Joanne Eastman

Risk Assessments

Project Impacts

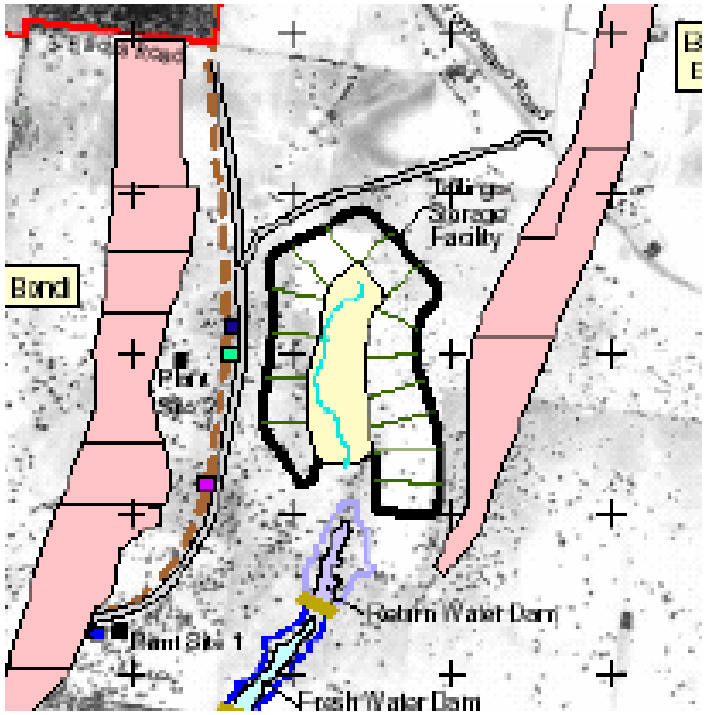
Air Quality

ControlsRegulation

Effects Index

Why trust in the process is difficult?

The Douglas community were ‘promised’ progressive rehabilitation – variations to workplans were quickly initiated to avoid that and the community were left with a massive open scar when mining had ceased (in 2012) that has still not been fully rehabilitated. And the Horsham RCC has been left with a massive radioactive waste dump to manage. (Where are DHHS, ERR and the EPA?)



The TSF is needed in the early years to develop enough pit space to allow safe disposal behind bunds created to keep water from the mining face.

Sand tailings will be pumped to the TSF area where some water will be recovered by a cyclone stacker and sand stored. Fine tailings will be treated with a flocculant at the primary treatment plant and then discharged into the cells constructed at the TSF. Each cell will be up to 7 ha in area to allow for up to 7 days of discharge and then 90 days of drying. In one year, there will be three discharge events into each cell. Basin has estimated that at the end of Year 1, the fine tailings will cover an area of 115ha to a depth of 1m. The sand tailings will cover an area of about 40ha to a height of 3 m.

During Year 2 it is hoped that it will be possible to start discharging all tailings, both sand and fines, into the pit void.

By Year 3 it is planned to rehabilitate the TSF by spreading sand across the dried fine tailings, mixing the two, and covering with topsoil. The area where sand has been stored will receive some fine tailings to assist with moisture retention; after mixing, the area will be covered with topsoil and revegetated.

It is proposed to collect all water that drains from the sand and fines tailings, both in the TSF, and in the pit void when that is used for disposal. This collected water will be stored in a return water dam for re-use.

As the excavation moves northward, the void created will be used for tailings disposal. When dried, the tailings will be covered with overburden being removed from the pit ahead, and then topsoil. This will avoid large stockpiles. Because of the ‘swell factor’ (it is not possible to put all the dirt that comes out of a hole back into the hole), the final surface level over the mined area may be up to 2 m higher than the former surface. It is proposed to treat the disturbed area in a number of ways depending on the requirements of the land owners or as set out in the conditions which are applicable to the operation. Areas could be prepared for cropping, pasture established, or the area established with native trees, understorey and ground flora.

Water for the project will be obtained from an entitlement purchased from Wimmera Mallee Water under its Sale of Savings Policy. A freshwater dam will store up to 365 ML. This will be supplied by pipeline from the Rocklands storage. It will not be supplied from surface run-off.

Concentrates produced from the primary processing plant will be trucked to a secondary treatment plant located in the Hamilton area. This plant will extract economic minerals (ilmenite, rutile, leucoxene, zircon) from the ‘trash’. The economic minerals will be trucked to Portland for export and the trash returned to the mine site for burial in the pit.

Bullying by the miners

Iluka – constant changes to work plans, foisted management of radioactive waste dump on to Horsham City Council, progressive rehabilitation means ‘when we’re ready’ not what the community is led to believe it will be (Douglas and Ouyen/WRP)

VCAT hearing about Pit 23 – Cost Horsham RCC many hundreds of thousands to defend. Iluka argued that if they weren’t allowed to continue using Pit 23 to dump waste from mines outside Victoria it would lead to the closure of the Hamilton processing plant and the loss of jobs. 6 weeks after the Tribunal ordered in favour of Iluka (as the time for appeal to Supreme Court)

“The grant of a permit for the disposal of waste by-products from the MSP will have implications not just for land in the municipality of Horsham. It will have significant regional impacts affecting operation of the MSP at Hamilton, most notably being direct and indirect employment and will indirectly affect the effective and efficient use of resources and the disposal of by-products from mining such resources within Victoria and interstate. The decision about this permit application is one where the principles of integrated decision making identified in clause 10.04 are more directly prominent than is often the case in planning decision making.”

https://iluka.com/iluka/media/website/douglas%20documents/iluka-resources-ltd-pp-15-105-(pit-23)-emp_rvmp-performance-report-2018.pdf By 2017 the Environmental management Plan had been revised 4 times.

Experience with the EES

Hard copies and downloaded soft copies
Impossible to follow – very poorly indexed – things missing tables impossible to read (magnifying by ? Percent) – multiple emails while the clock was quickly ticking – couldn't search e-folder, had to open every single document to search, appendices missing, pages upside down, out of order and back to front (and the stress of trying to get the response in –

Show photos of risk table beside
ordinary print

Photo of Bureau Veritas information on the back of my submission

There was so much wrong with the documentation – and so many changes since it was released that I'm only going to focus on a couple of aspects

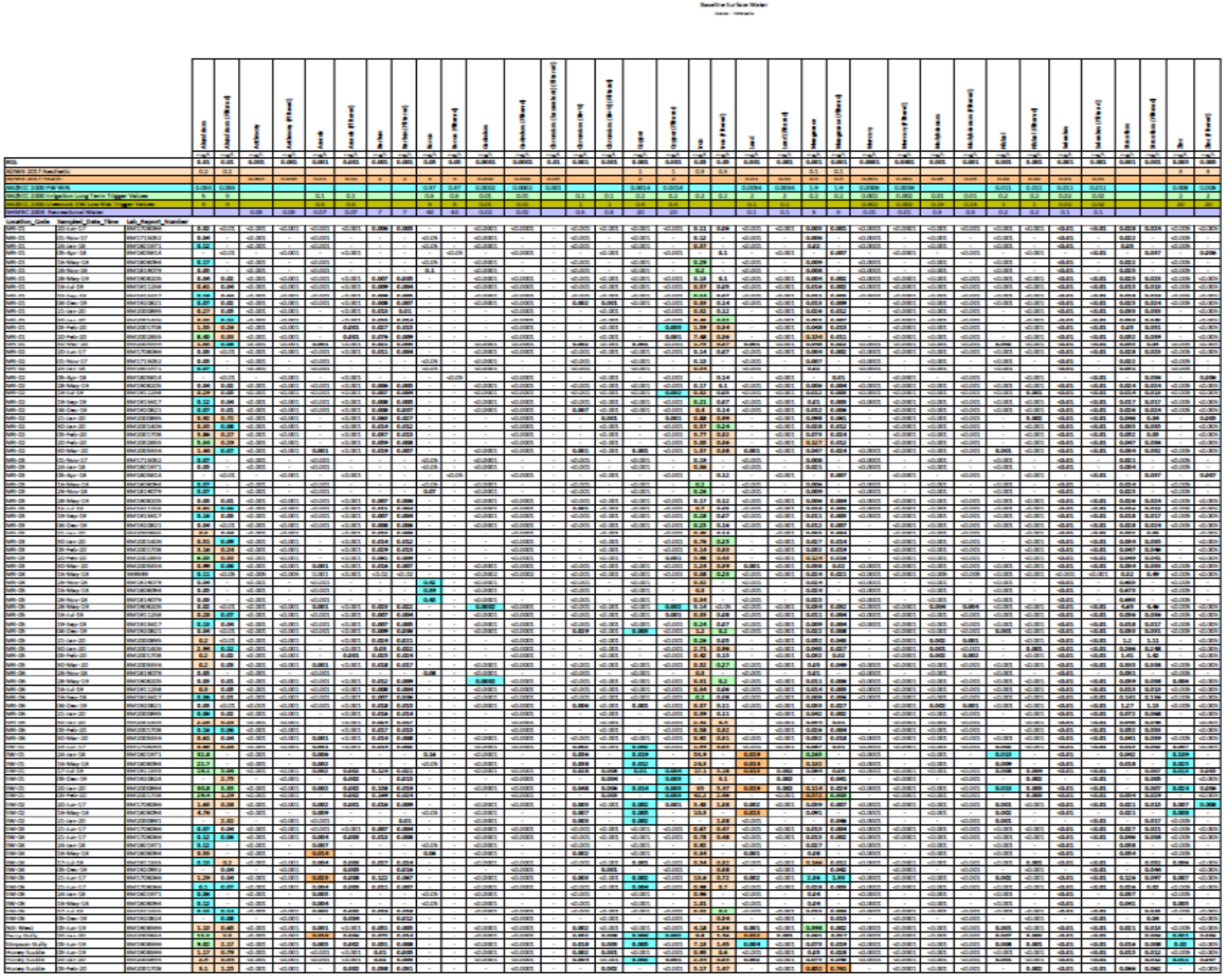
1. Risk assessments
2. Mitigations
3. Air Quality

Throughout though, you'll have to forgive me if I sound completely jaded, angry and incredulous that Kalbar had the gall to foist it on the community and thoroughly incredulous that it was approved by the TRG for release.

Drowning in rubbish

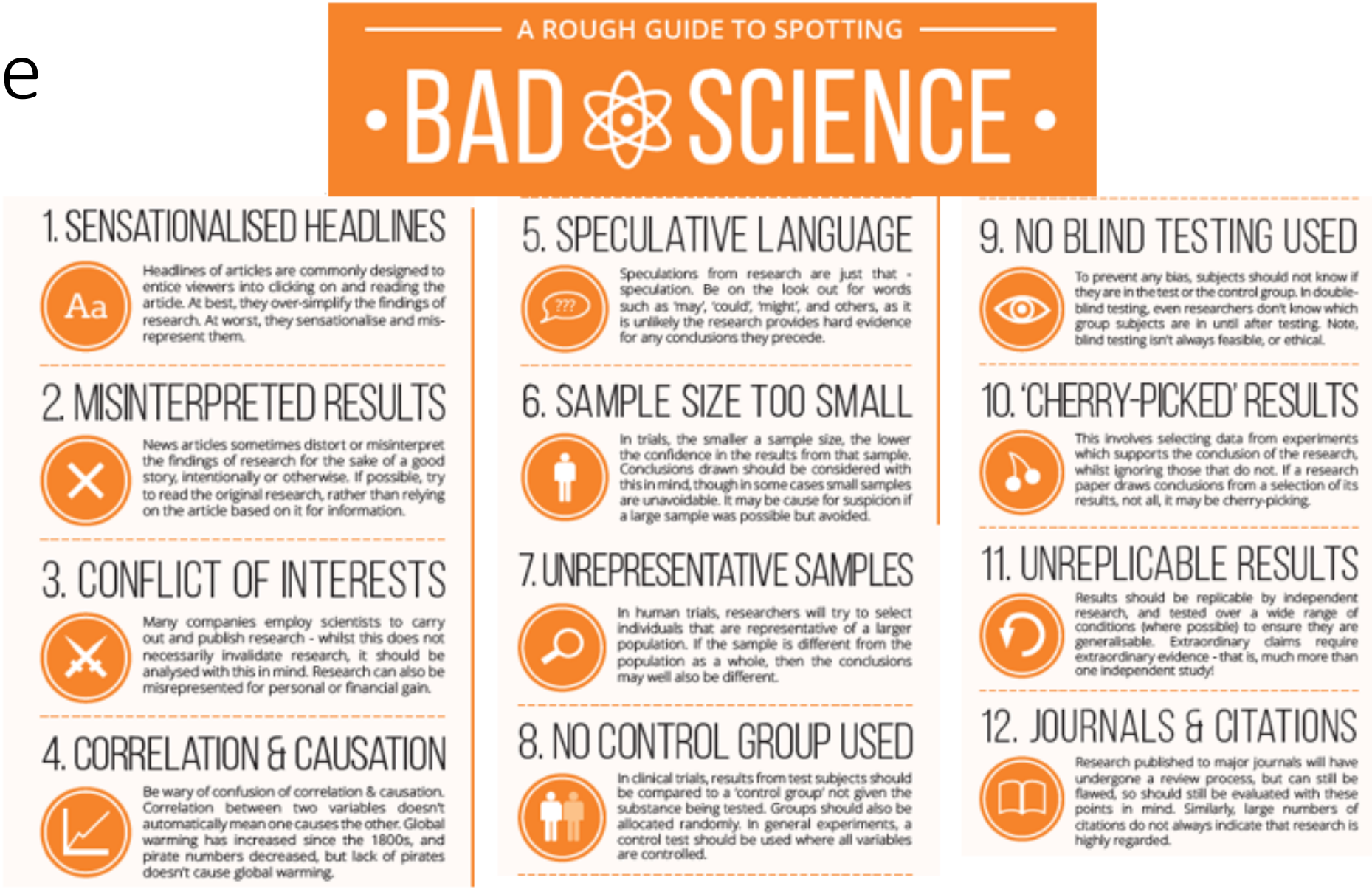
Typical presentation of information

Impossible on both laptop and hardcopy – therefore assume they have something to hide.



