

Chris J Cromey comment on TCM Barrytown mineral sands mine Fast Track project application – Southern Block

1. I appreciate and would like to thank the panel for the invite to comment on the TCM fast-track proposal.

The local area with a mine in the middle of it

2. The Barrytown Flats is a geographically constrained area. At the southern end of the Flats there is 17 Mile and at the northern end there is Perpendicular Point. Both of these are elevated above the Flats. Behind the Flats to the east are the Paparoa Mountains and in front of the Flats to the west is the Tasman Sea. One road in and one road out. TCM hope to operate an industrial mine right in the middle of this geographically constrained area. This continues to be a major concern.

Dust effects and the regulatory monitoring of dust

3. Dust and the tools the regulatory authorities used to monitor dust are an ongoing concern for myself. The dust deposition gauges proposed to be used for dust monitoring are likely to under-sample the amount of suspended dust that may be in the air at that point. I base these concerns on three decades of using an equivalent tool in the marine environment to measure waste particle deposition, the 'sediment trap'. This tool was one of many I used to validate particle tracking (lagrangian) mathematical models
4. In the following paragraphs, I attempt to demonstrate the similarities between the waste particle in the sea and the dust particle at the mine site, in turn hoping to explain why I consider the dust deposition gauges to be wholly inadequate. Although I am not a dust expert, I would consider myself an expert on particle tracking model development and validation.
5. This is the fifth occasion I have presented these concerns (previous occasions were TiGa public hearing, TiGa Environmental Court appeal, Mananui mineral sands mine public hearing of the now in-operational WMS, CRRG comments for this application).
6. In the sea for example, waste particles that are discharging from a point source have different particle sizes and associated settling velocities.

Same with dust at the mine site – dust is created at different point sources and has different particle sizes and settles at different rates (dust < 100 µm is of main interest).

7. The particles in the sea are suspended when a certain threshold of water current is reached, and then transported in a plume mainly driven by the current.

Same with dust at the mine site – when the wind reaches a certain threshold (this threshold is alluded to in the applicants Dust Management Plan (DMP)), dust particles are suspended and transported in a cloud driven by the wind.

8. The distance that particles are transported in the sea from the point source is primarily influenced by the distance which the particle has to settle vertically, the settling velocity of the particle, and the speed of the current.

Same with dust at the mine site – the distance the dust particles are transported from the point source towards a sensitive receptor depends on the height at which the dust particle is suspended (picked up) by the wind, the settling velocity of the dust particle and the speed of the wind.

9. For particles being dispersed in the sea, there is a slowly varying component of the current that moves the particle, plus a widely varying, more random component of the current caused by turbulence. E.g. When a dozen oranges thrown into the sea move along with the current, the dozen as a whole move in an average direction and speed according to the mean current speed, but individual oranges spread out away from the main patch in a more random manner caused by turbulence.

Same with dust at the mine site – dust particles are transported in a general direction and distance as a result of the mean wind, but the gusty component of the wind causes more random diversions away from the centre of the cloud in both distance and direction. This results in patchiness.

10. Suspended particles in the sea continue to be transported in suspension until they deposit on the sea bed at a certain distance from the point source, and this may be caused by the current falling to a low value, or the particle being transported to a different area where the current is lower.

Same with dust at the mine site – suspended dust particles continue to be transported in the wind until they deposit on the ground at a certain distance from the point source, and this may be in an area where there is less wind, or it may be that the wind has moderated below the threshold.

11. To measure deposition of particles in the sea from a point source for model validation, a number of sediment traps are used in a transect along a gradient from the source to try and understand patterns of deposition and identify patchiness and anomalies.

Not so with dust monitoring at the mine site – only one deposition gauge at the boundary with no transects are proposed. Patchiness of dust particle deposition cannot be assessed with only one sampling point.

12. To measure deposition of particles in the sea from a point source for model validation, often duplicate or triplicate sediment traps are used in one location. i.e. two or three traps strapped together in one location attempt to quantify the variability (patchiness) of very local particle deposition that may vary over just a few metres.

