Material Safety Data Sheet

Section 1: PRODUCT AND COMPANY INFORMATION

Product Name(s): Lafarge Portland Cement (cement)

Product Identifiers: Cement, Portland Cement, Hydraulic Cement, Oil Well Cement, Trinity® White Cement, Antique White Cement, Portland Limestone Cement, Portland Cement Type I, IA, IE, II, I/II, IIA, II L.A., III, IIIA, IV, IVA, V, VA, 10, 20, 30, 40, 50, GU, GUL, MS, MH, HE, LH, HS, OWH, OWG Cement, OW Class G HSR

Manufacturer:

Lafarge North America Inc.
12018 Sunrise Valley Dr, Suite 500
Reston, VA 20191

Information Telephone Number:

703-480-3600 (9am to 5pm EST)

Emergency Telephone Number:

1-800-451-8346 (3E Hotline)

Product Use: Cement is used as a binder in concrete and mortars that are widely used in construction. Cement is distributed in bags, totes and bulk shipment.

Note: This MSDS covers many types of Portland cement. Individual composition of hazardous constituents will vary between types of Portland cement.

Section 2: COMPOSITION/INFORMATION ON INGREDIENTS

Component	Percent (By Weight)	CAS Number	OSHA PEL -TWA (mg/m^3)	ACGIH TLV-TWA (mg/m^3)	LD_{50} (mouse, intraperitoneal)	LC_{50}
Portland Cement*	100	65997-15-1	15 (T); 5 (R)	1 (R)	NA	NA
Calcium Sulfate*	2-10	13397-24-5	15 (T); 5 (R)	10 (T)	NA	NA
Calcium Carbonate*	0-15	1317-65-3	15 (T); 5 (R)	3 (R), 10 (T)	NA	NA
Calcium Oxide	0-5	1305-78-8	5 (T)	2 (T)	3059 mg/kg	NA
Magnesium Oxide	0-4	1309-48-4	15 (T)	10 (T)	NA	NA
Crystalline Silica	0-0.2	14808-60-7	[(10) / (%SiO_2+2)] (R); [(30) / (%SiO_2+2)] (T)	0.025 (R)	NA	NA

Note: Exposure limits for components noted with an * contain no asbestos and <1% crystalline silica

Cement is made from materials mined from the earth and is processed using energy provided by fuels. Trace amounts of chemicals may be detected during chemical analysis. For example, cement may contain trace amounts of calcium oxide (also known as free lime or quick lime), free magnesium oxide, potassium and sodium sulfate compounds, chromium compounds, nickel compounds, and other trace compounds.

Section 3: HAZARD IDENTIFICATION

WARNING

Corrosive - Causes severe burns.
Toxic - Harmful by inhalation.
(Contains crystalline silica)

Use proper engineering controls, work practices, and personal protective equipment to prevent exposure to wet or dry product.

Read MSDS for details.

Section 3: HAZARD IDENTIFICATION (continued)

Emergency Overview: Cement is a solid, grey, off white, or white odorless powder. It is not combustible or explosive. A single, short-term exposure to the dry powder presents little or no hazard. Exposure of sufficient duration to wet cement, or to dry cement on moist areas of the body, can cause serious, potentially irreversible tissue (skin, eye, respiratory tract) damage due to chemical (caustic) burns, including third degree burns.

Potential Health Effects:

Eye Contact: Airborne dust may cause immediate or delayed irritation or inflammation. Eye contact with large amounts of dry powder or with wet cement can cause moderate eye irritation, chemical burns and blindness. Eye exposures require immediate first aid and medical attention to prevent significant damage to the eye.

Skin Contact: Cement may cause dry skin, discomfort, irritation, severe burns, and dermatitis.

Burns: Exposure of sufficient duration to wet cement, or to dry cement on moist areas of the body, can cause serious, potentially irreversible damage to skin, eye, respiratory and digestive tracts due to chemical (caustic) burns, including third degree burns. A skin exposure may be hazardous even if there is no pain or discomfort.

Dermatitis: Cement is capable of causing dermatitis by irritation and allergy. Skin affected by dermatitis may include symptoms such as, redness, itching, rash, scaling, and cracking.

Irritant dermatitis is caused by the physical properties of cement including alkalinity and abrasion.

Allergic contact dermatitis is caused by sensitization to hexavalent chromium (chromate) present in cement. The reaction can range from a mild rash to severe skin ulcers. Persons already sensitized may react to the first contact with cement. Others may develop allergic dermatitis after years of repeated contact with cement.

Inhalation (acute): Breathing dust may cause nose, throat or lung irritation, including choking, depending on the degree of exposure. Inhalation of high levels of dust can cause chemical burns to the nose, throat and lungs.

Inhalation (chronic): Risk of injury depends on duration and level of exposure.

Silicosis: This product contains crystalline silica. Prolonged or repeated inhalation of respirable crystalline silica from this product can cause silicosis, a seriously disabling and fatal lung disease. See Note to Physicians in Section 4 for further information.

Carcinogenicity: Cement is not listed as a carcinogen by IARC or NTP; however, cement contains trace amounts of crystalline silica and hexavalent chromium which are classified by IARC and NTP as known human carcinogens.

Autoimmune Disease: Some studies show that exposure to respirable crystalline silica (without silicosis) or that the disease silicosis may be associated with the increased incidence of several autoimmune disorders such as scleroderma (thickening of the skin), systemic lupus erythematosus, rheumatoid arthritis and diseases affecting the kidneys.

Tuberculosis: Silicosis increases the risk of tuberculosis.

Renal Disease: Some studies show an increased incidence of chronic kidney disease and end-stage renal disease in workers exposed to respirable crystalline silica.

Section 3: HAZARD IDENTIFICATION (continued)

Ingestion: Do not ingest cement. Although ingestion of small quantities of cement is not known to be harmful, large quantities can cause chemical burns in the mouth, throat, stomach, and digestive tract.

Medical Conditions Aggravated by Exposure: Individuals with lung disease (e.g. bronchitis, emphysema, COPD, pulmonary disease) or sensitivity to hexavalent chromium can be aggravated by exposure.

Section 4: FIRST AID MEASURES

Eye Contact: Rinse eyes thoroughly with water for at least 15 minutes, including under lids, to remove all particles. Seek medical attention for abrasions and burns.

Skin Contact: Wash with cool water and a pH neutral soap or a mild skin detergent. Seek medical attention for rash, burns, irritation, dermatitis, and prolonged unprotected exposures to wet cement, cement mixtures or liquids from wet cement.

Inhalation: Move person to fresh air. Seek medical attention for discomfort or if coughing or other symptoms do not subside.

Ingestion: Do not induce vomiting. If conscious, have person drink plenty of water. Seek medical attention or contact poison control center immediately.

Note to Physician: The three types of silicosis include:

- Simple chronic silicosis – which results from long-term exposure (more than 20 years) to low amounts of respirable crystalline silica. Nodules of chronic inflammation and scarring provoked by the respirable crystalline silica form in the lungs and chest lymph nodes. This disease may feature breathlessness and may resemble chronic obstructive pulmonary disease (COPD).
- Accelerated silicosis – occurs after exposure to larger amounts of respirable crystalline silica over a shorter period of time (5-15 years). Inflammation, scarring, and symptoms progress faster in accelerated silicosis than in simple silicosis.
- Acute silicosis – results from short-term exposure to very large amounts of respirable crystalline silica. The lungs become very inflamed and may fill with fluid, causing severe shortness of breath and low blood oxygen levels.

Progressive massive fibrosis may occur in simple or accelerated silicosis, but is more common in the accelerated form. Progressive massive fibrosis results from severe scarring and leads to the destruction of normal lung structures.

Section 5: FIREFIGHTING MEASURES

Flashpoint & Method: Non-combustible

General Hazard: Avoid breathing dust. Wet cement is caustic.

Extinguishing Media: Use extinguishing media appropriate for surrounding fire.

Firefighting Equipment: Cement poses no fire-related hazard. A SCBA is recommended to limit exposures to combustion products when fighting any fire.

Combustion Products: None.

Section 6: ACCIDENTAL RELEASE MEASURES

General: Place spilled material into a container. Avoid actions that cause the cement to become airborne. Avoid inhalation of cement and contact with skin. Wear appropriate protective equipment as described in Section 8. Scrape wet cement and place in container. Allow material to dry or solidify before disposal. Do not wash cement down sewage and drainage systems or into bodies of water (e.g. streams).

Waste Disposal Method: Dispose of cement according to Federal, State, Provincial and Local regulations.

Section 7: HANDLING AND STORAGE

General: Keep bulk and bagged cement dry until used. Stack bagged material in a secure manner to prevent falling. Bagged cement is heavy and poses risks such as sprains and strains to the back, arms, shoulders and legs during lifting and mixing. Handle with care and use appropriate control measures.

Engulfment hazard. To prevent burial or suffocation, do not enter a confined space, such as a silo, bin, bulk truck, or other storage container or vessel that stores or contains cement. Cement can buildup or adhere to the walls of a confined space. The cement can release, collapse or fall unexpectedly.

