
TRANSCRIPT OF PROCEEDINGS

**ENVIRONMENTAL PROTECTION AUTHORITY
HEARING**

**APP203660 - METYHL BROMIDE
Hazardous Substances Reassessment**

**VIRTUAL HEARING
on 11 August 2020**

DECISION-MAKING COMMITTEE:
Mr Tipene Wilson (Chair)
Dr Ngaire Phillips
Dr Derek Belton

Hearing Proceedings

Day 01 Tuesday 11 August 2020

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[8.31 am]

CHAIR: So, kia ora no tātou, mōrena. My name is Tipene Wilson. I've got the privilege of being Chair of this hearing, and given it is now 8.31 am, we'll get underway. Also on behalf of the EPA I'll be issuing, as is our custom at hearings, a mihi and a karakia, so I just invite you to join us in that.

MIHI WHAKATAU

CHAIR: (Māori content)

So, welcome and I pray first of all acknowledgements to our creator or wherever you sit in that space, in the spiritual space. I acknowledge also King Tūheitia and I know that many of us during this time, of course, we've had cause to reflect on the important things in life, so those of you that are suffering some burden of bereavement or other challenge of life, we acknowledge those that have passed on and also the individual burdens that we face.

I acknowledge that we are here today for an important matter, to hear from an application on the reassessment of methyl bromide. I'll get to the official stuff once I look at my notes, but I acknowledge the applicant, STIMBR, and the team, and then those from throughout the land and, indeed, likely to be from throughout the world that have joined us today, either as a submitter providing evidence of some sort, or generally interested in the proceedings. So, welcome once, welcome twice, welcome twice. On that note, let's lift up this time in prayer.

KARAKIA

CHAIR: (Māori content)

Father, we thank you for the opportunity to be together today for this occasion and we do acknowledge those that are burdened by the trials and tribulations of life and pray your restoration of them in good course. We pray that you help each one of us to acquit our responsibilities well during this time that we can reach a position where the best decision is made, having regard to everything before us. We pray this in the name of your son, Jesus Christ. Pomare e.

INTRODUCTION

CHAIR: Mōrena. First up I'd like to just introduce the Committee and then get on to some of our business of the day. So, as I said, my name is Tipene Wilson, or Steven. I am the Chair of this panel. I'm also the Deputy Chair of the HSNO Committee, which is the group that we're joined from, and I have the privilege of being Deputy Chair of the Board. I've

been around this organisation back in the ERMA days, so a little while. I never actually worked for the organisation as an employee but I'm looking forward to the next couple of days in front of us. So, Dr Belton, you first, and then Dr Phillips.

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[8.35 am]

DR BELTON: Thanks, Tipene. Good morning, everyone. I've spent the last three, now into four years, on the EPA Hazardous Substances and New Organisms Committee. My background is a regulator with MPI and then internationally with the World Organisation for Animal Health. Thank you.

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DR PHILLIPS: Mōrena, everyone. My name is Ngaire Phillips. This is my sixth year on the HSNO Committee. I'm an environmental scientist specialising in aquatic ecology and ecotoxicology and I run my own consulting business in Hamilton. Thanks.

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CHAIR: Kia ora. Thank you, both. So, there's the three of us on the Decision-making Committee, or most of you will be used to the acronym of DMC. So, that's us and we're here today to hear the evidence for and decide on application APP203660 to reassess methyl bromide.

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Now, we acknowledge that this hearing is being held virtually and at a number of venues over the course of the hearing. Unfortunately, it was not possible due to scheduling conflicts for the DMC to convene the hearing in person until mid to late September. Therefore, in the interests of time the hearing was convened with the DMC in attendance virtually, though there is some opportunities for people to meet in venues over the course of the hearing.

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So, the hearing is specifically to address this application. The HSNO Act does not permit the Committee to make decisions about other substances that are currently approved or going through their own application process as part of this process. The Committee shall consider and decide any application other than an application that is the subject of a ministerial decision under section 68 of the HSNO Act and shall have in relation to any such consideration and decision on any matter the same immunities and privileges as are possessed by a District Court judge. The object of the hearing is for the Decision-making Committee to be as informed as possible on the matter in which we are charged with making a decision.

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The way proceedings will run is we will hear first from the applicant, who will introduce the application, then from the EPA staff, who will present the staff report, and then from the submitters who have indicated they wish to be heard. After submitters, the Committee will

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have final questions and then the applicant will have the right of reply, at which stage the hearing will be adjourned for deliberation by the Committee.

5 I'd just like to let everybody know that the DMC has read all of the
information provided from the applicant and submitters. The parties
have been asked to pre-circulate any additional information they intend
10 to produce at the hearing. It does not need to be read verbatim. Parties
should highlight key parts of the information and we will be restraining
excessive repetition or matters we consider irrelevant to the application
we are hearing. For anybody that is interested, that composes in excess
of 6,100 pages, so well done.

15 Please speak clearly when asking or answering questions for audio
recording purposes. It would be helpful for the audio record if persons
putting a question forward could identify themselves. Given my
understanding that today is all a virtual hearing, I assume that wherever
20 you are you have taken care of your own health and safety, and I ask
you to continue to do that throughout the day.

25 If there are any media present, just to advise that the hearing will all be
made public via remote access technology, except to the extent that any
protection of sensitive information applies, and representatives of the
media are free to attend and report the proceedings. Cameras, video
30 recorders and audio recorders outside of EPA-commissioned
equipment can only be used by media in the hearing with prior
permission of the DMC. I do note that we have had one specific query
and permission has been granted. Application for recordings can be
made to the DMC in advance by writing to the EPA. However, please
35 note because the hearing will be conducted via Zoom, it will be
available online to the public and recorded both audio-visually and
transcribed. The transcripts of the hearing will be available the next
day and will be located in the hearings section of the methyl bromide
consultation page.

[8.40 am]

40 For completeness and context, please provide your presentation to
Marree Quinn so these can be uploaded in the same place. Media
interviews are not allowed, certainly over Zoom, but even where we do
get into hearing rooms within the media rooms, and the DMC are not
available for media interviews. The EPA will be available to process
information to the media and all media enquiries should be directed via
45 media@epa.govt.nz.

So we now go on to the introductions of everyone that's present today,
starting first with the applicant. I'm not sure, Mr Gear, who's leading.
We've got your name at the top of the list, Mr Slyfield.

MR SLYFIELD: Mōrena, Mr Wilson. My name is Morgan Slyfield. I am the legal
counsel for STIMBR, the applicant. You may just have to make some
5 technical adjustments so that we can reduce -- I'm not sure if you're
getting a feedback issue at your end with your speaker. So with me for
STIMBR and online already are Don Hammond, Jack Armstrong, Ian
Gear; we have David Sullivan, David Fletcher, Mark Pemberton and
10 hopefully joining us during the course of STIMBR's presentation will
also be Kieran Murray, who I don't think has -- is he here? Yes, Kieran
Murray is here; Lynne Clapham and Chris Leesteere. Mr Chair, you
will recall those last two, there was a question about whether the DMC
might have any queries for those two individuals, so both Ms Clapham
and Mr Leesteere are being called really for the purpose of providing
15 that opportunity if there are questions from the DMC. So, that is the
team for the applicant.

CHAIR: Thank you for that. We will now go to the EPA staff to introduce
themselves and any witnesses that they have.

20 MR BAILEY: (Māori content). I am Lee Bailey. I am a senior advisor in the
Reassessments Team and I am the EPA's application project lead for
this reassessment.

MR DEEBLE: (Māori content). I am Ben Deeble and I am an advisor in the
25 Reassessments Team and I have been working on the project as well.

MR BAILEY: So also in the room with us here in Wellington we have Marree Quinn,
who's been helping with the administration for today, Julian Jackson,
30 who's a member of Kaupapa Kura Taiao team, Milana Blakemore,
who's the team leader for the Reassessments Team, Gayle Holmes,
who's the general manager for compliance, monitoring and
enforcement, and then Matt Allen and Dan Phipps, who are advisors.
Mark is a senior advisor and Dan's an advisor in the reassessments team
and they're going to be helping the DMC write the decision when they
35 come to that decision in due course. Also in the room is Philip
McKenzie, who's a senior solicitor with the EPA.

CHAIR: Thank you. Do we have any submitters online? Whether or not you're
40 presenting today, if you would like to introduce yourself. I apologise,
I'm not sure how this appears on your screen, so rather than point to
each one of you. On my screen I can see Mr Gear.

DR MORGENSTERN: You're muted.

45 CHAIR: Mr Morgenstern, are you a submitter?

DR MORGENSTERN: I submitted an expert witness statement, yes. So I'm a climate scientist working for NIWA and with specialisation in atmospheric chemistry, especially (inaudible) substances.

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[8.45 am]

CHAIR: Thank you. Let's carry on. Any other submitters to introduce themselves, please?

10 MS DIJKSTRAN: (Māori content). Stephanie Dijkstran. I am part of the Ngāi Tahu HSNO(?) Committee and I whakapapa to Ngāi Tahu whānau and I will be presenting on behalf of Ngāi Tahu on Thursday.

15 DR TODOROSKI: I'm Aleks Todoroski. I'm not sure if the Chair introduced me. I'm an air quality consultant based in Australia and I've been assisting the EPA with some modelling and review of methyl bromide dispersion.

20 MR DEWDNEY: Hello, everybody. I'm Mark Dewdney. I'm the managing director of Genera Biosecurity. With me today I've got David Baker, who looks after our health, safety monitoring and compliance and Matt Hill, who is our chief operating officer. Genera, as you will possibly be aware, are probably New Zealand's largest fumigator and user of methyl bromide and other fumigants for biosecurity protection purposes and to facilitate trade. We will be presenting on Thursday and we have been working closely with STIMBR throughout the preparation of their submission. Thank you.

30 MR FALCO: Good morning. My name is Joseph Falco from Nordiko Quarantine Systems in Sydney. We are a major supplier of methyl bromide and other fumigant recapture and scrubber systems in Australia and, more importantly, we have supplied these systems in New Zealand in previous years.

35 MS GIBSON: Tēnā koutou katoa. It's Philippa Gibson from WorkSafe. We are presenting this afternoon on a methyl bromide project monitoring and modelling project we are doing. It'll be myself, Paul Moenboyd, who's from our Better Regulation Policy Team, and also Chris Bender from Pattle Delamore Partners, who has been doing the air modelling for us.

40 MR MOENBOYD: Kia ora tātou. I am Paul Moenboyd. I'm also from WorkSafe in our Regulatory Frameworks Team and I'm going to give a brief walk-through of our regulatory instruments this afternoon.

45 DR PEMBERTON: Good morning. My name is Mark Pemberton. I'm a toxicologist with 40 years' experience in the chemical industry. I am acting as a consultant to STIMBR, advising on health effects as a result of the exposures predicted by Sullivan Environmental Consulting.

CHAIR: Thank you. Is there anybody else? Let's carry on. Thank you for that. It's a little bit more difficult doing this virtually when we can't actually see people face to face, so well done for that. Now, I do note that there's a couple of ways to submit questions and either there's a chat at the bottom of your screen or at the end of each speaker there'll be an opportunity provided to present questions. It's a little different than any of you probably sees in participants in processes such as this, it's not an adversarial process, so if you do have any questions that you would like to submit in relation to clarification and explanation, then that's fine. It's not a cross-examination.

For the sake of process, all questions are put through me as the Chair and we determine whether or not - or I determine whether or not - that question can be put. It's not the opportunity to provide your own perspective on what we've just heard from a submitter. We'll leave that for when you have your time as a submitter or as a presenter for the panel.

[8.50 am]

So thank you for that. We now move to the applicant's submission, which will take us through, according to what we've estimated, to our morning tea break at 10.20 am. Wow, look at that, we are bang on time. Well done, team, 8.50 am. So in your hands.

APPLICANT PRESENTATION

MORGAN SLYFIELD PRESENTING

MR SLYFIELD: Thank you, Mr Chair. Now, can I confirm that you have before you, members of the Committee, a copy of the written legal submissions that were sent in yesterday afternoon? I will start by saying that I'm not going to read that verbatim. I don't imagine that you have necessarily had a chance to familiarise yourself with all of that in advance of the hearing, but I will endeavour to cover those parts that are essential. There are parts there that I think I will be able to move through relatively quickly.

Just one administrative matter to note. We have, I think, one member of STIMBR's team, Mr Duncan-Bellinger(?), who so far has been unable to join. He has apparently been sent a link, according to the EPA administration, but so far nothing has come through, so if some attention could be given to that during the course of the hearing, that would be appreciated. I take that back, apparently he is sorted out.

So, members of the Committee, starting at the beginning of the legal submission, methyl bromide is approved under the Hazardous Substances and New Organisms Act subject to a recapture control that

cannot be met. The control requires recapture to a level that is beyond all known or foreseeable technology. If the recapture control takes effect in its present form, it will in practice prohibit the use of methyl bromide in New Zealand. Over the subsequent decade, New Zealand will lose \$2.2 billion to \$3.2 billion due to the impact on export and import activity, and it is likely the loss will lie at the higher end of this range.

STIMBR is seeking to avoid these impacts through its application for reassessment of the recapture control. Some people believe the recapture control was always intended to prohibit the use of methyl bromide, but ERMA, who imposed the control, was well aware of the benefits New Zealand obtains from the use of methyl bromide. It set a standard that it believed would allow continued use of methyl bromide and retention of the benefits from such use. With hindsight, we can now say ERMA was wrong. It set a standard of recapture that cannot be achieved by any known or foreseeable technology.

STIMBR does not oppose recapture technology. Indeed, STIMBR's goal is to reduce the release of methyl bromide into the atmosphere and seek long-term reduction in its use. In pursuit of this goal, STIMBR has invested more than \$30 million over the past decade on research and development of recapture technology and alternatives to methyl bromide that might enable emissions to be reduced. This includes actively supporting an application under the Act for approval of an alternative fumigant, EDN. EDN is effective against pest species. It is not an ozone-depleting substance and it rapidly breaks down during fumigation. It has the potential to substitute methyl bromide in all log fumigations. Unfortunately, a decision on EDN has not yet been made, though the application was lodged more than three years ago.

Until EDN is approved with feasible controls, STIMBR's only remaining option is to seek a reassessment of the methyl bromide recapture control so that the control can be set at a level that is achievable with existing or foreseeable technology. The central question for this application is whether there is a recapture control that is achievable, that will not compromise the health and safety of people and communities, and that will uphold New Zealand's international obligations. STIMBR submits that there is. These submissions provide a succinct overview of STIMBR's application, a summary of the legal context, identification of the relevant issues and STIMBR's position on those issues, and some preliminary conclusions. With one exception, the submissions do not reply or respond to any of the information that the DMC has received from the EPA or submitters on 27 July or later, which will be covered in STIMBR's reply at the conclusion.

[8.55 am]

Now, I've got to a section entitled "The Application" and I think I can skip beyond paragraphs 8 and 9 that merely state what the Committee is already well familiar with, and move straight to paragraph 10 where I say STIMBR is no longer seeking the same outcomes as set out in the application documents. The following sections provide an up-to-date description of STIMBR's current position.

