

Supplementary submission – Centrifuge #268

Addendum to include Centrifuge option.

“The Proponent said centrifuges were being considered to address the concerns of some submitters and would offer the following advantages”:

	Proponent’s justification for Centrifuge option	Questioned rational
1	Centrifuges would provide certainty about water recovery from the fine tailings that is independent of climatic and soil conditions.	Overall water requirement for the mine has only minimally been reduced with the proposed Centrifuge component (2.9GL) . Alfa Laval testing – Spin test performed at lab scale indicated (not guaranteed) suitability of dewatering of slurry with a decanter centrifuge, noting that in fully scale equipment there are several variables untested. Samples tested were only from years 1 to 6 of the mined area, soil characteristics and compounds vary significantly over the whole project area and flocculant dosage rates and efficiency should have been more broadly assess and analysed. Insufficient data is provided on the climatic and soil conditions experience on the project area, and the consequences of the inadequacy of these assessments.
2	There is no need to construct the temporary tailings storage facility (TSF) or the in-pit fines TSFs if centrifuges are used, as they create a dry cake from fine tailings.	Adequate bunds/barriers will need to be constructed to hold back the wet fines and moisture so that it does not impact on the mine face. What is the contingency plan if the cake cannot be adequately and efficiently process to the optimum moisture content? Using centrifuges have not been scientifically or engineered to work in this environment a trail needs to be performed to ascertain the effectiveness, efficiency and through put of the process.
3	Centrifuges allow the continuous backfilling of the mined voids without the need to rip and remove in-pit fine TSFs before the commencement of rehabilitation operations, which means that the disturbed mining area is smaller, and rehabilitation can occur sooner after the completion of mining in any particular area.	The returned cake will need to be dry enough to support machinery to facilitate soil profiles to be reconstructed and formed. The stability of the soils within void needs to be continually monitored.
4	The continuous mining and backfilling operation significantly reduce overburden haul distance, which in turn reduces noise and dust generation.	The mined product flow includes slurring to the wet concentrator plant, then further slurring to the centrifuge, to be finally transported to the mine void will not reduce noise and dust generation but will be increase the truck movements and power generation required for the mining process, including generators to be used until adequate power supply can be facilitated. With more truck movements the required number of water trucks needs to be significantly increased to manage dust.

5	Any risk of seepage from fine tailings is removed as this material is fully dewatered to a state that will only retain capillary moisture that cannot seep to the environment.	Does the Centrifuge option in conjunction with the DAF wastewater treatment system's efficiency provide outcomes of reducing key contaminants i.e., nitrogen, copper, aluminium to levels acceptable for discharge to freshwater systems? Has contingencies for failure of the water treatment system been assessed. (Annexure B Technical Note 02 Supplementary expert witness statement John Sweeney Coffey 5 Alternative option – Centrifuge tailings) States <i>“Water that remains in the cake will not drain freely from the material even when it is deposited back into the void with overburden”</i> . Will the reconstituted soil allow water penetration through this surface layer once rehabilitation is affected and not form a watertight barrier creating an impermeable layer and water pooling above and adjoining it not being suitable for successful establishment of trees and deep-rooted vegetation?
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Dust

Touted minimised overland haul distance from centrifuge to void (750m) will reduce noise and dust is incorrect because the product will need to be slurried to and from the WCP to the Centrifuge and then trucked to the mine void requiring extra dump trucks, and additional slurry pipelines which are powered by electricity or generators. The need to relocated centrifuges every 4-5 years raises questions of the volume of dust produced when shifting the infrastructure to the new position.

Stockpiling of processed tailings once dried will become airborne dissipating dust particles over residences, including household water supplies , flora, and fauna in the vicinity of the project - what remediation has been assessed for these communities.

Estimates of airborne dust to receptors within or adjacent to the mine site significantly increases the volume of radioactive material that potential can be inhaled or ingested by humans and animals' - further exposure to this radioactive source should not be contemplated.