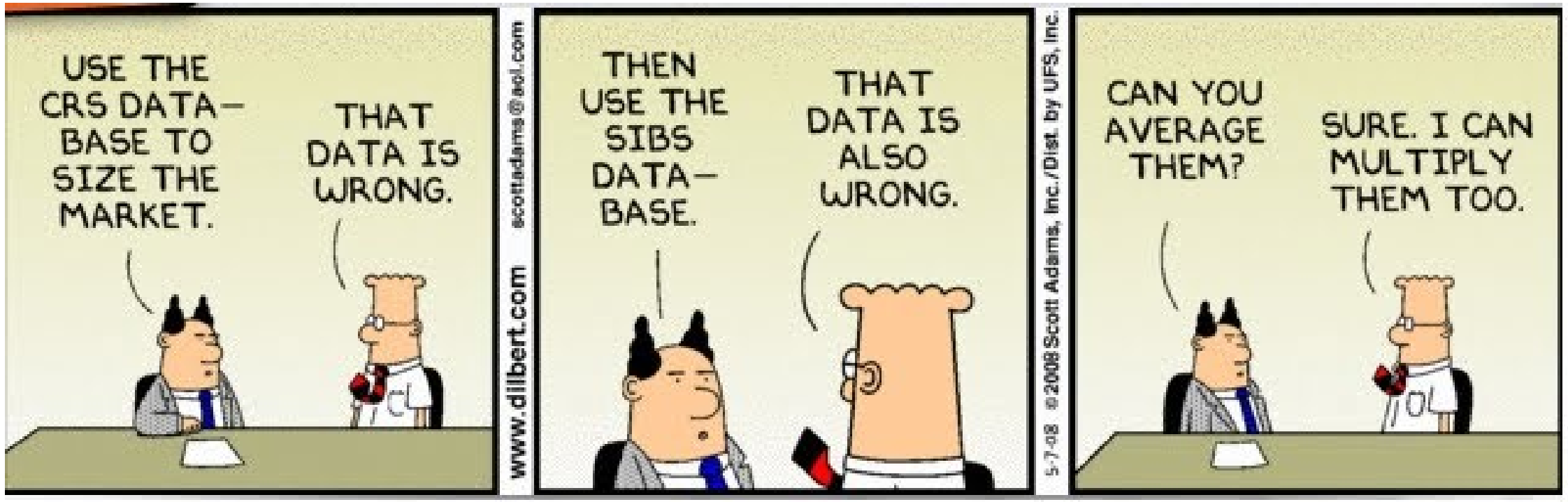
Bad Science

- Oversimplification of results
- Misinterpreted (or downplayed)
- Conflict of interests
- Speculative language
- Sample size too small
- Unrepresentative sample
- Payment relies on results
- Cherry-picked results
- Unreplicable results
- Outdated or inappropriate methodology (AERMOD/ALSP)
- Failure to check veracity of input data



https://www.compoundchem.com/2014/04/02/a-rough-guide-to-spotting-bad-science/

Playing with data



Risk Tables – EES Guidelines absolve action if risk is less than High

Subjectivity – who makes the call, who checks it, when do they decide to look at regional, state, national?

The EES guidelines say you don't need to consider mitigations if the risk is assessed as low. However, they do not require honesty from the proponent – a fact that has been reiterated by Stuart Morris at least twice in the hearings "There is no proof of truth required."

Completely goes against risk assessment processes – consistency is key – and it should be local
Aim is obviously to meet the ministerial guidelines to keep all risks under high so you can pretend they don't exist

The community has learnt not to trust what Kalbar say – and yet it appears that for some a miner's word is like god's

Likelihood and Consequence

B – Likelihood Ratings:

Level	Description	Context	Operational Frequency	Project Frequency
A	**Almost Certain**	Expected to occur in most circumstances	More than once in 12 months	**Greater than 90%** chance of occurrence
B	**Likely**	Will probably occur in most circumstances	At least once in 12 months	**60% - 90% chance** of occurrence
C	**Possible**	Should occur at some time	At least once in three years.	**40% - 60% chance** of occurrence
D	**Unlikely**	Could occur at some time	At least once in ten years	**10% - 40% chance** of occurrence
E	**Rare**	May occur, only in exceptional circumstances	Less than once in fifteen years.	**Less than 10%** chance of occurrence

Likelihood Rating Table

C – Risk Rating Matrix:

LIKELIHOOD		CONSEQUENCES				
		Insignificant	Minor	Moderate	Major	Severe
		1	2	3	4	5
Almost Certain	5	Medium (5)	High (10)	High (15)	Extreme (20)	Extreme (25)
Likely	4	Low (4)	Medium (8)	High (12)	High (16)	Extreme (20)
Possible	3	Low (3)	Medium (6)	Medium (9)	High (12)	High (15)
Unlikely	2	Low (2)	Low (4)	Medium (6)	Medium (8)	High (10)
Rare	1	Low (1)	Low (2)	Low (3)	Low (4)	Medium (5)

City of Albany Risk Categories

Risk Category / Level	Severe	Major	Moderate	Minor	Insignificant
Service Delivery Interruption *(Business Continuity Plan)*	More than 24 hours, indeterminate prolonged interruption of services, non – performance.	11 to 24 hours, prolonged interruption of services, additional resources, and performance affected.	5 to 10 hours, medium term, temporary interruption, backlog cleared by additional resources.	2 to 4 hours, Short term, temporary interruption, backlog cleared < 1 day.	Less than 2 hours, No material service interruption.
Community	Major/multiple disruptions to the widespread community.	Substantiated disruptions to the wide spread community.	Significant disruption to the nearby community.	Minor disruptions to the nearby community.	Little or no disruption to the community.
Environment	Major breach of legislation or extensive environmental damage requiring third party investigation.	Significant breach of legislation/significant contamination or damage requiring third party	Environmental damage requiring restitution or internal clean-up.	Minor impact to the environment.	Little impact on environment.
Financial	**More than $150,000**	**$50,000 to $150,000**	**$20,000 to $50,000**	**$5,000 to $20,000**	**Less than $5,000**
Legal & Compliance	Custodial sentencing for responsible officers, multiple class actions and high end penalties.	Major litigation & class action against Council and responsible officers. Prosecution and fines imposed.	Serious breach of regulations, with investigation and report by 3rd party, Prosecution and fines	Minor legal implications, non-compliance and breach of regulations.	Minor regulation breach.
Operational	Non-achievement of all organisations deliverables.	Non-achievement of major organisation deliverables.	Significant delays to achieving deliverables.	Inconvenient delays in achieving deliverables.	Small impact on City deliverables.
People Health & Safety	Death(s) or severe permanent injuries, mass hospitalisation, Post-traumatic Stress Disorder.	Extensive injuries requiring hospital admission, severe trauma, extended incapacity.	Onsite medical treatment by ambulance personnel longer term illness, recovery 1 to 6 months.	First aid treatment required by first aid officer, sick leave, short term impact, recovery 1 to 3 weeks.	No injuries or injuries but not requiring first aid treatment, no leave taken.
Property	Extensive property damage resulting in prolonged period of recovery.	Significant property damage requiring external resources.	Localised damage rectified by internal and external arrangements.	Localised damage rectified by internal arrangements.	Inconsequential or no damage to property.
Reputation	Substantiated public embarrassment, very high multiple impacts, high widespread multiple news profile.	Substantiated public embarrassment, high impact news profile, third party actions.	Substantiated public embarrassment, moderate impact, and moderate news profile.	Substantiated low impact, low news profile.	Unsubstantiated, low impact, low profile, no news item.

Kalbar's consequences

Descriptor	Description
Rare	A hazard, event and pathway are theoretically possible on this project and has occurred once elsewhere, but not anticipated over the duration of the project activity, project phase or project life.
Unlikely	A hazard, event and pathway exist and harm has occurred in similar environments and circumstances elsewhere but is unlikely to occur over the duration of the project activity, project phase or project life.
Possible	A hazard, event and pathway exist and harm has occurred in similar environments and circumstances elsewhere and may occur over the duration of the project activity, project phase or project life.
Likely	A hazard, event and pathway exist and harm has occurred in similar environments and circumstances elsewhere and is likely to occur at least once over the duration of the project activity, project phase or project life.
Almost certain	A hazard, event and pathway exist and harm has occurred in similar environments and circumstances elsewhere and is expected to occur more than once over the duration of the project activity, project phase or project life.

		Likelihood				
		Rare	Unlikely	Possible	Likely	Almost certain
Consequence	Negligible	Very low	Very low	Very low	Low	Moderate
	Minor	Very low	Low	Low	Moderate	Moderate
	Moderate	Low	Low	Moderate	High	High
	Major	Low	Moderate	High	Major	Major
	Extreme	Moderate	High	Major	Major	Major

Descriptor	Description
Negligible	A temporary or short-term (less than one year) and localised impact that is limited to the project footprint, is barely detectable, does not reduce the viability/capacity of the value, and will resolve itself without intervention.
Minor	A temporary or short-term (less than five years) and localised impact largely within the project footprint.
Moderate	A short- to medium-term (e.g., 5 to 15 years) impact that extends beyond the area of disturbance to the surrounding area. The viability of the value will be reduced to a limited extent only and will recover over time. Specific management measures may be required to effectively manage the impact. A long-term (e.g., greater than 20 years) and localised impact largely within the project footprint.
Major	A medium- to long-term (e.g., 15 to 20 years) impact, that is severe (e.g., viability of the value is reduced to some extent) and widespread (e.g., extends beyond the study area, but stays within the catchment). Specific management measures are required to effectively manage the impact.
Extreme	A long-term (e.g., greater than 20 years) and potentially irreversible impact (e.g., severely affecting the viability of the value) that is widespread (e.g., extending well beyond the study area, possibly at a catchment-wide and/or regional scale). Design modification is required to eliminate the impact or specific management measures are required to reduce the likelihood of occurrence of the impact.
Positive	An impact that enhanced the viability, capacity or quality of a value, over the short- or long-term.

Incorrect application of ISO31000 –

Likelihood of a hazard eventuating and consequence of it eventuating = risk

Definition of Inherent Risk is incorrect

Inherent Risk is risk without controls –
The CONTEXT needs to be properly understood and all sources of risk should have been established and assessed (not just throwing darts at a board or doing a Coffey and deciding what outcome you want and then working back to a path to get it). It is also not acceptable to say ERR said to combine or ditch a few risks to make it easier for them to regulate. The community and the environment deserve far more than such a cavalier approach.

Controls have to be **realistic** – what you actually have (or can realistically have) not what you 'would like to have if money was no object'. You can't assume the risk reduction claimed without evidence. E,g, reduction from suppression of dust via water is unrealistic when there isn't enough water to start with. Similarly using Dustex when it is too expensive to be used on such a large operation. The degree to which controls reduce risks and consequences

Residual Risk is risk remaining after controls that are realistic and that you know will be in place have been applied

Risk Management Plan contradictions

CONTRADICTING DEFINITIONS

Document 198 Updated Risk Management Plan (page 3-4)
The risk assessment identified and documented both inherent and residual risk (the latter meaning the risk rating once standard controls have been put in place). The suite of 'standard risk controls' used in the Fingerboards project is discussed in Section 6 of this risk management plan. Standard controls are controls conventionally used in industry, whose effectiveness has been well established and for which site-specific investigations and tailored design are generally not required. The standard controls listed in this risk management plan are consistent with those presented in the Fingerboards EES.

Where is the information about 'pre-controls' risk assessment?
Where is the reasoning behind the judgements?
Can Kalbar be trusted?

18	Seepage from ~~fine tailings in TSF~~in pit tailings storage are: Contamination of groundwater by metals or radionuclides	O	Minor	Unlikely	Low Forma

Kalbar Operations Pty Ltd — Fingerboards Mineral Sands

3. Inherent risk

In this risk treatment plan 'inherent risk' means the likelihood and consequence of a risk event, assuming that standard controls specified in Attachment 1 of the Fingerboards Risk Management Plan are implemented.

Table 3-1: Inherent risk ratings – water quality and hydrology

#	Details of risk event	Phase	Consequence	Likelihood	Inherent risk ratin
1	Runoff from stockpiles or disturbed / rehabilitated areas: Sedimentation increases water turbidity and harms aquatic species	C, O, CL	Moderate	Unlikely	Medium
2	Runoff from stockpiles or disturbed / rehabilitated areas: Increase in metals or radionuclides or change in receiving water pH harms aquatic species or human health	C, O	Insignificant	Unlikely	Low
3	Runoff from stockpiles or disturbed / rehabilitated areas: Sedimentation increases water turbidity and harms aquatic species	C, O	Minor	Unlikely	Low
4	Discharge from contact water dams (via spillway): Sedimentation increases water turbidity and harms aquatic species	O, CL	Moderate	Rare	Medium
5	Discharge from contact water dam (via spillway): Increase in metals or radionuclides or change in receiving water pH harms aquatic species or human health	O, CL	Insignificant	Rare	Low
6	Release of stored water as a result of failure of contact water dam(s): Sedimentation increases water turbidity and harms aquatic species	O, CL	Moderate	Rare	Medium

Insignificant to whom?

3. Inherent risk

In this risk treatment plan 'inherent risk' means the likelihood and consequence of a risk event, assuming that standard controls specified in Attachment A of the Fingerboards draft Risk Management Plan are implemented.

