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**From:** CSG [REDACTED]  
**Sent:** Friday, 26 March 2021 10:24 AM  
**To:** Fingerboards Inquiry and Advisory Committee (DELWP)  
**Cc:** Csg  
**Subject:** Submission 765 Supplementary Submission on Centrifuges  
**Attachments:** Supp Sub 765 final.docx

**EXTERNAL SENDER: Links and attachments may be unsafe.**

Hi Amy

Please find attached the Supplementary Submission on centrifuges from Gasfield Free Bairnsdale (Submission 765).

We would like to advise the IAC of the following which we have included in our submission at point 85:

*It is totally unacceptable that the Proponent provided the 'Draft Mine Rehabilitation Plan' less than 24 hours before the Supplementary Submissions were due. As the document is too long to review in time as well as draft a response, it would be expected that submitters would be able to provide their feedback about this document at the time of presenting to the IAC. This is yet another example where information is being rushed through by the Proponent leaving those impacted no time to consider the implications. If a major error in such an important matter as the water balance can be made after 4 years, what errors in assumptions and data is occurring through this rushed process where regulatory scrutiny is also not taking place.*

Kind regards

Debbie Carruthers  
Gasfield Free Bairnsdale Co-ordinator  
[REDACTED]

## Submission 765 - Supplementary Submission – Centrifuges

### Introduction

1. On behalf of Gasfield Free Bairnsdale (GFB), this supplementary submission is to raise our concerns about the introduction of centrifuges as an option to replace the Tailings Storage Facility (TSF). We note that the centrifuge option also addresses a major error in the Environment Effects Statement (EES) concerning an assumption made by the Proponent on water recovery, which would have resulted in a significant increase in water requirements from 3 GL annually to 5 GL annually if the TSF was pursued.

### Water resources at risk

2. The vast majority of our members are farmers, so water is a vital part of their livelihoods and businesses.
3. The centrifuge option does not reduce the environmental impacts of the Project in relation to the amount of water required.
4. Our group continues to be concerned about the enormous water requirements for the Project which does not change with the introduction of centrifuges, as nearly the same amount of water will be required annually.
5. With climate change concerns already a reality, access to water during the life of the Project which is 17 – 20 years raises serious concerns about what could happen if the water required by the Project is not available (no winter-fill for example from the Mitchell River). Will dust mitigation strategies be impacted and what will be the consequences if those measures fail for animal and human health, and the viability of farms which rely on water?
6. There is a high risk that if water isn't available, that the Project would have to be abandoned, with the real prospect of rehabilitation not occurring, dust not being mitigated, with contamination of farmland a potential outcome.
7. Many farmers rely on the same aquifer the Project proposes to use. There are grave concerns by farmers to the south of the Project's bore field because they have no access to other water sources other than from their aquifer. What happens if they are not able to extract water due to the high volumes of water the Project will require and the speed at which they will be able to extract, or if the aquifer becomes contaminated, could there also be aquifer interference, what if no winter-fill water is available?
8. Failure to access clean water will have significant detrimental consequences to farming businesses and livelihoods. Without water from the aquifer, they are no farming business, as there are no rivers or creeks these farmers can access.

## Risks from flocculant use unacceptable

9. In Tabled Document 130, from the Proponent's Expert witness on centrifuges Mr Saracik, in Appendix C is a report from a flocculant supplier (Nalco) which states that due to the nature of the slimes from the Project, the application of flocculant is not straightforward which will add to the complexity of effective flocculation:

*"The characteristics of Glenaladale slimes create a narrow band of conditions for effective flocculation such that feedwell design factors become critical to ensuring that design throughput can be maintained without excessive flocculant dosing,"* (Saracik, 2021; Appendix C p 3).

10. The flocculant proposed to be used is a polyacrylamide or PAM. A massive increase in flocculant (370g/tonne of tailings) will be needed due to the introduction of centrifuges. In Tabled Document 194, Technical Note 14 from the Proponent it states:

*"The flocculant will be used at a dosing rate of approximately 370 g/tonne of dry solids reporting to the centrifuge. This translates to a nominal (average or usual) dose rate of around 118 kg of flocculant every hour as the centrifuge units nominally receive around 321 tph of solids,"* (Kalbar, 2021; p 3).

