
SDS – RADA OREAS CRMs

Safety Data Sheet for radioactive OREAS Certified Reference Materials

SECTION 1 – PRODUCT AND COMPANY IDENTIFICATION

Product Names / Trade Names:

OREAS 100a, OREAS 101a, OREAS 101b, OREAS 102a, OREAS 104, OREAS 105, OREAS 106, OREAS 120, OREAS 121, OREAS 122, OREAS 123, OREAS 124, OREAS 146.

Synonyms / Common Names:

NIL

Manufacturer's Name:

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Date Prepared: 14 May 2012

Last Updated: 27th May, 2019

SECTION 2 – COMPOSITION / INFORMATION ON INGREDIENTS

<u>Ingredients:</u>	<u>Typical % By Weight</u>
Crystalline Silica (quartz)	30.0 – 82.0%
Uranium	0.001 – 0.19%
Thorium	0.0005-0.09%
Iron Oxide	1.0 – 10.0%
Potassium Aluminium Silicate	1.0 – 10.0%
Copper	0.01 – 3.0%
Gold	<0.000001%
Silver	<0.0001%

Other contaminants: Trace amount of radium (Ra). The radium to uranium ratio is 3.44×10^{-7} .

SECTION 3 – HAZARD IDENTIFICATION

EMERGENCY OVERVIEW:

Crystalline silica (quartz) is a commonly occurring essential constituent of many rocks and most ores. The OREAS CRMs listed above have been prepared from naturally-occurring, uranium bearing rocks and contain varying amounts of crystalline silica. They have been ground to fine powders. 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.

Inhalation of crystalline quartz, silica, can cause silicosis. Simple silicosis may only cause changes on chest X-ray. If the disease progresses, cough, shortness of breath, and death may occur. Crystalline silica is listed with IARC as a Class 2A carcinogen and with NTP as a substance reasonably anticipated to be a carcinogen in its sixth annual report on carcinogens.

A new CAS number, 112945-52-5, has been assigned to Amorphous Fumed Silica to distinguish it from crystalline silica. Unlike crystalline silica, amorphous silica is considered biologically benign. However, as with any dust hazard, it may cause discomfort to the eyes, skin and respiratory tract.

Pitchblende is a naturally occurring radioactive mineral. It is the principal ore source for uranium, in the form of uranium oxide, U₃O₈. Hazards are those associated with radiation and with dust particles.

CERCLA Ratings (SCALE 0-3): HEALTH=3 FIRE=0 REACTIVITY=0

PERSISTENCE = 3

NFPA RATINGS (SCALE 0-4): HEALTH=U FIRE=0 REACTIVITY=0

CARCINOGEN STATUS:

OSHA: N

NTP: Y

IARC: Y

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 if breathing stops, seek medical attention as needed.

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

Skin Contact: Wash with soap and water.

Ingestion: Not applicable.

SECTION 5 – FIRE FIGHTING MEASURES

FIRE AND EXPLOSION HAZARD: Not flammable, combustible or explosive.

EXTINGUISHING MEDIA: Dry chemical, carbon dioxide, water spray or regular foam (2000 *Emergency Response Guidebook*, ERG 2000, developed jointly by Transport Canada (TC), the U. S. Department of Transportation (DOT) and the Secretariat of Transportation and Communications of Mexico (SCT).)

For Larger Fires, use water spray or fog (flooding amounts) (2000 *Emergency Response Guidebook*, ERG 2000.)

FIREFIGHTING: Move container from fire area if you can do it without risk. Apply cooling water to sides of containers exposed to flames until well after fire is out (2000 *Emergency Response Guidebook*, ERG 2000).

Do not move damaged containers; move undamaged containers out of fire zone. For massive fire in cargo area, use unmanned hose holder or monitor nozzles (2000 *Emergency Response Guidebook*, ERG 2000).

Contact the local, State, or Department of Energy radiological response team. Use suitable agent for surrounding fire. Cool containers with flooding amounts of water, apply from as far a distance as possible. Avoid breathing dusts or vapours, keep upwind. Keep unnecessary people out of area until declared safe by radiological response team.

FLASH POINT: Non-flammable solid.