Table 3-1: Summary of inherent risk ratings (airborne and deposited dust)

#	Details of risk event	Phase	Consequence	Likelihood	Inherent risk
1	Ground clearing, mining, materials handling, vehicular traffic: exposure of sensitive offsite receptors to airborne particulates (total particulates, PM10, PM2.5, crystalline silica) exceeds human health guideline values	C, O, CL	Minor	Unlikely	Low
2	Wind erosion from disturbed surfaces and /or stockpiles: Exposure of sensitive offsite receptors to airborne particulates (total particulates, PM10, PM2.5, crystalline silica) exceeds human health guideline values	C, O, CL	Minor	Unlikely	Low
3	Wind erosion from TSF: Exposure of sensitive offsite receptors to airborne particulates (total particulates, PM10, PM2.5, crystalline silica) exceeds human health guideline values	O	Minor	Unlikely	Low
4	Ore processing: Exposure of sensitive offsite receptors to airborne particulates (total particulates, PM10, PM2.5, crystalline silica) exceeds human health guideline values	O	Minor	Rare	Low
5	Wheel-generated dust and lift off from disturbed areas and stockpiles: Contamination of horticultural crops (inert dust)	C, O, CL	Minor	Unlikely	Low
6	Wheel-generated dust and lift off from disturbed areas and stockpiles: contamination of horticultural crops (metals or radionuclides)	C, O, CL	Insignificant	Unlikely	Low
7	Wheel-generated dust and lift off from disturbed areas and stockpiles: impacts on productivity or marketability of horticultural crops	C, O, C L	Insignificant	Unlikely	Low
8	Wheel-generated dust and lift off from disturbed areas and stockpiles: Soiling of surfaces at sensitive receptors	C, O, CL	Insignificant	Unlikely	Low
9	Wheel-generated dust and lift off from disturbed areas and stockpiles: Deposition on rooftops, followed by contamination of rainwater tanks	C, O, CL	Insignificant	Unlikely	Low
10	Wheel-generated dust and lift off from disturbed areas and stockpiles: Aesthetic impacts: reduction in clarity of air	C, O, CL	Insignificant	Unlikely	Low
11	Wind erosion from disturbed surfaces, stockpiles or TSF: exposure of sensitive offsite receptors to airborne toxicants human health guideline values	C, O, CL	Insignificant	Unlikely	Low

#	Details of risk event	Phase	Consequence	Likelihood	Inherent risk
12	Ore processing: Exposure of sensitive offsite receptors to airborne toxicants exceeds human health guideline values	O	Insignificant	Unlikely	Low
13	Vehicle emissions: Exposure of sensitive offsite receptors to airborne toxicants exceeds human health guideline values	C, O, CL	Insignificant	Unlikely	Low
14	Scope 1 and Scope 2 GHG emissions: Emissions intensity incompatible with best practice management	C, O, CL	Minor	Possible	Medium
15	Wind erosion from disturbed surfaces, stockpiles or TSF: exposure of sensitive offsite receptors to radionuclides exceeds human health guideline values	C, O, CL	Insignificant	Unlikely	Low
16	Ore processing: exposure of sensitive offsite receptors to radionuclides exceeds human health guideline values	O	Insignificant	Unlikely	Low

Note: 'C' = construction; 'O' = operations; 'CL' = decommissioning and closure

Definition of Inherent Risk is incorrect

Where is the justification for this risk assessment – just because Coffey and Kalbar think the health of our community members is insignificant does not mean that they are. People matter – we are not 'insignificant'

Questionable risk assessments

21	Altered hydrology	Capture of water in mine contact water dams	Reduced frequency / magnitude of flow down drainage lines results in modifications to riparian systems along drainage lines - Mitchell system Reduced frequency / magnitude of flow down drainage lines results in modifications to riparian systems along drainage lines - Perry system	O, CL	• Surface water will be extracted from the Mitchell River in line with the conditions, timings, and limits detailed in any licence issued by Southern Rural Water. (SW01)	SW01	Possible	Minor	Medium

The mine contact water dams will capture every bit of water that used to flow down the gullies to the Mitchell.
Nobody knows what the effects will be on the hydrology, GDEs or anything else so how can they say the consequence is only minor. (The frogs might disagree?)
And taking water from the river is at the other end of the 'process'. It can't be used as a 'mitigation'.
This is the only mitigation and it can't possible have changed either the likelihood or the consequence of the water capture. What is the true risk?

20	Seepage of contaminated water into groundwater	Seepage from fines centrifuge cake or HMC product stockpiles	Contamination of groundwater by acidity, metals or radionuclides	O	• Surface runoff will be directed around or away from areas of land disturbance, stockpiles, embankments or nearby sensitive areas, where practicable. (SW04) • The project will recover and reuse water where practicable (such as run-off from ore stockpiles and water recovered from tailings stored within the mine void) and optimise operations to maximise water use efficiency. (SW23) • Runoff from concentrate stockpiles centrifuge cake storage areas will be diverted to the process water dams for reuse. (RD07)	SW04, SW23, RD07	Unlikely	Minor	Low
			Reduced frequency /		• Surface water will be extracted from the Mitchell River in line with the conditions, timings, and limits detailed in				

The proposed use of centrifuges has created its own unique risks but they are ignored. E.g. given the amount of concern about the quantities of flocculant proposed for the fine tailings, why has there been recognition of the risks of such things as breakdown to acrylamides and the impacts on aquatic and other life?

Other risks – including centrifuges

33	Erosion	Tunnel erosion compromises stability of water storage structures	Sediment discharge to surface water	O, CL	• The density of deep-rooted trees and shrubs will be increased in areas at risk from tunnel erosion by minimising the volume of seepage flows reaching valley slopes and channels.. (RH24) • All dams for regular water storage will be constructed with engineered liners to reduce infiltration to groundwater.(GW01) • Surface water ponding on post-mining landforms will be avoided, where practicable, through appropriate slope profile design and topsoil treatments. (SW38) • Erosion within gullies will be controlled using primary and secondary sediment traps constructed at appropriate	RH24, GW01, SW38	Rare	Major	Medium	• The density of deep-rooted trees and shrubs will be increased in areas at risk from tunnel erosion by minimising the volume of seepage flows reaching valley slopes and channels. (RH24) • Visual assessments of water controls will be undertaken on a regular basis, and after rainfall, to ensure that any ponding, seepage or run-off meets design specifications. (GEO06)

How on earth do you increase the ‘density of deep-rooted trees and shrubs’ while the mine is operational. Where are the references to the type of mitigations/practices recommended by GHD (e.g. compaction/use of the right materials). And for goodness sake they repeat the same impractical mitigation and say they’ll have an occasion look at the water storage structures?

Where are the references/risk assessments to the many hazards associated with the use of centrifuges, e.g.

- Vibration leading to possible liquefaction of soil
- Instability of site
- Noise disturbance for miles around
- Effects on power supplies of sudden stopping or starting
- Impacts on other power users?
- Impacts on workers (consider Daniel Banks submission on 15 minute stints)
- Failure to result in sufficient level of dewatering, etc.,

Still other risks

What if (as seems highly likely) the centrifuge option is not viable due to expense of implementation or inability to deliver the desired dewatering?
This is a business risk as well as an environmental one. Why hasn't it been considered

What consideration has been given to business risks?

Market downturn, new competitors (especially in rare earths), increased transport costs, ongoing China/America tensions, domestic political unrest?

Insolvency

This is a business risk as well as an environmental one. Why hasn't it been considered

Kalbar's concept of 'Adaptive Management' is the biggest one. It looks like they are just expecting people to trust them to make it up as they go. Why should any of us put so much at risk for such a lazy, haphazard, unprofessional approach to management? So much time looking for weasel words and trying to (just) meet standards rather than genuinely considering the things that could go wrong and making a sincere and concerted effort to avoid that happening.

Air Quality Controls

This risk treatment plan is for the control of mining hazards associated with airborne and deposited dust.
Gob smacking negligence and arrogance How are those 'likelihood' ratings allowed to be accepted without question.
How dare Kalbar consider the impacts on people minor or insignificant. How different would the outcomes be if realistic judgements were made?
WHO IS HOLDING KALBAR (AND THEIR CONSULTANTS) TO ACCOUNT FOR THE MISLEADING AND DECEIPTFUL INFORMATION

Ground clearing, mining, materials handling, vehicular traffic – is certain to happen
Wind erosion from disturbed surfaces and/or stockpiles – is certain to happen and the consequences are far from minor or insignificant
Wheel generated dust and lift off from disturbed areas and stockpiles are certain (and why are they both treated in the same risk event)?
Vehicle emissions almost certain

#	Details of risk event	Phase	Consequence	Likelihood	Inherent risk rating
1	Ground clearing, mining, materials handling, vehicular traffic: exposure of sensitive offsite receptors to airborne particulates (total particulates, PM10, PM2.5, crystalline silica) exceeds human health guideline values	C, O, CL	Minor	Unlikely	Low
2	Wind erosion from disturbed surfaces and /or stockpiles: Exposure of sensitive offsite receptors to airborne particulates (total particulates, PM10, PM2.5, crystalline silica) exceeds human health guideline values	C, O, CL	Minor	Unlikely	Low
4	Ore processing: Exposure of sensitive offsite receptors to airborne particulates (total particulates, PM10, PM2.5, crystalline silica) exceeds human health guideline values	O	Minor	Rare	Low
5	Wheel-generated dust and lift off from disturbed areas and stockpiles: Contamination of horticultural crops (inert dust)	C, O, CL	Minor	Unlikely	Low
6	Wheel-generated dust and lift off from disturbed areas and stockpiles: contamination of horticultural crops (metals or radionuclides)	C, O, CL	Insignificant	Unlikely	Low
7	Wheel-generated dust and lift off from disturbed areas and stockpiles: impacts on productivity or marketability of horticultural crops	C, O, C L	Insignificant	Unlikely	Low
8	Wheel-generated dust and lift off from disturbed areas and stockpiles: Soiling of surfaces at sensitive receptors	C, O, CL	Insignificant	Unlikely	Low
9	Wheel-generated dust and lift off from disturbed areas and stockpiles: Deposition on rooftops, followed by contamination of rainwater tanks	C, O, CL	Insignificant	Unlikely	Low
10	Wheel-generated dust and lift off from disturbed areas and stockpiles: Aesthetic impacts: reduction in clarity of air	C, O, CL	Insignificant	Unlikely	Low
11	Wind erosion from disturbed surfaces, stockpiles or TSF: exposure of sensitive offsite receptors to airborne toxicants human health guideline values	C, O, CL	Insignificant	Unlikely	Low
12	Ore processing: Exposure of sensitive offsite receptors to airborne toxicants exceeds human health guideline values	O	Insignificant	Unlikely	Low
13	Vehicle emissions: Exposure of sensitive offsite receptors to airborne toxicants exceeds human health guideline values	C, O, CL	Insignificant	Unlikely	Low

Controls? Reality?

7. Controls to address hazard

The controls listed in Table 7-1 will be implemented in order to minimise airborne and deposited dust from activities conducted within the mining licence area.

Table 7-1: Controls and associated performance measures (airborne and deposited dust)

#	Details of controls	Performance measures
AQ01	Areas will be cleared in a staged manner only as required to reduce dust generation by minimising the area of exposed ground surfaces at any one time.	Clearing records; airborne and deposited dust monitoring records. Maximum disturbed area at any given time will not exceed 360 ha
AQ02	Water or appropriate suppressants will be applied to working surfaces, stockpiles, haul roads, the mine voids and other areas as required to minimise dust generation.	Airborne and deposited dust monitoring records; water cart usage records
AQ03	Drop heights for topsoil and overburden during creation of stockpiles will be minimised as far as practicable to reduce dust generation.	Work instruction; periodic compliance observations
AQ04	Speed limits will be implemented and enforced on unsealed project roads to minimise dust generation	Induction records; signage; periodic audits; tiered vehicle speed limit of 20 km/hr on unsealed project roads in the event of dusty conditions and 50 km/hr under normal conditions.
AQ05	Topsoil stripping will be planned and conducted in consideration of forecast and actual weather conditions to minimise dust generation	Topsoil stripping records; materials inventory; site meteorological records; operations schedule. Topsoil stripping to be suspended under windy conditions (average wind speed ≥25 km/hr)
AQ07	The mine void will be progressively backfilled and rehabilitated to minimise the area required for topsoil and overburden stockpiles	Clearing and rehabilitation records; materials inventory.
AQ08	Haul vehicles will travel on designated haul roads only and haul routes will be minimised where possible. Haulage of product will be limited to daytime hours only (11hours a day)	Mine plans; haulage records
AQ09	Suppressants and water will be applied to exposed areas and stockpiles, where rehabilitation is not yet practical, to reduce potential for dust generation. In particular, during drier months when less rainfall is expected	Records of dust suppressant and water use.
AQ10	Ore will be transferred across the project area as a slurry to reduce potential for dust emission	Pipeline as-built report.
AQ11	Ore will be processed as a slurry.	Commissioning report.
AQ12	There will be no crushing or grinding of ore, preventing the potential generation of respirable crystalline silica emissions	Plant design specifications and as-built report.

