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FINGERBOARDS MINERAL SANDS PROJECT, INQUIRY AND ADVISORY COMMITTEE

OVERVIEW

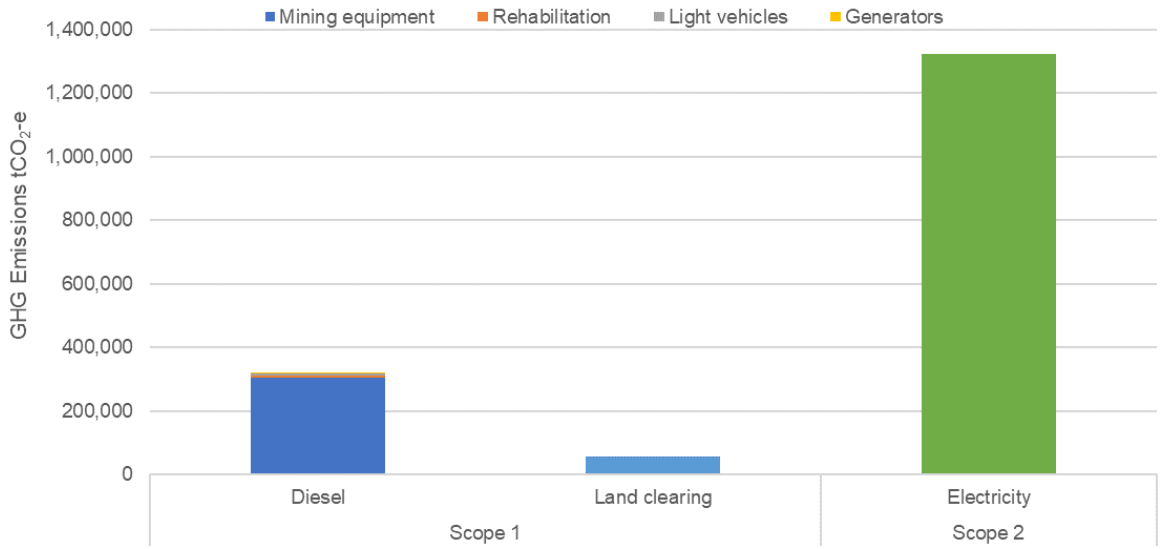
- Summary of findings
- Introduction
- IAC Statement 1
- IAC Supplementary Statement
- IAC Second Supplementary Statement

SUMMARY OF FINDINGS – AIR QUALITY

- AQ assessment conducted to comply with PEM Level 1 assessment requirements for extractive industries
- Considered Project Years 5, 8 and 12 due to overburden extraction rates and proximity of mining activities to receptors
- Characterised meteorology using 12-months of on-site data and TAPM meteorological model
- The EES air quality assessment identified standard dust control measures and additional control measures that will be applied to minimise the emissions and potential impact of dust from the Project
- By adopting these control measures, the Fingerboards Project can be conducted and managed so as to achieve compliance with the objectives contained in the PEM, the SEPP AAQ and the Proposed Final Environment Reference Standard
- An air quality management plan will be implemented that includes: dust mitigation measures, ongoing monitoring program and procedures for implementing additional mitigation measures in response to forecast conditions and particulate monitoring

SUMMARY OF FINDINGS – GHG

- Greenhouse gas (GHG) emissions assessment conducted in accordance with the PEM GHG
- Diesel usage 18% of life of Project GHG emissions
- Electricity 78% of life of Project GHG emissions
- Land clearing 3% of life of Project GHG emissions
- Maximum annual GHG emissions (Scope 1 + Scope 2) of 116,788 CO2-e, which represents 0.02% and 0.13% of national and state emissions inventories
- Scope 3 emissions associated with the preferred option of offsite haulage to the Fernbank East rail siding are estimated to be 5,406 tCO2-e per year



