WHITE & CASE

1 April 2021

By Email
Mr Nick Wimbush
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Dear Mr Wimbush,

Fingerboards Mineral Sands Mine EES Inquiry: Emails from submitter 639

We continue to act for Kalbar Operations Pty Ltd (**Kalbar**).

We refer to your letter to Kalbar dated 16 March 2021 (Tabled Document 219) and to the emails from submitter 639 (Mr Andrew Helps) to the Inquiry and Advisory Committee ("**IAC**") attached to it, namely:

- Email Title - The use of centrifuges, 30 January 2021 (Tabled Document 219A)
- Email Title - KALBAR -Fingerboards Radionuclides Mine, 6 February 2021 (Tabled Document 219B)
- Email Title - Significant changes to the KALBAR operational equipment list, 10 February 2021 (Tabled Document 219C)
- Email Title - Ongoing submissions of data, 26 February 2021 (Tabled Document 219D)
- Email Title - KALBAR Human Health Risk Assessment, 28 February 2021 (Tabled Document 219E)
- Email Title - Fingerboards Human Health Risk Assessment Table 9.7 Page 82 - the need for a standardised toxicity standard, 8 March 2021 (Tabled Document 219F).

This letter sets out Kalbar's response to the technical issues raised by Mr Helps in Tabled Documents 219A-F.

Centrifuge staffing requirements (raised as an issue in Tabled Document 219A)

The centrifuges will not be manually 'loaded' or 'unloaded'. The fines tailings will be pumped from the thickener underflow to the centrifuge building serving each mining unit plant ("**MUP**"). This will be an automated process, overseen by the MUP and control room operators.

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Consistency of the centrifuge feed and the presence of clay (raised as an issue in Tabled Document 219A)

The issue raised by Mr Helps is very general and the context for it is unclear.

There are many different applications for centrifuges, and different types of centrifuges can be used for each application. While it may be the case that the presence of clay presents a problem for some applications, the very reason centrifuges are proposed for the Fingerboards Project is to recover water from the clays and silts present in the ore body. The solid bowl decanter centrifuges proposed to be used for the Project have been selected because they are designed to deal with clays and silts.

Furthermore, variability in the content of the fines tailings will be buffered in the thickener, which then allows time for flocculation dosing rates to be adjusted as required during the centrifuge process. As explained in TN 014 (Tabled Document 194) in response to IAC's question C4, the nominal (average or usual) flocculant dose rate used during the centrifuge process will be approximately 370g/tonne of dry solids, but this may be incrementally increased or decreased to deal with the fines content in the underflow slurry from the thickener.

Release of radon (raised as an issue in Tabled Document 219A)

Mr Helps states that 'ore bodies are all capable of releasing large amounts of RADON during the mining processing operations'.

Radon impacts are addressed in section 9.1.3 of the radiation assessment report (EES, Appendix A011) and the expert witness statement of Darren Billingsley dated 29 January 2021 (Tabled Document 79).

Radionuclides - carcinogenic slope factors (raised as an issue in Tabled Documents 219A, C and D)

Mr Helps queries why Kalbar has not published a radionuclide carcinogenic slope factor table for the Fingerboards ore body.

Carcinogenic slope factors are commonly used by the United States Environmental Protection Agency ("**US EPA**"), but not for radiation protection in Australia. The Australian Radiation Protection and Nuclear Safety Agency ("**ARPANSA**") prepares dose assessment methodologies and standards used in this country. ARPANSA's methodologies and standards are based on guidelines published by the International Commission on Radiological Protection ("**ICRP**").

The US EPA report that Mr Helps refers to in Tabled Document 219A[1] compares the methods used by the US EPA and the ICRP. This report indicates that the ICRP methods may over-estimate potential risk from radionuclides. If that statement is correct, the ARPANSA/ICRP method adopted by SGS for the EES radiation assessment report (EES, Appendix A011) would be a more conservative approach than the method promoted by Mr Helps.

Regardless of the comparison between these different radiation assessment methodologies and standards, we note that all methodologies and standards used by SGS to predict baseline or potential future impact exposures associated with the Project are described in the EES radiation assessment report (EES, Appendix A011), and have been reviewed by regulatory experts in the Department of Health.

[1] *Radiation Exposure and Risks Assessments Manual*, US EPA June 1996 at page 1-9.

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We also make the following comments in relation to the table of Radionuclide Carcinogenicity Slope Factors provided by Mr Helps (File 8319.xlsx dated 20 August 2020):

- Mr Helps has provided a variety of radionuclide carcinogenetic slope factors. However, he has provided no context for them, only a list of limits.
- Some radionuclides listed in the table are present in the Fingerboards ore, but many are not present or are inconsequential. For example, radionuclides of arsenic, antinomy, tin and vanadium and tungsten are not naturally occurring in the ore, and it is unclear why they are listed, or how they are relevant to the Project. A number of the natural radionuclides present in the ore, including U and Th decay products, are not in Mr Helps' list.
- Kalbar accepts that radioactive materials present in the buried ore may be above typical background levels, if that is what Mr Helps is trying to demonstrate. However, that same buried ore is already exposed at the surface in the Perry Gully and Simpsons Gully, potentially washing into the Mitchell River. Radioactivity is also present naturally in other surface waters, as well as in groundwater that currently interacts with the buried ore body and which may be pumped to the surface for use.
- The table provides a list of risk factors but it does not relate them back to the Fingerboards ore. There is no quantification of risk, or discussion of impacts resulting from the Project above existing conditions. The radiation assessment report (EES, Appendix A011) does assess potential Project impacts above existing baseline conditions.

