

# Fingerboards Mineral Sands Project Inquiry and Advisory Committee

## Technical note

**TN No:** TN017

**Date:** 30 April 2021

**Subject:** Response to IAC Direction 54(a) – summary of and initial response to centrifuge submissions

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### 1.0 Government and agency submissions (plus MFG)

Issue #	Issue description	Submission number #	
1	The proposed replacement of the Tailings Storage Facility ( <b>TSF</b> ) with centrifuge technology eliminates the risk associated with failure of the TSF, and the subsequent impacts on the Perry River catchment.	358 (WGCMA), 514 (EPA)	Noted
2	The use of the centrifuge will reduce the demand for freshwater resources due to the increased harvesting from the centrifuge process. This outcome in isolation is a positive improvement. However, water savings will largely counteract an error in the water balance recently identified by Kalbar and because the EES did not predict any seepage from the fine tailings to groundwater.	358 (WGCMA), 514 (EPA)	Noted
3	The reduction of freshwater demands has been modelled to increase the risk of mine contact water spilling from water management dams and entering the Mitchell and Perry Rivers.  Surface water – the volume of water in the Freshwater Dam and impact on dilution should be clarified and approaches to reduce the chance of spillage from the water management dams should be implemented.	358 (WGCMA), 514 (EPA)	The predicted probability per annum of spill event has not changed from that reported in EES Appendix A006-App A. Jarrah Muller's evidence statement revised spill probabilities from what was presented in the EES, based on updated information about the water capture efficiency from amphirols. However, the updated water balance using centrifuges substantially restores the water balance provided in the EES and the spill probabilities are now predicted to be the same as presented in the EES. Refer addendum (centrifuge) statement of Jarrah Muller.

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4	<p>As per our previous submission, the reliance of a temporary mechanical treatment facility to bring the risk rating to the minimum requirement is unwise and leaves no margin for error or redundancies.</p> <p>The documentation is silent on measures to mitigate this risk.</p>	358 (WGCMA)	<p>This is taken as referring to the Dissolved Air Flotation (<b>DAF</b>) plant, which can treat water at a rate of 24ML/day. Whilst not strictly a matter relating to centrifuges, Kalbar responds as follows.</p> <p>Kalbar will not rely exclusively on the DAF plant to move water from the water management dams. Water will also be pumped between storages (water management dams, process water and contingency dam) to accommodate the extended wet periods when the water management dams may have limited storage at the time of a larger storm event and are at risk of spill. These systems are all linked through pipes and pumps. This creates flexibility and redundancy, enabling Kalbar to schedule maintenance activities for the DAF plant and respond to mechanical failure, if necessary. Nonetheless, the risk of spill from water management dams resulting from extended wet periods and large storm events is acknowledged and assessed in the EES.</p>
5	<p>Elimination of the TSF would also eliminate the risks associated with seepage to groundwater, thus eliminating the risk of adversely impacting the quality of groundwater.</p> <p>The harvesting of freshwater through the centrifuge process will also reduce the volume of slurry discharged to the mine pit voids. We note that this will reduce groundwater seepage by 32%, thus reducing the risk of groundwater mounding,</p>	358 (WGCMA)	Noted
6	<p>The increased use of Polyacrylamide (<b>PAM</b>) for the purposes of sediment/water separation in the centrifuge will result in an acceleration of contaminants in the Process water.</p> <p>The Proponent has not provided any information on the treatment of Process water and the disposal of contaminants. Including seepage into groundwater.</p> <p>We note that PAM degrades to form nitrogen, ammonia, carbon dioxide and water. West Gippsland CMA supports the calls in the documentation for further work to “determine the concentrations and flux of total nitrogen and ammonia that might be generated if residual PAM degrades in the mine void and seeps into groundwater”.</p>	358 (WGCMA), 813 (MFG)	Refer memorandum of Tony McAlister, 12 March 2021, TN014 Appendix 3 which considers the water quality implications of flocculants. Kalbar expects this matter will be discussed further through the course of the evidence at the hearing.
7	Groundwater – the feasibility of applying centrifuges to coarse tailings should be explored	514 (EPA)	Not proposed.

