

[REDACTED]

From: Astrid [REDACTED]
Sent: Friday, 26 March 2021 12:57 AM
To: Fingerboards Inquiry and Advisory Committee (DELWP)
Subject: Submission re Kalbar's proposed Centrifuge Option

EXTERNAL SENDER: Links and attachments may be unsafe.

Please accept my submission on the Centrifuge option of dealing with tailings. I have listed my concerns below in no particular order. At this point it is difficult to present a submission as detailed as I would like as Kalbar hasn't yet tabled an in depth outline of how they propose to include the Centrifuges in its project in a way that embraces every aspect of the project as set out in the EES and includes every impact, in detail - economic, social and environmental. However I hope to be able to do further investigation and research and expand on the concerns below during my Panel Hearing.

It would seem to me that Kalbar had the choice of the tailings dam or centrifuge alternative way back in 2018 and would have weighed up the advantages and disadvantages of both methods at that time before discarding the Centrifuge option and including the conventional tailings dam option in the EES. Why didn't the proponent decide on the Centrifuge option when the Community raised so many valid concerns about a 90 Ha tailings dams so close to the Perry River and Chain of Ponds? Residents' concerns were constantly rejected and the Community reassured on every occasion that the tailings dam, the flocculants used, the size and location, the rehabilitation - all would be safe, not detract from the amenity of the area, and not damage the environment. It would seem that the intense reaction of hundreds of submissions pointing out the risks and listing the permanent damage the tailings dam could cause made Kalbar realise they would not get a social licence to operate unless they abandoned the tailings dam and used the alternative Centrifuge option. This decision would be further reinforced when they read the submission of the West Gippsland CMA which highlighted all the problems with a tailings dam in its designated location.

Whether Kalbar uses the tailings dam as originally proposed in the EES or the Centrifuge option, failure or poor performance of either tailings treatment design can have a dramatically negative impact on surrounding communities and the environment, and can have a profound impact on the corporate bottom line and reputation of the area as a desirable destination to visit or place to live.

Early and ongoing consultation, information sharing and dialogue with stakeholders are required during the design, operation and closure phases of the Centrifuge method. Kalbar has failed to do this. Why didn't they inform the community of this option and show sufficient respect for the people who will be faced with the risks and suffer any adverse impacts? Now people in the area are expected to accept a complete alteration of the EES without having had any prior consultation and are left wondering if Kalbar deliberately left it until the last moment to announce a 'mistake' in the water requirement. It is unbelievable that they didn't realise this 'mistake' at the time of writing the EES. How many other mistakes are there? All the MFG experts and water scientists realised that more than 3 Gl of water would be required, as did many people in the community who had raised such concerns with Kalbar.

Background and baseline conditions need to be established well before the commencement of operations for environmental impact and risk assessments. Has Kalbar really had enough time to establish adequate and complete baseline conditions?

A risk-based design approach provides a framework for managing the uncertainty and possible changes associated with a tailings treatment method and the potential environmental impacts. Will Kalbar compile a risk based framework?

Key planning and design constraints on surface may arise from decreasing ore grades and the production of ever greater amounts of finer grained, low-strength tailings. Has Kalbar properly assessed the ore grades and tailing sizes, grades, weight etc? Will they provide a table to illustrate these?

Key risks exist when using the Centrifuge option such as inappropriate, or insufficient construction materials, or the failure to identify and incorporate early closure issues and a decommissioning program early in the mine life. Considerable attention must be given to investigating and understanding the centrifuge method of 'dewatering' the tailings before decommissioning. How can the Community be reassured that Kalbar has had sufficient time, experience and expertise to manage And properly mitigate these ?

A principal component of effective decommissioning is to identify present and potentially long-term risk issues. Has Kalbar provided this information and provided sufficient essential reference material to guide the decommissioning process required by the use of Centrifuges towards an appropriate closure strategy? It requires a multidisciplinary approach to ensure that all significant risk areas are investigated - including the four primary technical disciplines - geotechnical, hydrological, geochemical and environmental.

A post-closure aftercare monitoring and maintenance plan must also be prepared for any tailings treatment strategy and the length of time required to ensure that the agreed post-closure objectives and completion criteria are achieved. The aftercare period can demand greater resources and attention than is sometimes expected, but good-quality monitoring, maintenance, repair and refinements to improve the plan can increase the likelihood of the agreed post-closure objectives being met. Has Kalbar identified a satisfactory monitoring program? As mentioned before, had Kalbar included its proposal to incorporate Centrifuge pumps in the EES, this would have enabled progressive engagement with stakeholders who would have had time to review the proposal rather than spend countless hours researching the initially proposed tailings storage dam and raising their concerns about the serious environmental impacts and the unacceptable risks of these with the proponent at Community meetings. Kalbar ignored all these community concerns at the time and failed to inform them about the possible Centrifuge option which it had already considered.