11. In Technical Note 14 it stated that PAMs are not considered to be harmful to aquatic organisms or to cause long-term adverse effects in the environment:

*"PAMs are widely used by water authorities and in other industries, and their use in the Project is not considered harmful to aquatic organisms and does not cause long-term adverse effects in the environment,"* (Kalbar, 2021; p 2).

12. Dr Jasonsmith states in her Expert witness statement for Mine-Free Glenaladale that her research shows PAMs can be broken down into acrylamides which are toxic in aquatic environments and that further investigation into the potential hazard presented to the aquatic environment from flocculants is warranted:

*"The research I have conducted found that polyacrylamides can be broken down into smaller, toxic chemicals called acrylamides in low-air environments (i.e. anaerobic) — such as in muds within dams and other forms of sediments — with these chemicals highly mobile and toxic in aquatic environments<sup>11</sup>. In my opinion, further investigation into the potential hazard presented to the aquatic environment from the flocculants to be used at the proposed Fingerboards mine is therefore warranted,"* (Jasonsmith, 2021; p 13).

13. In her second supplementary Expert witness statement Dr Jasonsmith raises further concerns about PAMS when considering the aerobic environment in which the flocculants will be located:

*Anionic polyacrylamide flocculants, such as those proposed for use in the Fingerboards mine, behave differently in environments where there is ample air (called aerobic environments) than in environments where there is restricted air availability (called anaerobic environments). An example of an environment in which it can be considered there is likely to be ample air includes the soil surface — such as occurs in agricultural settings — or well aerated water treatment plants. An example on an environment in which it can be considered likely that restricted air availability occurs includes those where wet clays are buried, particularly in association with organic materials,” (Jasonsmith, 2021; p 6).*

14. Dr Jasonsmith goes further to say in the above report, that the limited studies undertaken on the subject of polyacrylamide degradation in anaerobic environments indicate that there is potential for acrylamide to be formed and that the acrylamide monomer, a known neurotoxic substance is considered hazardous to human health and the environment, even though polyacrylamide is considered less hazardous (Jasonsmith, 2021; p 7).

15. Dr Jasonsmith considers that the use of flocculants for tailings management may present a hazard to the environment associated with the proposed Fingerboards mine and continues by saying the following:

*“The need to assess the hazard of flocculants was identified in the Fingerboards EES, however, no assessment was undertaken by the proponent beyond committing to the use of these chemicals in accordance with safety data sheets,” (Jasonsmith, 2021; p 11).*

16. The impact on the environment from the significant increase in flocculant use has not been assessed by the relevant Government authorities as part of the EES and TRG process, nor the potential for leaching of this volume of flocculant into waterways nor the environmental impact from potential accidents given the large amount of these chemicals that will be stored on site. As stated here:

*“Applications of PAM can result in significant environmental challenges, both in water management and in contamination of local water supplies after accidental spills (Nature, 2018).*

17. Expert evidence raises concerns about the use of PAMs given the huge volume proposed to be used and the lack of scientific evidence about their performance and use on this scale. In her supplementary Expert witness statement Dr Jasonsmith states:

*“The potential hazard to human health and the environment presented by the use of polyacrylamide [flocculants] depends on a number of factors, including its concentration, and how it will behave and be changed in the environment. Demonstration that polyacrylamide will present an acceptable risk to the environment, at the concentrations used and conditions to which it will be*

*subject at the proposed Fingerboards mine, has not been demonstrated in the Fingerboards EES or associated technical notes,” (Jasonsmith, 2021; p 6).*

18. As indicated by Dr Jasonsmith in her second supplementary Expert witness statement, potential hazards, the likelihood of harm as a result of these hazards and how harm might manifest itself as a result of centrifugation have not been reported (Jasonsmith, 2021; p 8).
19. The report from Alfa Laval indicates that the transportable cake would be around 67% to 70% wt total solids. With the movement of groundwater and rain events, the flocculant in the interstitial water has the potential to leach into the groundwater where the ‘cake’ is being stored and while it is in the mine pits prior to and most likely, post rehabilitation.
20. Given the high volume of flocculant proposed to be used and the close proximity of the Project to the Mitchell River and local shallow aquifers, the risk of contamination of ground and surface water is high. If the aquifer becomes contaminated that means there will be no source of water for these farmers.
21. Trucking of the cake to the mine void is proposed to only take place during the day shift. This would result in stockpiling of the cake. This poses other risks to the environment for migration of the flocculant and tailings; these risks have not been assessed according to Dr Jasonsmith’s supplementary statement:

