Safety Data Sheet

Section 1
Identification of the Substance and of the Supplier

1.1 Product Identifier

Product Name/Identification:	ASTM Class F Fly Ash
Synonyms:	Coal Fly Ash, Pozzolan
Product Code:	N/A
Formula:	UVCB Substance

1.2 Relevant Identified Uses of the Substance or Mixture and Uses Advised Against

Relevant Identified Uses:	Cement Replacement, Concrete Additive, Inert Filler
Uses Advised Against:	Any uses not meeting appropriate engineering specifications

1.3 Details of the Supplier of the SDS

Manufacturer/Supplier:	Headwaters Resources, Inc.
Street Address:	10701 South Riverfront Parkway
City, State and Zip Code:	South Jordan, UT 84095
Customer Service Telephone:	801.984.9400
Website Address:	flyash.com

1.4 Emergency Telephone Number

Emergency Phone Number:	877.347.8096
Hours Available:	24 hours/7 days a week

Section 2
Hazards Identification

2.1 Classification of the Substance

GHS Classification(s) according to OSHA Hazard Communication Standard (29 CFR 1910.1200):

- STOT-SE Category 3 (Respiratory Irritation)
- STOT-RE Category 2

2.2 Label Elements

Labeling according to 29 CFR 1910.1200 Appendices A, B and C*	
Hazard Pictogram(s)	
Signal Word	Danger
Hazard Statement(s)	May cause respiratory irritation. May cause damage to lungs after repeated/prolonged exposure via inhalation.
Precautionary Statement(s)	Do not breathe dust. Use outdoors or in a well ventilated area. If inhaled: Remove to fresh air and keep comfortable for breathing. Get medical advice/attention if you feel unwell. Store in a secure area. Dispose of product in accordance with local/national regulations.

* *Fly ash and other coal combustion products (CCPs) are UVCB substances (substance of unknown or variable composition or biological). Various CCPs, noted as Ashes; Ash; Ash residues; Ashes, residues, bottom; bottom ash; bottom ash residues; waste solids, ashes under TSCA are defined by the US 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." Ashes, including fly ash and fluidized bed combustion ash, are identified by CAS number 68131-74-8. The exact composition of the ash is dependent on the fuel source and flue additives composed of a large number of constituents. The classification of the final substance is dependent on the presence of specific identified oxides as well as other trace elements.*

2.3 Other Hazards

Listed Carcinogens: Respirable Crystalline Silica

IARC: Yes **NTP:** Yes **OSHA:** No **Other:** No

Section 3
Composition/Information on Ingredients

Substance	CAS No.	Percentage (%)	GHS Classification
Aluminosilicates	Various: See note 1	70-95	Single Exposure STOT, Category 3
Crystalline Silica	14808-60-7	<10	Repeat Dose STOT, Category 2
Silica, crystalline respirable (RCS)	14808-60-7	See note 2	Repeat Dose STOT, Category 2
Calcium oxide (CaO)	1305-78-8	<2%	Skin Irritant Category 2 Eye irritant Category 2B

Substance	CAS No.	Percentage (%)	GHS Classification
Manganese dioxide (MnO_2)	1313-13-9	<2%	Skin Irritant Category 2 Eye irritant Category 2B
Phosphorus pentoxide (P_2O_5)	1314-56-3	<2%	Skin Irritant Category 2 Eye irritant Category 2B
Potassium oxide (K_2O)	12136-45-7	<2%	Skin Irritant Category 2 Eye irritant Category 2B
Magnesium sulfate	7487-88-9	<2%	Skin Irritant Category 2 Eye irritant Category 2B

1. *Aluminosilicates may be in the form of mullite (CAS#1302-93-8); aluminosilicate glass, or pozzolans (CAS#71243-67-9). 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.*
2. *RSC in the CCP has not been determined.*

Section 4
First Aid Measures

4.1 Description of First Aid Measures

Inhalation	If product is inhaled and irritation of the nose or coughing occurs, remove person to fresh air. Get medical advice/attention if respiratory symptoms persist.
Skin Contact	If skin exposure occurs, wash with soap and water.
Eye Contact	If product gets into the eye, rinse cautiously with water for at least 15 minutes. Remove contact lenses, if present and easy to do. Seek medical attention/advice if irritation occurs or persists.
Ingestion	No specific first aid measures are required.

4.2 Most Important Health Effects, Both Acute and Delayed

Acute Effects	Direct exposure may cause respiratory irritation, eye irritation and skin irritation. The product dust can dry and irritate the skin and cause dermatitis and can irritate eyes and skin through mechanical abrasion.
Chronic Effects	Chronic exposure may cause lung damage from repeated exposure. Chronic inhalation of dusts containing respirable crystalline silica may result in silicosis.

