

# Submission Cover Sheet

Fingerboards Mineral Sands Project Inquiry and Advisory  
Committee - EES

# 663

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Request to be heard?: No

**Full Name:** Tim Lequeux

**Organisation:**

**Affected property:**

**Attachment 1:** Case\_Against\_Fing

**Attachment 2:**

**Attachment 3:**

**Comments:** See attached submission.

**EAST GIPPSLAND FOR:  
QUALITY FRESH FOOD TO AUSTRALIA  
MITCHELL RIVER VALLEY  
TOURISM - RECREATION  
RIVERS – LAKES – COAST  
FORESTS – WILDLIFE**

**THE CASE AGAINST:**

**THE FINGERBOARDS MINERAL SANDS PROJECT  
BY KALBAR RESOURCES**

**RADIATION HEAVY MINERALS DUST**



**THESE SITE INHABITANTS WILL NOT SURVIVE A MINE**

**Global Hazard Statements for heavy minerals**



**Danger**

**Warning: Acute oral toxicity, Harmful in contact with skin, Causes serious eye irritation,**

**Harmful if inhaled- Causes silicosis.**

**Causes damage to organs through prolonged or repeated exposure**

**Suspected of causing genetic defects. May cause cancer.**

**Toxic to aquatic life with long -lasting**

## FOREWORD

East Gippsland is renowned for its natural beauty and diversity.

recreational and tourism pursuits

major contribution to national food and horticultural production

Fingerboards mineral sands project claims are outweighed by the risks posed to the region's staple industries and their future.

The adverse impacts on

air – water- wildlife - public health - social amenity

weigh heavily against the project.

By

No \$ & No Cents

October 2020

## Table of Contents

	PAGE
1. Executive Summary.....	4
2. Scope and Implications Of Kalbar Resources' Fingerboards Proposal.....	4
3. Employment Factors.....	5
4. Company's Assessment of Other Project Benefits.....	6
5. Implications for Regional Agribusiness.....	6
6. Impacts on Water and Air Quality.....	8
7. Dust and airborne mineral particulates.....	11
8. Radiation and Associated Contaminants.....	12
9. Threats to Biodiversity.....	14
10. Tourism.....	16
11. Transport Infrastructure and Bio-Hazard Risks.....	16

<b>12. Rehabilitation of Mined Areas.....</b>	<b>17</b>
<b>13. Conclusions and Recommendations.....</b>	<b>19</b>
<b>APPENDIX A: Mineral Resources (Sustainable Development) Act Sec 2A.....</b>	<b>19</b>
<b>APPENDIX B: Product List Proposed by Kalbar, including Hazard Statements.....</b>	<b>20</b>

## **KALBAR RESOURCES: FINGERBOARDS MINERAL SANDS PROJECT**

### **1. Executive Summary**

This submission is in response to the release of the Fingerboards Mineral Sands Project Environmental Effects Statement and associated documents, and the invitation to community members and the public to provide comment.

Extensive research into the nature and details of this project reveals that despite the optimistic predictions and assurances issued by the company, there remain strong and undiminished grounds for opposition. This submission addresses several critical areas of concern and offers supportive evidence.

Areas of primary concern include:

- The employment and economic benefits to the region, even if fully realised, are very modest in comparison to the gains achievable from maximising the agribusiness and tourism potential of the region. The latter also come without attendant environmental risks.
- The risk of degradation to water and air quality;
- The threat to public health and to grazing livestock from dust and airborne particulates;
- The dispersion of radionuclides from processing and transportation of ore;
- The very poor historical record in Australia of mine rehabilitation, and the inadequate regulatory controls;
- Kalbar’s expressed good intentions cannot be assessed against its performance record, as it has never previously operated a mine.
- The threat to regional biodiversity, both flora and fauna;
- Questions about the compatibility of the proposed mine with the principles of sustainability laid out in Section 2A of the Mineral Resources (Sustainable Development) Act 1990 (see Appendix A).
- The composition of the Technical Reference Group (TRR) lacks community representation and fails to include several critical professional disciplines (see next page);
- The rapid growth of regional tourism depends on its pristine environmental reputation. Any cause for change in public perceptions could undermine what is currently its most compelling asset.

For these reasons, the price to be paid for this proposed mine in environmental, economic, public health and social amenity terms is too great to be prudently contemplated. It is therefore recommended that it not be permitted to proceed.

## 2. Scope and Implications of Kalbar Resources' Fingerboards Proposal

The proposed Fingerboards' open-cut mine is approximately 20 kilometres North West of Bairnsdale and immediately south of the Glenaladale settlement. It lies about 350 metres from the \$200 million a year vegetable growing industry in the Mitchell River Valley.

The total project area is 1,675 hectares (around 4,200 acres). The area to be mined is 1,200 hectares<sup>1</sup> with a total disturbed mining area of 120 hectares at any one time.

Kalbar plans to extract about 170 million tonnes of ore over a period estimated at between 15 and 20 years, depending on production rates and the time for taken for construction and decommission.

It will process 7 million tons of Heavy Metal Concentrates (HMC), including 1.9 million tons of zircon. Other metals include titanium, rutile 92, ilmenite, leucoxene, monazite, and xenotime, as well as the rare earth elements terbium, neodymium and praseodymium.<sup>2</sup>

Fingerboards is proposed as the first mining operation at the Glenaladale Deposit, estimated to contain 50 million tons of Heavy Metal Concentrates.<sup>2</sup>

The potential scale and duration of the mining of the whole deposit makes it critical that the approval process fully address the many community concerns set out in this submission.

The risks posed and the adequacy of measures proposed by Kalbar to minimise negative impacts (public health, social amenity, threatened/vulnerable flora and fauna, detriment to other regional industries) are central to this debate (Sections 6 and 8 address these matters issues in detail).

The company's undertakings also need to be considered in relation to the Principles of Sustainable Development set out in section 2A of the *Mineral Resources (Sustainable Development) Act 1990, as amended*. (See Appendix A attached).

Under the assessment process as it presently stands, the composition of the Technical Reference Group (TRG) established through the EES process (Environment Effects Statement) is concerning:

- The TRG comprises predominantly State and local government members, together with representation by two government corporations and the proponent;
- There is no community representation;
- There are no independent technical or disaster management experts.
- There are no specialists in agriculture, horticulture, tourism, or public health.

The community must be confident that the assessment will be balanced, comprehensive and transparent. To achieve this end, the composition of the TRG panel should be broadened.

## 3. Employment Factors

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<sup>1</sup> 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>

<sup>2</sup> Analysts for Kalbar presentation 2017. <https://www.businesses.com.au/Analysts-Presentation-May-2017-for-website.pdf> Page 18-22..

The company anticipates the creation of 200 construction jobs to establish the mine, with 197 ongoing jobs. Of these, 63 would be employed directly by the mining company. The remainder would be employed by contractors. The breakdown is as follows:

<b>Company employees</b>	<b>Jobs</b>	<b>Contractors</b>	<b>Jobs</b>
Management Administration	17	Truck drivers	30
Mining Operations	13	Mining unit	8
Production	21	Equipment Operators	68
Engineering	8	Maintenance & day crew	19
Stores	4	Supervisors	5
Total Kalbar Employees	63	Total contractors	134

The Chair of East Gippsland Marketing Inc suggests that this project will create 110 ongoing company jobs compared to the 197 foreshadowed above.<sup>3</sup>

Kalbar’s website forecasts an additional 150- 200 flow-on local community jobs<sup>4</sup>.

In contrast, The Chairman of Kalbar Resources, Robert Bishop, has been quoted as stating that” We *anticipate this project will generate around 300 permanent jobs for the surrounding region.*”<sup>3</sup>

These estimates are highly variable. The company’s 25 June 2020 Webinar also agreed that increased labour competition could occur. If mining jobs displaces other employment it further weakens the case.

The most optimistic employment estimates for this project don’t match the growth potential of agribusiness and tourism, but its potential detriment to both industries cannot be overstated.

#### 4. Company’s Assessment of Other Project Benefits

The proposed mine is claimed to provide a benefit to Victoria of around \$392 Million in net present value (NPV) terms. Over its lifetime it would increase the Gross Regional Product of the East Gippsland region by just over \$1.4 Billion in Net Present Value (NPV) Terms.

Kalbar has stated that mineral sands mining has occurred in agricultural areas of Australia for the last 60 years. It uses no explosives, no chemicals in extraction and no hole is left behind. It controversially argues that it can rehabilitate the land completely and remediate erosion and water security issues.<sup>5</sup>

These claims do not withstand critical scrutiny. The history of mining in this country displays a sad record of failure to rehabilitate, and an equally poor record of regulatory enforcement.

<sup>3</sup> Proposed Glenaladale mine to give an economic boost to East Gippsland 2020 East Gippsland Bookeasy, Impart Media <https://www.liveeastgippsland.com.au/supporting-information>

<sup>4</sup> Kalbar, <https://www.fingerboardsproject.com.au/about-the-project>

<sup>5</sup> Kalbar Resources Information Sheet – Economic Impact Assessment, November 2019.

Mining inspections have typically been conducted by persons selected by the mines themselves, undermining any confidence that the regulatory and inspection functions will be rigorous and impartial.

Kalbar's figures also need to be compared to the mine's negative environmental, social and public amenity costs, and the detriment to other industries, especially food production and tourism.

The company has stated that it will only remove 5% of the ore body and that rehabilitation will occur continuously. The rehabilitation process is estimated to take 3-5 years.

Despite these assurances, progressive rehabilitation is not required by legislation in Victoria. Furthermore, Kalbar Resources has never previously operated a mine of any kind, and its rehabilitation claims need to be assessed against the history of other similar projects.

The Iluka project in western Victoria can provide some insights, but others can also be cited. The historical evidence makes for a poor prognosis. (Further details are set out in Sections 6 and 8 below).

## 5. Implications for Regional Agribusiness

Despite being the smallest mainland state in Australia, Victoria is the country's major food processing state, accounting for one third of all processed food produced nationally.

In 2018-19, Victoria's total food and fibre exports accounted for 77% of Australia's dairy exports, 50% of horticultural exports and 32% of prepared food exports. The gross value of agriculture production increased by 6.4% compared to the previous year.<sup>6</sup>

Statistics compiled by Agriculture Victoria show that in 2017-18 the industry produced \$14.9 billion worth of agricultural product and exported \$14.2 billion of food and fibre.

Victoria's food and fibre production and manufacturing employed 199,600 people, of whom 87,400 were employed in production. (The vast majority of the latter, 77,000 were in agriculture.<sup>7</sup>

<sup>7</sup>Within Victoria, East Gippsland is a pivotal agribusiness region. Its contribution to national income and wealth greatly exceeds any economic contribution that the Fingerboards' mine can make.

The region has a justifiable reputation for clean air, water, and soils. These are vital factors, together with high food safety standards and biosecurity measures, in attracting domestic and international customers to source their purchases in the region.

In March 2019, some 15,400 people were employed directly in agriculture, forestry and fisheries industries. An estimated 6,500 farming families contributed to the lifeblood of some 250 small Victorian communities.<sup>8</sup>

KPMG reported that Gippsland produces 32% of Victoria's milk, 25% of its beef by value, 27% of its vegetable growing area, and 25% of the state's timber estate. Agriculture and food production generate \$2 billion in regional exports, projected to grow by 5% per annum to 2025.

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<sup>6</sup> Victoria Dept of Jobs, Precincts and Regions — <https://djpr.vic.gov.au/priority-industries-sectors/food-and-fibre-industry.pdf>

<sup>7</sup> [http://agriculture.vic.gov.au/\\_data/assets/pdf\\_file/0003/489333/Overview-of-victorian-agriculture-industry-2019.pdf](http://agriculture.vic.gov.au/_data/assets/pdf_file/0003/489333/Overview-of-victorian-agriculture-industry-2019.pdf)

<sup>8</sup> Ben van Delden, 28 March 2019. KPMG & Food and Fibre Gippsland - Accelerating Growth for the Gippsland Food and Fibre Industry). 2020 KPMG, <https://home.kpmg/au/en/home/insights/2019/03/accelerating-growth-gippsland-food-fibre-industry.html> page 8

In June 2019, East Gippsland produced \$870 million worth of fruit and vegetable crops, livestock, meat and related products, bakery products, seafood, and beverage and food support services.

