



SECTION I – IDENTIFICATION		
PRODUCT IDENTIFIER Limestone/Dolomite	TRADE NAME Crushed Stone	OTHER SYNONYMS Sweet Rock, Aggregate, Aglime, Barn Lime, Coverstone, Fluing Agent, Flexible Base, Manufactured Sand, Mineral Filler, Screenings, Limestone CTB, Dolomite
RECOMMENDED USE AND RESTRICTION ON USE Used for construction purposes. This product is not intended or designed for, and should not be used as an abrasive blasting medium or for foundry applications.		
MANUFACTURER/SUPPLIER INFORMATION Martin Marietta 4123 Parklake Ave Raleigh, North Carolina 27612 Phone: 919-781-4550  For additional health, safety or regulatory information and other emergency situations, call 919-781-4550.		

SECTION II – HAZARD(S) IDENTIFICATION	
<p>HAZARD CLASSIFICATION:            Category 1A Carcinogen            Category 1 Specific Target Organ Toxicity (STOT) following repeated exposures            Category 1 Serious Eye Damage            Category 2 Skin Irritant</p>	 
<p>SIGNAL WORD: DANGER</p>	
<p>HAZARD STATEMENTS:            May cause cancer by inhalation.            Causes damage to lungs, kidneys and autoimmune system through prolonged or repeated exposure by inhalation.            Causes skin irritation and serious eye damage.</p>	
<p>PRECAUTIONARY STATEMENTS            Do not handle this product until the safety information presented in this SDS has been read and understood.            Do not breathe dusts or mists generated by this product. Do not eat, drink or smoke while manually handling this product.</p> <p>If on skin: Rinse skin thoroughly after manually handling and wash contaminated clothing if there is potential for direct skin contact before reuse.            If swallowed: If gastrointestinal discomfort occurs and if the person is conscious, give a large quantity of water and induce vomiting; however, never attempt to make an unconscious person drink or vomit.            If inhaled excessively: Remove the person to fresh air and keep comfortable for breathing.            If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do, and continue rinsing.            If exposed, concerned, unwell or irritation of the eyes, skin, mouth or throat/nasal passage persist or develop later: Get medical attention.            Wear eye protection and respiratory protection following this SDS, National Institute for Occupational Safety and Health (NIOSH) guidelines and other applicable regulations. Use protective gloves if manually handling the product.</p> <p>Avoid creating dust when handling, using or storing. Use with adequate ventilation to keep exposure below recommended exposure limits.</p> <p>Dispose of product in accordance with local, regional, national or international regulations.</p> <p>Please refer to Section XI for details of specific health effects of the components.</p>	

**SECTION III – COMPOSITION/INFORMATION ON INGREDIENTS**

COMPONENT(S) CHEMICAL NAME	CAS REGISTRY NO	% By weight (approx) <sup>1</sup>
Calcium Carbonate, CaCO <sub>3</sub>	1317-65-3	30-100
Magnesium Carbonate, MgCO <sub>3</sub>	546-93-0	0.1-60
Calcium Oxide, CaO	1305-78-8	0.1-40
Magnesium Oxide, MgO	1309-48-4	0.1-30
Silicon Dioxide <sup>2</sup> , SiO <sub>2</sub>	7631-86-9/14808-60-7	0.1-60
Aluminum Oxide, Al <sub>2</sub> O <sub>3</sub>	1344-28-1	0.1-1
Ferric Oxide, Fe <sub>2</sub> O <sub>3</sub>	1309-37-1	0.1-1.5
Sodium Oxide, Na <sub>2</sub> O	1313-59-3	0.1-1
Potassium Oxide, K <sub>2</sub> O	12136-45-7	0.1-1

1: The composition varies naturally; 2: The composition of SiO<sub>2</sub> may be up to 100% crystalline silica

**SECTION IV – FIRST-AID MEASURES**

**INHALATION:** If excessive inhalation occurs, move the person to fresh air. Dust in the throat and nasal passages should clear spontaneously. Contact a physician if breathing difficulty is experienced, or irritation persists or develops later.

**EYES:** Immediately flush eye(s) with plenty of clean water for at least 15 minutes, while holding the eyelid(s) open. Occasionally lift the eyelid(s) to ensure thorough rinsing. Remove contact lenses, if present and easy to do, and continue rinsing. Beyond flushing, do not attempt to remove material from the eye(s). Contact a physician if irritation persists or develops later.

**SKIN:** Rinse skin with soap and water after manually handling and wash contaminated clothing if there is potential for direct skin contact before reuse. Contact a physician if irritation persists or develops later.

**INGESTION:** If gastrointestinal discomfort occurs and if the person is conscious, give a large quantity of water and induce vomiting; however, never attempt to make an unconscious person drink or vomit. If gastrointestinal discomfort persists or develops later, get medical attention.

**SIGNS AND SYMPTOMS OF EXPOSURE:** Direct skin and eye contact with dust generated may cause irritation by mechanical abrasion or irritant effect. Some components of the product are also known to cause corrosive effects to skin, eyes and mucous membranes. Ingestion of large amounts may cause gastrointestinal irritation and blockage. Inhalation of dust may irritate nose, throat, mucous membranes and respiratory tract by mechanical abrasion or irritant action. Coughing, sneezing, chest pain, shortness of breath, inflammation of mucous membrane, fibrosis 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.