*“I consider that severe and extreme weather events are characteristic of the south-eastern Australian environment. The potential for substantial rainfall to erode the stockpiles as the result of such an event, and for migration of both the flocculant within the stockpiles as well as the tailings themselves as a result, are two of numerous scenarios that could arise from the stockpiling centrifuged tailings that are not considered within the Fingerboards Technical Note,” (Jasonsmith, 2021; p 8).*

22. Given the enormous quantity of flocculant (organic chemicals) and the acknowledgement that it is unknown what impact they could have, this ‘experiment’ should not be allowed to proceed given its close proximity to the Mitchell and Perry Rivers, the unique Chain of Ponds and the Gippsland Lakes Ramsar location. Knowing that the flocculants are harmful to aquatic life means the environmental risks from the use of centrifuges must be rated as high.

## Introduction of centrifuges without rigorous assessment

23. Over two years ago, the Proponent had investigated the use of centrifuges according to one of their Expert witnesses. In Appendix B of Tabled Document 130 from Mr Saracik, a laboratory spin test report using a sample of slimes from the Fingerboards mineral sands mine site was tested for its suitability for dewatering in an Alfa Laval centrifuge in October 2018 (Saracik, 2021; p 1). This is the same company that the

Proponent is proposing to use to supply the centrifuges.

24. As centrifuge testing was undertaken more than two years ago, why weren't centrifuges included in the EES as an option for tailings management, given there are multiple options in the EES for other matters such as transport routes, pumping stations etc.?
25. By not including centrifuges in the EES, it means there has not been a thorough, comprehensive and rigorous scientific assessment of the environmental hazards and risks as well as the potential cumulative impacts to determine if they are acceptable.
26. Did the Technical Reference Group (TRG) consider the use of centrifuges and if so, what was the outcome, and if not, why not?
27. If there was no consideration of the use of centrifuges by the TRG, there has been no compliance review for the safety and efficacy of their use within the context of the many intersecting Project components. Without this review, what guarantees can be given to the community that all the environmental risks have been comprehensively assessed and mitigated?
28. There has been no community consultation about the use of centrifuges which the Proponent is obliged to do under the Ministerial guidelines for the EES. Not including the centrifuges in the EES before it was released for public comment means there has been no community input or stakeholder discussion on the merits of this option, so the Proponent fails to meet their obligations. The Proponent needs to hold a community meeting.
29. The Fingerboards Project is a highly complex project as reflected in the fact there are over 11,160 pages in the EES. It took nearly 4 years for the EES to be completed and over 7 years since the Project was disclosed to the community. For such a complex project, there are extremely high risks of a major failure or an accident, particularly when considering the environmentally sensitive environment in which the Project is proposed to be located. Can the IAC be confident there has been a comprehensive review and evaluation of the introduction of centrifuges to assess their impact across all subject areas of the EES?
30. According to Tabled Document 194, centrifuges have not been used in minerals sands mining before and are therefore untested. The reason for this according to that Technical Note (14) is because of the higher cost of implementing centrifuges when compared to tailings storage facilities:

*"The operating cost of a typical above ground, unlined, conventional paddock style TSF is approximately \$1.50 to \$2.00 per tonne of tailings stored. By comparison, the operating cost of the centrifuge operations is in the range of \$3.50 to \$4.00 per tonne of tailings processed and hauled to the pit for backfill," (Kalbar, 2021; Technical Note 14, p 3).*

31. So, what has really changed to lead to these higher costs now being acceptable by the Proponent? Could a reason be that the environmental risk of the tailings storage facility (TSF) and that its proposed location would have been unacceptable? The argument about the footprint for the TSF in response to IAC question C3 (Kalbar, 2021; Technical Note 14, p 3) appears spurious unless there was now a need for the TSF to be larger than the proposed 90 hectares? The other reason given for proposing the use of centrifuges concerns water availability, which, on a defacto basis, concedes that the requirement of 5 GL of water annually is potentially unobtainable and unpalatable?