#	Details of controls	Performance measures
AQ13*	When real-time monitoring indicates that trigger level near key sensitive receptors have been reached, dust generating activities will be ceased at certain times, suspended, slowed or moved to other parts of the mine. This should be done in order of preference as outlined in the trigger action response plan of the AQMP.	Dust monitoring records; site meteorological records; operations records; complaints register. Dust generating activities to be suspended or moved under windy conditions in accordance with the trigger action response plan detailed in AQMP.
AQ14*	Ground-disturbing activities (including cessation of night time operations) and materials handling will be scheduled to avoid excessive dust emissions during forecast adverse weather conditions or at certain time within the mining footprint.	Mining schedules; dust monitoring records; site meteorological records; operations records; complaints register. Dust generating activities to be suspended or moved under windy conditions in accordance with the trigger action response plan detailed in AQMP.
AQ15*	Additional mitigation measures will be implemented and monitored through the proposed environmental management framework. In particular, the development of an air quality risk treatment plan.	Implementation of this plan.
AQ16	Construction of the wearing course of internal haul roads will use an optimal size grading of aggregate with road stabilisation and compaction agents.	Design specifications; as-built reports.
GHG01*	Solar photovoltaic technology will be used to supplement electricity requirements for applications such as lighting.	Annual tracking of energy use and greenhouse gas emissions; NGERS reporting
GHG02*	Energy efficient technology will be used where practicable, including low energy lighting (e.g., LEDs).	Annual tracking of energy use and greenhouse gas emissions; NGERS reporting
GHG03	The power factor of mains electricity will be improved by reducing the phase difference between the voltage and the current. The on-site power factor correction will be optimised for grid electricity usage	Annual tracking of energy use and greenhouse gas emissions; NGERS reporting
GHG04	Vehicle diesel consumption will be reduced through equipment selection, load and route optimisation and production scheduling, and minimising idle time.	Annual tracking of energy use and greenhouse gas emissions; NGERS reporting
GHG05	Fuel-burning equipment will be maintained and operated according to manufacturer/supplier guidelines and recommendations.	Maintenance records
GHG06	Generator diesel consumption will be reduced through selecting a flexible configuration that allows for electricity output to be adjusted in line with demand.	Annual tracking of energy use and greenhouse gas emissions; NGERS reporting
RD09a	Engineering controls, such as ventilation, dust control, and appropriate machinery shielding will be provided where required.	Workplace OH&S particulate monitoring results

Optimistic control measures

Katestone should not have ‘reduced’ risk on the basis of non-existent controls
We don’t know what the real inherent risk is
Many of the controls are meaningless
We don’t know if Kalbar can actually implement those controls
We certainly don’t know if they can be implemented effectively and whether in doing so the risk reduction they create is realistic for a mineral sands mine of this size, this level of complexity and in such a challenging environment (environmentally, geographically and socia

Table 17 Standard dust control measures during operations and relative reduction in emissions

Activity	Control measure	Reduction (%)
Scraper on topsoil/overburden	Continuous use of water truck	50[1]
	Level 2 watering on transport routes	75[1]
Wind erosion	Rehabilitation commenced	40[1]
	Rehabilitated areas	90[1]
Dozing	Travel routes and materials kept moist	50[2]
Haulage and grading	Application of water and/or suppressants	84[2]
Truck dumping	Minimise drop height	30[2]

Table notes:
[1] NPI for Mining (2012)
[2] Best practice (Katestone, 2011)

Hauling	50% for level 1 watering (2 litres/m^2/h)
	75% for level 2 watering (> 2 litres/m^2/h)
	100% for sealed or salt-encrusted roads
Wind erosion	30% for primary rehabilitation
	40% for vegetation established but not demonstrated to be self-sustaining. Weed control and grazing control.
	60% for secondary rehabilitation
	90% for revegetation
	100% for fully rehabilitated (release) vegetation

Incorrect use of term Inherent Risk

Kalbar Operation Pty Ltd Fingerboards Mineral Sands

3. Inherent risk

In this risk treatment plan 'inherent risk' means the likelihood and consequence of a risk event, assuming that standard controls specified in Attachment A of the Fingerboards draft Risk Management Plan are implemented.

Table 3-1: Summary of inherent risk ratings (airborne and deposited dust)

#	Details of risk event	Phase	Consequence	Likelihood	Inherent risk rating
1	Ground clearing, mining, materials handling, vehicular traffic: exposure of sensitive offsite receptors to airborne particulates (total particulates, PM10, PM2.5, crystalline silica) exceeds human health guideline values	C, O, CL	Minor	Unlikely	Low
2	Wind erosion from disturbed surfaces and /or stockpiles: Exposure of sensitive offsite receptors to airborne particulates (total particulates, PM10, PM2.5, crystalline silica) exceeds human health guideline values	C, O, CL	Minor	Unlikely	Low
4	Ore processing: Exposure of sensitive offsite receptors to airborne particulates (total particulates, PM10, PM2.5, crystalline silica) exceeds human health guideline values	O	Minor	Rare	Low
5	Wheel-generated dust and lift off from disturbed areas and stockpiles: Contamination of horticultural crops (inert dust)	C, O, CL	Minor	Unlikely	Low
6	Wheel-generated dust and lift off from disturbed areas and stockpiles: contamination of horticultural crops (metals or radionuclides)	C, O, CL	Insignificant	Unlikely	Low
7	Wheel-generated dust and lift off from disturbed areas and stockpiles: impacts on productivity or marketability of horticultural crops	C, O, C L	Insignificant	Unlikely	Low
8	Wheel-generated dust and lift off from disturbed areas and stockpiles: Soiling of surfaces at sensitive receptors	C, O, CL	Insignificant	Unlikely	Low
9	Wheel-generated dust and lift off from disturbed areas and stockpiles: Deposition on rooftops, followed by contamination of rainwater tanks	C, O, CL	Insignificant	Unlikely	Low
10	Wheel-generated dust and lift off from disturbed areas and stockpiles: Aesthetic impacts: reduction in clarity of air	C, O, CL	Insignificant	Unlikely	Low

Examples of airborne dust sources in mining

Says that all workers on a mine are potentially at risk from exposure to airborne respirable dust.
Sources include mechanical operations such as scraping, tipping and loading – anything that releases dust into the air, ore tipping, ore transport (from face to MUP), movement of people along haul routhes, backill placement. The crushing and pulverisation of particles by the vehicle tyers is a significant source of dust (unless haul routes are constantly treated by water or binding agents)
Crystalline silica (quartz) is a component of nearly every mineral deposit and can be >90% of sandstones and sand mines. Coal mines have far lower levels of quartz and are inappropriate to be used when determining risk and treatment for mineral sands mines

Don't even consider risk from wheel generated dust on human health but it is the most significant source of dust -

If it was their loved ones would they consider these consequences as Minor and downplay the risks?

Document 198 Updated Risk Management Plan

Control (AQ12)	Events managed	
There will be no crushing or grinding of ore, preventing the potential generation of respirable crystalline silica emissions.	40 46 49	

So totally misleading – people are supposed to believe that the only source of RCS emissions is crushing and grinding of ore? Haul trucks are the biggest cause, followed by wind erosion.

The Risk Management Plan considers the consequences of Airborne and deposited dust minor or insignificant and it being unlikely to happen because of ground clearing, mining materials handling, vehicular traffic, or wind erosion from stockpiles

Dust we will be exposed to

	Fraction		Subsoil	Sandy Clay	Sandy Gravel	Sand	Missing	Upper Sand	Bulk Ore
	Depth		0.2-0.5m	0.5-3.4m	3.4-8.6m	8.6-9m	from Table	14.7-23.8m	
Nuisance Dust	38µm to 105µm	%	7.94%	10.50%	1.71%	3.86%		26.63%	36.72%
Inhalable	20µm to 38µm	%	1.24%	3.00%	0.75%	1.82%		2.73%	1.91%
Respirable??	< 20µm	%	50.22%	53.48%	7.01%	20.65%		16.55%	26.33%
Total % Dust in samples			59.40%	66.99%	9.48%	26.33%		45.90%	64.96%

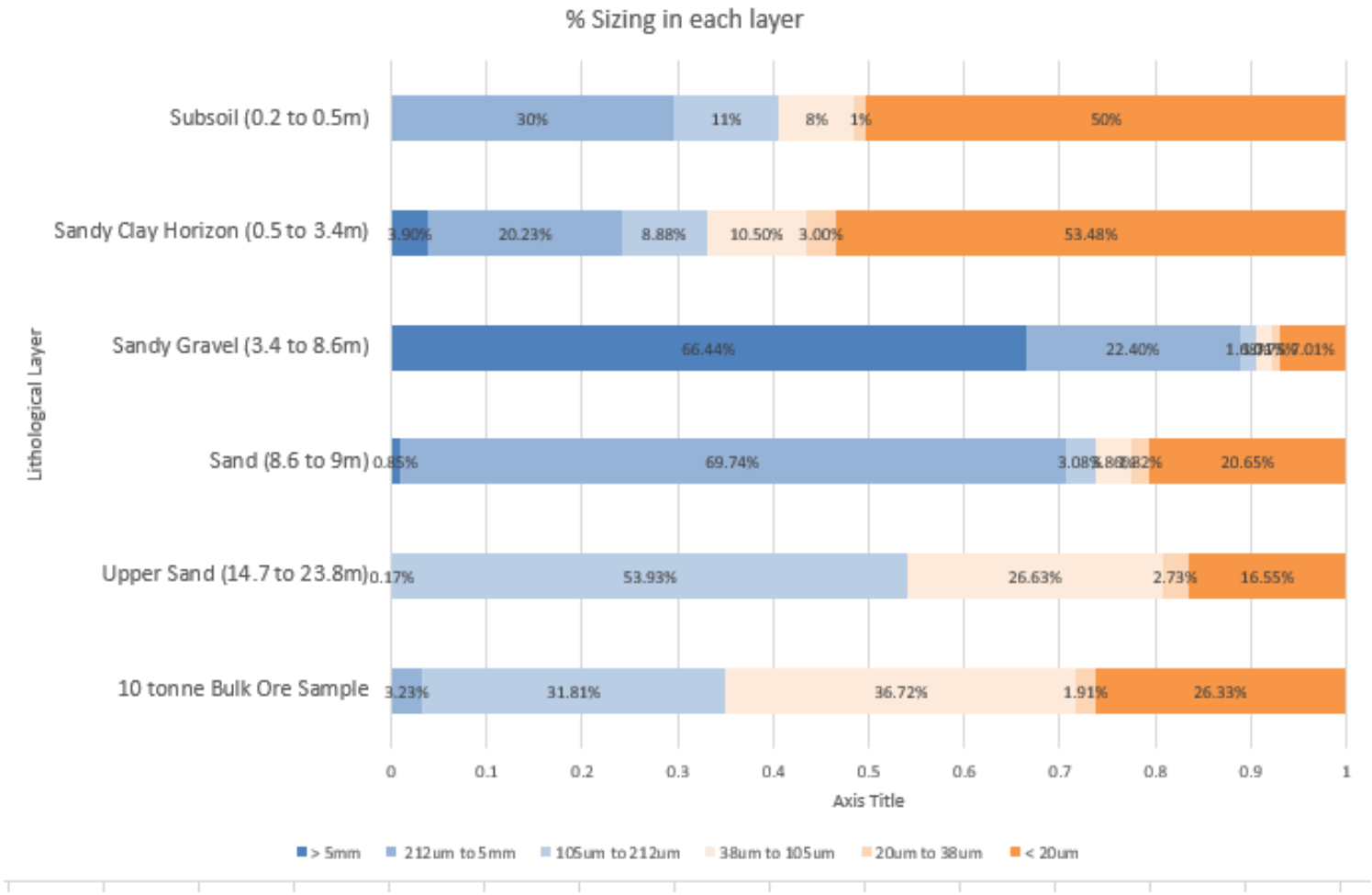
	Fraction		Subsoil	Sandy Clay	Sandy Gravel	Sand	Missing	Upper Sand	Bulk Ore
	Depth		0.2-0.5m	0.5-3.4m	3.4-8.6m	8.6-9m	from Table	14.7-23.8m	
Nuisance Dust	38µm to 105µm	kg/tonne	80.00	105.00	17.10	38.63		266.30	367.20
Inhalable	20µm to 38µm	kg/tonne	10.00	30.00	7.50	18.20		27.30	19.10
Respirable??	< 20µm	kg/tonne	500.00	534.80	70.01	206.50		165.50	263.30
Total kg dust in a tonne			590.00	669.80	94.61	263.33		459.10	649.60

Wind speed	10 micron	5 micron
km/hr	km travelled	km travelled
4.99	0.89	3.54
9.98	1.77	7.24
19.96	3.70	14.48
39.91	7.40	28.97
60.03	11.10	43.45
79.98	14.81	58.10

Kalbar do not have the water they need to stop fugitive dust from their roads, let alone exposed stockpiles and the orebody.

•Reduces respirable dust by 80%+. Respirable dust (typically less than 10 microns), is the dust that can cause everything from irritation and vision impairment to major health risks.

%s of dust in SD14



Blue shading – dust is not a problem
Orange tones – Dust is considered anything up to around 100µm. The smaller (increasingly darker colour) the more dangerous.

RCS will be in the dark orange section.
Every layer contains it.
Ore has been ignored

Welchman has used size fractions from a typical Western District or Western Australian mineral sands mine (e.g. Douglas). That is NOT the same as the Fingerboards, which is comprised of WIM sands* and is invariably far finer, more difficult to process and far more difficult to 'capture' all product as it such a large percentage is interspersed in the fines. (I doubt they would have been telling their investors (and the regulators) about this difficulty – I know they haven't been open with the community about it.)

Unbelievable and misleading claims about dust

Katestone has been advised by Kalbar that HMC is now proposed to be stored within silos. In Katestone's opinion, HMC storage in silos will not be a source of dust. Figure 6, Figure 7 and Figure 8 present the breakdown by activity of emissions of PM_{10} associated with all emission sources at the Fingerboards Project with HMC stored in silos and, therefore, with no emissions of dust from HMC stockpiles.

Dust potential of HMC

Katestone understands that there have been discussions around the dust potential of HMC e.g. in the context of potential spills during transport to port and rehandling and storage at ports. The size distribution of HMC concentrate shows that 80% of the material is larger than 105 µm. Less than 2% of material is less than 38 µm because of removal of fines during processing. The material that is less than 38 µm and is more likely to be emitted as dust if it is exposed to the wind. Consequently, the HMC will have a very low dustiness potential.

This is patently false. Katestone is referring to the coarse sand mineral sands mines – not the WIM type (i.e the Fingerboards).

Why does it matter

More than 26% of the ore is comprised of very fine particles (<20μm) but ore has not been included in air quality contributions as it has been considered to be damp. Evaporation will dry any exposed surface out rapidly and Kalbar have been shown to have made a pitifully insufficient allowance for water to keep the ore body damp. *

Why wasn't available data used?