Properly ground all pneumatic conveyance systems. The potential exists for static build-up and static discharge when moving cement powders through a plastic, non-conductive, or non-grounded pneumatic conveyance system. The static discharge may result in damage to equipment and injury to workers.

Usage: Cutting, crushing or grinding hardened cement, concrete or other crystalline silica-bearing materials will release respirable crystalline silica. Use all appropriate measures of dust control or suppression, and Personal Protective Equipment (PPE) described in Section 8 below.

Housekeeping: Avoid actions that cause the cement to become airborne during clean-up such as dry sweeping or using compressed air. Use HEPA vacuum or thoroughly wet with water to clean-up dust. Use PPE described in Section 8 below.

Storage Temperature: Unlimited. **Storage Pressure:** Unlimited.

Clothing: Promptly remove and launder clothing that is dusty or wet with cement. Thoroughly wash skin after exposure to dust or wet cement.

Section 8: EXPOSURE CONTROLS AND PERSONAL PROTECTION

Engineering Controls: Use local exhaust or general dilution ventilation or other suppression methods to maintain dust levels below exposure limits.

Personal Protective Equipment (PPE):

Respiratory Protection: Under ordinary conditions no respiratory protection is required. Wear a NIOSH approved respirator that is properly fitted and is in good condition when exposed to dust above exposure limits.

Eye Protection: Wear ANSI approved glasses or safety goggles when handling dust or wet cement to prevent contact with eyes. Wearing contact lenses when using cement, under dusty conditions, is not recommended.

Section 8: EXPOSURE CONTROLS AND PERSONAL PROTECTION (continued)

Skin Protection: Wear gloves, boot covers and protective clothing impervious to water to prevent skin contact. Do not rely on barrier creams, in place of impervious gloves. Remove clothing and protective equipment that becomes saturated with wet cement and immediately wash exposed areas.

Section 9: PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Solid (powder).	**Evaporation Rate:**	NA.
Appearance:	Gray, off white or white powder.	**pH (in water):**	12 – 13
Odor:	None.	**Boiling Point:**	>1000^{o} C
Vapor Pressure:	NA.	**Freezing Point:**	None, solid.
Vapor Density:	NA.	**Viscosity:**	None, solid.
Specific Gravity:	3.15	**Solubility in Water:**	Slightly (0.1 - 1.0%)

Section 10: STABILITY AND REACTIVITY

Stability: Stable. Keep dry until use. Avoid contact with incompatible materials.

Incompatibility: Wet cement is alkaline and is incompatible with acids, ammonium salts and aluminum metal. Cement dissolves in hydrofluoric acid, producing corrosive silicon tetrafluoride gas. Cement reacts with water to form silicates and calcium hydroxide. Silicates react with powerful oxidizers such as fluorine, boron trifluoride, chlorine trifluoride, manganese trifluoride, and oxygen difluoride.

Hazardous Polymerization: None. **Hazardous Decomposition:** None.

Section 11 and 12: TOXICOLOGICAL AND ECOLOGICAL INFORMATION

For questions regarding toxicological and ecological information refer to contact information in Section 1.

Section 13: DISPOSAL CONSIDERATIONS

Dispose of waste and containers in compliance with applicable Federal, State, Provincial and Local regulations.

Section 14: TRANSPORT INFORMATION

This product is not classified as a Hazardous Material under U.S. DOT or Canadian TDG regulations.

Section 15: REGULATORY INFORMATION

OSHA/MSHA Hazard Communication: This product is considered by OSHA/MSHA to be a hazardous chemical and should be included in the employer's hazard communication program.

CERCLA/SUPERFUND: This product is not listed as a CERCLA hazardous substance.

EPCRA SARA Title III: This product has been reviewed according to the EPA Hazard Categories promulgated under Sections 311 and 312 of the Superfund Amendment and Reauthorization Act of 1986 and is considered a hazardous chemical and a delayed health hazard.

EPRCA SARA Section 313: This product contains none of the substances subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372.

Section 15: REGULATORY INFORMATION (continued)

RCRA: If discarded in its purchased form, this product would not be a hazardous waste either by listing or characteristic. However, under RCRA, it is the responsibility of the product user to determine at the time of disposal, whether a material containing the product or derived from the product should be classified as a hazardous waste.

TSCA: Portland cement and crystalline silica are exempt from reporting under the inventory update rule.

California Proposition 65: Crystalline silica (airborne particulates of respirable size) and Chromium (hexavalent compounds) are substances known by the State of California to cause cancer.

WHMIS/DSL:  Products containing crystalline silica and calcium carbonate are classified as D2A, E and are subject to WHMIS requirements.

Section 16: OTHER INFORMATION

Abbreviations:

>	Greater than	NA	Not Applicable
ACGIH	American Conference of Governmental Industrial Hygienists	NFPA	National Fire Protection Association
CAS No	Chemical Abstract Service number	NIOSH	National Institute for Occupational Safety and Health
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act	NTP	National Toxicology Program
		OSHA	Occupational Safety and Health Administration
CFR	Code for Federal Regulations	PEL	Permissible Exposure Limit
CL	Ceiling Limit	pH	Negative log of hydrogen ion
DOT	U.S. Department of Transportation	PPE	Personal Protective Equipment
EST	Eastern Standard Time	R	Respirable Particulate
HEPA	High-Efficiency Particulate Air	RCRA	Resource Conservation and Recovery Act
HMIS	Hazardous Materials Identification System	SARA	Superfund Amendments and Reauthorization Act
IARC	International Agency for Research on Cancer	T	Total Particulate
		TDG	Transportation of Dangerous Goods
LC_{50}	Lethal Concentration	TLV	Threshold Limit Value
LD_{50}	Lethal Dose	TWA	Time Weighted Average (8 hour)
mg/m^3	Milligrams per cubic meter	WHMIS	Workplace Hazardous Materials Information System
MSHA	Mine Safety and Health Administration		

This MSDS (Sections 1-16) was revised on March 1, 2011.

An electronic version of this MSDS is available at: www.lafarge-na.com under the Sustainability section.

Lafarge North America Inc. (LNA) believes the information contained herein is accurate; however, LNA makes no guarantees with respect to such accuracy and assumes no liability in connection with the use of the information contained herein which is not intended to be and should not be construed as legal advice or as insuring compliance with any federal, state or local laws or regulations. Any party using this product should review all such laws, rules, or regulations prior to use, including but not limited to US and Canada Federal, Provincial and State regulations.

NO WARRANTY IS MADE, EXPRESS OR IMPLIED, OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR OTHERWISE.

Material Safety Data Sheet

Section 1: PRODUCT AND COMPANY INFORMATION

Product Name(s): Slag

Product Identifiers: NewCem®, Litex™ Lightweight Aggregate, True Lite Lightweight Aggregate™, Vitrex™ Pelletized Slag, Ground Granulated Blast Furnace Slag (GGBFS), Blast Furnace Slag, Steel Slag, Granulated Slag, Pelletized Slag, Metallic Slag, Air Cooled Slag, Non-metallic Slag, Slag Cement, Hydraulic Slag Cement, Slag

Manufacturer:
Lafarge North America Inc.
12018 Sunrise Valley Drive, Suite 500
Reston, VA 20191

Information Telephone Number:
703-480-3600 (9am to 5pm EST)

Emergency Telephone Number:
1-800-451-8346 (3E Hotline)

Product Use: Slag is used as a supplementary cementitious material for cement, concrete and concrete products. It is also used in soil stabilization and as filler in asphalt and other products that are widely used in construction.

Note: This MSDS covers many types of slag. Individual composition of hazardous constituents will vary between slag types.

Section 2: COMPOSITION/INFORMATION ON INGREDIENTS

Component	Percent (By Weight)	CAS Number	OSHA PEL -TWA (mg/m^3)	ACGIH TLV-TWA (mg/m^3)	LD_{50} (mouse, intraperitoneal)	LC_{50}
Slag	100	65996-69-2	NA	NA	NA	NA
Calcium Oxide	30-50	1305-78-8	5 (T)	2 (T)	3059 mg/kg	NA
Magnesium Oxide	0-20	1309-48-4	15 (T)	10 (T)	NA	NA
Crystalline Silica	< 1	14808-60-7	[(10) / (%SiO_2+2)] (R); [(30) / (%SiO_2+2)] (T)	0.025 (R)	NA	NA
Particulate Not Otherwise Regulated	-	NA	5 (R); 15 (T)	3 (R); 10 (T)	NA	NA

Note: Exposure limits for components noted with an * contain no asbestos and <1% crystalline silica

Slag is a nonmetallic byproduct from the production of iron. Trace amounts of chemicals may be detected during chemical analysis. For example, slag may contain trace amounts of manganese oxide, titanium oxide, chromium compounds, sulfur compounds, and other trace compounds.

Section 3: HAZARD IDENTIFICATION

WARNING

Irritant: Causes eye, skin and inhalation irritation
Toxic - Harmful by inhalation.
(Contains crystalline silica)

Use proper engineering controls, work practices, and personal protective equipment to prevent exposure to wet or dry product.

Read MSDS for details.