Economic

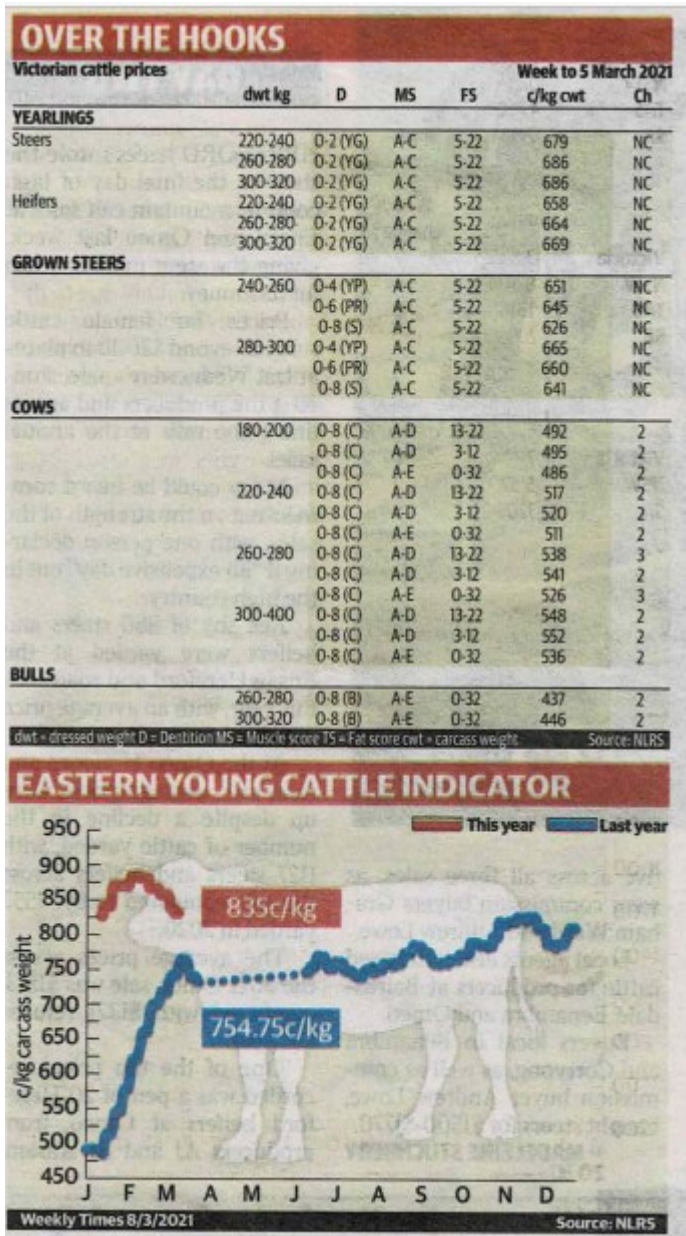
Technical No. 14 page 3 notes*centrifuges have not previously been used in mineral sand projects due to the higher cost of implementing them when compared to tailings storage facilities* .Considering the high risks and failures experienced overseas why would this option be contemplated in this mine, was it because too many EES responses were concerned of the TSF option , the TSF is a visually conceivable concept necessitating the proponent to reconsider an alternative.

Treatment of fine tailings using the centrifuge option will increase operating costs to \$3.50-\$4.00/tonnes has this been costed into the proposal.

Electricity use will increase from 9,000kVa to 14,000 kVa, will the grid be able to cope with power surges during operation and will the fluctuating power impact on household and surrounding enterprises who also use electricity? Centrifuges will require an increase demand on power when slowing them down or stopping them which will be a continual, will this increase localised brownouts or blackouts – what compromises to other power uses are planned?

There will be an increase of 15% in Greenhouse Gas (GHG) emissions (10,194MWh of electricity per year = 10,400 tCO₂-e(GHG emissions) per year) . Each loaded centrifuge uses 220kW per unit per cycle.

The proponent anticipates grossing \$455/tonne from HMC this does not include outgoing expenditure for excavation, employees' wages, transport, shipping, rehabilitation, land purchases, road diversion etc. Compared to the current cattle prices as illustrated in the attached Eastern Young Cattle Indicator item – animals are currently making \$835c/kg. Livestock production is currently operating on the project area, it is a renewable, sustainable, long term, economically viable industry which has been successfully carried on this land for over 140 years. Why would we be considering a once off mining operation that will have such negative ramifications to the land and the environment.



Environmental impacts

The soils in the project area are prone to erosion, vibrations from centrifuges and machinery operating will accelerate erosion, more detailed profile analysis of the soils within the project area need to be undertaken.

Ecological report impacts should be undertaken to assess the impact of 10,000 tons/annum of flocculants into the subsoil of the to be rehabilitated farmland, and downstream receiving ecosystems.

The centrifuge option expects the required volume of water to be 2.9GL but if the centrifuge option is not forthcoming the tailings dam option will require 5GL as the Proponents amended figures reveal.

Relocation of the centrifuge every 2-3 years will require reconstruction of substantial foundations on which it is mounted, and construction of the attenuate buildings, etc what happens to the foundations and infrastructure that were previously utilised – are they decommissioned and dumped where?

GHD's geotechnical assessment of the Coongulmerang formation noted the loss of strength on saturation and highly dispersive nature of the soils – has adequate assessment of these soils ability to rehabilitate been carried out.

What are the contingencies if efficiency of the DAF wastewater treatment process to reduce key contaminants such as nitrogen, copper, aluminium to levels acceptable for discharge to freshwater systems are not adequate? The acknowledged increase in the number of occurrences mine and process water dams will overflow is environmentally concerning and should be ameliorated.