Firstly, shipping containers. In relation to QPS fumigations in shipping containers, STIMBR continues to seek a recapture standard of 80 per cent. In doing so, STIMBR relies on advice from Genera that 80 per cent is an achievable standard for shipping container fumigations. The recapture obligation is due to take effect on 28 April 2021. STIMBR supports this deadline for shipping containers based on advice from Genera that the deadline is achievable if the recapture standard is 80 per cent. STIMBR understands from Genera that if any higher standard of recapture were required, then firstly it may not be achievable in practice for all shipping container fumigations and, secondly, even if it could be theoretically achieved, it is likely more time would be required before it could be achieved in practice, so additional lead time would be required in that instance.

Turning next to log stacks, after filing its application STIMBR learned that 80 per cent recapture is only achievable from time to time in operational conditions. In operational conditions, the achievable percentage of recapture is greatly affected by a number of variables, including, but not limited to, the moisture content of the logs in the stack, the size of the stack, and the ambient air temperature and composition of the enclosed atmosphere. Relying on Genera's advice, STIMBR understands 80 per cent reduction is at the highest end of what is achievable and 30 per cent reduction is at the lowest end. This variability was known to the air dispersion modellers and taken into account during their expert conferencing, which is why they agreed to model dispersion based on varied rates of recapture from 30 per cent through to 80 per cent.

In light of this updated information, STIMBR no longer seeks an 80 per cent recapture standard for log stacks. Such a standard would defeat a fundamental purpose of this reassessment, ie replacing the current unachievable standard with a new achievable standard. Therefore, STIMBR is seeking a standard of 30 per cent recapture for log stacks.

The equipment to achieve recapture from all log stacks will take some time to manufacture. No prudent commercial decision to make the necessary and significant capital investment can be made until there is clarity that a workable recapture standard has been set. Allowing for the lead time to manufacture and install all of the necessary equipment, STIMBR requests that any new recapture obligation should apply to

log stacks 24 months after the DMC's decision. STIMBR considers it would be feasible for the obligation to be stepped to reflect that plant will become progressively available, ie 25 per cent after six months, 50 per cent after 12, 75 per cent after 18, and 100 per cent at 24 months.

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Thirdly, dealing with ship holds, the feasibility of recapture from ship holds has not changed since the application was lodged. There is no known or foreseeable technology capable of achieving meaningful recapture from ship holds. This is the reason for STIMBR's request for a time extension to delay the recapture obligation from applying to ship holds. Any recapture obligation applying at the end of such an extension period would be aspirational given the current state of science and technology. However, STIMBR considers a recapture standard should apply at the end of the extension period to incentivise further progress and to provide greater certainty for the future. STIMBR considers a 50 per cent recapture standard may be appropriate.

Next I deal with buffer zones, and I think the short point can be made from paragraph 23 of the written submissions that STIMBR no longer seeks any change to the buffer zone controls. The reissued approval - and that's the approval reissued in 2019 - clarifies that management of buffer zones now sits exclusively within the Health and Safety at Work (Hazardous Substances) Regulations and the fundamental requirement to comply with the TEL - tolerable exposure level - at the boundary of the buffer zone applies whether or not recapture is used. STIMBR submits these measures are appropriate to manage the risks to the public from potential exposure to methyl bromide emissions during the ventilation.

[9.00 am]

Members of the Committee, the next section is titled "Legal Framework" and this is the section that I intend almost to take you through the least. I will just draw to your attention a few of the highlights. In particular, at paragraph 25 I have set out the guidance from section 63A, which requires you to take into account both positive and negative effects and to take into account the best international practices and standards for the safe management of hazardous substances. You'll be well familiar also with the provisions of section 77, 77A and 77B, and I've set out at paragraph 26 the key tests to be applied when assessing the replacement of one control with another from 77A(4). I won't read those aloud either.

Then at paragraph 28 I have provided a list of all those matters relevant from the many matters listed in part 2 of the Act, in particular section 6, and of those I wish to emphasise the top four in the list as being the most pertinent to this application, those being public health; the

relationship of Māori and their culture and traditions with their ancestral lands, water, sites, wāhi tapu, valued flora and fauna and other taonga; the economic and related benefit and costs of using a particular hazardous substance; and New Zealand's international obligations.

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I won't take you through the passage I've cited from Bleakley; I'm sure that's familiar to all members of the Committee already. I also won't take you in any detail through the many passages of relevance from the Methodology Order barring one, and that is the passage that I have replicated from clause 12 of the order at paragraph 30(a), and particularly here I wish to emphasise that when assessing or evaluating assessments of risks, the Methodology Order expressly identifies that the probability of occurrence and the magnitude of each adverse effect must be taken into account and that probability of occurrence is going to be a key matter for your consideration, given the differences of view you will get from various air dispersion modellers.

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I will now move on from the legal framework section to page 10 of the submission, where I start to address what STIMBR says are the key issues for this hearing.

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ERMA gave four reasons in 2010 for imposing the recapture obligation. It considered the recapture obligation would be consistent with the Montreal Protocol, reduce the risk of direct effects on human health, reduce the risk of indirect effects due to ozone depletion, and enable QPS, or Quarantine and Pre-Shipment, uses of methyl bromide to continue and all the benefits of those uses to be realised. Those four reasons provide a useful framework for covering most of the subject matter you are required to take into account under part 2 of the Act. The only subject they do not pick up and which was addressed in this section are the Māori cultural considerations raised by section 6(d) and 8 of the Act.

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Turning to the first of those in the list, the Montreal Protocol. STIMBR agrees with ERMA's 2010 assessment that imposing a recapture obligation is consistent with the Montreal Protocol. It would be equally consistent with the Montreal Protocol to not impose a recapture obligation as the protocol does not contain any strict requirement that New Zealand must, in its domestic legislation or regulation, require recapture.

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This is no criticism of the protocol. It is often considered one of the most successful environmental treaties ever negotiated. Yet the same parties who united under the protocol to phase out the use of methyl bromide and other ozone-depleting substances also agreed that this requirement would not apply to QPS uses.

In respect of those uses the protocol and decisions of the parties under the protocol require less. The most relevant guidance is that contained in decision XI/13, which:

5 "Encourages the use of methyl bromide recovery and recycling techniques where technologically and economically feasible to reduce emissions of methyl bromide until alternatives for Quarantine and Pre-Shipment uses are available."

10 **[9.05 am]**

15 In STIMBR's submission, New Zealand has already transitioned to alternatives to methyl bromide for QPS uses where possible. An example is the use of phosphine for fumigating logs in ship holds bound for China. A further alternative, EDN, is on the horizon. When it is approved by the EPA with workable controls and approved by New Zealand's trading partners, STIMBR expects it will replace all methyl bromide used in fumigations of forest products. But EDN is not available yet. Until it becomes available, or some other unknown alternative is discovered, decision XI/13 encourages recovery and recycling where that is technologically and economically feasible.

25 STIMBR's evidence is that for the past decade, and indeed prior, STIMBR, in the spirit of the Montreal Protocol, has been engaged at the forefront of a comprehensive effort to find technologically and economically feasible ways to recapture methyl bromide. The only conclusion this effort supports, at this time, is that recapture is not technologically feasible to the standard set by ERMA in 2010. In all these circumstances, New Zealand will be upholding in full the commitments it has made under the Protocol if the recapture obligation is amended in the manner STIMBR is seeking.

35 I turn next to deal with the second topic from the ERMA list, which was direct human health effects. In 2010 ERMA examined the direct risks to human health posed by methyl bromide emissions and decided to set tolerable exposure levels, a workplace exposure standard and buffer-zone controls, as well as monitoring, reporting and notification controls. These added to other controls covering approved handlers, licensing, and personal protective equipment. That is not an exhaustive list, members of the Committee.

45 Taking all these measures into account, ERMA concluded that every conceivable risk to human health would be negligible. It specifically decided that the level of risk to fumigation staff, to occupational bystanders and to the public would be negligible, and that is without any recapture being applied. Although ERMA considered the recapture control would minimise the risks to human health, in my submission that must be seen in the context of ERMA having already

determined that those risks would be negligible, whether or not recapture occurs.

5 Since then, there has been no material change to the toxicity assessment of methyl bromide. There has been no evidence that any effect on human health has arisen as a result of methyl bromide emissions, despite a significant increase in the volume of fumigation activity over that period. And there has been no credible evidence to link methyl bromide emissions with any new health risk. All the controls ERMA
10 relied on to conclude the risks are negligible are still in place. Those are under the reissued approval and the regulations or elsewhere. For these reasons, STIMBR submits there is no reason for you to reach any different conclusion than ERMA did as to the level of risks to human health.

15 In support of this, STIMBR has obtained air dispersion modelling from Sullivan Environmental Consulting. SEC has applied a methodology agreed with other air-dispersion experts and has reported the results of that modelling. This is the only modelling that has been conducted on a consensus basis. Dr Sullivan's evidence will be that the modelling
20 incorporates many elements of conservatism - that is it overstates the potential exposures to methyl bromide - and is reasonably consistent with measured data.

25 Dr Sullivan's response to the evidence to be presented by the EPA and other submitters will be provided in the course of STIMBR's reply, as required by the DMC. There is one exception to this, and it is an important one. Dr Sullivan will acknowledge that an error was made in SEC's 25 June 2020 report. He will describe that error and provide
30 his views on its significance. His evidence will be that the two tables attached to these submissions show the only corrections required to the data in SEC's report that was affected by the error, and the error does not alter the reliability of the modelling results or any of the conclusions he has reached. STIMBR will continue to rely on the SEC
35 modelling.

[9.10 am]

40 As good as the modelling is, it can only ever be a representation of reality. It is well known that at the extreme tail of modelled distributions model artefacts occur, ie unusual events that may or may not occur in the atmosphere. STIMBR relies on Dr Sullivan's evidence of best international practice, which is to use a probabilistic approach based on the 98th or 99th percentiles. The Institute of Environmental
45 Science and Research Limited, a Crown research institute, concurs with this approach, as did the air quality experts in the 2019 EDN approval hearings.

5 Dr Sullivan's approach is independently supported by Dr Fletcher's evidence. Dr Fletcher will say that the highest percentile concentrations from the modelling will be prone to a high degree of estimation error, that 100th percentiles are so poorly estimated that they are almost worthless, and that even the 99.9th percentile recommended by NIWA has more than three times the average error of the 98th percentiles.

10 Relying on Dr Sullivan's evidence, as supported by Dr Fletcher, ESR and other sources of international best practice, STIMBR submits that with or without recapture, the standards for protecting human health - the WES and the TELs - are being met or are capable of being met with minor adjustments to operational practices. Therefore, there is no reason to assess the recapture standard in terms of impacts on human health.

15 To dispel any remaining doubt, STIMBR has requested a regulatory toxicologist, Dr Pemberton, to review the results of Dr Sullivan's modelling, and advise on the health impacts of methyl bromide emissions as modelled. Dr Pemberton's evidence is that even at the 99.99th percentiles the modelled exposures are all well below levels likely to cause any adverse health effect. This, too, is consistent with ESR's independent analysis.

20 This brings me to the third matter from ERMA's 2010 list and that is indirect effects due to ozone depletion. ERMA reasoned that the recapture obligation would reduce the risk of indirect effects on human health and the environment due to the ozone-depleting properties of methyl bromide.

25 Indisputably, methyl bromide is an ozone-depleting substance and any decrease in emissions therefore reduces the risk of indirect effects on human health and the environment. However, these effects are so indirect as to be unquantifiable in any meaningful way. Further, your consideration of this aspect should take into account the Ozone Layer Protection Act 1996, the purpose of which is to give effect to New Zealand's international obligations, and to:

30 "To help protect human health and the environment from adverse effects resulting or likely to result from human activities which modify or are likely to modify the ozone layer."

35 This purpose is implemented under detailed regulations, which explicitly provide for continued use of methyl bromide for legitimate Quarantine and Pre-Shipment applications, without constraint. By "constraint" I am really only signifying recapture constraint there, members of the Committee.

5 Taking this into account, STIMBR submits that any indirect benefits for human health and the environment due to reduction of methyl bromide emissions cannot be a proper basis for imposing a recapture obligation, or alternatively that it cannot justify the selection of one particular recapture standard over another.

10 If the DMC should reach a different conclusion, then STIMBR submits that the Montreal Protocol and indeed the Vienna Convention, have in fact reduced use of methyl bromide worldwide to such a degree that any incremental benefit that might result from the choice of what recapture standard to apply to New Zealand's remaining QPS uses is too indirect to provide a basis for setting the recapture standard.

15 **[9.15 am]**

20 Benefits. The final reason for ERMA's decision to impose a recapture obligation was that it would allow for continued use of methyl bromide and enable the following benefits to be retained: (a) the prevention of the introduction of human disease vector organisms; (b) the prevention of the introduction and establishment of an exotic pest/disease; and (c) access to overseas markets, particularly for the export of logs.

25 STIMBR has obtained an economic assessment of the benefits associated with the recapture obligation from Mr Murray. He has compared two futures, one with the standard as it presently is, and one with the recapture standard amended so as to be achievable with existing or foreseeable technology.

30 Mr Murray's evidence will be that the recapture obligation in its present form would impact on the import and export of several types of fresh produce and on the export of logs to India and China, that avoiding those impacts by setting the recapture obligations at an achievable level would, in comparison, result in an economic benefit of at least \$2.2 billion to \$3.2 billion over the next decade. Thirdly, because of the economic uncertainties due to Covid, those economic benefits are more likely to lie at the upper end of that range. Mr Murray has adhered to the guidance in the methodology order and STIMBR will rely on his assessment.

40 Turning next to cultural matters, to the extent that the application may directly impact on the health and wellbeing of Māori, that has been addressed above in the section on direct health effects. STIMBR acknowledges that changes to the recapture obligation may impact on Māori culture and traditions and in particular may affect the ability of Māori to exercise kaitiakitanga. This has been reflected in the consultation undertaken by STIMBR, as recorded in the evidence of Mr Gear.

5 However, such effects must be considered alongside the effects on Māori that would flow from the current recapture obligation. Inability to fumigate with methyl bromide would have a major economic effect on the large share of forestry held or managed by Māori interests and on related enterprises on which many Māori depend for their livelihoods and wellbeing. The proposed new recapture controls would protect Māori interests in the log export sector and STIMBR submits such benefits are likely to outweigh any adverse impacts on Māori.

10 That brings me to some preliminary conclusions. STIMBR submits there is only one aspect of the reassessment that may lead the DMC to consider the degree of uncertainty attaching to the evidence before it and that is in relation to air dispersion modelling. STIMBR will say that on careful analysis of the evidence, and in particular taking account of the collective weight of Dr Sullivan's, Dr Fletcher's and Dr Pemberton's evidence, the DMC will be able to conclude that any apparent uncertainty is resolved.

20 In particular, the DMC will be able to conclude that when all the other controls are taken into account, particularly the TEL controls that apply at fumigation boundaries and the WES that applies within those boundaries, there is negligible risk to human health and safety and the benefits associated with a revised, achievable recapture control will outweigh the costs. In other words, the reassessment fits squarely within the terms of clause 26 of the methodology order. On that basis, STIMBR submits the application for reassessment can be approved and the recapture controls amended as sought. In the event the DMC retains any concern that the risks to human health may be more than negligible, the application may still be granted if the DMC considers that the risks associated with continued QPS uses would be outweighed by the benefits. If the DMC retains any concerns about the science of air dispersion modelling and/or the disagreements on scientific or technical information between the various modellers, then the DMC is required to determine the materiality and significance of that uncertainty, taking into account the extent of agreement.

