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From: June Haviman [REDACTED]
Sent: Thursday, 25 March 2021 8:59 AM
To: Fingerboards Inquiry and Advisory Committee (DELWP)
Subject: Supplementary Submission–Centrifuges.
Attachments: Centrifuge Matters.docx

[REDACTED] [REDACTED]

EXTERNAL SENDER: Links and attachments may be unsafe.

Centrifuge Matters

I write to oppose the centrifuge at the Fingerboards because of the elevated TENORM radiation and toxicant levels. Also, the durability of the centrifuge mechanisms is questionable with the massive volumes that are involved.

Further, the proponent's management plan for spillage and contamination is inadequate in the event of a breakdown in their systems with serious health risks to the region.

Thank you for this opportunity to respond to the proposal to instal such an incredible apparition.

June Haviman

Submission 556



Virus-free. www.avast.com

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Kalbar explained their volumes and planned increase in production 'A gradual increase in production is proposed following commencement of mining and commissioning of the WCP. The plant will initially commence at a rate of 500 t/hr and increase to a design capacity of 1,500 t/hr or 12 Mt/year', EES Main report, 2021.

The volumes of mining companies are listed below (without centrifuge), and provides an indication of Kalbar's proposed quantities. This data generally represents only 5% of material processed. It leaves a further 95% gangue increasingly exposed to elevated TENORM toxicants and radiation while centrifuged.

Estimates of the Inferred Resources of mineral sand mines.

Kalbar Resources- Glenaladale Inferred Resource (2013): 1,600,000,000 t @ 2.2% HM
Kalbar - Mossiface Inferred Resource (2013): 130,000,000 t @ 1.7% HM
WIM Resources Pty Ltd Murray Basin* Proved and Probable Reserve (2014): 12,000,000 t @16.0% HM for 1,930,000 t HM
Avonbank Indicated and Inferred Resource (2014): 488,000,000 t @ 4.0% HM for 19,520,000 t HM
Iluka Resources Measured, Indicated and Inferred Resource (2013): 1,650,000,000 t @ 3.7% HM for 61,050,000 t HM Proved and Probable Reserve (2013): 552,000,000 t @ 4.3% HM for 23,736,000 t HM WIM 150 Project Australian Zircon NL
Donald Mineral Sands Project Astron Ltd C Resource Estimate (2014): 4,780,000,000 t @ 3.7 %HM for 176,860 t HM
Source: Earth Resources. Mineral Sands Fact sheet –January 2019 - https://earthresources.vic.gov.au/http://www.australianminerals.gov.au/_data/assets/pdf_file/0006/80799/Fact-Sheet-Mineral-Sands-January-2019.pdf






The size and capacity of centrifuge should be advised by Kalbar. However, the Wet Concentrator Plant (WCP) at the Douglas mine, Iluka, is of interest to gauge such an apparition.

<https://libertyindustrial.com.au/portfolio-item/douglas-mine-site-demolition/>

GHS Hazards of the minerals

The mineral concentration processes are known globally for their hazardous heavy metals and elevated radiation levels. ^{i ii}.

The table lists the toxicity of minerals/metals with indicative GHS hazard warnings ^{iv} in general.

Indicative Hazards of the Minerals / Metals				
 Radiation	 Fatal	 Health	 Irritant	 Environment
	Arsenic	Arsenic	Arsenic	Arsenic
	Lead	Lead	Lead	Lead
	Cadmium	Cadmium	Cadmium	Cadmium
	Mercury inorganic	Mercury inorganic		Mercury inorganic
		Nickel	Nickel	Nickel
		Titanium Rutile 92	Xenotime	
		Leucoxene		
Zircon		Zircon	Zircon	
		Silicon dioxide	Silicon dioxide	
	Copper	Copper	Copper	Copper
		Alumina Al2O3	Alumina Al2O3	
Monazite	Monazite	Monazite	Monazite	Monazite
Uranium	Uranium	Uranium	Uranium	Uranium
Thorium		Thorium	Thorium	Thorium
			Lanthanum	Lanthanum
			Neodymium	
		Cerium	Cerium	Cerium
			Niobium	
	Thallium	Thallium	Yttrium	Thallium
		Cobalt	Cobalt	
			Erbium	
			Europium	
			Gadolinium	Gadolinium
			Ytterbium	
			Thulium	
			Dysprosium	
	Selenium	Selenium	Praseodymium	Selenium
		Vanadium	Vanadium	Vanadium

Source: Minerals - EES Table 8.3 Kalbar 2021. Presentation for Kalbar 2017.ⁱ

Elevated radiation levels

The combined radiation levels of 720 ppm in the Zircon productⁱⁱⁱ exceed the general industry upper limit of 500 ppm.ⁱ prior to an additional centrifuge process.

Table: Estimated increase in uranium & thorium levels in the production of Zircon.

Monazite	ppm	Topsoil	Overburden	Ore	Zircon Product
Thorium*	ppm	19	79	137	300
Uranium*	ppm	4	14	24	420
Total	ppm	23	93	161	720

*Source: EES Table 8.3 Kalbar 2021. Presentation for Kalbar 2017.ⁱⁱ

The information contained is sourced from desktop research. We do not take any liability for any consequences to any person arising directly or indirectly as a result of using this information, including but not limited to costs, or any other compensation.

