6BEFORE 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

30 January 2020

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

DATE AND TIME OF CONFERENCING: Thursday 30 January 2020 9:00am

INTRODUCTION

1. This signed joint witness statement is provided in response to the Decision-Making Committee's Directions and Minutes WGT002 to WGT006.
2. This joint witness statement relates to the conferencing topic of **Air Concentration Dispersion Modelling**.
3. Expert conferencing of the Air Concentration Dispersion Modelling experts took place in person on 30 January 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 relate to:
   a. Modelling choice
   b. Monitoring - existing and future
   c. Representative modelling scenarios
   d. Specific model settings
   e. Data flow and information sharing
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. 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, and have listed them below in an approximately order of priority:

ISSUE 1 - Modelling choice

11. The experts all agree that the one-hour time step 3D Calmet data set (2014-2016) developed by ASG (2018) for the Bay of Plenty Regional Council (BOPRC) shall be used to assess the fumigation at Port of Tauranga. Consequently, the experts all agree that CALPUFF Version 7.2.1 L150618 shall be used as the dispersion model.

12. Mr Sullivan agrees with the selection of CALPUFF Version 7.2.1 rather than AERMOD because the selected version of CALPUFF contains the updated features that are in the current version AERMOD.

ISSUE 2 – Monitoring- Existing and Future

Existing Monitoring Data

13. To ensure all of the experts have the same data available to evaluate models the experts request that the DMC direct that the raw measured air quality data, associated metadata, QA/QC and any associated reports collected by the following organisations are made available to the expert witnesses as soon as possible (e.g. within two weeks) in a consolidated electronic format (e.g. excel spreadsheet).

    - WorkSafe
    - BOPRC
    - Genera (Golder data and annual audit data comparing cannister and PID)

    For all these organisations, Summa cannister and associated PID data from 2018 onwards is needed. In addition, Genera is requested to provide to all the experts the results of any investigations of cannister and PID data.

14. The experts agree that the order of reliability of monitoring is as follows:
    a. Cannisters and sampling tubes
    b. PID with air pumped
    c. PID non pumped (e.g. cub PID)

Future Monitoring

15. The experts recommend that future monitoring should combine method 14 a. and 14 b. concurrently. This will allow continuous data collected as per method 14 b. to be validated with a more robust single result from method 14 a. Monitoring should be conducted in accordance with a sampling protocol developed or reviewed by a suitably qualified expert. All analysis should be undertaken by a laboratory accredited by the sampling protocol and using a detection limit at least ten times lower than the applicable criteria.

16. The sampling protocol should include at least the following:
    a. For each fumigation during sampling GPS coordinates of the four log pile corners, the log pile height, dose rates, initial and release time concentration.
    b. Reference to meteorological data to assist with downwind monitor location placement.
    c. Whether recapture was done or not.
    d. Sequencing and timing of fumigation events including tarp removal start and end time.
    e. The GPS coordinates of the monitor, the monitor height and the start and end time of the monitoring.
    f. Photographs of the monitors and the log pile.

ISSUE 3 and ISSUE 4 – Representative Modelling Scenarios and Model Settings

17. The experts discussed the various model scenarios and setting and agreed on the following key parameters in the table below. They agreed that there were three distinct receptor zones. The near zone is to address the possible short-term STEL (15 minutes). The mid zone is to particularly consider other port workers excluding applicators. The far zone is where the public may be exposed.

