Martin Marietta Materials

MATERIAL SAFETY DATA SHEET

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Effective Date: 5-08
Replaces: 6-10-99

I – PRODUCT AND COMPANY IDENTIFICATION

CHEMICAL NAME	CHEMICAL FORMULA	MOLECULAR WEIGHT
Ready Mix Concrete	Not Applicable	Not Applicable

TRADE NAME
Concrete

SYNONYMS
Mud, Cement, Portland Cement, Concrete

DOT IDENTIFICATION NO.
None

II – COMPOSITION/INFORMATION ON INGREDIENTS

COMPONENT(S) CHEMICAL NAME	CAS REGISTRY NO	% by weight (approx)	MSHA/OSHA PEL	ACGIH TLV-TWA
Portland Cement	65997-15-1	8.0	(T)15mg/m^3 (R) 5mg/m^3	#10mg/m^3
Fly Ash		2.4	N/A	N/A
Limestone Aggregate	1317-65-3	47	(T) 15 mg/m^3, (R) 5 mg/m^3	N/A
Sand		35	N/A	N/A
Quartz (Crystalline silica)*		<1	(R) 10 mg/m^3 /(% SiO_2 +2) §	(R) 0.025 mg/m^3
*Content of this material varies naturally	14808-60-7			

R): Respirable (T): Total, (C): Ceiling limit. §: Crystalline silica is normally measured as respirable dust. The OSHA standard also presents a formula for calculation of the PEL based on total dust: 30 mg/m^3 / (% SiO_2 +2). #: Particulate matter containing no asbestos and <1% crystalline silica;

III – HAZARDS IDENTIFICATION

Normally light grey, (can also be red, blue, black, green, white), viscous semi-solid, with graded sized aggregate.

Health Effects: The information below represents an overview of health effects caused by overexposure to one or more components in Ready-mix Concrete. The individual effects are described in Section XI.

Primary routes(s) of exposure: ■ Inhalation ■ Skin ■ Eye Contact □ Ingestion

EYE CONTACT: Contact with uncured concrete can injure the eye. A splash in the eye can cause smarting and burning sensation and may induce corneal edema (the victim may see colored rings or halos around lights).

INGESTION: Small amounts (a tablespoonful) swallowed during normal handling operations are not likely to cause injury. Ingestion of large amounts may cause gastrointestinal irritation and blockage.

INHALATION: Dusts may irritate the nose, throat, and respiratory tract by mechanical abrasion or corrosive action. Coughing, sneezing, chest pain, shortness of breath, inflammation of mucous membrane, and flu-like fever may occur following exposures in excess of appropriate exposure limits. Repeated excessive

exposure may cause pneumoconiosis, such as silicosis and other respiratory effects.

SKIN CONTACT: Uncured concrete can irritate the skin and may cause alkali burns. Repeated or prolonged contact may cause dermatitis. Individuals may develop an allergic dermatitis following contact with this product.

Silicosis:
Use of ready mix concrete for construction purposes is not believed to cause additional acute toxic effects. Repeated overexposures to respirable crystalline silica (quartz, cristobalite, tridymite) for periods as short as 6 months has caused acute silicosis.

Symptoms of acute silicosis include (but are not limited to): shortness of breath, cough, fever, weight loss, and chest pain. Acute silicosis is a rapidly progressive, incurable lung disease and is typically fatal.

Chronic exposure to respirable quartz-containing dust in excess of appropriate exposure limits has caused silicosis, a progressive pneumoconiosis (lung disease). Restrictive and/or obstructive lung function changes may result from chronic exposure.

Lung Cancer:
Crystalline silica is classified by the International Agency For Research on Cancer (IARC) as a carcinogenic to humans (Group 1). Prolonged and repeated breathing of silica may cause lung cancer.

Tuberculosis:
Silicosis increases the risk of Tuberculosis.

Autoimmune and Chronic Kidney Disease:
Some studies show excess number of cases of scleroderma, connective tissue disorders, lupus, rheumatoid arthritis, chronic kidney diseases and end-stage kidney disease in worker exposed to respirable crystalline silica.

