Submission Cover Sheet

Fingerboards Mineral Sands Project Inquiry and Advisory Committee - EES

556

Request to be heard?: No

Full Name: June Haviman

Organisation:

Affected property:

Attachment 1: Unearthing_miner

Attachment 2:

Attachment 3: Unearthing_miner

Comments: See Attached submission by Digging For The Facts Team

10/28/2020

Unearthing the mineral sands

Explanations of mineral sand mining

Digging for the Facts Team

Contents

> *'We need to better protect Victorians from exposure to chemicals and pollution than we unfortunately sometimes have in the past.*
>
> *And we need to ensure that the principle of environmental justice is adhered to.*
>
> *We all have the right to participate in making decisions on our shared environment, and share in the benefits it provides.'*

The Hon Lisa Neville, MP Minister for Environment, Climate Change and Water. During the 2016 announcement of an inquiry into the Environmental Protection Authority (EPA).[1]

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Explanation of mineral sand mining

Mineral sands conjure visions of beach sand deposits being mined to supply the minerals needed for technology with little harm to the area.

[1] See Endnotes/References (pg 11)

However, this is far from the truth. The process involves exposing dry material (with heavy minerals), which is then mixed with huge volumes of water to form a slurry for separation in the Wet Concentrator Plant (WCP), which concentrates the radiation and heavy metals.

Digging for the Facts Team (DFT) aims to provide information about the processing of Natural Occurring Radioactive Material, and include the GHS hazard statements with pictograms relevant to the minerals.

Introducing Natural Occurring Radioactive Material (NORM)

Mineral sands comprise NORM that emit low level radiation from thorium and uranium in the monazite, xenotime, zircon and some ilmenites.

Note: During each stage of separation, not only the targeted Heavy Minerals but also the heavy metals and radiation increase concentration (and toxicity traits).

Radioactivity in mineral sands and products

	Thorium		**Uranium**	
	ppm	**Bq/kg**	**ppm**	**Bq/kg**
Ore	5-70	40-600	3-10	70-250
Heavy mineral concentrate	80-800	600-6600	<10-70	<250-1700
Ilmenite	50-500	400-4100	<10-30	<250-750
Rutile	<50-350	<400-2900	<10-20	<250-500
Zircon	150-300	1200-2500	150-300	3700-7400
Monazite concentrate	10,000-55,000	80,000-450,000	500-2500	12,000-60,000
Processing tailings (Inc. monazite)	200-6000	1500-50,000	10-1000	250-25,000

Naturally-Occurring Radioactive Material. Appendix 1. Radioactivity.[2]

The radiation levels increase with each stage of Heavy mineral concentrate HMC.[2, 4.].

[2, and 2, 4] See Endnotes/References (pg 11)

Exposure Levels

Table XXVIII: Various heavy mineral process products and their Radionuclide contents

Material		Th		U	
		ppm	Bq/kg	ppm	Bq/kg
Mining					
Ore		5–70	40-600	3-10	70-250
Primary separation					
Product	Heavy metal concentration	80–800	600–6600	<10–70	<250–1700
Waste	Sand tailings	<10 ≤ 50	<100 ≤ 400	<10	<250
	Oversize	<10 ≤ 50	100 ≤ 400	<<10	<250
	Clay fines (slimes)	<30	<250	<10	<250
Secondary separation					
Products	Ilmenite	50–500	400–4100	<10–30	<250–750
	Leucoxene	80–700	600–5700	20–50	500–1200
	Rutile	<50–350	<400–2900	<10–20	<250–500
	Zircon	150–300	1200–2500	150–300	3700–7400
	Monazite	50,000-70,000	41,000 – 575,000	1,000-3,000	25,000-75,000
	Monazite concentrate (a semi-product that may either become a waste or be refined into into monazite)	10 000–55,000	80,000 - 450,000	500–2,500	12,000 - 60,000
	Xenotime	~15 000	~120	~4000	~100
	Waste Tailings (incl. monazite tails)	200–6,000	1,500–50,000	10–1,000	250–25,000
	Clay fines (slimes)	~600	~5000	~30	~750
	Oversize	80–650	700–5300	50–150	1200–3700
	Mill dust	~250–2,500	~2,000–21,000	~10–250	~250–6,200
	Stack particulates	~500–5,000	~4,000-41,000	~10–500	~250–12,500
Synthetic rutile production					
Product	Synthetic rutile	<50–350	<400–2900	<10–20	<250–500
Waste	Iron oxide solids	<50 ≤ 100	<400–2800	<10	<250
	Inert solids	~45	~400	~5	~100

Source: IAEA Technical Reports series no. 419: extent of environmental contamination by naturally occurring radioactive material (norm) and technological options for mitigation (pg 84).[3]

[3] See Endnotes/References (pg 11)

The NORM aspect is due to the nuclide's thorium and uranium that are composites of monazite:

> The minerals in the sands are subject to gravity concentration, and some concentrates are significantly radioactive, up to 4000 Bq/kg. Most of this NORM ends up in the waste streams from mineral processing (often including monazite)… (The World Nuclear Association April 2020[2] and the IAEA[3]).

'Elevated concentrations of other toxic elements' by IAEA

Significantly, NORM substances are often accompanied by other toxic elements:

> 'The waste arising from the chemical processing of titanium feedstocks can be considered as "mixed industrial waste" as it contains metals such as lead (Pb), arsenic (As), Zinc (Zn), Manganese (Mn), Magnesium (Mg), Vanadium (V) and Niobium (Nb), by the IAEA.[3]

Kalbar Resources Ltd[5] confirmed these heavy metals on The Fingerboards site in the Environment Effects Statement (EES) (see Table 8.3 below).

Maximum metal concentrations in topsoil, overburden and ore samples within the project area

> 'A total of 138 laboratory tests for metal concentrations were undertaken on samples of topsoil overburden, and ore from within the project area, collected from the historical drill cores and the recently drilled sonic cores. The maximum levels for each metal were compared against the Health Investigation Level A (HIL A) for residential gardens and accessible soil (Table 8.3), as stated in the NEPM (Assessment of Site Contamination) Schedule B1 (NEPC, 2013b).
>
> All averaged and maximum analysis results for the metals tested were below the HIL A levels (where these levels exist).'[3]

[3, and 5] See Endnotes/References (pg 11)

Table 8.3 Maximum metal concentrations in topsoil, overburden and ore samples within the project area

