MATERIAL SAFETY DATA SHEET

MSDS No: 093

UNIMIN CORPORATION
258 Elm Street
New Canaan, CT 06840

Emergency Telephone Number
(203) 966-8880

Telephone Number for Information
(203) 966-8880

Date Prepared: July 2000

SECTION 1: IDENTIFICATION

PRODUCT NAME: Kaolin Slurry

SYNONYMS: Kaolin, China Clay, Hydrated Aluminum Silicate

SECTION 2: COMPONENTS

CAS#	Component	Percentage	Exposure Limits
1332-58-7	Kaolin	>65%	PEL – 5 mg/m^3 TWA (respirable fraction) TLV- 2 mg/m^3 TWA (respirable fraction) MSHA - 5 mg/m^3 TWA (respirable fraction)
14808-60-7	Crystalline Silica in the form of Quartz	<1%	PEL - See Below TLV- 0.05 mg/m^3 TWA (respirable fraction) MSHA - See Below
13463-67-7	Titanium Dioxide	<2%	PEL – 15 mg/m^3 TWA (total dust) TLV- 10 mg/m^3 TWA MSHA - 15 mg/m^3 TWA (total dust)
7332-18-5	Water	<34%	None Established

OSHA PEL and MSHA Exposure Limit for Crystalline Silica, Quartz: (Respirable) 10 mg/m^3 / % Silica + 2

National Institute for Occupational Safety and Health (NIOSH) has recommended that the permissible exposure limit be changed to 50 micrograms respirable free silica percubic meter of air (0.05 mg/m^3) as determined by a full shift sample up to 10 hour working day, 40 hours per week. The 1974 NIOSH Criteria for a recommended Standard for Occupational Exposure to Crystalline Silica should be consulted for more detailed information.

PEL means OSHA Permissible Exposure Limit.
TLV means American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value.
MSHA means Mine Safety and Health Administration Exposure Limit.
TWA means 8 hour time weighted average.

Note: The Permissible Exposure Limits (PEL) reported above are the pre-1989 limits that were reinstated by OSHA June 30, 1993 following a decision by the 11th Circuit Court of Appeals. These PELs are now being enforced by Federal OSHA. Be aware that more restrictive exposure limits may be enforced by some states, agencies or other authorities.

SECTION 3: HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

This product is an aqueous slurry of a chemically inert, non-combustible mineral. A single exposure will not result in serious adverse effects. When this product is in a dryer form, prolonged and excessive inhalation of dust may cause lung disease, pneumoconiosis, with symptoms of shortness of breath and reduced pulmonary function. See "Cancer Status" in this Section

HEALTH HAZARDS:

Inhalation: Breathing prolonged and excessive amounts of kaolin dust may not cause noticeable injury or illness even though permanent lung damage may be occurring. Inhalation of dust may have the following serious chronic health effects:

Pneumoconiosis: Excessive inhalation of respirable dust may cause pneumoconiosis, a respiratory disease, which can result in delayed, progressive, disabling and sometimes fatal lung injury. Symptoms include cough, shortness of breath, wheezing, non-specific chest illness and reduced pulmonary function. This disease is exacerbated by smoking. Individuals with pneumoconiosis are predisposed to develop tuberculosis.

Cancer Status: The International Agency for Research on Cancer has determined that crystalline silica inhaled in the form of quartz or cristobalite from occupational sources is carcinogenic to humans (Group 1 - carcinogenic to humans). Refer to IARC Monograph 68, Silica, Some Silicates and Organic Fibres (published in June 1997) in conjunction with the use of these materials. The National Toxicology Program classifies respirable crystalline silica as "known to be a human carcinogen". Refer to the 9th Report on Carcinogens (2000). The American Conference of Governmental Industrial Hygienists (ACGIH) classifies crystalline silica, quartz, as a suspected human carcinogen (A2).

Other Data with Possible Relevance to Human Health:

There is some evidence that breathing respirable crystalline silica or the disease silicosis is associated with an increased incidence of significant disease endpoints such as scleroderma (an immune system disorder manifested by fibrosis of the lungs, skin and other internal organs) and kidney disease.

For further information consult "Adverse Effects of Crystalline Silica Exposure" published by the American Thoracic Society Medical Section of the American Lung Association, American Journal of Respiratory and Critical Care Medicine, Volume 155, pages 761-768, 1997.

Inhalation of dust may cause irritation of the nose, throat and respiratory passages.

Skin Contact: No adverse effects expected.

Eye Contact: Contact may cause mechanical irritation and possible injury.

Ingestion: No adverse effects expected for normal, incidental ingestion.