INTRODUCTION

- I hold the following qualifications:
  - I am a Director of Katestone Environmental Pty Ltd (Katestone), a consulting firm that works in the areas of air quality, dust, odour, greenhouse gases, climate and weather forecasting.
  - I hold a Bachelor of Environmental Engineering (Hons) from the University of Queensland.
  - I have worked for 26 years in the field of air quality including 5 years at the New South Wales EPA.
  - Katestone has produced many air quality impact assessment studies of mining and industrial activities including projects in Australia, Thailand, Myanmar, Bangladesh, Vietnam, PNG, Fiji and Ireland.
  - I have completed dust emissions and control benchmarking studies for coal mining, coal rail transport and bulk materials handling and other industries for State Governments, industry and other groups.
- Katestone was engaged by Kalbar to complete AQ and GHG assessments for the EES
- I have prepared three statements for the IAC, which are discussed below

STATEMENT 1 - OVERVIEW

- Dust metrics
- Legislative framework for AQ
- Assessment against SEPP AAQ objectives
- Meteorological data
- Dust suppression on haul roads
- Additional sensitive receptors

DUST METRICS

- TSP refers to the total of all particles suspended in the air. When TSP is measured using the standard method (a high-volume air sampler), the maximum particle size has been found to be approximately 30 µm.
- PM_{10} is a subset of TSP and refers to particles suspended in the air with an aerodynamic diameter less than 10 µm.
- $PM_{2.5}$ is a subset of TSP and PM_{10} and refers to particles suspended in the air with an aerodynamic diameter less than 2.5 µm. $PM_{2.5}$ is also called fine particulate matter.
- $PM_{2.5}$ is generated by combustion e.g. fuel combustion in motor vehicles and open burning and to a lesser extent by wind erosion of dust.
- Dust deposition rate is defined as the mass of particulate matter that collects on an area over a one-month period. Dust deposition rate is used as a metric of the potential for particulate matter to cause nuisance. Deposited dust tends to be dominated by TSP.
- Other relevant pollutants: silica, heavy metals

