

SAFETY DATA SHEET

1. SUBSTANCE AND SOURCE IDENTIFICATION

Product Identifier

SRM Number: 2691
 SRM Name: Coal Fly Ash
 Other Means of Identification: Not applicable.

Recommended Use of This Material and Restrictions of Use

This Standard Reference Material (SRM) is intended for use in the evaluation of analytical methods used for the classification of coal fly ash and for the determination of constituent elements in coal fly ash or materials of a similar matrix. A unit of SRM 2691 consists of three 10 g hermetically sealed glass vials of fly ash pulverized to less than 145 µm particle size and blended to a high degree of homogeneity.

Company Information

National Institute of Standards and Technology
 Standard Reference Materials Program
 100 Bureau Drive, Stop 2300
 Gaithersburg, Maryland 20899-2300

Telephone: 301-975-2200
 FAX: 301-948-3730
 E-mail: SRMMSDS@nist.gov
 Website: <http://www.nist.gov/srm>

Emergency Telephone ChemTrec:
 1-800-424-9300 (North America)
 +1-703-527-3887 (International)

2. HAZARDS IDENTIFICATION

Note: This material is complex mixture that contains respirable crystalline silica as quartz. The health and physical hazard information provided in this SDS contains the effects associated with the inhalation of quartz particulates at a concentration $\geq 1\%$.

Classification

Physical Hazard: Not classified.
Health Hazard: Carcinogen Category 1
 STOT, Repeated Exposure Category 1

Label Elements

Symbol



Signal Word

DANGER

Hazard Statement(s):

H350 May cause lung cancer.
 H372 Causes damage to lungs through prolonged or repeated inhalation.

Precautionary Statement(s):

P201 Obtain special instructions before use.
 P202 Do not handle until all safety precautions have been read and understood.
 P260 Do not breathe dust.
 P264 Wash hands thoroughly after handling.
 P270 Do not eat, drink or smoke when using this product.
 P280 Wear protective gloves/protective clothing/eye protection/face protection.
 P308 + P313 If exposed or concerned: Get medical advice/attention.
 P314 Get medical advice/attention if you feel unwell.

P405 Store locked up.

P501 Dispose of contents/container in accordance with applicable regulations.

Hazards Not Otherwise Classified: Not applicable.

Ingredients(s) with Unknown Acute Toxicity: Not applicable.

3. COMPOSITION AND INFORMATION ON HAZARDOUS INGREDIENTS

Substance: Coal ashes, (residues)

Other Designations: Coal fly ash (ash; coal ash; fly ash; flyash; coal ash, by product; bottom ash)

This material is a complex mixture that has not been tested as a whole and contains trace amounts of compounds which have been reported to have toxic, mutagenic, and/or carcinogenic properties, and should be handled with care, including nickel and chromium compounds. Components are listed in compliance with OSHA's 29 CFR 1910.1200; for the actual values see the Certificate of Analysis.

Hazardous Component(s)	CAS Number	EC Number (EINECS)	Nominal Mass Concentration (%)
Coal fly ash	68131-74-8	268-627-4	<99.0
Quartz	14808-60-7	238-878-4	>1.0

4. FIRST AID MEASURES

Description of First Aid Measures:

Inhalation: If adverse effects occur, remove to uncontaminated area. If not breathing, give artificial respiration or oxygen by qualified personnel. Seek immediate medical attention.

Skin Contact: Wash skin with soap and water for at least 15 minutes. Thoroughly clean and dry contaminated clothing before reuse.

Eye Contact: Flush eyes with water for at least 15 minutes. If necessary, seek medical attention.

Ingestion: If adverse effects occur after ingestion, seek medical treatment.

Most Important Symptoms/Effects, Acute and Delayed: May cause irritation, lung damage, silicosis, and cancer.

Indication of any immediate medical attention and special treatment needed, if necessary: If any of the above symptoms are present, seek medical attention if needed.

5. FIRE FIGHTING MEASURES

Fire and Explosion Hazards: Negligible fire hazard. See Section 9, "Physical and Chemical Properties" for flammability properties.

Extinguishing Media:

Suitable: Regular dry chemical, dry sand, water, and regular foam.