4.3 Indication of Any Immediate Medical Attention and Special Treatment Needed

Seek first aid or call a doctor or Poison Control Center if contact with eyes occurs and irritation remains after rinsing.

Section 5
Firefighting Measures

5.1 Extinguishing Media

Suitable Extinguishing Media	Product is not flammable. Use extinguishing media appropriate for surrounding fire.
Unsuitable Extinguishing Media	Not applicable; the product is not flammable.

5.2 Special Hazards Arising From the Substance or Mixture

Hazardous Combustion Products	None known.

5.3 Advice for Firefighters

Special Protective Equipment and Precautions for Firefighters	As with any fire, wear self-contained breathing apparatus (NIOSH-approved or equivalent) and full protective gear.

Section 6
Accidental Release Measures

6.1 Personal Precautions, Protective Equipment and Emergency Procedures

6.1.1 Personal Precautions/Protective Equipment

See Section 8.2.2 “Personal Protective Equipment”. For concentrations exceeding Occupational Exposure Levels (OELs), use a self-contained breathing apparatus (SCBA).

6.1.2 Emergency Procedures

Use scooping, water spraying/flushing/misting or ventilated vacuum cleaning systems to clean up spills. Do not use pressurized air.

6.2 Environmental Precautions

Prevent contamination of drains or waterways and dispose according to local and national regulations.

6.3 Methods and Material for Containment and Cleaning Up

Do not use brooms or compressed air to clean surfaces. Use dust collection vacuum and extraction systems.

Large spills of dry product should be removed by a vacuum system. Dampened material should be removed by mechanical means and recycled or disposed of according to local and national regulations.

See Sections 8 and 13 for additional information on exposure controls and disposal.

Section 7
Handling and Storage

7.1 Precautions for Safe Handling

Practice good housekeeping. Use adequate exhaust ventilation, dust collection and/or water mist to maintain airborne dust concentrations below permissible exposure limits. (Note: respirable crystalline silica dust may be in the air without a visible dust cloud).

Do not permit dust to collect on walls, floors, sills, ledges, machinery, or equipment. Maintain and test ventilation and dust collection equipment. In cases of insufficient ventilation, wear a NIOSH-approved respirator for silica dust when handling or disposing dust from this product. Avoid contact with skin and eyes. Wash or vacuum clothing that has become dusty. Avoid eating, smoking, or drinking while handling the material.

7.2 Conditions for Safe Storage, Including Any Incompatibilities

Minimize dust produced during loading and unloading.

Section 8
Exposure Controls/Personal Protection

8.1 Control Parameters

OCCUPATIONAL EXPOSURE LIMITS					
SUBSTANCE		**OSHA PEL TWA (mg/m^3)**	**NIOSH REL TWA (mg/m^3)**	**ACGIH TLV TWA (mg/m^3)**	**CA - OSHA PEL (mg/m^3)**
Calcium oxide		5	2	2	2
Particulates Not Otherwise Regulated	Total	15	15	-	10
	Respirable	5	5	-	5
Crystalline Silica	Total Quartz	30 ÷ (%SiO_2+2) (Total Quartz)	-	-	0.3
	Respirable Crystalline Silica	10 ÷ (%SiO_2+2)	0.05	0.025 (α-quartz & cristobalite)	0.1
	Cristobalite	-	0.05	0.025 (α-quartz & cristobalite)	0.05 (respirable)
Manganese dioxide (as manganese compounds)	Total	5 (Ceiling)	1 3 (STEL)	0.1	0.2
	Respirable	-	-	0.02	-

8.2 Exposure Controls

8.2.1 Engineering Controls

Provide ventilation to maintain the ambient workplace atmosphere below the occupational exposure limit(s). Use general and local exhaust ventilation and dust collection systems as necessary to minimize exposure.

8.2.2 Personal Protective Equipment (PPE)

Respiratory protection	Wear a NIOSH-approved particulate respirator if exposure to airborne particulates is unavoidable and where occupational exposure limits may be exceeded. If airborne exposures are anticipated to exceed applicable PELs or TLVs, a self-contained breathing apparatus or airline respirator is recommended.
Eye and face protection	If eye contact is possible, wear protective glasses with side shields or dust goggles, as appropriate. Avoid contact lenses.
Hand and skin protection	Wear gloves and protective clothing. Wash hands with soap and water after contact with material.

