Oglebay Norton®
Industrial Sands, Inc.

MATERIAL SAFETY DATA SHEET
Oglebay Norton Industrial Sands, Inc.

Date Prepared: February 12, 2001

SECTION I – CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Names/Trade Names:
Silica Sand sold under various names: Oglebay Norton Industrial Sands, Inc., Colorado Silica Sand ®, Glass Sand, Flint

Synonyms/Common Names: Sand, Silica Sand, Quartz, Crystalline Silica, Flint, Ground Silica, Foundry Sand, Engine Sand, Frac Sand, Filtration Sand, Bunker Sand, Turf Sand, Glass Sand

Manufacturer's Name: Oglebay Norton Industrial Sands, Inc.

Oglebay Norton Industrial Sands, Inc.
Three Gateway Plaza
410 N. 44th Street, Suite 320
Phoenix, AZ 85008
Telephone Number for Information: 602-389-4390
Toll Free Telephone Number: 800-640-7002

SECTION II – COMPOSITION/INFORMATION ON INGREDIENTS

Hazardous Ingredient: Crystalline silica (quartz), typically 90.0% to 99.9%

Chemical Formula: SiO_2
CAS#: 14808-60-7

OSHA PEL: Exposure to airborne crystalline silica shall not exceed an 8-hour time-weighted average limit as stated in 29 CFR §1910.1000 Table Z-1-A, Air Contaminants, specifically:

$$\frac{10\ mg/m^3}{SiO_2+2}$$

ACGIH TLV: Crystalline Silica (quartz)
TLV-TWA = 0.1 mg/m^3 Respirable Crystalline Silica (quartz)

See Threshold Limit Value and Biological Exposure Indices for American Conference of Governmental Industrial Hygienists (latest edition).

Other Recommended Limits:
National Institute for Occupational Safety and Health (NIOSH). Recommended standard maximum permissible concentration=0.05 mg/m^3 (respirable free silica) as determined by a full-shift sample up to 10-hour working day, 40-hour work week. See NIOSH Criteria for a Recommended Standard Occupational Exposure to Crystalline Silica.

CAUTION:
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. Crystalline silica as trydimite and cristobalite are more fibrogenic than crystalline silica as quartz. The OSHA PEL for crystalline silica as trydimite and cristobalite is one-half the PEL for crystalline silica (quartz); the ACGIH TLV for crystalline silica as trydimite and cristobalite is one-half the TLV for crystalline silica as quartz.

SECTION III – HAZARD IDENTIFICATION

EMERGENCY OVERVIEW:

Oglebay Norton Industrial Sands, Inc. material is a white or tan sand, or ground sand. It is not flammable, combustible or explosive. 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 Respirable crystalline silica (quartz) inhaled from occupational sources is classified as carcinogenic to humans.
c. Scleroderma There is evidence that exposure to respirable crystalline silica or that the disease silicosis is associated with the increased incidence of scleroderma, an autoimmune disorder manifested by a fibrosis (scarring) of the skin and internal organs.
d. Tuberculosis Silicosis increases the risk of tuberculosis.
e. Nephrotoxicity There are several studies suggesting that exposure to respirable crystalline silica or that the disease silicosis is associated with the increased incidence of kidney disorders.
f. Arthritis There is evidence that exposure to respirable crystalline silica is associated with the increased incidence of crippling arthritis.

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

Skin Contact: May cause skin irritation. See Section VII.

Ingestion: Not applicable.

Chronic Effects: The adverse health effects—silicosis, cancer, scleroderma, tuberculosis,

nephrotoxicity and arthritis —are chronic effects.

Signs and Symptoms of Exposure: There are generally no signs or symptoms of exposure to crystalline silica (quartz). 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 are the same; additionally, weight loss and fever are associated with acute silicosis. The symptoms of scleroderma include thickening and stiffness of the skin, particularly in the fingers, shortness of breath, difficulty swallowing and joint problems.

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 XI, Toxicological Information, for additional detail on potential adverse health effects.

SECTION IV – 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 V – FIRE FIGHTING MEASURES

Flammability: Crystalline silica (quartz) is non-flammable and non-explosive
Extinguishing Media: None required
Flash Point: None
Special Fire Fighting Procedures: N/A
Flammable Limits: None
Unusual Fire and Explosion Hazards: None

SECTION VI – 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 XIII.

