

Board of Inquiry

Tamarind development
drilling applications

IN THE MATTER

of the Exclusive Economic Zone
and Continental Shelf (Environmental
Effects) Act 2012 (the Act)

AND

IN THE MATTER

of a Board of Inquiry appointed under
Section 52 of the Exclusive
Economic Zone and Continental Shelf
(Environmental Effects) Act 2012 to
decide on Tamarind Taranaki Limited
marine consent applications (the
Applications)

JOINT STATEMENT OF EXPERTS IN THE FIELD OF

OIL SPILL MODELLING

Dated 20 September 2018

INTRODUCTION

1. Expert conferencing of the Oil Spill Modelling experts took place in person and by videoconference on 18 September 2018.
2. The conference was attended by:
 - a. Dr Brian King
 - b. Justin Rogers

The facilitator was Bill Rainey of FairWay Resolution Ltd.

CODE OF CONDUCT

3. We confirm that we have read the Environment Court's Code of Conduct 2014 and agree to comply with it. We confirm that the issues addressed in this Joint Statement are within our area of expertise.

SCOPE OF STATEMENT

4. In our conference we discussed the issues relevant to the Application which arise within our field of expertise. Prior to attending the conference, we each read the relevant parts of the Application, the evidence and independent reports prepared by the other expert(s) and which have been circulated.
5. The first Coffey review (14 June 2018) of the Applicant's oil spill modelling reports for the Application identified nine (9) issues of concern of either moderate or high severity. Subsequent evidence was provided by Dr. Brian King (20 July 2018). A second Coffey review (31 August 2018) confirmed that the new evidence addressed seven (7) of those issues and reiterated two remaining issues, discussed herein.
6. The issues relate to:
 - a. The choice of oil concentration and/or thickness thresholds of the Applicant's modelling.
 - b. Validation of models with respect to currents

7. In this Joint Statement we report the outcome of our discussions in relation to each issue by reference to points of agreement and disagreement relating to facts, assumptions, uncertainties and expert opinions / conclusions. We have noted where each of us is relying on the opinion or advice of other experts. Where we are not agreed in relation to any issue, we have set out the nature and basis of that disagreement.

LIST OF ISSUES

Issue 1 - The choice of oil concentration and/or thickness thresholds in the Applicant's spill modelling.

8. Dr King has provided spill modelling thresholds in his evidence. Mr Rogers has largely accepted those thresholds, and particularly relating to the surface and shoreline areas. He questions the thresholds that were chosen in respect of the sub-surface areas.
9. The reason Mr Rogers questions the sub-surface thresholds comes from the work of Deborah French McCay published in conference proceedings: *Potential Effects Thresholds for Oil Spill Risk Assessments, Proceedings of the Thirty-ninth AMOP Technical Seminar, Environment and Climate Change Canada, Ottawa, ON, pp.285-303, 2016.*
10. Mr Rogers has summarized the information relating to sub-surface thresholds in the following table which is based on data in Table 1 of French-McCay (2016), and separated by environment and expanded to include the reporting thresholds in the Applicant's oil spill modelling. Dr King agrees that this summary table is a good representation of the original source table, with the additional comment (annotated below) that many of the sub-lethal thresholds are assumed rather than measured.

Subsurface

Biota Group	Exposure Measure	Threshold	
		Value	Unit
Water column biota (generally)	Dispersed Oil – Lethal	1000	µg/L or ppb
High RPS Threshold	Dissolved Aromatics	400	µg/L or ppb
Water column biota (generally)	Dispersed Oil	100	µg/L or ppb
Moderate RPS Threshold	Dissolved Aromatics	50	µg/L or ppb
Fish Juveniles & Adults	Dissolved PAH - Lethal	10	µg/L or ppb
Nektonic & demersal invertebrates	Dissolved PAH - Lethal	10	µg/L or ppb
Invertebrate Plankton	Dissolved PAH - no UV - Lethal	6	µg/L or ppb
Low RPS Threshold	Dissolved Aromatics	6	µg/L or ppb
Fish larvae	Dissolved PAH - without UV exposure - Lethal	1	µg/L or ppb
Invertebrate Plankton	Dissolved PAH – with UV exposure - Lethal	1	µg/L or ppb
Fish Juveniles and Adults	Dissolved PAH - Sublethal	1	µg/L or ppb
Nektonic & demersal invertebrates	Dissolved PAH - Sublethal	1	µg/L or ppb
Invertebrate Plankton	Dissolved PAH - without UV exposure – assumed Sublethal	0.6	µg/L or ppb
Fish larvae	Dissolved PAH – with UV exposure - assumed Lethal	0.1	µg/L or ppb
Fish larvae	Dissolved PAH - without UV exposure – assumed Sublethal	0.1	µg/L or ppb

11. Mr Rogers is concerned that the impacts on particularly sensitive species or early life states may be understated by the Applicant’s “Low” threshold of 6 ppb (parts per

billion). The conclusion of the French McCay work suggests that 1 ppb would be appropriate for risk assessment.

12. Dr King considers that the Applicant has selected the maximum credible spill volume as an additional level of conservatism. Based on his experience it is still highly likely that the 1 ppb extent of an actual spill will still be within the bounds shown by the Applicant's modelling.
13. However, as a result of these discussion, it was agreed between Mr Rogers and Dr King that while the information deficit is moderate, the impact on decision making is low.

Issue 2 - Validation

14. This issue concerns the type of validation that was used to support the Applicant's modelling. Currents and wind are the dominant factors in oil spill transport. Validating the models to current data would reduce uncertainty.
15. The ability to validate HYCOM and HYDROMAP models is limited by data availability in offshore New Zealand waters. Validating with all the available data would be best practice and would provide additional confidence in the model and reduce some uncertainty.
16. The experts agree there was limited validation for the models in this application. With the validation that did occur and with the background information provided by Dr King during the joint conference process, the experts agree that the reliability of the models is high.
17. Consequently, it was agreed between Mr Rogers and Dr King that while the information deficit is moderate in the reporting, the likelihood of a technical deficiency is low and that the impact on decision making is also low.

References

16. We have referred to the following documents in our discussions:

French McCay, D. (2016). Potential Effects Thresholds for Oil Spill Risk Assessments. Proceedings of the 39th AMOP Technical Seminar, Environment and Climate Change Canada, Ottawa, ON, pp. 285-303.

Signed by: **Dr Brian King**

A handwritten signature in black ink, appearing to read "Brian King", with a long, sweeping underline.

Date: 19 September 2018

Signed by: **Justin Rogers**

A handwritten signature in blue ink, appearing to read "Justin Rogers", with a long, sweeping underline.

Date: 20 September 2018