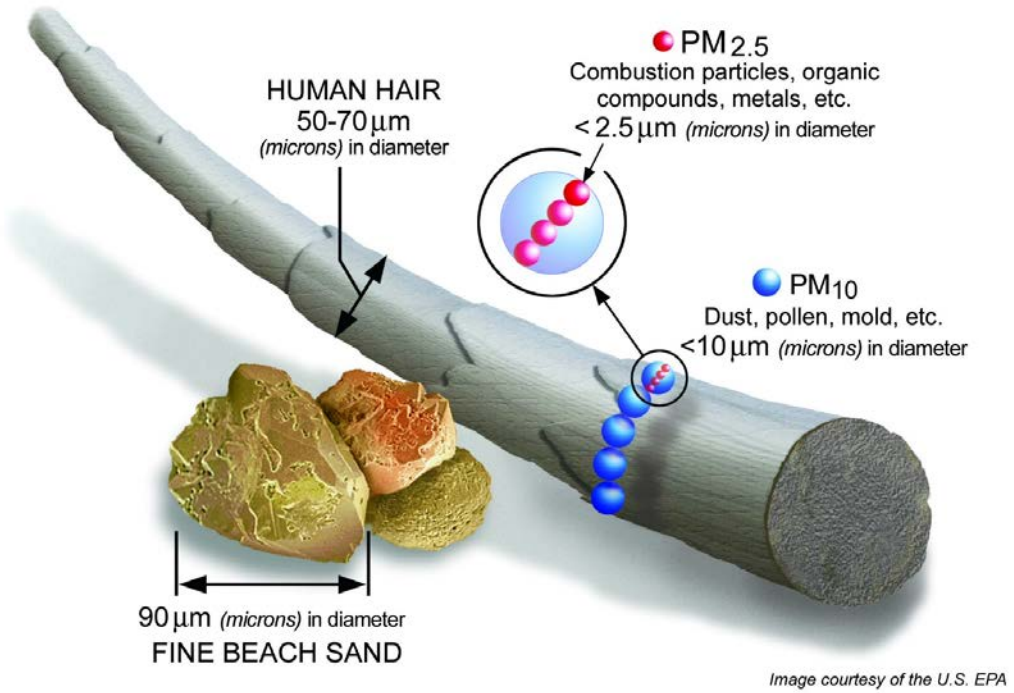


Image courtesy of the U.S. EPA

LEGISLATIVE FRAMEWORK FOR AQ

- General environmental duty to eliminate risks of harm to human health and environment so far as is reasonably practicable
- Proposed Final Environment Reference Standard – key differences with PEM are objectives for PM_{10} and $PM_{2.5}$
- Environmental values of the ambient air environment that are to be protected, which are:
  - Life, health and well-being of humans
  - Life, health and well-being of other forms of life, including the protection of ecosystems and biodiversity
  - Local amenity and aesthetic enjoyment
  - Visibility
  - The useful life and aesthetic appearance of buildings, structures, property and materials
  - Climate systems that are consistent with human development, the life, health and well-being of humans, and the protection of ecosystems and biodiversity.
- Indicators and objectives that are to be used to measure, determine or assess whether environmental values are being achieved, maintained or threatened

Table 2 Proposed Final ERS indicators and objectives for the ambient air environment

Column 1 Indicators	Column 2 Objectives	Column 3 Averaging period	Column 4 Maximum exceedances
Carbon monoxide (maximum concentration)	9.0 ppm	8 hours	1 day a year
Nitrogen dioxide (maximum concentration)	0.12 ppm	1 hour	1 day a year
	0.03 ppm	1 year	none
Sulfur dioxide (maximum concentration)	0.20 ppm	1 hour	1 day a year
	0.08 ppm	1 day	1 day a year
	0.02 ppm	1 year	none
Particles as PM_{10} (maximum concentration)	50 µg/m^3	1 day	none
	20 µg/m^3	1 year	none
Particles as $PM_{2.5}$ (maximum concentration)	25 µg/m^3	1 day	none
	8 µg/m3	1 year	none

ASSESSMENT AGAINST SEPP AAQ/PROPOSED FINAL ERS

- To address submissions on the EES, dispersion modelling was revised to assess Project against SEPP AAQ and Proposed Final ERS objectives
- As a result, the following additional mitigation measures were identified

59. The following mitigation measures have been considered:

- Scenario 1:
  - The EES air quality assessment assumed that overburden would be extracted using scapers. This scenario investigates the use of truck and shovel to extract overburden rather than scapers. Kalbar has determined that extraction of overburden by truck and shovel is viable.
  - The EES air quality assessment assumed that grading would occur continuously 24-hours per day. This scenario investigates grading for 12 hours of the day from 6am to 6pm (at the EES activity rate). This control measure is required from a noise abatement perspective.
  - The EES air quality assessment assumed that product haulage would occur 24-hours per day. This scenario investigates product haulage for 11 hours of the day at 2.2 times the EES activity rate. This control measure is required from a noise abatement perspective.
- Scenario 2: The EES air quality assessment assumed that overburden extraction would occur 24-hours per day. The assessment found that for nine days in Year 5, three days in Year 8 and 37 days in Year 12, additional mitigation measures in the form of ceasing certain activities was required to achieve compliance with the PEM objectives. This scenario adopts the mitigation measures described in Scenario 1, and also ceases overburden extraction during the night as a reactive control to be implemented in the event of elevated dust to achieve compliance with the SEPP AAQ environmental quality objectives for PM_{10}. As part of this scenario, the overburden extraction could occur at twice the normal rate during the day (6am to 6pm).
- Scenario 3: The EES air quality assessment assumed that overburden haulage and grading would occur 24-hours per day in the east and west pits. The assessment found that for nine days in Year 5, three days in Year 8 and 37 days in Year 12, additional mitigation measures in the form of ceasing certain activities was required to achieve compliance with the PEM objectives. This scenario adopts the mitigation measures described in Scenario 2 and further, ceases overburden haulage in the east pit and ceases grading in the east and west pits during the day as a reactive control to be implemented in the event of elevated dust to achieve compliance with the SEPP AAQ environmental quality objectives for PM_{10}.