Non-Malignant Respiratory Diseases (other than Silicosis):
Some studies show an increased incidence in chronic bronchitis and emphysema in workers exposed to crystalline silica.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE
Inhaling respirable dust and/or crystalline silica may aggravate existing respiratory system disease(s) and/or dysfunctions. Exposure to dust may aggravate existing skin and/or eye conditions. Smoking and obstructive / restrictive lung diseases may also exacerbate the effects of excessive exposure to this product.

IV – FIRST AID MEASURES

EYES: Flush eyes immediately with plenty of fresh water for at least 15 minutes, lifting the lower and upper lids occasionally. Seek medical attention immediately.

SKIN: Wash contaminated skin immediately with soap and water. Remove contaminated clothing at once. Obtain medical attention if irritation persists.

INHALATION: Remove to fresh air. If breathing is difficult, administer oxygen. If breathing has stopped, give artificial respiration. Keep person warm and quiet. OBTAIN MEDICAL ATTENTION IMMEDIATELY.

INGESTION: If person is conscious, give a large quantity of water and induce vomiting; however, never attempt to make an unconscious person drink or vomit. Get medical attention.

V – FIRE FIGHTING MEASURES

FLASHPOINT Not flammable	FLAMMABLE LIMITS IN AIR N/A

EXTINGUISHING AGENT
None required

UNUSUAL FIRE AND EXPLOSION HAZARD
Contact with powerful oxidizing agents may cause fire and/or explosions (see Section X of this MSDS).

VI – ACCIDENTAL RELEASE MEASURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED
Contain spilled material and do not allow to flow in to public sewers or water systems. Allow material to harden and transfer into containers for proper disposal.

Persons involved in cleaning should first follow the precautions defined in Section VII of the MSDS. Wet product should be removed from roads or other surfaces where it may interfere with traffic. Wet product should not be allowed to spill into sewers or drainage systems where it can harden and clog flow.

None of the components in this product are subject to the reporting requirements of Title III of SARA, 1986, and 40 CFR 372.

Material can be retained until it hardens, when it can be disposed of as common waste. However, disposal must be in compliance with all applicable federal, state, and local laws and regulations. Caution should be exercised to minimize the generation of dust during handling of hardened product.

VII – HANDLING AND STORAGE

Every attempt should be made to avoid skin and eye contact with Portland Cement. Respirable dust may be generated when hardened product is subjected to mechanical forces, such as in demolition work and surface treatment (sanding, grooving, chiseling, etc.).
Avoid contact with skin and eyes.
Do not store near food, beverages or smoking materials.
Do not stand on piles of materials; they may be unstable

VIII – EXPOSURE CONTROLS/PERSONAL PROTECTION

ENGINEERING CONTROLS
Ventilation: Ordinarily not required when working with wet product. Activities that generate dust from hardened product require the use of local exhaust or general ventilation adequate to maintain exposures below appropriate exposure limits.

Ample fresh water should always be readily available for skin and (emergency) eye washing. Clothing should be washed between uses. Respirable dust levels should be monitored regularly for activities which generate dust from hardened product. Dust levels in excess of appropriate exposure limits should be reduced by all feasible engineering controls, including (but not limited to) wet suppression, ventilation, process enclosures and enclosed employee work stations.

EYE/FACE PROTECTION
Safety glasses with side shields should be worn as minimum protection. Dust goggles should be worn when excessively (visible) dusty conditions are present or are anticipated. If product contacts the eyes, immediately wash the eyes with large

amounts of water, occasionally lifting the lower and upper lids. Get medical attention immediately. Contact lenses should not be worn when working with this material.

SKIN PROTECTION
Chemical resistant apron. Loose clothing, with the neck closed and sleeves rolled down. Safety shoes should be laced so that no openings are left through with concrete may reach the skin.

RESPIRATORY PROTECTION
Recommended when working in enclosed areas. A NIOSH/MSHA approved respirator is required if a TLV is exceeded.