40 STIMBR maintains that SEC's modelling can be relied on and that the only potential area of disagreement that remains relates to the interpretation of the results, not the reliability of the results of the modelling themselves. The major difference between the modellers is which percentile should be used as the basis for your assessment.

[9.20 am]

45 STIMBR will submit that Dr Sullivan's approach is more consistent with international best practice and is well supported by Dr Fletcher's evidence, ESR's analysis and the joint approach taken by experts in the EDM hearing. If the DMC remains unconvinced on those matters, then

5 clause 30 of the methodology order requires the DMC to take into account the need for caution in managing adverse effects. STIMBR will say that the DMC can rely on the expert assessment of Dr Pemberton and the independent reports of ESR to conclude that there is significant conservatism in the current TELs. On this basis, any need for caution in managing potential adverse health effects is already well satisfied.

10 For all the reasons outlined above, STIMBR anticipates that the DMC will ultimately be able to conclude that the recapture controls proposed by STIMBR: (a) will not compromise the health and safety of people and communities; (b) will uphold New Zealand's international obligations, and (c) unlike the current recapture controls, are achievable with existing or foreseeable technology and will therefore enable New Zealand to continue to realise the significant benefits of QPS use of methyl bromide.

20 I have listed at the tail end of these submissions the witnesses who will be called for STIMBR to give evidence to the DMC and attached at the rear of the submissions are the two tables that I have referred to that Dr Sullivan will address when he comes to present his evidence. I am happy to answer any questions that the DMC may have before we move on to call the first witness, who will be Mr Hammond.

25 CHAIR: Thank you. Dr Phillips.

QUESTIONS

30 DR PHILLIPS: Thank you very much, Mr Slyfield. I just had a couple of questions. I guess the first one is a fairly fundamental question.

CHAIR: Are you still there? Okay, let's move on. I'm curious to hear what that fundamental question is, but we'll move on to Dr Belton.

35 DR BELTON: Thanks, Tipene. Thanks, Mr Slyfield. I guess maybe the fundamental question, the first one, was some explanation for why we get this change in proposal the night before this hearing begins when it was known to modellers months ago.

40 MR SLYFIELD: Just to be clear, Mr Belton, I think you're referring to STIMBR's application being for 30 per cent recapture in relation to log stacks as opposed to 80 per cent. Am I understanding correctly?

45 DR BELTON: Correct.

MR SLYFIELD: Yes. I think the answer to that, sir, is that as you've identified, it has been known for some time now that recapture is not possible in operational conditions down to 30 per cent. There is not an element in

the procedures that formally sets up a moment in time where STIMBR would advise any particular changes of this sort and therefore the important point is that you do not go through this hearing with an incorrect understanding of what the application is seeking. That is the reason why I have endeavoured and taken up a significant portion indeed of STIMBR's time to be very clear about what STIMBR is seeking and that is now before you.

5

DR BELTON: And the other submitters to this process, they have learned about it this morning.

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MR SLYFIELD: All submitters have been - if they have an interest in the matter - able to follow what has been going on in terms of the publication of information about the application on the EPA's website, which includes the joint witness statement of the modellers that expressly recorded that they would be modelling down to 30 per cent recapture on the basis that that was the bottom end of the operational range achievable by Genera at the current time.

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[9.25 am]

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DR BELTON: Thanks for that clarification. That is probably enough from me for now, thanks.

CHAIR: Thank you. Dr Phillips, we're waiting with bated breath on your fundamental question.

25

DR PHILLIPS: Yes, I dropped out and I didn't hear Dr Belton's question, which may well have been the same question; I don't know because I didn't hear it. But my question was about the timing of announcing this change in the application, the purpose of the application in seeking 30 per cent versus 80 per cent, seeing that it seemed that, yes, the modellers may have known since last year sometime that that's what they were being asked to model, but you didn't actually tell us until last night. I just heard your comment about, "Well, if the submitters were interested they would have been following what the modellers were doing" but that is not the same as the applicant advising that they were now changing the proposed recapture rate. That's rather a big leap, I think. It really isn't a question, because I think you may have answered that question.

30

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But my second question related to the fact that you admitted that there is actually a range that can be achieved and we know from the data that's been provided there is a range between 30 per cent and 80 per cent, yet you have gone for the absolute lowest recapture rate. Now, why is that? Why wouldn't you go at least with an average rather than a minimum that you can get away with?

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MR SLYFIELD: You won't be surprised, Committee Member Phillips, to hear me say I can't endorse the use of the phrase "get away with" in relation to that. What I can say in terms of the proposal to set the recapture standard at the minimum is that the fundamental premise of STIMBR's approach is that the recapture standard has to be set at a level that can in fact be achieved. It is effectively a futile exercise to reassess the current unachievable standard and replace it with another standard that turns out to be equally unachievable. The reason why, therefore, STIMBR has promoted 30 per cent as the recapture standard specifically in relation to log stacks is because on the basis of the information it has from Genera, that is the level that is, in fact, achievable at the present time.

DR PHILLIPS: Thank you for that. Yes, but it's just I guess based on the data that we've been presented with, in fact, there is a range that can be achieved and, therefore, going with the minimum is not quite saying that's all that can be achieved. That's the question. You'll appreciate that that's a huge drop from 80 per cent to 30 per cent.

MR SLYFIELD: Yes, indeed.

DR PHILLIPS: So, I guess from our perspective in even considering the possibility of that huge drop there's more to it than just the science when we are considering what the implications of this drop are. So, yes.

MR SLYFIELD: Can I acknowledge, certainly, it is accepted by STIMBR that the degree of difference between the 80 per cent and the 30 per cent is very large. Certainly, in answer to the tenor of your questions, Ms Phillips --

DR PHILLIPS: No, Dr Phillips, thank you.

MR SLYFIELD: Sorry, Dr Phillips, it's not at all put aside that there is a range possible and that the range has both a lower and an upper end, and that may turn out to provide the DMC with opportunities to set the recapture standard in ways other than the way STIMBR has promoted in its opening submissions. I note that you mentioned, Dr Phillips, an average. I can't say that that is an approach that STIMBR supports at this point in time, but there is plenty to hear in the course of this hearing and it may well be that that is a more sensible position to end up at at the conclusion of the hearing. That would be one of the ways to reflect the range and how large that range is.

[9.30 am]

DR PHILLIPS: Yes. The average was just a number I plucked out of the air, really. It's just an alternative to a minimum and an alternative to a maximum.

5 The other question I had related to this, I guess, is I note in your submission that you have suggested that it's going to take two years to get to 30 per cent. Now, that's in your paragraph 17, I think it was. I was just wondering when on the one hand you're saying that 30 per cent is what can be achieved, it's a realistic rate of recapture, and yet you're saying you need to have two years to reach that point. So I'm just wondering why that is and why we can't set a limit, a recapture target of 30 per cent right now, considering that's what I understand the data is telling you.

10 MR SLYFIELD: I think the distinction there, Dr Phillips, is as between setting the recapture, which could be set now at 30 per cent, and being able to give effect to that. It is simply reflecting that there is time needed in order to construct the plant and equipment and install that plant and equipment in order to give effect to that standard. Now, I should add inroads towards that have already been made because of the work that 15 Genera has undertaken at the Port of Tauranga in compliance with the regional consents it holds where, as I think you know, it is required to have achieved a degree of recapture already. So there is already some recapture equipment operating on fumigations at the Port of Tauranga and the two years is the best estimate STIMBR can make at this time based on information it has from Genera about how long it will take to get that to cover all log stacks in the country. So it's moving from a partial compliance situation that might be achievable almost 20 immediately to a full compliance situation.

25 DR PHILLIPS: Just on that, can you just remind us what the consent limit is for -- or the consent requirement is at Tauranga in terms of the recapture rate and the percentage of log stacks that need to be recaptured?

30 MR SLYFIELD: Well, I can give you my understanding but I'll stand corrected by Genera if I get this slightly wrong.

35 DR PHILLIPS: Sure.

MR SLYFIELD: It has been a stepped requirement over time, but it's my understanding that it presently applies to all log stacks, and I can't recall the percentage recapture efficiency that's required to be achieved.

40 MR HILL: Hi there, Morgan. Matt Hill from Genera. I can help you out there. We are currently required to recapture from 75 per cent of the timber and log stacks on the Port of Tauranga. So it's a target around coverage, not efficiency.

45 DR PHILLIPS: Thank you, Mr Hill. So you're saying that 75 per cent of log stacks have to have recapture technology used on them but there's no recapture target?

MR HILL: That is correct.

DR PHILLIPS: Okay, thank you.

5 CHAIR: Could I just interject there? Mr Hill, I'm fine with your answer but just as a matter of process, if anyone other than the submitter is going to speak during the call, could you just as a matter of process seek the leave of the Committee before you speak? Thank you.

10 DR PHILLIPS: Thank you, Mr Wilson, that's all the questions I have at this point.

CHAIR: Okay, great. I was still making notes from that last response. Mr Slyfield, this is really one of process, and I acknowledge everything you've said about the information we've had to hand and from the modellers and so on. We've acknowledged the late clarification received from STIMBR in terms of seeking 30 per cent and your rationale for that. Process wise, the challenge that the DMC is faced with navigating through is that the submitters and all participants in this process, including the EPA itself, have worked on the assumption that STIMBR was applying for 80 per cent recapture and has now amended that application to 30 per cent.

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[9.35 am]

25 Putting the reasons aside for the moment, the challenge that the DMC has is whether it could or should form a view that this is a new application and, therefore, natural justice or participation, whatever term you want to use, means that submitters should have sufficient time to provide input into that. I guess it's looking for some guidance, and I'll be asking this of the EPA as well, but looking for some guidance to help us to understand why this request for 30 per cent recapture should or should not be treated as a new application.

30

MR SLYFIELD: Thank you, Mr Chair. The first point in response is that fundamentally the application is for reassessment of the recapture controls, and in that context STIMBR made some suggestions for particular changes that it wished to see when it filed the application some 18 months ago. But the fundamental doesn't change, that it is a reassessment of the recapture controls and, within that, the DMC has jurisdiction to consider where the information takes it. That could include reaching conclusions that differ substantially from what STIMBR has sought. There's no question that the DMC could decide that the recapture controls STIMBR has sought are too lenient if it found that supported on the basis of the science and the technical evidence, and also it could go in the other direction and decide that in actual fact STIMBR has assessed it in the other way, that actually it needs to be more lenient.

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5 So, the starting point in terms of the DMC's jurisdiction is that in my submission it is broadly drawn in terms of the reassessment, and I refer you to the chief executive's decision to proceed with the reassessment on a modified basis under 63A and the terms of that, which are sufficiently broadly drafted to put within your oversight and your decision-making capability the entirety of the recapture controls in any aspect, whether that's to do with percentage efficiency of recapture, timing of application and so on. I think that's probably the main part of the response.

10 The second part, Mr Wilson, would be that it is within the DMC's capability if it has any concerns about the change that STIMBR has now indicated to, of course, ask for comments or submissions from parties and it's not for me to say what parties' positions would be, except that I do observe that there are generally two camps in terms of submissions. There are those who are supporting reassessment and supporting a change to the recapture control, and those who obviously are not. Now, those who are not were opposed to the recapture control at 80 per cent. I don't mean to be at all facetious in saying that I don't imagine that a move to 30 per cent will have improved their view on that. So, to the extent that a party who was opposed to the recapture control at 80 per cent has been denied an opportunity through the timing of STIMBR's information on its position that is not accepted.

25 Those parties can still of course present to you and undoubtedly, if anything, their views may have become stronger than they were. By having the application publicly notified on the basis that the standard STIMBR was then promoting was 80 per cent I submit can give you some confidence that the submissions that were elicited through that process will have come from as broad a field as they could have and that there is no one who would have opposed this who is not already part of this process.

35 **[9.40 am]**

40 Conversely, those submitters who are supporting the application can of course provide some views to you as to whether they continue to support the application based on 30 per cent. Again, it is not really for STIMBR to offer a view as to whether they will or won't. I think, though, that is a question that is well within the DMC's ability to put to those submitters it hears from in terms of their support for the application and whether that continues.

45 Sorry, Mr Wilson, I can't hear you. I think you're muted still.

CHAIR: That was my fundamental question too, and you missed it. Anyway, moving on to paragraph 19 where you talked about the proposed 50 per cent recapture on ship holds, I just want clarity. Two questions. When

you say a 50 per cent recapture from ship holds, is that what is proposed at the end of the ten-year period? That is question 1. The second part is how did you arrive at 50 per cent?

5 MR SLYFIELD: Okay, so the first part is yes, STIMBR is fundamentally seeking an exemption of recapture applying to ship holds for a ten-year period, so it is at the end of the ten years that recapture would kick in. There is no real magic to the 50 per cent number except to say that it is accepted by STIMBR that there is potential for some improvement over time.
10 Much could happen in ten years but the evidence presently available to STIMBR suggests that any standard, whatever that percentage is, would be aspirational, that STIMBR can have, at this point in time, no real confidence of the industry's ability to meet that figure in ten years' time. Whatever that figure is, it is aspirational only. That is really the basis on which 50 per cent has been promoted there. It would be equally aspirational if it was 30 per cent or 80 per cent, for that matter.

CHAIR: That kind of answers my next question, which was when that was anticipated in terms of 80 per cent recapture from ship holds. Are you able to say at this point, though -- two questions again. Checking that therefore STIMBR is unable to say at which point in the future they anticipate 80 per cent recapture from ship holds. That is question 1. Secondly, are you able to say at what point in the future you anticipate 80 per cent of recapture from log stacks?

25 MR SLYFIELD: Ship holds I think are more challenging than log stacks, but log stacks are probably very close behind in terms of that level of recapture efficiency. In terms of ship holds, I don't think, on the basis of the evidence that it has, that STIMBR can offer a date at which 80 per cent is achievable. It's simply beyond all knowing or foreseeable technology. Indeed, the evidence from Dr Armstrong will be that based on the extent of research and development that has occurred over the past ten years, it is difficult to look into the future and see that there is a significant change likely, unless, of course, something that we do not know as at today is discovered. That cannot be ruled out, but for those reasons there is no date. Both the ten-year component and any percentage recapture component is in that sense aspirational in terms of ship holds.

[9.45 am]

40 As for log stacks and when 80 per cent might be an achievable number, I think I really need to -- and I don't mean to sidestep that at all, Mr Wilson, but I think I really need to reserve STIMBR's position, because fundamentally STIMBR relies on the information that it gets from Genera on such matters. You're going to be hearing from Genera. To
45 a large extent, STIMBR remains true to the premise of the application, which is that the recapture control needs to be achievable. So STIMBR will take its guidance from Genera on that matter and it does rather

mean that I don't think I'm in a position this morning to provide you with a firm deadline by which that could be met. But STIMBR is as interested as I'm sure you are in hearing from Genera on those matter.

5 CHAIR: Okay, thank you. Let's leave any response from Genera to the time within your right of reply.

10 That's all the questions that I had for you, Mr Slyfield, thank you. Submitters, do you have any questions for Mr Slyfield? You're welcome to ask them and then, unless I say otherwise, Mr Slyfield, if you wouldn't mind responding. Thank you.

15 MS DIJKSTRAN: Tēnā koutou katoa. I have more of a comment than a question around the late notification of the change from 80 per cent to 30 per cent recapture. We have an issue with the fact this has changed, given that we have mandate from our iwi and have consulted with our iwi and written our application with expectations that an 80 per cent recapture rate would be achieved. We feel that, given the timing on this and the nature of this process, we may have additional issues that we will not be able to voice during this hearing because of this change.