ASSESSMENT AGAINST SEPP AAQ/PROPOSED FINAL ERS

- Control measures specified in Scenario 1 in addition to the EES controls achieve compliance with the SEPP AAQ objective for annual average concentrations of PM_{10}
- Scenario 1 also reduces the number of exceedances of the 24-hour SEPP AAQ objective for PM_{10} to one day per year
- The remaining additional exceedance day can be avoided by implementing the additional controls that are detailed under Scenario 2 for Year 8 and 12.
- For Year 5, both Scenarios 2 and 3 are required to mitigate the additional exceedance.

Table 5 **Additional control measures to achieve compliance with SEPP AAQ Environmental Quality Objectives for PM_{10}**

Year	Mitigation scenario	Complies with SEPP AAQ[1] objective for annual average concentrations of PM_{10}? (Y/N)	Complies with SEPP AAQ[1] objective for 24-hour average concentrations of PM_{10}? (Y/N), additional exceedance days
Year 5	EES	N	N, 9
	1	Y	N, 1
	2	Y	N, 1
	3	Y	Y, 0
Year 8	EES	N	N, 3
	1	Y	N, 1
	2	Y	Y, 0
Year 12	EES	N	N, 37
	1	Y	N, 1
	2	Y	Y, 0

Note
[1] The SEPP AAQ objectives for PM_{10} are equal to the objectives contained in the Proposed Final Environment Reference Standard

METEOROLOGICAL MONITORING

- Various submissions related to the validity of the meteorological monitoring data
- The following points are relevant:
  - Sited and operated in accordance with Australian Std
  - Conducted in accordance with PEM and approved by EPA Vic
  - I inspected the monitoring station and am satisfied that the meteorological station is sited appropriately
  - Reviewed terrain data – site would not be subject to significant shielding
- Data loss did not have an adverse impact on the air quality assessment

DUST SUPPRESSION ON HAUL ROADS

- Submissions suggest there is insufficient water available for dust suppression
- EES assumed water alone for suppression on haul roads; however, additives can be used to reduce water usage
- EES air quality assessment (Table 13, page 37-39) provides a range of dust control measures that will be used in addition to watering to control emissions of dust from haul roads, cleared areas and stockpiles, which includes:

Haul roads

- Pave surface of product haul roads
- Low silt aggregate for unsealed roads
- Dust suppressants
- Speed limits
- Manage and maintain designated routes
- Minimise haul distances

Wind erosion and cleared areas

- Chemical suppressants
- Revegetation
- Rehabilitation

ADDITIONAL SENSITIVE RECEPTORS

- I understand that subsequent to the EES, additional sensitive receptors were identified within 2km of the Project boundary
- I have considered the locations of these sensitive receptors and in the context of my dispersion modelling
- I conclude that the Project can be conducted and managed to achieve compliance with the SEPP AAQ and Proposed Final ERS objectives by adopting the mitigation measures detailed earlier.

SUPPLEMENTARY STATEMENT - OVERVIEW

- Tailings centrifuge
  - Revised air quality assessment
  - Assessment against SEPP AAQ and Proposed Final ERS
  - Preliminary assessment of greenhouse gas emissions due to centrifuge project