In the Mitchell Valley, adjacent to Kalbar's proposed mine project, approximately 1500 people are directly employed in horticulture, with a flow-on benefit of 6,000 indirect jobs. If the mine's expected water consumption were used for horticulture instead, many additional jobs could be created.

Horticulturalists estimate that given 3 Gigalitres (GL) of water, a further direct 600 jobs could be generated, plus 2,500 indirectly. By contrast Kalbar only estimates a negligible 63 direct jobs and 134 additional contractors, using the same amount of water annually.

The Mitchell valley produces 30–50% of the fresh vegetables for Melbourne. It also supplies Sydney, Brisbane, and Adelaide, a national supermarket chain, a fast-food chain, and exports to South East Asia.

One producer, Bonaccord Ingram Ltd has a production of 22,000 tons of vegetables per year. It employs 250 people. In total, the area produces 500– 600 tons of vegetables daily, which is ice-packed from high-quality Mitchell River water for delivery to Melbourne and interstate.

Other major food producers in the region include:

- VEGCO Pty Ltd (A subsidiary of One Harvest), is the largest fresh packed salad manufacturer in Australia. It employs 810 people<sup>9</sup>.
- Busch Organics, Australia's largest Australian Certified Organic farm, on the Mitchell River Flats near Glenaladale. Over 500 acres of certified organic and conventional farmland supplying quality vegetables throughout Australia and to Asian markets.
- Patties Bakery – headquartered at Bairnsdale, Patties Bakery employs 570 people in the production of a range of meat pies, baked goods, frozen fruits, and pre-made desserts.

A comprehensive water use strategy is critical to the viability of the agribusiness sector. Any mining impact on water, air, or soil quality would completely undermine its environmental credentials.

The consequences of climate change for water resources in Gippsland are stated <sup>8</sup>as including:

- Growing demand for irrigation
- Increased strain on the lower part of major rivers such as the Mitchell
- Decreased quality of water in the lakes
- Decline of biodiversity and introduction of exotic species
- Changes in aquatic plant structure
- Increased rates of evaporation
- Reduced flows to and loss of wetlands; and
- Increased salinity.

Kalbar's assessment of the minimal impact of its proposed mining activities on water, or only marginal detriment to other regional industries, does not respond sufficiently to these serious concerns.

The intake for the region's water supply is very near the proposed mine site. This supply caters to commercial and residential sectors in 21 towns including Bairnsdale and through to Lakes Entrance and district.

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<sup>9</sup> Dun and Bradstreet: [https://www.dnb.com/business-directory/company-profiles.vegco\\_pty\\_ltd](https://www.dnb.com/business-directory/company-profiles.vegco_pty_ltd)).



Mine contaminants, including radionuclides, would be piped directly into the region's large-scale food production facilities and public, residential amenities. Co-existence of a large mine with a river and lakes system under increasing pressure is highly problematic.

The Macalister Irrigation District is an example of a regional project with great promise for regional agribusiness. It has around 61% of the 54,753 irrigated hectares of the district, sourcing water from the Macalister and Thomson rivers. (KPMG Report Page 44).

The Macalister Irrigation District 2030 strategy can transform the capability of this irrigation project with suitable infrastructure planning to support growth. This would enable the sustainable expansion of an industry more compatible than mining with the region's character.

## 6. Impacts on Water and Air Quality

Kalbar plans to obtain water from the Mitchell River as winter fill from 1 July to 31 October each year. Supplementary water requirements would be met by groundwater from the Latrobe aquifer, subject to licences from Southern Rural Water within total allocation limits.

Kalbar would have to buy water rights off current users. Its own modelling anticipates that three Gigalitres of water per annum would meet production needs, including dust suppression.<sup>10</sup>

Water quality is crucial to the economy, ecology, biodiversity, and tourist potential of the area. The East Gippsland Catchment Management Authority<sup>11</sup> has reported that 82% of its streams<sup>11</sup> are in excellent or good condition, the highest figure in the state.

This website adds that *"The Mitchell River has high conservation value, high level of naturalness of water flows, relative intactness of the entire river system and significance for the Gippsland Lakes."*

**East Gippsland Water** serves a population of around 45,000 people. The Mitchell Water Supply System is the region's largest supply system.<sup>12</sup>

Drinking water for these communities is pumped from the Mitchell River at Glenaladale into storage at Woodglen 2.5 km away. It is then processed at the Woodglen Water Treatment Plant before passing into the main supply pipeline which feeds the rest of the system.

A major water treatment plant and additional drinking water storage entered service at Woodglen in 2010, to ensure East Gippsland's water security. These storage ponds are exposed to the atmosphere and are in the direct path of prevailing winds blowing across the mine site.

The risk of dust and other airborne mineral particulates, including radionuclides, landing in the storage area ranks as a primary cause for concern.

East Gippsland manages the drawing water of water from the Mitchell River to minimise impacts on the environment. It focuses on drawing water during peak stream flows and adjusts the draw rate depending on flow conditions.

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<sup>10</sup> 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>

<sup>11</sup> East Gippsland Catchment Management Authority <https://egcma.com.au/rivers/>

<sup>12</sup> East Gippsland Water <https://egwater.vic.gov.au>

Kalbar's own planned water harvesting and management leave many unanswered questions. Its Webinar of 25 June 2020 set out several key claims that deserve closer perusal:

- No effect to the availability of groundwater expected
- Moderate risk identified and mitigated - Perry River could be impacted if tailings storage fails
- No effects on Ramsar Gippsland Lakes site
- Surface groundwater and groundwater monitoring programs and corrective actions identified
- Safeguards for surface water & priority for farmers. Licence will have restrictions.
- Water only to be taken during periods of high flow. If flow falls below 1400 megalitres per day, construction stops.
- Farmers to have access to water below that level.
- 20 dams to be built, to manage rainfall and runoff on sites
- 130-270 megalitres per year of water to be retained in dams; allegedly only 0.01% of the annual flow in the Mitchell River.

Contentious issues that present themselves are:

- In recent years, declining rainfall and periods of drought raise serious grounds for doubt that winter flows in dry years will allow winter-fill usage.
- Evaporation data from East Sale of 3.7 mm per day suggests that 675 Million litres would be needed per 50ha of open cut to keep the surface damp enough for dust suppression.
- If one also allows for the suppression of dust from overburden, top-soil storage, and roads, Kalbar's estimated 3.1 Gigalitres of water requirement is highly questionable.
- Kalbar has argued that there would be no adverse impact on the Mitchell or Perry Rivers. A solid body of evidence point to the opposite conclusion.
- There is also sparse attention to the Ramsar listed wetlands, little reference to run-off and siltation of the Mitchell River and Gippsland Lakes in heavy rain, or damage to the world-renowned Silk Jetties<sup>13</sup>

The Gippsland Lakes Ramsar site is listed as internationally important under the Convention on Wetlands of International Importance (negotiated at Ramsar, Iran in 1971).

Any increase in the level of contaminants in the Gippsland Lakes will remain there permanently. There is only one outlet at Lakes Entrance to flush the whole lakes network, Australia's largest.

Algal blooms already cause harm in drought periods. Climate change is predicted to reduce the river inflow to the lakes and the stability of the whole ecosystem will be further threatened by increased water extractions.

Gippsland Lakes and Paynesville's unique character is also in part defined by the presence of the Mitchell River Silt Jetties just off the mainland. These naturally formed silt banks run for over 8 km. They are the second largest silt jetties in the world, and the longest in the southern hemisphere.

One local estimate is that the mine would require about the same amount of water as used by the 29,000 households supplied by the Mitchell River. Kalbar plans to pipe additional water from the Sale aquifer, but it is fully committed and can only be released by purchasing existing water rights.

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<sup>13</sup> Gippsland Lakes Escape 2018- Savvy Digital <http://www.gippslandlakesescapes.com.au/portfolio/silt-jetties/>

## Management of tailings

A recurrent problem in mining worldwide is the design and construction of tailings storage facilities and the problem of leaching. Catastrophic tailings dam failures have occurred in Papua-New Guinea, Brazil, Mexico, Myanmar, and many other countries.

Despite regulatory controls in Australia there have been recent failures in this country. On 9 March 2018, Newcrest's gold and copper mine at Cadia, NSW suffered an embankment failure. Although the breakthrough was contained substantial damage was done. See attached link.

<https://www.youtube.com/watch?v=dDU1tS5zUwI>

This video shows the consequences of environmental damage, to say nothing of harm to water quality and public health.

Soil, in common with most chemical compounds, is partially soluble in water to varying degrees. The result is that the dams do not fully seal. Even when they are securely constructed and maintained, seepage and overflow risks are not uncommon.

Liners used to assist water retention are not fool-proof and require periodic costly replacement. Acidic leachates held in dam liners will leak due to sealing failures or liners perishing.

The Stockman mine tailings dam near Benambra still leaks despite \$6m remediation.

Kalbar has downplayed the risk of failure, stating that: ***“Project activities are not expected to significantly affect the beneficial uses of surface water, with the exception of a moderate risk to the Perry River Catchment in the event of a failure of the temporary tailings storage facility.”***<sup>14</sup>

Another significant issue is the risk of erosion in the mining area. Kalbar's Glenaladale Mineral Sands Project Baseline Report states at Section 4.1

***There is clear evidence for past or current mass movement of soil within the project area. Soils in the eastern lowlands are prone to gully, wind, rill and tunnel erosion etc.***

It adds that: *the risk assessment shows that the project area is located within an area that has been identified as high risk for sheet and rill erosion.*<sup>15</sup>

This characteristic means that the known proneness to erosion will be aggravated by mining activity and will intensify pressures on water quality and environmental degradation.

Finally, climate change will result in the reduction of rainfall and water flows. In conjunction with regional population growth and increased demand for water, these factors make it even more critical to conserve this resource for present and future generations.

## 7. Dust and airborne mineral particulates

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<sup>14</sup> <https://www.fingerboardsproject.com.au/environment-effects-statement/ees-key-findings>

<sup>15</sup> Coffey Environments Australia Pty Ltd. July 2015. Kalbar's Glenaladale Mineral Sands Project Baseline Report Section 4.1 [https://www.planning.vic.gov.au/\\_data/assets/pdf\\_file/0017/9134/Fingerboards-Mineral-Sand-Project\\_Referral-2016-06\\_Baseline-Report\\_Attachment-2.PDF](https://www.planning.vic.gov.au/_data/assets/pdf_file/0017/9134/Fingerboards-Mineral-Sand-Project_Referral-2016-06_Baseline-Report_Attachment-2.PDF)

Regional climate and geography are important factors in relation to the proposed mine. The mine site is on an exposed plateau, and wind would carry dust and contaminated particles.

Dust and soils are easily transported by air over distances that would encompass most of the productive land of the Mitchell Valley.

Households which rely on domestic water from tank storage will be placed in an invidious position from dust and mineral particulates. Dust will occur at all stages of construction and mining.

Kalbar has declared that mining will cease on windy days to prevent dust laden with radioactive and/or carcinogenic chromium, vanadium pentoxide, thorium and titanium dioxide from blowing across the farming and urban areas. The risks posed by these toxicants is detailed on pages 12-14 and in Appendix B.

Actual experience at comparable mine sites in Victoria leaves no room for confidence that Kalbar's assurances can be met.

Iluka Resources' Douglas Mine is a mineral-sands mine near the Victorian town of Balmoral in the southern Grampians. It was established in 2006 to mine rutile and zircon, then closed in 2012. It is estimated that 7.5 million tonnes of mineral sands were extracted from the mine.

Iluka Resources committed to rehabilitating the site but *The Age* newspaper reported on 28 June 2015 that the company:

*"is seeking approval to continue to operate the Douglas mine site as a dumping ground for up to 20 years because laws require mining companies to be operating a mine in the state to be able to process and store by-product."*

["Horsham Council debates Iluka Resources mining dump site at Kanagulk"](#). *The Age* 28 June 2015.

The ABC also reported in 2015 that radioactive gas from the mineral sand mining had been reported at levels exceeding the "maximum for public exposure.

(Source: Scully, Sarah (13 February 2015). ["Kanagulk Landcare Group calls for Iluka Resources to put up a bond for Douglas proposal"](#). *The Wimmera Mail Times*.)

After the mine closed, *The Wimmera Mail-Times* reported that local landowners were concerned that the levels of air and water contamination were not being independently monitored.

