

# MATERIAL SAFETY DATA SHEET

## Heavy Mineral Concentrate

### MURRAY ZIRCON MANUAL

Document No.	CORP-OHS-FOR-028
Effective Date.	16/08/2012
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### 1. IDENTIFICATION OF THE MATERIAL AND SUPPLIER INFORMATION

#### Product Identification

Product Name	<b>Heavy Mineral Concentrate</b>
Other Names	HMC, Mineral Sands Concentrate
Recommended Use	Separation into component products of Zircon, Rutile, Ilmenite, Leucosene and Monazite as feedstock for further processing and downstream products

#### Supplier Information

Company	<b>Murray Zircon Pty. Ltd.</b>	
A.B.N.	75 147 048 744	
Address	Lot 2 Knights Well Road, Mindarie, South Australia, 5309	
Telephone Number	Within Australia (08) 8578 7800	Outside Australia +61 8 8578 7800
Fax Number	Within Australia (08) 8578 7899	Outside Australia +61 8 8578 7899
Email Address	info@murrayzircon.com.au	
<b>Emergency Contact (24 hours)</b>		
Telephone	Within Australia (08) 8578 7800	Outside Australia +61 8 8578 7800
Position	Mine Reception	

### 2. COMPOSITION / INFORMATION ON INGREDIENTS

The product is a mixture of natural sand grains containing typical heavy minerals of zirconium and titanium plus quartz and naturally occurring radiological trace elements.

Ingredients (typical)	CAS Number	Content
Ilmenite/Leucosene (FeTiO <sub>3</sub> )	103170-28-1	50 – 60% (wt.)
Zircon (ZrSiO <sub>4</sub> )	14940-68-2	20 – 30%
Rutile (TiO <sub>2</sub> )	1317-80-2	5 – 10%
Quartz (SiO <sub>2</sub> )	14808-60-7	5 – 15%
Kyanite (Al <sub>2</sub> SiO <sub>5</sub> )	1302-76-7	0 – 1%
Moisture (H <sub>2</sub> O)	-	3 – 8%
Uranium (U)	7440-61-1	100 – 200ppm
Thorium (Th)	7440-29-1	500 – 900ppm
Monazite ((Ce,La,Nd,Th,Y)PO <sub>4</sub> )	-	<1%

The product may also contain minor amounts of iron oxide, xenotime and other less significant minerals, as well as trace amounts of other silicate minerals such as staurolite, tourmaline, micas, almandine and other minerals and trace elements.

### 3. HAZARDS IDENTIFICATION

#### Potential Health Effects

##### Acute

<b>Inhalation</b>	Typical product particle size is greater than the 10 micron respirable dust limit. It should be regarded as nuisance dust, and can be irritating if inhaled at high concentrations. May cause symptoms such as coughing or sneezing. Australian regulations nominate TLV (TWA) 10 mg/m <sup>3</sup> as total dust, and 5 mg/m <sup>3</sup> as respirable dust.
<b>Ingestion</b>	This product is considered non-toxic and there are no known hazards caused by accidental ingestion of small amounts as might occur during normal handling. Ingestion of larger quantities might cause irritation of the gastro-intestinal system due to abrasive action.

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<b>Eye</b>	Particles or dust are a moderate eye irritant due to abrasive action.
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**Chronic** (Prolonged long-term exposure may result in these possible health hazards)

<b>Radiation</b>	This HMC product contains low concentrations of naturally occurring radioactive material (NORM) of the uranium and thorium series. Typical activity concentrations are about 3 Bq/gm (thorium-232) and 2 Bq/gm (uranium-238). Daughter products are present at equilibrium concentrations. Low level external gamma radiation dose can be received from very extended times spent on or next to bulk product stockpiles. For example continuous exposure (2000 hours per year) within 2 metres of a bulk HMC product stockpile could give rise to an annual external dose above 1 millisievert (the annual dose limit for a member of public). There is also a minor potential for internal dose from inhaled dust. However, the mineral grains are generally too dense and large to remain airborne.
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#### 4. FIRST AID MEASURES

<b>Eye</b>	Flush gently with running water for 15 minutes.
<b>Inhalation</b>	If over exposure occurs, leave exposure area immediately. If irritation persists, seek medical attention.
<b>Skin</b>	Gently flush affected areas with water. Seek medical attention if irritation develops.
<b>Ingestion</b>	For advice, contact a Poison Information Centre on 13 11 26 (Australia Wide) or a medical doctor. If swallowed, do not induce vomiting.
<b>Advice to Doctor</b>	Treat symptomatically.

#### 5. FIRE FIGHTING MEASURES

<b>Flammability</b>	Non-flammable.
<b>Fire/Explosion</b>	Non-combustible and non-explosive.
<b>Extinguishing Media</b>	Non-reactive with typical fire extinguishing agents such as water, foam, carbon dioxide, dry chemicals etc.
<b>Hazchem Code</b>	None Allocated.