Who can you trust? Silt levels in lithological layers

Parameter	Units	Year 5	Year 8	Year 12	Information Source
Ore Moisture content	%		9		Kalbar
Ore Silt content	%		**6.9**		**AP42 Table 11.9-3**
Topsoil Moisture content	%		9		Kalbar
Topsoil Silt content	%		**6.9**		**AP42 Table 11.9-3**
Fine tailings moisture content	%		9		Kalbar
Overburden Moisture content	%		9		Kalbar
Overburden Silt content	%		**6.9**		**AP42 Table 11.9-3**
HMC Moisture content	%		9		Kalbar
Internal haul road surface silt content	%		0.5		Kalbar
Product haul silt loading	g/m2		1		Kalbar
Topsoil density	t/m3		2		Kalbar
Overburden density	t/m3		2.2		Kalbar
Ore density	t/m3		1.7		Kalbar

Table 11.9-3 (Metric And English Units). TYPICAL VALUES FOR CORRECTION FACTORS APPLICABLE TO THE PREDICTIVE EMISSION FACTOR EQUATIONS[a]

Source	Correction Factor	Number Of Test Samples	Range	Geometric Mean	Units
Blasting	Area blasted	17	100 – 6,800	1,590	m^2
	Area blasted	17	1100 – 73,000	17,000	ft^2
Coal loading	Moisture	7	6.6 - 38	17.8	%
Bulldozers					
Coal	Moisture	3	4.0 - 22.0	10.4	%
	Silt	3	6.0 - 11.3	8.6	%
Overburden	Moisture	8	2.2 - 16.8	7.9	%
	Silt	8	3.8 - 15.1	6.9	%
Dragline	Drop distance	19	1.5 - 30	8.6	m
	Drop distance	19	5 - 100	28.1	ft
	Moisture	7	0.2 - 16.3	3.2	%
Scraper	Silt	10	7.2 - 25.2	16.4	%
	Weight	15	33 - 64	48.8	Mg
	Weight	15	36 - 70	53.8	ton
Grader	Speed	7	8.0 - 19.0	11.4	kph
	Speed		5.0 - 11.8	7.1	mph
Haul truck	Silt content	61	1.2 – 19.2	4.3	%
	Moisture	60	0.3 – 20.1	2.4	%
	Weight	61	20.9 – 260	110	mg
	Weight	61	23.0 – 290	120	ton

[a] Reference 1,6.

False information in Air Quality report. References to non-existent factors. Why was it done when Kalbar already had silt content of what they were claiming are representative samples or topsoil and overburden (SD14) as well as ore (10tonne ore).

Katestone breaches own guidelines

- Default emission factors should be avoided. The onus to demonstrate the validity of data should remain with the coal mine. Air quality impact assessments that have been reviewed within this study were found to rarely rely upon local measurements of variables such as surface silt and moisture contents. Such data should be routinely collected and used in emission estimation.

Katestone clearly stated in their own 2011 report on best practice that local measurements of variables such as surface silt and moisture content should be used.
They have clearly relied on 'local measurements' from Kalbar regarding moisture – (not that that data would necessarily be true) – why then not use Kalbar's information about silt levels given they were available?

Table 3-4 Summary of Laboratory Testing – Haunted Hills Formation (2015)

Unit and Sample	Depth (m)	Soil Description (Group Symbol)	Particle Size Distribution				Atterberg Limits				Compaction		Emerson Class	Permeability (m/s)
			% Clay	% Silt	% Sand	% Gravel	LL (%)	PL (%)	PI (%)	LS (%)	SMDD (t/m³)	OMC (%)		
HHF - Gravel Composite 1	SD1 4.8-5.2 SD2 6.0-13.5 SD3 20.0-25.5	Clayey GRAVEL (GC)	10	12	38	40	19	12	8	3.5	2.11	8.5	2	2.0×10^{-9}
HHF - Gravel Composite 2	SD4 1.6-9.5	Clayey GRAVEL (GC)	14	18	33	35	23	12	11	6.0	2.06	8.5	1	2.0×10^{-9}
HHF - Clay Composite 1	SD3 12.5-17.88	CLAY trace Sand (CI)	49	39	12	0	47	17	31	12.5			1	
HHF - Clay Composite 2	SD2 2.7-2.93	CLAY trace Sand (CI)	38	57	5	0	37	19	18	8.0			1	

NOTE: LL = Liquid Limit PL = Plastic Limit PI = Plasticity Index LS = Linear Shrinkage SMDD = Standard Maximum Dry Density OMC = Optimum Moisture Content

The Geotechnical Report gave actual measures of silt
P15 – HHF Upper Clay 39—57%
P19 – HHF Gravel 12-18%
Coongulmerang – 31-73% fines (<75μm) and borderline between silt and clay

Wind erosion from exposed surfaces

9.3 Wind erosion

9.3.1 Overview

Of all sources of particulate matter from coal mining activities in the GMR, wind erosion of overburden, was ranked number 2 in terms of emissions of TSP and PM_{10} and number 1 in terms of emissions of $PM_{2.5}$. Wind erosion of exposed areas and coal stockpiles also ranked highly. Wind erosion has been estimated to contribute 22.3% of TSP, 32.3% of PM_{10} and 37.7% of $PM_{2.5}$ emissions from coal mines in the GMR. A summary of rankings and proportional contributions to GMR emissions of particulate matter is included in Table 67.

Table 67 Contribution of various wind erosion sources to GMR emissions of TSP, PM_{10} and $PM_{2.5}$

Wind erosion	TSP			PM_{10}			$PM_{2.5}$		
	Rank	Rate (tpy)	Proportion (%)	Rank	Rate (tpy)	Proportion (%)	Rank	Rate (tpy)	Proportion (%)
Overburden	2	28,906	18.6	2	16,246	27.3	1	3,272	31.8
Exposed areas	6	3,732	2.4	7	1,866	3.1	5	373	3.6
Coal	10	2,453	1.6	8	1,227	2.1	7	247	2.4

The NPI and AP-42 emission estimation equations for TSP and PM_{10} for wind erosion from exposed areas and overburden stockpiles are reproduced Table 68. The table shows that emissions from erodible surfaces are dependent on surface area.

	values				
2	Wind erosion from disturbed surfaces and /or stockpiles: Exposure of sensitive offsite receptors to airborne particulates (total particulates, PM10, PM2.5, crystalline silica) exceeds human health guideline values	C, O, CL	Minor	Unlikely	Low

Wind erosion is second highest source of TSP, PM10 and highest for PM2.5 but Kalbar say it is ‘unlikely’ to exceed guidelines. Where is the proof? They are haven’t factored in enough water to mitigate this dust.

Mitigations - laughable

The miner has already admitted that it won't be able to control all the dust, and unfortunately its water modelling make this even more apparent, in that it appears to have only factored in watering haul roads and has not made enough allowances for keeping the ore face or overburden stockpiles damp.
Welchman has included a 90% reduction in dust (due to Level 2 watering) from haul roads in his calculations and Kalbar have stated they have allowed 375ML water for dust control. Level 2 watering requires more than 2l/m^2/hour. The table below shows how pitifully inadequate this amount is. Granted watering will not be required 24/7, but even if it was only 1/5 of that time, there is still only enough water for 10ha.

	Water available	Hours per year	Water available per hour	Area that can be watered annually (2l/m^2/hr at Level 1)	Hectares that can be watered annually (at Level 1)
375ML water for haul roads	375,000,000 litres	8,760 hours	42,808 litres/hour	21,404m^2	2.14ha
25ML (additonal water available)	25,000,000 litres	8,760 hours	2,854 litres/hour	1,427m^2	0.14ha

Kalbar have committed to implementing a range of dust mitigation measures on a routine basis during construction and operations. These mitigation measures have been identified and incorporated into the emissions inventory based on:
• The application of best practice approaches for control of particulate emissions

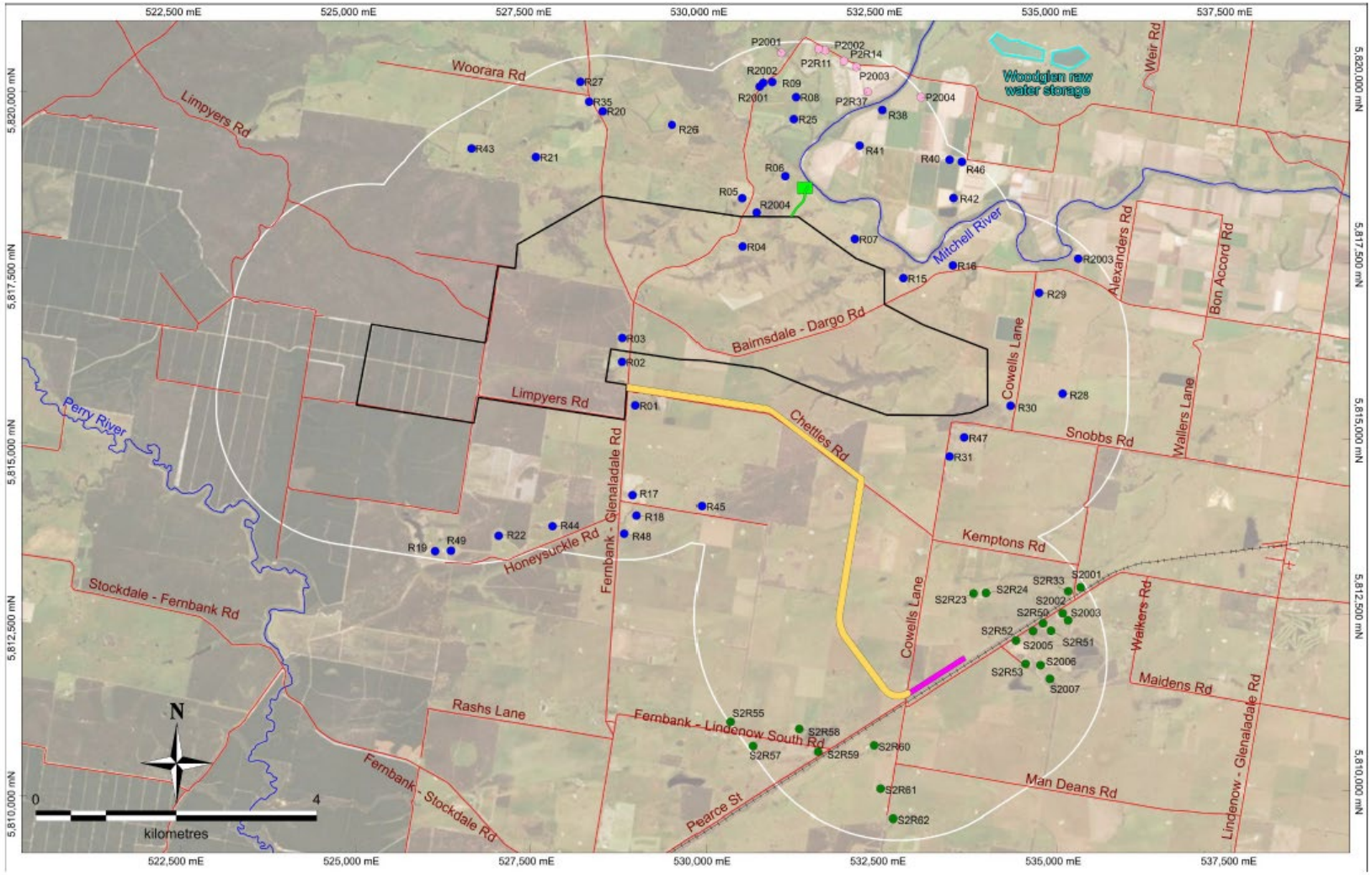


Figure 2.1: Sensitive receptor and suggested meteorological and particulate monitoring locations

Monitoring locations – Douglas revisited

No Monitoring locations at most sensitive receptors – all 3km from the mine and none to the East to catch impacts on downwind receptors. Designed not to find exceedances – cynical and a sign of what other communities have come to expect

Silt content figures were available to Katestone – why weren't they used?

ESTIMATES USED BY KATESTONE		
Overburden Silt content	6.9%	AP42 Table 11.9-3
Ore Silt content	6.9%	AP42 Table 11.9-3
Topsoil Silt content	6.9%	AP42 Table 11.9-3

FIGURES IN MINING ONE GEOTECH REPORT	
HHF Basal Gravel	12-18% silt
HHF Upper Clay	39-57% silt
Coongulmerang Formation	31 – 75% <75μm (silt)

$$EF_{PM_{10}} = \frac{k_{PM_{10}} \times 2.6\, s^{1.3} \times W^{2.4}}{1{,}000{,}000}$$

It matters – the effect of silt content on emissions is exponential

$6.9^{1.3} = 12.32$

$12^{1.3} = 25.29$

$24^{1.3} = 62.27$

Doubling the silt content has more than doubled the multiplier effect

Respirable Crystalline Silica

Safe Work Australia publishes exposure standards for airborne contaminants in the workplace, through its guidance Workplace exposure standards for airborne contaminants (link below).
The exposure standard for respirable crystalline silica dust is 0.05 mg/m3 as a time-weighted average (TWA) airborne concentration over 8 hours.
An 8-hour TWA exposure standard is the average airborne concentration of a particular substance permitted over an 8-hour working day and 5-day working week.
WorkSafe Victoria recommends that employers take a precautionary approach and reduce employees' exposure to below 0.02 mg/m3 as an 8-hour TWA to prevent silicosis and minimise the risk of lung cancer.

Katestone failed to use the real silt loading figures in their calculations – even though they were available to them. The silt loading of the haul roads was **assumed to be 3 g/m²** in the absence of any site-specific measurements.