The WRP mineral sands mine near Ouyen in the Murray Basin closed in 2012 but it will be several more years before it will be rehabilitated. Iluka Resources' Murray Basin Newsletter of November 2018 stated that topsoil had been placed on 639ha of the 1,118ha total disturbance area.

At the nearby Kulwin mine similar slow progress occurred. Rehabilitation earthworks were scheduled to recommence at the former mine site early in 2019. Topsoil has previously been placed on 457ha of the 773ha total disturbance at the site.<sup>16</sup>

Even if Kalbar's air quality monitoring standards met Victorian EPA requirements, all these standards for air, land and water are outdated. Due dates for update range from 2007 (groundwater) to 2012 (land contamination). Meanwhile, best practice standards have advanced.

As a case in point the State Environment Protection Policy 240: Air Quality Management was released in December 2001. It was due for review in 2011 but such a review or update has yet to occur.

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<sup>16</sup> Iluka. Hamilton Mineral Separation Plant

[https://www.iluka.com/iluka/media/website/consultation%20documents/murraybasin\\_newsletter\\_vweb.pdf](https://www.iluka.com/iluka/media/website/consultation%20documents/murraybasin_newsletter_vweb.pdf)

The United States EPA pollution control standards set much lower trigger levels for all forms of contaminants and toxicants, and it should not be sufficient to accept local standards. It would be much more prudent and safer to adopt USEPA standards of assessment.

A pertinent contribution to the subject of dust contaminants is found in the submission of the UNEP Global Mercury Partnership to the Australian Senate's 2017 **Inquiry into the Rehabilitation of Mining and Resource Projects and Power Station Ash Dams.**<sup>17</sup>

The submission named four major mines in Victoria with significant public health and environmental concerns. The Stawell Gold Mine (under care and maintenance), has a very large tailings dam that contains a range of carcinogenic materials.

A major pollution event from a tailing dam's failure would have repercussions for some of the most productive areas in the western part of the state.

At the GBM Mining Bendigo Gold Mine and the Woodvale Evaporation Ponds at Bendigo, the UNEP paper points out (Page 3) that although air sampling occurs, the state EPA allows the mine's laboratory to heat dust samples to 850 degrees to remove extraneous matter (e.g water, bird droppings).

**The UNEP paper points out that many carcinogenic metals in the dust gasify at lower temperatures than this and render the readings deceptive and meaningless.**

## 8. Radiation and Related Contaminants

All mineral sands are considered Naturally Occurring Radioactive Materials (NORM) due to the presence of uranium and thorium in mineral grains. Numerous authorities attest to this fact, including the International Atomic Energy Agency (IAEA).<sup>18</sup>

The IAEA points out that although everyday exposure to minerals and raw materials ordinarily occurs at a level not significantly greater than normal background, processing and mineral concentration activities may give rise to enhanced levels of exposure that must be adequately regulated.

As an example, The IAEA indicates that in the separation of dry separation of heavy mineral sands, thorium rich monazite concentrates preferentially in dust particles. The result is that concentrations of <sup>232</sup>Th "*and its progeny*" (page 37) can be significantly higher in the dust particles than in the bulk material.

NORM substances are often accompanied by elevated concentrations of other toxic elements. The IAEA has explained that *'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).*<sup>19</sup>

Several are in Kalbar's products list (Page 22 of the Analysts' Presentation May 2017). They include Manganese, Chromium, Magnesium, Vanadium and Niobium compounds.

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<sup>17</sup> Helps, A. 2015. Fingerboard Project [https://www.businesses.com.au/Kalbar\\_Environmental.pdf](https://www.businesses.com.au/Kalbar_Environmental.pdf) The submission of the UNEP Global Mercury Partnership to the Australian Senate's 2017 Inquiry into the Rehabilitation of Mining and Resource Projects and Power Station Ash Dams. [file:///C:/Users/User/Desktop/Mine%20Book%202020/UNEP.%20Mining%20-%20Submission%20to%20Senate%20Sub72%20\(1\).pdf](file:///C:/Users/User/Desktop/Mine%20Book%202020/UNEP.%20Mining%20-%20Submission%20to%20Senate%20Sub72%20(1).pdf)

<sup>18</sup> International Atomic Energy Agency (IAEA). (Management of NORM Residues, IAEA Vienna 2013).. [https://www-pub.iaea.org/MTCD/Publications/PDF/TE-1712\\_web.pdf](https://www-pub.iaea.org/MTCD/Publications/PDF/TE-1712_web.pdf)

<sup>19</sup> IAEA. TECHNICAL REPORTS SERIES No. 419. Extent of environmental contamination by naturally occurring radioactive material (NORM) and technological options for mitigation. Page 79, 84) [https://www-pub.iaea.org/MTCD/publications/PDF/TRS419\\_web.pdf](https://www-pub.iaea.org/MTCD/publications/PDF/TRS419_web.pdf)

Most of these substances are classified as carcinogenic by the US Environment Protection Agency.

The Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) has expressed shared concerns with the IAEA about the mineral sands radiation levels, pointing out that:

- Ores, products, and waste streams contain higher concentrations of U-238 and Th-232 than the naturally occurring levels.
- 'The workers & public are more exposed to NORM and their long-term hazards than to any other source of radiation'<sup>20</sup>.

Based on experimental evidence from animal inhalation studies, nanoparticles of Titanium Dioxide (of which rutile is the highest-grade natural form) are classified as an occupational carcinogen by the US National Institute for Occupational Safety and Health.

Crystalline silica also deserves mention for its hazardous properties. It is a known cause of lung fibrosis and has also been classified as a carcinogen by the International Agency for Research on Cancer. Ilmenite sand contains a small amount of free quartz and dust inhalation must be avoided.

Page 17 of Kalbar's Environment Effects Statement Summary Report of August 2020 acknowledges that project worker and members of the public will be exposed to different levels of radiation from radionuclides, including in the dust released from the mine site.

It asserts that maximum predicted exposures for workers and for members of the public respectively will be well below the annual occupational or public exposure levels stipulated by the Radiation Regulations. Similar modelling results for terrestrial biota in the project area are claimed.

The methodology underpinning Kalbar's findings has been called into question by expert commentators. Andrew Helps (UNEP Global Mercury Partnership) is an Environmental Disaster Management expert who has advised many nations on environmental remediation and managing toxic or hazardous materials.

Amongst other criticisms, Helps has highlighted the dangers posed by at least four airborne carcinogens in the ore at the Fingerboards site. Amongst the risks are that all can accumulate through the food chain, posing a particular risk to grazing animals.<sup>17</sup>

Helps has raised particular concern about Kalbar's data in relation to the mineral product qualities of the primary ilmenite at Page 22 of the Analysts' presentation. Titanium dioxide is quoted as 54% in the primary ilmenite.

The California EPA in June 2015 classed airborne unbound particles of respirable size Titanium Dioxide as a carcinogen and set very low trigger levels.

Although the technicalities in Helps' commentary are beyond this submission, it is self-evident that serious public health and safety issues have not been obviated.

Finally, a puzzling feature of Kalbar's EES Radiation Information Brochure (Page 5) is its description of the testing of the uptake of radionuclides to crops. The uptake rates were calculated for composite samples taken in 2018 from five areas within the farming district.

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<sup>20</sup> ARPANSA. Proposed Expansion of the Australian National Radiation Dose Register to the Mineral Sands Mining and Processing Industry. Technical Report No.165. Page 4, 11  
<https://www.arpansa.gov.au/sites/default/files/legacy/pubs/technicalreports/tr165.pdf>

The radionuclide content in the crops was stated to be well below naturally occurring levels found in soils worldwide. This finding is of little moment as it relates to sampling of soils in areas not yet exposed to the impact of mining.

Similar observations can be made in relation to air quality sampling carried out between June 2017 and September 2018. The fact that uranium and thorium concentrations for dust samples were at or below the detection levels of analysis also only describes air uncontaminated by dust released from mining.

## 9. Threats to Biodiversity

The Victorian Government has committed to biodiversity in *Protecting Victoria's Environment – Biodiversity 2037 (Department of Environment, Land, Water and Planning)*. Fingerboard's biodiversity protection undertakings need to be considered in relation to the Victorian framework.

The Ministerial foreword to this document points to the decline of biodiversity as having negative impacts on the future, health, well-being, and prosperity of all Victorian communities.

The Victorian Government defines biodiversity as encompassing "*All components of the living world: the number and variety of plants, animals and other living things including fungi and micro-organisms across our land, rivers, coast and ocean.*" (Page 4).

In its Webinar presentation of 25 June 2020, and in its EES Key Findings Review Kalbar Resources stated that the Glenaladale mining area was "highly *modified and supports low diversity values, dominated by pasture and plantations.*"<sup>21</sup> (

Kalbar identified only one national-listed significantly threatened ecological community - the red Gum grassy woodland and associated native grassland in an area of 1.74 hectares.

Kalbar's assertion of limited local biodiversity values does not match records easily retrievable from the Atlas of Living Australia (ALA) which identifies a diverse array of both plant and animal species in the immediate Glenaladale vicinity.<sup>22</sup>

Even the ALA records do not show the full diversity of animal and plant life because the State forest has not been assessed.

It also listed two nationally significant fauna species as vulnerable – the grey-headed flying fox and the Australian grayling. One EPBC (Environmental Protection and Biodiversity Conservation Act 1999) migratory species was also mentioned, the rufous fantail, but it was described as common.

Kalbar acknowledged regionally important fauna species such as the Eastern long-necked turtle, the emu, and the yellow-bellied sheath tail bat. Four state-significant flora species were also observed but not named. The protective measures to be taken were not made known.

Wombats are also a protected species in Victoria. On 4 February 2020, the Governor in Executive Council revoked a May 1997 declaration under Sec 7A of the Wildlife Act 1975 which provided for wombats to be declared unprotected in certain areas of the state.

This Order in Council took effect on 6 February 2020 but Kalbar's proposal takes no account of it.

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<sup>21</sup> Kalbar Resources Ltd. Webinar presentation of 25 June 2020, and in its EES Key Findings Review <https://www.fingerboardsproject.com.au/environment-effects-statement/ees-key-findings>

<sup>22</sup> Atlas of Living Australia (ALA). <https://www.ala.org.au>

Endangered Sea-Eagles nest by the Mitchell river at Glenaladale and echidna are often found on the site.

As for biodiversity values affected by water quality or abundance, the company acknowledges that project activities could impact the Ramsar listed Gippsland Lakes, 25 kilometres downstream.

Kalbar believes that the Lakes will not be directly impacted by the loss of vegetation or habitat. It admits to possible indirect impacts from sedimentation and decline of water quality.

As previously indicated, any impacts on water quality in the rivers threatens biodiversity in the entire Gippsland Lakes system. For example, the Perry River forms a rare chain of ponds network which is home to many threatened plant and animal species.

Kalbar's modelling inaccurately shows no adverse impacts to the Mitchell or Perry Rivers.

The Perry River catchment includes the proposed mine site at Glenaladale, and the increased silt load could infill the natural settling ponds of the Perry River. The well-being of resident platypus in the river and colonies of wombats around the head of the Perry would be at risk from mining.

In relation to the Avon River,<sup>23</sup> there is an equally pressing need to minimize any further threats or disturbance.

The river has a reed-fringed delta extending 600 metres into Lake Wellington upstream from the delta mouth. Phragmites (large perennial reed grasses found in wetlands) have largely disappeared from the western arm of the delta, and the lake shoreline of this arm is eroding.

To maintain the delta, Agriculture Victoria has emphasised the need to minimize the physical disturbance to the reed swamp and Melaleuca swamp. Grazing and clearing of the site should be prohibited. The maintenance of the delta is dependent upon continued undiminished river flow.

Any water diversion upstream must be evaluated in the light of the potential impact of such work on physiographic and ecological changes on the delta and shore of Lake Wellington.

Other important elements of regional biodiversity include the rare and endangered Burrunan dolphin which was found in the lakes system about a decade ago. This is one of only two known populations of this dolphin, the other being located in Port Phillip Bay.

This dolphin was recognised as a separate species as recently as 2011 and was listed in 2013 as an endangered species under *Victoria's Flora and Fauna Guarantees Act 1988*.

Finally, it is only seven months since the catastrophic bush fires that engulfed substantial areas of East Gippsland. The fires seriously depleted wildlife populations and areas that were spared now have even greater importance for wildlife recolonization and as sanctuary for migratory birds.

