BEFORE THE ENVIRONMENTAL PROTECTION AUTHORITY

IN THE MATTER of the Hazardous Substances and New Organisms Act 1996 (the Act)

AND

IN THE MATTER of the Decision-Making Committee with delegated responsibility for powers and functions related to the hearing and deciding of applications under the Act to reassess the approval for methyl bromide.

THE DECISION-MAKING COMMITTEE Tipene Wilson (Chair)
Derek Belton
Ngaire Phillips

JOINT STATEMENT OF EXPERTS IN THE FIELD OF AIR DISPERSION MODELLING

19 March 2020

PARTICIPANTS: David Sullivan, Aleks Todoroski, Jennifer Barclay, Cathy Nieuwenhuijsen

DATE AND TIME OF CONFERENCING: Thursday 19 March 2020 10:00am

INTRODUCTION

1. This signed joint witness statement is provided in response to the Decision-Making Committee's Directions and Minutes WGT009.
2. This joint witness statement relates to the conferencing topic of **Air Dispersion Modelling**.
3. Expert conferencing of the Air Dispersion Modelling experts took place by telephone / by videoconference on 19 March 2020.
4. The conference was attended by:
   David Sullivan, Aleks Todoroski, Jennifer Barclay, Cathy Nieuwenhuijsen

CODE OF CONDUCT AND HEARING PROCEDURES

5. 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.
6. We confirm that we are familiar with the Hearing Procedures issued by the EPA to the extent that they relate to this expert conferencing.

SCOPE OF STATEMENT

7. In our conference we discussed the issues relevant to the air dispersion modelling which arise within our field of expertise. Prior to attending the conference we each read the relevant parts of previous air dispersion modelling, the evidence, and independent reports prepared by the other expert(s) and circulated.
8. The issues are:
   a. CALMET Meteorological Data Set
   b. Range of Recovery Scenarios
   c. Near-field and far-field modelling
   d. Model settings and outputs
9. 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 the points above. Where we are not agreed in relation to any issue, we have set out the nature and basis of that disagreement.

LIST OF ISSUES

10. We considered the following issues:

ISSUE 1 – CALMET Meteorological Data Set

11. The experts agree that using a 2018 and 2019 CALMET data set would be useful to match up with Genera's operational records and recent ambient monitoring. This is necessary for robust model validation and to cover a 5 year period that the experts consider is best practice for the circumstances of this project.
12. The experts agree that the methods used by ASG for the development of the 2014 – 2016 CALMET data set should be applied for a 2018-19 data set. The experts agree that the Bay of Plenty Regional Council (BOPRC) is well placed to undertake this work, given that they were responsible for the 2014 – 2016 data.

ISSUE 2 – Range of Recovery Scenarios

13. Genera has advised that 80% of head space methyl bromide (MB) is being removed via recapture systems at this time. The latest monitoring has shown recapture rates from six recent tests (66%, 38%, 80.5%, 36%, 28.5%) with an average, of approximately 41.5%, approximately half of the figure provided by Genera (reference; https://www.epa.govt.nz/assets/FileAPI/hsno-ar/APP203660/APP203660_Recapture_Monitoring_Report_January_Final.pdf). These tests were each over a 4 hour recapture period. We are unclear if this is a typical operational recapture time period.

14. To date most modelling has assumed 80% recapture. This does not appear consistent with current recapture rates. The experts agree that a wider range of recapture rates need to be considered in the modelling assessment. A range of options are set out in the table below.

