



BADGER MINING CORPORATION

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Identity: Crystalline Silica (Quartz) Material Safety Data Sheet

SECTION I

Manufacturer's Name
Badger Mining Corporation

Address:
P.O. Box 97
HWY. 44 & A
Fairwater, WI 53931

Emergency Telephone Number
414-398-2395

Telephone Number for Information
414-398-2395

Date Updated: 05-22-92 Revised: 06-12-92

SECTION II - HAZARDOUS INGREDIENTS/IDENTITY INFORMATION

Hazardous Components: Silica, Crystalline Quartz (respirable)
Specific Chemical Identity: Silicon Dioxide SiO₂ (CAS 14808-60-7)
Common Names: Silica, Sand, Crystalline Silica, Crystalline Free Silica, Quartz
BMC Trade Names: Frac, Filtration, Well Packing, Bank, Silica, Blast - Sands common to all grades

OSHA PEL (Permissible Exposure Limit):
Exposure to airborne crystalline silica shall not exceed an 8-hour time-weighted average limit as stated in MSHA Standards, Subpart D, Section 56.5001 on air quality specifically "Silica: Crystalline:Quartz (respirable) PEL- TWA = 0.1 mg/m³"

Crystalline Quartz (respirable) $\frac{10 \text{ mg/m}^3}{\% \text{SiO}_2 \times 2}$

ACGIH TLV (Threshold Limit Value):

Crystalline Quartz
TLV-TWA = 0.1 mg/m³ (Respirable Dust)
See Threshold Limit Value and Biological Exposure Indices for 1989-1990
American Conference of Governmental Industrial Hygienists.

Other Limits Recommended: National Institute for Occupational Safety and Health (NIOSH). Recommended standard maximum permissible concentration = 0.05 mg/m³ (respirable free silica) as determined by a full-shift sample up to a 10-hour work day, 40-hour work week. See NIOSH Criteria for a Recommended Standard Occupational Exposure to Crystalline Silica.

SECTION III - PHYSICAL CHEMICAL CHARACTERISTICS

Boiling Point:	4046°F	Specific Gravity (H ₂ O = 1):	2.65
Vapor Pressure (mm Hg.):	None	Melting Point:	3000°F
Vapor Density (AIR = 1):	None	Evaporation Rate (Butyl Acetate = 1):	None
Solubility in Water:	Insoluble	Appearance & Odor:	White or tan sand, granular - no odor or taste.

Our mission is to become the leader in the industrial sand industry with a team of people committed to excellence

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

Flash Point: Non-flammable Flammable Limits: None LEL: None UEL: None

Extinguishing Media: Medium - will not burn

Special Fire Fighting Procedure: N/A

Unusual Fire and Explosion Hazards: Crystalline silica is neither a fire nor an explosion hazard. Sand may be used to smother and put out Class A and B fires.

SECTION V - REACTIVITY DATA

Stability: Stable (Inert - Neutral - Non-reacting)

Conditions to Avoid: None

Incompatibility (Materials to Avoid): Silica will dissolve in hydrofluoric acid and produce a corrosive gas--silicon tetrafluoride. Contact with powerful oxidizing agents, fluorine, chlorine trifluoride, manganese trioxide and oxygen difluoride may cause fires.

Hazardous Decomposition or Byproducts: None Hazardous Polymerization: Will Not Occur Conditions to Avoid: None

SECTION VI - HEALTH HAZARD DATA

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

Health Hazard (Acute and Chronic): Excessive inhalation of dust may result in respiratory disease, including silicosis, pneumoconiosis and pulmonary fibrosis. Acute or rapidly developing silicosis may occur in a short period of time in heavy exposure in certain occupations such as sandblasters. Silicosis is a form of disabling pulmonary fibrosis which can be progressive and may lead to death. Be sure to maintain current physicals. The International Agency for Research on Cancer (IARC) has evaluated in Volume 42, Monographs on the Evaluation of the Carcinogenicity Risk of Chemicals to Humans, Silica and some Silicates (1987), that there is "sufficient evidence" for the carcinogenicity of crystalline silica to experimental animals" and "limited evidence" with respect to humans.

Carcinogenicity: Potential Suspect - NTP? yes; IARC Monographs? yes-level 2A Grouping; OSHA Regulated? Not as a carcinogen.

NTP LISTS SILICA AS "REASONABLY ANTICIPATED TO BE A CARCINOGEN"

Signs and Symptoms of Exposure: Prolonged exposure to respirable silica may cause diminished lung capacity with shortness of breath during physical exertion and cause undue breathlessness, wheezing, coughing, and sputum production.

Medical Conditions Generally Aggravated by Exposure: Individuals with pulmonary or respiratory disease such as asthma, bronchitis and emphysema should avoid prolonged exposure to silica dust. Pulmonary function may be reduced by inhalation of respirable crystalline silica. Also lung scarring produced by such inhalation may lead to a progressive massive fibrosis of the lung which may aggravate other pulmonary conditions and diseases and which increases susceptibility to pulmonary tuberculosis. Progressive massive fibrosis may be accompanied by right heart enlargement, heart failure, and pulmonary failure. Smoking aggravates the effects of exposure.