In short, mining is transitory but the damage it can inflict on sensitive wildlife habitats is enduring.

## 10. Tourism

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23. Avon - Perry Delta, Victorian Resources Online, 23/03/2020. GL43 (8321) State of Victoria. Agriculture Victoria [http://vro.agriculture.vic.gov.au/dpi/vro/egreg.nsf/pages/eg\\_if\\_sites\\_significance\\_gl43](http://vro.agriculture.vic.gov.au/dpi/vro/egreg.nsf/pages/eg_if_sites_significance_gl43)



Tourism is a major contributor to the East Gippsland economy. Its diversity of marine, alpine, and attractive rural landscapes and its scope for outdoor recreational activities gives it huge potential for further growth and development. The local tourism industry is vibrant and growing rapidly.

East Gippsland attracted 1.455 million visitors in the year ended 31 December 2018, a 10.9% increase on the previous year. This was the fastest rate of growth in the Gippsland region. International visitor numbers swelled by 24.4%, compared to 6.1% for the state as a whole.<sup>24</sup>

2016 Australian census data indicates that East Gippsland tourism generated \$294 million for the local economy. More recent estimates suggest that this is now around \$340 million.

East Gippsland's clean environment is a strong foundation of regional tourism. Any cause for adverse changes in public environmental perceptions will have flow-on effects for the whole tourism sector.

The Kalbar mine proposal has sought to allay anxieties about its environmental impacts, but there remain numerous potential risks for the tourist industry. The Gippsland Lakes provide a good example. Anything that detracts from their appeal will impact badly on tourism and recreation.

The Gippsland Lakes system is the largest navigable inshore system in Australia and has long held significant social and economic value to both professional and recreational fishers, with commercial fishing established in the late 1800's.

This system is already under threat from reduced flows and increased salinity. Further reduction in flows from the Mitchell River and the threat of siltation from mine run-off will be an added burden that the Lakes are not equipped to withstand.

Despite a recently legislated ban on commercial fishing in the lakes, the Victorian Government's 'Target One Million' plan, aims to greatly increase recreational fishing,

In 2014 the state government committed \$46 million towards recreational fishing, aiming to grow participation to one million anglers by 2020. In 2018 it committed a further \$35 million to extending the Target One Million phase one plan into phase two.

These commitments are predicated on the continued preservation of the environment and waterways of the Gippsland Lakes System. Apart from the Lakes, other attractions such as the iconic Fingerboards Loop cycling circuit will become unviable if large numbers of mining vehicles use local roads.

## 11. Transport Infrastructure and Bio-Hazard Risks

The Closure Planning Practitioners Association (CPPA) was formed in 2017 in recognition of the poor history of mine rehabilitation and closure planning in Australia.

Kalbar has undertaken (weblink below)<sup>25</sup> that all new road and intersection upgrades required for the project will be funded by the company and built to the standards of the road authority. Its plans for the proposed sequencing of road diversions still leave many questions unanswered.

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<sup>24</sup> International Visitor Survey and National Visitor Survey, YE Dec 18, Tourism Research Australia

[https://www.eastgippsland.vic.gov.au/files/assets/public/documents/development\\_directorate/economic\\_development/travel-to-greater-gippsland-ye-dec-18.pdf](https://www.eastgippsland.vic.gov.au/files/assets/public/documents/development_directorate/economic_development/travel-to-greater-gippsland-ye-dec-18.pdf)

<sup>25</sup> Kalbar <https://www.fingerboardsproject.com.au/about-the-project/infrastructure>

It is still unknown how Kalbar will move the ore from the mine-site to a port for shipment. All options create their own problems. The company's stated transport preference involves a private haulage road within the infrastructure corridor to a new Fernbank East rail siding.

This option depends on completion of an upgrade to the Avon River rail bridge after the commencement of mining. Until then the alternative would be Fennings Yard rail siding in Bairnsdale.

Apart from infrastructure upgrades and associated local road closures, the daily movement of up to 60 double-B trucks on public roads will dramatically increase wear and tear on those roads, reduce public amenity and raise noise and safety issues for local road users.

Given that Kalbar would not be required to contribute to local rates, it seems inevitable that these costs would be borne by local government.

Kalbar has indicated that Port Anthony and Corner inlet are no longer part of the preferred transport option, and the concentrate it would be shipped from the Port of Melbourne.<sup>26</sup>

If this is not feasible and Port Anthony is the fall-back exit port, it is also a Ramsar listed site. Most local roads are not designed for double-B trucks and the damage they would cause.

Heavy minerals including zircon, rutile, ilmenite, leucoxene and monazite also create significant hazards for transportation. Some of these are related to the issue of radiation contamination risk in processing (addressed in Section 6 of this submission).<sup>27</sup>

## 12. Rehabilitation of Mined Areas

Kalbar has publicly committed to continuous rehabilitation of the mine site through the life of the project. The process of rehabilitation is envisaged as taking place over a period of 3-5 years.

This would be commendable if it can be proven in practice, but as previously indicated (see Page 2), the history of open-cut mining in this country does not inspire confidence in the company's *bona fides*.

The fact that Kalbar has never operated a mine means that there is no empirical evidence to assess the achievability of its plans. In the absence of a track record it is essential to examine historical evidence.

Although much of Australia's mining activity since colonial times has taken place underground rather than in open-cut mines, there are common features. The total number of abandoned mines in this country is very large, and there are common lessons to be learned from both forms of mining.

On 8 February 2017, the Australian Senate referred an **Inquiry into the Rehabilitation of Mining and Resource Projects (and Power Station Ash Dams)** to its Environment and Communications References Committee.

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<sup>26</sup> Kalbar <https://www.fingerboardsproject.com.au/community-engagement/fag>

<sup>27</sup> Radiation Exposure in the Transport of Heavy Mineral Sands September 2008 Page 2. Prepared by Calytrix Consulting Pty Ltd for the Australian Radiation Protection and Nuclear Safety Agency. [https://www.arpsa.gov.au/sites/default/files/legacy/pubs/rps/rps2\\_calytrix.pdf](https://www.arpsa.gov.au/sites/default/files/legacy/pubs/rps/rps2_calytrix.pdf)

Its submission to the Inquiry, the CPPA<sup>28</sup> questioned Australia's competency to regulate and implement rehabilitation. It argued that many of the mine rehabilitation issues subject to the Inquiry reflected a lack of experienced personnel in the mining, consultative and regulatory sectors.

The CPPA raised numerous matters of crucial importance for mine closure and rehabilitation practice, including the need to build professional capacity in most aspects of mine closure planning, namely:

- The adequacy of existing regulatory, policy and institutional arrangements to ensure adequate and timely rehabilitation; and
- The cost of outstanding rehabilitation obligations of currently operating projects;
- The potential social, economic, and environmental benefits of adequate rehabilitation.

Amongst other things, the CPPA called on the Commonwealth to develop a mine closure policy that aligns regulation of rehabilitation with economic development objectives to optimise the environmental, social, and economic benefits from mining assets.

Although the Inquiry's mandate limited to matters pertaining to the Commonwealth's responsibilities, the issues are equally applicable in all jurisdictions across the country.

In Victoria, the catastrophic Hazelwood Mine Fire exposed the fact that mine rehabilitation bonds administered by the Earth Resources Branch of the Department of Jobs, Precincts and Regions, provide no guarantee that companies will be capable of meeting their obligations.

Environment Victoria's submission to the above Senate Committee stated that the inquiry into the Hazelwood Mine Fire resulted in Hazelwood's bond increasing from \$15 million in 2015 to \$74 million in 2016, but in 2017 the mine owners increased the provision to an anticipated \$439M.

Despite this huge amount, Hazelwood's parent company was reported on 20 January 2017 as stating that the full cost of rehabilitation was estimated as \$743 million, with the possibility of rising further.<sup>29</sup>

Environment Victoria (EV) argued that mine operators currently have incentives to underestimate their rehabilitation obligations to reduce the opportunity cost of capital. EV makes a strong case that bonds should equal the cost to the state of ensuring that rehabilitation works are carried out.

Environment Victoria has also recommended that rehabilitation liabilities should be required to appear in mining companies' accounting records and reported publicly through documents lodged with the Australian Security and Investments Commission.

Another submission to the Senate Inquiry: *Potential environmental and social-economic impacts from neglected mining occurrences in Victoria, Australia* (A Miller, S Northey, and M Yellishetty) highlighted major historical deficits in the rehabilitation of areas affected by mining in Victoria.

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<sup>28</sup> CPPA. the Australian Senate 8 February 2017, referred an Inquiry into the Rehabilitation of Mining and Resource Projects (and Power Station Ash Dams) to its Environment and Communications References Committee.

[https://www.aph.gov.au/Parliamentary\\_Business/Committees/Senate/Environment\\_and\\_Communications/MiningandResources/Submissions](https://www.aph.gov.au/Parliamentary_Business/Committees/Senate/Environment_and_Communications/MiningandResources/Submissions)

<sup>29</sup> ABC. 20/1/2017. <https://www.abc.net.au/news/2017-01-20/hazelwood-rehabilitation-to-cost-743-million-engie-says/8197784>

This submission referred to a 2012 finding that Victoria has approximately 19,000 neglected mines (nationally more than 50,000). Communities in those vicinities faced loss of native vegetation, increased pollution, mining tailings leakages, and exposure to toxic residues.

In July 2017, the Australia Institute revealed that while Victoria has up to 150 operating mines and 122 mines in care and maintenance, the Department of Economic Development, Jobs, Transport and Resources was only able to name one example of a mine site that had been fully rehabilitated.<sup>30</sup>

The Australia Institute also cited evidence that bonds to cover the mine rehabilitation process were seriously inadequate in size and in the method of their assessment. It found (page 15) that

*“the Australian public stands to incur billions of dollars in rehabilitation costs through either use of taxpayer funds or a degraded environment if rehabilitation is not well managed and regulated.”*

The cumulative evidence shows up major gaps in mining rehabilitation practice, and deficiencies in the regulatory and monitoring processes. Self-assessment of rehabilitation liabilities is seriously wanting.

On 25 June 2020, the ABC reported findings by the Australian National Audit Office that almost 80 per cent of federal environmental reviews were non-compliant or contained errors.

The Commonwealth Department of Agriculture, Water and the Environment was found to not have adequate measures to administer national environmental laws. In particular, the *Environmental Protection and Biodiversity Act 1999* had not been well handled.

In Victoria, the Earth Resources Regulation branch of the Department of Jobs, Precincts and Regions (DJPR) is the regulator of exploration, mining, quarrying, and other earth resource activities. Its ability to manage its obligations is compromised because the information it receives is controlled by the mines.

The rehabilitation plans submitted to ERR are dependent on information provided by the company, which selects its own inspectors. The process cannot therefore be regarded as objective or unbiased. This further reinforces the case for an information process that includes independent inputs to ERR.

Adding to concern, another business unit of DJPR in the same branch as Earth Resources Regulation, finds opportunities and facilitates investments in resources. The co-existence of promotional and regulatory functions side by side means that despite assurances to the contrary, real separation does not exist.

The net result of the evidence available:

- challenges the case for the establishment of the Fingerboards' mine; and
- reinforces the point that even conformity with Commonwealth and state legislation does nothing to tip the balance in favour of approval.

## 13. Conclusions

The failure of the departments and their unwilling culture to address the recommendations from multiple inquiries and the auditor general require a Royal Commission.

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<sup>30</sup> Dark Side of the Boom (Victoria) p1. The Australia Institute.  
[https://www.tai.org.au/research?combine=Mining+in+Victoria&field\\_section\\_tid=26](https://www.tai.org.au/research?combine=Mining+in+Victoria&field_section_tid=26)

To unearth and hold accountable the powerful lobby within the departments that expedite land and water resources so vital to the nation's food capability, to mining interests.

The departments need to prioritise these resources for sustainable high-value food production for the future generations. A nation that can feed its own is a more resilient nation

## APPENDIX A: Mineral Resources (Sustainable Development) Act 1990

The sustainability principles under the MRSD Act (Appendix A) do not reconcile with the Kalbar proposal.