HAZARDOUS COMBUSTION PRODUCTS: Thermal decomposition may release toxic/hazardous gases.

SECTION 6 – ACCIDENTAL RELEASE MEASURES

OCCUPATIONAL SPILL: Do not touch damaged containers or spilled material. For large spills, dike far ahead of spill for later disposal. For dry spills, cover with plastic sheet or tarp to minimize spreading. Keep unnecessary people at least 50 metres (150 feet) upwind of spill. Isolate hazard area and deny entry. Limit entry to shortest time possible. Clean-up should be performed only by qualified radiation worker(s).

WATER SPILL: Contaminating any known source of drinking water with substances known to cause cancer and/or reproductive toxicity is prohibited by the Australian Safe Drinking Water Act 2003.

SECTION 7 – HANDLING AND STORAGE

Observe all Federal, State, and local regulations when storing this substance.

Store in accordance with 10 CFR 20.

Store in a designated radioactive materials area.

Waste Disposal Method: See Section 13.

Precautions During Handling and Use: Do not breathe dust. Use adequate ventilation and dust collection. Keep airborne dust concentrations below permissible exposure levels (<PEL). Do not rely on your sight to determine if dust is in the air. Silica and U₃O₈ particulates may be in the air without a visible dust cloud. Wear a respirator approved for fine 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 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

Exposure Limits for Hazardous Ingredients:

Ingredient	Reference	TWA		STEL	
		ppm	mg/m ³	ppm	mg/m ³
Copper (fume)	ASCC (AUS)	-	0.2	-	-
Copper, dusts & mists (as Cu)	ASCC (AUS)	-	1.0	-	-
Iron oxide fume (Fe ₂ O ₃) (as Fe)	ASCC (AUS)	-	5.0	-	-
Silica, Crystalline Quartz	ASCC (AUS)	-	0.1	-	-
Silver, metal	ASCC (AUS)	-	0.1	-	-
Uranium (natural)	ASCC (AUS)	-	0.2	-	0.6

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

Subject to California Proposition 65 cancer and/or reproductive toxicity warning and release requirements - (October 1, 1988).

Occupational exposure to radioactive substances must adhere to standards established by the Occupational Safety and Health Administration, 29 CFR 1910.96, and/or the Nuclear Regulatory Commission, 10 CFR Part 20.

Engineering Controls: Avoid inhalation. Use in well ventilated areas. Where an inhalation risk exists, mechanical extraction ventilation is recommended. Depending upon the specific work place activity, a more stringent ventilation system may be necessary to comply with OSHA exposure limits and those set forth in 10 CFR 20.103.

One method of controlling external radiation exposure is to provide adequate shielding.

ALPHA PARTICLES: The typical alpha particles emitted by uranium oxide are easily shielded by a fraction of a millimetre of any ordinary material or a few inches of air. Thick paper, plastic, or cardboard will suffice.

BETA PARTICLES: Beta particles are more penetrating than alpha, and require additional shielding. These certified reference materials do not emit significant amounts of beta radiation.

GAMMA RAYS: Gamma rays are highly penetrating and are most easily shielded by heavier elements (high Z number). These certified reference materials, in the quantities used for laboratory work, do not emit significant amounts of gamma radiation. If large (>10kg) quantities of this material are to be stored or used, consult a radiation protection specialist or health physicist to determine if shielding is required.

EYE PROTECTION: Employee must wear eye protection to prevent eye contact with this substance. Contact lenses should not be worn.

Emergency eye wash: If there is any possibility that an employee's eyes may be exposed to this substance, the employer must provide an eye wash station within the immediate area for emergency use.

Biological Limits: No biological limit allocated.

CLOTHING: Employee must wear impervious clothing to prevent repeated or prolonged skin contact with this substance.

GLOVES: Employee must wear appropriate protective gloves to prevent contact with this substance. Used gloves that may have contacted this substance should be disposed of as radioactive waste.

RESPIRATORY PROTECTION:

The following respirators and maximum use concentrations are recommendations by the U.S. Department of Health Services, NIOSH Pocket Guide to Chemical Hazards; or by the U.S. Department of Labor, 29 CFR 1910 Subpart Z. The specific respirator selected must be based on contamination levels found in the work place. Airborne contamination levels must not exceed the working limits of the respirator. Respirators must be jointly approved by the National Institute for Occupational Safety and Health and the Mine Safety and Health Administration (NIOSH-MSHA).