There are generally no signs or symptoms of exposure to respirable crystalline silica (RCS), one of the components of the product. Often, chronic silicosis has no symptoms. The symptoms of chronic silicosis, if present, are shortness of breath, wheezing, cough and sputum production. The symptoms of acute silicosis which can occur with exposures to very high concentrations of RCS over a very short time period, sometimes as short as 6 months, are the same as those associated with chronic silicosis; additionally, weight loss and fever may also occur. The symptoms of scleroderma, an autoimmune disease, include thickening and stiffness of the skin, particularly in the fingers, shortness of breath, difficulty swallowing and joint problems.

**SECTION V – FIRE-FIGHTING MEASURES****EXTINGUISHING AGENT**

Not flammable; use extinguishing media compatible with surrounding fire.

**UNUSUAL FIRE AND EXPLOSION HAZARD**

Contact with powerful oxidizing agents may cause fire and/or explosions (see Section X of this SDS). While individual components are known to react vigorously with water to produce heat, this is not expected from the product.

**SPECIAL FIRE FIGHTING PROCEDURES**

None known

**HAZARDOUS COMBUSTION PRODUCTS**

None known

**SECTION VI – ACCIDENTAL RELEASE MEASURES****STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED**

Persons involved in cleaning should first follow the precautions defined in Section VII of the SDS. Spilled materials, where dust can be generated, may overexpose cleanup personnel to RCS-containing dust and other components that may pose inhalation hazards. Do not dry sweep spilled material. Collect the material using a method that does not produce dust such as a High-Efficiency Particulate Air (HEPA) vacuum or thoroughly wetting down the dust before cleaning up, if feasible. Wear appropriate personal protective equipment (PPE) as specified in Section VIII including appropriate respirators during and following clean up or whenever airborne dust concentrations above the occupational exposure limits (OELs) are present, to ensure worker exposures remain below OELs (Refer to Section VIII).

Place the dust in a covered container appropriate for disposal. Dispose of the dust according to federal, state and local regulations.

This product and the components in this product are not subject to the reporting requirements of SARA Title III Section 313, and 40 CFR 372.

**SECTION VII – HANDLING AND STORAGE**

This product is not intended or designed for, and should not be used as an abrasive blasting medium or for foundry applications.

Follow protective controls set forth in Section VIII of this SDS when handling this product. Dust containing RCS and other components that may be corrosive/irritant may be generated during processing, handling and storage. Use good housekeeping procedures to prevent the accumulation of dust in the workplace.

Do not breathe dust. Avoid contact with skin and eyes. Do not store near food or beverages or smoking materials. Do not stand on piles of materials; it may be unstable.

Use adequate ventilation and dust collection equipment as needed to ensure that the airborne dust levels are below the appropriate OELs. If the airborne dust levels are above the appropriate OELs, use respiratory protection during the establishment of engineering controls. Refer to Section VIII - Exposure Controls/Personal Protection for further information.

In accordance with Occupational Safety and Health Administration's (OSHA's) Hazard Communication Standard (29 CFR 1910.1200, 1915.99, 1917.28, 1918.90, 1926.59, 1928.21), state, and/or local right-to-know laws and regulations, familiarize your employees with this SDS and the information contained herein. Warn your employees, your customers and other third parties (in case of resale or distribution to others) of the potential health risks associated with the use of this product. Train your employees in the appropriate use of PPE and engineering controls, which will reduce their risks of exposure.

See also ASTM International standard practice E 1132-13E1, "Standard Practice for Health Requirements Relating to Occupational Exposure to Respirable Crystalline Silica."

For safe handling and use of this product for Hydraulic Fracturing, please see the OSHA/NIOSH Hazard Alert Worker Exposure to Silica during Hydraulic Fracturing DHHS (NIOSH) Publication No. 2012-166 (2012).

[http://www.osha.gov/dts/hazardalerts/hydraulic\\_frac\\_hazard\\_alert.pdf](http://www.osha.gov/dts/hazardalerts/hydraulic_frac_hazard_alert.pdf)