### Section 2A - Principles of sustainable development

- (1) It is the intention of Parliament that in the administration of this Act regard should be given to the principles of sustainable development.
- (2) For the purposes of this Act, the principles of sustainable development are—
  - (a) community wellbeing and welfare should be enhanced by following a path of economic development that safeguards the welfare of future generations;
  - (b) there should be equity within and between generations;
  - (c) biological diversity should be protected and ecological integrity maintained;
  - (d) there should be recognition of the need to develop a strong, growing, diversified and internationally competitive economy that can enhance the capacity for environment protection;
  - (e) measures to be adopted should be cost effective and flexible, not disproportionate to the issues being addressed, including improved valuation, pricing and incentive mechanisms;
  - (f) both long and short term economic, environmental, social and equity considerations should be effectively integrated into decision-making;
  - (g) if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation and decision-making should be guided by—
    - (i) a careful evaluation to avoid serious or irreversible damage to the environment wherever practicable; and
    - (ii) an assessment of the risk-weighted consequences of various options;
  - (h) development should make a positive contribution to regional development and respect the aspirations of the community and of Indigenous peoples;
  - (i) decisions and actions should provide for community involvement in issues that affect them

## Appendix

### 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.<sup>31</sup>

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.<sup>19</sup>

## 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.<sup>6</sup>

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.


Note: Digging for the Facts Team (DFT) advises that the information contained in this submission is sourced from general references. Do not rely or act upon this information without seeking prior expert professional, scientific and technical advice. DFT does not take any liability for any consequences to any person arising directly or indirectly from using this information or material, including but not limited to losses, damages, costs, expenses or any other compensation.






### Product list by Kalbar Resources Ltd

Premium Zircon	Rare Earth Concentrate	Primary Ilmenite Rutile 92
   	  	   
Radio- active Harmful Irritant Environmental Hazard Health Hazard	Harmful Irritant Health Hazard Environmental Hazard	Harmful Irritant Health Hazard Environmental Hazard Corrosive
<b>Life of Mine Product Quantities</b> ZrO <sub>2</sub> Zircon –1,234,000 tons Kalbar: Analyst Pre-Feasibility Study. 2017	<b>Life of Mine Product Quantities</b> ReO - 187,000 tons Kalbar: Analyst Pre-Feasibility Study. 2017	<b>Life of Mine Product Quantities</b> TiO <sub>2</sub> - 1,664,000 tons Kalbar: Analyst Pre-Feasibility Study. 2017
ZrO <sub>2</sub> - Zirconium dioxide – 66%	Y <sub>2</sub> O <sub>3</sub> . - Yttrium oxide,	TiO <sub>2</sub> -Titanium dioxide












<p>SiO<sub>2</sub> - Silicon dioxide --32.5%</p> <p>Al<sub>2</sub>O<sub>3</sub> - Aluminium oxide</p> <p>Fe<sub>2</sub>O<sub>3</sub> - Iron (III) oxide</p> <p>TiO<sub>2</sub> - Titanium dioxide</p> <p>MnO – Manganese (II) oxide</p> <p>MgO - Magnesium oxide or magnesia</p> <p>CeO<sub>2</sub> - Cerium (IV) oxide</p> <p>P<sub>2</sub>O<sub>5</sub> - P<sub>4</sub>O<sub>10</sub> Phosphorus pentoxide</p> <p>Th – Thorium - 300 ppm</p> <p>U – Uranium – 420 ppm.</p> <p><b>Monazite</b> – 0.6% - 60,000 tons</p> <p>Metallica Minerals Ltd.</p> <p>Report to ASX. (MLM) 26 April 2012.</p>	<p>Xenotime -YPO<sub>4</sub>- Yttrium Phosphate</p> <p>Lanthanoids</p> <p>La<sub>2</sub>O<sub>3</sub> - Lanthanum oxide</p> <p>CeO<sub>2</sub> - Cerium (IV) oxide – 19.36%</p> <p>Pr<sub>6</sub>O<sub>11</sub> - Praseodymium oxide</p> <p>Nd<sub>2</sub>O<sub>3</sub> - Neodymium (III) oxide</p> <p>Sm<sub>2</sub>O<sub>3</sub> – Samarium (III) oxide</p> <p>Eu<sub>2</sub>O<sub>3</sub> - Europium (III) oxide</p> <p>Gd<sub>2</sub>O<sub>3</sub> - Gadolinium (III) oxide</p> <p>Tb<sub>4</sub>O<sub>7</sub> - Terbium (III, IV) oxide</p> <p>Dy<sub>2</sub>O<sub>3</sub> - Dysprosium Oxide</p> <p>Ho<sub>2</sub>O<sub>3</sub> - Holmium (III) oxide</p> <p>Er<sub>2</sub>O<sub>3</sub> - Erbium (III) oxide</p> <p>Tm<sub>2</sub>O<sub>3</sub> - Thulium (III) oxide</p> <p>Yb<sub>2</sub>O<sub>3</sub> – Ytterbium (III) oxide</p> <p>Lu<sub>2</sub>O<sub>3</sub> – Lutetium (III) oxide</p>	<p>Fe<sub>2</sub>O<sub>3</sub> – Iron (III) oxide (calc)</p> <p>FeO – iron Oxide</p> <p>SiO<sub>2</sub> - Silicon dioxide</p> <p>Al<sub>2</sub>O<sub>3</sub> - Aluminium oxide</p> <p>Cr<sub>2</sub>O<sub>3</sub> – Chromium (III)</p> <p>MgO - Magnesium oxide or magnesia</p> <p>MnO - Manganese (II) oxide</p> <p>ZrO<sub>2</sub> - Zirconium dioxide</p> <p>P<sub>2</sub>O<sub>5</sub> - Phosphorus oxide</p> <p>U XRF – Uranium – 41 ppm</p> <p>Th XRF – Thorium – 75 ppm</p> <p>V<sub>2</sub>O<sub>5</sub> - Vanadium Pentoxide –</p> <p>Nb<sub>2</sub>O<sub>5</sub> - Niobium pentoxide</p> <p>CaO - Calcium oxide, Quick lime</p> <p>K<sub>2</sub>O - Potassium oxide</p> <p>CeO<sub>2</sub> – Cerium (IV) oxide</p> <p>SnO<sub>2</sub> – Tin oxide</p>
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## 5. Exposure Levels








Formula	<p>Titanium Feedstock consist of: -</p> <p>TiO<sub>2</sub> - Life of Mine Product Quantities - 1,664,000 tons</p> <p>Rutile (TiO<sub>2</sub> with up to 10% iron).</p> <p>Ilmenite (FeTiO<sub>3</sub> with manganese and magnesium).</p> <p>Leucoxene (Fe<sub>2</sub>O<sub>3</sub>·TiO<sub>2</sub>), with uranium and thorium.</p>	
TiO <sub>2</sub>	<p>Rutile 92 Titanium dioxide. CAS 13463-67-7. ICSC CARD: 0338</p> <p>Is the purest, highest-grade natural form of titanium dioxide and the preferred feedstock in manufacturing titanium.</p> <p>Exposure can irritate the eyes, nose and throat</p> <p>Lung fibrosis; potential occupational carcinogen.</p> <p>Suspected of causing cancer.</p> <p><a href="https://www.cdc.gov/niosh/npg/npgd0617.html">https://www.cdc.gov/niosh/npg/npgd0617.html</a></p> <p><a href="https://pubchem.ncbi.nlm.nih.gov/compound/26042#section=Safety-and-Hazards">https://pubchem.ncbi.nlm.nih.gov/compound/26042#section=Safety-and-Hazards</a></p> <p><a href="https://www.cdc.gov/niosh/docs/2011-160/pdfs/2011-160.pdf">https://www.cdc.gov/niosh/docs/2011-160/pdfs/2011-160.pdf</a></p> <p>The New Jersey Department of Health Hazardous Substances List</p> <p><a href="https://nj.gov/health/eoh/rtkweb/documents/fs/1861.pdf">https://nj.gov/health/eoh/rtkweb/documents/fs/1861.pdf</a></p>	 <p><b>Health Hazard</b></p>











FeTiO <sub>3</sub>	Ilmenite – CAS 12168-52-4 Titanium-iron oxide metal with manganese and magnesium.	
Fe <sub>2</sub> O <sub>3</sub> ·TiO <sub>2</sub>	Leucoxene - is not regarded as being a mineral, a term for products containing a TiO <sub>2</sub> 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: <a href="http://mininglink.com.au/natural-resource/leucoxene">http://mininglink.com.au/natural-resource/leucoxene</a>	
Y(PO <sub>4</sub> ) <sub>3</sub>	Xenotime Yttrium phosphate CAS 13990-54-0 Yttrium phosphate, Phosphoric acid. Similar to monazite except enriched in the heavy lanthanides and yttrium. <a href="#">phosphate mineral</a> , Britannica. <a href="#">Monazite</a> and <a href="#">xenotime</a> ores are treated the same way, being <a href="#">phosphate minerals</a> . Causes serious eye irritation, skin, and respiratory irritation. <a href="https://echa.europa.eu/substance-information/-/substanceinfo/100.034.341">https://echa.europa.eu/substance-information/-/substanceinfo/100.034.341</a> <a href="https://www.britannica.com/science/rare-earth-element/Minerals-and-ores">https://www.britannica.com/science/rare-earth-element/Minerals-and-ores</a> <a href="https://www.industry.gov.au/sites/default/files/2019-04/lpsdp-hazardous-materials-management-handbook-english.pdf">https://www.industry.gov.au/sites/default/files/2019-04/lpsdp-hazardous-materials-management-handbook-english.pdf</a> <a href="https://www.world-nuclear.org/information-library/safety-and-security/radiation-and-health/naturally-occurring-radioactive-materials-norm.aspx">https://www.world-nuclear.org/information-library/safety-and-security/radiation-and-health/naturally-occurring-radioactive-materials-norm.aspx</a>	 <b>Irritant</b>
	Zircon ZrO <sub>2</sub> . Life of Mine Product Quantities–1,234,000 tons.	
ZrO <sub>2</sub>	ZIRCONIUM OXIDE, - Zirconium dioxide - CAS 1314-23-4 May cause an allergic skin reaction. <a href="https://pubchem.ncbi.nlm.nih.gov/compound/62395#datasheet=LCSS&amp;section=GHS-Classification">https://pubchem.ncbi.nlm.nih.gov/compound/62395#datasheet=LCSS&amp;section=GHS-Classification</a>	 <b>Irritant</b>
ZrSiO <sub>2</sub>  SiO <sub>2</sub>	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 <a href="https://www.atsdr.cdc.gov/substances/toxsubstance.asp?toxid=290">https://www.atsdr.cdc.gov/substances/toxsubstance.asp?toxid=290</a> <a href="https://pubchem.ncbi.nlm.nih.gov/compound/24261#section=GHS-Classification">https://pubchem.ncbi.nlm.nih.gov/compound/24261#section=GHS-Classification</a> <a href="https://echa.europa.eu/substance-information/-/substanceinfo/100.035.329">https://echa.europa.eu/substance-information/-/substanceinfo/100.035.329</a>	<b>Danger</b>  <b>Irritant</b>  <b>Health Hazard</b>
P <sub>2</sub> O <sub>5</sub>	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.	<b>Danger.</b> 