Farmers co-existence on site – PPEs

…. haul trucks generate the majority of dust emissions at these sites, with their contribution being 78–97 percent of total dust emissions for particulate matter less than 10 micrometers (µm) [Cole and Zapert, 1995; Amponsah-Dacosta and Annegarn 1998; Reed et al. 2001]

The high contribution of dust emissions from haul trucks has the potential to expose personnel working nearby (within 100 feet or downwind) to significant amounts of respirable dust, creating potential 3 overexposures. Further, high concentrations of respirable dust (up to 21.50 mg/m) have been documented in areas near the vehicles [Reed and Organiscak 2005], and elevated percentages of silica can be associated with haul road dust [Organiscak and Reed 2004].

… of greatest concern here is the ongoing health problem associated with high dust concentrations being inhaled by workers at mine operations, especially respirable silica dust.

The majority of the fugitive dust is generated through the forces of the wheels on the road surface and by the turbulence created by the vehicles [Moosmüller et al. 2005]. Therefore, the first step in haul road dust control is proper road construction.

Downplaying RCS

Although the percentage of silica in the deposit is high, analysis shows it is approximately the same as in topsoil of nearby farmland. Particle size distribution analysis of the ore and the overburden shows the amount of this silica that is respirable silica, particles up to 7 microns in size, is very low.

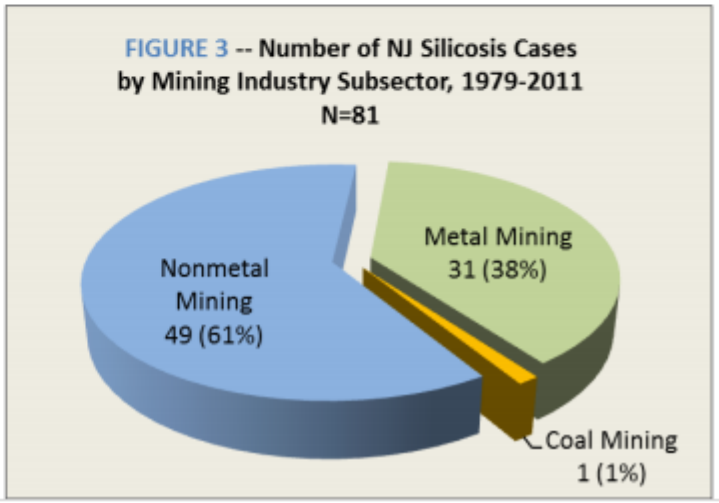
TABLE 1 – Ranking of NJ Mining Occupations with Overexposures* to Silica Dust, 2002-2012

Rank	Mining Occupation	# of Samples
#1	Bagging Operator	11
#2	Dryer Operator	8
#3	Laborer	5
#4	Crusher Operator	5
#5	Truck Loader/Driver	3

*Sampling results from MSHA inspections, MSHA Mine Data Retrieval System, 11/29/12

Forty-nine (61%) of the silicosis cases in mining (Figure 3) were related to work with nonmetallic minerals like sand, gravel, and stone. One case (1%) was employed as a tunnel worker in coal mines in Europe where his predominant exposure was to silica dust. Historically, 31 (38%) cases were associated with work in metal ore mines during the 1930's, 40's and 50's. Twenty of these mines were underground iron ore mines located in Morris County, NJ. All underground mines in New Jersey have been abandoned.

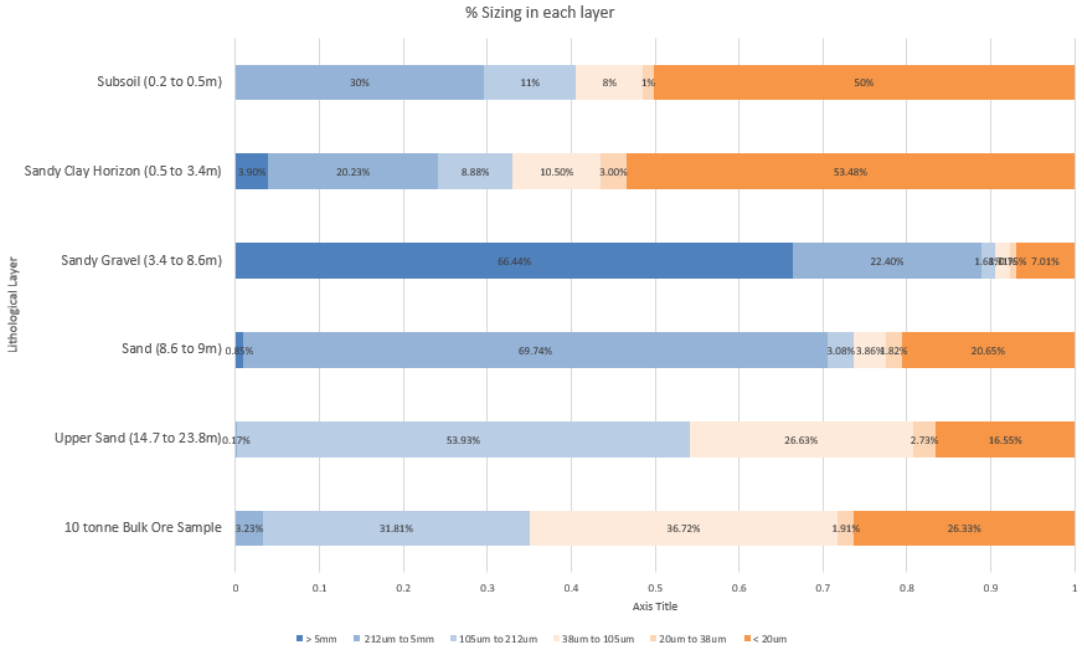
The majority of silicosis cases in mining were related to work with nonmetallic minerals like sand, gravel, and stone.



RCS – ‘pre-screened’ samples, missing layers, no chain of custody, no proof – no confidence

		Respirable (PM4) wt % of the bulk material for mineral phase		
Lab number	Client ID	α-quartz	Cristobalite	Tridymite
19_0491_01	Top Soil	5.25	<0.001	<0.001
19_0491_02	Overburden (HHF)	0.38	<0.001	<0.001
19_0491_03	Fine Tails	2.32	<0.001	<0.001

Impossible



If you believe RCS is not a problem you are delusional or wilfully blind.

Samples were pre-screened before submission to Townend On the basis of the one sample they did share information about, the overburden (from 0.2m to 23.8m in depth) had %s of <20µm ranging from 7.01% in the 5 metres of the gravelly component to more than 53% in the ‘Sandy Clay Horizon’. To claim there is only 0.38% a quartz in the overburden is an outright lie. There should be independent testing done. Where is the testing on the Upper Sands? Where is the testing on the Sandy Clay layer?

I believe Kalbar is putting people’s lives at risk by deliberately avoiding doing proper analysis of the materials at the Fingerboards so they can in turn avoid implementing adequate mitigations.

Cynical baseline data – Traralgon emissions

The diesel engines … produce exhaust from the combustion of diesel fuel. Diesel exhaust is made up of harmful chemicals including very small toxic particles and hazardous gases. Some of these hazardous gases (e.g. nitrogen oxides, benzene, sulfur dioxide, and formaldehyde) have been found to possibly cause cancer.

Health hazards of diesel exhaust
Breathing this exhaust is the most common method of exposure. As we breathe, fine particles and toxic gases can enter the lungs. Being exposed to diesel exhaust for **short periods of time** may cause **headaches, nausea, chest tightness, wheezing, cough and irritation of the eyes, nose, and throat**.
Over **long periods of time** (usually years), exposure may **increase the chances of getting cancer**. Those workers who already have respiratory illnesses, such as bronchitis, emphysema, and/or asthma, may be adversely affected if they are exposed to long-term, or chronic exposure to, diesel exhaust.

Who is at risk?
Workers most likely to be exposed to diesel exhaust include bridge, tunnel, and loading dock workers, truck and bus maintenance garage workers, miners, toll booth collectors, truck and forklift drivers, and material handling machine operators.

Table 12 Constant ambient background concentrations used in assessment

Parameter	Averaging Period	Background concentration ($\mu g/m^3$)	Source
Respirable crystalline silica (as $PM_{2.5}$)	Annual	0.34	Average of the measurements from the high-vol, after combining the α-quartz and cristobalite measurements and filling in data gaps)
Dust deposition	Monthly	53.3 $mg/m^2/day$	Highest measurement from on-site monitoring
	Annual	0.89 $g/m^2/month$	Average of the on-site monitoring data
NO_2	1-hour	41.0	Highest of the 70th percentile measurements from EPA Victoria's Traralgon site from 2013 – 2016
SO_2	1-hour	17.2	Highest of the 70th percentile measurements from EPA Victoria's Traralgon site from 2013 – 2016
Arsenic	Annual	0.001	Average of high-volume filter analysis

Kalbar claimed they did over a year's worth of air quality monitoring but strangely relied on Traralgon ambient air data for their baseline information

Community is right to be concerned about such an odd choice – an industrial city with the most polluting and toxic coal mines in the country.

Could it have something to do with wanting the baseline to appear as bad as possible so the actual pollution when the mine goes ahead seeks okay?

Envirolab Services (WA) Pty Ltd trading as MPL Laboratories
ABN 53 140 099 207
16-18 Hayden Court Myaree WA 6154
ph 08 9317 2505 fax 08 9317 4163
lab@mpl.com.au
www.mpl.com.au

CERTIFICATE OF ANALYSIS 217289-B

Client Details	
Client	Kalbar Resources
Attention	Steve Thomas
Address	

Sample Details	
Your Reference	Kalbar Resources
Number of Samples	1 Sludge, 2 Soils
Date samples received	15/11/2018
Date completed instructions received	08/11/2018

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.
Please refer to the last page of this report for any comments relating to the results.

Report Details	
Date results requested by	22/11/2018
Date of Issue	23/11/2018

NATA Accreditation Number 2901. This document shall not be reproduced except in full.
Accredited for compliance with ISO/IEC 17025 - Testing. **Tests not covered by NATA are denoted with ***

Results Approved By
Heram Halim, Inorganics Team Leader
Michael Mowle, Metals/Inorganics Supervisor
Todd Lee, Laboratory Manager, Perth

Authorised By
Todd Lee, Laboratory Manager

Client Reference: Kalbar Resources

Miscellaneous Inorg - soil				
Our Reference		217289-B-1	217289-B-2	217289-B-3
Your Reference	UNITS	Leach FT	Leach CT	Leach HM
Type of sample		Sludge	Soil	Soil
Date prepared	-	13/11/2018	13/11/2018	13/11/2018
Date analysed	-	13/11/2018	13/11/2018	13/11/2018
pH	pH Units	8.0	7.3	6.9
Electrical Conductivity (EC)	µS/cm	72	15	54
Chloride	mg/kg	31	<10	41

More dodgy baseline data

From Environmental Geochemistry International report dated 6 Feb 2019
Geochem Testing of Fingerboard Tailings and Overburden

(Kalbar provided all the information for analysis)

This is exactly as it was shown in the EES documentation.
Were the documents ‘doctored’? Samples received two days AFTER they were analysed

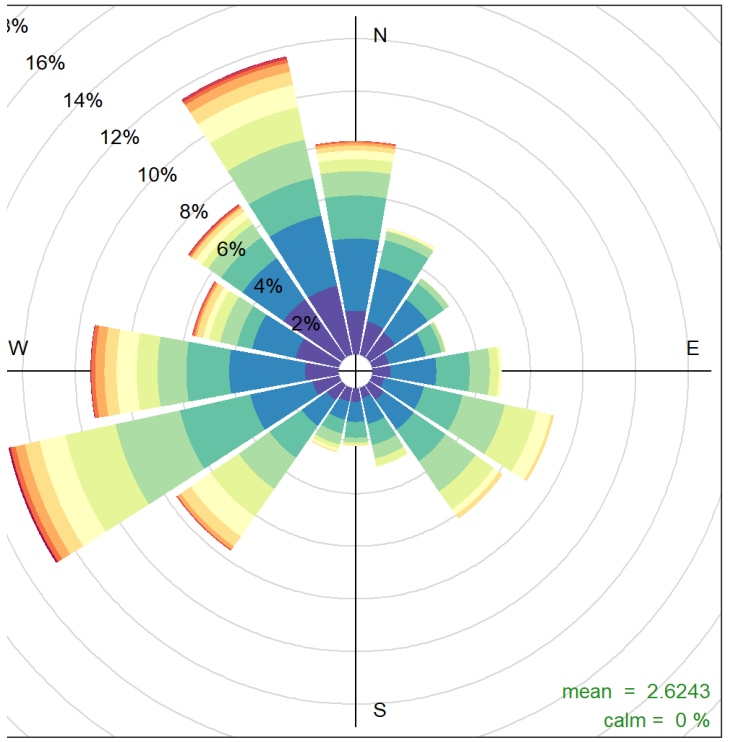
Same samples (217289-B-1) analysed 10-13 days before receipt by laboratory

Client Reference: Kalbar Resources

Metals in ASLP (reagent water)						
Our Reference		217289-B-1	217289-B-2	217289-B-3	217289-B-4	217289-B-5
Your Reference	UNITS	Leach FT	Leach CT	Leach HM	Leach FT - 3 Day	Leach CT - 3 Day
Type of sample		Sludge	Soil	Soil	Sludge	Soil
Date prepared	-	02/11/2018	02/11/2018	02/11/2018	05/11/2018	05/11/2018
Date analysed	-	02/11/2018	02/11/2018	02/11/2018	05/11/2018	05/11/2018
pH of final Leachate	pH units	7.5	6.7	7.0	[NT]	[NT]
Chloride	mg/L	2	<1	2	[NT]	[NT]
Sulphate	mg/L	<1	<1	<1	[NT]	[NT]
Fluoride in ASLP	mg/L	0.3	<0.1	0.2	[NT]	[NT]
Chromium (VI) in ASLP	mg/L	<0.005	<0.005	0.034	[NT]	[NT]
Calcium in ASLP	mg/L	<0.5	<0.5	0.7	<0.5	<0.5
Potassium in ASLP	mg/L	1.3	<0.5	<0.5	1.2	<0.5
Magnesium in ASLP	mg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Sodium in ASLP	mg/L	2.0	<0.5	1.4	2.0	<0.5
Phosphorus in ASLP	mg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Silicon in ASLP	mg/L	2.7	1.0	0.9	1.3	0.3

Windspeed and direction matter
Katestone's modelling is inadequate and dangerous

Katestone Air Quality Report			
metres per second	Legend	metres per second	kilometres per hour
10 to 20		20	72.0
		19	68.4
		18	64.8
		17	61.2
		16	57.6
		15	54.0
		14	50.4
		13	46.8
		12	43.2
		11	39.6
9 to 10		10	36.0
8 to 9		9	32.4
7 to 8		8	28.8
6 to 7		7	25.2
5 to 6		6	21.6
4 to 5		5	18.0
3 to 4		4	14.4
2 to 3		3	10.8
1 to 2		2	7.2
0 to 1		1	3.6



Frequency of counts by wind direction (%)

Wind speed	10 µm	5 µm
km/hr	km travelled	km travelled
4.99	0.89	3.54
9.98	1.77	7.24
19.96	3.70	14.48
39.91	7.40	28.97
60.03	11.10	43.45
79.98	14.81	58.10

Dust particles need to be smaller than 200 microns to become airborne and smaller than 10 microns to be classified as "respirable." Respirable dust is able to penetrate the body's natural defenses and travels to the lungs which can lead to serious health hazards. Naturally, the size of the dust particle dictates how far it travels when airborne. Wind speed is another contributing factor to distance traveled: as wind speed increases, so does the distance traveled of the respirable dust particles.