Element		Units[†]	Topsoil	Overburden	Ore	HIL A*
Arsenic	As	ppm	5	76	89	100
Bismuth	Bi	ppm	0.3	0.6	0.5	NA[‡]
Cadmium	Cd	ppm	BD[‡]	0.4	BD[‡]	20
Cobalt	Co	ppm	7	33	10	100
Chromium (III)	Cr	ppm	97	279	1,497	NA[‡]
Copper	Cu	ppm	15	36	42	6,000
Mercury (inorganic)	Hg	ppm	BD[‡]	0.14	0.03	40
Nickel	Ni	ppm	62	64	28	400
Lead	Pb	ppm	10	17	16	300
Selenium	Se	ppm	ND[‡]	0.8	BD[‡]	200
Thorium	Th	ppm	19	79	137	NA[‡]
Thallium	Tl	ppm	ND[‡]	0.1	0.2	NA[‡]
Uranium	U	ppm	4	14	24	NA[‡]
Vanadium	V	ppm	62	600	871	NA[‡]
Tungsten	W	ppm	10	25	7	NA[‡]

[*] Health Investigation Level A for residential gardens and accessible soil (NEPC, 2013b).
[†] Units in parts per million (ppm).
[‡] NA: Not applicable (HIL A level has not been defined), BD: Below detection limit, ND: Not detected.[5]
Source: http://fingerboardsproject.com.au

Kalbar has presented HIL-A (ppm – residential) levels of undisturbed soil. These levels are redundant with open-cut excavation. Where more, very large amounts of NORM are available for release into the biosphere than they were in the undisturbed natural state.

It is noted that the laboratory (commissioned by Kalbar) omitted the targeted minerals in the information in Table 8.3 (above). A comprehensive list is provided for the reader in the Appendix (page 12).

Glenaladale is not zoned residential.

Kalbar has failed to disclose the increase in industrial levels with excavation, separation and concentration that results in Technology Enhanced NORM (TENORM) with enhanced radiation levels. These are of the greatest concern.

DFT unearthed the increased nuclide levels in TENORM by Kalbar.

6. https://www.businesses.com.au/Analysts-Presentation-May-2017-for-website.pdf, Page 18 – 22.

[5] See Endnotes/References (pg 11)

Monazite 0.6% - 60,000 tons 8	**ppm**	**Ore**	**Premium Zircon Product** 6 1,234,000 tonnes 6 Post concentration in WCP.
Thorium	ppm	137	300
Uranium	ppm	24	400

Table: Showing the increase in the concentration of uranium and thorium TENORM after processing by Kalbar.

The heavy metals selected in table 8.3 may be non-viable, and deemed 'mixed industrial waste' as described by the IAEA.[3]

Britannica states that

> 'an economically viable source should contain more than 5 percent rare earths, unless they are mined with another product—e.g., zirconium, uranium, or iron—which allows recovery of ore bodies with concentrations of as little as 0.5 percent by weight. Less than 5 percent by weight is deemed uneconomic'.[7]

It is of interest that both Rio Tinto and Metallica Minerals Ltd[8] assayed the site prior to Kalbar and elected not to develop it further.

The proponent's failure in disclosure is a manipulation of information. Referral to the Ethical Investors Advisors and to the Financial Services Council (FSC)[9] for investigation is warranted, as the EES process does not include independent review.[22]

We urge readers to express concern directly and urge the Inquiry Panel[10] for the proponent, to reject this proposal.

Kalbar explains on website FAQ

The following text was published on the website 'http://fingerboardsproject.com.au/fingerboards-project/faq/' between Feb 2019 to Feb 2020, and accessed on 3rd Feb, 2020, but has since been removed from the site:[11]

> 'Are heavy metals present in the soil?
>
> Kalbar has conducted assays of the ore body, and there is next to no heavy metal content in it, as is typical for mineral sands mines. As expected, the levels of Heavy Metals are very low throughout the overburden and ore. All naturally occurring heavy metals found are well within the accepted safe standards.
>
> Below are examples of the heavy metals detected and the concentrations found, compared to the 'Health Investigation Level' (HIL A) for residential soils (that is, the level at which further investigation would be required to assess potential health impacts).'

[3,8,10,22,11] See Endnotes/References (pg 11)

Heavy Metal	Average Concentration detected (ppm)	HIL A level (ppm)
Arsenic	10	100
Cadmium	Below detection limit of 1 ppm	20
Mercury	0.01	200
Lead	6	300
Selenium	Below detection limit of 1 ppm	200
Cobalt	7	100
Copper	14	7000
Nickel	16	500
Zinc	34	8000
Thallium	Below detection limit of 1 ppm	N/A
Bismuth	Below detection limit of 1 ppm	N/A

Reference: National Environment Protection (Assessment of Site Contamination) Measure 1999
https://www.legislation.gov.au/Details/F2013C00288

The above table displays the HIL-A levels (residential) that are invalid in an industrial context.

Another key point is that Victorian EPA requirements for all of the standards for air, land and water are outdated in respect to the due dates for update range from 2007 (groundwater) to 2012 (land contamination).

The United States EPA pollution control standards set much lower trigger levels than local Australian standards. It would be safer to adopt USEPA standards of assessment to inform the workforce.[12]

Water and Tailings in the Process

Huge volumes of water are used to mix with the huge volumes of soil to form the slurry.

Kalbar explains their production in the EES:

> 'A gradual increase in production is proposed following commencement of mining and commissioning of the WCP. The plant will initially commence at a rate of 500 t/hr and increase to a design capacity of 1,500 t/hr or 12 Mt/year. An average of 520,000 t of topsoil is expected to be removed annually.
>
> Approximately 300,000 litres per hour (L/hour) of water is expected to be lost from the system, bound up with the coarse sand and fines tailings. Only 65% of the water in the tailings stream will be recovered.'

The temporary TSF will cover an area of up to 90ha with a capacity of 6,600,000 m^3 of fines tailings.

New global standards in the management of tailings were released in August 2020. They are now pertinent to this project.[13]

The water and residual 95% soil are mixed with the said heavy metals within the WCP, stored as leachates, and returned to the void or in tailings dams, known as the Temporary Storage Facility (TSF), forever.

[10,13] See Endnotes/References (pg 11)

Initially 3 - 4 Gl water-take is sought, but as the production volumes increase, so too greater volumes of water will be needed.

According to IAEA:

> '…when compared with the amount of declared radioactive waste that is disposed in radioactive waste repositories, the amounts of NORM containing residues are orders of magnitude larger.'… Also 'NORM that has been altered from its natural state, and is thus more available for release into the biosphere or for direct human exposure'[3]

The massive volumes of material processed through the WCP produces just 5% HMC.

> Tonnes of HMC -
>
> TiO2 - 1,664,000 Tonnes.[6]
>
> ZrO2 Zircon - 1,234,000 Tonnes.[6]
>
> ReO - 187,000 Tonnes.[6]
>
> Monazite - 60,000 tonnes.[8] - by Metallica Minerals Ltd, report to ASX (MLM). April 26th, 2012.
>
> Life of Mine Product Quantities are an estimated 5% of total material processed.