**SECTION VIII – EXPOSURE CONTROLS/PERSONAL PROTECTION**

**Airborne OELs for Components of Limestone/Dolomite:**

COMPONENT(S) CHEMICAL NAME	OSHA PEL <sup>1</sup>	MSHA PEL <sup>2</sup>	ACGIH TLV-TWA <sup>3</sup>	NIOSH REL <sup>4</sup>
Calcium Carbonate, CaCO <sub>3</sub>	<sup>T</sup> 15 mg/m <sup>3</sup> , <sup>R</sup> 5 mg/m <sup>3</sup>	<sup>5,T</sup> 10 mg/m <sup>3</sup>	-	<sup>T</sup> 10 mg/m <sup>3</sup> , <sup>R</sup> 5 mg/m <sup>3</sup>
Magnesium Carbonate, MgCO <sub>3</sub>	<sup>6,T</sup> 15 mg/m <sup>3</sup> , <sup>R</sup> 5 mg/m <sup>3</sup>	-	-	<sup>6,T</sup> 10 mg/m <sup>3</sup> , <sup>R</sup> 5 mg/m <sup>3</sup>
Calcium Oxide, CaO	5 mg/m <sup>3</sup>	5 mg/m <sup>3</sup>	2 mg/m <sup>3</sup>	2 mg/m <sup>3</sup>
Magnesium Oxide, MgO	<sup>7</sup> 15 mg/m <sup>3</sup>	<sup>7</sup> 10 mg/m <sup>3</sup>	<sup>1</sup> 10 mg/m <sup>3</sup>	-
Silicon Dioxide <sup>8</sup> , SiO <sub>2</sub>	<sup>9,R</sup> 0.05 mg/m <sup>3</sup> <sup>10,R</sup> 10 mg/m <sup>3</sup> /(% SiO <sub>2</sub> +2)	<sup>R,11</sup> 0.05 mg/m <sup>3</sup>	<sup>R,12</sup> 0.025 mg/m <sup>3</sup>	<sup>R,13</sup> 0.05 mg/m <sup>3</sup>
Aluminum Oxide, Al <sub>2</sub> O <sub>3</sub>	-	<sup>14</sup> 10 mg/m <sup>3</sup>	<sup>15,R</sup> 1 mg/m <sup>3</sup>	-
Ferric Oxide, Fe <sub>2</sub> O <sub>3</sub>	<sup>16</sup> 10 mg/m <sup>3</sup>	<sup>16</sup> 10 mg/m <sup>3</sup>	<sup>R</sup> 5 mg/m <sup>3</sup>	<sup>17</sup> 5 mg/m <sup>3</sup>
Sodium Oxide <sup>18</sup> , Na <sub>2</sub> O	2 mg/m <sup>3</sup>	<sup>C</sup> 2 mg/m <sup>3</sup>	<sup>C</sup> 2 mg/m <sup>3</sup>	<sup>C</sup> 2 mg/m <sup>3</sup>
Potassium Oxide <sup>19</sup> , K <sub>2</sub> O	-	-	<sup>C</sup> 2 mg/m <sup>3</sup>	<sup>C</sup> 2 mg/m <sup>3</sup>

- 1: OSHA’s Permissible Exposure Limits - Annotated Tables Z-1 and Z-3
- 2: MSHA Handbook Series, Handbook Number PH20-V-4, Health Inspection Procedures Handbook, Attachment - Contaminant Index, December 2020
- 3: 2024 ACGIH TLVs and BEIs Based on Documentation of the Threshold Limit Values for Chemical Substances and Physical Agents
- 4: NIOSH Pocket Guide to Chemical Hazards, last reviewed February 18, 2020
- 5: If respirable fraction is >1% quartz, then MSHA PEL is 10 mg/m<sup>3</sup>/(% SiO<sub>2</sub>+2)
- 6: Listed as Magnesite, a naturally occurring form of MgCO<sub>3</sub>
- 7: As Magnesium Oxide Fume
- 8: The OELs provided are for crystalline silica. Refer to Section X for thermal stability information.
- 9: OSHA has also established an action level (AL) of 0.025 mg/m<sup>3</sup> for RCS.
- 10: This standard applies to any operations or sectors for which the RCS standard, 1910.1053, is stayed or is otherwise not in effect. If the formula is used for PEL calculation, then the PEL for cristobalite and tridymite is half the value of quartz PEL.
- 11: The MSHA Standard for Lowering Miners’ Exposure to Respirable Crystalline Silica and Improving Respiratory Protection was issued on April 18, 2024, was effective from June 17, 2024 and has a compliance date of April 8, 2026 for metal and nonmetal operators. The MSHA PEL for RCS, starting April 8, 2026 is presented in the table and the AL will be 0.025 mg/m<sup>3</sup>. Until then, the limit for silica-containing dust of 10 mg/m<sup>3</sup>/(% SiO<sub>2</sub>+2) will be applicable.
- 12: The ACGIH TLV for RCS as cristobalite is equal to the TLV for quartz. In 2005, ACGIH withdrew the TLV for tridymite.
- 13: The NIOSH REL for crystalline silica as cristobalite and tridymite is the same as for quartz.
- 14: Dust and Fume
- 15: Limits based on Aluminum Metal and Insoluble Compounds
- 16: As Iron Oxide Fume
- 17: Dust and fume, as Iron
- 18: Based on Sodium Hydroxide
- 19: Based on Potassium Hydroxide
- R: Respirable Fraction
- T: Total Dust
- I: Inhalable Fraction
- C: Ceiling Limit

**Airborne OELs for Inert/Nuisance Dust:**

Standard	Respirable Dust	Total Dust
OSHA PEL (as Inert or Nuisance Dust or Particulates Not Otherwise Regulated)	5 mg/m <sup>3</sup>	15 mg/m <sup>3</sup>
MSHA PEL (Dust < 1% quartz)	10 mg/m <sup>3</sup>	10 mg/m <sup>3</sup>
ACGIH TLV (as Particles Not Otherwise Specified)	3 mg/m <sup>3</sup>	*10 mg/m <sup>3</sup>

Note: The limits for Inert Dust are provided as guidelines. Nuisance dust is limited to particulates not known to cause systemic injury or illness.  
\* The TLV provided is for inhalable particles not otherwise specified.