Emergency and First Aid Procedures: Eyes - wash eyes with large amounts of water, obtain medical attention if irritation persists. Extensive Inhalation - move to an area of fresh air; give oxygen or CPR if necessary. Seek medical attention for treatment, observation and support as needed.

SECTION VII - PRECAUTIONS FOR SAFE HANDLING AND USE

Steps To Be Taken In Case Material Is Released Or Spilled: Clean up by dustless methods (water or vacuum); put in closed container (Note: do not use air or dry sweep). Use approved NIOSH or MSHA respirators for dust (29 CFR 1910.134) as noted below.

Waste Disposal Method: If uncontaminated, dispose as an inert, non-metallic mineral. If contaminated use appropriate method in light of contamination in accordance with Federal, State, and Local laws.

Precautions To Be Taken In Handling and Storing: Avoid spillage. Use dustless systems for handling and employ engineering controls to reduce concentration of airborne dust. (Example: an approved bag house).

Other Precautions: Post warning signs to keep all persons alerted to dusty areas. Use dustless systems for handling, storing, and cleaning up so that airborne dust does not exceed the PEL (Permissible Exposure Limit). Use adequate ventilation and dust collection. Practice good housekeeping. Do not permit dust to collect on walls, floors, sills, ledges, machines, or equipment. Maintain, clean and fit test respirators in accordance with OSHA regulations. Maintain and test ventilation and dust collection equipment. Vacuum or wash clothing which has become dusty. See control measures in Section VIII.

See OSHA Hazard Communication Rule 29 CFR Sections 1910.1200, 1915.99, 1917.20, 1918.90, 1926.59, and 1928.21, and state and local worker or community "right to know" laws and regulations. We recommend that smoking be prohibited in all areas where respirators must be used. **WARN YOUR EMPLOYEES (AND YOUR CUSTOMER'S USERS IN CASE OF RESALE) BY POSTING AND OTHER MEANS, OF THE HAZARD AND OSHA PRECAUTIONS TO BE USED. PROVIDE TRAINING FOR YOUR EMPLOYEES ABOUT THE OSHA PRECAUTIONS.**

See, also, American Society for Testing and Materials (ASTM) standard practice E1132.86, "Standard Practice for Health Requirements Relating to Occupational Exposure to Quartz Dust."

See, also, the most recent standards of the American National Standard Institute (ANSI z.88.2), and the Mine Safety and Health Administration (MSHA) (30 CFR Part 56).

SECTION VIII - CONTROL MEASURES

Respiratory Protection:

The following chart specifies the types of respirators which may provide respiratory protection from crystalline silica.

RESPIRATORY PROTECTION FROM CRYSTALLINE SILICA

CONDITION	MINIMUM RESPIRATORY PROTECTION
Particulate Concentration	
5 X PEL or less	An approved dust respirator.
10 X PEL or less	An approved dust respirator, except single use or quartz mask respirator. An approved fume respirator or high efficiency particulate filter respirator. An approved supplied air respirator. An approved self-contained breathing apparatus.
50 X PEL or less	An approved high efficiency particulate filter respirator with a full facepiece. An approved supplied air respirator with a full facepiece, helmet, or hood. An approved self-contained breathing apparatus with a full facepiece.
500 X PEL or less	An approved powered air-purifying respirator with a high efficiency particulate filter. An approved type C supplied air respirator operated in pressure demand or other positive pressure or continuous flow mode.

Water than 500 T PEL or entry
pressure and escape from unknown
concentrations.

An approved self-contained breathing apparatus with a full facepiece operated in
demand or other positive pressure mode.

An approved 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.

Abrasive Blasting

An approved, type CE, supplied air respirator with a full facepiece, hood, or helmet,
operated in a positive pressure mode.
(See 29 CFR Section or Numbered Clause 1910.94 (a).

Only NIOSH approved or MSHA approved equipment should be used. (See 29 CFR Section or Numbered Clause 1910.134).

See also ANSI standard Z88.2-1980 "Practices for Respiratory Protection," and standard Z9.4-1984 "Ventilation and Safe Practices
of Abrasive Blasting Operations."

Ventilation: Local Exhaust - when possible to meet PEL Standards. Special - An approved Wet Scrubber
Mechanical - an approved bag-house. Other - -ETC-

Protective Gloves: Recommended for hot or cold products. Eye Protection: Recommended at all times.

Other Protective Clothing or Equipment: Use NIOSH or MSHA approved dust respirators.

Work/Hygienic Practices: Avoid creating and breathing dust.

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This form has been completed to meet all current State and Federal (OSHA) regulations, but is offered without guarantee.
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