This results in the massive 95% extra contaminated material, a huge source of serious contamination of water and land resources forever.

A comparison of the mineral sand mines by Earth Resources.[14]

The estimates by Earth Resources (Jan 2019) of the Inferred Resources of mineral sand mines are[3]:

> Kalbar Resources- Glenaladale Inferred Resource (2013): 1,600,000,000 t @ 2.2% HM
>
> Kalbar - Mossiface Inferred Resource (2013): 130,000,000 t @ 1.7% HM
>
> WIM Resources Pty Ltd Murray Basin* Proved and Probable Reserve (2014): 12,000,000 t @16.0% HM for 1,930,000 t HM
>
> Avonbank Indicated and Inferred Resource (2014): 488,000,000 t @ 4.0% HM for 19,520,000 t HM
>
> Iluka Resources Measured, Indicated and Inferred Resource (2013): 1,650,000,000 t @ 3.7% HM for 61,050,000 t HM Proved and Probable Reserve (2013): 552,000,000 t @ 4.3% HM for 23,736,000 t HM WIM 150 Project Australian Zircon NL
>
> Donald Mineral Sands Project Astron Ltd C Resource Estimate (2014): 4,780,000,000 t @ 3.7 %HM for 176,860 t HM.

Measurements - Volumes of Water

The Bureau of Meteorology's Water Storage dashboard lets you compare water levels and volumes of lakes, reservoirs and weirs:[15]

> 1 Ml - Megalitre - One million litres - 1,000,000 litres or 0.001 Gl.
>
> 1GL - 1 gigalitre - One billion litres - 1,000,000,000 litres or 1 000 ML

[6,8,15] See Endnotes/References (pg 11)

Kalbar explains

In its FAQ, accessed 28/6/2020, the Kalbar website explains:

> 'The term heavy metal refers to any metallic chemical element that is toxic or poisonous at low concentrations (e.g. lead and mercury). Heavy metals are natural components of the Earth's crust. They cannot be degraded or destroyed.[16]
>
> The Fingerboards Mineral Sands Project is targeting zircon, titanium and rare earths - minerals which, because of their high densities, occur together at the Fingerboards ore as natural heavy mineral concentrate (HMC). These are not Heavy Metals.
>
> Kalbar has conducted assays and, as expected, the levels of Heavy Metals are very low throughout the overburden, ore and HMC, as is typical for mineral sands mines.
>
> … All naturally occurring heavy metals found are well within the accepted safe standards.'

Mining Methods

Kalbar explains its methods in its website, accessed 1st July 2020:

> 'We propose to use modern mining methods to extract the ore.
>
> Put simply, the sand is removed using conventional earth moving equipment, and the minerals are extracted using gravity separation and water in much the same way as gold panning.
>
> No harmful chemicals are used in the mining or the mineral separation process.'

Water Treatment Explained by Kalbar

Kalbar explains in its Fingerboards Mining Proposal Questions and Answers, accessible online from 15/3/2019 to 28/6/2020:

> 'The biggest issue with run-off water from land surrounding the Mitchell River is turbidity from suspended solids. This issue occurs at present and is not related to mining activity. Testing of the water containing suspended solids from overburden demonstrates that the turbidity of the water can be controlled using a number of water treatment methods including gypsum, alum or lime. See a photograph below to demonstrate the effectiveness of this treatment, which Kalbar would conduct, as required'.[17]

However, the proposed method – 'with a small quantity of gypsum' – is not a valid nor credible method for the treatment of the heavy metal contaminants involved.

Kalbar has again failed to disclose the radiation and heavy minerals associated with the project.

[16,17] See Endnotes/References (pg 11)

In conclusion

Kalbar is <u>not</u> a 'fit and proper person to hold the licence'[18] in view of its use of invalid data and questionable statements; for example, the incorrect statement that there are 'No harmful chemicals' and that 'metals found are well within the accepted safe standards.'

Failure to disclose the NORM radiation and heavy metal contaminants place investors, authorities and the region at risk through the long-term contamination of water resources and environment.

The concerns are:

- There is no assurance of information or remediation in respect to leaks, dust, and radiation impacts;
- The type or level of penalties administered in the presence of contamination is unknown;
- It is unknown whether the directors of Kalbar will be held personally responsible for contamination or that accountability will manifest;
- It is unknown how Kalbar's compliance will be monitored; and
- After life-of mine (20 years), it is unknown who will be responsible for remediating the contamination of water and land resources and the Gippsland lakes network.

The accumulated evidence presented in this submission makes a compelling case on multiple grounds for this project not to proceed.

It is therefore strongly recommended that the Fingerboards mineral sands project not be approved.

Recommendations

We recommend the following:

- Cancellation of Kalbar's application for licence;
- Investigation by Ethical Investors Advisors, and The Financial Services Council (FSC);[9]
- Commercial laws to be applied equally to mining operatives and other industries;
- Regulations prescribing severe penalties for false information, and for failure of disclosure; and
- Regulations prescribing severe penalties for contamination, and the enforcement of remediation and compensation.

[18, 9] See Endnotes/References (pg 11)

Endnotes/references

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16. Kalbar Website FAQ.28/6/2020. https://www.fingerboardsproject.com.au/community-engagement/faq_Copy.
17. Kalbar, Fingerboards Mining Proposal Questions and Answers. Page 1, 2. Accessed on 15/3/2019, 24/10/2020. file:///C:/Users/User/Desktop/Fingerboards-Mine-Project-QAs-15.3.19-Kalbar-and-GLaWAC-responses.pdf
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Appendix

1. Heavy Minerals and GHS

Quick reference guides to the heavy minerals identified by Kalbar at The Fingerboards site.

GHS Hazardous Chemicals Poster is available at Safe Work Australia.[5]

ICSC - The International Chemical Safety Cards
https://www.ilo.org/dyn/icsc/showcard.home

ToxGuides™ATDSR. - https://www.atsdr.cdc.gov/toxguides/index.asp

Lenntech https://www.lenntech.com/periodic/elements/index.htm

Pubchem.(NIH). https://pubchem.ncbi.nlm.nih.gov/.

2. GHS – Globally Harmonized System

The warning system of the Globally Harmonized System GHS is for the classification and labelling of substances / chemicals.

The hazard pictograms and statements are used to signal the dangers in substances and for the safety of workers. Applying GHS pictograms and Hazard Statements.[19]

3. Kalbar's Mineral Formula converted to Identity

In 2017, Kalbar presented a list of formula with their percentage, but omitted the mineral identity by the 'Analyst for Kalbar' in their marketing presentation.[6]

So, the team elected to identify the minerals by applying the quick-guides from global agencies for reader's convenience.