**ENGINEERING CONTROLS**

Ventilation: Use local exhaust, general ventilation or natural ventilation adequate to maintain exposures below appropriate OELs.

**SECTION VIII – EXPOSURE CONTROLS/PERSONAL PROTECTION, CONT'D.**

Other control measures: Respirable dust and crystalline silica levels should be monitored regularly. Dust and crystalline silica levels in excess of appropriate OELs should be reduced by implementing feasible engineering controls, including (but not limited to) dust suppression (wetting), ventilation, process enclosure 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 irritation persists, get medical attention immediately. There is potential for severe eye irritation if exposed to excessive concentrations of dust for those using contact lenses.

**SKIN PROTECTION**

Use appropriate protective gloves if manually handling the product.

**RESPIRATORY PROTECTION****Respirator Recommendations:**

For concentration of components that exceed or are likely to exceed appropriate OELs, a NIOSH-approved particulate filter respirator must be worn. Respirator use must comply with applicable MSHA or OSHA standards, which include provisions for a user training program, respirator repair and cleaning, respirator fit testing, and other requirements. For additional information contact NIOSH at 1-800-356-4674 or visit the website: <http://www.cdc.gov/niosh/npg> (search for the relevant component). See also ANSI standard Z88.2 (latest revision) "American National Standard for Respiratory Protection," 29 CFR 1910.134 and 1926.103, and 42 CFR 84.

Emergency or planned entry into unknown concentrations or immediately dangerous to life or health (IDLH) conditions: A self-contained breathing apparatus (SCBA) that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode or any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus.

Escape from unknown or IDLH conditions: An air-purifying, full facepiece respirator with a high-efficiency particulate (100-series) filter or any appropriate escape-type, self-contained breathing apparatus.

If the workplace airborne crystalline silica concentration is unknown for a given task, conduct air monitoring to determine the appropriate level of respiratory protection to be worn. Consult with a certified industrial hygienist, your insurance risk manager or MSHA/OSHA for detailed information. Ensure appropriate respirators are worn, as needed, during and following the task, including clean up or whenever airborne dust concentrations exceeding OELs are expected to be present.

**GENERAL HYGIENE CONSIDERATIONS**

There are no known hazards associated with this material when used as recommended. Following the guidelines in this SDS is recognized as good industrial hygiene practice. 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 if there is potential for direct skin contact.

**SECTION IX— PHYSICAL AND CHEMICAL PROPERTIES**

<b>PHYSICAL STATE</b> Mixture of fine to coarse particles	<b>COLOR</b> White to gray
<b>ODOR</b> Odorless to musty odor	<b>MELTING POINT/FREEZING POINT</b> Not applicable
<b>BOILING POINT AND RANGE</b> Not applicable	<b>FLAMMABILITY</b> Not flammable
<b>LOWER AND UPPER EXPLOSION LIMIT/ FLAMMABILITY LIMIT</b> Not applicable	<b>FLASH POINT</b> Not applicable

**SECTION IX— PHYSICAL AND CHEMICAL PROPERTIES, CONT'D**

AUTOIGNITION TEMPERATURE Not applicable	DECOMPOSITION TEMPERATURE Not applicable
pH Not applicable	KINEMATIC VISCOSITY Not applicable
SOLUBILITY IN WATER Insoluble	PARTITION COEFFICIENT: N-OCTANOL/WATER Not applicable
VAPOR PRESSURE Not applicable	DENSITY/RELATIVE DENSITY 2.5-2.82
RELATIVE VAPOR DENSITY Not applicable	PARTICLE CHARACTERISTICS Angular particles ranging in size from powder to small stones

**SECTION X – STABILITY AND REACTIVITY**

STABILITY Stable	CONDITIONS TO AVOID Contact with incompatible materials (see below).
<b>THERMAL STABILITY</b> If crystalline silica (quartz) is heated to more than 870°C (1598°F), it can change to a form of crystalline silica known as tridymite, and if crystalline silica (quartz) is heated to more than 1470°C (2678°F), it can change to a form of crystalline silica known as cristobalite.	
<b>INCOMPATIBILITY (Materials to avoid)</b> Contact of quartz with powerful oxidizing agents such as fluorine, boron trifluoride, chlorine trifluoride, manganese trifluoride, and oxygen difluoride may cause fire and/or explosions. One of the components rapidly reacts with hydrochloric acid to form carbon dioxide and magnesium chloride. While individual components are known to react vigorously with water to produce heat, this is not expected from the product.	
<b>HAZARDOUS DECOMPOSITION PRODUCTS</b> Silica dissolves in hydrofluoric acid producing a corrosive gas - silicon tetrafluoride.	
<b>HAZARDOUS POLYMERIZATION</b> Not known to polymerize	