Unsuitable: None listed.

Specific Hazards Arising from the Chemical: None listed.

Special Protective Equipment and Precautions for Fire-Fighters: Avoid inhalation of material or combustion byproducts. Wear full protective clothing and NIOSH approved self-contained breathing apparatus (SCBA).

NFPA Ratings (0 = Minimal; 1 = Slight; 2 = Moderate; 3 = Serious; 4 = Severe)

Health = 1

Fire = 1

Reactivity = 0

6. ACCIDENTAL RELEASE MEASURES

Personal Precautions, Protective Equipment and Emergency Procedures: Use suitable protective equipment; see Section 8, "Exposure Controls and Personal Protection".

Methods and Materials for Containment and Clean up: Collect spilled material in appropriate container for disposal. Keep out of water supplies and sewers. Keep unnecessary people away, isolate hazard area and deny entry.

7. HANDLING AND STORAGE

Safe Handling Precautions: Minimize dust generation. See Section 8, "Exposure Controls and Personal Protection".

Storage: Store and handling in accordance with all current regulations and standards. Keep separated from incompatible substances (oxidizing materials, bases, halogens, acids, metal salts, metals, combustible materials).

8. EXPOSURE CONTROLS AND PERSONAL PROTECTION

Exposure Limits:

Coal fly ash:

OSHA (PEL): No exposure limits available.

NIOSH (REL): 0.015 mg/m³ (TWA) [except Nickel carbonyl, as Ni, related to Nickel compounds]
10 mg/m³ (IDLH) [except Nickel carbonyl, as Ni, related to Nickel compounds]

Quartz:

ACGIH (TLV): 0.025 mg/m³ (TWA) [respirable fraction]

OSHA (PEL): (30)/(%SiO₂ + 2) mg/m³ (TWA) [total dust]
(250)/(%SiO₂ + 5) mppcf (TWA) [respirable fraction]
(10)/(%SiO₂ + 2) mg/m³ (TWA) [respirable fraction]

NIOSH (REL): 0.05 mg/m³ (TWA) [respirable dust]
50 mg/m³ (TWA) [respirable dust]

Engineering Controls: Provide local exhaust or process enclosure ventilation system. Ensure compliance with applicable exposure limits.

Personal Protection: In accordance with OSHA 29 CFR 1910.132, subpart I, wear appropriate Personal Protective Equipment (PPE) to minimize exposure to this material.

Respiratory Protection: If workplace conditions warrant a respirator, a respiratory protection program that meets OSHA 29CFR 1910.134 must be followed. Refer to NIOSH 42 CFR 84 for applicable certified respirators.

Eye/Face Protection: Wear splash resistant safety goggles with a face shield. An eyewash station should be readily available near areas of use.

Skin and Body Protection: Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product. Chemical-resistant gloves should be worn at all times when handling chemicals.

9. PHYSICAL AND CHEMICAL PROPERTIES

Descriptive Properties:

Appearance

(physical state, color, etc.):

Molecular Formula:

Molar Mass (g/mol):

Odor:

Odor threshold:

pH:

Evaporation rate:

Melting point/freezing point (°C):

Relative Density (g/L):

Vapor Pressure (mmHg):

Vapor Density (air = 1):

Viscosity (cP):

Solubility(ies):

Partition coefficient (n-octanol/water):

Particle Size (if relevant):

Coal Fly Ash

grey to black granular powder

varies

varies

not available

not available

not applicable

not applicable

not available

not available

not applicable

not applicable

not applicable

0.5 % (water)

not available

<145 µm

Thermal Stability Properties:	Coal Fly Ash
Autoignition Temperature (°C):	not applicable
Thermal Decomposition (°C):	not applicable
Initial boiling point and boiling range (°C):	not applicable
Explosive Limits, LEL (Volume %):	not applicable
Explosive Limits, UEL (Volume %):	not applicable
Flash Point (°C):	not applicable
Flammability (solid, gas):	slight

10. STABILITY AND REACTIVITY

Reactivity: Stable at normal temperatures and pressure.

Stability: X Stable Unstable

Possible Hazardous Reactions: None listed.