The mineral products with GHS hazard statements and pictograms are indicative only of the general mineral traits that are enhanced with separation / concentration, and may not apply to the natural and undisturbed minerals.

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[6,19] See Endnotes/References (pg 11)

4. Product list by Kalbar Resources Ltd

Premium Zircon	**Rare Earth Concentrate**	**Primary Ilmenite** **Rutile 92**
		
Radio- active Harmful Irritant Environmental Hazard Health Hazard **Life of Mine Product Quantities** ZrO2 Zircon –1,234,000 tons Kalbar: Analyst Pre-Feasibility Study. 2017	Harmful Irritant Health Hazard Environmental Hazard **Life of Mine Product Quantities** ReO - 187,000 tons Kalbar: Analyst Pre-Feasibility Study. 2017	Harmful Irritant Health Hazard Environmental Hazard Corrosive **Life of Mine Product Quantities** TiO2 - 1,664,000 tons Kalbar: Analyst Pre-Feasibility Study. 2017
ZrO2 - Zirconium dioxide – 66% SiO2 - Silicon dioxide --32.5% Al2O3 - Aluminium oxide Fe2O3 - Iron (III) oxide TiO2 - Titanium dioxide MnO – Manganese (II) oxide MgO - Magnesium oxide or magnesia CeO2 - Cerium (IV) oxide P2O5 - P4O10 Phosphorus pentoxide Th – Thorium - 300 ppm U – Uranium – 420 ppm. **Monazite** – 0.6% - 60,000 tons Metallica Minerals Ltd. Report to ASX. (MLM) 26 April 2012.	Y2O3. - Yttrium oxide, Xenotime -YPO4- Yttrium Phosphate Lanthanoids La2O3 - Lanthanum oxide CeO2 - Cerium (IV) oxide – 19.36% Pr6O11 - Praseodymium oxide Nd2O3 - Neodymium (III) oxide Sm2O3 – Samarium (III) oxide Eu2O3 - Europium (III) oxide Gd2O3 - Gadolinium (III) oxide Tb4O7 - Terbium (III, IV) oxide Dy2O3 - Dysprosium Oxide Ho2O3 - Holmium (III) oxide Er2O3 - Erbium (III) oxide Tm2O3 - Thulium (III) oxide Yb2O3 – Ytterbium (III) oxide Lu2O3 – Lutetium (III) oxide	TiO2 -Titanium dioxide Fe2O3 – Iron (III) oxide (calc) FeO – iron Oxide SiO2 - Silicon dioxide Al2O3 - Aluminium oxide Cr2O3 – Chromium (III) MgO - Magnesium oxide or magnesia MnO - Manganese (II) oxide ZrO2 - Zirconium dioxide P2O5 - Phosphorus oxide U XRF – Uranium – 41 ppm Th XRF – Thorium – 75 ppm V2O5 - Vanadium Pentoxide – Nb2O5 - Niobium pentoxide CaO - Calcium oxide, Quick lime K2O - Potassium oxide CeO2 – Cerium (IV) oxide SnO2 – Tin oxide

5. Exposure Levels

Formula	Titanium Feedstock consist of: - TiO2 - Life of Mine Product Quantities - 1,664,000 tons Rutile (TiO2 with up to 10% iron). Ilmenite (FeTiO3 with manganese and magnesium). Leucoxene (Fe2O3·TiO2), with uranium and thorium.	
TiO2	Rutile 92 Titanium dioxide. CAS 13463-67-7. ICSC CARD: 0338 Is the purest, highest-grade natural form of titanium dioxide and the preferred feedstock in manufacturing titanium. Exposure can irritate the eyes, nose and throat Lung fibrosis; potential occupational carcinogen. Suspected of causing cancer. https://www.cdc.gov/niosh/npg/npgd0617.html https://pubchem.ncbi.nlm.nih.gov/compound/26042#section=Safety-and-Hazards https://www.cdc.gov/niosh/docs/2011-160/pdfs/2011-160.pdf The New Jersey Department of Health Hazardous Substances List https://nj.gov/health/eoh/rtkweb/documents/fs/1861.pdf	 Health Hazard
FeTiO3	Ilmenite – CAS 12168-52-4 Titanium-iron oxide metal with manganese and magnesium.	
Fe2O3·TiO2	Leucoxene - is not regarded as being a mineral, a term for products containing a TiO2 titanium content of 70 to 93 percent. Leucoxene can contain crystalline silica which may cause silicosis. Can contain low levels of uranium and thorium, making it slightly radio-active. If inhaled constantly that can result in shortness of breath and coughing. MiningLink: http://mininglink.com.au/natural-resource/leucoxene	
Y(PO4)	Xenotime Yttrium phosphate CAS 13990-54-0 Yttrium phosphate, Phosphoric acid. Similar to monazite except enriched in the heavy lanthanides and yttrium. phosphate mineral, Britannica. Monazite and xenotime ores are treated the same way, being phosphate minerals. Causes serious eye irritation, skin, and respiratory irritation. https://echa.europa.eu/substance-information/-/substanceinfo/100.034.341 https://www.britannica.com/science/rare-earth-element/Minerals-and-ores https://www.industry.gov.au/sites/default/files/2019-04/lpsdp-hazardous-materials-management-handbook-english.pdf https://www.world-nuclear.org/information-library/safety-and-security/radiation-and-health/naturally-occurring-radioactive-materials-norm.aspx	 Irritant
	Zircon ZrO2. Life of Mine Product Quantities–1,234,000 tons.	