Chronic Health Effects: See "Inhalation" subsection above with respect to silicosis, cancer status and other data with possible relevance to human health.

Medical Conditions Aggravated by Exposure: Individuals with respiratory disease, including but not limited to, asthma and bronchitis, or subject to eye irritation should not be exposed to respirable quartz dust.

Signs and Symptoms of Exposure: There are generally no signs or symptoms of exposure to crystalline silica (quartz). See "Inhalation" subsection above for symptoms of silicosis.

SECTION 4: FIRST AID

Gross Inhalation: Remove victim to fresh air. If breathing has stopped, perform artificial respiration. If breathing is difficult have qualified personnel administer oxygen. Get prompt medical attention.

Skin Contact: No first aid should be needed since this product does not affect the skin. Wash exposed skin with soap and water before breaks and at the end of the shift.

Eye Contact: Flush the eyes immediately with large amounts of running water, lifting the upper and lower lids occasionally. If irritation persists or for imbedded foreign body, get immediate medical attention.

Ingestion: If large amounts are swallowed, get immediate medical attention.

SECTION 5: FIRE AND EXPLOSION DATA

Flash Point (Method Used): Fully oxidized, will not burn.

Autoignition Temp: Will not burn.

Flammable Limits: LEL: Not applicable UEL: Not applicable

Extinguishing Media: This product will not burn but is compatible with all extinguishing media. Use any media that is appropriate for the surrounding fire.

Special Fire Fighting Procedures: None required with respect to this product. Firefighters should always wear self-contained breathing apparatus for fires indoors or in confined areas.

Unusual Fire and Explosion Hazards: None.

Hazardous Combustion Products: None.

SECTION 6: ACCIDENTAL RELEASE MEASURES

Wear appropriate protective equipment. If uncontaminated, collect using dustless method (HEPA vacuum or wet method) and place in appropriate container for use. If contaminated: a) use appropriate method for the nature of contamination, b) consider possible toxic or fire hazards associated with the contaminating substances. Collect for disposal.

SECTION 7: HANDLING AND STORAGE

Do not breathe dust. Do not rely on your sight to determine if dust is in the air. Silica may be in the air without a visible dust cloud. Use normal precautions against bag breakage or spills of bulk material. Avoid creation of respirable dust. Use good housekeeping in storage and use areas to prevent accumulation of dust in work area.

Use adequate ventilation and dust collection. Maintain and use proper, clean respiratory equipment (See Section 8). Launder clothing that has become dusty. Empty containers (bags, bulk containers, storage tanks, etc.) retain silica residue and must be handled in accordance with the provisions of this Material Safety Data Sheet. WARN and TRAIN employees in accordance with state and federal regulations.

WARN YOUR EMPLOYEES (AND YOUR CUSTOMERS - USERS IN CASE OF RESALE) BY POSTING AND OTHER MEANS OF THE HAZARDS AND OSHA PRECAUTIONS TO BE USED. PROVIDE TRAINING FOR YOUR EMPLOYEES ABOUT OSHA PRECAUTIONS.

Additional information on silica hazards and precautionary measures can be found at the following websites:
NIOSH Joint Campaign on Silicosis Prevention http://www.cdc.gov/niosh/sicampn.html
OSHA Crystalline Silica Website http://www.osha-slc.gov/SLTC/silicacrystalline/index.html
MSHA Silicosis Prevention Website http://www.msha.gov/S&HINFO/SILICO/SILICO.HTM

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

Ventilation: Use local exhaust as required to maintain exposures below applicable occupational exposure limits (See Section 2). See also ACGIH "Industrial Ventilation - A Manual for Recommended Practice", (current edition).

Respiratory Protection: Use appropriate respiratory protection for respirable particulates based on consideration of airborne workplace concentrations and duration of exposure arising from intended end use. Refer to the most recent standards of ANSI (Z88.2), OSHA (29 CFR 1910.134), MSHA (30 CFR Parts 56 and 57) and NIOSH Respirator Decision Logic.

Gloves: Protective gloves recommended.

Eye Protection: Safety glasses or goggles recommended.

Other Protective Equipment/Clothing: As appropriate for the work environment. Dusty clothing should be laundered before reuse.