Respiratory Protection


Eye Protection


Waterproof Gloves


Waterproof Boots

Section 3: HAZARD IDENTIFICATION (continued)

Emergency Overview: Slag is a solid, grey/black or brown/tan, odorless powder. It is not combustible or explosive. A single, short-term exposure to the dry powder presents little or no hazard.

Potential Health Effects:

Eye Contact: Airborne dust may cause immediate or delayed irritation or inflammation. Eye contact with large amounts of dry powder or with wet slag can cause moderate eye irritation. Eye exposures require immediate first aid to prevent significant damage to the eye.

Skin Contact: Slag may cause dry skin, discomfort, irritation, and dermatitis.

Dermatitis: Slag is capable of causing dermatitis by irritation and allergy. Skin affected by dermatitis may include symptoms such as, redness, itching, rash, scaling, and cracking.

Irritant dermatitis is caused by the physical properties of slag including moisture and abrasion.

Allergic contact dermatitis is caused by sensitization to hexavalent chromium (chromate) present in slag. The reaction can range from a mild rash to severe skin ulcers. Persons already sensitized may react to the first contact with slag. Others may develop allergic dermatitis after years of repeated contact with slag.

Inhalation (acute): Breathing dust may cause nose, throat or lung irritation, including choking, depending on the degree of exposure.

Inhalation (chronic): Risk of injury depends on duration and level of exposure.

Silicosis: This product contains crystalline silica. Prolonged or repeated inhalation of respirable crystalline silica from this product can cause silicosis, a seriously disabling and fatal lung disease. See Note to Physicians in Section 4 for further information.

Carcinogenicity: Slag is not listed as a carcinogen by IARC or NTP; however, slag contains trace amounts of crystalline silica and hexavalent chromium which are classified by IARC and NTP as known human carcinogens.

Autoimmune Disease: Some studies show that exposure to respirable crystalline silica (without silicosis) or that the disease silicosis may be associated with the increased incidence of several autoimmune disorders such as scleroderma (thickening of the skin), systemic lupus erythematosus, rheumatoid arthritis and diseases affecting the kidneys.

Tuberculosis: Silicosis increases the risk of tuberculosis.

Renal Disease: Some studies show an increased incidence of chronic kidney disease and end-stage renal disease in workers exposed to respirable crystalline silica.

Ingestion: Do not ingest slag. Ingestion of small quantities of slag is not known to be harmful, large quantities can cause distress to the digestive tract.

Medical Conditions Aggravated by Exposure: Individuals with lung disease (e.g. bronchitis, emphysema, COPD, pulmonary disease) or sensitivity to hexavalent chromium can be aggravated by exposure.

Section 4: FIRST AID MEASURES

Eye Contact: Rinse eyes thoroughly with water for at least 15 minutes, including under lids, to remove all particles. Seek medical attention for abrasions.

Skin Contact: Wash with cool water and a pH neutral soap or a mild skin detergent. Seek medical attention for rash, irritation, dermatitis, and prolonged unprotected exposures to wet slag, cement, cement mixtures or liquids from wet cement.

Inhalation: Move person to fresh air. Seek medical attention for discomfort or if coughing or other symptoms do not subside.

Ingestion: Do not induce vomiting. If conscious, have person drink plenty of water. Seek medical attention or contact poison control center immediately.

Note to Physician: The three types of silicosis include:

- Simple chronic silicosis – which results from long-term exposure (more than 20 years) to low amounts of respirable crystalline silica. Nodules of chronic inflammation and scarring provoked by the respirable crystalline silica form in the lungs and chest lymph nodes. This disease may feature breathlessness and may resemble chronic obstructive pulmonary disease (COPD).
- Accelerated silicosis – occurs after exposure to larger amounts of respirable crystalline silica over a shorter period of time (5-15 years). Inflammation, scarring, and symptoms progress faster in accelerated silicosis than in simple silicosis.
- Acute silicosis – results from short-term exposure to very large amounts of respirable crystalline silica. The lungs become very inflamed and may fill with fluid, causing severe shortness of breath and low blood oxygen levels.

Progressive massive fibrosis may occur in simple or accelerated silicosis, but is more common in the accelerated form. Progressive massive fibrosis results from severe scarring and leads to the destruction of normal lung structures.

Section 5: FIREFIGHTING MEASURES

Flashpoint & Method: Non-combustible

General Hazard: Avoid breathing dust.

Extinguishing Media: Use extinguishing media appropriate for surrounding fire.

Firefighting Equipment: Slag poses no fire-related hazard. A SCBA is recommended to limit exposures to combustion products when fighting any fire.

Combustion Products: None.

Section 6: ACCIDENTAL RELEASE MEASURES

General: Place spilled material into a container. Avoid actions that cause the slag to become airborne. Avoid inhalation of slag and contact with skin. Wear appropriate protective equipment as described in Section 8. Scrape wet slag and place in container. Allow material to dry or solidify before disposal. Do not wash slag down sewage and drainage systems or into bodies of water (e.g. streams).

Waste Disposal Method: Dispose of slag according to Federal, State, Provincial and Local regulations.

Section 7: HANDLING AND STORAGE

General: Handle with care and use appropriate control measures. Keep bulk slag and cement dry until used. When slag is kept wet for long periods of time, the leachate may be discolored and have a sulfurous odor. When this liquid is exposed to oxygen elemental sulfur may precipitate out leaving a solution of calcium thiosulfate.

Engulfment hazard. To prevent burial or suffocation, do not enter a confined space, such as a silo, bin, bulk truck, or other storage container or vessel that stores or contains slag or cement. Slag and cement can buildup or adhere to the walls of a confined space. The slag or cement can release, collapse or fall unexpectedly.

Properly ground all pneumatic conveyance systems. The potential exists for static build-up and static discharge when moving powders through a plastic, non-conductive, or non-grounded pneumatic conveyance system. The static discharge may result in damage to equipment and injury to workers.

Usage: Cutting, crushing or grinding hardened cement, concrete or other crystalline silica-bearing materials will release respirable crystalline silica. Use all appropriate measures of dust control or suppression, and Personal Protective Equipment (PPE) described in Section 8 below.

Housekeeping: Avoid actions that cause the slag to become airborne during clean-up such as dry sweeping or using compressed air. Use HEPA vacuum or thoroughly wet with water to clean-up dust. Use PPE described in Section 8 below.

Storage Temperature: Unlimited. **Storage Pressure:** Unlimited.

Clothing: Promptly remove and launder clothing that is dusty or wet with slag or cement. Thoroughly wash skin after exposure to dust or wet slag or cement.

Section 8: EXPOSURE CONTROLS AND PERSONAL PROTECTION

Engineering Controls: Use local exhaust or general dilution ventilation or other suppression methods to maintain dust levels below exposure limits.

Personal Protective Equipment (PPE):

Respiratory Protection: Under ordinary conditions no respiratory protection is required. Wear a NIOSH approved respirator that is properly fitted and is in good condition when exposed to dust above exposure limits.

Eye Protection: Wear ANSI approved glasses or safety goggles when handling dust or wet slag to prevent contact with eyes. Wearing contact lenses when using slag, under dusty conditions, is not recommended.

Skin Protection: Wear gloves, boot covers and protective clothing impervious to water to prevent skin contact. Do not rely on barrier creams, in place of impervious gloves. Remove clothing and protective equipment that becomes saturated with wet slag or cement and immediately wash exposed areas.

Section 9: PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Solid (powder).	**Evaporation Rate:**	NA.
Appearance:	Gray/black or brown/tan powder.	**pH (in water):**	8-11
Odor:	None.	**Boiling Point:**	>1000° C
Vapor Pressure:	NA.	**Freezing Point:**	None, solid.
Vapor Density:	NA.	**Viscosity:**	None, solid.
Specific Gravity:	2-3	**Solubility in Water:**	Negligible

Section 10: STABILITY AND REACTIVITY

Stability: Stable. Keep dry until use. Slag may react with water resulting in a slight release of heat, depending on the amount of lime (calcium oxide) present. Avoid contact with incompatible materials.

Incompatibility: Slag is incompatible with acids, ammonium salts and aluminum metal. Slag and cement dissolves in hydrofluoric acid, producing corrosive silicon tetrafluoride gas. Slag and cement reacts with water to form silicates and calcium hydroxide. Silicates react with powerful oxidizers such as fluorine, boron trifluoride, chlorine trifluoride, manganese trifluoride, and oxygen difluoride.

Hazardous Polymerization: None.

Hazardous Decomposition: Hydrogen sulfide gas may be released from moist or wet slag when it is heated.

Section 11 and 12: TOXICOLOGICAL AND ECOLOGICAL INFORMATION

For questions regarding toxicological and ecological information refer to contact information in Section 1.

Section 13: DISPOSAL CONSIDERATIONS

Dispose of waste and containers in compliance with applicable Federal, State, Provincial and Local regulations.

Section 14: TRANSPORT INFORMATION

This product is not classified as a Hazardous Material under U.S. DOT or Canadian TDG regulations.

Section 15: REGULATORY INFORMATION

OSHA/MSHA Hazard Communication: This product is considered by OSHA/MSHA to be a hazardous chemical and should be included in the employer's hazard communication program.