Calculation of rare earth/toxic element/compounds (raised as an issue in Tabled Documents 219A and B)

Mr Helps has provided calculations for the Fingerboards ore, based on samples analysed by Envirolab (analysis #22941). The calculations presented are generally not consistent with the *National Environment Protection (Assessment of Contaminated Sites) Measure*, as amended in 2013 ("**ASC NEPM**"). In particular:

- While is it acknowledged Australian soil, water and air guidance does not establish criteria for many of the chemicals listed in Mr Helps' calculations, the source of toxicity information listed is only obtained from US agencies and does not assess other relevant sources, Australian policy and other considerations noted in the enHealth or ASC NEPM guidance.
- The classification of carcinogenicity should be based on classifications provided by the US EPA's Integrated Risk Information System and the International Agency for Research on Cancer, rather than the Californian EPA, to be consistent with the ASC NEPM.
- The acceptable incremental lifetime risk of cancer ("**ILRC**") is 1E-5 in Australia[2], and calculations based on international toxicity reference values should be adjusted according.
- There is no consideration of whether the chemicals should be evaluated as carcinogenic based on genotoxicity endpoints.

[2] As described in enHealth (Environmental Health Risk Assessment - Guidelines for Assessing Human Health, 2012) and the ASC NEPM.

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- Exposure inputs have not been presented and do not appear to have used in the calculation of a chemicals' hazard index ("**HI**") or ILRC.
- Background exposures have not been considered.
- The calculation of chronic daily intakes and the risk characterisation has not been presented. Furthermore, based on the HI equation presented at the top of the attachment, this work does not appear to have been done in accordance with Australian guidance (enHealth and ASC NEPM).

Explosion/fire risk (raised as an issue in Tabled Documents 219C and D)

It is important to note that the Fingerboards ore does not contain free metal. All metals are bound in phosphate, oxide or aluminosilicate minerals. For example, the zirconium metal - zircon - is a wholly oxidised zirconium silicate. Zircon is a refractory and is commonly used in ceramics to provide a glossy white coating to tiles, toilet bowls and sinks. Zircon does not explode or catch fire, even in the finest dust form.

"Centrifuge" is a commonly used industrial term. Mr Helps refers to the involvement of centrifuges in a mine accident in central west China in mid 2020, but provides no other information about the circumstances of this accident. Nevertheless, if there were such an accident, we suspect the centrifuges were being used for the purification of radionuclides, rather than tailings management. For the Fingerboards Project, decanter centrifuges are proposed and these devices are only operated wet, to separate the water from fine clays and silts. They will not process or concentrate radioactive compounds, as the majority of these naturally occurring minerals will be separated out with the heavy mineral concentrate.

Leachate concentrations presented in the human health risk assessment (raised as an issue in Tabled Documents 219E and F)

Mr Helps is concerned that the data reported in Table 9.7 of the human health risk assessment (EES, Appendix A019) (**HHRA Report**) is presented in mg/L units rather than ug/L, and that it is provided for only 14 metals.

Dealing first with the reporting unit:

- Table 9.7 of the human health risk assessment (EES, Appendix A019) ("**HHRA Report**") presents the leachate concentrations associated with tailings, heavy mineral concentrate and overburden provided in the Geochemistry report prepared by Environmental Geochemistry International ("**EGi**") dated 14 April 2020 (EES Appendix A006/Appendix D) ("**EGi Report**"). While the concentrations are reported in mg/L units, all of the concentrations shown have been analysed by the laboratory at the more sensitive ug/L level, as indicated by the number of decimal places.
- The laboratory analysis for the EGi Report was undertaken by Envirolab, in accordance with the Australian Standard Leaching Procedure (Australian Standards AS 4439.2-1997 and AS 4439.3—1997). This procedure is specified by Victoria EPA in its *Waste disposal categories – characteristics and thresholds* guideline (publication number 1828). Both the Australian Standard and the EPA guideline 1828 require results to be reported in mg/L, not ug/L.
- The sensitivity requested (the limit of reporting) is determined by the sensitivity of the screening criteria. The Tier 1 health screening criteria for barium, boron, copper and zinc are in mg/L, whereas all the other metals in Table 9.7 required more sensitive limits of reporting.

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- The mg/L units presented in Table 9.7 of the HHRA Report are consistent with the summary of guideline values set out in Table 10.5 of the Australian Drinking Water Guidelines, the units in the EGi Report (see in particular the laboratory certificates of analysis included in Appendix D to the EGi Report), and all the tables relating to water in the HHRA Report.

As for the range of metals tested, the Envirolab laboratory analysis for the EGi Report included over 40 analytes of which most were metals and metalloids. However, as noted in section 6 of the HHRA, the metals shown in Table 9.7 of the HHRA report were selected based on abundance in tailings and soils and toxicity to humans, with other metals considered in the Tier 1 assessment of air.

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Please do not hesitate to contact me if you have any questions.

Yours sincerely,

[redacted]

Tim Power
Partner
[redacted]

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