REVISED AIR QUALITY ASSESSMENT

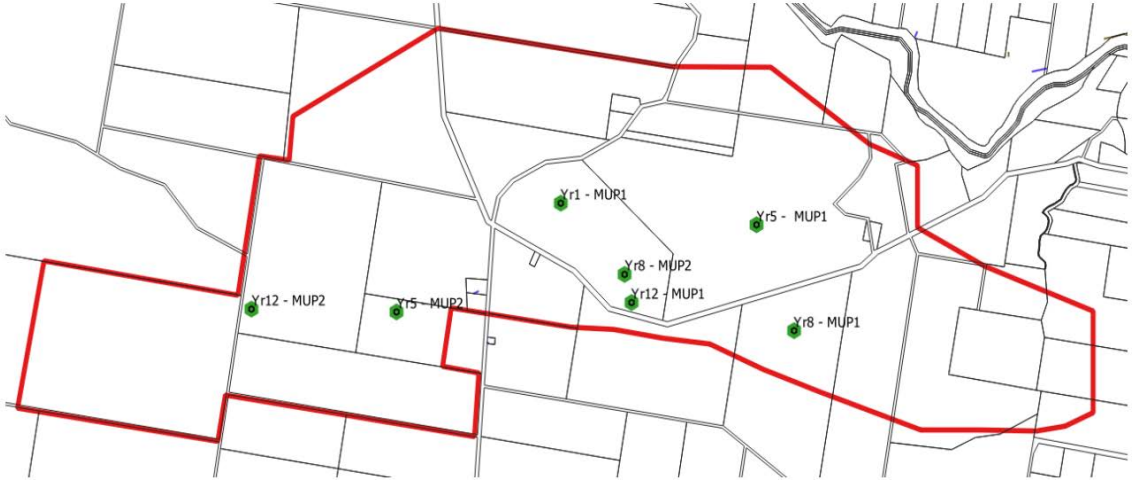
- Air quality assessment was revised to account for changes in the Project due to the use of tailings centrifuges
- Key changes are associated with:
  - Dust emissions due to overburden haulage, vehicle emissions and wind erosion are reduced
  - Dust emissions from tailings management increase
  - For Year 5, TSP and PM_{10} emissions are estimated to reduce by 3-4% and PM2.5 emissions are estimated to increase by 1%
  - For Year 8, TSP and PM_{10} emissions are estimated to increase by 1-2%
  - For Year 12, TSP and PM_{10} emissions are estimated to reduce by 3-4%
- Dispersion modelling of Year 5 and Year 12 revised to account for centrifuge changes
- Dispersion modelling of Year 8 was not conducted because lower predicted concentrations than Year 5 and Year 12 and emissions did not change significantly

ASSESSMENT AGAINST SEPP AAQ AND PROPOSED FINAL ERS

- My Supplementary Statement included dispersion modelling that was based on January 2021 locations of centrifuges
- I have been advised that centrifuge locations were revised in May 2021
- I have revised dispersion modelling results to account for the May 2021 centrifuge locations

JANUARY 2021

MAY 2021



ASSESSMENT AGAINST SEPP AAQ AND PROPOSED FINAL ERS

- Predicted concentrations of are not significantly different (<2%) as a result of the change in centrifuge location from January 2021 to May 2021
- Cumulative concentrations of PM_{10} due to the Project with centrifuges are marginally lower than the EES in Year 5, 8 and Year 12
- The outcome of the revised AQ assessment is that the Project using centrifuges can comply with the SEPP AAQ and Proposed Final ERS objectives with the adoption of the control measures detailed earlier in my presentation

SECOND SUPPLEMENTARY STATEMENT

- My second supplementary statement was prepared to provide a detailed emissions inventory for the Project with tailings centrifuges
- An equivalent methodology to the EES was used with the following adjustments:
  - Corrected electricity demand of 9MW (78,840 MWh assuming 100% utilisation)
  - Centrifuge electricity use of 10,550 MWh per year
  - Scrapers removed from Project
  - Reduced diesel associated with reduced haulage of overburden
  - Reduced diesel because amphirol and TSF dozer no longer required
- The outcome of that inventory is summarised above
- GHG emissions estimated in my second supplementary statement are lower than the EES by 10%