Scenario #	Percent of log stacks with recapture	Percent removal efficiency
1 – Worst-case one-hour impact scenario	0%	0%
2 – Based on current testing	*To be determined from Genera's current records	Average 41.5% based on the most recent six tests
3a – Effect of removal efficiency	70%	30%
3b - Effect of removal efficiency	70%	45%
3c - Effect of removal efficiency	70%	60%
3d - Effect of removal efficiency	70%	80%
4 – General target	80%	80%
5 – Best-case target	100%	80%
6 – Validation Scenario	*To be determined from Genera's current records (2018-19) with concurrent monitoring and meteorological data	*To be determined from Genera's current records (2018-19) with concurrent monitoring and meteorological data

ISSUE 3 – Near-field and far-field modelling

15. The experts agree that different approaches are needed for both near and far-field modelling.
    a. For far-field modelling, a model which accounts for the variability (seasonal, hourly, time of day, location on port, percent recapture, size of log stack, number of ships holds, dosage rates) in operational procedures is needed. A Monte Carlo approach is proposed based on the 2019 Port of Tauranga Operational Records. The modelling domain encompasses the port fumigation and surrounding residential areas.
    b. For near-field modelling, a model which accounts for the size and configuration of logs and the buffer needed to protect people in the near-field. For the near-field the size and

configuration of the log piles, time of day and weather are the only variables to be considered. A simple single source analysis based upon a refined receptor grid.

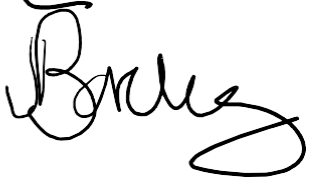
c. A probabilistic exposure model may be useful for nearfield assessment but needs to be evaluated if it is to be used.

ISSUE 4 – Model settings and outputs

16. The experts agree the following about the model settings and outputs:
    a. Distributions to be compiled (90th, 95th, 98th, 99th, 99.5th, 99.9th and 100th) to support subsequent review and interpretation by experts in toxicology.
    b. Basis for Distributions:
        i. All hours.
        ii. Only hours with active ventilation (port set of receptors show non-zero impacts).
    c. Number of Years Simulated to Support Stable Distributions:
        i. Process 3-year data set multiple times to ensure there is a stable base for the distributions.
        ii. For near-field modelling a range of fixed position log ventilation scenarios would be run with ring receptors based on a 1-3 year data set.
    d. For the near-field buffer distance both one hour and eight-hour exposure times should be presented to allow evaluation by a health risk expert.
    e. To determine appropriate buffer distances a range of realistic mass emission rates (kg/h) (and range of associated volumes) will be modelled.
    f. The near-field scenarios are 1, 3a, 3b, 3c, 3d and 6 for recapture as outlined in the above table.
    g. The far-field scenarios are 1, 2, 3a, 3b, 3c, 3d, 4 and 5 for recapture as outlined in the above table.
    h. Scenario 1 and 5 are upper and lower bound examples and are unlikely to be realistic.
    i. For near-field, to assist in determining operational buffer distances, up to five ranges of mass emission rates will be considered based on the 2019 Port of Tauranga Operational Data. An upper limit of 450kg/h (dose equivalent) methyl bromide will be assumed, based on Genera's application.
    j. The near-field analysis will be performed based on hourly emissions and meteorological analysis, or if testing shows a significant difference, in ten-minute emission releases (ASG to inform experts of previous research). This is due to the short-term nature of the fumigation events.
    k. For the far-field the dose rate that will be used will be based on the relationship in the 2019 Tauranga Operational Data between volume and mass applied, which will be higher than 120g/m^3. The dose rate will be applied to four volume source sizes at each location.

ISSUE 5 – Mass rate, dose rate and volume size correlation

17. The experts have requested that table(s) based on Genera's data detailing the relationship between application rate (g/m^3), recovery (%), dose (kg) and mass emission rate (kg/time) and log pile volume (m^3). These table(s) should be similar in layout to Table 3-4 of Todoroski Air Sciences Report dated November 4th 2019 for the New Zealand EPA. Cathy Nieuwenhuijsen will distribute this to the other experts.

Name of each expert	[Each expert to sign]
David Sullivan	
Aleks Todoroski	
Jennifer Barclay	
Cathy Nieuwenhuijsen