

Memorandum

To: Vicki Morrison Shaw / Mike Holm, Legal Counsel for Tran-Tasman Resources Limited

From: Dr Philip Mitchell

Date: 27 April 2017

Re: Response to Minute 41, Appendix 1, Questions 1, 2 and 7

INTRODUCTION

The purpose of this memorandum is to provide a response to questions raised by the Decision Making Committee in Minute 41 dated 10 April 2017.

I have only responded to questions that relate to my area of expertise, being planning and consent conditions, noting that Trans-Tasman Resources Limited’s other technical experts have responded to the remaining questions.

RESPONSE TO MINUTE 41, APPENDIX 1, QUESTIONS 1, 2 AND 7

1. How were the discharge standards in the latest set of proposed conditions derived?

The values and process used to derive the “end of pipe” discharge standards provided for in Condition 5(c) are summarised in the table below.

% of <38 micron sediment	Discharge rate (tonnes/hr)	Specific gravity value (mass of fine sediment within a m ³)	Discharge Limit (column 2 / column 3) (m ³ /hr)
2.25%	369	2.86	130
1.6%	237	2.86	83
0.9%	188	2.86	66

The values in column 1 and 2 are taken from the paragraph 15 (table) of the *Joint Statement of Experts in the Field of Sediment Plume Modelling – Setting Worst Case Parameters* (“JWS Worst-case”) and provides the combined discharge mass for the different percentages of fines (<38 microns) in the discharge from the Integrated Mining Vessel.

The specific gravity (listed in column 3), is used to convert the discharge rate by mass to a volumetric rate, and the value used is taken from Appendix A - Table A.1 (averaged) of the HR Wallingford Report “*Source terms and sediment properties for plume dispersion modelling*”.

The final “Discharge Limit” values in column 4 are expressed volumetrically and were calculated by dividing the discharge rate by mass (column 2) by the specific gravity (column 3). These are the “end of pipe” discharge standards identified in the proposed conditions (Condition 5 (c)).

Note also that TTR’s technical advice is that it is more appropriate to express the fines content in the de-ored sediment discharge volumetrically (m³/hr) rather than by mass (tonnes/hr) as monitoring volumetrically will provide for greater accuracy.

With regard to the content of fines in the extracted seabed material, paragraph 13 of the JWS “Worst-case” states:

“We recommend that if consent is granted a condition is added to limit the content of ultra-fines of the excavated seabed material. The proposed condition would be an upper limit for an average ultra-fines (<8 microns) content of 2.25% averaged over any one week period, as determined by a minimum of 20 representative samples of the excavated sea bed material.”

This recommendation has also been accepted in the proposed conditions (Condition 5(d)), however, the 2.25% figure has been reduced to 1.8% in order to be more conservative.

2. How do the proposed discharge standards (in the latest set of conditions) compare to the model inputs used for the application and also those used in the worst case scenario modelling.

The response to Question 1 has explained how the numerical values for the discharge standards have been derived. In his presentation to the DMC, Dr Mitchell spoke to these limits and how they relate to the model inputs and the worst-case modelling (refer to the Hearing Transcript 16 March 2017, last paragraph of pg. 1937 to the third paragraph of pg. 1938). The key points as they relate to the discharge standards are summarised below:

- The 2.25% value was used in the worst-case scenario modelling over a 7 day period. However, TTR has proposed that such a value only be allowed to occur for a 48 hour period, this being a much more conservative approach than that used in the modelling (both original and worst case);
- The 1.6% value was the long term /continuous value used in the original modelling that was referred to in Dr Dearnaley’s evidence. Although originally modelled as a continuous discharge TTR has, again, taken a conservative approach and applied this as a 7 day limit; and
- The 0.9% value has been used as the long term discharge value. It is only 56% of the value used in the original modelling (and 40% of that used in the “worst case” modelling, which means that the discharge limit is significantly less than what would have been imposed under either model.

Given all the above, while the modelling provides a useful context, the actual discharge limits proposed are significantly less than the values used in any of the modelled scenarios. As such, because all the assessments of environmental effects are based on the modelling outputs, they too are very conservative.

The above information was previously summarised in a table on slide 17 of Dr Mitchell’s slide-show presentation to the DMC. For ease of reference, that table is presented below – noting that the correct unit in the heading for Column 2 is “m³/hour”.

Parameter	Fines Limit (<38µm) (m ³ /hr)	Rationale
48 hour Suspended Sediment Limit	130	Represents processing limit for fines (2.25%), as used in “worst case” modelling, but only allowed over 2 days not 7.
7 day Suspended Sediment Limit	83	Represents figures used in original modelling (1.6% fines), but only allowed over 7 days, not continuously.
3 month Suspended Sediment Limit	66	Represents actual field data (0.9% fines), and represents 56% of the modelling in the IA.

I note that the second part of Question 2 has been responded to by Dr Dearnaley separately.

7. The earlier set of conditions (those attached to Dr Mitchell’s Evidence in Chief) includes Condition 20b which would not allow the actual 25th, 50th, 80th, and 95th percentile SSC values to be “significantly” greater than the background (no mining) percentile values predicted by the Operational Sediment Plume Model or the values in Schedule 2. Please clarify what is deemed to be “significant” in terms of this condition.

An updated set of conditions (dated 15 March 2017) was provided to parties and the DMC during the hearing that had removed Condition 20(b) based on the recommendation of Dr Liewing (see para 95 of his “Conditions Report” dated 22 February 2017).

In response to questioning from Dr Thompson, Dr Mitchell confirmed that he had no objection to condition 20b being reinstated if the DMC considered that desirable.

Having reflected on the issue, TTR will be proposing that Condition 20b be re-instated (a revised full set of proposed conditions will be available shortly), but in a modified form. The new proposed condition will state:

As determined by the EPA following advice from the TRG, any significant change of the 25th, 50th, 80th and 95th percentile Suspended Sediment Concentrations (“SSC”) at any of the seven monitoring sites identified in Schedule 2 when compared to the baseline SSC at those sites as determined by the validated OPSM (Condition 49) following the completion of PCEMP (Condition 44), but taking into account any wider environmental changes not related to mining activities. [emphasis added]

It is acknowledged that the term “significant” is qualitative. When considering the issue TTR initially considered using a statistical measure in an attempt to better quantify the term. However, the technical advice received was that it would be exceedingly difficult to define what would constitute a “statistically significant change” in the STB setting and so this option is not practical.

Accordingly, the condition will always require a degree of technical judgement to be exercised, but requiring significance to be “determined by the EPA following advice from the TRG” is considered to provide a high level of confidence that the condition will be able to be applied in practice and enforced.

Further, in considering the above, it is important to note that this condition is a “back-up” to the primary controls, these being both “end of pipe” and receiving environment compliance limits.