SECTION VII – HANDLING AND STORAGE

WARNING LABEL
DO NOT BREATHE THIS MATERIAL
Never Use This Material Without An Air-Supplied Respirator

Silica (Blasting) sand material contains fine dust. If you breathe this dust you can suffer severe, irreversible lunge damage and death. Some medical reports state inhalation of silica dust may cause lung cancer. Medical reports also link breathing silica dust to crippling arthritis and skin and eye irritation.

You must never use this material without having a government-approved respirator. The work area must also be thoroughly ventilated by the use of forced air ventilation during and after use of this material.

Prior to use or handling, you are advised to review and thoroughly understand all health precautions outlined in the Material Safety Data Sheet (MSDS) provided to you by your employer by the supplier of this material.

Respirator Protection
It is a violation of federal safety laws (OSHA) for employers to require workers to use this material without full respiratory protection. The federal laws that apply are: 29CFR 1910.134; 29CFR 1910.1000; 29CFR 1910.94.

It is recommended that users of abrasive blasting media use OSHA approved positive pressure, air fed breathing hood respirators. The positive air pressure will prevent dust from being drawn into the respirator. Continue to wear the respirator until all airborne dust is eliminated from the work area.

Ventilation
Finely divided silica dust is nearly invisible. Work areas must be thoroughly ventilated with forced ventilation fans sufficient to exhaust all dust and provide a complete air exchange every five minutes. Continue ventilation even after abrasive blasting operations have been completed.

Other Protective Equipment
Dust can be harmful to skin and eyes. You need to wear tight goggles, heavy rubber gloves. Clothing should be tight fitting at the cuffs, neck and ankles to prevent dust from contacting your body. Clothing should be regularly washed to prevent dust accumulation.

Warning Symptoms and First Aid
If you experience shortness of breath, coughing, lung and/or throat irritation these may be early warning signs that silica dust is causing a medical condition such as silicosis. Avoid further contact with the material and see your doctor at once if such symptoms occur. Swelling of joints, and joint pain, may signal the start of arthritis, which is also reported to be aggravated by silica exposure. Again, if such symptoms occur seek immediate medical attention.
If eye contact and irritation take place, flush your eyes continuously with clear cold water for at least 15 minutes and then see your doctor for an examination and possible treatment.

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

Safety Notes: Federal safety regulations require that employers train workers in the safe use of abrasive blasting materials and equipment and that they hold periodic safety meetings to assure that safety precautions are being maintained. Report any concerns about these issues to OSHA at (202) 999-OSHA

The OSHA Hazard Communication Standard, 29 CFR Sections 1910.1200, 1915.99, 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 FOR HANDLING CRYSTALLINE SILICA.
See also American Society for Testing and Materials (ASTM) standard practice E 1132-86, "Standard Practice for Health Requirements Relating to Occupational Exposure to Quartz Dust."

For Additional Health and Safety Information, Call OSHA, at (202) 999-OSHA

SECTION VIII – 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 that may provide respiratory protection for crystalline silica.

CONDITION 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 powered air-purifying respirator with a high efficiency particulate filter. 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 Abrasive blasting	A type C, supplied-air respirator with a full facepiece, hood, or helmet, operated in a positive pressure mode (see 29 CFR1910.94(a)) Anyone in the vicinity of the blasting site during blasting and during cleanup should wear proper respiratory protection. (See 29 CFR1910. 94 (5) (iii)) Also see 30 CFR Part 11.
***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:

Component	**CAS Number**	**Percentage (by weight)**
Crystalline Silica (Quartz)	14808-60-7	90.0 – 99.9

Silica Sand

Exposure Guidelines						
OSHA		ACGIH		NIOSH		
TWA	STEL	TWA	STEL	TWA	STEL	Unit
10 % Si02+2	None	.1	None	.05	None	mg/m^3

SECTION IX – PHYSICAL AND CHEMICAL PROPERTIES

Appearance: White or tan sand; granular, crushed, or ground

Odor: None

Boiling Point: 4046°F
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 X – STABILITY AND REACTIVITY

Stability: Crystalline silica (quartz) is stable.

Incompatibility (Materials to Avoid): Contact with powerful oxidizing agents such as fluorine, chlorine trifluoride, 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 XI – 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 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). (Emphasis added)

NTP - The National Toxicology Program, in its Sixth Annual Report on Carcinogens, concluded that "silica, crystalline (respirable)" may reasonably be anticipated to be a carcinogen, based on sufficient evidence in experimental animals and limited evidence in humans.