**SECTION XI – TOXICOLOGICAL INFORMATION**

<p>Health Effects: The information below represents an overview of health effects caused by overexposure to one or more components in limestone/dolomite.</p> <p>Primary routes(s) of exposure:   <input checked="" type="checkbox"/> Inhalation                      <input type="checkbox"/> Skin                      <input checked="" type="checkbox"/> Ingestion</p> <p><b>EYE CONTACT:</b> Direct contact with dust may cause irritation by mechanical abrasion or corrosive action. Conjunctivitis may occur.</p> <p><b>SKIN CONTACT:</b> Direct contact may cause irritation by mechanical abrasion or irritant action. Some components of material are also known to cause corrosive effects to skin and mucous membranes.</p> <p><b>SKIN ABSORPTION:</b> Not expected to be a significant route of exposure.</p> <p><b>INGESTION:</b> 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.</p> <p><b>INHALATION:</b> Dust generated from this product may irritate nose, throat, mucous membranes and respiratory tract by mechanical abrasion and/or irritant action. Coughing, sneezing, chest pain, shortness of breath, inflammation of mucous membrane, fibrosis and flu-like fever may occur following exposures in excess of appropriate OELs.</p>
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## SECTION XI – TOXICOLOGICAL INFORMATION, CONT'D.

### MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE

Inhaling respirable dust and/or crystalline silica may aggravate existing respiratory system disease(s) (e.g., bronchitis, emphysema, chronic obstructive pulmonary disease) 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.

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

**Silicon Dioxide:** It is comprised of amorphous and crystalline forms of silica. In some batches, crystalline silica may represent up to 100% of silicon dioxide.

Exposure route: Eyes, respiratory system.

Target organs: Eyes, skin, respiratory system.

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

#### A. SILICOSIS

The major concern is silicosis (lung disease), caused by the inhalation and retention of RCS dust. 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 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.

Chronic or Ordinary Silicosis is the most common form of silicosis and can occur after many years of exposure to levels above the OELs for airborne RCS dust. Not all individuals with silicosis will exhibit symptoms (signs) of the disease. 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; heart enlargement and/or failure. It is further defined as either simple or complicated silicosis.

Simple Silicosis is characterized by lung lesions (shown as radiographic opacities) less than 1 centimeter in diameter, primarily in the upper lung zones. Often, simple silicosis is not associated with symptoms, detectable changes in lung function or disability. Simple silicosis may be progressive and may develop into complicated silicosis or progressive massive fibrosis (PMF).

Complicated Silicosis or PMF is characterized by lung lesions (shown as radiographic opacities) greater than 1 centimeter in diameter. Although there may be no symptoms associated with complicated silicosis or PMF, the symptoms, if present, are shortness of breath, wheezing, cough and sputum production. Complicated silicosis or PMF may be associated with decreased lung function and may be disabling. Advanced complicated silicosis or PMF may lead to death. Advanced complicated silicosis or PMF can result in heart disease (cor pulmonale) secondary to the lung disease.

Accelerated Silicosis can occur with exposure to high concentrations of RCS over a relatively short period; the lung lesions can appear within five (5) years of the initial exposure. The progression can be rapid. Accelerated silicosis is similar to chronic or ordinary silicosis, except that the lung lesions appear earlier and the progression is more rapid.

Acute Silicosis can occur with exposures to very high concentrations of RCS over a very short time period, sometimes as short as a few months. The symptoms of acute silicosis include progressive shortness of breath, fever, cough and weight loss. Acute silicosis is a rapidly progressive, incurable lung disease and is typically fatal.

#### B. CANCER

IARC - The International Agency for Research on Cancer ("IARC") concluded that there is "*sufficient evidence* in humans for the carcinogenicity of crystalline silica in the form of quartz or cristobalite," there is "*sufficient evidence* in experimental animals for the carcinogenicity of quartz dust," and that there is "*limited evidence* in experimental animals for the carcinogenicity of tridymite dust

**SECTION XI – TOXICOLOGICAL INFORMATION, CONT'D.**

and cristobalite dust.” The overall IARC evaluation was that “crystalline silica inhaled in the form of quartz or cristobalite dust is *carcinogenic to humans (Group 1)*.” The IARC evaluation noted that not all industrial circumstances studied evidenced carcinogenicity. The monograph also stated that “Carcinogenicity may be dependent on inherent characteristics of the crystalline silica or on external factors affecting its biological activity or distribution of its polymorphs.” For further information on the IARC evaluation, see IARC Monographs on the Evaluation of Carcinogenic Risks to Humans, Volume 100C, “Silica Dust, Crystalline, in the Form of Quartz or Cristobalite” (2012).

NTP - In its Eleventh Annual Report on Carcinogens, concluded that RCS is known to be a human carcinogen, based on sufficient evidence of carcinogenicity from studies in humans indicating a causal relationship between exposure to RCS and increased lung cancer rates in workers exposed to crystalline silica dust.

CALIFORNIA PROPOSITION 65 - Crystalline silica in October 1996 was listed on the Safe Drinking Water and Toxic Enforcement Act of 1986 as a chemical known to the state to cause cancer.