SILICA (CRYSTALLINE): At any detectable concentration: Any self-contained breathing apparatus with full face-piece, operated in a pressure-demand or other positive pressure mode. Any supplied-air respirator with a full face-piece and operated in pressure-demand or other positive pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive pressure mode.

Escape - Any air-purifying full face-piece respirator with a high-efficiency particulate filter. Any appropriate escape-type self-contained breathing apparatus.

FOR FIREFIGHTING AND OTHER IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONDITIONS:

Any self-contained breathing apparatus that has a full face-piece and is operated in a pressure-demand or other positive-pressure mode.

Any supplied-air respirator that has a full face-piece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive-pressure mode.

URANIUM, Insoluble compounds (As U): At any detectable concentration: Any self-contained breathing apparatus that has a full face-piece and is operated in a pressure-demand or other positive-pressure mode. Any supplied air respirator that has a full face-piece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive-pressure mode.

Escape - any air-purifying, full-face-piece respirator with a high-efficiency particulate filter. Any appropriate escape-type, self-contained breathing apparatus.

FOR FIREFIGHTING AND OTHER IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONDITIONS: Any self-contained breathing apparatus that has a full face-piece respirator with a high-efficiency particulate filter. Any supplied-air respirator that has a full face-piece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive-pressure mode.

SECTION 9 – PHYSICAL AND CHEMICAL PROPERTIES

Appearance: Pale grey to tan to dark grey.

SILICON DIOXIDE (SiO₂):

Molecular weight: 60.09

Molecular formula: SiO₂

Boiling point: 4046_F (2230°C)

Melting point: 2930_F (1610°C)

Vapour Pressure: 0 mm Hg @ 20°C

Specific Gravity: 2.635-2.660

Water Solubility: insoluble

Solvent Solubility: Soluble in hydrofluoric acid; very slightly soluble in alkalis and hot concentrated phosphoric acid; insoluble in most acids and organic solvents.

URANIUM OXIDE (U₃O₈):

Molecular weight: 842

Molecular formula: (U₃O₈)

Boiling point: Decomposes

Melting point: 1300°C (2372°F) decomposes

Specific Gravity: 8.30

Water Solubility: Insoluble

Solvent Solubility: Nitric acid, sulfuric acid

SECTION 10 – STABILITY AND REACTIVITY

Stability: Stable under recommended conditions of storage. Some uptake of moisture may occur of opened packets under humid conditions.

Conditions to avoid: No potentially hazardous conditions could be found in literature, nor could any accidents be recalled in which uranium oxide reacted in a hazardous manner.

Incompatibility (Materials to Avoid): Contact with powerful oxidizing agents, such as fluorine, chlorine trifluoride and oxygen difluoride, may cause fires. Avoid heat, sparks, open flames and other ignition sources when contacting with these agents.

QUARTZ:

Alkalis (Strong): May be attacked.

Chlorine Trifluoride: Possible explosion.

Hydrochloric Acid: May be attacked with exothermic reaction.

Manganese Trifluoride: Violent reaction.

Oxidizers (Strong): Fire and explosion hazard.

Oxygen Trifluoride: Possible explosive reaction.

Ozone: Possible explosive reaction in presence of organic materials.

Vinyl Acetate: Vigorous reaction.

Xenon Hexafluoride: Possible detonation.

URANIUM OXIDE:

Bromine Trifluoride: Reaction is rapid below the boiling point of the trifluoride.

Hazardous Decomposition or Byproducts: Silica will dissolve in hydrofluoric acid and produce a corrosive gas – silicon tetrafluoride. Thermal decomposition may release hazardous and toxic gases.

Hazardous Polymerization: Will not occur under normal temperature and pressure.

SECTION 11 – TOXICOLOGICAL INFORMATION

Uranium oxide is irritating to the skin, eyes, and mucous membranes. Uranium compounds may be toxic to the kidneys (nephrotoxins). Chronic inhalation of insoluble uranium compounds may damage the lungs and effect the lymph nodes. Pneumoconiosis may occur. Deposition of uranium in the tissue of the bone occurs most readily with soluble uranium compounds. Deposition may occur, to a lesser degree, with insoluble compounds. Adverse effects of uranium bone deposition include blood disorders such as anemia and leukopenia.