ZrO_2	ZIRCONIUM OXIDE, - Zirconium dioxide - CAS 1314-23-4 May cause an allergic skin reaction. https://pubchem.ncbi.nlm.nih.gov/compound/62395#datasheet=LCSS&section=GHS-Classification	 **Irritant**
$ZrSiO_2$ SiO_2	Zirconium silicate CAS 233-252-7 Causes serious eye irritation, is harmful if inhaled, causes skin irritation and may cause respiratory irritation. Silicon dioxide, - Respirable crystalline silica CAS 14808-60-7. Kalbar levels – 32.5% - in Premium Zircon Product. Immunological (Immune System), Renal (Urinary System or Kidneys), Respiratory (From the Nose to the Lungs). May cause cancer - Danger Carcinogenicity. Causes damage to organs through prolonged or repeated exposure https://www.atsdr.cdc.gov/substances/toxsubstance.asp?toxid=290 https://pubchem.ncbi.nlm.nih.gov/compound/24261#section=GHS-Classification https://echa.europa.eu/substance-information/-/substanceinfo/100.035.329	**Danger**  **Irritant**  **Health Hazard**
P_2O_5	Phosphorus pentoxide CAS Number - 1314-56-3. EC - 215-236-1 (Seek independent advice on hazards for the natural state). FIRE & EXPLOSION. Many reactions may cause fire or explosion. Gives off irritating or toxic fumes (or gases) in a fire. Reacts violently with water. NO contact with water or combustible substances. Health Hazard: Causes eye damage / Skin corrosion/ severe skin burns. https://www.ilo.org/dyn/icsc/showcard.display?p_version=2&p_card_id=0545 http://hcis.safeworkaustralia.gov.au/HazardousChemical/Details?chemicalID=3532	**Danger.**  **Corrosion**
Al_2O_3	Alumina CAS Number - 1344-28-1. EC Number - 215-691-6 Health Hazard Causes serious eye and respiratory irritation. Causes damage to organs through prolonged or repeated exposure. https://pubchem.ncbi.nlm.nih.gov/compound/Alumina#datasheet=LCSS&section=GHS-Classification	 **Irritant**  **Health Hazard**
V_2O_5	Vanadium Pentoxide CAS 1314-62-1 Causes serious eye damage, respiratory irritation. Suspected of damaging fertility. Suspected to be Toxic to Reproduction. Suspected of causing genetic defects, and damaging the unborn child. Suspected of causing cancer Suspected to be Mutagenic.	  

	Toxic to aquatic life with long lasting effects. Safe Work Australia http://hcis.safeworkaustralia.gov.au/HazardousChemical/Details?chemicalID=1798 https://echa.europa.eu/substance-information/-/substanceinfo/100.013.855	**Corrosive**  **Environ Hazard**
Nb2O5	Niobium(V) oxide CAS – 1313-96-8 Niobium Nb is a vanadium group element atom. Serious eye irritation / Skin corrosion / Respiratory tract irritation. https://pubchem.ncbi.nlm.nih.gov/compound/Niobium_V_-oxide	 **Irritant**
Cr2O3	Chromium oxide CAS 1308-38-9 Catches fire spontaneously if exposed to air (seek independent advice on natural state). May damage fertility or the unborn child. Causes serious eye irritation, allergic skin reaction. Seed germination and growth was inhibited at 25 -100 ug/mL https://www.cdc.gov/niosh/npg/nengapdxc.html https://pubchem.ncbi.nlm.nih.gov/compound/Chromium-oxide#section=GHS-Classification	   **Flammable**
K2O	Potassium Oxide CAS 1310-58-3, 12136-45-7 Harmful if swallowed May cause respiratory irritation Causes severe skin burns and eye damage. https://pubchem.ncbi.nlm.nih.gov/compound/Potassium-oxide	**Corro** 
CaO	Calcium oxide Quicklime, Burnt lime. CAS 1305-78-8 Causes serious eye damage, skin and respiratory irritation. http://hcis.safeworkaustralia.gov.au/HazardousChemical/Details?chemicalID=4835 https://www.cdc.gov/niosh/npg/npgd0093.html	 
SnO2	Tin dioxide CAS 18282-10-5 May cause respiratory irritation. May cause long lasting harmful effects to aquatic life. https://pubchem.ncbi.nlm.nih.gov/compound/Tin-dioxide	
REE REO	Rare Earth Concentrate Life of Mine Product Quantities - 187,000 tons Rare Earth Oxides are formed in two groups: - Actinoids (includes thorium, Uranium). Lanthanoids - cerium (Ce), praseodymium (Pr), neodymium (Nd), promethium (Pm), samarium (Sm), europium (Eu), gadolinium (Gd), terbium (Tb), dysprosium (Dy),	

	holmium (Ho), erbium (Er), thulium (Tm), ytterbium (Yb), and lutetium (Lu). https://www.newworldencyclopedia.org/entry/Inner_transition_element	
Actinoids 	Actinoids - All the actinoids group are radioactive. The 14 elements in the actinoid series are: thorium (Th), protactinium (Pa), uranium (U), neptunium (Np), plutonium (Pu), americium (Am), curium (Cm), berkelium (Bk), californium (Cf), einsteinium (Es), fermium (Fm), mendelevium (Md), nobelium (No), and lawrencium (Lr) https://www.newworldencyclopedia.org/entry/Inner_transition_element	
	Monazite – (Ce,La,Nd,Th)(PO4,SiO4). CAS 1306-41-8 Composite of rare earth metals. (particularly cerium and lanthanum) and 5–12% (typically about 7%) thorium. Radionuclides - Thorium (Th) Uranium (U). OSHA HAZARDS: Highly toxic by inhalation. Highly toxic by ingestion. TARGET ORGANS: Kidney, liver, lungs, brain. Fatal if swallowed or inhaled, Causes skin irritation, May cause cancer, May cause damage to organs through prolonged or repeated exposure. Glenaladale deposit: 60,000 tons monazite- (Metallica Minerals Ltd.) prior owner. Report to ASX - 26 April 2012. http://www.metallicaminerals.com.au/wp-content/uploads/2016/09/Maiden-Gippsland-Mineral-Resource.pdf https://science.osti.gov/-/media/nbl/pdf/price-lists/SDS/SDS-Monazite_Sand.pdf?la=en&hash=2BD57B8A2A9717257915A88DBDE90172040E7BC6 https://pubchem.ncbi.nlm.nih.gov/compound/Monazite-CE	**Danger**  **Deadly**  **Health Hazard**  **Irritant**
Th 	Thorium CAS 7440-29-1. May intensify fire - oxidiser. (Seek independent advice in natural state). Harmful if swallowed, causes serious eye, skin irritation. May cause damage to organs through prolonged or repeated exposure. May cause long lasting harmful effects to aquatic life. https://echa.europa.eu/substance-information/-/substanceinfo/100.028.308	 **Oxidiser**  **Health Hazard**
U 	Uranium CAS 7440-61-1 May cause damage to organs through prolonged or repeated exposure. May cause long lasting harmful effects to aquatic life. Potential for cancer as a result of alpha-emitting properties & radioactive decay products (e.g., radon). [Potential occupational carcinogen]. https://www.cdc.gov/niosh/npg/npgd0650.html https://echa.europa.eu/substance-information/-/substanceinfo/100.028.336 The Department of Mines, Industry Regulation and Safety. Guidance about radiation safety on mining operations. http://www.dmp.wa.gov.au/Safety/Guidance-about-	 **Danger**  **Irritant**