20 CHAIR: Thank you. Just for clarification, not to step back on what you've said, this isn't the time to state a position or make a submission, it's a time to ask questions for clarification/expectation of Mr Slyfield. I welcome your or anybody expanding on their position in their submission period, thank you. On that note, any other questions?

25 Okay, Mr Slyfield, thank you. In your hands as to who is up next.

30 APPLICANT PRESENTATION

DON HAMMOND PRESENTING

35 MR SLYFIELD: Thank you, members of the Committee. STIMBR's first witness is Mr Hammond. You have a statement of evidence that he has prepared and filed in advanced, dated 27 July. In accordance with your directions, he's not going to be taking you through that verbatim. I'll simply get him to confirm that that is his evidence for the purposes of the hearing, and then ask him to take you through the highlights of that.

40 MR HAMMOND: Kia ora, tātou, members of the Decision-making Panel. Thank you very much for the opportunity to address you this morning. Firstly I will just confirm that the statement of evidence I have previously submitted is my statement and I don't propose going through it. I just wish to address a few key highlights.

45 I'm Don Hammond. I am chairman of STIMBR. If I turn first to STIMBR's raison d'être, what is STIMBR here for. Its primary

function is to reduce the loss of methyl bromide to the atmosphere through considering alternatives, whether those alternatives are different fumigants or non-fumigant treatments, reduced use of methyl bromide, reduced rates of methyl bromide, recapture or destruction of methyl bromide following fumigation.

[9.50 am]

STIMBR was formed prior to the 2010 decision and did not appeal that 2010 decision due to a belief that a solution could be found. STIMBR has worked solidly since then to try to find a solution, so there was a strong commitment to complying with both the intent and the spirit of that 2010 decision if at all possible.

STIMBR has invested in all of the options noted - non-fumigants, alternative treatments, all of those sorts of things - including things like an ecological approach, trapping insects to see whether numbers got so low that there was no need to fumigate logs and we could work with our trading partners on that. The reality is that nothing has been found that can be immediately implemented. All of the work that we've completed over the last decade points to the 2010 requirement as being commercially impossible at this stage. Collectively something approaching \$44 million has been invested to seek a solution to meet that 2010 decision.

Perhaps even more important, STIMBR is continuing to work on seeking alternatives. We're aware there is an application for an alternative fumigant. We continue to invest in Joule heating and other possible solutions that allow us collectively as an industry to move away from methyl bromide. Sixty per cent of our harvested logs, particularly the lower grades, are exported. The New Zealand domestic industry neither wants those logs nor has the capacity to use them. There are plenty of logs available for domestic process, albeit at export parity prices. I think it's really critical for us to understand that methyl bromide is only used because our trading partners demand it. Industry is not wedded to methyl bromide; our trading partners are.

We need to recognise that methyl bromide is a cost-add, not a value-add, and we cannot recover that cost in the value of the logs or in terms of the log price. Looking at it another way, all like-for-like logs achieve the same price regardless of whether they are fumigated, debarked or indeed exported untreated to markets like Korea and Japan. Of course we would export more to Korea and Japan, because the ultimate residual value back in New Zealand would be greater if we didn't have the methyl bromide cost, but those markets are saturated.

Methyl bromide is considerably more costly, in the order of four to six times, than phosphine and phosphine treatment makes up around 70 per

cent of the logs exported to China and around 60 per cent of our total log exports. Clearly from a purely economic perspective, the industry preferentially phosphine treats because it is considerably cheaper.

5 To give a little bit of historical perspective, in 2003 we exported
somewhere in the order of 200,000 tonnes of logs - that's about six
shiploads - to China and India. Today those markets take around 17
million tonnes; that is over 500 shipments a year. It is almost a tenfold
10 increase and thus the scale of our challenge in finding alternatives to
methyl bromide has grown accordingly. We've seen some commentary
and concern that if there is no requirement to recapture from ship holds
then the industry would simply move to methyl bromide treatment in
ship holds to escape the need for recapture.

15 I want to dispel that myth. Firstly, methyl bromide, as I have noted, is
four to six times the cost of phosphine and, secondly, the extreme cost
and difficulty of treating within a hold of a ship and then taking those
logs out to load them on to another ship, it would double the fumigation
20 cost and it makes absolutely no sense if you've got phosphine treatment
available. So there is no likelihood of exporters wanting to simply
methyl bromide treat in ship holds to avoid the recapture requirement.
They will preferentially use phosphine.

[9.55 am]

25 There's also been considerable discussion around debarking as a
suitable alternative. Once again, debarking is substantially more
expensive than fumigation and it varies depending the scale of the
debarker, the volume of material going through it, the quality of the
30 those logs and a whole raft of other issues, but without exception,
debarking is more expensive than fumigation. Perhaps more critically
though, we get very variable quality and we have issues with quality
assurance when it comes to debarking. If we get a failed debarking
cargo, in other words, a cargo arrives in China and it still has bark on
35 and has insects on it, then those logs must be fumigated with methyl
bromide in China at the exporter's cost. It's also critically important to
remember that China is the only market that accepts debarking, which
precludes us from developing other markets and further growing the
Indian market to reduce our reliance on a single market.

40 We have no efficacy dataset for debarking. In other words, we don't
have a large amount of knowledge about just how successful it is and
we have no surety about its ongoing acceptance within that Chinese
market. In a legal sense, the Chinese can stop accepting debarked logs
45 without notice at any time and for any reason. Debarking also does not
cope well with some smaller grades of logs and rougher grades of logs
and is seasonally variable. When the logs are very dry or in the winter,
it's quite difficult to get the bark off; much simpler in the spring, the

bark comes off quite easily. So we get very variable results and therefore we run considerable risk if we place too much emphasis on debarking because, as noted, that option could be turned off very quickly.

5

We also have inadequate installed capacity and there is a significant lead time to grow debarking capacity. Current debarking capacity is around 2 million tonnes and we currently export somewhere in the order of 5 - 6 million tonnes a year of methyl bromide treated logs, so we don't even have the capacity even if we wish to move to debarking.

10

I'd like to address the reasons that STIMBR has sought a reassessment of methyl bromide. I go back to my earlier point that initially STIMBR was very much of the belief that a solution to the recapture issue would be found, provided we looked hard enough. We were even more confident when we discovered that EDN was efficacious and a registration application was commenced. There's a considerable lag between the 2010 decision and the 2017 registration application, but that time was required in order to have the confidence that EDN would achieve the outcomes that we sought.

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As a board, STIMBR said that any alternative had to achieve three criteria. Firstly, it needed to be technically feasible; secondly, it needed to be economically acceptable; and thirdly, it needed to be socially acceptable. Failure on any one of those would actually put an end to the work and so it was only in 2017 that we were finally in a position to actually say, "Yes, we believe we've found the alternative to methyl bromide" which would almost eliminate the need for methyl bromide once we get through both the registration, resource consenting and acceptance by our trading partners.

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As it became increasingly obvious that no recapture solution existed and that EDN would not be available within the time constraints, ie by October this year, it was then necessary for a continuation of the export trade involving methyl bromide and therefore methyl bromide needed to remain available. As it became apparent that the reassessment process itself was unlikely to be decided within the timeframes required, STIMBR also approached the courts to seek relief. It's essential to understand that STIMBR has applied for this reassessment as there simply is no other option to ensure the continued economically viable trade for those logs that currently require methyl bromide. I step you through this to show that STIMBR has worked extremely hard to actually move away from methyl bromide by finding alternatives.

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[10.00 am]

It has worked extremely hard to find recapture technologies and it's only as we have recognised that each of those doors are not going to be

open at the time required that we have had to move on to the next step in the process. Indeed, the delays that we've seen in these processes are causing some anxiety amongst our trading partners, as they ask why we don't have suitable alternatives or options.

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In summary, we are only here because the other avenues have been exhausted, at considerable expense and effort. We too live on this planet and we don't want the ozone hole damaged any more than anyone else, but as we are here today, other options simply do not exist. STIMBR will continue to seek alternative solutions, but until those are available the industry needs ongoing access to methyl bromide treatment with workable controls, as has been described earlier this morning. Thank you.

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15 CHAIR: Thank you. Dr Phillips, any questions?

QUESTIONS

20 DR PHILLIPS: Yes. Thank you, Mr Hammond, for your presentation. It's good to get that nice succinct summary of the whole process. It's been going on for quite some time. I just have one question which related to your evidence, where you refer to discussions with trading partners around the possibility of a lower application rate, around the 40 g per cubic metre level. I was just wondering where those discussions were at.

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MR HAMMOND: Thank you, Dr Phillips. We have met with - and I have used the Royal "we", this is MPI, STIMBR and exporters - various parts of our trading partner counterparts, if that makes sense. MPI have talked directly to officials, industries talk to importers and so on. I think it's fair to say the discussions, the questions that are coming back are indicative that they are very interested in what's being proposed because the questions are more of a technical nature than perhaps a delaying tactic or a, "Yes, we're interested, but no, we're not really going to listen" type of approach, if that makes any sense. We are hopeful that they will proceed.

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Critically, we have provided the efficacy data that shows that the 40 g is just as efficacious as the much higher levels and that has given our trading partners, both in India and China, considerable confidence that perhaps they can rely on that. But as with most of these things, while the science is critically important, the politics and the trade leverage is probably even more important. I think it's also extremely important for us just to recognise that somewhere in China is a public official sitting at a desk with an inbox and in that inbox is an application for lower rates of methyl bromide from New Zealand, along with hundreds of other applications from every other country in the world, trying to adjust their trade agreements and so on. So, while it's critically important to us, and I'm not trying to belittle the work of those people,

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I'm just simply saying it's one more job for those officials, and one of our challenges is to elevate its urgency, I suppose.

5 DR PHILLIPS: Okay, thanks for that. Thank you, no further questions.

CHAIR: Thank you. Dr Belton?

10 DR BELTON: Thanks, Mr Wilson. Mr Hammond, probably a more philosophical question from me. You've been in the business for over a decade now and our methyl bromide usage continues to go up, and we all know the reasons why. There are multiple players in this industry and regulation of it. What are the things that we can focus on most that will assist you to reduce your methyl bromide usage?

15 MR HAMMOND: Yes, a very good question. Perhaps I can also just reflect while we know that the export log trade has expanded considerably in the last decade, we have also seen a very fundamental shift away from Japan and Korea, which don't require treatment, to China and India, which do require treatment.

20 [10.05 am]

25 Hence the reason for highlighting that change from 2003 where we exported 200,000 tonnes to China to 16 million or 17 million tonnes. Japan and Korea have diminished both in importance and in volume over that period, which has sort of exacerbated the problem. One of the threats to us is that either of those countries, Japan or Korea, could at any point in time require methyl bromide treatment to be shifted back to New Zealand because they treat on arrival. They could well say, "Well, we can reduce our methyl bromide emissions simply by requiring New Zealand, the exporter, to do that".

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35 But reverting to your question what could be done, obviously we have applied for a registration for EDN and we're extremely keen to get some decisions on that if that comes through with workable controls and we can get a commitment from our trading partners to use EDN instead of methyl bromide. That would almost eliminate the need for methyl bromide use in New Zealand. That would probably be the single biggest step that we could make.

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45 The fallback position that Dr Phillips asked about a moment ago is if we can reduce the treatment rates we would reduce the use of methyl bromide. That single thing would reduce the use of methyl bromide by, our estimates, around 235 tonnes a year, which is around 40 per cent of our total use. So, that would be a huge decline in total use.

So, those two things, but if you ask me which one we should back, it would be EDN followed by other non-fumigant treatments, but they are probably still a decade away.

5 DR BELTON: Yes. I guess I was coming more to our role in this Decision-making Committee on this subject, as to what we can do. Both those things are outside our scope.

10 MR HAMMOND: Yes, okay. I did wonder when you asked because I didn't really want to raise the issue of EDN. Look, there was earlier discussion with Mr Slyfield's opening address about the 30 per cent to 80 per cent. We know that we get a huge range of recapture efficiency, and we initially thought that 80 per cent was a stretch but could be achieved. What we've discovered is that operationally that is not achievable, day in, day out. There are just so many other parameters.

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20 But it is certainly within the desire of STIMBR and the desire of the industry to ensure that we are continually seeking to improve, firstly, the level of recapture, second, to reduce the amount of methyl bromide if we can, seeking to be more efficient. But equally, that recapture has to be sustainable in its own right, so that has been a challenge for us as well. You're seeking a system that will deliver a permanent, sustainable solution to recapturing methyl bromide. Capturing it is one thing, doing something with it is a separate issue, and we're not willing to simply say, "Well, we've recaptured it, now we'll give it to someone else and make them fix the problem". It needs to be an end to end solution.

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30 So, we're seeking from the DMC controls that allow the trade to continue but we are not seeking, "Hey, just let us go back to venting the stuff to the atmosphere and it's all ..." We're absolutely committed to a level of recapture that we can achieve and we would continue to work to improve that. But to do that, we need certainty about what those rules are so that we can get capital investment and research investment, knowing that we will be able to continue work. Nobody wishes to invest capital into recapture equipment if we have no confidence that we'll be able to meet whatever the rules are.

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40 DR BELTON: Okay, thank you.

CHAIR: No further questions?

DR BELTON: No further questions, thanks.

45 [10.10 am]

CHAIR: Okay, thank you. So, Mr Hammond, thank you for your submission. I guess for everybody listening you may find what appears to be a

paucity of questions during the course of this hearing. That's not a reflection of lack of interest but of the preceding 6,100 pages that we've read. So, thank you for that; not really, but there you go. It's in front of us.

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MR HAMMOND: Thank you.

CHAIR: Anyway, I just want to reflect back to a question that I asked Mr Slyfield in terms of whether you had any input into or any input you could give us in terms of at what point would you anticipate, if you could, that an 80 per cent recapture would be achievable, either in ship holds or in log stacks.

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MR HAMMOND: Thank you. The ship holds, I'll deal with that first because it's arguably the easiest and it's the easiest because it's the most difficult. We simply have no visibility on any system that would give us any significant level of recapture in an economic sense out of ship holds. To just provide a little perspective, a ship hold is a 5,000 cubic metre steel box. It's very difficult to recapture methyl bromide that's within those holds. So, I have to be completely honest and say I don't see at this stage anything on the horizon that says we can recapture significant amounts from ship holds. The real opportunity there is to move to alternatives, whether it's EDN or some other thing.

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Having said that, lower rates of methyl bromide would reduce the amount of methyl bromide that needed to be recaptured, but it would still not give us any substantive confidence in the amount that we could capture.

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If I move to log stacks, log stacks are considerably smaller. They're much more accessible in a physical sense and we are continuing to -- and again the royal "we". This is industry in particular, the fumigators, are continuing to seek advances in technology that will allow them to recapture greater percentages of the methyl bromide that's remaining in the head space. I would defer to Genera in terms of where they could get to, but I think one of the things that we've probably got to recognise is that we have possibly discovered the quantum changes that we can make, the step changes, and a lot of the work that will happen going forward is fine-tuning and polishing. So, I'm not confident that we'll suddenly say, "Well, if we change this we'll get a 10 per cent uplift in recapture", it'll be more if we adjust this and adjust that we'll get another 1 per cent on average or 2 per cent. It'll be those cumulative 1 per cent and 2 per cent improvements that are more likely to give us an increase than some sudden new thing that says, "Here's 10 per cent or 20 per cent in a single hit".