In humans, cancer of the lung, lymphatic and hemopoietic systems, and bone have been reported. Uranium compounds usually do not constitute an external radiation exposure hazard since uranium emits mainly alpha-radiation at a low energy level. Uranium may constitute an internal radiation hazard if it is absorbed into the body, delivering alpha emission onto tissues in which it is stored. Crystalline silica can cause silicosis and is listed as a carcinogen. See Section 3 above.

SKIN CONTACT: Silica may cause irritation of intact skin via mechanical action. Skin abrasions may cause scarring. Uranium oxide may be irritating to the skin; however, there is no evidence that insoluble uranium compounds can be absorbed through unbroken skin. Penetration through damaged skin may result in internal damage or deposition of radioactive materials. Prolonged skin contact with insoluble uranium compounds should be avoided because of potential radiation damage to basal cells. Dermatitis has occurred as a result of handling some insoluble uranium compounds.

EYE CONTACT: Particles of silica may cause irritation via mechanical action. An abnormally high silicon content in the cornea, and a gradual decrease in visual acuity due to corneal opacities in the pupillary area, have been reported in a group of foundry workers who developed pulmonary silicosis. Radiation affects the eye by inducing acute inflammation of the conjunctiva and the cornea. The most sensitive part of the eye is the lens. An effect of eye irradiation is cataract formation. Cataracts may begin to develop anywhere from 6 months to several years after a single, large exposure or after prolonged exposure. The rate of growth and the degree of opacity are dependent upon the dose of radiation. The silicon content of these Certified Reference Materials is expected to preclude any long term eye contact via irritation. It is important to note that long term eye contact with these certified reference materials would most likely result in serious damage to the cornea long before cataracts would be formed.

INGESTION: Crystalline silica is biologically inert. Effects of ingestion are due to mechanical action. The fate of ingested alpha emitters depends on their solubility. Uranium oxide is not biologically soluble and the primary dose received would be to the lining of the gut. Repeated ingestion of alpha emitters may lead to increased cancer risk.

Toxicity Data: SILICA, CRYSTALLINE - QUARTZ (14808-60-7)
LCLo (Inhalation): 300 ug/m³/10 years (human)
LDLo (Intratracheal): 200 mg/kg (rat)
LDLo (Intravenous): 20 mg/kg (dog)
TCLo (Inhalation): 16 000 000 particles/ft³/8 hours/17.9 years (human-fibrosis)
URANIUM (7440-61-1)
LD50 (Ingestion): 750 mg/kg (rat)
HAEMATITE (1317-60-8)
Carcinogenicity: Not classifiable as to carcinogenicity (IARC Group 3)
COPPER (7440-50-8)
LD50 (Intraperitoneal): 3500 ug/kg (mouse)
LDLo (Subcutaneous): 375 mg/kg (Rabbit)
TDLo (Ingestion): 120 ug/kg (human - gastrointestinal upset)
GOLD (7440-57-5)
LDLo (Intravenous): 58 mg/kg (rat)
SILVER (7440-22-4)
TCLo (Inhalation): 1 mg/m³ (human)

SECTION 12 – ECOLOGICAL INFORMATION

Environmental Impact Rating (0-4): No data available

Acute Aquatic Toxicity: No data available

Degradability: No data available

Log Bioconcentration Factor (BCF): No data available

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 SDS.

SECTION 13 – DISPOSAL CONSIDERATIONS

Observe all Federal, State and local regulations when disposing of these materials.

SECTION 14 – TRANSPORT INFORMATION

U.S. Department of Transportation Hazard Classification, 49 CFR 173 Subpart I - Class 7
- (Radioactive) Materials

U.S. Department of Transportation Labelling Requirements 49 CFR 172.101 and 49CFR 172 Subpart E - Labelling and 172.402; Additional Labelling requirements for subsidiary hazards.