GENERAL HYGIENE CONSIDERATIONS
There are no known hazards associated with this material when used as recommended. Following the guidelines in this MSDS are recognized as good industrial hygiene practices. Avoid breathing dust. Avoid skin and eye contact. Wash dust-exposed skin with soap and water before eating, drinking, smoking, and using toilet facilities. Wash work clothes after each use.

IX— PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE AND ODOR Normally light grey, (can also be red, blue, black, green, white), viscous semi-solid, with graded sized aggregate.	SPECIFIC GRAVITY. 2.28
BOILING POINT Not applicable	VAPOR DENSITY IN AIR (AIR = 1) Not applicable
VAPOR PRESSURE Not applicable	% VOLATILE, BY VOLUME No applicable
EVAPORATION RATE Not applicable	SOLUBILITY IN WATER Negligible

X – STABILITY AND REACTIVITY

STABILITY Stable	CONDITIONS TO AVOID Contact with incompatible materials (see below).

INCOMPATIBILITY (Materials to avoid)
Contact with powerful oxidizing agents such as fluorine, boron trifluoride, chlorine trifluoride, manganese trifluoride, and oxygen difluoride may cause fire and/or explosions. Silica dissolves in hydrofluoric acid producing a corrosive gas-silicon tetrafluoride. Wet Portland cement is caustic (pH approximately 12) and could react with strong acids.

HAZARDOUS DECOMPOSITION PRODUCTS
None known.

XI – TOXICOLOGICAL INFORMATION

This product is a mixture of components. The composition percentages are listed in Section II. Toxicological information for each component is listed below:

Chronic exposure to wet cement has caused chronic dermatitis, the symptoms of which may include erythema (reddening), skin irritation, and eczematous rashes. Drying, thickening, and cracking of the skin and nails may also occur. Irritated or broken skin is more likely to develop further complications such as ulcers and infection, and may increase the chance of absorbing toxic materials into the body through the skin.

Individuals who become allergically sensitized to hexavalent chromates may experience an allergic reaction upon subsequent contact with those compounds (delayed Type IV hypersensitivity reaction).

The chronic toxicity effects described above have been associated with exposure to wet cement. Once the product has set and hardened, these effects are extremely unlikely to occur; hardened cement base poses no known health hazard. If hardened product is subjected to mechanical force (such as in demolition work) which generate dust particles, exposure to respirable quartz dust is possible. Chronic exposure to respirable dust in excess of appropriate exposure limits has caused pneumoconiosis (lung disease). Chronic exposure to respirable quartz-containing dust in excess of appropriate exposure limits has caused silicosis, a progressive pneumoconiosis. Chronic tobacco smoking may further increase the risk of developing chronic lung problems.

Portland Cement:

Exposure Routes: inhalation, ingestion, skin and/or eye contact

Target Organs: Eyes, skin, respiratory system.

Acute Effect: Exposure to dry portland cement may cause drying of the skin and mild irritation, or more significant effects from the aggravation of other conditions. Wet portland cement is caustic (pH > 12) and dermal exposure may cause more severe skin effects, including thickening, cracking or fissuring of the skin. Eye exposures to portland cement may cause immediate or delayed irritation or inflammation of the cornea. Eye contact with larger amounts of dry powder or splashes of wet portland cement may cause effects ranging from moderate eye irritation to chemical burns and blindness. Inhalation of dry portland cement may cause irritation to the moist mucous membranes of the nose, throat and upper respiratory system, or may cause or aggravate certain lung diseases or conditions.

Chronic Effect: Prolonged exposure can cause severe skin damage in the form of chemical (caustic) burns. Portland Cement is not listed as carcinogen on the NTP, IARC or OSHA list of carcinogens, however Portland Cement contains trace amounts of hexavalent chromium [Cr(VI)] and certain chromium compounds which are listed on the NTP and IARC lists of carcinogens. The total amounts of chromium and chromium compounds in Portland Cement are typically less than 0.003% and hexavalent chromium less than 0.001%..