CERCLA/SUPERFUND: This product is not listed as a CERCLA hazardous substance.

EPCRA SARA Title III: This product has been reviewed according to the EPA Hazard Categories promulgated under Sections 311 and 312 of the Superfund Amendment and Reauthorization Act of 1986 and is considered a hazardous chemical and a delayed health hazard.

EPRCA SARA Section 313: This product contains none of the substances subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372.

RCRA: If discarded in its purchased form, this product would not be a hazardous waste either by listing or characteristic. However, under RCRA, it is the responsibility of the product user to determine at the time of disposal, whether a material containing the product or derived from the product should be classified as a hazardous waste.

Section 15: REGULATORY INFORMATION (continued)

TSCA: Slag and crystalline silica are exempt from reporting under the inventory update rule.

California Proposition 65: Crystalline silica (airborne particulates of respirable size) and Chromium (hexavalent compounds) are substances known by the State of California to cause cancer.

WHMIS/DSL: Products containing crystalline silica and calcium oxide are classified as D2A, E and are subject to WHMIS requirements.

Section 16: OTHER INFORMATION

Abbreviations:

>	Greater than	NA	Not Applicable
ACGIH	American Conference of Governmental Industrial Hygienists	NFPA	National Fire Protection Association
CAS No	Chemical Abstract Service number	NIOSH	National Institute for Occupational Safety and Health
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act	NTP	National Toxicology Program
		OSHA	Occupational Safety and Health Administration
CFR	Code for Federal Regulations	PEL	Permissible Exposure Limit
CL	Ceiling Limit	pH	Negative log of hydrogen ion
DOT	U.S. Department of Transportation	PPE	Personal Protective Equipment
EST	Eastern Standard Time	R	Respirable Particulate
HEPA	High-Efficiency Particulate Air	RCRA	Resource Conservation and Recovery Act
HMIS	Hazardous Materials Identification System	SARA	Superfund Amendments and Reauthorization Act
IARC	International Agency for Research on Cancer	T	Total Particulate
		TDG	Transportation of Dangerous Goods
LC_{50}	Lethal Concentration	TLV	Threshold Limit Value
LD_{50}	Lethal Dose	TWA	Time Weighted Average (8 hour)
mg/m^3	Milligrams per cubic meter	WHMIS	Workplace Hazardous Materials Information System
MSHA	Mine Safety and Health Administration		

This MSDS (Sections 1-16) was revised on March 1, 2011.

An electronic version of this MSDS is available at: www.lafarge-na.com under the Sustainability section.

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NO WARRANTY IS MADE, EXPRESS OR IMPLIED, OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR OTHERWISE.

Material Safety Data Sheet

Section 1: PRODUCT AND COMPANY INFORMATION

Product Name(s): Lafarge Blended Cement (cement)

Product Identifiers: Pozzolan Cement, Sulfate Resistant Cement, MaxCem®, SF™ Cement, Silica Fume Cement, TerraCem™, Tercem 3000™, Performance Cement, Blended Hydraulic Cement, PozzMod Plus™, Portland Fly Ash Blended Cement, FortiPave®, FortiMax™, Lightweight Well Cement, Type IS, S, P, IP, I(PM), I(SM), GUb, HEb, MSb, HSb, MHb, LHb, 10S, 10SM, 10F, 10FM, 50S Cement.

Manufacturer:
Lafarge North America Inc.
12018 Sunrise Valley Drive, Suite 500
Reston, VA 20191

Information Telephone Number:
703-480-3600 (9am to 5pm EST)

Emergency Telephone Number:
1-800-451-8346 (3E Hotline)

Product Use: Cement is used as a binder in concrete and mortars that are widely used in construction. Cement is distributed in bags, totes and bulk shipment.

Note: This MSDS covers many types of Cement. Individual composition of hazardous constituents will vary between types of Cement.

Section 2: COMPOSITION/INFORMATION ON INGREDIENTS

Component	Percent (By Weight)	CAS Number	OSHA PEL -TWA (mg/m^3)	ACGIH TLV-TWA (mg/m^3)	LD_{50} (mouse, intraperitoneal)	LC_{50}
Portland Cement*	5-95	65997-15-1	15 (T); 5 (R)	1 (R)	NA	NA
Calcium Carbonate* (Limestone)	5-50	1317-65-3	15 (T); 5 (R)	3 (R); 10 (T)	NA	NA
Calcium Oxide	0-30	1305-78-8	5 (T)	2 (T)	3059 mg/kg	NA
Calcium Sulfate* (Gypsum)	1-10	13397-24-5	15 (T); 5 (R)	10 (T)	NA	NA
Silica Fume (Amorphous Silica)	0-10	69012-64-2	NA	3 (R); 10 (T)	NA	NA
Magnesium Oxide	0-10	1309-48-4	15 (T)	10 (T)	NA	NA
Crystalline Silica	0-10	14808-60-7	[(10) / (%SiO_2+2)] (R); [(30) / (%SiO_2+2)] (T)	0.025 (R)	NA	NA

Note: Exposure limits for components noted with an * contain no asbestos and <1% crystalline silica

Cement is made from materials mined from the earth and is processed using energy provided by fuels. Trace amounts of chemicals may be detected during chemical analysis. For example, cement may contain trace amounts of titanium oxide, potassium and sodium sulfate compounds, chromium compounds, nickel compounds, arsenic compounds and other trace compounds.

Section 3: HAZARD IDENTIFICATION

WARNING

Corrosive - Causes severe burns.
Toxic - Harmful by inhalation.
(Contains crystalline silica)

Use proper engineering controls, work practices, and personal protective equipment to prevent exposure to wet or dry product.

Read MSDS for details.


Respiratory Protection


Eye Protection


Waterproof Gloves


Waterproof Boots

Section 3: HAZARD IDENTIFICATION (continued)

Emergency Overview: Cement is a solid, grey, odorless powder. It is not combustible or explosive. A single, short-term exposure to the dry powder presents little or no hazard. Exposure of sufficient duration to wet cement, or to dry cement on moist areas of the body, can cause serious, potentially irreversible tissue (skin, eye, respiratory tract) damage due to chemical (caustic) burns, including third degree burns.

Potential Health Effects:

Eye Contact: Airborne dust may cause immediate or delayed irritation or inflammation. Eye contact with large amounts of dry powder or with wet cement can cause moderate eye irritation, chemical burns and blindness. Eye exposures require immediate first aid and medical attention to prevent significant damage to the eye.

Skin Contact: Cement may cause dry skin, discomfort, irritation, severe burns, and dermatitis.

Burns: Exposure of sufficient duration to wet cement, or to dry cement on moist areas of the body, can cause serious, potentially irreversible damage to skin, eye, respiratory and digestive tracts due to chemical (caustic) burns, including third degree burns. A skin exposure may be hazardous even if there is no pain or discomfort.

Dermatitis: Cement is capable of causing dermatitis by irritation and allergy. Skin affected by dermatitis may include symptoms such as, redness, itching, rash, scaling, and cracking.

Irritant dermatitis is caused by the physical properties of cement including alkalinity and abrasion.

Allergic contact dermatitis is caused by sensitization to hexavalent chromium (chromate) present in cement. The reaction can range from a mild rash to severe skin ulcers. Persons already sensitized may react to the first contact with cement. Others may develop allergic dermatitis after years of repeated contact with cement.

Inhalation (acute): Breathing dust may cause nose, throat or lung irritation, including choking, depending on the degree of exposure. Inhalation of high levels of dust can cause chemical burns to the nose, throat and lungs.

Inhalation (chronic): Risk of injury depends on duration and level of exposure.

Silicosis: This product contains crystalline silica. Prolonged or repeated inhalation of respirable crystalline silica from this product can cause silicosis, a seriously disabling and fatal lung disease. See Note to Physicians in Section 4 for further information.

Carcinogenicity: Cement is not listed as a carcinogen by IARC or NTP; however, cement contains trace amounts of crystalline silica and hexavalent chromium which are classified by IARC and NTP as known human carcinogens.

Autoimmune Disease: Some studies show that exposure to respirable crystalline silica (without silicosis) or that the disease silicosis may be associated with the increased incidence of several autoimmune disorders such as scleroderma (thickening of the skin), systemic lupus erythematosus, rheumatoid arthritis and diseases affecting the kidneys.

Tuberculosis: Silicosis increases the risk of tuberculosis.

Renal Disease: Some studies show an increased incidence of chronic kidney disease and end-stage renal disease in workers exposed to respirable crystalline silica.

Section 3: HAZARD IDENTIFICATION (continued)

Ingestion: Do not ingest cement. Although ingestion of small quantities of cement is not known to be harmful, large quantities can cause chemical burns in the mouth, throat, stomach, and digestive tract.

Medical Conditions Aggravated by Exposure: Individuals with lung disease (e.g. bronchitis, emphysema, COPD, pulmonary disease) or sensitivity to hexavalent chromium can be aggravated by exposure.

Section 4: FIRST AID MEASURES

Eye Contact: Rinse eyes thoroughly with water for at least 15 minutes, including under lids, to remove all particles. Seek medical attention for abrasions and burns.