Flora Fauna

With the return to the area following the 2014 fire, long extended durations of dry drought periods, species such as the masked parrot (pictured) are establishing breeding colonies within the area, the noise, vibration, constant lighting, dust emanating from the Centrifuge plant and mine infrastructure will deter migratory, endemic birds and animals to forage, live and breed within the denuded interface of the mine.



Masked Parrot (Johnston collection)

Flocculant ecotoxicity to aquatic environment should be assessed in aerobic and anaerobic conditions.

Noise

At our property, the passing train can be heard 9.3km from its tracks, it is not unusual for noise to dissipate up to 15km from its source. This would impact households in Woodglen (43 residents) Walpa (154 residents), Glenaladale (61 residents), Fernbank (152 residents), Lindenow (449 residents), Lindenow South (549 residents), Hillside and the outer suburbs of Bairnsdale including Shannon Waters Estate (1674 residents). Can these residents be guaranteed their serenity will not be compromised – because I am sure they would not have chosen to live in this area if a mine were operating. Will this population be afforded the legislated monitoring for noise with a just and equitable outcome?

With the centrifuge operating at speeds of 1,000-1,800 rp range (600 to 1800 G force range) will the volume of noise be reduced enough in an enclosed shed to not impact on humans and animals in the vicinity of the mine ? Noise assessment on centrifuges was carried out when the vessel was empty - fully

loaded the anticipated noise is expected to be beyond acceptable tolerances. Is this a safe environment in which to work, live and commute ?

Noise will also be generated from ancillary equipment including flocculant mixing tanks, switch room transformers, slurry pipelines and bypass sump (containing of fines tailings slurry) at centrifuge plans.

Full noise impacts from 6 operating centrifuges and associated infrastructure have not been provided and nor assessed.

Should both options been considered (TSF and centrifuges)

Major changes to project with intervention of centrifuge proposition – significantly alters the EES reporting because of :

- increased use of power and greenhouse emissions through initially diesel generators then mains power.
- increase noise on sensory receptors including animals.
- increased truck movements returning product to void.
- increase in volume of unspecified flocculants' to be used and the consequences of final placement of these toxic substances.
- Flocculants used and their subsequent impact on groundwater, GDE, biota, soil profiles etc.
- Effective dewatering of the mine voids, where does the retrieved liquids go.
- constraints or compromising timely rehabilitation of void because of unstable landforms.
- untried and untested system of processing with mineral sands using centrifuges.
- definitive volumes of water requirements and savings should be presented.
- costing including comparison to both concepts.

The Public was not afforded the opportunity to discuss this option in a Community forum.

Precautionary principle

- Proponent in charge and undertaking their own rehabilitation – can stable landforms be established; can successful, sustainable, and viable rehabilitation be achieved.
- Premature shut down or abandonment of mine – what are the impacts on the environment, community, residents, and ongoing rehabilitation – why has this option not been including in the risk assessment and closure planning.
- Discharges to land of mining wastes are exempt from the need for permitting under the EP Act as they are regulated under the MRSD Act 1-4 Volume 3. This has potential impact to adjoining landowners, GDE, biota, groundwater, Creeks, Rivers and Lakes with no recourse.
- Centrifuges are untested in mineral sands mining. Overseas experiences using centrifuges illustrated a risk of accidents causing injury or death to workers is of great concern, the likelihood of such hazards is not addressed in the EES.
- Karen Teague (Health) suggests providing PPE health and safety training for farmers working near the mine – is this suggesting there is a health and safety concern and if so, there should be a buffer zone around the farming land so that the farmland will be protected and not be adversely impacted. What are the health impacts on native animals, domestic animals including livestock for human consumption and farm workers?
- Flocculants used at a dosing rate of approximately 370g/tonne used over 15–20-year mine life will have an accumulative impact on the environment – this needs to be further scientifically assessed.
- Too many ameliorations or solutions to identified problems/risks have been side stepped by the proponent stating they will address or remediate when it occurs- is not good enough.

- Consistency of feed supply into centrifuge needs to continually adjust by the manual operator this brings “human error” into the process – what are the consequences of human error?

Has the Technical Reference Group assessed the consequences of risks associated with the centrifuges on the environmental, ecological, human health, and economic viability of the mine?

Under the Mineral Resources (Sustainable Development) Act 1990 - 2A Principles of sustainable development –

(a) *Community wellbeing and welfare should be enhanced by following a path of economic development that safeguards the welfare of future generations* – how does this project protect the Communities wellbeing and welfare now and in the future?

(f) *both long and short term economic, environmental, social and equity considerations should be effectively integrating into decision-making.* How is this addressed in the project and will it leave a long-term legacy for Local Government, State Government, local Community, residents, and future generations?

Kalbar can request a variation to work plan and revert to the option of a TSF following approval, siting minimal risks with this option and not requiring a Planning permit. Has the proponent fully assessed the required risks of all options as regulated by the relevant authority?

L Johnston