9: PHYSICAL AND CHEMICAL PROPERTIES

Appearance and Odor: White to cream colored slurry with a slight earthy odor.

pH: Not determined
Boiling Point: Not applicable
Melting Point: Not applicable
Solubility in Water: Negligible
Percent Volatile: Not determined
Specific Gravity (water=1): 1.78-2.58
Vapor Pressure: Not applicable
Vapor Density: Not applicable
Evaporation Rate: Not applicable
Fusion Range: 1569-1785°C

SECTION 10: STABILITY AND REACTIVITY

Stability: Stable
Conditions to Avoid: When exposed to high temperatures, free quartz can change crystal structures to form tridymite (above 870°C) or cristobalite (above 1470°C) which have greater health hazards than quartz.
Incompatibility: Powerful oxidizing agents such as fluorine, chlorine trifluoride, manganese trioxide, etc.
Hazardous Decomposition Products: Silica will dissolve in hydrofluoric acid producing a corrosive gas, silicon tetrafluoride.
Hazardous Polymerization: Will not occur.
Conditions to Avoid: None

SECTION 11: TOXICOLOGICAL INFORMATION

No acute toxicity data is available for product or components. Refer to Section 3 for health hazard information.

SECTION 12: ECOLOGICAL INFORMATION

No ecotoxicity data is available. This product is not expected to present an environmental hazard.

SECTION 13: DISPOSAL

Waste Disposal Method: If uncontaminated, dispose as an inert, non-metallic mineral. If contaminated, dispose in accordance with all applicable local, state/provincial and federal regulations.

SECTION 14: TRANSPORTATION DATA

U.S. DOT HAZARD CLASSIFICATION

Proper Shipping Name: Not Regulated
Technical Name: N/A
UN Number: N/A
Hazard Class/Packing Group: N/A
Labels Required: None
DOT Packaging Requirements: N/A
Exceptions: N/A

SECTION 15: OTHER REGULATORY INFORMATION

SARA 311/312: Hazard Categories for SARA Section 311/312 Reporting: Chronic Health

SARA 313 This Product Contains the Following Chemicals Subject to Annual Release Reporting Requirements Under the SARA Section 313 (40 CFR 372): None

CERCLA Section 103 Reportable Quantity: None

California Proposition 65: This product contains crystalline silica (respirable) which is known to the State of California to cause cancer.

Toxic Substances Control Act: All of the components of this product are listed on the EPA TSCA Inventory or exempt from notification requirements.

European Inventory of Commercial Chemical Substances: All of the components of this product are listed on the EINECS Inventory or exempt from notification requirements. (The EINECS number for Quartz: 231-545-4)

Canadian Environmental Protection Act: All the components of this product are listed on the Canadian Domestic Substances List or exempt from notification requirements.

Japan MITI: All of the components of this product are existing chemical substances as defined in the Chemical Substance Control Law.

Australian Inventory of Chemical Substances: All of the components of this product are listed on the AICS inventory or exempt from notification requirements.

Canadian WHMIS Classification: Class D, Division 2, Subdivision A (Very Toxic Material causing other Toxic Effects)

16: OTHER INFORMATION

European Community Labeling Classification: Harmful (Xn)

European Community Risk and Safety Phrases: R40, R48, S22

NFPA Hazard Rating: Health: 1 Fire: 0 Reactivity: 0

HMIS Hazard Rating: Health: * Fire: 0 Reactivity: 0
* Warning - Chronic health effect possible - inhalation of silica dust may cause lung injury/disease (silicosis). Take appropriate measures to avoid breathing dust. See Section 3.

References:

Registry for Toxic Effects of Chemical Substances (RTECS), 1998
Patty's Industrial Hygiene and Toxicology
NTP Ninth Report on Carcinogens, 2000
IARC Monograph Volume 68, Silica, Some Silicates and Organic Fibres, 1997

Revision Summary: New Product

The data in this Material Safety Data Sheet relates only to the specific material designated herein and does not relate to use in combination with any other material or in any process. The information set forth herein is based on technical data the Unimin Corporation believes reliable. It is intended for use by persons having technical skill and at their own discretion and risk. Since conditions of use are outside the control of Unimin Corporation, no warranties, expressed or implied, are made and no liability is assumed in connection with any use of this information. Any use of these data and information must be determined by the user to be in accordance with federal, state and local laws and regulations.

HMIS RATING
HEALTH ---------- 1
FLAMMABILITY ---------- 0
REACTIVITY ---------- 0
PERSONAL PROTECTION - E

Material Safety Data Sheet
May be used to comply with OSHA's Hazard Communication Standard, 29 CFR 1910.1200. Standard must be consulted for specific requirements.

U.S. Department of Labor
Occupational Safety and Health Administration
(Non-Mandatory Form)
Form Approved
OMB No. 1218-0072

IDENTITY *(As Used on Label and List)*
HALTEX® Alumina Trihydrate (all grades)

Note: Blank spaces are not permitted. If any item is not applicable, or no information is available, the space must be marked to indicate that.