	Near	**Mid**	**Far**
Sensitive people	Applicator within the safety zone	Port workers	Public beyond port boundary
Results	Show distribution of percentile results for 1-hour results. *	Show distribution of percentile results for 1-hour results. Use monitoring data to inform performance of model.	Show distribution of percentile results for 1-hour results. Use monitoring data to inform performance of model.
Receptors	Ring at >36 points per ring and 5m ring interval spacing downwind for single event modelling.	25m grid from sources out to the port boundary. Boundary receptors at 20m.	50m spacing to 1km 100m spacing 1km to 3km (6km x 6km domain)
Source Type	Logs and ships' holds as volume sources.	Logs and ships' holds as volume sources.	Logs and ships' holds as volume sources.
Source Parameters	All square sources Sigma Y= diagonal length Effective height = 3m log stacks = 8m above sea level for ship width =30m		
Source Scenarios	Logs and Ships modelled separately plus event modelling and worst-case scenario.	Logs and Ships modelled separately and then together.	Logs and Ships modelled separately and then together.
Log sorption	50% sorbed by logs		
Log Emissions**	As per measured data 2019 and a worst case and a real live sub hourly event.	As per measured data 2019 with Monte Carlo simulation to assess variability due to recapture variability.	As per measured data 2019 with Monte Carlo simulation to assess variability due to recapture variability.
Recapture	An event with no recapture and high application rate, at 150kg	70% of mass, modelled as 70% of log stack and	70% of mass, modelled as 70% of log stack and 80% of

	dose/log pile on a 1250m3 log stack.	80% of mass, modelled as 80% of log stack.	mass, modelled as 80% of log stack.
Night-time Stability	Mr Sullivan would like to further evaluate using real measured temperature profile data evaluate the likelihood of night-time stable conditions occurring and how critical these are to the results.***	Mr Sullivan would like to further evaluate using real measured temperature profile data evaluate the likelihood of night-time stable conditions occurring and how critical these are to the results.***	Mr Sullivan would like to further evaluate using real measured temperature profile data evaluate the likelihood of night-time stable conditions occurring and how critical these are to the results.***
Upset Conditions	The experts could not identify a scenario that is not captured about the other modelling scenarios and therefore no particular modelling is necessary to assess these. Procedures need to be developed to prevent the repeat of a double ship hold ventilation.	The experts could not identify a scenario that is not captured about the other modelling scenarios and therefore no particular modelling is necessary to assess these. Procedures need to be developed to prevent the repeat of a double ship hold ventilation.	The experts could not identify a scenario that is not captured about the other modelling scenarios and therefore no particular modelling is necessary to assess these. Procedures need to be developed to prevent the repeat of a double ship hold ventilation.
Ship hold emissions	Modelling assuming opening the five holds at two-hourly intervals starting at 10pm, 12am, 2am, 4am, and 6am. The experts agree that the ship hold emissions are unknown and warrant better quantification, namely the absorption rate and the release profile of the emission release over time/hold. In the interim the modelling will assume that 35% of the initial dose is not sorbed into the logs and is discharged evenly over within the first two hours. And during the next 12 hours 13% is lost by desorption.	Modelling assuming opening the five holds at two-hourly intervals starting at 10pm, 12am, 2am, 4am, and 6am.	Modelling assuming opening the five holds at two-hourly intervals starting at 10pm, 12am, 2am, 4am, and 6am.

***** Ms Nieuwenhuijsen notes that she still considers that there is still value in near field monitoring to assist the modelling analysis.

** The experts agree that these details need to be further refined. Their discussions have been restricted due to time restraints.

*** Ms Barclay's considers that this is not a high priority issue because of the high roughness length around the port and the weakly unstable marine boundary layer.

ISSUE 5 – Data flow and information sharing

18. The experts have appreciated the opportunity to conference together and have found the process very valuable and constructive. There has been significant progress made on complex matters. There are some residual matters such as ship hold emissions and the exact model settings. The experts have had varying access to the necessary data which is a key factor in the widely different modelling results.

19. The experts request the DMC to consider issuing a further direction to enable additional joint conferencing or conferring with one another in order to best align future modelling.

REFERENCES

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

    a) ASG (2018). A Meteorological Assessment and Development of a 3-Dimensional Meteorological Model for Air Quality Applications in the Tauranga Region for 2014,2015,and 2016. Atmospheric Science Global Ltd.

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