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

There is substantial literature on the issues of the carcinogenicity of crystalline silica, which the reader should consult for additional information. A summary of the literature is set forth in "Exposure to crystalline silica and risk of lung cancer; the epidemiological evidence", Thorax, Volume 51, pp. 97-102 (1996). The official statement of the American Thoracic Society on the issue of silica carcinogenicity was published in "Adverse Effects of Crystalline Silica Exposure", American Journal of Respiratory and Critical Care Medicine, Volume 155, pp. 761-765 (1997). The official statement concluded that "The available data support the conclusion that silicosis produces increased risk for bronchogenic carcinoma. The cancer risk may also be increased by smoking and other carcinogens in the workplace. Epidemiologic studies provide convincing evidence for increased cancer risk among tobacco smokers with silicosis. Less information is available for never-smokers and for workers exposed to silica but who do not have silicosis. For workers with silicosis, the risks for lung cancer are relatively high and consistent among various countries and investigators. Silicosis should be considered a condition that predisposes workers to an increased risk of lung cancer." Id. at 763.

C. SCLERODERMA

There is evidence that exposure to respirable crystalline silica or that the disease silicosis is associated with the increased incidence of scleroderma, an immune system disorder manifested by a fibrosis (scarring) of the lungs, skin and other internal organs. Recently, the American Thoracic Society noted that "there is persuasive evidence relating scleroderma to occupational silica exposures in setting where there is appreciable silicosis risk." The following may be consulted for additional information on silica, silicosis and scleroderma (also known as progressive systemic sclerosis): Occupational Lung Disorders, Third Edition, Chapter 12, entitled "Silicosis and Related Diseases", Parkes, W. Raymond (1994). "Adverse Effects of Crystalline Silica Exposure", American Journal of Respiratory and Critical Care Medicine, Volume 155, pp. 761-765 (1997).

D. TUBERCULOSIS

Individuals with silicosis are at increased risk to develop 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). "Adverse Effects of Crystalline Silica Exposure", American Journal of Respiratory and Critical Care Medicine, Volume 155, pp. 761-765 (1997).

E. NEPHROTOXICITY

There are several recent studies suggesting that exposure to respirable crystalline silica or that the disease silicosis is associated with the increased incidence of kidney disorders. The following may be consulted for additional information on silica, silicosis and nephrotoxicity: Occupational Lung Disorders, Third Edition, Chapter 12, entitled "Silicosis and Related Diseases", Parkes, W. Raymond (1994). "Further evidence of human silica nephrotoxicity in occupationally exposed workers", British Journal of Industrial Medicine, Vol. 50, No. 10, pp. 907-912 (1993). "Adverse Effects of Crystalline Silica Exposure", American Journal of Respiratory and Critical Care Medicine, Volume 155, pp. 761-765 (1997).

F. ARTHRITIS

There are recent studies suggesting that exposure to respirable crystalline silica or that the disease silicosis is associated with the increased incidence of arthritis. The following may be consulted for additional information on silica exposure and arthritis: American Journal of Industrial Medicine, Volume 35, pp. 375-381 "Connective Tissue Disease and Silicosis", Rosenman KD; Moore-Fuller M.; Reilly MJ. (1999). Environmental Health Perspective, Volume 107, pp. 793-802 "Occupational Exposure to Crystalline Silica and Autoimmune Disease", Parks CG; Conrad K; Cooper GS. (1999).

SECTION XII – ECOLOGICAL INFORMATION

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

SECTION XIII – DISPOSAL CONSIDERATIONS

General: The material may be landfilled; however, spent abrasive media may contain materials derived from the prepared surfaces that because of contamination may not be disposed of in landfills. Disposed 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 Oglebay Norton Industrial Sands, Inc. 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 XIV – 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 XV – REGULATORY INFORMATION

UNITED STATES (FEDERAL AND STATE)

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 Oglebay Norton Industrial Sands, Inc. was not processed with or does not contain any Class I or Class II ozone depleting substances.

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

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 probable carcinogen.

OSHA Carcinogen: Respirable crystalline silica (quartz) is not listed.

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

WHMIS Classification: D-2A

OTHER

EINECS No.: 231-545-4

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, city, county 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 XVI – OTHER INFORMATION

Hazardous Material Information System (HMIS):

Health	*
Flammability	*0*
Reactivity	**0**
Protective Equipment	**E**

*** For further information on health effects, see Sections III and XI of this MSDS.**

National Fire Protection Association (NFPA):

Health	**0**
Flammability	**0**
Reactivity	**0**

http://www.msha.gov - The Mine Safety Health Administration Home Page, which contains general (not mining specific) information on silicosis. Click on "Silicosis Prevention".
http://www.cdc.gov/niosh/silicpag.html - NIOSH Hotlinks to Silicosis Prevention.

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