Conditions to Avoid: Avoid generating dust. Avoid heat, flames, sparks and other sources of ignition. Avoid contact with incompatible materials.

Incompatible Materials: Oxidizing materials, bases, halogens, acids, metal salts, metals, combustible materials.

Fire/Explosion Information: See Section 5, "Fire Fighting Measures".

Hazardous Decomposition: Thermal decomposition will produce oxides of carbon.

Hazardous Polymerization: Will Occur X Will Not Occur

11. TOXICOLOGICAL INFORMATION

Route of Exposure: X Inhalation Skin Ingestion

Symptoms Related to the Physical, Chemical and Toxicological Characteristics: May cause irritation, lung damage, silicosis, and cancer.

Potential Health Effects (Acute, Chronic and Delayed):

Inhalation: Inhalation of dust may cause coughing, sneezing, upper respiratory tract irritation, and lung damage. Chronic exposure to fine particles containing respirable quartz may result in lung damage, silicosis, and cancer.

Skin Contact: May cause mechanical irritation.

Eye Contact: May cause mechanical irritation.

Ingestion: No data available.

Numerical Measures of Toxicity:

Acute Toxicity: Not classified.

Coal fly ash, Rat, Oral LD50: >2000 mg/kg

Quartz, Rat, Oral LD50: 500 mg/kg

Skin Corrosion/Irritation: Not classified; no data available.

Serious Eye damage/ Eye irritation: Not classified; no data available.

Respiratory Sensitization: Not classified; no data available.

Skin Sensitization: Not classified; no data available.

Fly ash containing chromium and nickel compounds has an irritant and allergic potential; only trace amounts of these compounds are present in this material

Germ Cell Mutagenicity: Not classified; no data available.

Carcinogenicity: Category 1

Listed as a Carcinogen/Potential Carcinogen X Yes No

Silica, crystalline (as respirable dust) is listed by IARC and NTP as a human carcinogen. Silica, crystalline is not listed by OSHA as a designated carcinogen.

Reproductive Toxicity: Not classified.

Coal fly ash, Rat, Intratracheal LDLo: 600 mg/kg (pregnant 14 d to 19 d)

Quartz: No data available.

Specific Target Organ Toxicity (STOT), Single Exposure: Not classified; no data available.

Specific Target Organ Toxicity (STOT), Repeated Exposure: Category I

Cumulative exposure to silica dust may result in reduced lung capacity and silicosis.

Aspiration Hazard: Not classified.

12. ECOLOGICAL INFORMATION

Ecotoxicity Data:

Coal fly ash: Invertebrate, water flea (*Daphnia magna*) EC50: 140 mg/L to 2000 mg/L (24 h)

Quartz: No data available.

Persistence and Degradability: No data available.

Bioaccumulative Potential: No data available.

Mobility in Soil: No data available.

Other Adverse effects: No data available.

13. DISPOSAL CONSIDERATIONS

Waste Disposal: Dispose of waste in accordance with all applicable federal, state, and local regulations.

14. TRANSPORTATION INFORMATION

U.S. DOT and IATA: Not regulated by DOT or IATA.

15. REGULATORY INFORMATION

U.S. Regulations:

CERCLA Sections 102a/103 (40 CFR 302.4): Not regulated.

SARA Title III Section 302 (40 CFR 355.30): Not regulated.

SARA Title III Section 304 (40 CFR 355.40): Not regulated.

SARA Title III Section 313 (40 CFR 372.65): Not regulated.

OSHA Process Safety (29 CFR 1910.119): Not regulated.

SARA Title III Sections 311/312 Hazardous Categories (40 CFR 370.21):

ACUTE HEALTH: No.

CHRONIC HEALTH: Yes.

FIRE: No.

REACTIVE: No.

PRESSURE: No.

State Regulations:

California Proposition 65: WARNING! This product contains a chemical (quartz) known to the state of California to cause cancer.

U.S. TSCA Inventory: Coal fly ash and quartz are listed.

TSCA 12(b), Export Notification: Not listed.

Canadian Regulations:

WHMIS Information: Not provided for this material.