	<p>Reacts violently with water. NO contact with water or combustible substances.</p> <p>Health Hazard: Causes eye damage / Skin corrosion/ severe skin burns.</p> <p><a href="https://www.ilo.org/dyn/icsc/showcard.display?p_version=2&amp;p_card_id=0545">https://www.ilo.org/dyn/icsc/showcard.display?p_version=2&amp;p_card_id=0545</a></p> <p><a href="http://hcis.safeworkaustralia.gov.au/HazardousChemical/Details?chemicalID=3532">http://hcis.safeworkaustralia.gov.au/HazardousChemical/Details?chemicalID=3532</a></p>	<p><b>Corrosion</b></p>
Al <sub>2</sub> O <sub>3</sub>	<p>Alumina CAS Number - 1344-28-1. EC Number - 215-691-6</p> <p>Health Hazard Causes serious eye and respiratory irritation.</p> <p>Causes damage to organs through prolonged or repeated exposure.</p> <p><a href="https://pubchem.ncbi.nlm.nih.gov/compound/Alumina#datasheet=LCSS&amp;section=GHS-Classification">https://pubchem.ncbi.nlm.nih.gov/compound/Alumina#datasheet=LCSS&amp;section=GHS-Classification</a></p>	<p></p> <p><b>Irritant</b></p> <p></p>
V <sub>2</sub> O <sub>5</sub>	<p>Vanadium Pentoxide CAS 1314-62-1</p> <p>Causes serious eye damage, respiratory irritation.</p> <p>Suspected of damaging fertility. Suspected to be Toxic to Reproduction.</p> <p>Suspected of causing genetic defects, and damaging the unborn child.</p> <p>Suspected of causing cancer Suspected to be Mutagenic.</p> <p>Toxic to aquatic life with long lasting effects.</p> <p>Safe Work Australia</p> <p><a href="http://hcis.safeworkaustralia.gov.au/HazardousChemical/Details?chemicalID=1798">http://hcis.safeworkaustralia.gov.au/HazardousChemical/Details?chemicalID=1798</a></p> <p><a href="https://echa.europa.eu/substance-information/-/substanceinfo/100.013.855">https://echa.europa.eu/substance-information/-/substanceinfo/100.013.855</a></p>	<p></p> <p></p> <p></p> <p><b>Corrosive</b></p> <p></p> <p><b>Environ Hazard</b></p>
Nb <sub>2</sub> O <sub>5</sub>	<p>Niobium(V) oxide CAS – 1313-96-8</p> <p>Niobium Nb is a <a href="#">vanadium</a> group element atom.</p> <p>Serious eye irritation / Skin corrosion / Respiratory tract irritation.</p> <p><a href="https://pubchem.ncbi.nlm.nih.gov/compound/Niobium_V_-oxide">https://pubchem.ncbi.nlm.nih.gov/compound/Niobium_V_-oxide</a></p>	<p></p> <p><b>Irritant</b></p>
Cr <sub>2</sub> O <sub>3</sub>	<p>Chromium oxide CAS 1308-38-9</p> <p>Catches fire spontaneously if exposed to air (seek independent advice on natural state).</p> <p>May damage fertility or the unborn child.</p> <p>Causes serious eye irritation, allergic skin reaction.</p> <p>Seed germination and growth was inhibited at 25 -100 ug/mL</p> <p><a href="https://www.cdc.gov/niosh/npg/nengapdx.html">https://www.cdc.gov/niosh/npg/nengapdx.html</a></p> <p><a href="https://pubchem.ncbi.nlm.nih.gov/compound/Chromium-oxide#section=GHS-Classification">https://pubchem.ncbi.nlm.nih.gov/compound/Chromium-oxide#section=GHS-Classification</a></p>	<p></p> <p></p> <p></p> <p><b>Flammable</b></p>
K <sub>2</sub> O	<p>Potassium Oxide CAS 1310-58-3, 12136-45-7</p> <p>Harmful if swallowed May cause respiratory irritation</p> <p>Causes severe skin burns and eye damage.</p> <p><a href="https://pubchem.ncbi.nlm.nih.gov/compound/Potassium-oxide">https://pubchem.ncbi.nlm.nih.gov/compound/Potassium-oxide</a></p>	<p></p> <p><b>Corrosive</b></p>

CaO	<p>Calcium oxide Quicklime, Burnt lime. CAS 1305-78-8</p> <p>Causes serious eye damage, skin and respiratory irritation.</p> <p><a href="http://hcis.safeworkaustralia.gov.au/HazardousChemical/Details?chemicalID=4835">http://hcis.safeworkaustralia.gov.au/HazardousChemical/Details?chemicalID=4835</a></p> <p><a href="https://www.cdc.gov/niosh/npg/npgd0093.html">https://www.cdc.gov/niosh/npg/npgd0093.html</a></p>	  <b>Corrosive</b>
SnO2	<p>Tin dioxide CAS 18282-10-5</p> <p>May cause respiratory irritation.</p> <p>May cause long lasting harmful effects to aquatic life.</p> <p><a href="https://pubchem.ncbi.nlm.nih.gov/compound/Tin-dioxide">https://pubchem.ncbi.nlm.nih.gov/compound/Tin-dioxide</a></p>	 <b>Irritant</b>
REE REO	<p>Rare Earth Concentrate Life of Mine Product Quantities - 187,000 tons</p> <p>Rare Earth Oxides are formed in two groups: -</p> <p>Actinoids (includes thorium, Uranium).</p> <p>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).</p> <p><a href="https://www.newworldencyclopedia.org/entry/Inner_transition_element">https://www.newworldencyclopedia.org/entry/Inner_transition_element</a></p>	
Acti noid s  	<p>Actinoids - All the actinoids group are radioactive.</p> <p>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)</p> <p><a href="https://www.newworldencyclopedia.org/entry/Inner_transition_element">https://www.newworldencyclopedia.org/entry/Inner_transition_element</a></p>	
	<p>Monazite – (Ce,La,Nd,Th)(PO4,SiO4). CAS 1306-41-8</p> <p>Composite of rare earth metals. (particularly cerium and lanthanum) and 5–12% (typically about 7%) thorium.</p> <p>Radionuclides - Thorium (Th) Uranium (U).</p> <p>OSHA HAZARDS: Highly toxic by inhalation. Highly toxic by ingestion.</p> <p>TARGET ORGANS: Kidney, liver, lungs, brain.</p> <p>Fatal if swallowed or inhaled, Causes skin irritation, May cause cancer, May cause damage to organs through prolonged or repeated exposure.</p> <p>Glenaladale deposit: 60,000 tons monazite- (Metallica Minerals Ltd.) prior owner. Report to ASX - 26 April 2012. <a href="http://www.metallicaminerals.com.au/wp-content/uploads/2016/09/Maiden-Gippsland-Mineral-Resource.pdf">http://www.metallicaminerals.com.au/wp-content/uploads/2016/09/Maiden-Gippsland-Mineral-Resource.pdf</a></p> <p><a href="https://science.osti.gov/-/media/nbl/pdf/price-lists/SDS/SDS-Monazite_Sand.pdf?la=en&amp;hash=2BD57B8A2A9717257915A88DBDE90172040E7BC6">https://science.osti.gov/-/media/nbl/pdf/price-lists/SDS/SDS-Monazite_Sand.pdf?la=en&amp;hash=2BD57B8A2A9717257915A88DBDE90172040E7BC6</a></p> <p><a href="https://pubchem.ncbi.nlm.nih.gov/compound/Monazite-CE">https://pubchem.ncbi.nlm.nih.gov/compound/Monazite-CE</a></p>	<p><b>Danger</b></p>  <p><b>Deadly</b></p>  <p><b>Health Hazard</b></p>  <p><b>Irritant</b></p>
Th	<p>Thorium CAS 7440-29-1.</p> <p>May intensify fire - oxidiser. (Seek independent advice in natural state).</p>	

	<p>Harmful if swallowed, causes serious eye, skin irritation. May cause damage to organs through prolonged or repeated exposure.</p> <p>May cause long lasting harmful effects to aquatic life.</p> <p><a href="https://echa.europa.eu/substance-information/-/substanceinfo/100.028.308">https://echa.europa.eu/substance-information/-/substanceinfo/100.028.308</a></p>	 <b>Oxidiser</b>  <b>Health Hazard</b>
<p>U</p> 	<p>Uranium CAS 7440-61-1</p> <p>May cause damage to organs through prolonged or repeated exposure.</p> <p>May cause long lasting harmful effects to aquatic life.</p> <p>Potential for cancer as a result of alpha-emitting properties &amp; radioactive decay products (e.g., radon). [Potential occupational carcinogen].</p> <p><a href="https://www.cdc.gov/niosh/npg/npgd0650.html">https://www.cdc.gov/niosh/npg/npgd0650.html</a></p> <p><a href="https://echa.europa.eu/substance-information/-/substanceinfo/100.028.336">https://echa.europa.eu/substance-information/-/substanceinfo/100.028.336</a></p> <p>The Department of Mines, Industry Regulation and Safety. Guidance about radiation safety on mining operations. <a href="http://www.dmp.wa.gov.au/Safety/Guidance-about-radiation-safety-6950.aspx">http://www.dmp.wa.gov.au/Safety/Guidance-about-radiation-safety-6950.aspx</a></p> <p><a href="https://www.arpansa.gov.au/sites/default/files/legacy/pubs/technicalreports/tr165.pdf">https://www.arpansa.gov.au/sites/default/files/legacy/pubs/technicalreports/tr165.pdf</a></p> <p><a href="https://science.osti.gov/-/media/nbl/pdf/price-lists/SDS/SDS-Monazite_Sand.pdf?la=en&amp;hash=2BD57B8A2A9717257915A88DBDE90172040E7BC6">https://science.osti.gov/-/media/nbl/pdf/price-lists/SDS/SDS-Monazite_Sand.pdf?la=en&amp;hash=2BD57B8A2A9717257915A88DBDE90172040E7BC6</a></p>	 <b>Danger</b>  <b>Irritant</b>
	<p>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)—</p> <p>Britannica <a href="https://www.britannica.com/science/yttrium">https://www.britannica.com/science/yttrium</a></p>	
<p>Y2O3.</p>	<p><b>Yttrium oxide</b> CAS 1314-36-9</p> <p>Causes serious eye skin and respiratory irritation.</p> <p>Commercially recovered from monazite sand &amp; in almost all rare-earth minerals plus uranium ores.</p> <p>OSHA PEL TWA 1 mg/m3 The PEL also applies to other yttrium compounds (as Y).</p> <p><a href="https://www.newworldencyclopedia.org/entry/Yttrium">https://www.newworldencyclopedia.org/entry/Yttrium</a></p> <p><a href="https://pubchem.ncbi.nlm.nih.gov/compound/Yttrium-oxide#datasheet=LCSS">https://pubchem.ncbi.nlm.nih.gov/compound/Yttrium-oxide#datasheet=LCSS</a></p> <p><a href="https://www.world-nuclear.org/information-library/safety-and-security/radiation-and-health/naturally-occurring-radioactive-materials-norm.aspx">https://www.world-nuclear.org/information-library/safety-and-security/radiation-and-health/naturally-occurring-radioactive-materials-norm.aspx</a></p>	 <b>Irritant</b>
	<p><b>Lanthanoides</b> -are the most reactive of the rare earth metals.</p> <p>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).</p> <p>Chemistry: The lanthanoids react with water to liberate <a href="#">hydrogen</a>.</p> <p>New World Encyclopaedia: <a href="https://www.newworldencyclopedia.org/entry/Lanthanum">https://www.newworldencyclopedia.org/entry/Lanthanum</a>  <a href="https://www.newworldencyclopedia.org/entry/Inner_transition_element">https://www.newworldencyclopedia.org/entry/Inner transition element</a></p>	