Regulators nowadays expect all tailings treatment options to demonstrate beyond reasonable doubt that sustainable outcomes will be achieved by the application of leading practice, risk-based design that:

- fully assesses all the associated risks relevant to the mining infrastructure, environment, costs and sustainability criteria.
- compares the suitability of all available storage methods, in particular those that dewatered tailings before disposal and/or eliminate the requirement for the damming of surplus water within the TSF
- incorporates a site-specific closure monitoring and maintenance plan to demonstrate that the agreed TSF closure objectives and completion criteria have been met. It will be necessary to check that Kalbar has met the above criteria to demonstrate that Kalbar can achieve SUSTAINABLE outcomes will be achieved.

There are no examples of leading practice mineral sands mines that incorporate the use of Centrifuges to provide reassurance that Kalbar can incorporate Centrifuges in their mining operations to achieve a safe, sustainable, economic and responsible outcome with negligible social and environmental impacts during operation and after closure. Nor is it possible for the Community to properly assess the Centrifuge option when there are no other examples of mineral sands mines that have used these pumps to dewater tailings or other case studies to compare with. Kalbar failed to take into account the viewpoints and expectations of the Community in which it operates. How can it expect the Community which will host its mine to accept such a significant change to the project with only Kalbar and the various manufacturers' assurances about the efficiency of the Centrifuges and the impacts of their introduction when this option has never been trialled by any mineral sands mine in the past. The technology has been available since well before 2016.

The higher costs associated with the use of Centrifuge pumps will be significant and might lead to cost cutting measures for other important aspects of the project such as rehabilitation, decommissioning of the mine- either prematurely or when intended, it might mean cost savings at the expense of the cost of other socio economic management or remediation.

Alternative tailings management strategies, in particular those that eliminate the need for low-permeability dams and minimise excess stored water through dewatering of the tailings or good surface water management, need to be thoroughly evaluated for cost and risk- effectiveness over the full Tailings operations life cycle, including after closure.

The possibility and implications of premature closure must be considered throughout the mining operations. There must also be a high degree of confidence that the Centrifuge design option will enable the successful closure of the facility. If this is not done thoroughly and objectively, and if steps are not taken throughout the mine life cycle to reduce potential post-closure liabilities, the costs of mitigating those liabilities can exceed the profits and other benefits accrued over the operational life of the mine (Bentel 2009).

It is important to mention the past limitations to successful thickened tailings transport and disposal were either COST or the lack of suitable flocculant and thickener technology.

The solids concentrations achieved on dewatering vary for different tailings, since particle size distributions, clay mineral content, particle shape, mineralogy, electrostatic forces and flocculant dosing vary. How do we know what the characteristics of the 'cake' residue remaining after the tailings treatment used by Kalbar, will be?

*Tailings' rheology is 'a function of their expected solids concentration, particle size distribution, specific gravity, and mineralogy and geochemistry, and is the key determinant in assessing tailings slurry and thickened tailings' pumpability. The design report should contain reference to the rheological investigations conducted, including the rheological parameters selected for the purposes of tailings transport design.

Slurried tailings of low solids concentration exhibit Newtonian behaviour (Boger et al. 2002), in which the shear stress of the tailings is a linear function of the shear rate applied. Once tailings are thickened above a certain consistency, they exhibit non-Newtonian behaviour in which the tailings possess a yield stress beyond which the shear stress increases with increasing shear rate in some fashion, with the possibility of time-dependent behaviour. The design of the appropriate tailings disposal system and operation requires an understanding of the rheological characteristics of the tailings, both in shear and in compression. The implementation and optimisation of a tailings disposal system involves rheological studies to determine: can Kalbar provide evidence that it has applied knowledge of the rheological characteristics of the tailings?

Has Kalbar adequately assessed the feasibility of producing solids to the right concentrations before transporting it?

The feasibility of the Centrifuge dewatering of the tailings to the required solids concentration before their transport and disposal:

- the optimal conditions for tailings pumping and pipeline transport
- the solids concentration required to achieve the optimal management of the tailings on disposal (Boger et al. 2002).

Boger et al. (2002) described a planning, design and testing flow sheet to take into account the tailings rheology in the design of an appropriate disposal system. Under 'planning', they highlighted the rheological parameters required for the selected disposal method, the transportation of the tailings (will require additional trucks) and its cost and risk-effectiveness, and the optimal degree of

tailings thickening. Under 'design considerations', they highlighted thickener design, pumpability, and the prediction of the tailings beach slope and settling.