16. OTHER INFORMATION

Issue Date: 04 February 2014

Sources: ChemAdvisor, Inc., MSDS *Fly Ash*, 17 June 2013.
ChemAdvisor, Inc., MSDS *Quartz*, 17 June 2013.

Key of Acronyms:

ACGIH	American Conference of Governmental Industrial Hygienists	NIST	National Institute of Standards and Technology
ALI	Annual Limit on Intake	NRC	Nuclear Regulatory Commission
CAS	Chemical Abstracts Service	NTP	National Toxicology Program
CEN	European Committee for Standardization	OSHA	Occupational Safety and Health Administration
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act	PEL	Permissible Exposure Limit
CFR	Code of Federal Regulations	RCRA	Resource Conservation and Recovery Act
CPSU	Coal Mine Dust Personal Sample Unit	REL	Recommended Exposure Limit
DOT	Department of Transportation	RM	Reference Material
EC50	Effective Concentration, 50 %	RQ	Reportable Quantity
EINECS	European Inventory of Existing Commercial Chemical Substances	RTECS	Registry of Toxic Effects of Chemical Substances
EPCRA	Emergency Planning and Community Right-to-Know Act	SARA	Superfund Amendments and Reauthorization Act
IARC	International Agency for Research on Cancer	SCBA	Self-Contained Breathing Apparatus
IATA	International Air Transportation Agency	SRM	Standard Reference Material
IDLH	Immediately Dangerous to Life and Health	STEL	Short Term Exposure Limit
ISO	International Organization for Standardization	STOT	Specific Target Organ Toxicity
LC50	Lethal Concentration, 50 %	TDLo	Toxic Dose Low
LD50	Lethal Dose, 50 %	TLV	Threshold Limit Value
LEL	Lower Explosive Limit	TPQ	Threshold Planning Quantity
MSDS	Material Safety Data Sheet	TSCA	Toxic Substances Control Act
NFPA	National Fire Protection Association	TWA	Time Weighted Average
MSHA	Mine Safety and Health Administration	UEL	Upper Explosive Limit
NIOSH	National Institute for Occupational Safety and Health	WHMIS	Workplace Hazardous Materials Information System

Disclaimer: Physical and chemical data contained in this SDS are provided only for use in assessing the hazardous nature of the material. The SDS was prepared carefully, using current references; however, NIST does not certify the data in the SDS. The certified values for this material are given in the NIST Certificate of Analysis.

Users of this SRM should ensure that the SDS in their possession is current. This can be accomplished by contacting the SRM Program; telephone (301) 975-2200; fax (301) 948-3730; e-mail srmmsds@nist.gov; or via the Internet at <http://www.nist.gov/srm>.

26310

MATERIAL SAFETY DATA SHEET

1. SUBSTANCE AND SOURCE IDENTIFICATION

National Institute of Standards and Technology
Standard Reference Materials Program
100 Bureau Drive, Stop 2300
Gaithersburg, Maryland 20899-2300

SRM Number: 2691
MSDS Number: 2691
SRM Name: Coal Fly Ash

Date of Issue: 08 September 2010

MSDS Coordinator: Mario J. Cellarosi
Telephone: 301-975-2200
FAX: 301-926-4751
E-mail: SRMMSDS@nist.gov

Emergency Telephone ChemTrec:
1-800-424-9300 (North America)
+1-703-527-3887 (International)

Description: This Standard Reference Materials (SRM) is intended for use in the evaluation of analytical methods and techniques used for the classification and determination of constituent elements in coal fly ash or materials with a similar matrix. Each unit consists of three hermetically sealed glass vials, each containing 10 g of fly ash.

Substance: Coal fly ash

Other Designations: Coal ash, fly ash; bottom ash

2. COMPOSITION AND INFORMATION ON HAZARDOUS INGREDIENTS

Component	CAS Registry	EC Number (EINECS)	Nominal Mass Fraction (%)
Coal Fly Ash	68131-74-4	268-627-4	100
Major Constituent			
Quartz	14808-60-7	238-878-4	36

NOTE 1: This material is a complex mixture, which incorporates a mass fraction of bound Silicon Dioxide (Quartz) the main hazardous component, which is above the limits established by OSHA (hazardous components 1%, carcinogens 0.1%) according to 29 CFR 1910.1200 (g)(2)(ii)(C)(1) for MSDS information. For major health hazards and inhalation exposure limits, see "Section 3 and 8".