So, I know that's a roundabout way of responding to your question, but being completely honest we don't have the visibility that says, "Hey, in three years' time we will have X".

5 CHAIR: Okay, thank you for that. I do appreciate the clarity or the lack of a clear way forward, just confirming that.

10 My last question is in relation to you talk about ship hold treatment and the additional costs. You are no doubt aware of -- and I'm not speaking for them as a submitter, but the Bay of Plenty Regional Council suggested a control would be that ship hold treatments, if the DMC were of a mind to grant the application, a control on ship hold treatments would be at a quantity of what was occurring, I think if memory serves, in 2018-19. What comment do you have to make on that as a proposed control, that the actual amount of logs fumigated in the ship hold remain at a certain quantity?

[10.15 am]

20 MR HAMMOND: I do have some concerns with that on the basis that that has the potential to limit any growth in trade with India. I go back to the first point. The only logs that are treated, methyl bromide treated, in ship holds are to India because phosphate is 20 per cent of the price of methyl bromide. So, it's hard to think of a reason you would methyl bromide treat logs going to China in a ship hold when you could do it for less than a quarter of the cost with phosphate. If we want to grow the trade to India and at a high New Zealand Inc level, having 60 per cent of our total harvest going to China is, in my view, risky -- sorry 60 per cent of our total export logs going to China is risky and diversification would be a sensible thing to do. I'd be concerned if we limited the amount by saying, "Well, you can have no more than one ship a month" or 20 ships a year or whatever the limit that was decided, because I think you run the risk of putting a handbrake on development of the industry.

35 The other question that I have continually raised, and it's a very open question, is where is our next market. China didn't exist 20 years ago. Where will our logs be going in 20 years' time? We need to be conscious that wherever that country is they may have particular requirements for phytosanitary treatment and we need to have the tools available to us that allow us to access that market. So I'd be concerned about a physical limit of that nature, but as I have been at pains to point out, I do not see any reason that the industry would suddenly go, "Let's treat in ship holds because we don't have to recapture". It is just so much more expensive you would not do it.

45 CHAIR: Thank you for that. No further questions from me, so I open up if any submitters have questions - not comments, questions - or clarification or explanation, thank you.

Right, Mr Hammond, we'll take the silence as a job well done. Mr Slyfield, over to you.

5 MR SLYFIELD: Thank you, sir, and I'll be guided by you. I'm conscious the agenda has a break scheduled at 10.20 am but the next witness for STIMBR is Dr Armstrong and we may be able to get through his presentation reasonably promptly if we can press on.

10 CHAIR: Let's do that.

MR SLYFIELD: Very well. Dr Armstrong, over to you.

15 MR BROWNING: Excuse me. Steffan Browning here from Soil & Health. I raised my hand to ask a question of Mr Hammond and apparently it wasn't noticed.

CHAIR: Sure, Mr Browning, carry on.

20 MR BROWNING: Thank you. I would like to know -- I'm in Nelson today, the port that only accepts recapture. It's not doing it of log stacks, it's sending it elsewhere through the country because of the deaths that happened at that port many years ago. I want to know why STIMBR - and I've been watching closely for more than a decade on this whole issue - haven't
25 trialled correctly, with effort on their part, of the Nordiko recapture system.

CHAIR: Mr Browning, the recapture technology and the systems used is actually outside the scope of what the DMC must consider.

30 MR BROWNING: We had Mr Hammond and STIMBR through their evidence and again today reiterating the theoretical huge money, by their standards, they say, having been spent on looking at recapture systems that would mean that they actually needed to go ahead with this reassessment,
35 which I think was ultra vires anyway.

[10.20 am]

40 For us in the community, and NGOs, I'm afraid we do see it a little holistically. It is not just a matter of this reassessment. We've got a long history with people who have been exposed, communities that have been exposed, communities that have stopped using it. The recapture part is part of the picture for us. I understand the DMC will be looking to see what levels may be released. We're saying that there
45 shouldn't be any levels being released and consequently you must be looking at the recapture systems that show that there is not a need for the levels that are being expressed.

We heard earlier from the counsel for STIMBR trying to explain their drop from a potential 80 per cent, in some time to come, to 30 per cent. We're talking about recapture, so I'm afraid I don't understand, Mr Chair, why it is outside your scope.

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CHAIR: Sure. It's not your job to question the DMC, I might add.

MR BROWNING: (overspeaking)

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CHAIR: Excuse me, Mr Browning, you won't interrupt me while I'm talking. The DMC has a certain function. I'm not saying that the issue that you're raising is not important, it's just not something that we as a Committee are charged with considering at this stage. If you have any other further questions relating to Mr Hammond's submission, ask them now, otherwise we will move on to another -- someone else has another question.

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MR BROWNING: My question remains, in terms of their considerations of recapture, why they did not put real effort into the Nordiko system. Because we heard just before about the difficulty with ships' holds and some other recapture around the commercial aspect of it, the pricing of it, I guess. So it is part of the conversation so I would like him to answer that question if possible.

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CHAIR: I'll state again that that's outside the scope of our deliberations. Mr Hammond, if you're of a mind to provide a two- to three-minute response, you may.

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MR HAMMOND: Sir, I think it's inappropriate to respond. As you say, it's outside the consideration at the moment so I think we'll just leave it there.

CHAIR: Thank you. Mr Browning, any further questions from you?

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MR BROWNING: I will leave the hearing at this point and probably not bother with it until I present evidence on Friday, but I'm finding the whole process, including your waiver, show that the community is not actually being listened to in the correct manner, that the EPA is not following its jurisdiction as laid out. How are we to have confidence in the DMC if it is not actually following the provisions for the Environmental Protection Authority? We have no confidence in STIMBR. We have no confidence in the principle of fumigators. We have put a lot into it. So I'll bow out for now, you'll go through your charade and I'll leave you with the biggest charade being STIMBR. Thank you.

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CHAIR: We'll be hearing from you on Friday, Mr Browning.

We have had another two people. It looks like we will be going for a cup of tea rather than to Dr Armstrong. Mr Weiss, you have a question?

[10.25 am]

MR WEISS: Yes, I do, thank you. It's Sam Weiss from Bay of Plenty Regional Council here. I have two questions. The first one is just in relation to the number of ships or ship fumigation. What I'm asking is just clarification that if ship fumigation wasn't to be carried out, presumably those logs that would otherwise be fumigated on that ship could be fumigated in the way that most logs are fumigated, just under tarpaulins and then loaded on to the ship. I understand that that may be a little bit more expensive or take a bit more time, but presumably that possibility is still there.

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The second question is just regarding the efficiency of the ship-recapture process. I understand that Genera has previously done some work in relation to ship recapture, some trials. I wondered if they might be able to share the results. Because we know that the volume of fumigants used on ships is high, potentially over 5,000 kilograms, so even just a small or a relatively small percentage of recapture does then correspond to potentially quite a significant amount.

MR HAMMOND: Mr Chair, in response to the first part for Mr Weiss's question regarding fumigation onshore and then loading those fumigated logs on to a ship, there are significant logistical challenges, quite apart from costs, associated with that. There is a requirement that fumigated logs are loaded on to the ship within 48 hours of the fumigation being completed. To ballpark, a ship is carrying, let's say, 35,000 - 45,000 tonnes of wood. About two-thirds of that is in the holds. Somewhere in the 20,000 - 25,000 tonnes is sitting in the holds, the balance is on top.

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So the balance of a shipment going to India -- sorry, the total shipment going to India has to be methyl bromide treated. The top-stow logs are treated onshore. The ship is loaded with logs and treated with methyl bromide in the hold and then the top-stow logs are put on top. That way the 48-hour requirement, MPI requirement, is achieved. If all 35,000 tonnes had to be fumigated onshore and then loaded on to the ship within that 48-hour window, that would be extremely difficult and would add a further layer of cost because the logs are being double-handled. So there is logistical challenges to be met, quite apart from the economic challenge.

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In terms of the second part of the question, I think it's not appropriate for me to respond to that because that is work that Genera has been doing and they are the ones who would have more accurate information on what they've been able to achieve and not achieve.

CHAIR: Thank you. Mr Weiss, is that your questions?

MR WEISS: Yes, thank you.

5 CHAIR: Thank you for that. My apologies if I say the name wrong: Ms Barry-Piceno, you have a question? Someone whose first name is Kate. Okay, we'll go to Mr Falco now.

10 MR FALCO: Thank you, Mr Chair. My name is Joe Falco, representing Nordiko Quarantine Systems. I've got a question with Dr Hammond with a comment that he made before when asked the question about Genera using the Nordiko Quarantine Systems at the Port of Nelson when they mandated recapture. His answer was it was out of the scope because predominantly the fumigations being conducted there are within
15 containers, but having said that, Nordiko has supplied efficient recapture systems for under tarp log fumigations here in Australia.

[10.30 am]

20 We supplied this some time ago, a few years ago, to a log export company. We've got data that suggests that methyl bromide recapture from under tarp logs is achievable at a higher rate than being mentioned by STIMBR.

25 We also have data on ship hold fumigation. We have a design for a recapture system. Based on data that we have from a third party, there was a nice ship fumigation recapture conducted by the Canadian and American Governments some time ago and they wrote a very good scientific paper on this which suggests up to 80 per cent successful
30 recapture of the methyl bromide injected in the ship hold.

35 Lastly, Dr Hammond mentioned that it's difficult to recapture from a ship hold. It's about a 5,000 cubic metre steel box. We have in fact a 25,000 cubic metre steel box or cylinder - it's a grain silo - in Newcastle here in New South Wales that recaptures methyl bromide because they are made to do so by the local EPA. That has been successful in compliance with the current regulatory policies for recapture for some time now, for a few years. So that's a 25,000 cubic metre steel box. I would just like to make that comment.

40 CHAIR: I'm not sure what your question was, Mr Falco.

MR FALCO: My question, I'm sorry, to Dr Hammond: was Nordiko engaged to see if their recapture technologies would be feasible in the application?

45 MR HAMMOND: I think, Mr Chair, there has been discussion with Nordiko over quite a number of years, but I think it's inappropriate to have that discussion here.

CHAIR: Thank you. Mr Falco, do you have any further questions? You're on mute, but from lip-reading I took that as a no.

MR FALCO: Thank you.

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CHAIR: All right, on that note, it looks like we have all our questions answered. I might add that using the chat facility is a very effective way to let me know whether you want to ask questions.

10 MS BARRY-PICENO: Thank you, sir. It's Kate Barry-Piceno speaking. Can you hear me now? I was having difficulties with my mic, apologies.

CHAIR: Yes, thank you. Away you go.

15 MS BARRY-PICENO: Thank you, sir. I have a question regarding the comments Mr Gear made around concerns of the forecast relating to other countries over the 20 years. My question is with regard to needing flexibility to access potential markets, would you not accept that it would be a likelihood that rather than following India, which appears to be rather backward in its approach to environment protection, that other countries in the next 20 years will be improving their environmental obligations on an international scale, such that New Zealand should be focusing on export markets that meet high environmental standards in regards to use of fumigants or contaminants that have effects on the environment?

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MR HAMMOND: Mr Chair, Don Hammond. I apologise, I come up as Mr Gear, but it's me who was talking. I think it's fair to say we would endorse the thrust of that comment in that New Zealand continues to try and improve its environmental record, it continues to try and encourage countries we trade with to accept improvements. A good example, I think, of that is that we have put a lot of effort into proving we can achieve the same level of fumigation success or efficacy using considerably less methyl bromide than our current trading partner demands.

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[10.35 am]

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So while it's still methyl bromide, we are trying to reduce the use of it and encourage our trading partners to do the same. As noted before, that alone would reduce our consumption of methyl bromide by 40 per cent or somewhere in that order.

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We can't predict where our next market is going to come from. Lots of people suggest it's India, but as Kate, I think, said, it's not an easy country to trade with and it has some issues. But where is the next market beyond India? We have no idea what their requirements might be.

5 Part of our philosophy, I suppose, is we need to keep our options available and open and we also need to remember that while use of methyl bromide, north of 90 per cent of it is used on log exports, a small amount is used on horticulture exports to extremely high value markets like Japan and we also use a small amount to protect New Zealand's borders from infected materials coming in. We need to retain that ability to protect New Zealand from importation of pests and diseases. Certainly we want to trade with people that have similar philosophies in terms of environmental improvement, but it's also difficult to guess what the future is going to look like.

10 MS BARRY-PICENO: I just have a second question, Mr Chair, that just follows from that, and apologies for getting your surname incorrect. I was following what was there. Do you see your role as having a bottom line in relation to either India or other countries? Because what you're saying is, as I understand it, you want flexibility to trade with any potential future countries regardless of where they may sit in terms of positions on fumigants that have potential adverse effects on humans or the environment. Where is your bottom line and when do you consider the appropriate time to set that from yourself as an industry with other countries?

25 MR HAMMOND: Look, no apology needed over the surname. I think we are reliant on our Government to determine where our trade will be and Government has followed the world lead in various embargos and economic sanctions against countries for various things, so we would follow that lead because I don't know that we have the depth of knowledge and research to adequately say we can make a decision about the environmental record of any given country. We would need our Government to provide a lead on that, but we certainly wish to be part of a good corporate citizen type approach to these things. I'm not sure if I've fully answered your question, but I don't know that it's an individual industry's sole responsibility to determine whether a foreign government is a good country to trade with or not.

35 MS BARRY-PICENO: Thank you.

40 CHAIR: Thank you. This seems like a natural place to have a break, our 15-minute break, so by my clock, let's allow an extra minute to 10.55 am. There you go. In terms, you will note from the agenda that we have questions from after morning tea until 11.35 am obviously with the questions being combined into the submissions, we'll go to 11.35 am with the remainder of your witnesses, Mr Slyfield.

45 MR SLYFIELD: Yes, I acknowledge that, Mr Chair. We're obviously taking a bit longer to get through the list. We've had Mr Hammond and he's the first on the list. We'll try and speed things up so that we can get what you need to hear heard before our time runs out, but I will signal that that's going

to be a significant challenge to get through in the remaining time available. That's all I can say at this point in time. Let's see where we get to by 11.35 am.

5 [10.40 am]

CHAIR: Thank you. Let's make it 10.56 am we'll reconvene after a cup of coffee, so I would suggest turning our videos and sounds off so we can do that in a bit of privacy. Kia ora.

10 **ADJOURNED** [10.40 am]

RESUMED [10.55 am]

15 CHAIR: Tēnā koutou, welcome back. Just before we go to your next witness, Mr Slyfield, my colleagues pointed out to me that I specifically asked if there were any questions from EPA staff, so I will do that now in relation to your previous two -- or yourself and Mr Hammond. So, I'll just ask if the EPA staff have any questions they would like to ask.

20 MR BAILEY: Not at this stage.

CHAIR: Okay, wonderful. Let's move into your next submitter. Thank you.

25 APPLICANT PRESENTATION

DR JACK ARMSTRONG PRESENTING

30 MR SLYFIELD: Thank you, Chair, members of the Committee. The next witness is Dr Armstrong and you have from him a statement of evidence dated 27 July. I'll just get him to confirm the contents of that and then take you through his highlights.