* Community values

Community values such as health, heritage, surrounding land uses, aesthetics and the environment must be included throughout the decision-making process for a TSF design from planning to closure. This involves meaningful, ongoing, regular consultation with the relevant interest groups, including information sharing and dialogue with stakeholders. This consultation is normally carried out as part of the stakeholder engagement during the mine approval process and throughout operations to ensure that the community is fully informed of any possible impacts and how they are being managed. Consultation is required to ensure that the community is fully informed and able to contribute to the design option to be selected and the closure objectives and plans.

In conclusion I would like to say that I believe that both disposal of tailings methods Kalbar has proposed are inadequate and far too risky for this environment. It would be unfair to approve Kalbar's project because of the huge risks to our environment and to the amenity of those who live here. The Centrifuge option, when looked at closely and without the spin Kalbar and their paid experts will put on it, has just as many although slightly different risks attached to it. The 15-20 year life of the mine and the many changes that can occur in such a long time frame, means that regardless of the method chosen, it will have to be efficient, cost effective and viable for many years. There has to be certainty that it won't be the cause of the project closing prematurely, leaving an environmental mess, a community in chaos and disenfranchised miners unemployed.

Astrid Rose
Fernbank

Reference Material : [industry.gov.au] LEADING PRACTICE SUSTAINABLE DEVELOPMENT PROGRAM FOR THE MINING INDUSTRY

Please see previous submission response to the EES.

Also, I have already sent you via Amy some brief notes about the Centrifuge method in relation to noise, vibration, how and why the latter are caused and the affect it will have on the residents living in the vicinity of the mine. I included information also about the technical aspects of the design and issues with the equipment required. I asked her to pass them on to you about six weeks ago, when Kalbar first introduced the changes.

[REDACTED]

From: Astrid [REDACTED]
Sent: Tuesday, 2 February 2021 5:54 PM
To: Fingerboards Inquiry and Advisory Committee (DELWP)
Subject: Re: Kalbar's proposed change to the use of Centrifugal pumps.

EXTERNAL SENDER: Links and attachments may be unsafe.

Hi Amy,

I have read the correspondence about Kalbar's proposed changes to the Tailings dam and would appreciate it if you could forward the information and questions below to the IAC (the Panel).

How and when will the community members and others who are presenting to the Panel during the Hearings going to be informed about the technical aspects of the Centrifugal Pumps and the implication of this change to all aspects of the Project as described in the EES?

I have done some research about the pumps and learnt the following :

* there appears to be some instances when they are unsuitable to use. Will Kalbar's experts discuss the disadvantages as well as the beneficial uses of these pumps?

* why haven't they been used before in large mineral sand mining operations in Australia? It is not a new technology.

* the reliability of the pump is of concern. The units have the reputation of intermittently breaking down or needing to be serviced so at least one spare unit will have to be on hand at all times to avoid stoppages.

* will the use of the Centrifuge system make any changes to the location of the Processing plant or to any other mine infrastructure?

* will additional trucks and therefore noise and disruption be incurred when transporting the 'cake'?(residual solids/paste)

*Will Kalbar experts provide an estimate of **all** costs?

* centrifugal pumps are noisy. The noise emitted is caused by vibrations in the piping and pump casing, which interact with the surrounding air and are perceived as airborne sound. The transient flow and the pressure fluctuations produce this affect when energy is transferred via the finite number of impeller vanes to the fluid

handled - this leads to periodic pressure Fluctuations with amplitudes of varying intensity. The flow pattern of the fluid flowing around the vanes as well as flow separation make the flow in a Centrifugal pump transient. The sound of a Centrifugal pump varies in intensity along its H/Q curve.

“Noise control: The most critical active sound-absorbing measure for noise control is the correct selection of the pump itself, which must be designed for the task in question and have the correct size. “Passive sound-absorbing measures are a necessity when centrifugal pumps are used in applications with stringent noise restrictions, and include expansion joints in the piping, installation of the pump set on rubber-metal or spring mounts, in sound enclosures and insulated rooms in which pump sets are operated with special sound-proofing or sound-dampening panels.” [www.ksb.com ‘Noise in pumps and systems’]

* if the pumps are so much more environmentally friendly why didn't Kalbar suggest they use them in the EES? They are **not** a recent innovation, and if they are so much better than a tailings dam why didn't Kalbar propose them well before this. The extract I have provided below is from an Australian Government report on the various tailings methods and which includes Centrifuging. The report is dated 2016 and makes it quite clear that the Centrifuge pumping method is not recent. Kalbar was well aware from the many serious and constantly repeated concerns of the community about the size, location and treatment of the tailings dam that the community was opposed to the risks incurred by the 90 ha tailings dam as described in the EES. This is another example of the many times Kalbar simply ignored the community and paid scant regard to our concerns until they began to worry about not getting approval for their proposed mine.

Their hurried changes now are not for the benefit of our community nor for our environment but to facilitate approval for their project.