EC Classification:

Quartz: T (Toxic)

EC Risk (R No.): 49

EC Safety (S No.): 2, 24, 46.

EC Risk/Safety Phrases: See Section 15, "Regulatory Information".

3. HAZARDS IDENTIFICATION

NFPA Ratings (Scale 0-4): Health = 1 Fire = 1 Reactivity = 0

Major Health Hazards: Respiratory track irritation, cancer hazard in humans.

Physical Hazards: Not applicable.

Potential Health Effects (short term exposure)

Inhalation: Irritation to the mucous membranes and respiratory tract, chest pain, lung damage.

Skin Contact: Irritation.

Eye Contact: Irritation, visual disturbances, eye damage.

Ingestion: Irritation.

Listed as a Carcinogen/Potential Carcinogen¹

	Yes	No
In the National Toxicology Program (NTP) Report on Carcinogens	X	
In the International Agency for Research on Cancer (IARC) Monographs	X	
ERROR: undefined		
OFFENDING COMMAND: !sSs^@''~		
STACK:		

Inhalation: If adverse effects occur, remove to uncontaminated area. If not breathing, give artificial respiration by qualified personnel. Seek immediate medical attention.

Skin Contact: Wash affected skin with soap and water for at least 15 minutes while removing contaminated clothing. Seek medical attention, if needed.

Eye Contact: Immediately flush eyes, including under the eyelids, with copious amounts of water for at least 15 minutes. Seek immediate medical attention.

Ingestion: If a large amount is swallowed, seek immediate medical attention.

5. FIRE FIGHTING MEASURES

Fire and Explosion Hazards: Negligible fire hazard.

Extinguishing Media: Use extinguishing media appropriate for the surrounding fire.

Fire Fighting: Avoid inhalation of material or combustion by-products. Wear full protective clothing and NIOSH-approved self-contained breathing apparatus (SCBA).

Flash Point (°C): Not applicable.

Method Used: Not applicable.

Autoignition Temp. (°C): Not applicable.

Flammability Limits in Air

UPPER (Volume %): Not applicable.

LOWER (Volume %): Not applicable.

6. ACCIDENTAL RELEASE MEASURES

Occupational Release: Collect spilled material in appropriate container for disposal. Keep out of water supplies and sewers. Keep unnecessary people away, isolate hazard area and deny entry.

Disposal: Refer to Section 13, "Disposal Considerations".

7. HANDLING AND STORAGE

Storage: Store and handle in accordance with all current regulations and standards.

Safe Handling Precautions: See Section 8, "Exposure Controls and Personal Protection".

8. EXPOSURE CONTROLS AND PERSONAL PROTECTION

Silicon Dioxide (Quartz)

OSHA TWA: 0.1 mg/m³ (total dust)

ACGIH TWA: 0.025 mg/m³ (respirable fraction)

NIOSH TWA: 0.05 mg/m³ (respirable dust)

Fly Ash

NIOSH TWA: 0.015 mg/m³ (as Ni, except Nickel carbonyl)

Ventilation: Provide local exhaust ventilation system. Ensure compliance with applicable exposure limits. Refer to the ACGIH document *Industrial Ventilation, a Manual of Recommended Practices*.

Respirator: If necessary, refer to the "NIOSH Guide to the Selection and Use of Particulate Respirators Certified under 42 CFR 84" for selection and use of respirators certified by NIOSH.

¹ Carcinogenicity status applies to the Quartz component present in this material.
MSDS 2691

Toolbox Talk / Pre-Job Brief

Coal Ash / Fly Ash

BACKGROUND:

What is coal ash: Coal ash is the waste that is left after coal is combusted or burned. It includes fly ash, which is the fine powdery particles that are carried up the smoke stack and captured by pollution control devices, as well as coarser materials that fall to the bottom of the boiler (i.e., bottom ash).