Skin Contact: Wash with cool water and a pH neutral soap or a mild skin detergent. Seek medical attention for rash, burns, irritation, dermatitis, and prolonged unprotected exposures to wet cement, cement mixtures or liquids from wet cement.

Inhalation: Move person to fresh air. Seek medical attention for discomfort or if coughing or other symptoms do not subside.

Ingestion: Do not induce vomiting. If conscious, have person drink plenty of water. Seek medical attention or contact poison control center immediately.

Note to Physician: The three types of silicosis include:

- Simple chronic silicosis – which results from long-term exposure (more than 20 years) to low amounts of respirable crystalline silica. Nodules of chronic inflammation and scarring provoked by the respirable crystalline silica form in the lungs and chest lymph nodes. This disease may feature breathlessness and may resemble chronic obstructive pulmonary disease (COPD).
- Accelerated silicosis – occurs after exposure to larger amounts of respirable crystalline silica over a shorter period of time (5-15 years). Inflammation, scarring, and symptoms progress faster in accelerated silicosis than in simple silicosis.
- Acute silicosis – results from short-term exposure to very large amounts of respirable crystalline silica. The lungs become very inflamed and may fill with fluid, causing severe shortness of breath and low blood oxygen levels.

Progressive massive fibrosis may occur in simple or accelerated silicosis, but is more common in the accelerated form. Progressive massive fibrosis results from severe scarring and leads to the destruction of normal lung structures.

Section 5: FIREFIGHTING MEASURES

Flashpoint & Method: Non-combustible

General Hazard: Avoid breathing dust. Wet cement is caustic.

Extinguishing Media: Use extinguishing media appropriate for surrounding fire.

Firefighting Equipment: Cement poses no fire-related hazard. A SCBA is recommended to limit exposures to combustion products when fighting any fire.

Combustion Products: None.

Section 6: ACCIDENTAL RELEASE MEASURES

General: Place spilled material into a container. Avoid actions that cause the cement to become airborne. Avoid inhalation of cement and contact with skin. Wear appropriate protective equipment as described in Section 8. Scrape wet cement and place in container. Allow material to dry or solidify before disposal. Do not wash cement down sewage and drainage systems or into bodies of water (e.g. streams).

Waste Disposal Method: Dispose of cement according to Federal, State, Provincial and Local regulations.

Section 7: HANDLING AND STORAGE

General: Keep bulk and bagged cement dry until used. When slag or slag containing materials are kept wet for long periods of time, the leachate may be discolored and have a sulfurous odor. When this liquid is exposed to oxygen, elemental sulfur may precipitate out leaving a solution of calcium thiosulfate.

Stack bagged material in a secure manner to prevent falling. Bagged cement is heavy and poses risks such as sprains and strains to the back, arms, shoulders and legs during lifting and mixing. Handle with care and use appropriate control measures.

Engulfment hazard. To prevent burial or suffocation, do not enter a confined space, such as a silo, bin, bulk truck, or other storage container or vessel that stores or contains cement. Cement can buildup or adhere to the walls of a confined space. The cement can release, collapse or fall unexpectedly.

Properly ground all pneumatic conveyance systems. The potential exists for static build-up and static discharge when moving cement powders through a plastic, non-conductive, or non-grounded pneumatic conveyance system. The static discharge may result in damage to equipment and injury to workers.

Usage: Cutting, crushing or grinding hardened cement, concrete or other crystalline silica-bearing materials will release respirable crystalline silica. Use all appropriate measures of dust control or suppression, and Personal Protective Equipment (PPE) described in Section 8 below.

Housekeeping: Avoid actions that cause the cement to become airborne during clean-up such as dry sweeping or using compressed air. Use HEPA vacuum or thoroughly wet with water to clean-up dust. Use PPE described in Section 8 below.

Storage Temperature: Unlimited. **Storage Pressure:** Unlimited.

Clothing: Promptly remove and launder clothing that is dusty or wet with cement. Thoroughly wash skin after exposure to dust or wet cement.

Section 8: EXPOSURE CONTROLS AND PERSONAL PROTECTION

Engineering Controls: Use local exhaust or general dilution ventilation or other suppression methods to maintain dust levels below exposure limits.

Personal Protective Equipment (PPE):

Respiratory Protection: Under ordinary conditions no respiratory protection is required. Wear a NIOSH approved respirator that is properly fitted and is in good condition when exposed to dust above exposure limits.

Eye Protection: Wear ANSI approved glasses or safety goggles when handling dust or wet cement to prevent contact with eyes. Wearing contact lenses when using cement, under dusty conditions, is not recommended.

Section 8: EXPOSURE CONTROLS AND PERSONAL PROTECTION (continued)

Skin Protection: Wear gloves, boot covers and protective clothing impervious to water to prevent skin contact. Do not rely on barrier creams, in place of impervious gloves. Remove clothing and protective equipment that becomes saturated with wet cement and immediately wash exposed areas.

Section 9: PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Solid (powder).	**Evaporation Rate:**	NA.
Appearance:	Gray or white powder.	**pH (in water):**	12 – 13
Odor:	None.	**Boiling Point:**	>1000^{o} C
Vapor Pressure:	NA.	**Freezing Point:**	None, solid.
Vapor Density:	NA.	**Viscosity:**	None, solid.
Specific Gravity:	3-3.2	**Solubility in Water:**	Slightly (0.1 - 1.0%)

Section 10: STABILITY AND REACTIVITY

Stability: Stable. Keep dry until use. Avoid contact with incompatible materials.

Incompatibility: Wet cement is alkaline and is incompatible with acids, ammonium salts and aluminum metal. Cement dissolves in hydrofluoric acid, producing corrosive silicon tetrafluoride gas. Cement reacts with water to form silicates and calcium hydroxide. Silicates react with powerful oxidizers such as fluorine, boron trifluoride, chlorine trifluoride, manganese trifluoride, and oxygen difluoride.

Hazardous Polymerization: None. **Hazardous Decomposition:** None.

Section 11 and 12: TOXICOLOGICAL AND ECOLOGICAL INFORMATION

For questions regarding toxicological and ecological information refer to contact information in Section 1.

Section 13: DISPOSAL CONSIDERATIONS

Dispose of waste and containers in compliance with applicable Federal, State, Provincial and Local regulations.

Section 14: TRANSPORT INFORMATION

This product is not classified as a Hazardous Material under U.S. DOT or Canadian TDG regulations.

Section 15: REGULATORY INFORMATION

OSHA/MSHA Hazard Communication: This product is considered by OSHA/MSHA to be a hazardous chemical and should be included in the employer's hazard communication program.

CERCLA/SUPERFUND: This product is not listed as a CERCLA hazardous substance.

EPCRA SARA Title III: This product has been reviewed according to the EPA Hazard Categories promulgated under Sections 311 and 312 of the Superfund Amendment and Reauthorization Act of 1986 and is considered a hazardous chemical and a delayed health hazard.

EPRCA SARA Section 313: This product contains none of the substances subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372.

Section 15: REGULATORY INFORMATION (continued)

RCRA: If discarded in its purchased form, this product would not be a hazardous waste either by listing or characteristic. However, under RCRA, it is the responsibility of the product user to determine at the time of disposal, whether a material containing the product or derived from the product should be classified as a hazardous waste.

TSCA: Blended cement and crystalline silica are exempt from reporting under the inventory update rule.

California Proposition 65: Crystalline silica (airborne particulates of respirable size) and Chromium (hexavalent compounds) are substances known by the State of California to cause cancer.

WHMIS/DSL: Products containing crystalline silica and calcium carbonate are classified as D2A, E and are subject to WHMIS requirements.

Section 16: OTHER INFORMATION

Abbreviations:

>	Greater than	NA	Not Applicable
ACGIH	American Conference of Governmental Industrial Hygienists	NFPA	National Fire Protection Association
CAS No	Chemical Abstract Service number	NIOSH	National Institute for Occupational Safety and Health
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act	NTP	National Toxicology Program
		OSHA	Occupational Safety and Health Administration
CFR	Code for Federal Regulations	PEL	Permissible Exposure Limit
CL	Ceiling Limit	pH	Negative log of hydrogen ion
DOT	U.S. Department of Transportation	PPE	Personal Protective Equipment
EST	Eastern Standard Time	R	Respirable Particulate
HEPA	High-Efficiency Particulate Air	RCRA	Resource Conservation and Recovery Act
HMIS	Hazardous Materials Identification System	SARA	Superfund Amendments and Reauthorization Act
IARC	International Agency for Research on Cancer	T	Total Particulate
		TDG	Transportation of Dangerous Goods
LC_{50}	Lethal Concentration	TLV	Threshold Limit Value
LD_{50}	Lethal Dose	TWA	Time Weighted Average (8 hour)
mg/m^3	Milligrams per cubic meter	WHMIS	Workplace Hazardous Materials Information System
MSHA	Mine Safety and Health Administration		

This MSDS (Sections 1-16) was revised on August 1, 2011.

An electronic version of this MSDS is available at: www.lafarge-na.com under the Sustainability section.