La <sub>2</sub> O <sub>3</sub>	<p><b>Lanthanum Oxide</b> CAS 1312-81-8</p> <p>Causes serious eye skin and respiratory irritation.</p> <p>Very toxic to aquatic life with long lasting effects</p> <p><a href="https://pubchem.ncbi.nlm.nih.gov/compound/Lanthanum-oxide#datasheet=LCSS&amp;section=GHS-Classification">https://pubchem.ncbi.nlm.nih.gov/compound/Lanthanum-oxide#datasheet=LCSS&amp;section=GHS-Classification</a></p> <p><a href="https://www.newworldencyclopedia.org/entry/Inner_transition_element">https://www.newworldencyclopedia.org/entry/Inner_transition_element</a></p>	 
CeO <sub>2</sub>	<p><b>Cerium dioxide</b> CAS 1306-38-3</p> <p>Harmful if swallowed.</p> <p>Causes damage to organs through prolonged or repeated exposure.</p> <p>May cause long lasting harmful effects to aquatic life.</p> <p>Corrosive to metals, Skin corrosion, Serious eye damage. (Chemical Book).</p> <p>Cerium can be a threat to the liver when it accumulates in the human body.</p> <p><a href="http://www.lenntech.com/periodic/elements/ce.htm#ixzz6YoGJsHq1">Lenntech https://www.lenntech.com/periodic/elements/ce.htm#ixzz6YoGJsHq1</a></p> <p><a href="https://pubchem.ncbi.nlm.nih.gov/compound/Cerium-dioxide#section=GHS-Classification">https://pubchem.ncbi.nlm.nih.gov/compound/Cerium-dioxide#section=GHS-Classification</a></p> <p><a href="https://www.chemicalbook.com/ChemicalProductProperty_EN_CB4666451.htm">https://www.chemicalbook.com/ChemicalProductProperty_EN_CB4666451.htm</a></p> <p><a href="https://cfpub.epa.gov/ncea/iris/iris_documents/documents/toxreviews/1018tr.pdf">https://cfpub.epa.gov/ncea/iris/iris_documents/documents/toxreviews/1018tr.pdf</a></p>	 <b>Health Hazard</b>  <b>Irritant</b>  <b>Corrosive</b>
Pr <sub>6</sub> O <sub>11</sub>	<p><b>Praseodymium oxide</b> CAS 12037-29-5</p> <p>Causes serious eye skin and respiratory irritation.</p> <p>Causes damage to cell membranes, which affect reproduction and the nervous systems of water animals.</p> <p><a href="https://www.lenntech.com/periodic/elements/pr.htm#ixzz6YoNcAbD0">https://www.lenntech.com/periodic/elements/pr.htm#ixzz6YoNcAbD0</a></p>	 <b>Irritant</b>
Nd <sub>2</sub> O <sub>3</sub>	<p><b>Neodymium oxide</b> CAS 1313-97-9</p> <p>Hazardous to the aquatic environment, acute / long-term hazard.</p> <p>Neodymium can be a threat to the liver when it accumulates.</p> <p><a href="https://www.lenntech.com/periodic/elements/nd.htm#ixzz6YoPRrJIU">https://www.lenntech.com/periodic/elements/nd.htm#ixzz6YoPRrJIU</a></p> <p><a href="https://pubchem.ncbi.nlm.nih.gov/compound/Neodymium-oxide">https://pubchem.ncbi.nlm.nih.gov/compound/Neodymium-oxide</a></p>	 <b>Environ Hazard</b>
Sm <sub>2</sub> O <sub>3</sub>	<p><b>Samarium (III) oxide</b> CAS 12060-58-1</p>	
Eu <sub>2</sub> O <sub>3</sub>	<p><b>Europium (III) oxide</b> CAS 1308-96-9</p> <p>Causes serious eye, skin and respiratory irritation.</p> <p><a href="https://pubchem.ncbi.nlm.nih.gov/compound/159371#datasheet=LCSS&amp;section=GHS-Classification">https://pubchem.ncbi.nlm.nih.gov/compound/159371#datasheet=LCSS&amp;section=GHS-Classification</a></p> <p><a href="https://echa.europa.eu/substance-information/-/substanceinfo/100.013.787">https://echa.europa.eu/substance-information/-/substanceinfo/100.013.787</a></p>	 <b>Irritant</b>
Gd <sub>2</sub> O <sub>3</sub>	<p><b>Gadolinium (III) oxide</b> CAS 11129-31-0</p> <p>Causes serious eye irritation.</p> <p>Very toxic to aquatic life with long lasting effects.</p> <p><a href="https://pubchem.ncbi.nlm.nih.gov/compound/Gadolinium-oxide">https://pubchem.ncbi.nlm.nih.gov/compound/Gadolinium-oxide</a></p>	 <b>Irritant</b>  <b>Environ Hazard</b>

Yb <sub>2</sub> O <sub>3</sub>	<p><b>Ytterbium (III) oxide</b> CAS 1314-37-0</p> <p>Causes serious eye, skin and respiratory, irritation.</p> <p>All compounds of ytterbium known to cause irritation to the skin and eye, and some might be teratogenic.</p> <p><a href="http://www.eurare.org/docs/internalGuidanceReport.pdf">http://www.eurare.org/docs/internalGuidanceReport.pdf</a> Page 16.</p> <p><a href="https://pubchem.ncbi.nlm.nih.gov/compound/Ytterbium-oxide- Yb2O3">https://pubchem.ncbi.nlm.nih.gov/compound/Ytterbium-oxide- Yb2O3</a></p>	 <b>Irritant</b>
Tb <sub>4</sub> O <sub>7</sub>	<p><b>Terbium oxide</b> CAS 12037-01-3</p>	
Dy <sub>2</sub> O <sub>3</sub>	<p><b>Dysprosium Oxide</b> CAS 1308-87-8</p>	
Ho <sub>2</sub> O <sub>3</sub>	<p><b>Holmium (III) oxide</b> CAS 12055-62-8</p>	
Er <sub>2</sub> O <sub>3</sub>	<p><b>Erbium (III) oxide</b> CAS 1206-16-4</p> <p>Causes serious eye, skin and respiratory irritation.</p>	 <b>Irritant</b>
Tm <sub>2</sub> O <sub>3</sub>	<p><b>Thulium (III) oxide</b> CAS 12036-44-1</p> <p>Causes serious eye, skin and respiratory irritation</p> <p><a href="https://echa.europa.eu/substance-information/-/substanceinfo/100.031.670">https://echa.europa.eu/substance-information/-/substanceinfo/100.031.670</a></p>	 <b>Irritant</b>
Lu <sub>2</sub> O <sub>3</sub>	<p><b>Lutetium (III) oxide</b> CAS 12032-20-1</p>	
	<p><b>Exposure levels: Raw material for production of rare earth compounds.</b></p> <p>Hazard Statement: Harmful if swallowed. Harmful if inhaled.</p> <p>mg/m<sup>3</sup> Milligrams per Cubic Metre OEL Occupational Exposure Limit .</p> <p>Safety Data Sheet - SDS Date: 26 Jun 2020 by Iluka Resources.</p> <p><a href="http://sds.chemicalert.com/company/10002061/download/3225200_030_001.pdf">http://sds.chemicalert.com/company/10002061/download/3225200_030_001.pdf</a></p>	

## Reference

1. 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>
2. Analysts for Kalbar presentation 2017. <https://www.businesses.com.au/Analysts-Presentation-May-2017-for-website.pdf> Page 18-22.
3. Proposed Glenaladale mine to give an economic boost to East Gippsland 2020 East Gippsland Bookeasy, Impart Media <https://www.liveeastgippsland.com.au/supporting-information>
4. Kalbar, <https://www.fingerboardsproject.com.au/about-the-project>
5. Kalbar Resources Information Sheet – Economic Impact Assessment, November 2019.
6. Victoria Dept of Jobs, Precincts and Regions – <https://djpr.vic.gov.au/priority-industries-sectors/food-and-fibre-industry.pdf>
7. [http://agriculture.vic.gov.au/\\_data/assets/pdf\\_file/0003/489333/Overview-of-victorian-agriculture-industry-2019.pdf](http://agriculture.vic.gov.au/_data/assets/pdf_file/0003/489333/Overview-of-victorian-agriculture-industry-2019.pdf)
8. Ben van Delden, 28 March 2019. KPMG & Food and Fibre Gippsland - Accelerating Growth for the Gippsland Food and Fibre Industry). 2020 KPMG, <https://home.kpmg/au/en/home/insights/2019/03/accelerating-growth-gippsland-food-fibre-industry.html> page 43
9. Dun and Bradstreet: [https://www.dnb.com/business-directory/company-profiles.vegco\\_pty\\_ltd.](https://www.dnb.com/business-directory/company-profiles.vegco_pty_ltd.)
10. 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>
11. East Gippsland Catchment Management Authority <https://egcma.com.au/rivers/>
12. East Gippsland Water <https://egwater.vic.gov.au>
13. - Gippsland Lakes Escape 2018- Savvy Digital <http://www.gippslandlakesescapes.com.au/portfolio/silt-jetties/>
14. EES. <https://www.fingerboardsproject.com.au/environment-effects-statement/ees-key-findings>
15. Coffey Environments Australia Pty Ltd. July 2015. Kalbar’s Glenaladale Mineral Sands Project Baseline Report Section 4.1 [https://www.planning.vic.gov.au/\\_data/assets/pdf\\_file/0017/9134/Fingerboards-Mineral-Sand-Project\\_Referral-2016-06\\_Baseline-Report\\_Attachment-2.PDF](https://www.planning.vic.gov.au/_data/assets/pdf_file/0017/9134/Fingerboards-Mineral-Sand-Project_Referral-2016-06_Baseline-Report_Attachment-2.PDF)
16. Iluka. Hamilton Mineral Separation Plant [https://www.iluka.com/iluka/media/website/consultation%20documents/murraybasin\\_newsletter\\_vweb.pdf](https://www.iluka.com/iluka/media/website/consultation%20documents/murraybasin_newsletter_vweb.pdf)
17. Helps, A. 2015. Fingerboard Project [https://www.businesses.com.au/Kalbar\\_Environmental.pdf](https://www.businesses.com.au/Kalbar_Environmental.pdf) The submission of the UNEP Global Mercury Partnership to the Australian Senate’s 2017 Inquiry into the Rehabilitation of Mining and Resource Projects and Power Station Ash Dams. [file:///C:/Users/User/Desktop/Mine%20Book%202020/UNEP.%20Mining%20-%20Submission%20to%20Senate%20Sub72%20\(1\).pdf](file:///C:/Users/User/Desktop/Mine%20Book%202020/UNEP.%20Mining%20-%20Submission%20to%20Senate%20Sub72%20(1).pdf)
18. International Atomic Energy Agency (IAEA). (Management of NORM Residues, IAEA Vienna 2013).. [https://www-pub.iaea.org/MTCD/Publications/PDF/TE-1712\\_web.pdf](https://www-pub.iaea.org/MTCD/Publications/PDF/TE-1712_web.pdf)

19. IAEA. TECHNICAL REPORTS SERIES No. 419. Extent of environmental contamination by naturally occurring radioactive material (NORM) and technological options for mitigation. Page 79, 84)  
[https://www-pub.iaea.org/MTCD/publications/PDF/TRS419\\_web.pdf](https://www-pub.iaea.org/MTCD/publications/PDF/TRS419_web.pdf)
20. ARPANSA. Proposed Expansion of the Australian National Radiation Dose Register to the Mineral Sands Mining and Processing Industry. Technical Report No.165. Page 4, 11  
<https://www.arpansa.gov.au/sites/default/files/legacy/pubs/technicalreports/tr165.pdf>
21. Kalbar Resources Ltd. Webinar presentation of 25 June 2020, and in its EES Key Findings Review  
<https://www.fingerboardsproject.com.au/environment-effects-statement/ees-key-findings>).
22. Atlas of Living Australia (ALA) <https://www.ala.org.au> 23. Victorian Resources Online, 23/03/2020. GL43 (8321) Avon –
23. Perry Delta State of Victoria. Agriculture Victoria  
[http://vro.agriculture.vic.gov.au/dpi/vro/egregn.nsf/pages/eg\\_if\\_sites\\_significance\\_gl43](http://vro.agriculture.vic.gov.au/dpi/vro/egregn.nsf/pages/eg_if_sites_significance_gl43)
24. Marine Mammal Foundation - <https://marinemammal.org.au/burrunan-ffg/>
25. Kalbar <https://www.fingerboardsproject.com.au/about-the-project/infrastructure>
26. Kalbar <https://www.fingerboardsproject.com.au/community-engagement/faq>
27. Radiation Exposure in the Transport of Heavy Mineral Sands September 2008 Page 2. Prepared by Calytrix Consulting Pty Ltd for the Australian Radiation Protection and Nuclear Safety Agency.  
[https://www.arpansa.gov.au/sites/default/files/legacy/pubs/rps/rps2\\_calytrix.pdf](https://www.arpansa.gov.au/sites/default/files/legacy/pubs/rps/rps2_calytrix.pdf)
28. CPPA. the Australian Senate 8 February 2017, referred an Inquiry into the Rehabilitation of Mining and Resource Projects (and Power Station Ash Dams) to its Environment and Communications References Committee.  
[https://www.aph.gov.au/Parliamentary\\_Business/Committees/Senate/Environment\\_and\\_Communication\\_s/MiningandResources/Submissions](https://www.aph.gov.au/Parliamentary_Business/Committees/Senate/Environment_and_Communication_s/MiningandResources/Submissions)
29. [Nicole Asher](#). ABC. 20/1/2017. <https://www.abc.net.au/news/2017-01-20/hazelwood-rehabilitation-to-cost-743-million-engie-says/8197784>
30. Dark Side of the Boom (Victoria) p1. The Australia Institute.  
[https://www.tai.org.au/research?combine=Mining+in+Victoria&field\\_section\\_tid=26](https://www.tai.org.au/research?combine=Mining+in+Victoria&field_section_tid=26)

## Publications – Reports

National - Global Agencies - Websites of Interest

Mineral Sands – NORM - Rare Earth - Radiation -

### Location

Satellite maps to locate Glenaladale 3864. Sentinel Hotspot <http://www.ga.gov.au/> <https://sentinel.ga.gov.au/#/> search Fingerboards, Walpa, VIC. Search:

Google Earth [https://satellites.pro/Glenaladale\\_map#-37.786487,147.354512,14https://satellites.pro/Glenaladale\\_map#-37.793530,147.328663,13](https://satellites.pro/Glenaladale_map#-37.786487,147.354512,14https://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](mailto:minefreeglenaladale@gmail.com), #StopKalbar.