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8	<p>Noise – an assessment of the potential for adverse impacts from tonal noise, low frequency noise, and vibration should be prepared (and mitigation measures implemented if necessary).</p> <p>Further information be provided on:</p> <p>a. The locations for which the centrifuge plant has been modelled</p> <p>b. Justification that the haul routes would not be a significant contributor to the noise levels at noise sensitive areas.</p>	514 (EPA), 813 (MFG)	Tonality, frequency and vibration are all addressed and inherent components of the noise assessments undertaken. The requested further information regarding haul routes is being compiled separately.
9	GHG – an amended GHG assessment should be prepared	514 (EPA), 813 (MFG)	The requested further information is being prepared separately.
10	The introduction of the proposed centrifuges to the fine tailings circuit may contribute to mitigating some dust generation activities on the site (such as reducing overburden haulage and accelerating rehabilitation). However, there is also a risk of increased dust generation due to the increased daytime mining and haulage activity.	514 (EPA), 813 (MFG)	See Supplementary Statement (centrifuge) of Simon Welchman, Section 4.2 for dust emission rates for the centrifuge scenario compared to the EES scenario.
11	<p><u>Centrifuge performance:</u></p> <ul style="list-style-type: none"> <li>• Technical risk related to the sizing and application of centrifuges in this duty</li> <li>• Fines handling - risks associated with dewatering performance and handling of the centrifuged product</li> <li>• Water consumption and site water balance</li> <li>• The temporary TSF may still be required to generate an initial mining void, or for settling ultrafines from the centrifuge effluent stream</li> </ul>	716 (EGSC), 813 (MFG)	These matters are addressed through the centrifuge evidence (refer statements of Conleth O'Loughlin and Ivan Saracik including their conclave statement. See also TN14 (Tabled Documents 194-195).
12	<p>Further work should consider:</p> <ul style="list-style-type: none"> <li>• Validating the centrifuge sizing with the vendor</li> <li>• Conducting a full-size centrifuge trial</li> <li>• Conducting a testing program to determine the materials handling, truckability, geotechnical and hydrogeological (permeability) characteristics of the centrifuged product.</li> <li>• Confirming the design for co-storage of fine and coarse tailings, including the required and expected mixing approach</li> <li>• Conducting a variability program to understand the ranges of particle size</li> <li>• Model the impact of ultrafines recirculation on the process</li> </ul>	716 (EGSC), 813 (MFG)	Refer above. Kalbar appreciates that these matters will be considered further through the course of the hearing.
13	EES Scoping requirements have not been evaluated nor met with respect to the centrifuge option	813 (MFG)	Not agreed.

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14	The rehabilitation plan originally used fine tailings in the creation of a "manufactured subsoil". There has been no discussion regarding substitutes for the fine tailings in the rehabilitation process.	813 (MFG)	There is no change proposed to the material composition of the manufactured subsoil. It will contain both fine and course sand tails.