32. It has not been established that centrifuges would be a viable option either on a technical or financial basis as no testing other than in a controlled laboratory setting using a laboratory centrifuge has been undertaken. As stated in the 'Testing Aim' in Tabled Document 195, Exhibit 1 to Technical Note 14, from Alfa Laval dated 02/02/21:

*"The results must only be considered as an indication (not a guarantee). In full scale equipment, there are a number of variables available which are not possible to test in a laboratory,"* (Kalbar, 2021; Technical Note 14, Exhibit 1 p 23).

33. No chain of custody documentation was provided to Alfa Laval for samples that were centrifuged. Without chain of custody verification, the results are invalid. As stated in Tabled Document 195 in a report from Alfa Laval dated 02/02/21:

*"The age and origin of the sample is unknown to Alfa Laval,"* (Kalbar, 2021; Technical Note 14, Exhibit 1, p 3 & 12).

34. In Tabled Document 195 it was further stated by Alfa Laval in their report of 02/02/21, in conclusions from testing the slimes:

*"Further work on the optimisation for flocculent dose should be undertaken, testing the type of flocculent, dilution of floc and feed and the impact of water chemistry,"* (Kalbar, 2021; Technical Note 14, Exhibit 1, p 27).

35. A number of matters are therefore unresolved in relation to the flocculant as stated above. Furthermore, potable Perth water was used in the testing dilutions with the laboratory centrifuge (Kalbar, 2021; Technical Note 14, Exhibit 1, p 23). Therefore, the results achieved in the above testing are not transferable to this Project as the water chemistry is different at the Fingerboards.

36. The Proponent advised the EPA in Tabled Document 142 that it would not be in a position to respond to the EPA's questions until a number of Project design matters are more fully resolved. The Proponent stated they would submit the information to the EPA after the Minister for Planning provided an assessment of the environment effects statement for the Project (Kalbar, 2021 Tabled Document 142). Since the design matters for the Project haven't been resolved, how can the IAC make an

assessment of the environment effects, and how can the IAC make that assessment if important questions from the EPA will not be addressed by the Proponent during the hearing?

37. As stated in Tabled Document 42, the reason provided by the Proponent for the late introduction of centrifuges (only weeks before the IAC hearing was due to start on 15 February 2021) was because of an error made in an assumption about the rate of water recovery from the fine tailings (White & Case, 2021; p 2). What other assumptions are incorrect in the EES? Could the introduction of centrifuges without a comprehensive examination of their use in relation to the other subject matters in the EES lead to the exposure of other errors that could have catastrophic impacts on the environment?
38. The speed at which documents have been tabled to the IAC without any form of outside regulatory and statutory review has the real potential for a significant failure to arise that could have major consequences for the environment, and for the health, well-being and livelihoods of landholders and also workers on the site.
39. There are many plans and reports that the Proponent has failed to present in its EES as identified in responses from Expert witness statements. In light of all of what has been said above and when considering the other areas of concern in the rest of this supplementary submission, it is claimed that the EES fundamentally fails to meet its adequacy review. It is stated in the strongest possible terms that this EES is not fit for purpose and the Proponent should be advised that further work is required to enable a proper assessment of the environmental effects of their Project.
40. As the Proponent company has NO experience operating any mine, this should be great cause for serious concern given centrifuges have never been used in mineral sands mining. The Proponent has no track record to demonstrate their capability to manage this in such a highly sensitive location environmentally. The Project area is where many people live, farm, work, play sports and children go to Primary Schools. The precautionary principle dictates that all the risks must be thoroughly and comprehensively assessed. This is particularly important given the highly complex nature of this Project and the lack of rigour that has been applied to assessing the late introduction of a major change in the mining operations.

### Proponent's responsibilities under MRSD Act 1990 have not been met

41. Under the Mineral Resources (Sustainable Development) Act 1990, the purpose of the Act is:

*“to encourage economically viable mining and extractive industries which make the best use of resources in a way that is compatible with the economic, social and environmental objectives of the State,”* (State Government of Victoria, 1990; p 1).