35 DR ARMSTRONG: Kia ora koutou. For almost 40 years I was with the US Department of Agriculture before retiring from my research etymologist and research position at the US Pacific Basin Agricultural Research Centre in Hilo, Hawaii. Throughout my career, I was involved with the control of insect pests of dry-stored products during storage and of quarantine pests in tropical and temperate fruits for export. One of the important treatment technologies I used was fumigation, many different fumigants, but many of my publications report the results of methyl bromide fumigation at low, ambient and high temperatures.

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45 I established Quarantine Scientific Limited in New Zealand where I permanently emigrated almost ten years ago. During that time, I have been providing specialist scientific advice to a range of clients, including Government agencies, CRIs and industries.

At STIMBR's request, I carried out a comprehensive review in September 2017 that considered all available methyl bromide recapture and/or destruction systems and their potential use on log stacks. I updated that review in June 2019 to incorporate any advances in recapture technology and their potential efficacy for application to log stacks. The review included a range of potential methyl bromide destruction technologies spanning plasma arc, ozone treatment, chemical-based scrubbing systems, recapture technologies using activated carbon, and combined recapture and destruction technologies using both activated carbon and a scrubbing material. Many of the claims made about the technologies were based on desktop concepts, laboratory experiments or current recapture equipment used for closed systems with low moisture content, such as fumigation chambers in shipping containers.

My review found that with one exception all of the technologies were either not technically or economically feasible, were not amenable to port operations, were not transferable from the recapture of methyl bromide from container fumigation to log stack fumigations, or had a combination of these issues. The exception was the New Zealand company Genera, which had an ongoing methyl bromide recapture research and development programme specific to log fumigations that included the purchase and testing of commercial methyl bromide recapture systems from overseas purveyors and development of their own recapture equipment using a proprietary scrubbing compound.

[11.00 am]

My review further determined that no commercially available methyl bromide recapture equipment, including any of the equipment developed by Genera, would be capable of removing methyl bromide from a log stack down to the level of five parts per million or anything close to that level. Even the Genera equipment has a variable recapture rate, which I understand is of 30 per cent to 80 per cent of the methyl bromide remaining in the log stack after fumigation.

The removal of methyl bromide from a log stack is an extremely complex system, with many variables that include stack size, moisture content, (inaudible) from the logs, temperatures, atmospheric changes within the log stack caused by log respiration, and the amount of bark that remains on the logs after they've been harvested. It is this complexity that continues to impede the development of a viable and efficacious methyl bromide recapture technology. Thank you.

QUESTIONS

CHAIR: Thank you, Dr Armstrong. Dr Belton?

- 5 DR BELTON: Thanks, Dr Armstrong. So, that final point there and the variability of results, so many variables and 30 per cent to 80 per cent range. If we can set up quality systems that control some of those variables, can we get a narrower range of performance expected, improved, higher performance than 30 per cent?
- 10 DR ARMSTRONG: Yes, based on adequate amount of research. You have to be able to understand each one of those variables, their ranges and how they interact within the environment of a log stack to be able to determine how your recapture systems are going to work if you're ever going to get them to work in a uniform manner.
- 15 DR BELTON: So just taking that a little further, say we introduce and permit this recapture proposal that's in front of us and we have Genera doing that around the ports. They're not likely to carry on the level of research and the operating environment that may be needed to improve the understanding and performance of the system, are they? Or are they?
- 20 DR ARMSTRONG: I couldn't speak to that. You would have to ask someone like Genera to see what their capability is. I can't answer that. All as I can tell you is the kind of research that would be required.
- 25 DR BELTON: Okay. Well, taking another direction, are you aware of other research institutes that could advance the research required to get operationally improved performance of recapture? Where would we go with that? We've invested a lot of money already but ...
- 30 DR ARMSTRONG: Well, I was with the Agricultural Research Service in the United States Department of Agriculture and that, sir, was the gold standard. So, they would be my first choice, but you have excellent Crown research institutes here in New Zealand that for the past ten years have produced world-first research on a number of issues, including a great deal of research on methyl bromide desorption from logs. They have done all of the research that culminated in the ethylene dibromide application.
- 35 I would hand it over to them and say, "This work needs to be done". But remember, it takes time and it takes funding.
- 40 DR BELTON: Okay, thank you very much. Thanks, Tipene, that's it for me.
- CHAIR: Dr Phillips?
- [11.05 am]**
- 45 DR PHILLIPS: Thank you, Dr Armstrong. So, I just wanted to pick up on some comments you made or some statistic fractions that you had in your evidence. So, I'm talking about paragraph 42. You're reporting on the recapture efficiencies for different log stack sizes and you talk about Genera reporting to STIMBR that they can get 30 per cent to

5 50 per cent recapture for what you call large-scale fumigations. That is greater than 1,000 JAS, and then 50 per cent to 60 per cent for medium-sized stacks, so that's 600 to 800 JAS, and then around 80 per cent for small log stacks, which are around 200 to 400 JAS. So that's where that range comes in, I understand that.

10 So, I guess my question to you would be: in your opinion could we then, instead of setting a minimum recapture standard, you could actually set up a range of standards based on something as simple as log stack size?

15 DR ARMSTRONG: Not until you understand what is going on within the environment in that log stack. That is first and foremost the need for research, but also that information, which was new information in 2019, was given to me based on the reports by Hall et al and by a person at Genera, which you would have to discuss it with them. That was the first research that they looked at using their new proprietary equipment. At that point, I finished my report for STIMBR and I have not been back to discuss this with them since.

20 DR PHILLIPS: Sure, yes. No, I was not suggesting that that was in any way your data. I was just reading off your evidence to give the context for my question.

25 DR ARMSTRONG: My job is to present.

30 DR PHILLIPS: Yes, because just picking up a bit on Dr Belton's point around we understand from what you've said that there's considerable variability in the effectiveness of the methyl bromide based on a whole bunch of different characteristics, most of which probably we don't have a lot of control over or have an understanding of how they control, but it seems to me that having a blanket single number recapture target, if you like, or rate or whatever may not necessarily reflect the potential - what's the word for it - opportunity is not the right word, but the recapture rates that can potentially be achieved based on the data that has been gathered so far. Maybe there is more flexibility there than perhaps a single number that's currently being proposed, either the 80 per cent or the 30 per cent or a single number in between, but perhaps a range. I don't know, that wasn't so much of a question, sorry, it was a long convoluted question.

40 DR ARMSTRONG: No, that's very good and I can answer that. Again, based on research, what you know you will be able to control. It would be my opinion that research, over time, would allow any recapture technology to be able to be improved.

45 DR PHILLIPS: Yes, and that's picking up a bit on what Mr Hammond was saying before. I guess the next question for me is in the whole equation of the efficacy of a particular level of fumigation, how much of a driver is the

size of the log stack versus, for example, the number of pipes that are underneath the tarp? I'm just thinking how much of a driver is log stack size alone in determining the effectiveness of the recapture?

5 DR ARMSTRONG: I would suspect that the size of the log stack plays an important role because the larger the log stack, the more changes within the environment within the log stack, the more respiration that is going on, and so therefore understanding the size of the log stacks would be important as you gain understanding of the different factors involved.

10 DR PHILLIPS: Thank you very much. That was very useful, thanks. No further questions.

[11.10 am]

15 CHAIR: Thank you, Dr Armstrong. No questions from me. EPA team, do you have any questions?

20 MR BAILEY: Dr Phillips, I had a similar question that she started with, but maybe taking it on a step, with those three ranges of log stacks, what's the practicability of those log stacks, particularly medium and small stacks, being used on-port to be able to get those higher recapture rates?

25 DR ARMSTRONG: That would be a question you would have to ask Genera.

CHAIR: Any further questions?

MR DEEBLE: No, sir. Thank you.

30 CHAIR: Okay, thank you. Any other submitters have any questions for Dr Armstrong?

MR WEISS: Yes, Mr Chair, I have a question, if I may.

35 CHAIR: Sure.

40 MR WEISS: It's Sam Weiss, Bay of Plenty Regional Council. Dr Armstrong, it's clear that there's a lot of variables when it comes to how efficiently recapture can be carried out and some of the ones you've mentioned are log size, moisture content, temperature. I wonder if, based on your understanding of the trials that have been carried out, you might also comment on the significance of two other factors that haven't been mentioned, notably the freshness of the scrubbing solution that's used for recapture and also the time or the duration that the recapture period is actually carried out for, because from my observation, those two latter factors are hugely significant and significant also because those are two factors that can be actively controlled more so than the other factors.

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DR ARMSTRONG: Yes, I would have to pass you on to Genera to answer those questions.

CHAIR: Anything further, Mr Weiss?

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MR WEISS: No, that's it for now, thank you.

CHAIR: Thank you. Ms Smith. It's Nicole Smith.

10 MS SMITH: Kia ora. Yes, it's Nicole Smith here. I'm just looking, Dr Armstrong, at paragraph 39(h) of your report and that's commenting on the Nordiko system. From what I can see there, there are two reasons why you discount that system: (1) that you haven't seen efficacy data; and (2) you have a question as to whether it could be done on a larger scale. If
15 both of those questions were answered in a way that satisfied you, would you then say that you couldn't necessarily discount that system as being an option?

20 DR ARMSTRONG: I will say this for any purveyor of recapture and/or extraction equipment for methyl bromide: if they are able to show valid data and then prove under efficacy testing in a commercial situation that they can remove methyl bromide to a level that they say they do, then of course, I'm a scientist, show me the data.

25 MS SMITH: Okay, thank you.

CHAIR: Thank you. Any further questions? It looks like we're done there with Dr Armstrong.

30 MR SLYFIELD: Thank you, Mr Chair. That brings us to the next witness for STIMBR, who is Mr David Sullivan, who's online with us from the United States. Dr Sullivan has signalled in advance that he has a PowerPoint presentation that is perhaps the best way to communicate his highlights of his evidence and so I'll hand over to Dr Sullivan and hopefully this
35 technology can be made to work.

[11.15 am]

APPLICANT PRESENTATION

40

DAVID SULLIVAN PRESENTING

DR SULLIVAN: Yes, thank you, Mr Slyfield. Let me see if I can show my screen and find the PowerPoint. Thank you. Can everyone hear me okay?

45

CHAIR: Yes, we can, thank you.

DR SULLIVAN: Great, very good. I should introduce myself first, which I didn't do in the beginning. I'm a certified consulting meteorologist and I've been practising for 45 years. Our firm has been in business 32 years, the last 22 of which was specialised in air quality impacts and fumigation. Much of that work - almost all of that work - has been in agricultural fumigation, which involves model development as well as we've conducted over 50 field trials, evaluating emission rates from these fumigation sources.

Also on the line are two of my three other people that worked on this project, Dennis Hlinka, also a certified consulting meteorologist, he has 43 years of experience, most in applied modelling, and Mark Holdsworth has about 22 years of experience in environmental engineering. These folks are heavily involved in our projects here as well.

I want to go over these topics in the 30 minutes that I've been allocated. First I want to talk about the error that TAS, Dr Todoroski, identified and discuss that first, because that provides context for the rest, but I also want to go through these other topics, which I won't mention one at a time now, but this is the thrust of what I'd like to go through to give more of a big picture idea of why it's important to do the type of modelling that we have done for intermittent sources such as this.

So let's talk about the fundamental error that was alleged to have occurred by Dr Todoroski. We agree there was an error in one of the (inaudible) terms in the Fortune(?) programme or one of the Fortune programmes. I agree with that completely. We appreciate the fact that he identified that and it's been corrected, but I do not disagree with the conclusion that it was a fundamental error. Basically it was a rare error in the raw data. It had an insignificant effect on the reported tables, figures and conclusions. I won't go into that today because of the time, but on rebuttal, I will.

In terms of the example that they used around 2I(?), that was a test run. That was not part of our report. That was a test run that was done and had special circumstance. We agree that that max was not found, but that didn't affect the report at all.

There were a small number of locations among the thousands of receptors that were processed in the model. It generally shifted only the 100th percentile values to the next receptor. For that reason, it didn't really change the results of the plots or too much of anything else in general. It changed a few numbers in two of the tables, which I'll show.

The issue had no effect on the large 3-kilometre grid that we were in. It didn't affect any of the deterministic modelling at all. That particular

programme was not even used for those particular runs. So, in short, there was an error, it was a very small error in terms of the big picture. It's been corrected and those two tables have been fixed and are now included in the package you received yesterday.

5

Let's talk about the objectives of the modelling. It's quite important to take into account the fact that the methodology requirements do have these three points, (a), (b) and (c): the nature of the adverse effects, the probability of occurrence and the magnitude of each adverse effect. I found a combination of those two terms.

10

The probability of occurrence in magnitude for the operation of this port, which is an extremely intermittent source, with sources all over the place. The only way to really do that well or even at all is based on probabilistic modelling. I'll describe the reasons why as we go through this presentation. It requires a distribution of exposures from the smallest to the medium to the largest. Without that, this particular item B(?) cannot be met. It can't be met with what's called traditional modelling, which we call deterministic modelling, as I'll describe a little further.

15

20

The intent of the modelling that I've conducted at our firm had the objective of conservatively representing each input. I'll give you one exception but let's say (several inaudible words) input that we had we endeavoured to put it so that it would be overstating not understating. So if we had five log-stack groups, we used the highest value in each of those groups. For the terms of the worker exposure, we used a person stood downwind for the whole eight-hour shift.

25

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[11.20 am]

So we had a number of steps like that, including the fact that our annual mass loading that we used in the model overstated the actual mass that it released because of the other conservative assumptions. So we did every step that we could to make this modelling conservative.

35

There are two options, basically, to do modelling: probabilistic or deterministic. There are other variations but in terms of this discussion let's focus on these two. Probabilistic means that we're going to in this case set the emission rates in the model, which sources turn on and off, based upon port operational characteristics, based on probability.

40

Deterministic modelling can replicate a person or day or a certain hour or it can represent a whole year and by assuming, if you don't know the characteristics, say it's at maximum all the time. A deterministic approach, the limitation of it for this type of source, it cannot give you the full picture, the full range of distributions that are required.

45

5 Most modellers (several inaudible words) deterministic modelling. Here's an example of a smoke stack industry where they emit the same all year around, pretty much. You can put that into your model and get results and just vary the meteorology and have an answer. But here's the Port of Tauranga. It's nothing like this. We have ships that come in and can fumigate. We have location 1 which does a lot of fumigation but there's other fumigation areas as well. On a particular day there might be a large log stack going on at location 1. There might be other log stacks going on at other locations. Either you turn it on all the time and overstate or you consider the probabilities. You turn on the emission rates according to those probabilities. That's all that Monte Carlo in this case is doing, turning on and off the sources as they actually would be on a long-term basis as would tend to be done in terms of probability.

10
15 So what we did is we set the emissions from the various sources as a function of time of day, season, location area within the port and among the various size of log-stack categories and we could the frequency in for the ships. Based on the 2019 port operational characteristics we replicated that. We modelled 24 years of port operations using those characteristics so we could identify those times when we had overlap, when there were ship sources that might be impacting a large log stack as well. So we were able to, with that approach, come up with a distribution that's quite stable and it provides the distribution needed for this type of event.

20
25 This type of methodology -- we first developed this in the US on a study of this particular Union Carbide facility in West Virginia, because there were so many different batch operations from this particular type of source, they were intermittent. They might turn on once a year or three times a year. They couldn't assume that it was always operating. We developed in late 1980s a programme that would do a Monte Carlo for addressing that type of batch intermittent process.