	radiation-safety-6950.aspx https://www.arpansa.gov.au/sites/default/files/legacy/pubs/technicalreports/tr165.pdf https://science.osti.gov/-/media/nbl/pdf/price-lists/SDS/SDS-Monazite_Sand.pdf?la=en&hash=2BD57B8A2A9717257915A88DBDE90172040E7BC6	
	Yttrium Is a mixture of oxides from which nine elements were separated.— yttrium, scandium (atomic number 21), and the heavy lanthanide metals from terbium (atomic number 65) to lutetium (atomic number 71)— Britannica https://www.britannica.com/science/yttrium	
Y_2O_3.	**Yttrium oxide** CAS 1314-36-9 Causes serious eye skin and respiratory irritation. Commercially recovered from monazite sand & in almost all rare-earth minerals plus uranium ores. OSHA PEL TWA 1 mg/m3 The PEL also applies to other yttrium compounds (as Y). https://www.newworldencyclopedia.org/entry/Yttrium https://pubchem.ncbi.nlm.nih.gov/compound/Yttrium-oxide#datasheet=LCSS https://www.world-nuclear.org/information-library/safety-and-security/radiation-and-health/naturally-occurring-radioactive-materials-norm.aspx	 **Irritant**
	Lanthanoides -are the most reactive of the rare earth metals. The 14 elements follow lanthanum in the periodic table - cerium (Ce), praseodymium (Pr), neodymium (Nd), promethium (Pm), samarium (Sm), europium (Eu), gadolinium (Gd), terbium (Tb), dysprosium (Dy), holmium (Ho), erbium (Er), thulium (Tm), ytterbium (Yb), and lutetium (Lu). Chemistry: The lanthanoids react with water to liberate hydrogen. New World Encyclopaedia: https://www.newworldencyclopedia.org/entry/Lanthanum https://www.newworldencyclopedia.org/entry/Inner_transition_element	
La_2O_3	**Lanthanum Oxide** CAS 1312-81-8 Causes serious eye skin and respiratory irritation. Very toxic to aquatic life with long lasting effects https://pubchem.ncbi.nlm.nih.gov/compound/Lanthanum-oxide#datasheet=LCSS&section=GHS-Classification https://www.newworldencyclopedia.org/entry/Inner_transition_element	 
CeO_2	**Cerium dioxide** CAS 1306-38-3 Harmful if swallowed. Causes damage to organs through prolonged or repeated exposure. May cause long lasting harmful effects to aquatic life. Corrosive to metals, Skin corrosion, Serious eye damage. (Chemical Book).	 **Health Hazard**

	Cerium can be a threat to the liver when it accumulates in the human body. Lenntech https://www.lenntech.com/periodic/elements/ce.htm#ixzz6YoGJsHq1 https://pubchem.ncbi.nlm.nih.gov/compound/Cerium-dioxide#section=GHS-Classification https://www.chemicalbook.com/ChemicalProductProperty_EN_CB4666451.htm https://cfpub.epa.gov/ncea/iris/iris_documents/documents/toxreviews/1018tr.pdf	 **Irritant**  **Corrosive**
Pr6O11	**Praseodymium oxide** CAS 12037-29-5 Causes serious eye skin and respiratory irritation. Causes damage to cell membranes, which affect reproduction and the nervous systems of water animals. https://www.lenntech.com/periodic/elements/pr.htm#ixzz6YoNcAbD0	 **Irritant**
Nd2O3	**Neodymium oxide** CAS 1313-97-9 Hazardous to the aquatic environment, acute / long-term hazard. Neodymium can be a threat to the liver when it accumulates. https://www.lenntech.com/periodic/elements/nd.htm#ixzz6YoPRrJIU https://pubchem.ncbi.nlm.nih.gov/compound/Neodymium-oxide	 **Environ Hazard**
Sm2O3	**Samarium (III) oxide** CAS 12060-58-1	
Eu2O3	**Europium (III) oxide** CAS 1308-96-9 Causes serious eye, skin and respiratory irritation. https://pubchem.ncbi.nlm.nih.gov/compound/159371#datasheet=LCSS&section=GHS-Classification https://echa.europa.eu/substance-information/-/substanceinfo/100.013.787	 **Irritant**
Gd2 O3.	**Gadolinium (III) oxide** CAS 11129-31-0 Causes serious eye irritation. Very toxic to aquatic life with long lasting effects. https://pubchem.ncbi.nlm.nih.gov/compound/Gadolinium-oxide	 **Irritant**  **Environ Hazard**
Yb2O3	**Ytterbium (III) oxide** CAS 1314-37-0 Causes serious eye, skin and respiratory, irritation. All compounds of ytterbium known to cause irritation to the skin and eye, and some might be teratogenic. http://www.eurare.org/docs/internalGuidanceReport.pdf Page 16. https://pubchem.ncbi.nlm.nih.gov/compound/Ytterbium-oxide-_Yb2O3	 **Irritant**
Tb4O7	**Terbium oxide** CAS 12037-01-3	
Dy2O3	**Dysprosium Oxide** CAS 1308-87-8	

Ho2O3	**Holmium (III) oxide** CAS 12055-62-8	
Er2O3	**Erbium (III) oxide** CAS 1206-16-4 Causes serious eye, skin and respiratory irritation.	 **Irritant**
Tm2O3.	**Thulium (III) oxide** CAS 12036-44-1 Causes serious eye, skin and respiratory irritation https://echa.europa.eu/substance-information/-/substanceinfo/100.031.670	 **Irritant**
Lu2O3	**Lutetium (III) oxide** CAS 12032-20-1	
	Exposure levels: Raw material for production of rare earth compounds. Hazard Statement: Harmful if swallowed. Harmful if inhaled. mg/m³ Milligrams per Cubic Metre OEL Occupational Exposure Limit . Safety Data Sheet - SDS Date: 26 Jun 2020 by Iluka Resources. http://sds.chemalert.com/company/10002061/download/3225200_030_001.pdf	

6. EES Table 8.3. Heavy Metals – GHS Statements and Pictograms

The heavy metals identified in the EES table 8.3 are listed with their GHS statements in general.