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NO WARRANTY IS MADE, EXPRESS OR IMPLIED, OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR OTHERWISE.

RECON LSS Bed Ash

MATERIAL SAFETY DATA SHEET

Product Name: Bed Ash (Marion Unit 123)

SECTION I – General Information:

Manufacturer's Name Southern Illinois Power Cooperative	**Emergency Telephone Number** (618) 964-1701
Address (Number, Street, City, State Zip) 10543 Lake of Egypt Road Marion, Illinois 629859	**Information Telephone Number** (618) 964-1448
Date Prepared 1/1/2004	**Signature of Preparer**

SECTION II – Hazardous Ingredients/Identity Information:

Hazardous Components: *

(Specific Chemical Identity; Common Name)	CAS Number	OSHA PEL	ACGIH TLV	Notes	Percent*
Amorphous Silica	7631-86-9	2.52 mg/m^3	10.0 mg/m^3	(Total Dust)	<1
Iron Oxide	1309-37-1	10.0 mg/m^3	5.0 mg/m^3	(Fume)	1.96
Aluminum	7429-90-5	15.0 mg/m^3	10.0 mg/m^3	(Total Dust)	0.040
Calcium	1305-78-8	5.0 mg/m^3	2.0 mg/m^3	(CaO)	25.56
Potassium	7440-09-7	2.0 mg/m^3	2.0 mg/m^3	(KOH-Ceiling)	0.43
Crystalline Silica (Quartz):	14808-60-7				9.1
Respirable Dust		3.33 mg/m^3	0.05 mg/m^3		
Total Dust		10.0 mg/m^3	--		
Dysprosium	7429-91-6	NA	NA		<0.00091
Terbium	7440-27-9	NA	NA		<0.00091
Magnesium	7439-95-4	15.0 mg/m^3	10.0 mg/m^3	(MgO-Fume)	1.79
Titanium	7440-32-6	15.0 mg/m^3	10.0 mg/m^3	(TiO_2)	0.043
Sulfate	7664-93-9	1.0 mg/m^3	1.0 mg/m^3	(H_2SO_4))	0.046
Thulium	7440-30-4	NA	NA		<0.00091
Tellurium	13494-80-9	0.1 mg/m^3	0.1 mg/m^3		<0.00091
Sodium	7440-23-5	NA	NA		<0.054
Erbium	7440-30-4	NA	NA		<0.00091
Iodine	7553-56-2	1.0 mg/m^3	0.1 ppm	(Ceiling)	<0.093
Barium	7440-39-3	0.5 mg/m^3	0.5 mg/m^3		<0.0070
Lanthanum	7439-91-0	NA	NA		<0.0010
Arsenic, Chromium, Copper, Fluoride, Lead, Manganese, Nickel, Strontium, Zinc, Zirconium					<0.0765

*Based on composite sample; values may vary.
NA = Not Applicable; Not Available

SECTION III – Physical/Chemical Characteristics:

BOILING POINT:	NA	SPECIFIC GRAVITY (H_2O = 1):	NA
VAPOR PRESSURE (mm Hg):	NA	MELTING POINT:	NA
VAPOR DENSITY (Air = 1):	NA	EVAPORATION RATE (Butyl Acetate = 1)	NA
pH:	12.47		
SOLUBILITY IN WATER:	Insoluble		
APPEARANCE AND ODOR:	Light brown, granular solid		

SECTION IV – Fire and Explosion Hazard Data:

FLASH POINT: (Method Used):	NA
FLAMMABLE LIMITS IN AIR:	LEL: NA UEL: NA
EXTINGUISHING MEDIA:	No Special Media required
SPECIAL FIRE FIGHTING PROCEDURES:	None
UNUSUAL FIRE AND EXPLOSION HAZARDS:	None

SECTION V – Reactivity Data:

STABILITY: Stable: X Unstable:_____

Conditions to Avoid: Reacts with water/liquid & gives off heat (Exothermic) None Known

INCOMPATIBILITY (Materials to Avoid):	None Known
HAZARDOUS DECOMPOSITION OR BYPRODUCTS:	None Known
HAZARDOUS POLYMERIZATION:	May Occur:_____ Will Not Occur: X
Conditions to Avoid:	None Known

SECTION VI – Health Hazard Data:

ROUTE (S) OF ENTRY: Inhalation: Yes Skin: Yes Ingestion: Yes

HEALTH HAZARDS (Acute and Chronic):

Acute: Eye, skin and respiratory tract irritation possible from over-exposure.

Chronic: Pneumoconiosis, toxic effects of metals possible from prolonged or repeated over-exposure.

Carcinogenicity: NTP: No IARC MONOGRAPHS: Yes
OSHA REGULATED: No

Crystalline silica (quartz) is listed in IARC Monographs, Volume 42.

Certain forms of arsenic, cadmium, chromium, and nickel are considered suspect human carcinogens. These metals are present at <0.10% in this product.

SIGNS AND SYMPTOMS: Skin or eye irritation; respiratory tract irritation.

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE: None Known

EMERGENCY AND FIRST AID PROCEDURES:

Eyes: Flush eyes with water. Seek medical attention.

Skin: Wash affected area. If redness or irritation develops, seek medical attention.

Inhalation: Exit to fresh air; if irritation develops, seek medical attention.

SECTION VII – Precautions for Safe Handling and Use:

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED:	Bottom ash may be hot. Avoid stepping into areas of bottom ash spillage. Handle bottom ash spillage to avoid creating airborne dust. Wet methods or vacuuming are recommended to clean up spills.
WASTE DISPOSAL METHOD:	Handle as an inert bulk material. Material may be disposed of in landfill disposal sites in accordance with local, state, and federal regulations.
PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE:	Bottom ash may be hot. Avoid prolonged skin contact. Handle to avoid creating airborne dust. Exothermic Reaction when mixed with water or other liquids. May cause burning to skin & eyes.
OTHER PRECAUTIONS:	Material transport over the roadway shall be performed by properly permitted vehicles. Trucks and rail cars shall be properly covered to prevent spillage or dusting of the material in transport.

SECTION VIII – Control Measures:

RESPIRATORY PROTECTION (Specify Type):	NIOSH approved half-mask or full-facepiece air-purifying respirator equipped with HEPA filters, if dust exposure is likely. Additional protection may be required in designated areas, e.g. confined areas.
VENTILATION:	
Local Exhaust:	To keep dust levels below PEL; Recommended for open convening systems.
Mechanical:	To keep dust levels below PEL; Recommended for confined areas.
Special:	NA
Other:	NA
PROTECTIVE GLOVES:	None normally required. May be needed when excessive skin contact is likely.
EYE PROTECTION:	Safety glasses with side shields. Cover goggles are recommended in dusty areas or where splashing is likely.
OTHER PROTECTIVE CLOTHING OR EQUIPMENT:	Rubber boots and gloves when wetted or when excessive skin contact is likely.
WORK/HYGIENIC PRACTICES:	Practice good personal hygiene.

End of MSDS

HEADWATERS RESOURCES

Material Safety Data Sheet

FLY ASH / ASTM Class C

TYPICAL

(801) 984-9400
Information Phone Number

(800) 241-7799
Emergency Phone Number

Prepared: March 12, 1999 (reviewed 5/08)

SECTION 1 – MATERIAL IDENTIFICATION AND INFORMATION

INGREDIENT		FORMULA	%[1]	OSHA PEL[2]	ACGIH TLV [2]
Aluminosilicate Glass		Contains Al, Si, Fe, Ca, Mg, Ti	50-70	Not Listed [3]	Not Listed [3]
Crystalline Silica	Total	SiO_2	5-10	30/% SiO_2+2 [4]	0.3
	Respirable	SiO_2	See Note (5)	10/% SiO_2+2 [4]	0.1
Calcium Oxide		CaO	20-30	5	2
Iron Mineral Dusts [6]		Fe_2O_3, Fe_3O_4	2-5	10	5

Notes:
(1) Values approximate. Material is derived from naturally occurring coal. May contain unburned carbon from coal, which may be considered a nuisance dust (see note 3).
(2) Airborne exposure limits in mg/m^3.
(3) Not listed specifically by substance name. Exposure to aluminosilicate glass dust may be covered by inert or nuisance dust limits of 15 mg/m^3 for total dust and 5 mg/m^3 for respirable portion.
(4) The percentage of crystalline silica in the formula is the amount determined from airborne samples.
(5) Presence of respirable crystalline silica has not been established.
(6) Iron minerals may include magnesium, hematite, and other iron oxides.

SECTION 2 – PHYSICAL / CHEMICAL CHARACTERISTICS

Boiling Point: N/A
Vapor Pressure (mmHg and Temperature): N/A
Vapor Density (Air = 1): N/A
Solubility in Water: Negligible
pH in Water: 10-12
Specific Gravity (H_2O = 1): 2.2-2.8
Melting Point: >2000° F
Evaporation Rate: N/A
Water Reactive: Not Reactive
Appearance and Odor: Grey to tan color, no odor. Average particle size is 10-20 microns.