42. Under Division 2, Clause 15 (6B) of that Act:

*“...an applicant for a mining licence or a retention licence must satisfy the Minister that there is a reasonable prospect that the mining of the mineral resource described in the application will be economically viable,”* (State Government of Victoria, 1990; p 56).

43. Will the project be economically viable due to the increased capital and operating costs? No business case, nor an updated cost benefit analysis nor an updated Bankable Feasibility Study have been provided to be able to determine if the Project, as currently presented with the use of centrifuges, is an economically viable project.

44. In response to IAC question C3 (in Tabled Document 194) the Proponent stated that centrifuges have not been used in mineral sands mining because of their cost (Kalbar, 2021; Technical Note 14, p 3). Given this explanation, the Proponent has not provided an updated economic impact assessment to demonstrate that the use of centrifuges is economically viable, to support their use in this Project. The value of the ore body has not changed; however, the capital and operating costs have significantly increased, therefore it is incumbent on the Proponent under the MRSD Act 1990, to demonstrate the economic viability of the Project with the introduction of centrifuges.

45. An Expert witness for Mine-Free Glenaladale, Mr Campbell of The Australia Institute, identified major flaws in the economic impact assessment undertaken by BAEconomics (BAE) for the EES (refer to Tabled Document 93). No further report was provided by BAE in response to the introduction of centrifuges, therefore how can the IAC assess the obligations on the Proponent for the Project to be economically viable under the MRSD Act without that information?

46. In Tabled Document 187, in response to the introduction of centrifuges, Mr Campbell presents his arguments that further challenge the economics of the Project. In his conclusion Mr Campbell states:

*“It remains my opinion that the economic case for the Fingerboards project has been misrepresented, with benefits overstated and costs understated. The proposal for centrifuge use would have been relatively simple if data was provided and if the original cost benefit analysis had followed standard methods. Unfortunately, this is not the case, adding to the uncertainty around the economics of the project,”* (Campbell, 2021; p 1).

47. In Tabled Document 93, Mr Campbell raises important consequences should the economic assessment be faulty:

*“The Fingerboards project presents considerable risks and uncertain benefits for the East Gippsland and wider Victorian communities. Having been abandoned by a major, publicly-listed company, it is now being pursued by a relative minnow of the mining world, leaving considerable risk that even if*

*approved the project could stall indefinitely, prolonging community division, or if commenced it could be abandoned leaving the community with rehabilitation costs, as has occurred recently in the region,”* (Campbell, 2021; p 18).

48. In relation to both of the tailings management options, the Proponent has not demonstrated that the Project is economically viable and therefore the requirements under the MRSD Act 1990 have not been met.

### EES Scoping Requirements have not been met

49. There has been no reporting by the Proponent in relation to the EES Scoping Requirements with the introduction of centrifuges. The Proponent needs to document how the Scoping Requirements and Evaluation Objectives have been met.
50. In Dr Jasonsmith’s Expert witness supplementary report for Mine-Free Glenaladale, in paragraphs 3, 17, 18 and 19 she makes the point that the scoping requirements were not considered in relation to Evaluation Objective 4.3 and 4.8 (Jasonsmith, 2021; p 1, 2, 5, & 6).

### Competition for water fails to meet EES scoping requirements

51. In Tabled Document 42, Mr Power, the Proponent’s legal representative from White & Case lawyers, stated the following:

*“It has become evident that one of the assumptions that underpins the Project water balance in EES Appendix A006 (Appendix A) - the water recovery rate from fine tailings – is incorrect.”* (White & Case, 2021; p 2).

52. In response to the revelation of this significant error in the EES, in an Expert witness statement (Tabled Document 81), Mr Sweeney from Coffey Services, the consultancy company engaged by the Proponent, stated the following:

*“When applying the corrected water recovery rate, the corresponding water supply requirement for the project when using amphirols alone would be in the range of 4 to 5 GL/year,”* (Coffey, 2021; p 7).

53. Should the tailings storage facility, as documented in the EES, be put forward as an option for managing tailings waste if centrifugation fails to be viable, 5 GL of water could be required by the Project which means an additional 2 GL of water would be needed on an annual basis for the life of the Project, in addition to 3 GL stated in the EES. This will have a significant impact on other ground and surface water users, with the horticulture industry in the Lindenow Valley potentially seriously impacted. Any expansion plans by the horticulture industry would be threatened due to an even larger water consumption amount required by the Project.