Section I

Manufacturer's Name **TOR Minerals International**	Emergency Telephone Number **361/883-5591**
Address *(Number, Street, City, State, and ZIP Code)* **722 Burleson Street (Plant)**	Telephone Number for Information **361/883-5591**
Corpus Christi, TX 78402	Date Prepared **June 20, 2000**
	Signature of Preparer *(optional)*

Section II - Hazardous Ingredients/Identity Information

Hazardous Components (Specific Chemical Identity; Common Name(s))	OSHA PEL	ACGIH TLV	Other Limits Recommended	% *(optional)*
Aluminium Trihydrate ($Al(OH)_3$)	**10 mg/m³ (dust)**	**10 mg/m³ (dust)**		**99.5**
(CAS No. 21645-51-2)				

(These are typical quantities and may change slightly with different lots.)

Section III - Physical/Chemical Characteristics

Boiling Point	**2980 ± 60**	Specific Gravity (H_2O = 1)	**2.38 - 2.42**
Vapor Pressure (mm Hg.)	**N/A**	Melting Point	**2015 ± 15**
Vapor Density (AIR = 1)	**N/A**	Evaporation Rate (Butyl Acetate = 1)	**N/A**
Solubility in Water	**Insoluble**		
Appearance and Odor	**Fine white powder with no odor.**		

Section IV - Fire and Explosion Hazard Data

Flash Point (Method Used)	**Non-flammable**	Flammable Limits	**N/A**	LEL **N/A**	UEL **N/A**
Extinguishing Media	**As appropriate for surrounding combustibles. Does not burn or support combustion.**				
Special Fire Fighting Procedures	**Fire fighters should wear self-contained breathing apparatus.**				
Unusual Fire and Explosion Hazards	**No fire or explosion hazard.**				

Section V - Reactivity Data

Stability	Unstable		Conditions to Avoid: None in normal or expected use
	Stable	X	

Incompatibility *(Material to Avoid)*: None Known

Hazardous Decomposition or Byproducts: None in normal or expected use

Hazardous Polymerization	May Occur		Conditions to Avoid: None in normal or expected use
	Will Not Occur	X	

Section VI - Health Hazard Data

Route(s) of Entry: Primary — Inhalation? Yes — Skin? No — Eye ? Yes — Ingestion? Yes

Health Hazards *(Acute and Chronic)*
Hydrated Alumina is environmentally safe and is not regulated under RCRA. None of the components are on the EPA list of Extremely Hazardous Substances. However, high exposure to Alumina dust may produce irritation to the eyes and respiratory system.

Carcinogenicity: None known. — NTP? N/A — IARC Monographs? N/A — OSHA Regulated? N/A

Signs and Symptoms of Exposure
Inhalation of dust may cause mechanical irritation of the respiritory tract. Skin and eye contact may cause mechanical abrasion - irritation.

Medical Conditions
Generally Aggravated by Exposure: Pre-existing upper respiritory and lung diseases such as, but not limited to , brochitis, emphysema, and asthma.

Emergency and First Aid Procedures: **Eye contact**: Flush eye with generous amounts of water for 15 min., consult a physician. **Inhalation**: Remove to fresh air. **Skin contact**: Wash from skin with soap and water. **Ingestion**: Consult a physician.

Section VII - Precautions for Safe Handling and Use

Steps to Be Taken in Case Material is Released or Spilled
Prevent spread of material and keep dust level down. Scoop up material or use vacuum technique and place in closed container.

Waste Disposal Method
Disposal must be made in accordance with Federal, State, and Local regulations, and pursuant to 40 CFR p. 261 of RCRA regulations currently in effect. Discarded hydrated alumina would not be classified as hazardous waste.

Precautions to Be Taken in Handling and Storing
Handle and keep in dry building area. Avoid handling methods which cause dusting. Avoid breathing dust. Use ventilation that will maintain exposure below recommended TLV. Wear goggles and use NIOSH/MSHA approved respirator. Wash thoroughly after handling.

Other Precautions: No special requirements. Use good, acceptable industrial hygene practices.

Section VIII - Control Measures

Respiratory Protection *(Specify Type)*: **Use NIOSH approved respirator in accordance with air contaminant standard.**

Ventilation	Local Exaust: Provide local system.		Special
	Mechanical *(General)*: Is recommemded for potentially dusty conditions.		Other

Protective Gloves
No special requirement, ordinary work type.

Eye Protection: Safety glasses or vented goggles.

Other Protective Clothing or Equipment
No special requirement, ordinary work clothes.

Work/Hygienic Practices
Good industrial hygiene practices. Wash thoroughly with soap and water before eating, drinking, or using tobacco products.