#### 6. ACCIDENTAL RELEASE MEASURES

<b>Spillage</b>	If spilled (bulk), contact emergency services if appropriate. Wear dust-proof goggles, PVA/rubber gloves, a Class P2 (Particulate) respirator (where an inhalation risk exists), coveralls and rubber boots. Clear area of all unprotected personnel. Prevent spill entering drains or waterways. Collect and place in sealable containers for disposal or reuse. Avoid generating dust.
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#### 7. STORAGE AND HANDLING

<b>Storage</b>	Store in cool, dry, well-ventilated area, removed from acids (e.g. hydrofluoric acid) and foodstuffs. For smaller quantities, ensure containers are adequately labeled, protected from physical damage and sealed when not in use. For bulk quantities, storage should be in accordance with an approved Radiation Management Plan.
<b>Handling</b>	Before use carefully read the product label if available as well as the most current MSDS. Use of safe work practices are recommended to avoid inhalation of dusts or excessive contact with eyes or skin. Observe good personal hygiene, including washing hands before eating. Prohibit eating, drinking or smoking in areas where this product is used or stored.

#### 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

<b>Engineering Controls</b>	Handle this product only in well ventilated areas such as outdoors. Handling indoors or in areas with restricted ventilation may require the use of mechanical ventilation or dust extraction fans to minimize potential dust inhalation. Maintain dust levels below the recommended exposure standard. Australian regulations nominate TLV (TWA) 10 mg/m <sup>3</sup> as total dust, and 5 mg/m <sup>3</sup> as respirable dust.
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<b>Personal Protective Equipment</b>	Avoid breathing dusts, prevent contact with eyes and minimize contact with skin. Where an inhalation risk exists, the use of a Class P2 (Particulate) respirator is recommended. Wear goggles or safety glasses with side shields. Wearing gloves and long-sleeved protective clothing such as coverall is also recommended to minimize contact with skin.				
<b>Exposure Standards</b>	<b>Component</b>	<b>CAS No.</b>	<b>Wt. %</b>	<b>ACGIH TLV (mg/m<sup>3</sup>)</b>	<b>ACGIH STEL (mg/m<sup>3</sup>)</b>
	Titanium Dioxide ((Fe)TiO <sub>2</sub> )	13463-67-7	60 – 75%	10	--
	Zircon (ZrSiO <sub>4</sub> )	14940-68-2	20 – 30%	5 (as Zr)	10 (as Zr)
	Quartz (SiO <sub>2</sub> )	14808-60-7	5 – 15%	0.05 (respir.)	--
	Uranium (U-nat)	7440-61-1	<0.03%	0.2 (as U)	0.6 (insol. U)
	Thorium (Th-nat)	7440-29-1	<0.10%	--	--
<b>Radiation Exposure</b>	Exposure to radiation due to presence of minor amounts of naturally occurring radioactive materials (NORM) in this product should be controlled in accordance with the ALARA principle; that is, by maintaining radiation dose 'as low as reasonably achievable'. Radiation dose can be minimised by avoiding breathing product dusts and minimizing the time spent in close proximity to stored product, especially large quantities such as stockpiles or storage bins. Radiation dose to workers (occupational dose) as 'effective dose equivalent' should not exceed 20 millisieverts per year, and should not exceed 1 millisievert per year for a member of the public (ICRP 60 (5)).				

## 9. PHYSICAL AND CHEMICAL PROPERTIES

<b>Appearance</b>	GREY TO BLACK SAND	<b>Solubility in water</b>	INSOLUBLE
<b>Odour</b>	ODOURLESS	<b>Specific Gravity</b>	4.2
<b>pH</b>	6.5-8.0 (10% solids in water)	<b>% Volatiles</b>	NOT AVAILABLE
<b>Vapour Pressure</b>	NOT AVAILABLE	<b>Flammability</b>	NON-FLAMMABLE
<b>Vapour Density</b>	NOT AVAILABLE	<b>Flash Point</b>	NOT RELEVANT
<b>Boiling Point</b>	NOT AVAILABLE	<b>Upper Explosion Limit</b>	NOT RELEVANT
<b>Melting Point</b>	> 2000°C	<b>Lower Explosion Limit</b>	NOT RELEVANT
<b>Evaporation Rate</b>	NOT AVAILABLE	<b>Autoignition Temperature</b>	NOT AVAILABLE
<b>Bulk Density</b>	2200-2400 kg/m <sup>3</sup>		

## 10. STABILITY AND REACTIVITY

<b>Stability/Reactivity</b>	This product is stable and considered inert.
<b>Corrosivity</b>	Non-corrosive.
<b>Incompatibility</b>	None identified.
<b>Conditions to Avoid</b>	Avoid contact with strong oxidisers.
<b>Decomposition</b>	This product will only decompose in the presence of high heat (>1400oC) or in the presence of high concentrations of strong acid (e.g. sulphuric or hydrofluoric) and/or in the presence of strong oxidisers.
<b>Hazardous Polymerization</b>	Will not polymerize.