Note: Some individuals who are exposed to portland cement may exhibit an allergic response, which can result in symptoms ranging from mild rashes to severe skin ulcers. Cement dermatitis may be irritant contact dermatitis induced by the alkaline, abrasive, and hygroscopic (water-absorbing) properties of portland cement, or it may be allergic contact dermatitis elicited by an immunological reaction to Cr(VI), or it may be a combination of the two.

Fly Ash

Fly Ash is a mixture of components and is highly variable. The toxicology for this compound is encompassed below under Limestone due its similar chemical composition.

Limestone:

Exposure Route: Eyes, skin, inhalation, ingestion.

Target Organs: Eyes, skin, respiratory system.

Acute Effect: Direct eye and skin contact with dust may cause irritation by mechanical abrasion. Dusts may irritate the nose, throat, and respiratory tract by mechanical abrasion or corrosive action. Coughing, sneezing, chest pain, shortness of breath, inflammation of mucous membrane, and flu-like fever may occur following exposures in excess of appropriate exposure limits. Small amounts (a tablespoonful) swallowed during normal handling operations are not likely to cause injury. Ingestion of large amounts may cause gastrointestinal irritation and blockage.

Chronic Effect: Repeated exposure to respirable dust in excess of appropriate exposure limits has caused silicosis, a progressive pneumoconiosis (lung disease) and lung cancer. Restrictive and/or obstructive lung function changes may result form chronic exposure. Chronic tobacco smoking may further increase the risk of developing chronic lung problems

Sand:
See toxicology for Limestone (above)

Respirable crystalline silica (quartz):
ACGIH TLV= 0.025 mg/m^3

MSHA and OSHA PEL:
Crystalline quartz (respirable): PEL-TWA 10 mg/m^3/ (%SiO_2 + 2).

Other Particulates: TLV = 10 mg/m^3 (inhalable/total particulate, not otherwise classified), TLV = 3 mg/m^3 (respirable particulate, not otherwise classified), OSHA PEL = 15 mg/m^3 (total particulate, not otherwise regulated), OSHA PEL = 5 mg/m^3 (respirable particulate, not otherwise regulated)

ACGIH, MSHA, and OSHA have determined that adverse effects are not likely to occur in the workplace provided exposure levels do not exceed the appropriate exposure limits. Lower exposure limits may be appropriate for some individuals including persons with pre-existing medical conditions such as those described below.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE
Inhaling respirable dust and/or crystalline silica may aggravate existing respiratory system disease(s) and/or dysfunctions. Exposure to dust may aggravate existing skin and/or eye conditions.
Occupational exposure to free silica is known to produce silicosis, a chronic, disabling lung disease characterized by the formation of silica-containing nodules of scar tissue in the lungs. Simple silicosis, in which the nodules are less than 1 cm in diameter is generally asymptomatic but can be slowly progressive, even in the absence of continued exposure.

Silicosis leads to conditions such as lung fibrosis and reduced pulmonary function. The form and severity in which silicosis manifests itself depends in part on the type and extent of exposure to silica dusts: chronic, accelerated and acute forms are all recognized. In later stages the critical condition may become disabling and potentially fatal. Restrictive and / or obstructive changes in lung function may occur due to exposure. A risk associated with silicosis is development of pulmonary tuberculosis (silico-tuberculosis). Respiratory insufficiencies due to massive fibrosis and reduced pulmonary function, possibly with accompanying heart failure, are other potential causes of death due to silicosis.

Symptoms of Silicosis: Not all individuals with silicosis will exhibit symptoms (signs) of the disease. However, silicosis is progressive, and symptoms can appear at any time, even years after exposures have ceased. Symptoms of silicosis may include (but are not limited to): Shortness of breath; difficulty breathing with or without exertion; coughing; diminished work capacity; diminished chest expansion; reduction of lung volume; right heart enlargement and/or failure. Persons with silicosis have an increased risk of pulmonary tuberculosis infection.