Road diversions are dangerous and nonsensical

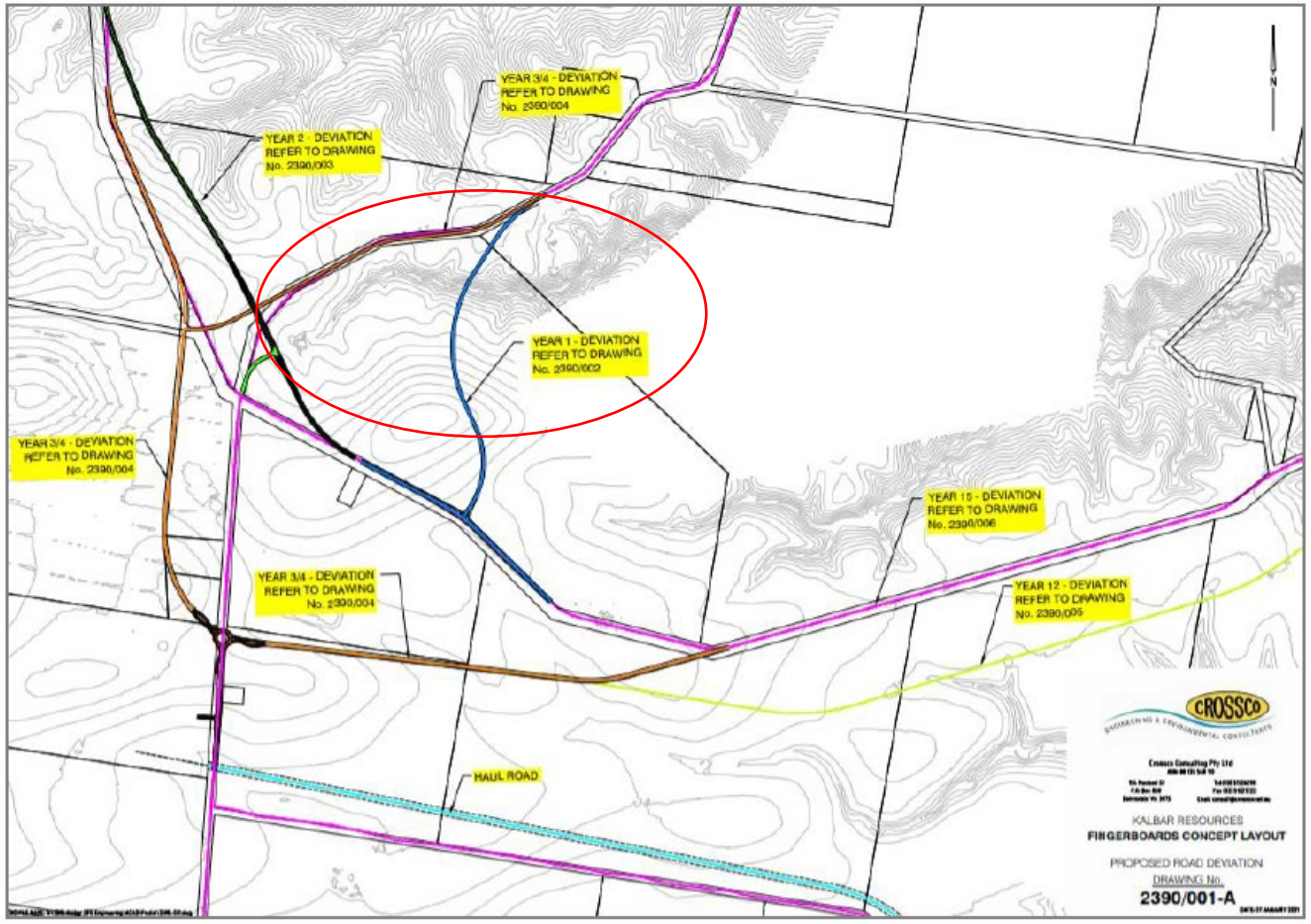


Figure 2 January tabled plans – proposed road network - diversions and staging (Tabled Document 45)

Road diversions

Not only do they make no sense

1. Interfere with others' businesses
2. Aren't economically justified
3. Are downright dangerous – year 1 where the tailings storage facility is????
4. Go against GHD recommendations

Table 7: Cash flow per tonne of ore from diverting roads

Road diversions	Tonnes of ore mined	Cash Flow	$/tonne ore	Biodiversity loss
Bairnsdale - Dargo Road	34,500,000	$216,000,000	$6.26	10.61 ha native vegetation plus 42 large trees
Fernbank - Glenaladale Road	2,500,000	$42,900,000	$17.16	4.45 ha native vegetation plus 39 large trees

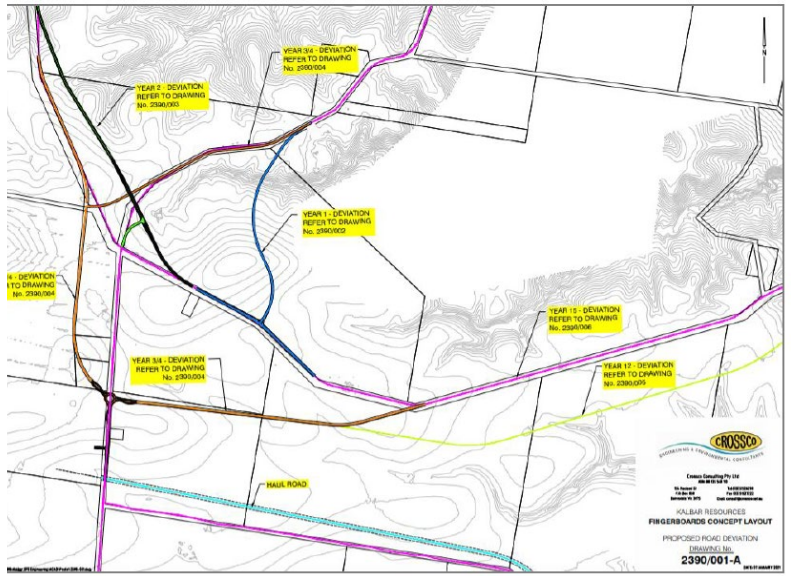
GHD Recommendations re roads

5.9 Reinstatement of Public roads

During development of the mine plan it is recommended that careful consideration is given to the location of the existing road and whether it requires realignment during mining and then subsequent reinstatement. If this scenario proceeds, then the reinstated road requires positioning in an area where it will not be affected by remnant geotechnical issues associated with the previous mining activities.

It is suggested that the tailings facility and deep overburden dumps are not positioned in areas where the future public road is to be placed as such features are likely to experience significant long term settlement. Such settlements will be detrimental any structures or roads placed over these features.

In addition it is recommended that public roads are not positioned downstream of any water storage reservoir or on dam crests as this may elevate the consequence category of the dam in question. Higher consequence category dams require more stringent design, maintenance and surveillance thus the cost of higher consequence category dams is generally greater than low consequence dams.



re 2 January tabled plans – proposed road network - diversions and staging (Tabled Document 45)

Dam failure – must be modelled.

We need to know who will be accountable.
We need to know which insurer will pay up when the dams fail.

2.6 Consequence of failure

…the sudden release of water and debris could result in loss of life or injury, and damage to downstream properties. Damages could include other dams, houses, buildings, livestock, roads, railways or interruption to public utilities such as electricity and telephone networks. In addition, there could be significant environmental damage. This can take the form of erosion of the waterway or gully, and the loss of flora and fauna downstream, which may take considerable time to recover, ***if recovery is possible****.*

The ANCOLD Guidelines on the Consequence Categories of Dams (2012) describes consequence category as categories of dams based on the consequences of potential dambreak failure to human life, property, commerce, infrastructure, the effect on the dam owner's business, political and business credibility, health, social and economic disruption, and environmental impacts.

The consequence categories range from ***'Very Low', 'Low', 'Significant', 'High (A, B, C)' to 'Extreme',*** *depending on the impacts failure of the dam would pose to downstream communities and environments.* Dams with Significant or above consequence categories to pose risk to human life (potential for fatalities) and thus have more stringent licensing, design, operation and maintenance requirements

Has the IAC, the TRG, ERR or anyone else seen a proper risk assessment or any modelling for dam failure? The community has not been presented with a proper consequence assessment of dam failure for any of the dam sites. It is a matter of not if, but when.

4.3.1 On-stream storages

On-stream storages (all the mine water catchment dams) are usually the most economical BUT have several disadvantages, including:

· The need for a spillway to accommodate extreme floods without the embankment being overtopped. **Even for a Very Low consequence category dam ANCOLD suggest a capacity to accommodate a flood in excess of the 1 in 100 year flood. For a Significant consequence category dam ANCOLD suggest a capacity to accommodate a flood in excess of the 1 in 10,000 year flood.**

• The possible need to deal with floods during construction

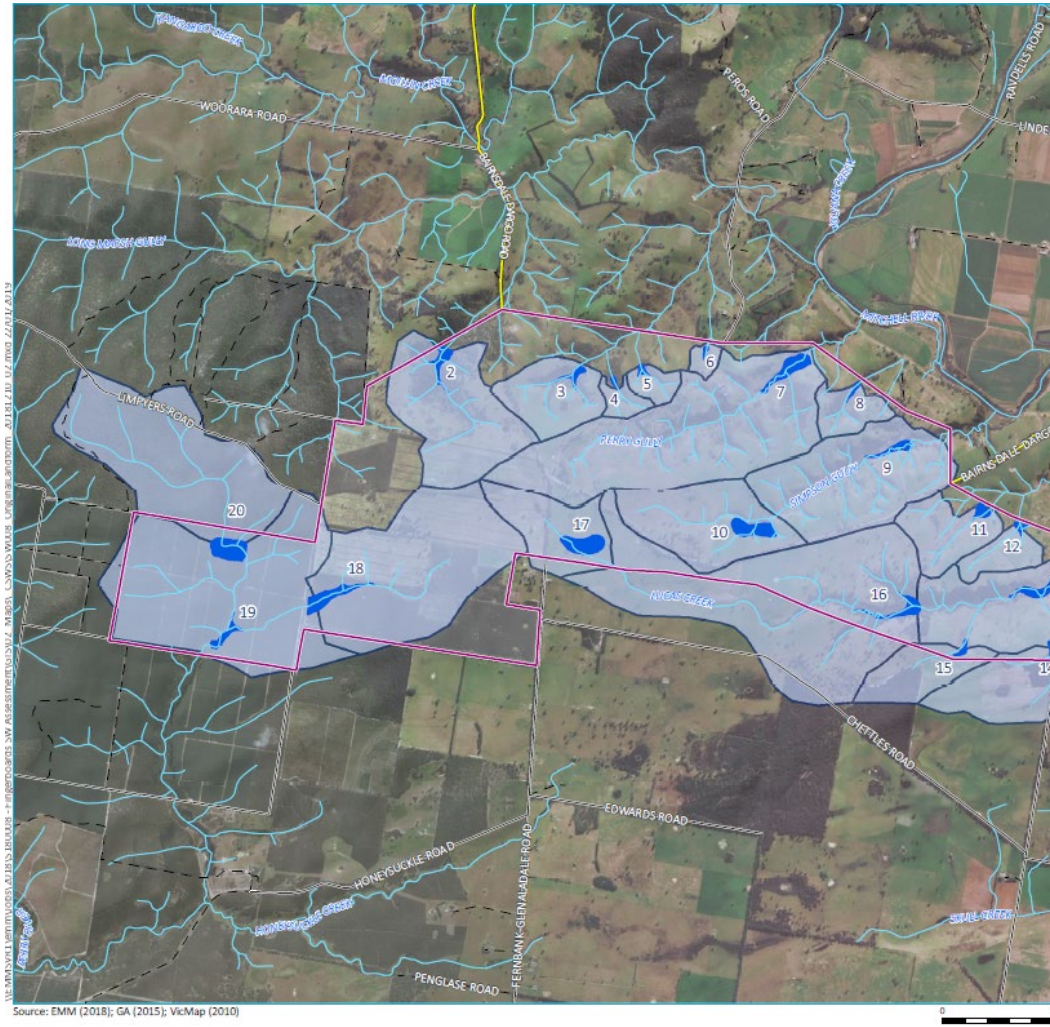
• Potentially poor foundation conditions (as are found with the Fingerboards dispersive soils)

Dams – effects on downstream users and neighbours

Neighbours and downstream users.
Kalbar are capturing all water that would normally flow down the gullies. How do you compensate neighbours and the Rivers for loss of water?
What modelling has been done for failure water storage dams? (Kalbar admit that the neighbours properties will receive less runoff – except during floods.)