There have been many articles published on the carcinogenicity of crystalline silica, which the reader should consult for additional information; the following are examples of recently published articles: (1) “The Effect of Silica Exposure on the Risk of Lung Cancer: A Dose-Response Meta-Analysis”, *Cancer Epidemiology*, (75) 102024 (2021); (2) “Dose-Response Meta-Analysis of Silica and Lung Cancer”, *Cancer Causes Control*, (20):925-33 (2009); (3) “Occupational Silica Exposure and Lung Cancer Risk: A Review of Epidemiological Studies 1996-2005”, *Ann Oncol*, (17) 1039-50 (2006); (4) “Lung Cancer Among Industrial Sand Workers Exposed to Crystalline Silica”, *Am J Epidemiol*, (153) 695-703 (2001); (5) "Is Silicosis Required for Silica-Associated Lung Cancer?", *American Journal of Industrial Medicine*, (37) 252- 259 (2000); (6) " Silica, Silicosis, and Lung Cancer: A Risk Assessment", *American Journal of Industrial Medicine*, (38) 8-18 (2000); (7) "Silica, Silicosis, and Lung Cancer: A Response to a Recent Working Group Report", *Journal of Occupational and Environmental Medicine*, (42) 704-720 (2000); (8) "Crystalline Silica and The Risk of Lung Cancer in The Potteries", *Occup Environ Med*, (55) 779-785 (1998).

**C. AUTOIMMUNE DISEASES**

There is evidence that exposure to RCS (without silicosis) or that the disease silicosis may be associated with the increased incidence of several autoimmune disorders including: scleroderma, systemic lupus erythematosus, rheumatoid arthritis, and diseases affecting the kidneys. For a review of the subject, the following may be consulted: (1) “Systematic Review and Meta-Analysis on the Association of Occupational Exposure to Free Crystalline Silica and Rheumatoid Arthritis”, *Clin Rev Allergy Immunol*, (62) 333-345 (2022); (2) “Systematic review and Meta-Analysis of Epidemiological Studies on the Association of Occupational Exposure to Free Crystalline Silica and Systemic Lupus Erythematosus”, (60) 81-91 (2021); (3) “The Association between Occupational Exposure to Silica and Risk of Developing Rheumatoid Arthritis: A Meta-Analysis”, *Saf Health Work*, (11) 136-142 (2020); (4) “Occupational Silica Exposure as a Risk Factor for Scleroderma: A Meta-Analysis”, *Int Arch Occup Environ Health*, (83) 763-9 (2010); (5) “Antinuclear Antibody and Rheumatoid Factor in Silica-Exposed Workers”, *Arh Hig Rada Toksikol*, (60) 185-90 (2009); (6) "Occupational Exposure to Crystalline Silica and Autoimmune Disease", *Environmental Health Perspectives*, (107) Supplement 5, 793-802 (1999); (7) "Occupational Scleroderma", *Current Opinion in Rheumatology*, (11) 490-494 (1999); (8) “Connective Tissue Disease and Silicosis”, *Am J Ind Med*, (35), 375-381 (1999).

**D. TUBERCULOSIS**

Individuals with silicosis are at increased risk to develop pulmonary tuberculosis, if exposed to persons with tuberculosis. The following may be consulted for further information: (1) “The Association between Silica Exposure, Silicosis and Tuberculosis: A Systematic Review and Meta-Analysis”, *BMC Public Health*, (21) 953 (2021); (2) “Tuberculosis and Silicosis: Epidemiology, Diagnosis and Chemoprophylaxis”, *J Bras Pneumol*, (34) 959-66 (2008); (3) *Occupational Lung Disorders*, Third Edition, Chapter 12, entitled "Silicosis and Related Diseases", Parkes, W. Raymond (1994); (4) "Risk of Pulmonary Tuberculosis Relative to Silicosis and Exposure to Silica Dust in South African Gold Miners," *Occup Environ Med*, (55) 496-502 (1998); (5) “Occupational Risk Factors for Developing Tuberculosis”, *Am J Ind Med*, (30) 148-154 (1996).

**E. KIDNEY DISEASE**

There is evidence that exposure to RCS (without silicosis) or that the disease silicosis is associated with the increased incidence of kidney diseases, including end stage renal disease. For additional information on the subject, the following may be consulted: (1) “Occupational Exposure to Respirable Crystalline Silica and Chronic Non-Malignant Renal Disease: Systematic Review and



**SECTION XI – TOXICOLOGICAL INFORMATION, CONTD.**

Meta-Analysis”, *Int Arch Occup Environ Health*, (90) 555-574 (2017); (2) “Mortality from Lung and Kidney Disease in a Cohort of North American Industrial Sand Workers: An Update”, *Ann Occup Hyg*, (49) 367-73 (2005); (3) “Kidney Disease and Arthritis in a Cohort Study of Workers Exposed to Silica”, *Epidemiology*, (12) 405-412 (2001); (4) “Kidney Disease and Silicosis”, *Nephron*, (85) 14-19 (2000); (5) “End Stage Renal Disease Among Ceramic Workers Exposed to Silica”, *Occup Environ Med*, (56) 559-561 (1999).