54. As indicated by Southern Rural Water (Tabled Document 38), only 2 GL of 6 GL of winter-fill water available through the Gippsland Regional Sustainable Water Strategy is potentially unallocated (Southern Rural Water, 2021; Item 4 p 3). Should the Project require 5 GL of water, at least 3 GL would need to be identified from groundwater licences which are fully allocated (Southern Rural Water, 2021; Item 7 p 5).
55. The increased water needs of the Project, as identified as a result of the water recovery error, will further exacerbate water security concerns for the horticulture industry. The Project would be competing with pre-existing users for even more water which means that the EES scoping requirements are not met. Detrimental financial impacts would be expected for the horticulture business owners with impacts on their farm production and livelihoods, as without sufficient clean water, their businesses cannot operate.
56. In considering the use of centrifuges, the amount of water required by the Project remains approximately the same as originally specified in the exhibited EES which is nearly 3 GL. As indicated in point 54 above, the maximum of unallocated water according to Southern Rural Water (SRW) is 2 GL which is proposed to become available later this calendar year. This is water that was proposed for use by the horticulture industry. SRW states that the water would be made available to the highest bidder which puts the Project in competition with the horticulture industry for water which means that the scoping requirements for the EES have not been met.
57. The arguments and issues presented in Chapter 7 (Horticulture) of EES Submission #813 also apply to the use of centrifuges (refer to section 3 'Impact on Water' pages 316 to 320). The concerns relating to water security and the competition for water with existing users are not alleviated with the introduction of centrifuges and the detrimental impacts of the Project still exist.
58. Since submissions were lodged, pressure on the availability of water has increased with no licences for groundwater available, and 4 GL of the 6 GL of winter-fill water allocated leaving possibly 2 GL which will put the Project in direct competition with the horticulture industry and other landholders for that final allocation of 2 GL of winter-fill.
59. EES scoping requirements are not met in relation to both the TSF and centrifuge options, in that the Project's need for water WILL compete with other users.

### Safety concerns with the use of centrifuges

60. Accidents have occurred overseas with centrifuge use and as centrifuges are untested in mineral sands mining, the risk of an accident that will cause injury or death to workers is high.

61. Although the Proponent was repeatedly requested to provide the full specifications for the centrifuges, this information has not been provided. The potential hazards, likelihood of harm as a result of these hazards, and how harm might manifest as a result of using centrifuges has not been provided by the Proponent to enable an assessment of environmental risks.
62. The centrifuges will require massive concrete foundations. The Proponent states the centrifuges need to be moved several times to be near the mining operations. What will happen with all the concrete foundations? How stable will the concrete foundations be given they will be located on dispersive soils?
63. As the soils in the area are dispersive and prone to tunnel erosion, what impact will vibration from the operation of at least six centrifuges 24 hours a day, seven days a week have on the underlying soils? No testing has been done to assess the risks, so the environmental impacts have not been assessed.
64. There will be radionuclides in the centrifuges. Has any assessment been done on the risks from a number of different radionuclides intersecting with each other inside the centrifuge and what potential hazards could be created as a result?
65. Expert witness Dr Jasonsmith in her supplementary witness statement identifies another hazard and questions whether the potential risk and consequences were considered:

*“There is the potential for the fines component of tailings to cake screens within the centrifuges and prevent water extraction. This is because caking of screens within centrifuges can create an impermeable barrier to water, thereby requiring the cake to be cleaned from the screen if water extraction is to continue. This hazard, its potential risk (i.e. likelihood of causing harm), and its consequences were not considered,” (Jasonsmith, 2021; p 8).*

## Impact on human and animal health

66. As indicated above, stockpiles of tailings waste cake from the centrifuges will be accumulating overnight while the centrifuges are operating and there are no truck movements to deposit the cake in the mine void. According to the Proponent’s revised Draft Work Plan (Tabled Document 197) enormous quantities of HMC will also be accumulating in stockpiles out in the open prior to shipping:

*“Up to 500,000 t of concentrate may be stockpiled on a temporary basis adjacent to the WCP, depending on market demand for the concentrate,” (Kalbar, 2021; p 5-2).*

67. The HMC contains thorium and uranium which are risks to human health. In addition to the risks of leaching should rainfall events occur, if the stockpiles are left for any period of time due to a range of reasons, and the cake and HMC becomes dry on the upper layers, there are risks of toxic substances dispersing as dust and

becoming airborne. This poses a significant risk to human and animal health.