The information herein is believed to be correct and reliable. However no warranty is expressed or implied regarding the accuracy of these data, and none is made as to the marketability of the material or its fitness for any purpose. The consumer accepts the responsibility of and the conditions for liability of use of the products.

QUICK FAX

Date	# Of Pages
To: ANNE BLACKER	From: ROBERT
Co./Dept.	Co./Dept. HALL
Fax: 785-841-8142	Fax:
Phone	Phone: 816 221-6713
Note: SB136 Replaces	E-Mail:

March 2000

722 Burleson St. Corpus Christi, Texas 78402
www.hitox.com

SHEET

HALTEX® 315

ALUMINA TRIHYDRATE $AL(OH)_3$

CAS #: 21645-51-2

- Smoke suppressant; flame retardant
- Functional filler for Resins
- Particle size ~15 microns

SB136
OFFSET

PRELIMINARY PHYSICAL PROPERTIES (Typical)

	315
Brightness	91
325 Mesh Residue, %	9%
Specific Gravity	2.42
Bulk Density, Loose (lbs./ft.^{3})	61
Bulk Density, Packed (lbs./ft.^{3})	85
Oil Absorption	16-18
Median Particle Diameter (microns)	15

PACKAGING

HALTEX® Alumina Trihydrates are available in 50 lb. (22.7 Kg.) multi-wall paper bags. There are 50 bags (2500 lbs.) per pallet. All pallets are stretch-wrapped prior to shipment.

Special packaging available upon request.

Alumina Trihydrate is not regulated as a hazardous material by the Department of Transportation.

The information herein is believed to be correct and reliable. However, no warranty is expressed or implied regarding the accuracy of these data, and none is made as to the marketability of the material or its fitness for any purpose. The consumer accepts the responsibility of and the conditions for liability of use of the products.

U. S. SILICA COMPANY

MSDS - MATERIAL SAFETY DATA SHEET

SECTION 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Names/Trade Names:

Silica Sand sold under various names: ASTM TESTING SANDS • GLASS SAND • FLINT SILICA • DM-SERIES • F-SERIES • FOUNDRY SANDS • FJ-SERIES • FP-SERIES • H-SERIES • L-SERIES • N-SERIES • NJ-SERIES • OK-SERIES • P-SERIES • T-SERIES • HYDRAULIC FRACING SANDS • MIN-U-SIL® • MYSTIC WHITE® • #1 DRY • #1 SPECIAL • PENN SAND® • Q-ROK® • SIL-CO-SIL® • SUPERSIL®.

Synonyms/Common Names: Sand, Silica Sand, Quartz, Crystalline Silica, Flint, Ground Silica.

Manufacturer's Name:
U. S. Silica Company
P. O. Box 187
Berkeley Springs, WV 25411

Emergency Telephone Number: **304-258-2500**
304-258-8295 **(fax)**

Date Prepared: September 15, 2000

SECTION 2 - COMPOSITION/INFORMATION ON INGREDIENTS

Ingredients:

	Chemical Formula	Typical %, By Weight	CAS #
Crystalline Silica (quartz)	SiO_2	99.0 - 99.9	14808-60-7
Aluminum Oxide	Al_2O_3	< .8	1344-28-1
Iron Oxide	Fe_2O_3	< .1	1309-37-1
Titanium Oxide	TiO_2	< .1	13463-67-7

Exposure Limits for Hazardous Ingredients:

	OSHA PEL	ACGIH TLV	NIOSH REL
Crystalline Silica (Quartz)	$\frac{10\ mg/m^3}{\%\ SiO_2 + 2}$	.05	.05

The exposure limits are time-weighted average concentrations for an 8-hour workday and a 40-hour workweek.

Crystalline silica exists in several forms, the most common of which is quartz. If crystalline silica (quartz) is heated to more than 870°C, it can change to a form of crystalline silica known as trydimite, and if crystalline silica (quartz) is heated to more than 1470°C, it can change to a form of crystalline silica known as cristobalite. The OSHA PEL for crystalline silica as trydimite and cristobalite is one-half of the OSHA PEL for crystalline silica (quartz).

SECTION 3 - HAZARD IDENTIFICATION

EMERGENCY OVERVIEW:

The U. S. Silica Company material is a white or tan sand, or ground sand. It is not flammable, combustible or explosive. It does not cause burns or severe skin or eye irritation. A single exposure will not result in serious adverse health effects. Crystalline silica (quartz) is not known to be an environmental hazard.

Crystalline silica (quartz) is incompatible with hydrofluoric acid, fluorine, chlorine trifluoride or oxygen difluoride.