**F. NON-MALIGNANT RESPIRATORY DISEASES**

NIOSH has cited the results of studies that report an association between dusts found in various mining operations and non-malignant respiratory disease, particularly among smokers, including bronchitis, emphysema, and small airways disease. For additional information on the subject, the following may be consulted: “Respirable Quartz Dust Exposure and Airway Obstruction: A Systematic Review and Meta-Analysis”, *Occup Environ Med*, (71) 583-9 (2014); “NIOSH Hazard Review – Health Effects of Occupational Exposure to Respirable Crystalline Silica”, (2002), available from NIOSH, 4676 Columbia Parkway, Cincinnati, OH 45226.

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.

More information on the effects of crystalline silica exposure may be obtained from OSHA (website: <http://www.osha.gov>) or from NIOSH (website: <http://www.cdc.gov/niosh>).

**Calcium Carbonate:**

Exposure route: Inhalation, skin/eye contact.

Target organs: Eyes, skin, respiratory system.

Acute effect: Irritation of the eyes, skin and respiratory system and cough. It has been reported that there may be a silicosis risk when using impure CaCO<sub>3</sub> containing in excess of 3% quartz. However, it is claimed that pure CaCO<sub>3</sub> does not cause pneumoconiosis. Adverse health effects have generally not been reported in literature among workers using CaCO<sub>3</sub>.

Chronic effect/carcinogenicity: Not classifiable as human carcinogen.

**Magnesium Carbonate:**

Exposure route: Inhalation.

Target organs: Respiratory system.

Acute effect: A nuisance-causing concentration of airborne particles can be reached quickly when dispersed.

Chronic effect/carcinogenicity: Lungs may be affected by repeated or prolonged exposure to dust particles. Animal experiments show that MgCO<sub>3</sub> dust may produce a slight fibrosis and after prolonged exposure to high concentrations, pulmonary deposition and retention may occur. Not classifiable as human carcinogen.

**Calcium Oxide:**

Exposure route: Inhalation, ingestion, skin/eye contact.

Target organs: Eyes, skin, respiratory system.

Acute effect: Direct contact with tissues, can result in burns and severe irritation because of its high reactivity and alkalinity. Major complaints of workers exposed to lime consist of irritation of the skin and eyes, although inflammation of the respiratory passages, ulceration and perforation of the nasal septum, and even pneumonia has been attributed to inhalation of the dust.

Chronic effect/carcinogenicity: Not classifiable as human carcinogen.

**SECTION XI – TOXICOLOGICAL INFORMATION, CONT'D.****Magnesium Oxide:**

Exposure route: Inhalation, eye/skin contact.

Target organs: Eyes, respiratory system.

Acute effect: MgO dust caused slight irritation of the eyes and nose, conjunctivitis, inflammation of the mucous membrane, and coughing up discolored sputum after industrial exposures amongst workers exposed to an unspecified concentration of MgO.

Chronic effect/carcinogenicity: Not classifiable as human carcinogen.

**Aluminum Oxide:**

Exposure route: Inhalation, ingestion, eye/skin contact.

Target organs: Respiratory system, gastrointestinal system, eyes, skin.

Acute effect: Inhalation or ingestion of high concentrations of this substance may cause gastrointestinal and/or upper respiratory tract irritation. It is an eye and skin irritant.

Chronic effect/carcinogenicity: Al<sub>2</sub>O<sub>3</sub> is not classifiable as a human carcinogen. On occasion, workers chronically exposed to aluminum-containing dusts or fumes have developed severe pulmonary reactions including fibrosis, emphysema and pneumothorax. Long-term exposure may have effects on the central nervous system.

**Iron Oxide: (Ferric Oxide)**

Exposure route: Inhalation, ingestion, skin.

Target organs: Respiratory system, skin, eyes, neurological system.

Acute effect: Major findings: stupor, shock, acidosis, hematemesis, bloody diarrhea or coma. Minor findings: vomiting, diarrhea, mild lethargy. Benign pneumoconiosis with X-ray shadows indistinguishable from fibrotic pneumoconiosis. Experimental work in animals exposed by intratracheal injection or by inhalation to iron oxide mixed with less than 5% silica has shown no evidence of fibrosis produced in lung tissue.

Chronic effect/carcinogenicity: Irritability, nausea or vomiting, and normocytic anemia. When exposed to levels greater than 50 to 100 milligram per day, it can result in pathological deposition of iron in the body tissues causing fibrosis of the pancreas, diabetes mellitus, and liver cirrhosis. Workers exposed to iron oxide fumes and silica may develop a "mixed dust pneumoconiosis." Not classifiable as human carcinogen.

**Sodium Oxide:**

Exposure route: Inhalation, ingestion, eye/skin contact.

Target organs: Respiratory system, gastrointestinal system, eyes, skin.

Acute effect: Corrosive – Sodium oxide reacts violently with water to form sodium hydroxide. Causes burns of skin, eyes, respiratory and gastrointestinal tracts, extremely destructive to mucous membranes.

Chronic effect/carcinogenicity: Not classifiable as human carcinogen.

**Potassium Oxide:**

Exposure route: Inhalation, ingestion, eye/skin contact.

Target organs: Respiratory system, gastrointestinal system, eyes, skin.