30
35 Fumigation has the same problem, and this is an example of (inaudible) fumigation for agriculture, centreline pivot applications. These may happen once a year or once in every three years on a field. In order to come up with a reasonable distribution of exposures, you have to consider those probabilities, much like the example from the chemical plant. When it starts up a certain sequence of events will occur and then it stops and you can get your distributions based upon actual real data and actual real probabilities rather than assuming that it's constant all the time, which will tend to dramatically overstate relative to any measurements you might want to take.

40
45 We come to the most significant and most representative example of this type of intermittent source, of course is log fumigation, which we're showing you in a picture here. That's the subject of today's talk.

5 Nearly all modelling, as I said, is done by assuming that emission is a steady state. They vary by time of day, by season, but not intermittently. The (inaudible) itself gives you a way to address that problem, but let's say you take a ten-log log stack and you assume that that's emitting all year long (several inaudible words) distribution. That tells you an overstated value but it doesn't even consider the fact there could overlap in other sources. It could be from ships or it could be from other log stacks. It gives you an inflated answer but it's not even complete in that sense. The Monte Carlo approach can overcome that limitation and, for an intermittent source like this, give you realistic distributions that will describe those concentrations at the port boundary and within that port boundary.

15 **[11.25 am]**

20 I do want to make the case here that the methods we're using here is not something we developed for this project. It has been developed in a history over the last 25 years through the US EPA, work we've done there. I'll go right to the step of down in the 1990s we took the work we did in West Virginia and we built the model for US EPA called TOXST. In TOXST we'd be able to do this intermittent distribution approach.

25 We then developed a fumigant version of that and presented that to the US EPA Science Advisory Panel over two days of hearings. That panel determined that that model was acceptable to identify distributions of exposures in fumigation applications. So what we brought to the Port to Tauranga was vetted methodology. The testing methodology has been approved.

30 The other point that I wanted to make sure upfront that comes across is when we talk about 99.9th percentile or 98th percentile. These percentiles are not all the same. By default, a distribution of concentration is what happens at any location such as a port boundary, what happens over the course of a year at that location. That's a distribution. That would include a lot of zeros because much of the time there's nothing happening at a particular point. There would be a lot of zeros in there and then some numbers when there are impacts occurring. That's a real distribution based upon default methods.

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40 For this modelling here we didn't do that. We were more conservative. We only used those hours when there was non-zero impact. All the distributions are based upon only those times when there are impacts, which tends to make the modelling much more conservative. So as an example, the 99.5th percentile that we showed in our plots, using eight hours as an example, would be equivalent to 99.99th percentile for all hours at that location. So our goal again was to be conservative.

5 The only area that I think was identified by one of the reviewers or maybe two was on the volumes for (inaudible). These stacks were treated as volumes. For the testing we've done we were about 10 per cent unconservative. Having considered the whole emphasis on overstating every other aspect, I'm confident that we are definitely on the conservative side as well. Plus, if we had gone the route of making many, many small sources, the runtimes would increase by a factor of 24. So we had good reasons for going the route we did.

10 Just to show an example of this, this is an example of a distribution only for non-zero hours. I'm just pulling off the 99.5 percentile. In this example there's a 5.1 ppm. But if I go to all hours, 5.3 ppms would be approximately the 99.99th percentile. So we talk about percentiles and that is what the basis for it is and our basis is highly conservative. There's the example here where the 99.5 for the non-zero would be equivalent to 99.99 if we put all the non to if we did not.

15 So let's go through and show a summary of the far-field modelling results. I want to start by showing this first line here. This is to compare to the measured data distributions. These distributions here shown in this first line is only for those hours that had the first hour of emissions. That simulates what occurs when you do the sampling of the report, whether it be TVOC or whether it be from methyl bromide. That takes sampling in the first hour. That's what just replicates it. We show 99.9 of 1.35 ppm -- I'm sorry, 3.94 ppm. And 99.9 of 1.35.

20 These other values here are based upon only those hours when we had quantifiable emissions, non-zero emissions. We're showing a range of different percent control values. What you tend to see here is there aren't a lot of differences in the extreme values, the 99.99th percentile don't change much by control because that's affected mostly by those hours that don't have control. But this also shows -- there's four examples here of the 99.99th percentile where the numbers changed based upon the error that was identified, so this being the second highest value, 24-hour value, to the highest value. They rounded up is what occurred in each of those cases. But I will say that in terms of the significance of the error, it didn't affect the conclusions and had a very minor effect on a small number of values just in these two tables.

40 **[11.30 am]**

45 Near-field results similar, and this is showing the maximum values. This particular table here doesn't show the -- there are a few cross-outs in here. I'm sorry, deterministic had no changes and we're showing numbers from 10 to 90 metres, the highest and second highest. This highest is the highest concentration over the period of three years. It's 100th percentile. As I've mentioned in my expert statement, 100th percentile and extreme percentiles are well known to modellers as

having outlier issues. They're not generally considered credible. The second high is a little bit better but not by much. In my expert statement, I do provide references on an international basis that do show that to be the case.

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So this is based on deterministic methods, assuming that every hour of the whole day of operations at the worst case the industry has all day long. These are inflated values. These would not occur in the real world like that.

10

This is showing the changes due to the error in the programme that was then corrected. You'll see at the upper level there's no changes at all and you find that in the lower values there's a few changes here and there where the shift from receptor to receptor caused some differences, but in the big picture it doesn't change the conclusions. In this example here, by 50 metres the value is within approximately the 5 ppm level and by 90 they are lower than that. With or without these minor changes doesn't affect those conclusions in any way.

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Now, this is just going over some of the ways that it was conservative. In the examples from the results I just showed the deterministic eight-hour worker exposure. Again, we assume the highest one-hour value occurred all day long. Of course, that's unrealistic. We also assumed that the worker stayed directly downwind at set distance for the full eight-hour shift. That's not how it works as usual. We simplified the number of sub-sources I mentioned. That went a little bit the other way, round about 10 per cent issue, which is minor compared to these others.

25

30

So, in the bottom line all these points act to overstate those worker exposures with that one exception and none of this modelling takes any credit for respirator use. I don't know what the accepted terminology is in New Zealand, but in the US respirator use for fitted respirators is generally considered to be 98 per cent effective.

35

So, one of the important statements in the expert statement that the expert panel put together was this statement that we should use monitoring data to inform model performance. That was in the 30 January 2020 expert statement. I think it's an important thing to do. If you were going to compare models, it doesn't matter how one model compares to another. What matters is which model is most realistically representing distributions and is realistic in terms of the actual measured data.

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So, in terms of monitoring at the port there's multiple years of total volatile organic carbon dated where whenever there is a venting operation they have three monitors set up downwind approximately at the boundary and they take the first hour, one-hour methyl bromide

5 sample. There's also some methyl bromide specific data paired with these TVOC numbers that are useful as well, the direct data. There's some uncertainties at the very high values, which I'll show in a minute, but these data are very useful and important. I'm going to assume for the sake of argument that all the methyl bromide data are accurate and accept that as a given to be conservative.

10 The question is how well do the one-hour data that we modelled at the boundary match up with the comparable measured methyl bromide data. That is where the rubber meets the road in distributions, and this is the bottom line of that. In the blue it's showing the total VOC data over these various period data points, and then in the brown it's showing the methyl bromide component of TVOC. Methyl bromide should be lower than the total VOC; it is the VOC. In these two
15 examples here in the Golder dataset, this 2.2 and 2.3 at the boundary are higher, about double the TVOC. That's not been identified why. Although let's assume for the sake of argument that it's correct, the 99.9th percentile value we modelled was this green line down here and the 99.99th 3.9 ppm, so in a range of 1.35 to 4.94 it's in range of these
20 values. It's on the high side as we intended.

[11.35 am]

25 This is an example of the 2019, each one of the maximum measured concentration of TVOC for each venting event that occurred that year. You see a maximum of 1.6 ppm. We have a 1.1 ppm. Pretty much everything is less than 1 ppm for total volatile organic carbon, so in that sense, yes, the modelling we've done is conservative relative to that data as well.

30 In terms of recommendations, our recommendation is in order to meet the Methodology Order it's important that probabilistic methods be used to take into account probability versus magnitude. That isn't to say there isn't utility in review of deterministic modelling; there is.
35 Reviewing specific days that way is very useful and it's been done by other modellers here. Looking at the maximum possible emission in concentration situations has also been done and provides a useful upper bound. But in terms of meeting the need for management and probability, the probabilistic Monte Carlo data is the only way to really
40 show those distributions that are needed to do that.

45 In my judgement, if the trading partners agree, reducing the maximum rate, the 40 grams per cubic metre, should be done to further reduce concentration substantially and would be a good goal. I would also recommend continuing with good application practices, which means removing tarps going into the wind to minimise the potential that the crew is exposed to high down-level values.

5 Finally, in terms of the utility of the Tauranga modelling for the ports, I have only seen the Tauranga/Northport/Napier myself, but for those ports in my judgement Tauranga would be a reasonable conservative representation of concentrations there, assuming that the boundary, because of the distance factors and orientation of those other ports, would make Tauranga a more conservative representation.

With that, I will stop there for questions.

10 QUESTIONS

CHAIR: Thank you. Dr Phillips?

15 DR PHILLIPS: Thank you, Dr Sullivan. Would you mind going back to your slide 27? I just wanted to make sure that I understood this graph because the title of the graph says "Paired Measured and Modelled TVOC in MB". So, I thought that was comparing it to measured, paired measured.

20 DR SULLIVAN: Let me go back there, I'm sorry. Let's see.

DR PHILLIPS: No, that's right, that's correct, that graph there. So are those data points measured or modelled?

25 DR SULLIVAN: These data points are all measured data points. I'm showing the 99.9th percentile modelled distribution value versus the 99.99th percentile modelled value. I'm just showing the distribution that exists with paired measured data in comparison to the range that we have at the upper end of our modelling.

30 DR PHILLIPS: Okay. I thought what you were presenting was some sort of validation of your model, but clearly that's not what this is.

DR SULLIVAN: It would be very nice if the model matched just like this, I agree.

35 DR PHILLIPS: Yes. I saw it and I thought, "Well, that's pretty good".

40 DR SULLIVAN: Yes, that's not going to happen. Basically, these type of models, all dispersion models, do not do very well paired in time and space. So if I wanted to predict at a particular day and hour and location, it doesn't work very well, but over distribution, over the course of a whole year, for example, or in this case over this distribution, they do pretty well.

45 DR PHILLIPS: Yes, that's fine. So I guess the only real question I had for you was as you're aware there has been a fair bit of modelling done and you've had your expert conferencing and there's some agreement, some disagreement. There's been further work done. There's been reviews and then the EPA has taken an approach of reading across multiple models. So I was really interested in from the DMC's perspective we

5 have to draw some conclusions from all of this modelling and also make some decisions about what we think is acceptable and not acceptable in terms of how we use it in our decision-making process. I guess I'm interested in your perspective. How do we navigate through all of these models to come up with an answer that, I don't know, is robust, I guess? Are you just going to say, "Well, you should just use my model" or what do you think?

[11.40 am]

10 DR SULLIVAN: No, I'm not going to say just use my model. I think what you should do is look at the measured data, which I will show you in rebuttal. Compare the measured data across the different models and determine which modelling approach is realistic relative to measured data and which approach would provide the methodology requirements that shows the magnitude and probability of various concentrations. Select that model, which I would say in my own humble opinion would be this model that's showing here because our modelling is in the right ballpark. Other modelling is high. Not all modelling, some modelling is just looking at certain days and looking at certain hours and those distributions look pretty good. I'm not criticising that. The Todoroski modelling, I'm not criticising that either but that modelling was aimed at doing upper-bound assessment and it did it properly, but that modelling is overstating the measurements, and I'll show that in rebuttal. It would not provide a firm basis for decision making that requires magnitude of probability to be considered.

25 DR PHILLIPS: Sure. So just picking up on your point, and I know it's going to be in your rebuttal, it sounds to me like that's going to be essentially your validation, is that correct, of your model that you're presenting in rebuttal?

30 DR SULLIVAN: Yes. I don't have time or opportunity now to do so but I will make comparisons in rebuttal to the rebuttal in answer to your question. I think we're very clear how to interpret all the models.

35 DR PHILLIPS: Because another question is how big a deal is it, the differences between the models? How important is it? Models have different input parameters, they have different ways of doing things. You have used different models. If we look at what is the purpose of the modelling, one of them is to come up with buffer zones or distances to achieve TELs. How important are the different models? Carry on, sorry.

40 DR SULLIVAN: It's very important, but again, I think the key point to your decision-making is it is not important to compare one model to the other. Again, if you have a model that's showing you need a buffer zone of a kilometre and you look at the boundary and you look at the data I'm showing here, it doesn't need a kilometre. The measured data doesn't

support that. If we put these models on a level playing field all to that kind of benchmark, I think your decision-making will be quite easy.

5 DR PHILLIPS: Do you believe that we have enough measured data to capture the range of possible scenarios obviously in terms of wind and weather and position on the port and all that sort of thing? Is it sufficient?

10 DR SULLIVAN: You do, because what we've done is taken the three years of meteorology that were available. We're modelling that 8 times to create a distribution based upon 24 years of port operation, so all the alignment of the worst-case realistic things that will happen, they're in our model. Some time when the ship is venting, when you have a situation with the large log stack, we're covering those events, but we're also showing the probability of how often that occurs. It might be a
15 once every 24-year occurrence, but it's showing that level of detail in the analysis.

20 I think you do have enough. There was a question raised, "Why didn't you model every single scenario in the deterministic modelling?" Those ones took a long time and, more importantly, that the differences in the highest value across the three years is hardly anything because if I have 45 per cent control versus 60 per cent control or any per cent control, the highest that each year is going to be when you don't have control. So though we can now show those numbers, it makes little
25 difference. I think you do have enough information to make a decision and I'll show that on rebuttal.

DR PHILLIPS: Thank you very much. No more questions.

30 CHAIR: Dr Belton.

DR BELTON: Thanks, Tipene. Yes, Dr Sullivan, so we're going to hear quite a lot in the rebuttal. I guess my question then is going forward with whatever we agree on, what are the opportunities realistically to validate
35 expected performance with the ongoing operations there?

[11.45 am]

40 DR SULLIVAN: I think that the more data that's being collected, if that's the case, if there's more data than we had available to us, further validation could be done. I don't think it would change the situation a lot. There's a fair amount of data already, but I think that could be done if more data is available.

45 DR BELTON: Yes. There will be some sort of monitoring, inevitably, and I'm just wondering how realistic it is to use that on an ongoing basis at relatively limited cost to be sure that what we think is happening is happening.