## Quick Reference to 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.

## **ECHA - European Chemicals agency.**

<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](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/>

## **VAGO - Victorian Auditor General's Office.**

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](http://www.veac.vic.gov.au/documents/VEAC_CoastalRsAssessment_DraftReport2019-LR-.pdf)

BOM - 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](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](https://earthresources.vic.gov.au/data/assets/pdf_file/0010/461782/Regulatory_Impact_Statement_2019.pdf)

Samuel, G 2020, Independent Review of the EPBC Act—Interim Report, Department of Agriculture, Water and the Environment, Canberra, June. CC BY 4.0. [https://epbcactreview.environment.gov.au/sites/default/files/2020-07/EPBC%20Act%20Review\\_Interim%20Report\\_June2020.pdf](https://epbcactreview.environment.gov.au/sites/default/files/2020-07/EPBC%20Act%20Review_Interim%20Report_June2020.pdf)

**UNEP** - United Nation Environmental Program, Helps A. Global Mercury Partnership. The Fingerboards report

[https://www.businesses.com.au/Kalbar\\_Environmental.pdf](https://www.businesses.com.au/Kalbar_Environmental.pdf)

UNEP. - Helps A. Global Mercury Partnership. The rehabilitation of mining and resource projects Australia.

Commonwealth responsibilities to the Environment and Communications. 23 August 2017. Submission 72.

[file:///C:/Users/User/Desktop/Mine%20Book%202020/UNEP.%20Mining%20-%20Submission%20to%20Senate%20Sub72%20\(1\).pdf](file:///C:/Users/User/Desktop/Mine%20Book%202020/UNEP.%20Mining%20-%20Submission%20to%20Senate%20Sub72%20(1).pdf)



UNEP. - GLOBAL INDUSTRY STANDARD ON TAILINGS MANAGEMENT AUGUST 2020. United Nations Environmental Program. <https://globaltailingsreview.org/global-industry-standard/>

**Environmental Justice** - <https://www.envirojustice.org.au/projects/gippsland-lakes-community-workshops/>

ACF. Roche, C. Judd, S. Bista, S. GROUND TRUTHS: TAKING RESPONSIBILITY FOR AUSTRALIA'S MINING LEGACIES. 2016. Mineral Policy Institute. Australian Conservation Foundation. <http://www.mpi.org.au/wp-content/uploads/2016/06/Ground-Truths-2016-web.pdf>

ACF- - Submission to Productivity Commission. Resources Sector Regulation Draft Report. The Australian Conservation Foundation. 14 September 2020  
[https://d3n8a8pro7vnm.cloudfront.net/auscon/pages/17945/attachments/original/1600396636/140920\\_ACF\\_Submission\\_to\\_Productivity\\_Commission\\_Resources\\_Sector\\_Regulation\\_Draft\\_Report.pdf?1600396636](https://d3n8a8pro7vnm.cloudfront.net/auscon/pages/17945/attachments/original/1600396636/140920_ACF_Submission_to_Productivity_Commission_Resources_Sector_Regulation_Draft_Report.pdf?1600396636)

Don Rankin Pitcher Partners. The Victorian Chamber of Commerce and Industry Agribusiness Taskforce. <https://www.victorianchamber.com.au/policy-and-advocacy/taskforces/agribusiness-taskforce#:~:text=The%20Agribusiness%20Taskforce%20report%2C%20Harvesting,job%20growth%2C%20trade%20and%20investment. Page22>

Gippsland Regional Profile. A Report for Infrastructure Victoria. AITHER | March 2019, page 85  
<https://www.infrastructurevictoria.com.au/wp-content/uploads/2019/04/Aither-Gippsland-Regional-Profile-March-2019.pdf>

WATER STEWARDSHIP. LEADING PRACTICE SUSTAINABLE DEVELOPMENT PROGRAM FOR THE MINING INDUSTRY, INDUSTRY.GOV.AU DFAT.GOV.AU Commonwealth of Australia 2016. Page 9.  
<https://www.industry.gov.au/sites/default/files/2019-04/lpsdp-water-stewardship-handbook-english.pdf>

## Radiation

### **ARPANSA - Australian Radiation Protection and Nuclear Safety Agency.**

ARPANSA publications are available to download free of charge.

ARPANSA. Proposed Expansion of the Australian National Radiation Dose Register to the Mineral Sands Mining and Processing Industry. Technical Report No.165. Collett, S. Guilfoyle, R. Paritsky, B. and O'Brien, R. 2014. Page 4, 11, 12.  
<https://www.arpansa.gov.au/sites/default/files/legacy/pubs/technicalreports/tr165.pdf>

ARPANSA Radiation Protection and Radioactive Waste Management in Mining and Mineral Processing (2005) Radiation Protection Series Publication No. 9. Chief Executive Officer 2005. Updated January 2015.  
<https://www.arpansa.gov.au/sites/default/files/legacy/pubs/rps/rps9.pdf>

ARPANSA. Fundamentals for Protection Against Ionising Radiation (2014). "© Commonwealth of Australia 2014, as represented by the Australian Radiation Protection and Nuclear Safety Agency. © Commonwealth of Australia 2014.  
<https://www.arpansa.gov.au/sites/default/files/legacy/pubs/rps/rpsF-1.pdf> page 7, 8.

ARPANSA. Guide for Radiation Protection of the Environment 2015, as represented by the Australian Radiation Protection and Nuclear Safety Agency. © Commonwealth of Australia. YALLAMBIE VIC.  
<https://www.arpansa.gov.au/sites/default/files/legacy/pubs/rps/rpsg-1.pdf>

### **U.S. (EPA) Environmental Protection Agency - Superfund Radiation Fact Sheet**

This toolkit was developed by the U.S. Environmental Protection Agency (EPA) to help the public understand more about the risk assessment process used at Superfund sites with radioactive contamination. <https://epa-sdcc.ornl.gov/RadRiskCommunityGuide.pdf>

**EURARE.** Health and safety issues in REE mining and processing. An internal EURARE guidance report on health and safety issues in the mining and processing of REE ores. P 14 – 21 <http://www.eurare.eu/docs/internalGuidanceReport.pdf>

### **INTERNATIONAL ATOMIC ENERGY AGENCY. IAEA. Publications**

IAEA. management of norm residues. –iaea-tecdoc series, 2013. Vienna. [https://www-pub.iaea.org/MTCD/Publications/PDF/TE-1712\\_web.pdf](https://www-pub.iaea.org/MTCD/Publications/PDF/TE-1712_web.pdf)

IAEA. EXTENT OF ENVIRONMENTAL CONTAMINATION BY NATURALLY OCCURRING RADIOACTIVE MATERIAL (NORM) AND TECHNOLOGICAL OPTIONS FOR MITIGATION. 2003. TECHNICAL REPORTS SERIES No. 419. [https://www-pub.iaea.org/MTCD/publications/PDF/TRS419\\_web.pdf](https://www-pub.iaea.org/MTCD/publications/PDF/TRS419_web.pdf) Page 7-11, Table for radionuclides page 86.

IAEA. RADIATION PROTECTION AND NORM RESIDUE MANAGEMENT IN THE TITANIUM DIOXIDE AND RELATED INDUSTRIES. SAFETY REPORTS SERIES No. 76. 2012. Vienna.. [https://www-pub.iaea.org/MTCD/Publications/PDF/Pub1568\\_web.pdf](https://www-pub.iaea.org/MTCD/Publications/PDF/Pub1568_web.pdf)

IAEA. RADIATION PROTECTION AND NORM RESIDUE MANAGEMENT IN THE PRODUCTION OF RARE EARTHS FROM THORIUM CONTAINING MINERALS. SAFETY REPORTS SERIES No. 68. 2011.Vienna. [https://www-pub.iaea.org/MTCD/Publications/PDF/Pub1512\\_web.pdf](https://www-pub.iaea.org/MTCD/Publications/PDF/Pub1512_web.pdf)

RADIATION PROTECTION AND NORM RESIDUE MANAGEMENT IN THE ZIRCON AND ZIRCONIA INDUSTRIES. SAFETY REPORTS SERIES No. 51. 2007. Vienna. [https://www-pub.iaea.org/MTCD/Publications/PDF/Pub1289\\_Web.pdf](https://www-pub.iaea.org/MTCD/Publications/PDF/Pub1289_Web.pdf)

**World Nuclear Association.** Mineral Sands. Naturally-Occurring Radioactive Materials (NORM) April 2020 <https://www.world-nuclear.org/information-library/safety-and-security/radiation-and-health/naturally-occurring-radioactive-materials-norm.aspx>

Naturally-Occurring Radioactive Material Appendix 1. August 2014 <https://www.world-nuclear.org/information-library/safety-and-security/radiation-and-health/appendices/mineral-sands-appendix-to-norm-information-paper.aspx>

## **Safe Work Australia**

Hazardous Chemical Information System (HCIS) <http://hcis.safeworkaustralia.gov.au/>

**GUIDANCE ON THE INTERPRETATION OF WORKPLACE EXPOSURE STANDARDS FOR AIRBORNE CONTAMINANTS** <https://www.safeworkaustralia.gov.au/system/files/documents/1705/guidance-interpretation-workplace-exposure-standards-airborne-contaminants-v2.pdf> APRIL 2013.

Workplace Exposure Standards for Airborne Contaminants

<http://www.safeworkaustralia.gov.au/AboutSafeWorkAustralia/WhatWeDo/Publications/Pages/Exposure-Standards-Airborne-Contaminants.aspx>.

Crystalline silica and silicosis. National guidance material 2019 <https://www.safeworkaustralia.gov.au/silica>

Working with silica and silica containing products.

[https://www.safeworkaustralia.gov.au/system/files/documents/2003/national\\_guide\\_for\\_working\\_with\\_silica\\_and\\_silica\\_containing\\_products\\_1.pdf](https://www.safeworkaustralia.gov.au/system/files/documents/2003/national_guide_for_working_with_silica_and_silica_containing_products_1.pdf)

## **Measurements - Units of Measure**

mg/m<sup>3</sup> milligrams per cubic metre of air

mm millimetre μm micron or micrometre;

μm micron or micrometre; 1 micrometre = 1 1,000 millimetre

How many ug in 1 mg? The answer is 1000. ConvertUnits.com

<https://www.convertunits.com/from/grams/to/milliliters> <https://www.convertunits.com/from/ug/to/mg>

## **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

BOM - The Bureau of Meteorology's Water Storage dashboard lets you compare water levels and volumes of lakes, reservoirs and weirs. 2020, Commonwealth of Australia

<http://www.bom.gov.au/water/dashboards/#/water-storages/summary/state>

[http://www.bom.gov.au/water/about/publications/document/factsheet\\_waterstorage.pdf](http://www.bom.gov.au/water/about/publications/document/factsheet_waterstorage.pdf)

Water volumes - how much water? Water Resources Northern Territory.

[https://denr.nt.gov.au/\\_data/assets/pdf\\_file/0004/589477/WaterResNT\\_Factsheet-WaterVolumes.pdf](https://denr.nt.gov.au/_data/assets/pdf_file/0004/589477/WaterResNT_Factsheet-WaterVolumes.pdf)

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. <https://www.epa.vic.gov.au/about-epa/publications/1626>

Inquiry into the Environment Effects Statement Process in Victoria. Parliamentary Paper No.59. 2010–11. [https://www.parliament.vic.gov.au/images/stories/committees/enrc/FINAL EES Report 30 August 2011.pdf](https://www.parliament.vic.gov.au/images/stories/committees/enrc/FINAL_EES_Report_30_August_2011.pdf)

## 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 audit, 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

East Gippsland Newspapers

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## 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 stabilise 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 be 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.