As	**Arsenic** Toxic if swallowed. May cause cancer. Suspected of damaging fertility or the unborn child. Causes damage to the gastrointestinal tract if swallowed. Causes damage to organs through prolonged or repeated exposure. Toxic to aquatic life with long lasting effects. It is strongly advised not to let the chemical enter into the environment. Combustible. Gives off irritating or toxic fumes (or gases) in a fire. https://www.ilo.org/dyn/icsc/showcard.display?p_lang=en&p_card_id=0013&p_version=2 According to UN GHS Criteria UN #: 1558(See ICSC 0222).	**GHS** **DANGER** 
Bi	**Bismuth** Flammable solid. (seek independent advice for natural state). May cause long lasting harmful effects to aquatic life. https://pubchem.ncbi.nlm.nih.gov/compound/Bismuth#datasheet=LCSS&section=GHS-Classification	 **Flammable**
Cd	**Cadmium** Catches fire spontaneously if exposed to air. (seek independent advice for natural state). Fatal if inhaled, suspected of causing genetic defects, May cause cancer. Suspected of damaging fertility; Suspected of damaging the unborn child. Causes damage to organs through prolonged or repeated exposure Very toxic to aquatic life with long lasting effects. https://pubchem.ncbi.nlm.nih.gov/compound/Cadmium#datasheet=LCSS&section=GHS-Classification	
Cb	**Cobalt** May cause an allergic skin reaction. May cause allergy or asthma symptoms or breathing difficulties if inhaled. May cause long lasting harmful effects to aquatic life. https://pubchem.ncbi.nlm.nih.gov/compound/Cobalt#datasheet=LCSS&section=GHS-Classification	
	Chromium 111.	
Cu	**Copper**	

	Harmful if swallowed, Toxic if inhaled. Very toxic to aquatic life with long lasting effects. https://pubchem.ncbi.nlm.nih.gov/compound/Copper#section=GHS-Classification	
Hg	**Mercury (inorganic)** Fatal if inhaled. May damage the unborn child. Causes damage to organs through prolonged or repeated exposure. Very toxic to aquatic life with long lasting effects. https://pubchem.ncbi.nlm.nih.gov/compound/Mercury#section=GHS-Classification	
Ni	**Nickel** May cause an allergic skin reaction. Suspected of causing cancer. Causes damage to organs through prolonged or repeated exposure. https://pubchem.ncbi.nlm.nih.gov/compound/Nickel#datasheet=LCSS&section=GHS-Classification	
Pb	**Lead.** Harmful if swallowed, inhaled. May cause cancer. May damage fertility or the unborn child. May cause damage to organs through prolonged or repeated exposure https://betastatic.fishersci.com/content/dam/fishersci/en_US/documents/programs/education/regulatory-documents/sds/gsc-lead-safety-data-sheet.pdf	
Se	**Selenium** Toxic if swallowed, inhaled. Causes damage to organs through prolonged or repeated exposure. May cause long lasting harmful effects to aquatic life https://pubchem.ncbi.nlm.nih.gov/compound/Selenium#datasheet=LCSS&section=GHS-Classification	
Tl	**Thallium** Fatal if swallowed, Fatal if inhaled. Causes damage to organs through prolonged or repeated exposure. May cause long lasting harmful effects to aquatic life. https://pubchem.ncbi.nlm.nih.gov/compound/Thallium#datasheet=LCSS&section=GHS-Classification	
W	**Tungsten** Flammable solid, Self-heating in large quantities. (seek independent advice for natural state).	

	Self-heating substances and mixtures. https://pubchem.ncbi.nlm.nih.gov/compound/Tungsten#datasheet=LCSS&section=GHS-Classification	

7. Decision on proposed waste by-product disposal at Douglas Mine Pit 23. May 2016

Environment Protection Authority Victoria (EPA) has assessed a works approval application from mining company Iluka Resources to continue disposing of radioactive materials in Pit 23 at its Douglas Mine in western Victoria. EPA has found that neither pollution nor environmental hazard has occurred or is likely to occur in the future as a result of current or proposed disposal activities. As a result, EPA has determined the company does not require a works approval or licence for these activities but will still require a planning permit and the radiation management licence currently in place at the site. This publication summarises the key aspects of EPA's assessment and decision-making process around the proposal. 2016.

'*EPA's assessment relied on data and information provided by Iluka and its consultants, as well as the conclusions drawn by the independent desktop reviewer and the DHHS*.' EPA. 22

No bonanza

Sir,- Response to Bob Kastelyn (*Advertiser*, August 22), part two.

From our experience it is simple; the system of mine regulation is broken. The EES and first work plan were sound and endorsed but were not followed. As regulators DEDJTR and DHHS have failed in their 'duty of care' to our community.

We have formally complained to the Mining Warden who requested an independent audit of the mine's operations. Instead of undergoing an independent audited, DEDJTR appointed personnel to audit their own work and – surprise, surprise – reported there was no issue.

The benefits to the local area are very limited with sand mining. There is short-term employment while the resource lasts and extra economy while the mine is in operation.

However, farmland that has been purchased by the mining company is left depleted and unproductive. Once mining companies have stripped the asset and moved on they are in no hurry to return once productive land to its former state (delay of rehabilitation is euphemistically referred to as 'cost deferral' in the industry.)

Communities are destroyed by compulsory acquisition, people leaving because they cannot tolerate living near a mine and remaining residents left have to put up with the loss of and quality of life, including the elevated risk of cancers from radioactive material.

On this point, our Landcare group purchased its own radon gas monitors from the Australian Protection and Nuclear Safety Agency. They recorded over three months effectively measuring and calculated with only 50 per cent exposure over one-and-a-half times the allowable public dose rate for radiation. Farming people who live and work on site would be at least 80 per cent exposure.

The wealth created evaporates away from the community at the mine. Over a billion dollars of profit was taken out of the Douglas mine, yet our community remains as one of the poorer socioeconomic regions in Australia.

The wealth goes to the shareholders, in capital cities, superannuation companies, investment funds etc. Do not expect a local bonanza.

Mr Kastelyn's recollection is very much at odds with the lived experience of our community. Sand mining does not create sustainable communities or sustainable agriculture.

Dust is only one of the many problems associated with it, and it does create a significant health risk when inappropriate management occurs.

Yours etc.,
Ian Ross,
President, Kanagulk Landcare Group.

Contact
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Phone: (03) 5150 2300 Email: editorial@eastvicmedia.com.au

Mine risks

Sir,- I was concerned when I read Mr Kastelyn's limited level of understanding of the risks of open cut mineral sand mining (*Advertiser*, August 22).

Initially I supported Iluka Resources' Douglas Mineral Sand Mine in our community.

Be alarmed! Be aware! We were promised 'world's best practice' mining with a moving footprint between one-and-a-half to three kilometres long. The radioactive mining waste was to be buried deeper and dispersed as it naturally occurred, reducing risk to our community from radiation, especially radon gas and radium pollution through leachate. Dust was to be controlled through the use of water and resins to stablise bare surfaces.