68. In Dr Tillman Ruff's Expert witness statement for Mine-Free Glenaladale on the radiation health impacts of the Project, he stated:

*"Any and all levels of ionising radiation exposure, including doses far too low to cause any short-term effects or symptoms, are associated with increased risks of long-term genetic damage, a variety of chronic diseases, and increases in almost all types of cancer, proportional to the dose. There is no dose of radiation below which there is no incremental health risk. These excess risks persist for the lifetime of those exposed,"* (Ruff, 2021; p 7).

69. In the summary of his conclusions and recommendations Dr Ruff also said:

*"New evidence shows that radiation risks to health are greater than previously thought and are not adequately reflected in regulatory limits. Health risk exists below the maximum permissible doses for the public and for workers. Radiation health risks associated with chronic diseases approximately double the risks associated with cancer,"* (Ruff, 2021; p 1).

70. Hundreds of people live within a few kilometres of the Project boundary. Although more sensitive receptors have been recently identified by the Proponent, they have still failed to identify all residences within 3km of the mine boundary. Therefore, the full impact on human health has not been assessed in terms of noise and dust.
71. The actual impact of noise has not been declared as the test results for noise from the centrifuges were produced without any product entering or leaving the centrifuges and the outlets were sealed. What will be the real noise levels from operating 6 centrifuges with product loaded? Is it acceptable given so many families live nearby and mining operations will continue throughout the night and into the early hours of the morning?
72. There are further human health risks because the centrifuges will be operating throughout the night. It is unacceptable for the noise of an industrial mining operation to be in a residential area where hundreds of people including children live. The noise is expected to have human health impacts from interrupted sleep which is unacceptable. The centrifuges must not be allowed to operate during the night. The IAC needs to question what the actual noise impacts will be from centrifuges operating with product and outlets unsealed.
73. With the massive increase in flocculant use, there has been no reporting on the health implications for workers and community members. The [National Toxicology Program's Report on Carcinogens](#) considers acrylamide to be a human carcinogen based on studies in laboratory animals that were given acrylamide in drinking water (National Cancer Institute, 2017).

## Increased power consumption and costs

- 74.** According to Technical Note 14, electricity use will increase from 9,000 kVA to 14,000 KVA (Kalbar, 2021; p 2) which will greatly increase the electricity and greenhouse gas emissions of the Project adding significant additional costs to the increased financial liabilities of centrifuge use.
- 75.** Will the electricity grid be able to be upgraded and will it cope with the surges of power during centrifuge operation? What impact will this have on household and business users and most particularly on essential services such as the hospital and local schools?
- 76.** According to Tabled Document 194 (Technical Note 14), Kalbar has engaged AusNet Services to conduct a feasibility study to determine the scope and cost of works required to connect the Project to the existing 66kV network, including any necessary upgrade works (Kalbar, 2021; p 5). As the Project has been under consideration for over 4 years it is unacceptable at this point for this matter to not be known and is yet another area of the EES that has not been resolved.
- 77.** How will the huge extra power inputs for 6-8 centrifuges, equate with the State's Greenhouse Gas emission targets? In Technical Note 14, it states that revised greenhouse gas inventory for the use of centrifuges is to comply with the reporting obligations in the "*National Greenhouse Gas and Energy Reporting Act 2007 (Cth)*" (Kalbar, 2021; p 2) however no justification as to how this is to be achieved, is provided.
- 78.** As indicated in Technical Note 14, the inclusion of centrifuges would represent a 15% increase in Greenhouse Gas emissions "*if no other changes to the project were made,*" (Kalbar, 2021, p 11). No explanation has been provided in relation to meeting Victorian Government GHG emission targets? It was further stated that a complete GHG inventory for the Project with the introduction of centrifuges has not been prepared so it cannot be stated that the impact is expected to be the same as with the TSF.