## 11. TOXICOLOGICAL INFORMATION

### Health Hazard Summary

This product is considered non-toxic. Under normal conditions of use, adverse health effects are not anticipated. Refer to Section 3 – HAZARDS IDENTIFICATION in this MSDS for potential health effects.



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<b>Acute Toxicity</b>	Potential irritant to upper respiratory track and mucus membranes if inhaled, and to eyes and skin due to abrasive nature of product.
<b>Chronic Toxicity</b>	Repeated exposure to high concentrations of product dust may result in severe respiratory irritation Prolonged and repeated inhalation of respirable silica may result in pulmonary fibrosis (silicosis). Crystalline quartz is classified as carcinogenic to humans (IARC Group 1).

### 12.ECOLOGICAL INFORMATION

<b>Environment</b>	This is a natural product of mineralized sand grains. It is insoluble in water. It is not anticipated to cause any adverse effects to animal or plant life if released to the environment in small quantities. Not expected to bio-accumulate.
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### 13.DISPOSAL CONSIDERATIONS

<b>Waste Disposal</b>	This product contains very low levels of Naturally Occurring Radioactive Material (NORM) which must be considered for any permanent disposal option. Ensure product is covered with moist soil to prevent dust generation. The Activity of this product is <10 Bq/gm and is therefore exempt under the transportation regulations. Contact the Supplier to discuss return and/or recycle options for this material.
<b>Legislation</b>	Dispose of in accordance with relevant Federal, State and Local legislation. Disposal legislation varies from jurisdiction to jurisdiction. Contact the supplier for additional information regarding applicable legislation and disposal and/or recycle options.

### 14.TRANSPORT INFORMATION

<b>Safe Handling Procedures</b>	The material is not a transport hazard as per Australian Dangerous Goods Transport Code. It is exempted from regulation as radioactive pursuant to paragraph 107(e) of The ARPANSA Code of Practice for Safe Transport of Radioactive Materials and IAEA TS-R-1 Regulations for Safe Transport of Radioactive Substances. Trucks should be covered with a tarpaulin to prevent dispersal of dust when travelling. Washing rather than sweeping should be used to clean bulk transporters. Drivers/cleaners should wear respiratory protection when cleaning.
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### 15.REGULATORY INFORMATION

<b>Radiation Protection</b>	<i>Radiation Protection and Control Act, 1982</i> – EPA South Australia
<b>Transportation</b>	Code of Practice: Safe Transport of Radioactive Material, Radiation Protection Series No.2 Australian Radiation Protection and Nuclear Safety Agency (ARPANSA), 2008  Regulations for the Safe Transport of Radioactive Material, Safety Requirements No. TS-R-1, International Atomic Energy Agency (IAEA), Vienna, 2005
<b>Poison Schedule</b>	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).

### 16.OTHER INFORMATION

This MSDS should be considered valid for a period of up to five (5) years from the date of issue. However it should be considered invalid if replaced by a revised MSDS. Please refer to Murray Zircon's website ([www.murrayzircon.com.au](http://www.murrayzircon.com.au)) to determine if this MSDS is the latest issued. Users of this product and MSDS are advised to consult Worksafe's National Guidance Note NOHSC: 3017 (1994) on the appropriate use of an MSDS to aid in the assessment of potential health risks.



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<b>Respirators</b>	<p>In general, reliance on the use of respirators in lieu of adequate engineering controls should be avoided to minimize potential exposure to dusts. If respiratory equipment must be worn, appropriate measures should be taken to ensure correct respirator selection. In addition, training on the appropriate use of the respirator should be provided. The use of respirators can be uncomfortable when used for extended periods. The use of powered air supply respirators should be considered whenever prolonged or repeated respiratory use is required.</p>
<b>Abbreviations</b>	<p>A.B.N. – Australian Business Number          ARPANSA – Australian Radiation Protection and Nuclear Safety Agency          Bq/gm – Becquerels per gram          CAS# – Chemical Abstract Service number; used to uniquely identify chemical compounds          CNS – Central Nervous System          IAEA – International Atomic Energy Agency          IARC – International Agency for Research on Cancer          ICRP – International Commission on Radiological Protection          mg/m<sup>3</sup> – milligram per cubic metre          MSDS – Material Safety Data Sheet          NOHSC – National Occupational Health and Safety Commission          ppm – parts per million          PVA – polyvinyl acetate          PVC – polyvinyl chloride          STEL – short-term exposure limit          TLV – Threshold Limit Value          TWA – Time Weighted Average</p>
<p><b>This is a revised MSDS.</b>  <b>Date of Issue: AUGUST 2012</b>  <b>[Replaces MSDS issued April 2011]</b></p>	