SECTION 3 – FIRE AND EXPLOSION HAZARD DATA

Extinguisher Media: No special media required.
Auto Ignition Temperature: N/A
Flammability Limits in Air (% by Volume): Not flammable
LEL: N/A **UEL:** N/A
Special Fire Fighting Procedures: No special procedures required
Flash Point and Method Used: N/A
Unusual Fire and Explosion Hazards: None. This material is considered non-flammable and non-combustible. Use fire extinguishing agent suitable for surrounding media.

SECTION 4 – REACTIVITY HAZARD DATA

Stability: Considered to be stable. Mixing with water may produce a slight temperature increase.
Hazardous Decomposition Products: Decomposition products are unknown and not suspected.
Hazardous Polymerization: Hazardous polymerization not known to occur.
Reactivity: Material is considered inert. Avoid contact with strong acids, reducing agents, and oxidizers
Conditions to Avoid: None.

N/A = Not Applicable

SECTION 5 – HEALTH HAZARD DATA

PRIMARY ROUTES OF ENTRY:

Inhalation: Can irritate respiratory tract; long-term exposure to respirable silica above the OEL may produce silicosis in susceptible persons.

Ingestion: Possible, but very unlikely to occur in sufficient quantities.

Skin and Eye Contact: Can dry and irritate the skin; is not absorbed by skin. Can irritate eyes.

Hazardous: Is not considered hazardous.

CARCINOGEN LISTED IN:

NTP: Yes (Crystalline Silica)*

IARC Monograph: Yes (Crystalline Silica)*

OSHA: No

** Coal fly ash is not a listed carcinogen. Respirable crystalline silica from occupational sources is listed as carcinogenic to humans (Group1) by IARC. NTP lists silica, crystalline (respirable) as a compound that may reasonably be anticipated to be a carcinogen. Presence of crystalline silica in respirable dust has not been established in this source.*

HEALTH HAZARDS:

Acute: Fly ash may cause irritation to the respiratory tract, eyes, or the skin. Alkaline material; irritation may be aggravated by the addition of moisture (sweat).

Chronic: Prolonged inhalation exposure may cause pulmonary fibrosis or chronic bronchitis.

Signs and Symptoms of Exposure: Irritation of eyes, skin, and respiratory system.

Medical Conditions Generally Aggravated by Exposure: May aggravate existing pulmonary condition if high dust situation is created. Dusting conditions should not occur under normal use.

EMERGENCY FIRST AID PROCEDURES:

Eye Contact: Flush for 15 minutes with water. Seek medical care as needed to remove particles and treat scratched cornea.

Skin Contact: Wash with mild soap and water.

Inhalation: Remove to fresh air; seek medical attention if respiratory symptoms (coughing, chest tightness, shortness of breath) persist.

Ingestion: Rinse mouth out with water. Induce vomiting if significant quantities are ingested.

SECTION 6 – CONTROL AND PROTECTIVE MEASURES

Respiratory Protection: If airborne dust exposure approaches the TLV or PEL (Section 1), use half-mask or full-face air purifying respirator equipped with NIOSH or MSHA-approved high efficiency filters for protection against pneumoconiosis-producing dust. An airline respirator may be required where dust levels are extremely high. Recommend use of a NIOSH or MSHA-approved mask or respirator for nuisance dusts whenever dust is created below TLV or PEL.

Protective Gloves: Limit contact with skin. Use rubber or cloth gloves as necessary.

Eye Protection: Wear goggles or face shield as appropriate. Avoid contact lenses.

Ventilation to be Used: Keep dust levels below PEL. Use general and local exhaust ventilation and dust collection systems to keep dust levels within acceptable limits.

Other Protective Clothing and Equipment: Protective clothing may be necessary under heavy dusting conditions.

Hygienic Work Practices: Do not allow dust to get into eyes, to be inhaled, to be swallowed, or to remain on skin if irritation occurs. Minimize dusting. Practice good personal hygiene. Wash or shower after use. Launder clothes as normal.

SECTION 7 – PRECAUTIONS FOR SAFE HANDLING / LEAK PROCEDURES

Steps to be Taken If Material is Spilled or Released: Do not create unnecessary airborne dust. Avoid inhalation. Use water mist to reduce dust. Provide ventilation as appropriate. Use personal protection: respiratory, skin, and eyes.

Waste Disposal Methods: Fly ash is not classified as a RCRA hazardous waste. Material can be disposed of as inert solid in a permitted landfill. Follow applicable federal, state, and local rules.

Precautions to be Taken in Handling and Storage: Avoid dust inhalation. Use water and other available means to minimize dusting. Use personal protection. Follow good housekeeping and personal hygiene practices.

Other Precautions and/or Special Hazards: Certain conditions (e.g. work in enclosed areas) could create over-exposure to trace elements. These activities should be evaluated for compliance with applicable standards.

RECON LSS Lime Kiln Dust
Carmeuse North America
11 Stanwix Street, 11th Floor
Pittsburgh, PA 15222
Phone: 412-995-5500
Fax: 412-995-5594

Date of Origin:	06/05/02
Date of Revision:	3/31/06
Revision No.	4

Material Safety Data Sheet

Product Name:	ENVIROLIME

INFOTRAC: 800-535-5053 [In case of an emergency call this number 24 HOURS a day 7 DAYS a week.]

1. IDENTIFICATION OF THE SUBSTANCE AND COMPANY

1.1. Identification of the substance:

Chemical name: Calcium Oxide/Calcium Carbonate
Product name: EnviroLime sometime referred to as: Lime Kiln Dust, LKD, High Calcium Lime Kiln Dust, Dolomitic Lime Kiln Dust
Formula: Complex mixture – mostly $CaCO_3$, CaO, $Ca(OH)_2$, $CaMg(CO_3)_2$, CaO, MgO, Al_2O_3, SiO_2 Fe_2O_3, $CaSO_4$
C.A.S Nº: 1305-78-8/1317-65-3
Molecular Weight: $CaCO_3$ = 100.09, CaO = 56.08, $Ca(OH)_2$ = 74.096, CaO-MgO = 96.38, $CaMg(CO_3)_2$ = 184.40

1.2. Company:

Main Office:
Carmeuse North America
11 Stanwix Street, 11th Floor
Pittsburgh, PA 15222
Telephone: 412-995-5500
Fax: 412-995-5594

Canadian Office:
Carmeuse Lime (Canada) Limited
P.O. Box 190
Ingersoll, Ontario N5C 3K5
Telephone: 519-423-6283
Fax: 519-423-6545

2. COMPOSITION / INFORMATION ON INGREDIENTS

Ingredient	% by Weight	C.A.S Nº:	Exposure Limits
Calcium Carbonate	0 - 90	1317-65-3	OSHA PEL: 15 mg/m³ (total dust); 5 mg/m³ (respirable) ACGIH TLV: 10 mg/m³ O. Reg. 833 TWAEV: 10 mg/m³
Calcium Oxide	0 - 50	1305-78-8	OSHA PEL: 5 mg/m³ ACGIH TLV: 2 mg/m³ O. Reg. 833 TWAEV: 2 mg/m³
Calcium Hydroxide	0 - 70	1305-62-0	OSHA PEL: 15 mg/m³ (total dust); 5 mg/m3 (respirable) ACGIH TLV: 5 mg/m³ O. Reg. 833 TWAEV: 5 mg/m³ LD_{50} oral (rat) 7340 mg/kg
Calcium Magnesium Carbonate	0 - 50	16389-88-1	OSHA PEL: 10 mg/m³ ACGIH TLV: 10 mg/m³
Calcium Magnesium Oxide	0 - 50	37247-91-9	OSHA PEL: 2 mg/m³ ACGIH TLV: 2 mg/m³
Magnesium Carbonate	0 - 5	546-93-0	OSHA PEL: 15 mg/m³ (total dust); 5mg/m³ (respirable) ACGIH TLV: 10 mg/m³; O. Reg. 833 TWAEV: 10 mg/m³
Magnesium Oxide	0 - 5	1309-48-4	OSHA PEL: 10 mg/m³ ACGIH TLV: 10 mg/m³ O. Reg. 833 TWAEV: 10 mg/m³
Silica - Crystalline Quartz	0-10	14808-60-7	OSHA PEL*: 2.5 mg/m³ (total dust); 0.8 mg/m³ (respirable) ACGIH TLV: 0.025mg/m³ (respirable) O. Reg. 845: 0.1 mg/m³

*PEL (total dust) = (30 mg/m³) / (% silica + 2) ; PEL (respirable) = (10 mg/m³) / (% silica + 2)

Product Name:	ENVIROLIME (continued)

3. HAZARDS IDENTIFICATION AND CLASSIFICATION

Overview: Envirolime is an odorless white or grayish-white granular powder. Contact can cause irritation to eyes, skin, respiratory system, and gastrointestinal tract. Contact may aggravate disorders of eyes, skin, gastrointestinal tract, and respiratory system.

Eyes: Can cause severe irritation or burning of eyes, including permanent damage.

Skin: Can cause severe irritation or burning of skin, especially in the presence of moisture.

Ingestion: Can cause severe irritation or burning of gastrointestinal tract if swallowed.