Section 9
Physical and Chemical Properties

9.1 Information on Basic Physical and Chemical Properties

Property: Value	**Property:** Value
Appearance (physical state, color, etc.): Fine tan/ gray particulate	**Upper/Lower Flammability or Explosive Limits:** Not applicable
Odor: Odorless[1]	**Vapor Pressure (Pa):** Not applicable
Odor Threshold: Not applicable	**Vapor Density:** Not applicable
pH in Water (25°C): 7-12[2]	**Specific Gravity:** 2.2 - 2.8
Melting Point/Freezing Point (°C): Not applicable	**Water Solubility:** Slight
Initial Boiling Point and Boiling Range (°C): Not applicable	**Partition Coefficient: n-octane/water:** Not determined
Flash Point (°C): Not determined	**Auto Ignition Temperature (°C):** Not applicable
Evaporation Rate: Not applicable	**Decomposition Temperature (°C):** Not determined
Flammability (solid, gas): Not combustible	**Viscosity:** Not applicable

[1] *The use of urea or aqueous ammonia injected into the flue gas to reduce nitrogen oxides (NOx) emissions may result in the presence of ammonium sulfate or ammonium bisulfate in the ash at less than 0.1%. When ash containing these substances becomes wet under high pH (>9), free ammonia gas may be released, resulting in objectionable/nuisance ammonia odor and potential exposure to ammonia gas, especially in confined spaces.*

[2] *This is a typical range. There are rare cases where Class F fly ash has pH in water of less than 7.*

9.2 Other Information

None.

Section 10
Stability and Reactivity

10.1 Reactivity

The material is an inert, inorganic material primarily composed of elemental oxides.

10.2 Chemical Stability

The material is stable under normal use conditions.

10.3 Possibility of Hazardous Reactions

The material is a relatively stable, inert material. Polymerization will not occur. However, when ash containing added ammonia becomes wet under high pH (>9), free ammonia gas may be released, resulting in an objectionable/nuisance ammonia odor and potential exposure to ammonia gas, especially in confined spaces.

10.4 Conditions to Avoid

Product can become airborne in moderate winds. Dry material should be stored in silos. Materials stored out of doors should be covered or maintained in a damp condition.

10.5 Incompatible Materials

None known.

10. 6 Hazardous Decomposition Products

None known.

Section 11
Toxicological Information

11.1 Information on Toxicological Effects

Endpoint	Data
Acute oral toxicity	LD50 > 2000 mg/kg
Acute dermal toxicity	LD50 > 2000 mg/kg
Acute inhalation toxicity	LC50 > 5.0 mg/L
Skin corrosion/irritation	Not irritating to skin.
Eye damage/irritation	Slight but reversible eye irritation.

Endpoint	Data
Respiratory/skin sensitization	Not a respiratory or dermal sensitizer.
Germ cell mutagenicity	Not mutagenic in *in vitro* and *in vivo* assays with or without metabolic activation.
Carcinogenicity	Not available. Respirable crystalline silica has been identified as a carcinogen by NTP and IARC.
Reproductive toxicity	An animal study with a CCP has indicated some effects on male and female reproductive organs and parameters without a clear dose response, while studies with other CCPs have not shown reproductive effects. Therefore, there is not enough evidence available to classify according to reproductive toxicity. No developmental toxicity has been observed in available animal studies.
STOT-SE	No specific target organ toxicity after a single exposure to the substance is expected; however, presence as a nuisance dust may result in respiratory irritation.
STOT-RE	NOAEC = 4.2 mg/m^3 fly ash dust; as no effects were observed at the highest dose tested during the 180-day inhalation study, it is not possible to assess the level at which toxicologically significant effects may occur. Repeated inhalation exposures to high levels of respirable crystalline silica may result in lung damage (i.e., silicosis).
Aspiration Hazard	Not applicable based on product form.

Section 12
Ecological Information

12.1 Toxicity

Coal Ash CAS# 68131-74-8	
Toxicity to fish	LC50 >100 mg/L
Toxicity to invertebrates	Data indicates that the test substance is not toxic to *Daphnia magna* (EC50 undetermined).
Toxicity to algae and plants	EC50 = 10 mg/L

Calcium oxide CAS# 1305-78-8	
Toxicity to fish	LC50 = 50.6 mg/L The findings were closely related to the pH of the test solutions; therefore, pH is considered to be the main reason for the effects.

Toxicity to invertebrates	EC50 = 49.1 mg/L The findings were closely related to the pH of the test solutions; therefore, pH is considered to be the main reason for the effects.
Toxicity to algae and plants	NOEC =48 mg/L @ 72 hours based on $Ca(OH)_2$ The initial pH of the test medium was not directly related to the biologically relevant effects. The formation of precipitates is likely the result of the reaction between CO_2 dissolved in the medium.

12.2 Persistence and Degradability

Not relevant for inorganic materials.

12.3 Bioaccumulative Potential

No data available.

12.4 Mobility in Soil

No data available.

12.5 Results of PBT and vPvB Assessment

No data available.

12.6 Other Adverse Effects

None known.

Section 13
Disposal Considerations

See Sections 7 and 8 above for safe handling and use, including appropriate hygienic practices.

Dispose of all waste product and containers in accordance with federal, state and local regulations.