Appendix 1. Kalbar Dams Capacity. From EEM A006 A Table 4-2 p 30 NJ Barton

Water Management Dams				Capacity Each Year(ML)														
Dam ID	Catchment	Capacity	Runoff to	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	ha	ML	fill (mm)															
2	132	125	95	0	0	0	0	125	125	125	125	125	125	125	125	125	125	125
3	61	57	93	57	57	57	0	0	0	0	0	0	0	0	0	0	0	0
4	15	15	100	0	0	15	15	0	0	0	0	0	0	0	0	0	0	0
5	13	13	100	0	0	13	13	0	0	0	0	0	0	0	0	0	0	0
6	7	7	100	0	0	7	7	0	0	0	0	0	0	0	0	0	0	0
7	222	211	95	211	211	211	211	211	211	211	211	211	211	0	0	0	0	0
8	24	23	96	0	0	0	23	23	23	0	0	0	0	0	0	0	0	0
9	128	122	95	0	0	0	122	122	122	122	122	122	122	0	0	0	0	0
10	134	127	95	0	0	0	127	127	127	127	127	127	127	0	0	0	0	0
11	41	39	95	0	0	0	0	0	0	39	39	39	39	0	0	0	0	0
12	22	21	95	0	0	0	0	0	0	21	21	21	21	0	0	0	0	0
13	135	128	95	0	0	0	0	0	0	128	128	128	128	0	0	0	0	0
14	76	72	95	0	0	0	0	0	0	72	72	72	72	0	0	0	0	0
15	42	40	95	0	0	0	0	0	0	40	40	40	40	0	0	0	0	0
16	280	266	95	0	0	0	0	0	0	266	266	266	266	266	266	266	266	266
17	101	96	95	0	0	0	96	96	96	96	96	96	96	96	96	96	96	96
18	207	197	95	0	0	0	197	197	197	197	197	197	197	197	197	197	197	197
19	230	219	95	0	0	0	0	0	0	0	0	0	0	219	219	219	219	219
20	175	166	95				0											
Totals	2045	1944		268	268	303	811	901	901	1444	1444	1444	1444	903	903	903	903	903



Sources of soil contamination

FLOCCULANTS
The flocculants used in excessive amounts at the Fingerboards are likely to break down to acrylamides under anaerobic conditions.
Acrylamides in water have a deleterious effect on human health
No testing has been done on the ultimate breakdown of flocculants or the filtration rates of flocculated soil (centrifuge cake) through the in pit tailings storage facilities
Limited research but it is apparent they will break down
Acrylamides will contaminate the groundwater and possibly surface water via the Perry Gully or through leaching sideways across the site
People use the river water for domestic, stock and irrigation supplies
Are we going to see another PFAS/PFOS situation at the Glen and be faced with the same issues of contamination that are destroying farms around the western edges of the Lakes?

DIESEL – VOLATILE ORGANIC COMPOUNDS
Incomplete combustion is common in mining areas (they don't pay tax on diesel so use with abandon)
*DPM is typically composed of carbon **particles** ("**soot**", also called black carbon, or BC) and numerous organic compounds, including over 40 known cancer-**causing** organic substances. ...*
*NO_x **emissions** from **diesel** engines are important because they can undergo chemical reactions in the atmosphere leading to formation of PM2.*

How much diesel over each area – what measures are taken by any mining company to clean it up
What rubbish will be buried on site – tyres, concrete, general waste, not to mention the effluence of the affluent society.

Impacting on flows to neighbouring farmers

					reuse. (RD07)				
21	Altered hydrology	Capture of water in mine contact water dams	Reduced frequency / magnitude of flow down drainage lines results in modifications to riparian systems along drainage lines - Mitchell system Reduced frequency / magnitude of flow down drainage lines results in modifications to riparian systems along drainage lines - Perry system	O, CL	• Surface water will be extracted from the Mitchell River in line with the conditions, timings, and limits detailed in any licence issued by Southern Rural Water. (SW01)	SW01	Possible	Minor	Medium
				Medium	• Mine contact water from outside of the mine void or tailings dam that is retained in water management dams will be offset by releasing the same volume of fresh water from the fresh water storage dam. Water will be released downstream of the project area (to the Perry River Catchment) or directly to the Mitchell River via the pipeline from the freshwater dam. (SW03) • An adaptive management strategy will be implemented, based on water quality and quantity monitoring results, to determine whether offset water that would typically be returned to the Mitchell River may be directed to ephemeral drainage gullies in a controlled manner. (SW35)	SW03, SW35	Unlikely	Minor	Low

How does this help neighbouring farmers who are going to lose flows to their properties?

Cumulative/additive effects

ADDITIVE EFFECTS When the body is exposed to two or more contaminants, an additive effect is obtained when contaminants have the same target organ or the same mechanism of action. In this situation, the total effect upon the body equals the sum of effects from the individual substances. For substances which are purely additive, conformity with the standard results when: $\frac{C_1}{L_1} + \frac{C_2}{L_2} + \ldots + \frac{C_n}{L_n} \leq 1 \quad (1)$

Where C1 , C2 .. Cn are the average measured airborne concentrations of the particular substances 1, 2 .. n and L1 , L2 .. Ln are the appropriate exposure standards for the individual substances.

Example 1: Consider an atmosphere containing:

- 35 ppm toluene (exposure standard 50 ppm),
- 25 ppm xylene (exposure standard 80 ppm), and
- 20 ppm 1, 1, 1-trichloroethane (exposure standard 100 ppm).

As all of these substances act primarily on the central nervous system, equation (1) can be applied. The resultant aggregate effect is:

$$\frac{35}{50} + \frac{25}{80} + \frac{20}{100} = 1.2125$$

Since the sum of the contribution from each substance exceeds one, the exposure standard for the airborne mixture is exceeded.

Other consultants base reports on the basis of incorrect and misleading assumptions

Predicted impact health assessment

As described in the Assessment , the potential impacts during the construction, operational and rehabilitation stages of the project were predicted on the basis that releases of contaminants would be minimised as a result of the management measures recommended by the technical specialists. Different methodologies were adopted to qualitatively assess exposures or quantitatively estimate concentrations of contaminants at the point of exposure. Almost all the qualitative and quantitative assessments undertaken to inform this Assessment made allowances in their evaluations for the application of proposed key management measures.

Based on the available data, assumptions and uncertainties noted in the Assessment, the Tier 1 screening assessment of predicted concentrations in media with adopted health screening criteria determined the risk profiles of substances of concern in air, groundwater and surface, soil or sediments to be low and acceptable.

Failure to include noise is yet another fundamental flaw in the HHRA – why has that been allowed?

Apart from the fact that the Health Assessment is inadequate and incomplete, Teague states that it is based on assumptions about controls being in place. We already know those controls won't be in place – Many of them are based on the use of water or dustex (or similar). There is inadequate water and Dustex is too expensive for this sort of operation. The Panel should require all the consultants and Kalbar to re-do the EES risk assessments on the basis that their controls will not eventuate.

Others are based on progressive rehabilitation – which we have seen time and time again does not happen in Victoria generally and in mineral sands mines specifically.

Yet others are based on changes to human behaviour (e.g. reduced vehicle speeds, which, as has been pointed out, are never adhered to.

CONCERNS ABOUT REGULATION

Tailings Storage Facilities – variation

Even with the centrifuge option there are still two types of Tailings Storage Facility

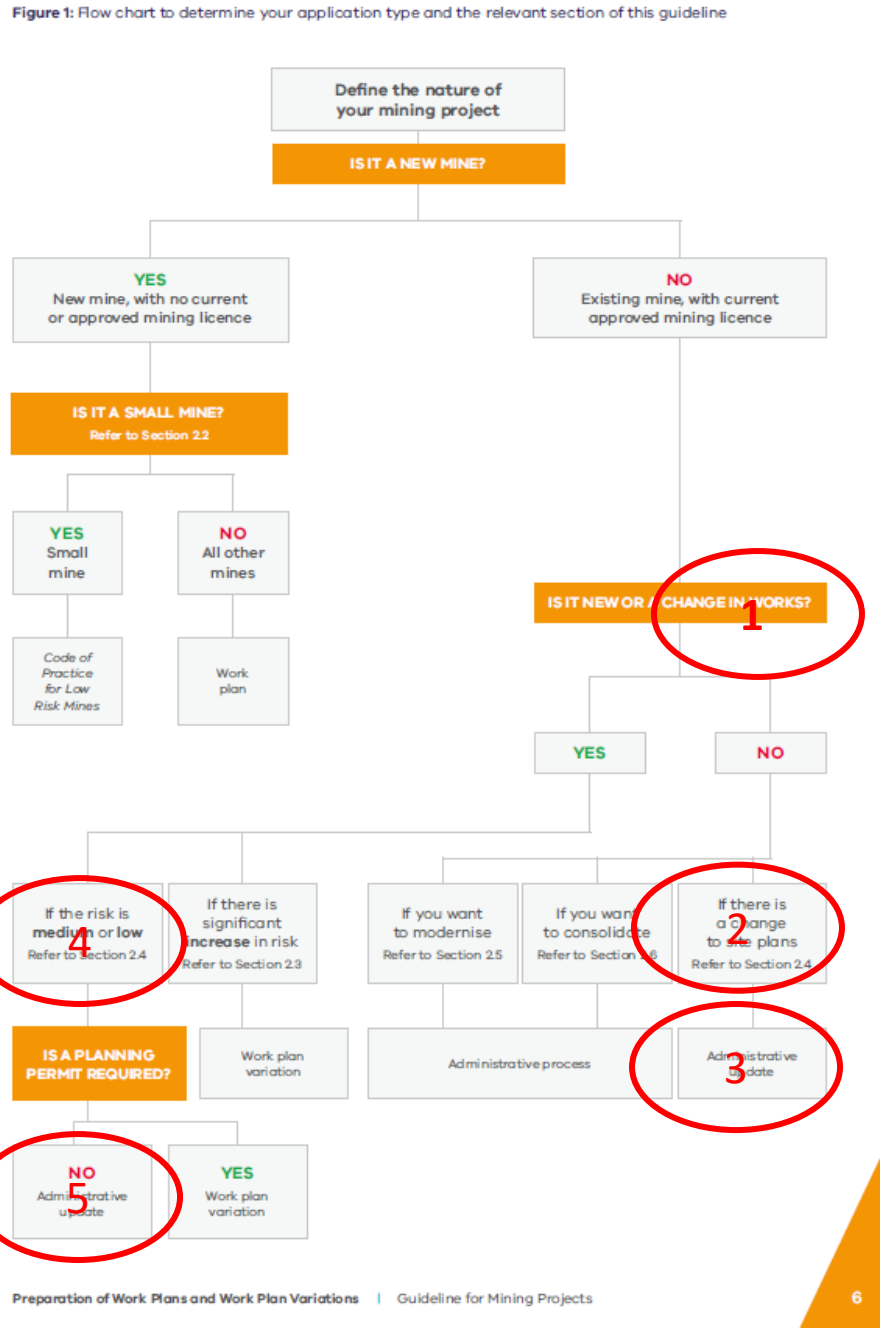
1. In-pit TSFs
2. Cross-valley TSF (Perry Gully)

ERR's guidance says the EPA is responsible for in-pit TSFs, but EPA says they are not.

ERR defines TSFs as:

TSFs are areas used to confine tailings and include the dam or other structure, as well as the associated infrastructure. The term refers to the overall facility, and may include one or more tailings (or water) dams.

Have the EPA and ERR established who is responsible for regulating the in-pit tailings. There is no excuse for not having done so - people's lives and livelihoods (not to mention the groundwater, GDEs etc.) are at stake.



NON-STANDARD INTERPRETATION OF WORDS ALLOWS AGENCIES TO ABSOLVE THEMSELVES OF RESPONSIBILITY FOR REGULATORY OVERSIGHT

1 Change in Works – would the TSF be interpreted as 'infrastructure' rather than 'works'

If YES then

2 and 3 - any change to on-site plans requires a simple administrative tick

If NO then

3 and 4 – they will use Kalbar's unsubstantiated and inadequate risk assessment and be able to give an administrative tick because of the Planning Scheme Amendment which has removed any 'agency' of the shire and the community over the licence area.

Greenhouse Gas Emissions – underestimated but still unacceptable

Once again the consultants base 'reports' on information/data provided by Kalbar without any cross-checking for validity. There is no evidence anywhere of the supposed reduction in haul routes from the centrifuge. There is also no evidence for the magical reduction in power use identified since the EES was released. Sloppy, unprofessional and insulting. No wonder the community is annoyed and sceptical.

		Australia	Victoria	Kalbar
Emissions	tCO2-e	529,300,000	91,300,000	129,560
Jobs	Number	13,125,100	3,453,700	200
% Australia's employment	%	100	26.31	0.0015
% Victoria's employment	%	380	100	0.0058
Emissions/job	tCO2-e	40	26	648
% of Australian emissions	%	100	17.249	0.024
% of Victorian emissions	%	579.737	100	0.142

Kalbar's own figures show the maximum contribution they make is only 1 job for every 17,263 Victorian worker and only 1 job for every 65,625 Australian Worker.

Yet each of those jobs is going to create massive emissions compared to other jobs (25 times as much as every other Victorian job and 16 times as much as every other Australian job)

They haven't included emissions associated with transport of the product after it reaches the sidings. How is transport to Melbourne or Geelong and then shipping to China accounted for?