## 2.0 Community

Issue #	Issue description	Submission number #	
1	Concern about long-term environmental effects, detriment to human health, groundwater, surface water and ecological consequences of flocculants	12, 24, 94, 202, 241, 268, 335, 423, 429, 484, 488, 546, 638, 649, 679, 698, 703, 712, 765, 781, 812, 814, 815, 831, 833, 834, 872, 893, 896	See above.
2	Concerned about the noise and vibration caused by the centrifuges (Argyle Diamond Mine sited as an example), including effects to human health and animals (native and domestic)	94, 96, 224, 268, 303, 335, 355, 429, 476, 488, 546, 598, 638, 679, 698, 703, 712, 765, 781, 812, 814, 831, 833, 834, 872, 875, 893	Refer to Supplementary Statement (centrifuge) of Christophe Delaire. The use of centrifuges does not materially alter predicted noise emissions.
3	Concerned about the extra power consumption due to the use of centrifuges, along with how loads will be managed	94, 202, 268, 335, 423, 429, 484, 488, 546, 638, 679, 698, 705, 712, 752, 765, 781, 814, 831, 833, 834, 872	An updated GHG assessment will be provided separately. Power availability and loads are detailed design matters, however Kalbar has progressed these arrangements with relevant authorities.
4	Will the centrifuge cake make a difference to the rehabilitation, including mixing of subsoils to perform as suggested in the EES and unstable landforms	202, 268, 303, 335, 429, 484, 488, 546, 638, 679, 703, 765, 781, 812, 814, 831, 834, 872, 875, 896	Refer to Supplementary Statement (centrifuge) of Dr Rob Loch.
5	Extra vehicle movement (trucks) on site will create more dust	202, 268, 335, 712, 812	See Supplementary Statement (centrifuge) of Simon Welchman, Section 4.2 for dust emission rates for the centrifuge scenario compared to the EES scenario.
6	Centrifuge operation will adversely increase the airborne emissions and/or their toxicity, including radioactive waste. Stockpiling of cake overnight is of concern.	224, 268, 335, 546, 698, 712, 752, 812, 814, 834, 872	Refer to Supplementary Statement (centrifuge) of Darren Billingsley and Supplementary Statement (centrifuge) of Simon Welchman.
7	Visual impact of the centrifuges at night (lights)	224, 335	Lighting will be screened and/or baffled in accordance with the mitigation measures proposed with the EES. The impact of lighting from plant and equipment operating at night is explored in EES Appendix A014 (Landscape & Visual Impact Assessment) and TN010 (Landscape and visual

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			response to IAC questions). At the distances in question, and subject to mitigation such as VL02 which provides “ <i>Fixed lighting on plant and buildings will be designed to reduce the potential for light spill through measures such as focussed/targeted lighting and installation of shields or baffles</i> ”, the centrifuge buildings will not change the risk assessment of lighting for the Project and will not cause any unacceptable lighting impacts.
8	Concerned about whether the centrifuge and revised process will perform as suggested, including the fact that they have not been used on mineral sands and lack of trials	268, 288, 303, 335, 355, 423, 429, 476, 484, 488, 598, 610, 638, 703, 705, 765, 781, 812, 814, 815, 831, 833, 872, 875, 893, 896	These matters are addressed through the centrifuge evidence (refer statements of Conleth O’Loughlin and Ivan Saracik including their conclave statement).
9	Have the impacts of a changed water balance been properly considered, including the added chance of the DAF being used. Are there contingencies for failure of the water treatment system.	268, 484, 812	The updated water balance is set out in the Supplementary Statement (centrifuge) of Jarrah Muller.
10	Has the economics of using centrifuge been properly considered	268, 288, 335, 355, 423, 429, 484, 488, 546, 598, 638, 649, 712, 752, 765, 781, 812, 814, 831, 833, 834, 872, 875	This matter has been taken into account by Kalbar. The net additional cost of using centrifuges does not make the project unviable.
11	Not proceeding with the TSF is a good decision	423	Noted.
12	Concern that the flocculant will continue accumulating in the recirculating water supply as it leaves the centrifuge and re-enters the water circuit	423, 429, 703, 752, 812, 814	Refer Item 6 in Part 1 above.
13	General concern about the centrifuge structure, including the ability to design foundations and structures to carry the centrifuge dead and live loads, rehabilitation of the centrifuge sites and damage to the land which they are on	429, 488, 546, 638, 679, 712, 765, 812, 814, 831, 833, 834, 872	These are detailed design matters that are not necessary to consider through the EES process.
14	Concern about the safety of workers operating the centrifuge	638, 765, 781, 814, 831	Kalbar will need to provide a safe working environment for all workers.