For specific advice on the minerals

Toxno <https://www.toxno.com.au/articles/>

ARPANSA. <https://www.arpansa.gov.au/sites/default/files/legacy/pubs/technicalreports/tr165.pdf>

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

Tox Profiles - toxicological information <https://www.atsdr.cdc.gov/toxprofiledocs/index.html>

PubChem - National Institutes of Health (NIH) <https://pubchem.ncbi.nlm.nih.gov/>.

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

WebWISER <https://webwiser.nlm.nih.gov/getHomeData;jsessionid=7DF3964F63B980EA02BA4482C433CE0E>

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

Crystalline silica and silicosis. National guidance material SEPTEMBER 2019

<https://www.safeworkaustralia.gov.au/silica> Working with silica containing products.

https://www.safeworkaustralia.gov.au/system/files/documents/2003/national_guide_for_working_with_silica_and_silica_containing_products_1.pdf <http://hcis.safeworkaustralia.gov.au/> <https://www.comcare.gov.au/safe-healthy-work/dust-conditions/silica>

ⁱ. # 610. Environmental Media Foundation Inc. Peter Vaughan. SCOPING STUDY REPORT Rio Tinto / Oresome Australia Pty Ltd .2012 – 2013. R. J. Robbins & Associate. https://s3.ap-southeast-2.amazonaws.com/hdp.au.prod.app.vic-engage.files/6216/0568/8544/Submission_610_-_Environmental_Media_Foundation_Inc_-_Updated.pdf # 639 UNEP. Helps A. https://s3.ap-southeast-2.amazonaws.com/hdp.au.prod.app.vic-engage.files/2716/0488/7885/Submission_639_-_Andrew_G_Helps_Redacted.pdf.

ⁱⁱ. 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>

(IAEA). International Atomic Energy Agency (Management of NORM Residues. 2013. https://www-pub.iaea.org/MTCD/Publications/PDF/TE-1712_web.pdf

ⁱⁱⁱ Kalbar Analyst 2017. <https://www.businesses.com.au/Analysts-Presentation-May-2017-for-website.pdf>

^{iv}. Globally Harmonised System of classifying chemicals (GHS): this warning system's hazard pictograms and information signify the dangers in substances, for the safety of workers. https://www.safeworkaustralia.gov.au/system/files/documents/1702/classification_and_labelling_workplace_hazardous_chemicals_poster.pdf

Insight to the Fingerboard site

Satellite view - Sentinel Hotspot Glenaladale 3864. <http://www.ga.gov.au/> <https://sentinel.ga.gov.au/#/>
<https://sentinel.ga.gov.au/#/>

FIRMS by NASA satellite <https://earthdata.nasa.gov/earth-observation-data/near-real-time/firms>
<https://firms.modaps.eosdis.nasa.gov/map/#d:2021-03-21..2021-03-22;@158.1,-26.9,3z>

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

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

Publications & Reports

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

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

VAGO - Victorian Auditor General's Office. 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. (2019) Assessment of Victoria's Coastal Reserves http://www.veac.vic.gov.au/documents/VEAC_CoastalRsAssessment_DraftReport2019-LR-.pdf

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

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

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

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

WATER STEWARDSHIP. LEADING PRACTICE SUSTAINABLE DEVELOPMENT PROGRAM FOR THE MINING INDUSTRY, 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 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. January 2015.

<https://www.arpansa.gov.au/sites/default/files/legacy/pubs/rps/rps9.pdf>

ARPANSA. Fundamentals for Protection Against Ionising Radiation (2014). 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. 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 ...risk assessment process with radioactive contamination. <https://epa-sdcc.ornl.gov/RadRiskCommunityGuide.pdf>

EURARE. Health and safety issues in REE mining and processing. P 14 – 21

<http://www.eurare.eu/docs/internalGuidanceReport.pdf>

INTERNATIONAL ATOMIC ENERGY AGENCY. IAEA. Publications

IAEA. MANAGEMENT OF NORM RESIDUES. 2013. Vienna. https://www-pub.iaea.org/MTCD/Publications/PDF/TE-1712_web.pdf

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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 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


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


World Nuclear Association. Mineral Sands. Naturally-Occurring Radioactive Materials (NORM) (Updated 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. (Updated August 2014) <https://www.world-nuclear.org/information-library/safety-and-security/radiation-and-health/appendices/mineral-sands-appendix-to-norm-information-paper.aspx>


iv. Globally Harmonised System of classifying chemicals (GHS): this warning system's hazard pictograms and information signify the dangers in substances, for the safety of workers.


 Radiation. Radio - active

 Danger. Toxic. Acute toxicity (oral, dermal, inhalation).

 Health Hazard. Causes damage to organs through prolonged or repeated exposure. Suspected of causing cancer Suspected to be Mutagenic. Suspected of causing genetic defects, and damaging the unborn child.

 Irritant Causes serious eye, skin, respiratory irritation.

 Corrosion Corrosive to metals, Skin corrosion, Serious eye damage

 Environmental toxicity Very toxic to aquatic life with long lasting effects