The EES process appeared sound and the first WorkPlan supported and was consistent with what we were promised. However, it proved not to be worth the paper it was written on. What has occurred, without appropriate consultation, consecutive WorkPlans were presented directly opposing what the EES stated:

1. There was no moving footprint. Mining ceased four-and-a-half years ago and the whole site of 14.5km was open and with no rehabilitation.
2. The radioactive wastes were concentrated in pits near the separation plant, to the extent of hills being formed where there was once a drainage line.
3. Monazite was being dumped in Pit 23 without meeting the 140:1 co-disposal criteria to alleviate the radioactivity.
4. One farmer had monazite blow over his residence and sheds; this forced the Health Department to have a 'clean-up' with roofs, tanks etc., having to be industrially cleaned. We know the Geiger counter got very excited, but were never given hard figures of how radioactive the material was. The farmer was concerned and kept a sample of the material in a bag in his machinery shed. The only other person he informed of its presence was an individual from the Health Department. The bag disappeared.
5. In wind events, the area would become blanketed in red dust. On several occasions the local fire tower mistook the dust as a fire. This dust deposited all over our community for up to 5-6km.
6. High volume dust monitors only operated one in seven days. Not surprisingly they missed these events as there was only about a 15 per cent chance of monitoring them. However, the 24/7 dust deposition monitors did pick up large volumes of dust that contained elevated levels of radiation, this indicates there would an increase in risk of cancer to our community.
7. Residents were forced to clean out tanks and spouting about twice a year. The Health Department on one occasion tested the water; it measured up to one-third the allowable level for radiation in drinking water. The roof that had twice the surface area had twice the radiation. Had the tanks not been so regularly cleaned and or stirred up, I am sure they would have exceeded the limit as radium attaches strongly to dust.

Our experience is opposite to Mr Kastelyn's. Sand mining has disadvantaged our community. More in a future edition.

Yours etc.,
Ian Ross,
Kanagulk Landcare Group president.

The Hon Lisa Neville, MP Minister for Environment, Climate Change and Water shared these words on instigating an inquiry into the EPA. 2016. 1

'We need to better protect Victorians from exposure to chemicals and pollution than we unfortunately sometimes have in the past.'

However, there is still no accountability for false information, contamination, remediation, and rehabilitation 22. Nor have the recommendations in both the Parliamentary Paper No.59. 2010–11, or the inquiry 2016, been enacted.

8. Publications – reports and websites

Satellite maps to view Glenaladale

Sentinel Hotspot http://www.ga.gov.au/ https://sentinel.ga.gov.au/#/ https://sentinel.ga.gov.au/#/ Search: Fingerboards, Walpa, VIC. Search: Glenaladale 3864.

Google Earth, Fingerboards, Glenaladale. 3864.

https://satellites.pro/Glenaladale_map#-37.786487,147.354512,14

https://satellites.pro/Glenaladale_map#-37.793530,147.328663,13

Earth Resources: http://earthresources.vic.gov.au

http://earthresources.vic.gov.au/earth-resources/maps-reports-and-data/mining-licences-near-me

Fingerboards: http://earthresources.vic.gov.au/earth-resources/maps-reports-and-data/mining-licences-near-me/mining-licences-near-me#lat=-37.7510906&lng=147.32669550000003

Mine-free Glenaladale (MFG): https://www.facebook.com/minefreeglenaladale/; http://minefreeglenaladale.org/about/; minefreeglenaladale@gmail.com, #StopKalbar.

Quick Reference to Mineral Exposure levels

ICSC - The International Chemical Safety Cards https://www.ilo.org/dyn/icsc/showcard.home

The ICSC project is a joint effort of the World Health Organization (WHO) and the International Labour Organization (ILO), with the cooperation of the European Commission.

European Chemicals agency (ECHA)

http://echa.europa.eu/web/guest/information-on-chemicals/registered-substances

ATDSR ToxGuides™ - are quick reference guides https://www.atsdr.cdc.gov/toxguides/index.asp

Tox Profiles - toxicological information on a given hazardous substance https://www.atsdr.cdc.gov/toxprofiledocs/index.html

PubChem - is an open chemistry database at the National Institutes of Health (NIH For chemical, health, safety, toxicity data. https://pubchem.ncbi.nlm.nih.gov/.

Lenntech - https://www.lenntech.com/periodic/elements/index.htm

GHS Hazardous Chemicals Poster is available at Safe Work Australia. https://www.safeworkaustralia.gov.au/system/files/documents/1702/classification_and_labelling_workplace_hazardous_chemicals_poster.pdf PubChem GHS: https://pubchem.ncbi.nlm.nih.gov/ghs/

Victorian Auditor General's Office (VAGO)

VAGO. The Victorian Auditor General. Report. Effectiveness of the Environmental Effects Statement Process. -. https://www.audit.vic.gov.au/sites/default/files/20170322-EES.pdf

VAGO. Rehabilitating Mines Report; Is the state effectively managing its exposure to liabilities from the rehabilitation of mines on private and public land? 5 August 2020. https://www.audit.vic.gov.au/report/rehabilitating-mines?section=

VEAC. Victorian Environmental Assessment Council. Victorian Environmental Assessment Council (2019) Assessment of Victoria's Coastal Reserves – Draft Report. Victorian Environmental Assessment Council. http://www.veac.vic.gov.au/documents/VEAC_CoastalRsAssessment_DraftReport2019-LR-.pdf

Water resources in the South East Coast (Victoria) 2011–12. Australian Water Resources Assessment Bureau of Meteorology 2012 http://www.bom.gov.au/water/awra/2012/documents/southeastcoastvic-lr.pdf Page 33, 48.

Inquiry into the Environment Effects Statement Process in Victoria. Parliamentary Paper No.59. 2010–11. Environment and Natural Resources Committee. Parliament of Victoria. https://www.parliament.vic.gov.au/images/stories/committees/enrc/FINAL_EES_Report_30_August_2011.pdf

Armytage, P., Brockinton, J. & van Reyk, J. 2017. The Independent Inquiry into Victoria's Environment Protection Authority (EPA) June 2015 to March 2016. Ministerial Advisory Committee for The State of Victoria Department of Environment, Land, Water & Planning. https://www.environment.vic.gov.au/sustainability/independent-inquiry-into-the-epa

RIS. Regulatory Impact Statement Proposed Mineral Resources (Sustainable Development) (Mineral Industries) Regulations. March 2019. by 'the department' – Department of Jobs, Precincts and Regions (prior to 1 January 2019 known as the Department of Economic Development, Jobs, Transport and Resources) https://earthresources.vic.gov.au/__data/assets/pdf_file/0010/461782/Regulatory_Impact_Statement_2019.pdf

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UNEP - United Nation Environmental Program, Helps A. Global Mercury Partnership. The Fingerboards report. https://www.businesses.com.au/Kalbar_Environmental.pdf

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Safe Work Australia

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Information about measurements/volumes of Water

1 Ml - Megalitre - One million litres - 1,000,000 litres or 0.001 Gl.

1GL - 1 gigalitre - One billion litres - 1,000,000,000 litres or 1 000 ML.

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