Respirable dust containing newly broken particles has been shown to be more hazardous to animals in laboratory tests than respirable dust containing older silica particles of similar size. Respirable silica particles which had aged for sixty days or more showed less lung injury in animals than equal exposures of respirable dust containing newly broken pieces of silica.

There are reports in the literature suggesting that excessive crystalline silica exposure may be associated with adverse health effects involving the kidney, scleroderma (thickening of the skin caused by swelling and thickening of fibrous tissue) and other autoimmune disorders. However, this evidence has been obtained primarily from case reports involving individuals working in high exposure situations or those who have already developed silicosis; and therefore, this evidence does not conclusively prove a casual relationship between silica or silicosis and these adverse health effects. Several studies of persons with silicosis also indicate increased risk of developing lung cancer, a risk that increases with the duration of exposure. Many of these studies of silicosis do not account for lung cancer confounders, especially smoking. In October 1996, an IARC Working group re-assessing crystalline silica, a component of this product, designated crystalline silica as carcinogenic (Group 1). The NTP indicates that crystalline silica is reasonably anticipated to be a carcinogen (Group 2). These classifications are based on sufficient evidence of carcinogenicity in certain experimental animals and on selected epidemiological studies of workers exposed to crystalline silica. Crystalline silica in October 1996 was listed on the Safe Drinking Water and Toxic Enforcement ACT of 1986 (California Proposition 65) as a chemical known to the state to cause cancer or reproductive toxicity.

XII – ECOLOGICAL INFORMATION

No data available**.**

XIII – DISPOSAL CONSIDERATIONS

WASTE DISPOSAL METHOD
Landfill waste materials at approved sites. Dispose of waste materials only in accordance with applicable federal, state, and local laws and regulation.

XIV – TRANSPORT INFORMATION

DOT HAZARD CLASSIFICATION
None

PLACARD REQUIRED
None

LABEL REQUIRED
Label must contain warning to avoid the inhalation of dust due to silica dioxide content.

XV – REGULATORY INFORMATION

Crystalline silica, a component of this product, is on the NTP and IARC carcinogen lists, but not on the OSHA carcinogen list. Ready mix concrete contains trace amounts of hexavalent chromium [Cr(VI)] and certain chromium compounds which are listed in the NTP and IARC lists of carcinogens.

In October 1996, an IARC Working group re-assessing crystalline silica, a component of this product, designated crystalline silica as a human carcinogen (Group 1 Carcinogen).

Crystalline silica in October 1996 was listed on the Safe Drinking Water and Toxic Enforcement ACT of 1986 (California Proposition 65) as chemical known to the state to cause cancer or reproductive toxicity.

XVI – OTHER INFORMATION

ACGIH: American Conference of Governmental Industrial Hygienists
CFR: US Code of Federal Regulations
DOT: US Department of Transportation
IARC: International Agency for Research on Cancer
IDLH: Immediately Dangerous to Life and Health
NIOSH: National Institute for Occupational Safety and Health, US Department of Health and Human Services
NTP: National Toxicology Program
OSHA: Occupational Safety and Health Administration, US Department of Labor
PEL: Permissible Exposure Limit
SARA Title III: Title III of the Superfund Amendments and Reauthorization Act, 1986
TLV: Threshold Limit Value
TWA: Time-weighted Average

FOR FURTHER INFORMATION	CONTACT:	Martin Marietta Aggregates Manager-Safety 2710 Wycliff Road Raleigh, NC 27607 919/781-4550 HOURS; 8 AM – 5 PM (EST)

DATE OF PREPARATION 5/08

NOTICE: Martin Marietta Materials believes that the information contained on this Material Safety Data Sheet is accurate. The suggested precautions and recommendations are based on recognized good work practices and experience as of the date of publication. They are not necessarily all-inclusive or fully adequate in every circumstance as not all use circumstances can be anticipated. Also, the suggestions should not be confused with nor followed in violation of applicable laws, regulation, rules or insurance requirement. However, product must not be used in a manner which could result in harm.

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