**SECTION XI – TOXICOLOGICAL INFORMATION, CONT'D.**Potassium Oxide, cont'd:

Acute effect: Corrosive – K<sub>2</sub>O reacts violently with water to produce potassium hydroxide. If inhaled, it causes sore throat, cough, burning sensation and shortness of breath. Contact with skin produces pain and blisters. Severe deep burns, redness and pain occur with eye contact. Ingestion results in burning sensations, abdominal pain, shock or collapse.

Chronic effect/carcinogenicity: Not classifiable as human carcinogen.

Acute Toxicity Estimates for Limestone/Dolomite – Not Available

**SECTION XII – ECOLOGICAL INFORMATION**

No data available for this product.

**SECTION XIII – DISPOSAL CONSIDERATIONS****WASTE DISPOSAL METHOD**

Collect and reuse clean materials. Dispose of waste materials only in accordance with applicable federal, state, and local laws and regulations.

The above information applies to this product only as sold. The product may be contaminated during use and it is the responsibility of the user to assess the appropriate disposal method in that situation.

**SECTION XIV – TRANSPORT INFORMATION****DOT HAZARD CLASSIFICATION**

None

**PLACARD REQUIRED**

None

**LABEL REQUIRED**

Label as required by the OSHA Hazard Communication standard {29 CFR 1910.1200(f)}, and applicable state and local regulations.

**SECTION XV – REGULATORY INFORMATION**

**SARA Title III:** Section 311 and 312: Immediate health hazard and delayed health hazard.

**TSCA:** All components of the product appear on the EPA TSCA chemical substance inventory.

**RCRA:** The product is not classified as a hazardous waste under the Resource Conservation and Recovery Act, or its regulations, 40 CFR §261 *et seq.*

**CERCLA:** The product is not classified as a hazardous substance under regulations of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), 40 CFR §302.4

**EPCRA (Emergency Planning and Community Right to Know Act):** The product is not an extremely hazardous substance under regulations of the Emergency Planning and Community Right to Know Act, 40 CFR Part 355, Appendices A and B and is not a toxic chemical subject to the requirements of Section 313.

**Clean Air Act:** This product mined and processed by Martin Marietta was not processed with or does not contain any Class I or Class II ozone depleting substances.

**FDA:** Silica is included in the list of substances that may be included in coatings used in food contact surfaces, 21 CFR §175.300(b)(3) (The FDA standard primarily applies to products containing silica used in the coatings of food contact surfaces).

**California Proposition 65:** ⚠️ **WARNING:** This product can expose you to chemicals including crystalline silica, which is known to the State of California to cause cancer. For more information, go to [www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov)

**SECTION XVI – OTHER INFORMATION****DEFINITIONS OF ACRONYMS/ABBREVIATIONS**

ACGIH: American Conference of Governmental Industrial Hygienists  
 ANSI: American National Standards Institute  
 ASTM: American Society for Testing and Materials  
 BEIs: Biological Exposure Indices  
 CAS: Chemical Abstracts Service  
 CERCLA: Comprehensive Environmental Response, Compensation and Liability Act  
 CFR: US Code of Federal Regulations  
 DHHS: Department of Health and Human Services  
 EPA: Environmental Protection Agency  
 EPCRA: Emergency Planning and Community Right to Know Act  
 FDA: Food and Drug Administration  
 HEPA: High-Efficiency Particulate Air  
 IARC: International Agency for Research on Cancer  
 IDLH: Immediately Dangerous to Life and Health  
 MSHA: Mine Safety and Health Administration  
 NIOSH: National Institute for Occupational Safety and Health, US Department of Health and Human Services  
 NTP: National Toxicology Program  
 OEL: Occupational Exposure Limit  
 OSHA: Occupational Safety and Health Administration, US Department of Labor  
 PEL: Permissible Exposure Limit  
 PMF: Progressive Massive Fibrosis  
 PPE: Personal Protective Equipment  
 RCRA: Resource Conservation and Recovery Act  
 RCS: Respirable Crystalline Silica  
 REL: Recommended Exposure Limit  
 SARA Title III: Title III of the Superfund Amendments and Reauthorization Act, 1986  
 SCBA: Self-Contained Breathing Apparatus  
 SDS: Safety Data Sheet  
 STOT: Specific Target Organ Toxicity  
 TLV: Threshold Limit Value  
 TSCA: Toxic Substance Control Act  
 TWA: Time-Weighted Average

**User's Responsibility:** The OSHA Hazard Communication Standard 29 CFR 1910.1200 requires that this SDS be made available to your employees who handle or may be exposed to this product. Educate and train your employees regarding applicable precautions. Instruct your employees to handle this product properly.

**Disclaimer:** The information contained in this document applies to this specific material as supplied and Martin Marietta believes that the information contained in this SDS 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. It may not be valid for this material if it is used in combination with other materials. It is the user's responsibility to satisfy oneself as to the suitability and completeness of this information for one's own particular use. Since the actual use of the product described herein is beyond our control, Martin Marietta assumes no liability arising out of the use of the product by others. Appropriate warnings and safe handling procedures should be provided to handlers and users. Also, the suggestions should not be confused with nor followed in violation of applicable laws, regulation, rules or insurance requirements. The product must not be used in a manner which could result in harm.

An electronic version of this SDS is available at [www.martinmarietta.com](http://www.martinmarietta.com).

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