POTENTIAL HEALTH EFFECTS:

Inhalation:

a. Silicosis	Respirable crystalline silica (quartz) can cause silicosis, a fibrosis (scarring) of the lungs. Silicosis may be progressive; it may lead to disability and death.
b. Cancer	Crystalline silica (quartz) inhaled from occupational sources is classified as carcinogenic to humans.
c. Autoimmune Diseases	There are some studies that show excess numbers of cases of scleroderma and other connective tissue disorders in workers exposed to respirable crystalline silica.
d. Tuberculosis	Silicosis increases the risk of tuberculosis.
e. Nephrotoxicity	There are some studies that show an increased incidence of chronic kidney disease and end-stage renal disease in workers exposed to respirable crystalline silica.

Eye Contact: Crystalline silica (quartz) may cause abrasion of the cornea.

Skin Contact: Not applicable.

Ingestion: Not applicable.

Chronic Effects: The adverse health effects -- silicosis, cancer, autoimmune diseases, tuberculosis, and nephrotoxicity -- are chronic effects.

Signs and Symptoms of Exposure: Generally, there are no signs or symptoms of exposure to crystalline silica (quartz).

Medical Conditions Generally Aggravated by Exposure: The condition of individuals with lung disease (e.g., bronchitis, emphysema, chronic obstructive pulmonary disease) can be aggravated by exposure.

See Section 11, Toxicological Information, for additional detail on potential adverse health effects.

SECTION 4 - FIRST AID MEASURES

Inhalation: No specific first-aid is necessary since the adverse health effects associated with exposure to crystalline silica (quartz) result from chronic exposures. If there is a gross inhalation of crystalline silica (quartz), remove the person immediately to fresh air, give artificial respiration as needed, seek medical attention as needed.

Eye Contact: Wash immediately with water. If irritation persists, seek medical attention.

Skin Contact: Not applicable.

Ingestion: Not applicable.

SECTION 5 - FIRE FIGHTING MEASURES

Crystalline silica (quartz) is not flammable, combustible or explosive.

SECTION 6 - ACCIDENTAL RELEASE MEASURES

Spills: Use dustless methods (vacuum) and place into closable container for disposal, or flush with water. Do not dry sweep. Wear protective equipment specified below.

Waste Disposal Method: See Section 13.

SECTION 7 - HANDLING AND STORAGE

Precautions During Handling and Use: Do not breath dust. Use adequate ventilation and dust collection. Keep airborne dust concentrations below PEL. Do not rely on your sight to determine if dust is in the air. Silica may be in the air without a visible dust cloud. If dust cannot be kept below permissible limits, wear a respirator approved for silica dust when using, handling, storing or disposing of this product or bag. Practice good housekeeping. Do not permit dust to collect on walls, floors, sills, ledges, machinery, or equipment. Maintain, clean, and fit test respirators in accordance with OSHA regulations. Maintain and test ventilation and dust collection equipment. Wash or vacuum clothing that has become dusty. See also control measures in Section 8.

Precautions During Storage: Avoid breakage of bagged material or spills of bulk material. See control measures in Section 8.

Do not use U. S. Silica Company materials for sandblasting.

The OSHA Hazard Communication Standard, 29 CFR Sections 1910.1200, 1915.1200, 1917.28, 1918.90, 1926.59 and 1928.21, and state and local worker or community "right-to-know" laws and regulations should be strictly followed. WARN YOUR EMPLOYEES (AND YOUR CUSTOMERS IN CASE OF RESALE) BY POSTING AND OTHER MEANS OF THE HAZARDS AND THE REQUIRED OSHA PRECAUTIONS. PROVIDE TRAINING FOR YOUR EMPLOYEES ABOUT THE OSHA PRECAUTIONS.

See also American Society for Testing and Materials (ASTM) standard practice E 1132-99a, "Standard Practice for Health Requirements Relating to Occupational Exposure to Respirable Crystalline Silica."

SECTION 8 - EXPOSURE CONTROLS/PERSONAL PROTECTION

Local Exhaust: Use sufficient local exhaust to reduce the level of respirable crystalline silica to below the PEL. See ACGIH "Industrial Ventilation, A Manual of Recommended Practice" (latest edition).

Respiratory Protection: The following chart specifies the types of respirators which may provide respiratory protection for crystalline silica.