At the old Dan River Coal Plant, coal ash was mixed with water and disposed in ash basins or so-called "ponds" behind earthen walls called dikes. In a series or sequence of ash basins, the solid materials and particles in the ash would sink or settle from the water to the bottom of the ash ponds.

Appearance and Odor: Ash is a solid, grey/black or black/tan powder which may contain solidified masses. Again, it is the residual from the burning of a combination of carbon-containing materials. So, it has a somewhat charcoal or shoot-like smell similar to the ash in a fireplace or wood burning stove.

What are the hazards: Depending on where the coal was mined, coal ash typically contains heavy metals including arsenic, lead, mercury, cadmium, chromium, and selenium as well as other lighter metals such as aluminum, and other natural elements.

Contact can cause eye or skin irritation. If inhaled or ingested in high doses or repeated exposure over time, these toxicants can cause respiratory tract irritation, gastrointestinal illness, and/or nervous system impacts. Arsenic is one of the most common and most dangerous pollutants from coal ash. Inorganic arsenic exposure has been linked to cancer.

PRIMARY ROUTE(S) OF EXPOSURE:

Eye Contact: Exposure to airborne fly ash or dust may cause immediate or delayed irritation or inflammation. As the material becomes wet, it will become corrosive and cause burning of the eyes.

Control: Safety glasses are required when handling this product. Goggles or safety glasses with a face shield should be worn when splashing or spraying is likely to occur. Goggles are required in dusty conditions.

Skin Contact: Dry fly ash may cause dry skin, discomfort, and irritation in susceptible individuals. Once wet, the material becomes corrosive and will cause burning of the skin.

Skin Absorption: Not known to occur under normal use.

Control: For wet ash wet, neoprene, butyl, or nitrile gloves are recommended. Protective clothing with long sleeves or disposable outer garments (e.g., Tyvek coveralls) should also be worn. Use of barrier skin cream may prevent skin irritation in susceptible individuals.

When handling dry product, cloth, canvas, or leather gloves may be used. However, don't reuse or attempt to clean by clapping, beating, or blowing off dried ash (i.e., don't create a dust). Ensure contaminated protective clothing is removed at the end of the task or end of the shift (whichever comes first).

Inhalation (acute): A single, short-term exposure to the dry ash presents little or no hazard. High concentrations of fly ash may cause unpleasant obstruction to the nasal passages and minor chemical irritation to the membranes of the upper respiratory tract. Fly ash deposition in the nasal passages may lead to nosebleed and/or headache.

Inhalation (chronic): The risk of injury depends on the duration, level of exposure, and make up of the ash but may cause lung irritation or more serious health problems.

Control: If dusty conditions exist or if discomfort is experienced, use NIOSH-approved respirators or a filtering face piece (e.g., substantial dust mask).

Ingestion: Not a typical exposure route. Although ingestion of small quantities of ash is not known to be harmful, large quantities can cause distress to the digestive tract. Should a significant amount of ash be ingested, refer to a physician.

Control: Do not ingest ash. Use good personal hygiene. Wash face and hands prior to break and shower at the end of the work shift.

HANDLING: Fly ash may be shoveled or vacuumed after wetting for recovery or disposal. Avoid generating dusty conditions. Do not blow off or use other practices that generate high airborne dust concentrations. Keep it wet.

Do not do anything to contaminated materials that could send dust into the air. Clean or change shoes (e.g., vacuum or wash). Remove protective clothing and gear in the dirty area of the designated changing area. Remove respirators last if they're being worn. Wash hands and face often and before breaks.

Upon finishing work for the day, workers should place disposable coveralls and shoe covers in an appropriate receptacle. Place contaminated clothing that will be cleaned, laundered, or disposed of in closed, labeled containers in a change room. Finally, take a shower.

OTHER HAZARDS: To prevent burial or suffocation, do not enter a confined space, such as a bulk truck, storage container, or vessel that stores or contains ash. Ash can build up or adhere to the walls of a confined space. The ash can release, collapse, or fall unexpectedly. Use caution when stepping into deep accumulations. Fly ash should be stored and transported to the extent possible in a covered bin or container.