Not so with dust monitoring at the mine site – only one sampling point (dust deposition gauge) is at any one monitoring location.

13. With a transect of sediment traps, if any one trap location along the transect is empty and contains no deposited particles, then other adjacent traps in the transect or in the duplicate/triplicate traps can be used to assess if the empty trap really is empty because there are no particles depositing there.

Not so with dust monitoring at the mine site – without a transect or duplicate/triplicate sampling at one location, an empty dust monitoring gauge cannot be compared with other measurements near it, as there are no other measurements. Here there is an underlying problem with an empty dust monitoring gauge, because it is taken as an acceptable monitoring result and that there is no dust depositing at that very specific location.

14. For sediment trap A in one location on the sea bed, it can be observed from traps deployed next to it and above it suspended on a rope, that particles in the plume occupy a three dimensional space. The particles are transported to one side and over the top of sediment trap A, so that sediment trap A may be empty even though particles have passed close by to one side, and over the top of the trap opening. The sampling area of sediment trap A, the trap opening, is miniscule and as little as 10 cm in diameter. The trap opening is also a certain height above the bed, and particles may even pass the trap

location, below the trap opening (that is between the trap opening and the seabed).

Similar sampling problems would be expected with dust gauges at the mine site – there is no way of telling whether dust has passed just to one side of the gauge, or over the top of it and onto the sensitive receptor.

15. In the measurement of particle deposition in the sea, the larger particles which are fewer in number have higher settling velocities and move in smaller 'steps'. This means larger particles can be harder to measure and capture in sediment traps, because of patchiness. This is observed with sediment trap measurements near fish farms – traps close to the source have a tendency to measure patchiness because they capture the large, uneaten fish feed pellets that are fewer in number and have very localised deposition, compared to the highly numerous finer particles.

Similar sampling problems would be expected at the mine site – the DMP describes that because of the mining process, coarser particles are expected to be more abundant than the finer particles, in any uncontrolled dust. So these coarser particles may easily be missed by the gauges because of patchiness. An example entirely unrelated to this application, may be given by considering the media reports of the WMS HMC stockpile dust that was blown through the streets of Westport and up into the roof gutters of nearby businesses. These HMC particles were heavy and likely to be deposited in quite a patchy distribution, such that a dust deposition gauge located at one end of the street close to the stockpile might be empty or have little in it, even though the rooves above it and the gutters to one side of it were found to contain the dust. This particular event at Westport served to prove quite conclusively that even the relatively heavy HMC dust can be suspended and transported relatively large horizontal and vertical distances if uncontrolled.

16. In the marine environment, sediment traps are deployed in locations near to the point source, and the point source does not move very much (perhaps a few metres) in relation to the trap location.

Not so with dust monitoring at the mine site – the dust monitoring gauge is placed in a location on the boundary, but the point source is large and moving along relative to the gauge location because grassed areas in front of the mining equipment are 'stripped' in preparation for the mining. Although the point source is large and moves, the location of the monitoring point is fixed and might only be reviewed once a month when gauges are serviced. There can be no understanding of exactly when dust may have been suspended and entered the gauge unless precise records are kept.

17. Given the known limitations with sediment traps for measuring particle deposition in the sea, that is, the need for many of them in different locations, the replication required at one location, the importance of trap location relative to the point source and patchiness to name a few, very few if any regulatory authorities of the aquaculture industry globally use sediment traps as a regulatory monitoring tool.

Not so with dust monitoring at the mine site – one dust deposition near to a sensitive receptor is expected to monitor dust adequately for regulatory purposes.

18. Based on these limitations, it is quite possible that dust deposition gauges at the mine site could be doing very little, and could just be empty because of under-sampling.

AF8 and local food security

19. The proposed fast track project has a much longer life than the consented middle block, so now would be a good time for TCM to seriously consider the risk of AF8 and what would happen with such a large operational mine in a small community. This is a major concern for me.
20. For the average number of employees expected to be on-site at any one time, TCM should be required to have enough food, shelter, clothing and medications to care for them for a minimum of two weeks.
21. Thank you for the opportunity to comment.

Chris J Cromeey

28th September 2026