U.S. Department of Transportation Shipping Name-ID Number, Hazard Class or Division, 49 CFR 172.101

U.S. Department of Transportation Packaging Authorizations:
Exceptions: 49 CFR 173.421, and 173.453
Specific requirements: 49 CFR 173.455
Non-Bulk Packaging: 49 CFR 173.415, or 173.417
Bulk Packaging: None

SECTION 15 – REGULATORY INFORMATION

Poison Schedule: A poison schedule number has not been allocated to this product using the criteria in the Standard for the Uniform Scheduling of Drugs and Poisons (SUSDP).

AICS: All chemicals listed on the Australian Inventory of Chemical Substances (AICS).

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.

TSCA STATUS: Y

CERCLA SECTION 103 (40 CFR 302.4): N

SARA SECTION 302 (40 CFR 355.30): N

SARA SECTION 304 (40 CFR 355.40): N

SARA SECTION 313 (40 CFR 372.65): Y

OSHA PROCESS SAFETY (29 CFR 1910.119): N

CALIFORNIA PROPOSITION 65: Y

SARA HAZARD CATEGORIES, SARA SECTIONS 311/312 (40 CFR 370.21)

ACUTE HAZARD: Y

CHRONIC HAZARD: Y

FIRE HAZARD: N

REACTIVITY HAZARD: N

SUDDEN RELEASE HAZARD: N

SECTION 16 – OTHER INFORMATION

IARC - GROUP 1 - CONFIRMED HUMAN CARCINOGEN.

This product contains an ingredient for which there is sufficient evidence to have been classified by the International Agency for Research into Cancer as a human carcinogen. The use of products known to be human carcinogens should be strictly monitored and controlled.

ABBREVIATIONS:

ADB - Air-Dry Basis.

BEI - Biological Exposure Indice(s)

CAS# - Chemical Abstract Service number - used to uniquely identify chemical compounds.

CNS - Central Nervous System.

EINECS - European INventory of Existing Commercial chemical Substances.

IARC - International Agency for Research on Cancer.

M - moles per litre, a unit of concentration.

mg/m³ - Milligrams per cubic metre.

NOS - Not Otherwise Specified.

NTP - National Toxicology Program.

OSHA - Occupational Safety and Health Administration.

pH - relates to hydrogen ion concentration using a scale of 0 (high acidic) to 14 (highly alkaline).

ppm - Parts Per Million.

RTECS - Registry of Toxic Effects of Chemical Substances.

TWA/ES - Time Weighted Average or Exposure Standard.

HEALTH EFFECTS FROM EXPOSURE: It should be noted that the effects from exposure to this product will depend on several factors including: frequency and duration of use; quantity used; effectiveness of control measures; protective equipment used and method of application. Given that it is impractical to encompass all possible scenarios, it is anticipated that users will assess the risks and apply control methods where appropriate.

PERSONAL PROTECTIVE EQUIPMENT GUIDELINES: The recommendation for protective equipment contained within this SDS is provided as a guide only. Factors such as method of application, working environment, quantity used, product concentration and the availability of engineering controls should be considered before final selection of personal protective equipment is made.

Report Status: The information is based on the latest chemical and toxicological research and is believed to represent the current state of knowledge as to the appropriate safety and handling precautions for the product at the time of issue.

It is provided to users of OREAS reference materials as a reference tool only, is not all-inclusive and does not represent any guarantee as to the properties of the product. Further clarification regarding any aspect of the product should be obtained directly from the manufacturer.

These materials are prepared for use as a reference standard for laboratories that routinely handle uranium. ORE Research & Exploration P/L assumes that recipients of this material have developed internal safety procedures which guard against accidental exposure to radioactive and toxic materials, contamination of the laboratory environment, or criticality.

ORE further expects that personnel who handle radioactive materials have been thoroughly trained in the safety procedures developed by and for their laboratory.

The information and recommendations set forth herein are presented in good faith and believed to be correct as of the revision date. However, recipients of this material should use this information only as a supplement to other information gathered by them, and should make independent judgement of the suitability and accuracy of this information. This statement is not intended to provide comprehensive instruction in developing an appropriate safety program and does not include all regulatory guidelines. This information is furnished without warranty, and any use of the product not in conformance with this Safety Data Sheet, or in combination with any other product or process, is the responsibility of the user.

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