Particulate Concentration	MINIMUM RESPIRATORY PROTECTION*
10 x PEL or less	Any particulate respirator, except single-use or quarter-mask respirator. Any fume respirator or high efficiency particulate filter respirator. Any supplied-air respirator. Any self-contained breathing apparatus.
50 x PEL or less	A high efficiency particulate filter respirator with a full facepiece. Any supplied-air respirator with a full facepiece, helmet, or hood. Any self-contained breathing apparatus with a full facepiece.
500 x PEL or less	A Type C supplied-air respirator operated in pressure-demand or other positive pressure or continuous-flow mode.
Greater than 500 x PEL or entry and escape from unknown concentrations	Self-contained breathing apparatus with a full facepiece operated in pressure-demand mode. A combination respirator which includes a Type C supplied-air respirator with a full facepiece operated in pressure-demand or other positive pressure continuous-flow mode and an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive pressure mode.
***Use only NIOSH-approved or MSHA-approved equipment. See 29 CFR §1910.134 and 42 CFR §84.**	

See also ANSI standard Z88.2 (latest revision) "American National Standard for Respiratory Protection".

Permissible Exposure Levels:

			Exposure Guidelines						
			OSHA		ACGIH		NIOSH		
Component	CAS No.	Percentage (by wt.)	TWA	STEL	TWA	STEL	TWA	STEL	Unit
Crystalline Silica (quartz)	14808-60-7	99.0-99.9	$\frac{10}{\% SiO_2 + 2}$	None	.05	None	.05	None	mg/m^3

SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES

Appearance:	White or tan sand; granular, crushed, or ground.		
Boiling Point:	4046°F	**Odor:**	None
Vapor Pressure (mm Hg.):	None	**Specific Gravity (Water = 1):**	2.65
Vapor Density (Air = 1):	None	**Melting Point:**	3110°F
Solubility in Water:	Insoluble in water	**Evaporation Rate (Butyl Acetate = 1):**	None

SECTION 10 - STABILITY AND REACTIVITY

Stability: Crystalline silica (quartz) is stable.

Incompatibility (Materials to Avoid): Contact with powerful oxidizing agents, such as fluorine, chlorine trifluoride and oxygen difluoride, may cause fires.

Hazardous Decomposition or Byproducts: Silica will dissolve in hydrofluoric acid and produce a corrosive gas - silicon tetrafluoride.

Hazardous Polymerization: Will not occur.

SECTION 11 - TOXICOLOGICAL INFORMATION

A. SILICOSIS

The major concern is silicosis, caused by the inhalation and retention of respirable crystalline silica dust. Silicosis can exist in several forms, chronic (or ordinary), accelerated, or acute.

Chronic or Ordinary Silicosis (often referred to as Simple Silicosis) is the most common form of silicosis, and can occur after many years of exposure to relatively low levels of airborne respirable crystalline silica dust. 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 secondary to the lung disease (cor pumonale).

Accelerated Silicosis can occur with exposure to high concentrations of respirable crystalline silica 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 respirable crystalline silica 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 fatal.

B. CANCER

IARC - The International Agency for Research on Cancer ("IARC") concluded that there was "*sufficient evidence* in humans for the carcinogenicity of crystalline silica in the forms of quartz or cristobalite from occupational sources", and that there is "*sufficient evidence* in experimental animals for the carcinogenicity of quartz and cristobalite." The overall IARC evaluation was that "crystalline silica inhaled in the form of quartz or cristobalite from occupational sources is *carcinogenic to humans* (*Group 1*)." The IARC evaluation noted that "carcinogenicity was not detected in all industrial circumstances studies. 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 68, "Silica, Some Silicates..." (1997).

NTP - The National Toxicology Program, in its Ninth Annual Report on Carcinogens, classified "silica, crystalline (respirable)" as a known human carcinogen.

OSHA - Crystalline silica (quartz) is not regulated by the U. S. Occupational Safety and Health Administration as a carcinogen.

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) "Crystalline Silica and Lung Cancer: The Problem of Conflicting Evidence", Indoor Built Environ, Volume 8, pp. 121-126 (1998); (2) "Crystalline Silica and the risk of lung cancer on the potteries", Occup. Environ. Med., Volume 55, pp. 779-785 (1998); (3) "Is Silicosis Required for Silica-Associated Lung Cancer?", American Journal of Industrial Medicine, Volume 37, pp. 252-259 (2000); (4) " Silica, Silicosis, and Lung Cancer: A Risk Assessment", American Journal of Industrial Medicine, Volume 38, pp. 8-18 (2000); (5) "Silica, Silicosis, and Lung Cancer: A Response to a Recent Working Group Report", Journal of Occupational and Environmental Medicine, Volume 42, pp. 704-720 (2000).