Extract from ‘Tailings Management’ 2016:

Leading Practice Sustainable Development Program for the Mining Industry [industry.gov.au]

‘the disadvantages of the different tailings disposal and storage methods are summarised in Table 4.

Note that an appropriately qualified geotechnical engineer experienced in tailings management should be engaged when considering tailings disposal and storage.

Table 4: **disadvantages** of different tailings disposal and storage methods:

*Centrifuging and pumping or conveying incur additional costs over slurry disposal

*the Cone footprint will be large, with implications for rehabilitation. *the Cone surface will require some desiccation for transport.’

I trust that Kalbar's expert will include impacts of the Centrifugal System on every aspect of the project including socio-economic, amenity, and environmental impacts

Sincere regards,

Astrid Rose

[REDACTED]

From: Astrid [REDACTED]
Sent: Monday, 8 February 2021 4:27 PM
To: Fingerboards Inquiry and Advisory Committee (DELWP)
Subject: Centrifuging and disadvantages

[REDACTED] [REDACTED]

EXTERNAL SENDER: Links and attachments may be unsafe.

Hi Amy,

I have read the correspondence about Kalbar's proposed changes to the Tailings dam and would appreciate it if you could forward the information and questions below to the IAC (the Panel).

How and when will the community members and others who are presenting to the Panel during the Hearings going to be informed about the technical aspects of the Centrifugal Pumps and the implication of this change to all aspects of the Project as described in the EES?

I have done some research about the pumps and learnt the following :

- * there appears to be some instances when they are unsuitable to use. Will Kalbar's experts discuss the disadvantages as well as the beneficial uses of these pumps?
- * why haven't they been used before in large mineral sand mining operations in Australia? It is not a new technology.
- * the pump units have the reputation of intermittently needing to be serviced so at least one spare unit will have to be on hand to prevent stoppages. Will Kalbar's experts provide an estimate of costs?
- * If the pumps are so much more environmentally friendly why didn't Kalbar suggest they use them in the EES? They are **not** a recent innovation and if they are so much better than a tailings dam why didn't Kalbar propose them well before this. They knew very well from the many serious and constantly repeated concerns from the community about the tailings dam that the community was opposed to the risks of the tailings dam as described in the EES. This is another example of the many times K simply ignored the community and paid scant regard to their concerns until K began to worry about not getting approval for the proposed mine.

On 29 Jan 2021, at 5:29 pm, Fingerboards Inquiry and Advisory Committee (DELWP)
<Fingerboards.IAC@delwp.vic.gov.au> wrote:

Dear Parties

The Fingerboards Mineral Sands Project Inquiry and Advisory Committee (IAC) has received correspondence (see tabled documents 60 - 65) from the parties calling evidence (East Gippsland Shire Council and Mine Free Glenaladale) and the Proponent (Kalbar Operations Pty Ltd) regarding the possible use of centrifuges to potentially reduce environmental impact of the project, and how the centrifuges and their impacts might be considered and assessed by the IAC.

Please find attached correspondence from the Chair of the Inquiry and Advisory Committee in response to the requests around the centrifuge issue, which also includes modified and updated directions from the IAC (Document 66).

These documents are also now available on the 'Tabled Documents' Page here:

<https://engage.vic.gov.au/fingerboards-IAC/Fingerboards-IAC-tabled-documents>

(Note: only the first 5 Tabled documents can be seen on the webpage, to view all of the documents click the see more button at the end to expand the list)



As a reminder the documents sent by the IAC and tabled by parties before and during the hearing will be progressively made available on the Tabled Documents page [here](#).

If you have any questions, please let me know.

Kind regards

Amy

**Amy Selvaraj | Senior Project Officer | Planning Panels Victoria
Planning | Department of Environment, Land, Water and Planning**

Level 5, [1 Spring Street, Melbourne, Victoria 3000](#)

T: [REDACTED]



[<image0](#)



[04.gif>](#)

I am currently working remotely. Please contact me by email at the above email address or planning.panels@delwp.vic.gov.au

OFFICIAL

<Fingerboards IAC - Response to requests around centrifuge issue.pdf>

Extract from 'Tailings Management'

TAILINGS MANAGEMENT

Leading Practice Sustainable Development Program for the Mining Industry

[\[industry.gov.au\]](http://industry.gov.au)

4.7 Comparison of tailings disposal and storage methods

disadvantages of the different tailings disposal and storage methods are summarised in Table 4. **Note that an appropriately qualified geotechnical engineer experienced in tailings management should be engaged when considering tailings disposal and storage.**

Table 4: **disadvantages** of different tailings disposal and storage methods:

Centrifuging :

Centrifuging and pumping or conveying incur additional costs over slurry disposal

Cone footprint will be large, with implications for rehabilitation

Cone surface will require some desiccation for