Inhalation: Can cause severe irritation or the respiratory system. Long-term exposure may cause permanent damage. This product is not listed by MSHA, OSHA, or IARC as a carcinogen, but this product may contain crystalline quartz silica, which has been classified by IARC as (Group I) carcinogenic to humans when inhaled. Inhalation of silica can also cause a chronic lung disorder, silicosis.

Irritant: Eyes, mucous membranes, moist skin, respiratory tract.

Flammability: This product is not flammable or combustible

Explosive: This product is not explosive in dust form

Reactivity: May react violently with strong acids producing heat and possible steam explosion in confined space

Symbols: WHMIS Symbol: “E” Corrosive Material; “D2A” Materials causing other toxic effects

4. HEALTH EFFECTS AND TREATMENTS

Health Effects:

Inhalation: Acute: irritation, sore throat, cough, sneezing. Chronic: persistent coughing and breathing problems. Long-term exposure to silica can cause a chronic lung disorder, silicosis.

Eyes: Acute: severe irritation, intense tearing, burns. Chronic: possible blindness when exposure is prolonged.

Skin: Acute: removes natural skin oils, blotches, itching and superficial burns in case of sweating. Chronic: no known effects.

Ingestion: Acute: sore throat, stomach aches, cramps, diarrhea, vomiting. Chronic: no known effects.

Treatments:

Inhalation: Move victim to fresh air. Seek medical attention if necessary. If breathing has stopped, give artificial respiration.

Eyes: Immediately flush eyes with large amounts of water for at least 15 minutes. Pull back the eyelid to make sure all the lime dust has been washed out. Seek medical attention immediately. Do not rub eyes.

Skin: Flush exposed area with large amounts of water. Seek medical attention immediately.

Ingestion: Give large quantities of water or fruit juice. Do not induce vomiting. Seek medical attention immediately. Never give anything by mouth if victim is rapidly losing consciousness or is unconscious or convulsing.

Product Name:	ENVIROLIME (continued)

5. FIRE FIGHTING MEASURES

Flash point:	Non-flammable
Autoignition temperature:	Non-flammable
Inflammability limits:	None
Explosion risk:	None by itself, but heat produced by reaction with strong acids can generate steam and pressure
Hazardous combustion products:	Decomposes to produce calcium oxide (CaO), which can react with water to produce steam and pressure
Extinguishing media:	Use dry chemical fire extinguisher. Do not use water or halogenated compounds, except that large amounts of water may be used to deluge small quantities of Envirolime. Use appropriate extinguishing media for surrounding fire conditions.
Fire fighting instructions:	Keep personnel away from and upwind of fire. Wear full fire-fighting turn-out gear (full Bunker gear), and respiratory protection (self-contained breathing apparatus).

6. ACCIDENT PREVENTION MEASURES

Individual and collective precautions:	Avoid creating conditions which release dust – use mechanical ventilation to remove dust from work spaces
Avoid inhalation of dust:	Wear respiratory protection - minimum NIOSH N-95 Dust Mask
Cleaning methods for spills:	Use personal protective equipment (eyes, skin and inhalation, see Section 8). Use dry methods (vacuuming, sweeping) to collect spilled materials. Avoid generating dust. For large spills, evacuate area downwind of clean-up area operations to minimize dust exposure. For small spills, store spilled materials in dry, sealed plastic or metal containers. Dust residue on surfaces may be washed with water.
Precautions for the protection of the environment:	May not be released into surface waters without controls (increases pH)
Waste Disposal:	Dispose according to federal, provincial/state and local environmental regulations

7. HANDLING AND STORAGE

Handling:	In open air or in ventilated places, avoid skin and eye contact, avoid creating airborne dust
Storage:	Store in dry places sheltered from humidity. Keep away from acids and incompatible substances Keep out of reach of children

Product Name:	ENVIROLIME (continued)

8. EXPOSURE CONTROL / PERSONAL PROTECTION

Exposure Limits: Calcium carbonate: 15 mg/m^3 (total dust), 5 mg/m^3 (respirable) (OSHA); 10 mg/m^3 (ACGIH, O. Reg. 833);
Calcium oxide: 5 mg/m^3 (OSHA); 2 mg/m^3 (ACGIH, O. Reg. 833);
Calcium Magnesium Carbonate: 10 mg/m^3 (ACGIH, OSHA)
Calcium Magnesium Oxide: 2 mg/m^3 (ACGIH, OSHA)
Magnesium Carbonate: 15 mg/m^3 (total dust), 5 mg/m^3 (respirable) (OSHA); 10 mg/m^3 (ACGIH,O. Reg. 833)
Calcium hydroxide: 15 mg/m^3 (total dust), 5 mg/m^3 (respirable) (OSHA); 5 mg/m^3 (ACGIH, O. Reg. 833)
Magnesium oxide: 15 mg/m^3 (OSHA); 10 mg/m^3 (ACGIH, O. Reg. 833)
Silica (crystalline quartz): 2.5 mg/m^3 (total dust); 0.8 mg/m^3 (respirable) (OSHA); 0.05 mg/m^3 (respirable - ACGIH); 0.1 mg/m^3 (O. Reg. 845)

Engineering Controls: Use ventilation and dust collection to control exposure to below applicable limits.

Respiratory Protection: Wear NIOSH N-95 Dust Mask.

Eye Protection: Eye protection (chemical goggles, safety glasses and/or face shield) should be worn where there is a risk of lime exposure. Contact lenses should not be worn when working with lime products

Hand Protection: Use clean dry gloves

Skin Protection: Cover body with suitable clothes (long sleeves shirts and trousers). Use over the ankle waterproof caustic resistant footwear

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State: Solid
Odor & Appearance: Odorless, white powder
pH: 12.4 in saturated water solution at 25 ^{o}C
Melting point: 1410 ^{o}C
Boiling point: 1565 ^{o}C
Vapor pressure: Non volatile
Vapor density: Non volatile
Relative density: 720-1130 kg/m^3
Solubility: 0.100 – 0.125 g/100 g – reactive with water to produce $Ca(OH)_2$ with large amount of heat generated. Soluble in acids, glycerin and sugar solutions

Product Name:	ENVIROLIME (continued)

10. STABILITY AND REACTIVITY

Stability:	Stable products, not very soluble.
Decomposition temperature:	580°C, forms calcium oxide (CaO) and water
Reactivity:	Reacts with acids to form calcium salts while generating heat. Reacts with carbon dioxide in air to form calcium carbonate.
Conditions to avoid:	Vicinity of incompatible materials
Incompatible materials:	Acids; reactive fluoridated, brominated or phosphorous compounds; aluminum (may form hydrogen gas), reactive powdered metals; organic acid anhydrides; nitro-organic compounds; interhalogenated compounds
Hazardous decomposition products:	Calcium oxide (CaO)

11. TOXICOLOGICAL INFORMATION

Toxicity:	LD_{50} oral (rat) for calcium hydroxide is 7340 mg/kg. This product is not listed by MSHA, OSHA, or IARC as a carcinogen, but this product may contain crystalline silica, which has been classified by IARC as (Group I) carcinogenic to humans when inhaled in the form of quartz or cristobalite. No reported Carcinogenicity, Reproductive Effects, Teratogenicity or Mutagenicity.
Exposure Limits:	Refer to Section 8.
Irritancy:	Can cause severe irritation of eyes, skin, respiratory tract and gastrointestinal tract.
Chronic Exposure:	Inhalation of silica can cause a chronic lung disorder, silicosis.

12. ECOLOGICAL INFORMATION

Alkaline substance that increases pH to a maximum of 12.4 in a saturated water solution at 25°C
Calcium hydroxide gradually reacts with CO_2 in air to form calcium carbonate ($CaCO_3$)
Calcium carbonate is ecologically neutral
Uncontrolled spillage in surface waters should be avoided since the increase pH could be detrimental to fish
Harmful to aquatic life in high concentration

13. DISPOSAL CONSIDERATIONS

Dispose according to federal, provincial/state and local environmental regulations.

Product Name:	ENVIROLIME (continued)

14. TRANSPORTATION INFORMATION

Classification:

TDG	Not listed for ground transportation
HMR	Not listed for ground transportation

TDG: Transportation of Dangerous Goods Regulation (CAN)
HMR: Hazardous Materials Regulation (USA)

15. REGULATORY INFORMATION

Symbol:

WHMIS RATING
D2A, E
NFPA RATING
HEALTH – 3 SPECIFIC HAZARD - ALK FLASH POINTS – 0 REACTIVITY –1
HMIS RATING
HEALTH – 2 SPECIFIC HAZARD - ALK FLASH POINTS – 0 REACTIVITY – 1

Risk Phrases:

Risk of serious damage to the eyes
Keep out of reach of children

Safety Phrases:

Keep storage container away from humidity
Avoid contact with skin and eyes. In case of contact with eyes, rinse immediately with water for at least 15 minutes

CPR (Canada):

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulation (CPR) of Canada and this MSDS contains all information required by the CPR.

16. MISCELLANEOUS OTHER INFORMATION

Lime dust can be removed from objects (such as vehicles) using rags dampened with dilute vinegar. After applying dilute vinegar, vehicles (especially chrome surfaces) must be washed with water.