C. AUTOIMMUNE DISEASES

There is evidence that exposure to respirable crystalline silica (without silicosis) or that the disease silicosis is associated with the increased incidence of several autoimmune disorders, -- scleroderma, systemic lupus erythematosus, rheumatoid arthritis and diseases affecting the kidneys. For a review of the subject, the following may be consulted: "Occupational Exposure to Crystalline Silica and Autoimmune Disease", Environmental Health Perspectives, Volume 107, Supplement 5, pp. 793-802 (1999); "Occupational Scleroderma", Current Opinion in Rheumatology, Volume 11, pp. 490-494 (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: Occupational Lung Disorders, Third Edition, Chapter 12, entitled "Silicosis and Related Diseases", Parkes, W. Raymond (1994); "Risk of pulmonary tuberculosis relative to silicosis and exposure to silica dust in South African gold miners," Occup Environ Med., Volume 55, pp.496-502 (1998).

E. KIDNEY DISEASE

There is evidence that exposure to respirable crystalline silica (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: "Kidney Disease and Silicosis", Nephron, Volume 85, pp. 14-19 (2000).

SECTION 12 - ECOLOGICAL INFORMATION

Crystalline silica (quartz) is not known to be ecotoxic; i.e., there is no data which suggests that crystalline silica (quartz) is toxic to birds, fish, invertebrates, microorganisms or plants. For additional information on crystalline silica (quartz), see Sections 9 (physical and chemical properties) and 10 (stability and reactivity) of this MSDS.

SECTION 13 - DISPOSAL CONSIDERATIONS

General: The packaging and material may be landfilled; however, material should be covered to minimize generation of airborne dust.

RCRA: Crystalline silica (quartz) is not classified as a hazardous waste under the Resource Conservation and Recovery Act, or its regulations, 40 CFR §261 et seq.

The above applies to materials as sold by U.S. Silica Company. The material may be contaminated during use, and it is the responsibility of the user to assess the appropriate disposal of the used material.

SECTION 14 - TRANSPORT INFORMATION

Crystalline silica (quartz) is not a hazardous material for purposes of transportation under the U. S. Department of Transportation Table of Hazardous Materials, 49 CFR §172.101.

SECTION 15 - REGULATORY INFORMATION

UNITED STATES (FEDERAL AND STATE)

TSCA No.: Crystalline silica (quartz) appears on the EPA TSCA inventory under the CAS No. 14808-60-7.

RCRA: Crystalline silica (quartz) is not classified as a hazardous waste under the Resource Conservation and Recovery Act, or its regulations, 40 CFR §261 et seq.

CERCLA: Crystalline silica (quartz) is not classified as a hazardous substance under regulations of the Comprehensive Environmental Response Compensation and Liability Act (CERCLA), 40 CFR §302.

Emergency Planning and Community Right to Know Act: Crystalline silica (quartz) is not an extremely hazardous substance under Section 302 and is not a toxic chemical subject to the requirements of Section 313.

Clean Air Act: Crystalline silica (quartz) mined and processed by U.S. Silica Company 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)(xxvi).

NTP: Respirable crystalline silica (quartz) is classified as a carcinogen.

OSHA Carcinogen: Crystalline silica (quartz) is not listed.

California Proposition 65: Crystalline silica (quartz) is classified as a substance known to the State of California to be a carcinogen.

CANADA

Domestic Substances List: U. S. Silica Company products, as naturally-occurring substances, are on the Canadian DSL.

WHMIS Classification: D2A

OTHER

EINECS No.: 238-878-4

EEC Label (Risk/Safety Phrases): R 48/20, R 40/20, S22, S38

IARC: Crystalline silica (quartz) is classified in IARC Group 1.

National, state, provincial or local emergency planning, community right-to-know or other laws, regulations or ordinances may be applicable--consult applicable national, state, provincial or local laws.

SECTION 16 - OTHER INFORMATION

Hazardous Material Information System (HMIS):

Health	*
Flammability	0
Reactivity	0
Protective Equipment	E

* For further information on health effects, see Sections 3 and 11 of this MSDS.

National Fire Protection Association (NFPA):

Health	0
Flammability	0
Reactivity	0

Web Sites with Information about Effects of Crystalline Silica Exposure:

http://www.osha.gov - The Occupational Safety and Health Administration Home Page, click on "Technical Links", then click on "silica, crystalline".

http://www.cdc.gov/niosh/silicpag.html - NIOSH Hotlinks to Silicosis Prevention.

U. S. SILICA COMPANY DISCLAIMER

The information and recommendations contained herein are based upon data believed to be correct. However, no guarantee or warranty of any kind, express or implied, is made with respect to the information contained herein. We accept no responsibility and disclaim all liability for any harmful effects which may be caused by purchase, resale, use or exposure to our silica. Customers-users of silica must comply with all applicable health and safety laws, regulations, and orders, including the OSHA Hazardous Communication Standard.