## Impact on soils

- 79.** The soils in the Project area are problematic and recognised as being prone to tunnel erosion. The soil erosion potential in relation to centrifuged tailings has not been considered in relation to the introduction of centrifuges (Drake, 2021; p 11).
- 80.** Depositing the tailings cake and tailings in the mine void means the soil structure in the Project area will be changed. What impact will that have on the ability of the soil to filter water that will eventually find its way into the rivers and waterways?
- 81.** Will the land be able to be returned to its prior agricultural use and will it be safe to grow pasture and crops given the new soil structure, and to graze animals? Will

trees be able to develop a root system given the presence of tailings and flocculant in the subsurface soil?

82. How stable will the centrifuges be given the placement of their foundations on sodic dispersive soils, will liquefaction occur?

## Rehabilitation concerns

83. In the Expert supplementary witness statement from Dr Drake (Tabled Document 210) she stated:

*“It is in my opinion that the Fingerboards EES has not adequately considered the centrifuged management of tailings in rehabilitation, closure plans or design criteria (Drake, 2021; p 5).*

84. Given the increased financial costs associated with the centrifuges, it is likely that the Project would be abandoned, and that rehabilitation won't happen. It is vitally important that the rehabilitation bond is set at an appropriate level to reflect the increased risks of the Project being abandoned due to these increased costs and the potential that centrifuges are not likely to be technically feasible given they are untested in mineral sands mining.
85. It is totally unacceptable that the Proponent provided the 'Draft Mine Rehabilitation Plan' less than 24 hours before the Supplementary Submissions were due. As the document is too long to review in time as well as draft a response, it would be expected that submitters would be able to provide their feedback about this document at the time of presenting to the IAC. This is yet another example where information is being rushed through by the Proponent leaving those impacted no time to consider the implications. If a major error in such an important matter as the water balance can be made after 4 years of evaluation, what errors in assumptions and data is occurring through this rushed process where regulatory scrutiny is also not taking place.

## Work plan variation concerns

86. The Proponent made it clear in its legal arguments, as outlined in Tabled Document 141, that they were seeking to replace the tailings storage facility (TSF) option in their EES with the use of centrifuges.
87. In Tabled Document 212, the IAC made a ruling that confirmed that centrifuges alone were to be considered, so the TSF is no longer an option to dewater tailings in the environment effects assessment for the Fingerboards mineral sands Project EES.

88. In its ruling the IAC stated,

*“From the date of this ruling, the IAC’s assessment of environment effects and recommendations to the Minister with respect to the Project, in the context of the exhibited EES, and subsequent technical and other submissions, will only consider the centrifuges as described in Technical Note 1 in relation to fines tailings treatment and management,”* (Planning Panels Victoria, 2021; p 4).

89. It is submitted that Technical Note 1 is manifestly inadequate as a basis for supporting the capability of the Project to dewater tailings (which is based on laboratory scale testing) for the reasons outlined earlier in this submission. As stated by Dr Jasonsmith in her Supplementary Statement:

*“The Fingerboards Technical Note is a brief document that does not present an assessment of the potential impacts of the centrifuges and associated tailings discussed on soil, groundwater, or surface water. I consider it cannot be used as an addenda to the Fingerboards EES and is inadequate as a means of addressing environmental concerns at the proposed Fingerboards mine in its current form,”* (Jasonsmith, 2021; p 8).

90. With reference to the information presented in this Supplementary Submission, the position is put most strongly that there is a very high level of uncertainty that centrifuges would be a successful option to dewater the mine tailings.

91. There are too many examples where after an EES and Work Plan have been ‘awarded’ to a proponent, that Earth Resources Regulation has approved a Work Plan variation without requiring that mining company to consult with the community nor inform the community of that variation. It would be a gross manipulation of the EES process if the Proponent avoided scrutiny of the TSF by presenting a potentially unviable option (centrifuges) as a ‘decoy’. Therefore, it is requested that the IAC, in making its recommendations to the Minister, advise the Minister that the environment effects of a TSF were not assessed at the request of the Proponent. Is the IAC able to indicate that a Supplementary EES would be required if the centrifuges option was not pursued for whatever reason by the Proponent? This would ensure that the environment effects of a TSF and 5 GL of water was assessed should the Proponent decide to pursue that option at some later stage.

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