

MSDS – NRAM OREAS CRMs

Material Safety Data Sheet for non-radioactive OREAS Certified Reference Materials

SECTION 1 – PRODUCT AND COMPANY IDENTIFICATION

Globally Harmonised System (GHS) Code: 38220003

Product Names / Trade Names (all products are branded ‘OREAS’ followed by a number ± letter):

2Ca	2Pa	2Pd	4Pb	5Pb	6Ca	6Pa	6Pb	6Pc	7Ca	7Pa	7Pb	10c			
12a	13P	13b	14P	15Pa	15Pb	15Pc	15d	16a	16b	17Pb	17c	18Pa	18Pb	18c	19a
21e	22b	22c	22d	22e	22P	23a	24b	24c	24P	25a	26a	26b	27	27b	
32	33	36	37	38	40	43P	44P	45b	45c	45d	45e	45P			
50P	50c	50Pb	51P	52P	52c	52Pb	53P	53Pb	54Pa	55P	56P	59a	59b	59c	59d
60P	60b	60c	61Pa	61Pb	61d	61e	62Pa	62Pb	62c	62d	62e	65a	66a	67a	68a
70b	70P	72a	72b	73a	73b	74a	74b	75a	75b	76a	76b	77a	77b	78	
90	91	92	93	94	95	96	97	98	99	99b					
110	111	111b	112	113											
131a	131b	132a	132b	133a	133b	134a	134b								
140	141	142	146	151a	151b	152a	152b	153a	153b						
160	161	162	163	164	165	166									
170a	170b	171	172								180	181	182	183	184
185	186	187	189	190	191	192	193	194	195		197	198	199		
200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215
216	217	218		220	221	222	223	224				228	229		
250	251	252	253	254	255	256	257						350	351	352
401	402	403	404	405	406										
460	461	462	463	464	465										
501	502	503	504	501b	502b	503b	504b	501c	502c	503c	504c				
520	521	522	523	524											
600	601	602	603	604	605	620	621	622	623	624					
700	701														
901	902	903	904	905	906	907	908								
920	921	922	923	924	925	926	927	928	929	930	931	932	933	934	935
991	992														
H1	H3	H5													

Synonyms / Common Names:

Certified Reference Materials (CRMs), Secondary Reference Materials (SRMs), Reference Materials (RMs), Standards.

Manufacturer's Name:

Ore Research & Exploration Pty Ltd
37A Hosie Street
Bayswater, VIC 3153
AUSTRALIA

Emergency Contact Numbers:

Tel: +613 9729 0333
Fax: +613 9729 8338
Email: info@ore.com.au

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SECTION 2 – COMPOSITION / INFORMATION ON INGREDIENTS

<u>Ingredients:</u>	<u>Typical % By Weight</u>
Crystalline Silica (quartz)	0.0 – 65.0%
Feldspar	0.0 – 60.0%
Clays (illite, montmorillonite, kaolin)	0.0 – 90.0%
Adularia	0.0 – 25.0%
Mica (sericite)	0.0 – 20.0%
Carbonate (calcite, dolomite, magnesite)	0.0 – 15.0%
Chlorite	0.0 – 25.0%
Iron Oxides	0.0 – 25.0%
Sulphides (pyrite, pyrrhotite, arsenopyrite)	0.0 – 90.0%

Exposure Limits for Hazardous Ingredients:

	<u>OSHA PEL</u>	<u>ACGIH TLV</u>	<u>NIOSH REL</u>
Crystalline Silica (Quartz)	<u>10 mg/m³ %SiO₂+2</u>	0.05	0.05

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 tridymite, 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 tridymite and cristobalite is one-half of the OSHA PEL for crystalline silica (quartz).

SECTION 3 – HAZARD IDENTIFICATION

EMERGENCY OVERVIEW:

Crystalline silica (quartz) is a commonly occurring essential constituent of many rocks and most gold ores. The OREAS CRMs listed above have been prepared from naturally-occurring gold-bearing rocks and base metal ores and therefore contain varying amounts of crystalline silica. They have been ground to fine powders and are tan to grey in colour. They are not flammable, combustible or explosive. They do not cause burns or severe skin or eye irritation. A single exposure will not result in serious adverse health effects. They are not known to be an environmental hazard.

POTENTIAL HEALTH EFFECTS OF QUARTZ COMPONENT:

Inhalation:

- 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.
- Cancer Crystalline silica (quartz) inhaled from occupational sources is classified as carcinogenic to humans.
- Autoimmune Disease There are some studies that show excess numbers of cases of scleroderma and other connective tissue disorders in workers exposed to respirable crystalline silica.
- Tuberculosis Silicosis increases the risk of tuberculosis.

- e. **Nephrotoxicity** There are some studies that show an increase incidence of chronic kidney disease and end-stage renal disease in workers expose 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

OREAS CRMs are 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 Ore Research & Exploration Pty Ltd products 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 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	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 [AS/NZS 1716:2012](#) or NIOSH-approved or MSHA-approved equipment. See also ANSI standard [ANSI Z88.2](#).

Permissible Exposure Levels:

Component	CAS No.	Percentage by weight	Exposure Guidelines						
			OSHA		ACGIH		NIOSH		Unit
			TWA	STEL	TWA	STEL	TWA	STEL	
Crystalline silica (quartz)	14808-60-7	0.0 – 65.0	10 %SiO ₂ +2	None	0.05	None	0.05	None	mg/m ³

SECTION 9 – PHYSICAL AND CHEMICAL PROPERTIES

Appearance:	pale to dark grey, light brown to deep red brown powder.		
Boiling Point:	NA	Odour:	None
Vapour Pressure (mm Hg.):	None	Specific Gravity (Water = 1):	2.2-3.6
Vapour Density (Air = 1):	None	Melting Point:	1100-1300°C
Solubility in Water:	Insoluble in water	Evaporation Rate (Butyl Acetate = 1):	None

SECTION 10 – STABILITY AND REACTIVITY

Stability: The silicate component of OREAS CRMs is stable. The sulphide component may oxidise slowly on exposure to heat and oxygen. Some uptake of moisture may occur under humid conditions.

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 pulmonale).

Accelerated Silicosis can occur with exposure to high concentrations of respirable crystalline silica over a relatively short period; the lung lesions can appear with 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 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).

NIP - 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 Ore Research & Exploration Pty Ltd. 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: OREAS CRMs sold by Ore Research & Exploration Pty Ltd are not processed with or do 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.

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/biosh/silicpag.html> - NIOSH Hotlinks to Silicosis Prevention.

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