Section 14
Transport Information

Regulatory entity: U.S. DOT	Shipping Name:	Not Regulated
	Hazard Class:	Not Regulated
	ID Number:	Not Regulated
	Packing Group:	Not Regulated

Section 15
Regulatory Information

15.1 Safety, Health and Environmental Regulations/Legislation Specific for the Mixture

- **TSCA Inventory Status**

  All components are listed on the TSCA Inventory.

- **California Proposition 65**

  The following substances are known to the State of California to be carcinogens and/or reproductive toxicants:

  - Respirable crystalline silica
  - Titanium dioxide (airborne particles)

- **State Right-to-Know (RTK)**

Component	CAS	MA[1, 2]	NJ[3, 4]	PA[5]	RI[6]
Ammonium bisulfate	7803-63-6	No	Yes	No	No
Ammonium sulfate	7783-20-2	Yes	No	Yes	No
Calcium oxide	1305-78-8	Yes	Yes	Yes	No
Iron oxide	1309-37-1	Yes	Yes	Yes	No
Magnesium oxide	1309-48-4	No	Yes	No	No
Phosphorus pentoxide (or phosphorus oxide)	1314-56-3	Yes	Yes	Yes	No
Potassium oxide	12136-45-7	No	Yes	No	No
Silica-crystalline (SiO_2), quartz	14808-60-7	Yes	Yes	Yes	No
Titanium dioxide	13463-67-7	Yes	Yes	Yes	No

[1] *Massachusetts Department of Public Health, no date*
[2] *189th General Court of The Commonwealth of Massachusetts, no date*
[3] *New Jersey Department of Health and Senior Services, 2010a*
[4] *New Jersey Department of Health, 2010b*
[5] *Pennsylvania Code, 1986*
[6] *Rhode Island Department of Labor and Training, no date*

- **Coal ash is not a SARA 313 substance**.

  Coal ash is required for SARA Tier II (311/312) reporting when in sufficient quantities. Trace elements in coal ash should be considered in TRI reporting.

Section 16
Other Information, Including Date of Preparation or Last Revision

16.1 Indication of Changes

Date of preparation or last revision: May 18, 2015

16.2 Abbreviations and Acronyms

ACGIH:	American Conference of Industrial Hygienists
ANSI:	American National Standards Institute
CA:	California
CAA:	Clean Air Act
CAS:	Chemical Abstract Services
CCP:	Coal Combustion Product
CFR:	Code of Federal Regulations
EPA:	Environmental Protection Agency
GHS:	Globally Harmonized System of Classification and Labeling
HMIS:	Hazardous Materials Identification System
IARC:	International Agency for Research on Cancer
LC50:	Concentration resulting in the mortality of 50% of an animal population
LD50:	Dose resulting in the mortality of 50% of an animal population
LEL:	Lower explosive limit
MA:	Massachusetts
NA:	Not Applicable
NJ:	New Jersey
NOEC:	No observed effect concentration
NIOSH:	National Institute of Occupational Safety and Health
NOx:	Nitrogen oxides
NTP:	US National Toxicology Program
OEL:	Occupational Exposure Limit
OSHA:	Occupational Safety and Health Administration
PA:	Pennsylvania
Pa:	Paschal
PBT:	Persistent, Toxic and Bioaccumulative
PEL:	Permissible exposure limit
PPE:	Personal Protective Equipment
REL:	Recommended exposure limit
RI:	Rhode Island
RCS:	Respirable Crystalline Silica
RTK:	Right-to-Know
SARA:	Superfund Amendments and Reauthorization Act
SCBA:	Self-contained breathing apparatus
SDS:	Safety Data Sheet
STEL:	Short-term exposure limit
STOT-RE:	Specific target organ toxicity-repeated exposure
STOT-SE:	Specific target organ toxicity-single exposure
TLV:	Threshold limit value
TSCA:	Toxic Substances Control Act
TWA:	Time-weighted average
UEL:	Upper explosive limit
UVCB:	Unknown or Variable Composition/Biological
U.S.:	United States
U.S. DOT:	United States of Department of Transportation
vPvB:	Very Persistent and Very Bioaccumulative

16.3 Other Hazards

Table 1: Class F Fly Ash

Hazardous Materials Identification System (HMIS)			Degree of hazard (0 = Low; 4= Extreme)
Health: 1*	**Flammability:** 0	**Reactivity:** 1	**Personal Protection:** -

** Chronic Health Effects*

DISCLAIMER:

This SDS has been prepared in accordance with the Hazard Communication Rule 29 CFR 1910.1200. Information herein is based on data considered to be accurate as of date prepared. No warranty or representation, express or implied, is made as to the accuracy or completeness of this data and safety information. No responsibility can be assumed for any damage or injury resulting from abnormal use, failure to adhere to recommended practices, or from any hazards inherent in the nature of the product.