- 5 DR SULLIVAN: That's an excellent point. I think that there's issues in this dataset. I'm not particularly happy with the relationship between total volatile organics and methyl bromide extraction when you're seeing two to one differences like this. I think that method validation is needed to get the measured data tighter and I agree, getting more methyl bromide-specific information and accurate information would be a good way to confirm that what you approve is actually occurring and give you a checkpoint going down the road.
- 10 DR BELTON: All right, thank you very much. Thanks, Tipene. That's me.
- 15 CHAIR: Just as a process question or statement, if you could ensure that your presentation is forwarded to the EPA team so it can be posted for everybody, that would be great.
- 20 Just a question for you, I'm really just asking to refresh my memory, there's been a bit of discussion across a number of people/experts in terms of what scenarios were not modelled, like your expert conferencing determined a number of scenarios but then you chose not to model some of those scenarios, if memory served. Could you explain why some of those scenarios weren't modelled?
- 25 DR SULLIVAN: In terms of the deterministic modelling, we did not model every one of those for two reasons: (1) the length of time for those model runs was excessive; and (2) the odds of getting different results for different control percentages was very small. We will show results in rebuttal that it really makes no difference at the highest and second highest.
- 30 In terms of the others, in terms of the far field analysis we did, the probabilistic analysis, we ran a pretty good range, but in the interests of time we didn't run every single one. At the upper percentiles though, if you look at the data, it doesn't make much difference, again because if you're controlling let's say 80 per cent, it's the 20 per cent you aren't controlling that's going to tend to give you the highest 100th percentile, 99.99, 99.9, and there's not a lot of differences in there. They certainly could be run. There's no reason why they cannot be, but to meet the schedule for this one, we couldn't run every single one.
- 35
- 40 CHAIR: Thank you. That's all the questions from me. EPA team, questions?
- 45 MR BAILEY: I have one and I know our expert has a couple as well. The use of methyl bromide to fumigate under sheets and tarps happens a lot more regularly than those in ship holds, but those in ship holds obviously use a lot more methyl bromide in each instance than each individual log stack. If we were to provide evidence to the DMC, how could we distinguish from your modelling the impact from the log stacks with those from the ship holds?

5 DR SULLIVAN: We do have ship hold only and the ship hold only analysis. We don't have the log stack only analysis in there. It does include ships, but because log stacks tend to dominate because of the greater frequency and greater alignment of worst-case meteorology with the more frequent applications.

10 MR BAILEY: Another thing you mentioned about probability, but also uncertainty and caution that as a regulator we have to keep in mind, what would happen if a log stack coincided towards more extreme weather conditions? Is that considered? Sorry, not log stack, ship hold.

15 DR SULLIVAN: Yes. We ran 24 years of analysis, so there's a certain probability of a ship venting and we ran that 24 years and we have the 24-year occurrence, the highest value.

[11.50 am]

20 The 100 percentile would be the 24-year occurrence and we have that number. If there's concern, it could be run for 100 years, one scenario like that could be run longer, but that's how you would do it, you'd run more simulated years to get a lot longer occurrence interval value on the model.

25 MR BAILEY: The EPA does not have any, but Mr Wilson, as the Chair, you're happy for us to pass over to Aleks Todoroski to ask some questions he had raised?

CHAIR: Sure, thank you.

30 DR TODOROSKI: I didn't see the information that showed the ship alone, but in that vein, one of my questions is the 2020 modelling shows both ships and logs combined statistically and then the 98 percentile has been taken. Can you comment on when you take a 98 percentile of two fairly dissimilar events, the ships having much higher rates of emissions versus the logs, what tendency is there to remove quite a large percentage of the larger ship data from that analysis?

40 DR SULLIVAN: We do have a run that's ships only that I will present on rebuttal, so I can show that to you. I think the important issue is the ship does vent, it's venting a lot of methyl bromide, no question. In our modelling, ideally we'd do it one hatch per hour, one hatch every two hours and so when you compare one hatch every two hours or even one hour with a large log stack, then the ship doesn't look quite so big anymore.

45 The other issue is with the ships, if you have six ships per year the probability of that ship having an alignment with the worst-case meteorology is much lower, and so like the 24-year recurrence interval, that's what we have now. But if we needed to, for closure, we could

certainly run more years and create a lot longer period and show a longer recurrence interval, simulating more years of operation or you add two more years of meteorology into it that way. So there's a couple of ways it could be done.

5

DR TODOROSKI: I guess moving on, in the vein of that response, there have been 24 years modelled or 8 sets of 3 years, and my understanding is in each of those we have 6 ship venting events. That would be a total of 118 ship-venting events in the 24 years that are modelled. What certainty can you provide of the many, many thousands of other hours in which those ship events could occur that there wouldn't be worse weather conditions than the ones you've modelled the ships in?

10

15

DR SULLIVAN: I think, as I mentioned before, if you want to assess this probabilistically, which I think needs to be done in order to meet your requirements, then to answer your question, it would be ideal to have two more years of meteorology processed and then to do a 100-year run, just run it to get -- actually, 96 years of data and that would give you your answer. You'd have to consider, and the Committee would want to consider, the recurrence interval of that evidence. If it happens once every 100 years versus once every 24 years versus every week, it's a very different situation. But that falls right out of the model. That can be done. Things like that where there's questions still remaining and what if a different run could be done, that could be decided and that could be done. You know, there's issues and if a certain scenario wants to be run, run the scenario. That would be my recommendation.

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DR TODOROSKI: My next question is relating also to that plot with the monitoring data and the two green lines with the modelling. I can still see that on my screen, I don't know if the others can. I have two questions in this. One is a fairly fundamental one. What was being monitored? Is that logs or ships? Do those modelling results relate to logs and ships or logs alone? What's the comparison?

30

[11.55 am]

40

DR SULLIVAN: I don't identify on this particular plot which of those would be associated with ships. I believe there are some dots that are ship pairs. They could be identified. Obviously I don't recall off the top of my head which ones were.

45

DR TODOROSKI: All right. The secondary question to that is perhaps one that maybe will need an answer later. It may not be a fair question without notice or something like that. With the data there, the TVOC and the methyl bromide data, we're seeing sections where it's pretty much one to one, we're seeing sections where the TVOC is many times higher than the methyl bromide, and vice versa. The quality of the data is, I guess,

being questioned here. Can you comment further on that or can anything more on that be provided at some time?

5 DR SULLIVAN: I agree, Aleks. I mean, basically the TVOC data is more than once. I'm showing slide 28 now where there's 323 days where they monitored directly downwind and at 245 angles with the boundary. They come up with a range of numbers and the highest number is 1.6. When you talk to the manufacturer of that particular PID unit, they say plus or minus 5 per cent. Do I believe that in practice? Not really, but I don't think it's out by a factor of two. But then you look at the data on page 10 27. The only time that this issue occurs where the methyl bromide is enormously high compared to the total VOC is on these two days. I think to be conservative and safe, we assume those are right. But am I confident they're right? I'm not. I think that the quality of this data going forward should be improved so that the decisions are made on 15 buffer zones there can be confidence to the Committee that they're meeting the goals. When you have questions like this it's harder to do this so we're going to err on the side of conservatism and say that they're right, but I don't know if they are. I've asked that question a number of 20 times, Aleks, and so far I haven't had an explanation yet for why that occurred.

25 DR TODOROSKI: I did preface that this may not really be a fair question but I think it just lets us understand what we're dealing with.

DR SULLIVAN: It's a good question, no question about it.

DR TODOROSKI: Thank you.

30 CHAIR: That's all from the EPA team? Okay, thank you.

DR TODOROSKI: Yes, I think that's what we have for now.

35 CHAIR: In terms of people who raised their hand, Mr Weiss, you had a question?

40 MR WEISS: Just a question for Dr Sullivan. I see in his latest report in table 1-4 and 1-8 where he presents the results of the modelling from the ship ventilation, in table 1-4 it relates to two-hour venting, and both tables 1-4 and 1-8 talk about a one-hour concentration that's presented. I just wondered if there was any analysis or reporting on the predicted one-hour concentration rather than an eight-hour concentration. Because clearly effects on human health can occur in a much shorter period than over an eight-hour average.

45 DR SULLIVAN: Mr Weiss, I don't have the report in front of me on the screen I'm working from, but in terms of ship holds, if that was your question, we did -- on the base scenario we used for validation purposes, we've

assumed one ship hold per hour. For all the other scenarios based on the expert conference we had, we've recommended every two hours. That's how we modelled it. I don't know if I answered your question but that is how we addressed that issue.

5

MR WEISS: The question was really around the reporting of the data. The data seems to be representing an eight-hour concentration and I just wondered if there was any other data where a one-hour or a shorter period predicted concentration was reported, because I just couldn't see it.

10

[12.00 pm]

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DR SULLIVAN: If that's worker exposure eight-hour table, that was done for worker exposure. That was logs only. That would not be a log and ship. That's where we assumed that from 6.00 am to 6.00 pm, every hour the highest emission rate occurred all day long and we did modelling on that basis to link up the worst-case meteorology with the highest emission rates, but that was ships -- that was just log stacks, not ships.

20

CHAIR: That's all from you, Mr Weiss? Okay, Ms Barry-Piceno. Can you hear me?

25

MS BARRY-PICENO: Sorry, can you hear me?

CHAIR: Yes, we can now, thank you.

30

MS BARRY-PICENO: Dr Sullivan, I was just clarifying that you have also worked for the EPA in the US. Is that right, in terms of your work?

DR SULLIVAN: I worked as a contractor to the US EPA for many years, yes, I have.

35

MS BARRY-PICENO: But as I understand it - I was also a practising environmental lawyer in the US, in California - the Clean Air Act and in terms of the obligations that the EPA has, that the US phased out methyl bromide use unless it's for certain critical uses. In that circumstance, has your role only been for assessing those critical-exemption-type applications?

40

DR SULLIVAN: Other than going to the methyl bromide alternatives conference each year, I don't have a lot of information about those exemptions, so I'm sorry I don't have a lot of information to share with you on that.

45

MS BARRY-PICENO: But you're aware that the US Government has banned the use of methyl bromide in almost all instances?

DR SULLIVAN: Well, I know that they've phased it out in terms of agricultural use. I don't know the status right now in terms of quarantine use and things

like that, so I really don't want to give an opinion without having more facts on that matter. It's not something I'm really up to date on, sorry.

5 MS BARRY-PICENO: So if I advised you that since 2005 that has been the stance of the US, that wouldn't surprise you, would it?

DR SULLIVAN: It would not surprise me, no. They're definitely phasing out methyl bromide in the US, no question.

10 MS BARRY-PICENO: Just in terms of your information on the data and the use of probabilistic modelling as opposed to deterministic, with the use of methyl bromide and the extent to which it can cause extreme damage over a one-incident event, usually with modelling that has what we would call peak or extreme outcomes even for a minor or unlikely event, wouldn't you agree that the peak or extreme event is where the modelling should sit, given the extremity of the outcomes or risk?

15

DR SULLIVAN: That wasn't US EPA's position. In other words, the model we developed with the US EPA, the TOXST model which was used with the ISC model in the past and has a link to AERMOD now, that user probabilistic approach to address various toxic chemicals emitted by the chemical industry and others. So the answer is it's important to get the probabilities correct and to model as accurately as we can. Your point to do with would we only use a higher percentile for a more toxic chemical, that would be a regulatory decision, but I think the goal of the model should be to be conservative, like I've stated I was, but try to give a distribution that's reasonably realistic and then let the regulator make the call of what percentile they think is appropriate.

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30 MS BARRY-PICENO: Are you familiar within New Zealand under the RMA that section 3 in terms of effect has a definition that includes a weighing up of both the extremity or probability of the event with the extremity or outcome of it such that the two are balanced together in terms of looking at the event such that -- for example, let's take an earthquake. The chances of it occurring are rolled up in terms of number of years or time but also the extremity of outcome.

35

[12.05 pm]

40 I'm just wondering in terms of what you've looked at in modelling, has it considered that actually it would only take one event, for example in a ship hold, where the prevailing wind was in a certain situation where the workers would in fact have extreme outcomes in terms of effects on them, even if it is once in 24 years that that may occur.

45

DR SULLIVAN: You know, as a modeller what I tend to state - our firm says from time to time - when you run your model like CALPUFF or AERMOD, your various options you have, you run that model, you can find artefacts. You'll find times when the mixing height is just 3 ft off the ground and it's trapping a source and you'll get a really unusual value or other reasons for that as well. In order to say we want to get the most extreme value from a model, I don't think we want to do that, but I think what we want to do is make sure we run the model, that we try to be conservative, reasonably conservative at each step, give the regulator a distribution of exposures likely to occur and then let them make the call regarding percentile and relationship to the severity of the effect. That's not something that I have any expertise to do. My role would stop where I give them a reasonably conservative distribution of concentration and let the regulator do their job and their risk assessors and toxicologists weigh in on where to draw that line.

MS BARRY-PICENO: My final question is in relation to the actual data. I'm just interested, have you read the submission from the Bay of Plenty Regional Council in terms of the data gathered at the Port of Tauranga?

DR SULLIVAN: I have read that.

MS BARRY-PICENO: In your view, in terms of giving feedback to the EPA in terms of their questions about the robustness of data gathered through monitoring, is it of concern to you that that modelling and data that you've referred to has primarily been gathered by the actual holder of the consents themselves, namely Genera?

DR SULLIVAN: I don't have a concern about that. I haven't seen in my career situations where professionals not at least try to take accurate data. I don't have any belief that the data are taken inaccurately, the TVOC data collected by Genera. I just have this issue that I wish that it would be validated so that the differences between the TVOC and methyl bromide-specific data could be resolved and that more definitive data can be obtained going forward. I don't think the data is tremendously off, but it certainly shouldn't be the way it is now, in my view.

It should be ordered such that when you're very close to a stack or a ship, you're going to tend to get methyl bromide dominance and maybe almost all methyl bromide, but as you go further towards that boundary, especially the distant boundaries, and you get entrainment of the cleaner air, the other VOC is going to kick in there too and you should see that level drop, the ratio should drop of methyl bromide to TVOC as you approach the boundary. In some cases it's not and those values that I showed were relatively is a good example of that. That should be reconciled, in my view.

MS BARRY-PICENO: In your experience, the EPA in the US, do they allow the applicants or consent holders to gather data or does the EPA independently verify that?

5 DR SULLIVAN: The EPA doesn't generally collect data, measured air quality data. They require the company to collect data when we have that need.

MS BARRY-PICENO: In terms of independently verifying that, they have mechanisms to do so though, don't they?

10 DR SULLIVAN: They do. We do field studies that go to EPA, so if a registrant wants to register a new fumigant or re-register an existing fumigant, they have to do a field study to show the emission rates. They collect the measured data, compute the emission rates, submit the report to EPA and they independently evaluate it and that's the process. It works.

15 MS BARRY-PICENO: Just in terms of that data that you've referred to, in regards to ship holds, Genera has held consents at the Port of Tauranga for I think it's now some ten years, to which the logging has increased significantly over the last decade.

[12.10 pm]

25 During that time, are you aware that even in the last year there has been legal challenge to the measuring of the data in terms of release of methyl bromide with the boundary of it -- in terms of Genera gathering that data and measuring it from the port boundary, as opposed to its release over the harbour, where there is a significant number of the community using the harbour for recreational purposes?

30 CHAIR: Could I just pause for a moment there? Dr Sullivan's expertise is as a modeller so could I just check, Ms Barry-Piceno, where this is going in relation to his modelling expertise? Not the actual data collection.

35 MS BARRY-PICENO: My concern is, sir, that the references to the credibility of the data with actual data collected, and where the actual data collected has some deficiencies in terms of how it's been collected, who it's been collected by or where it's been measured, then some of those statements that he's included in his evidence are, in my view, needing to get to the bottom of in terms of that cross-reference and reliance for credibility purposes.

40 CHAIR: Okay. Dr Sullivan, I am not an air modelling expert, don't pretend to be. I would suggest that I'll allow this line of questioning for the moment, but I would ask you to confine your answers to your area of expertise and not go out beyond what you've been engaged to do.

45 DR SULLIVAN: In terms of the question, I do have expertise in air quality modelling and air quality monitoring, which we do a lot of. In terms of the water,

5 I am not familiar with any of legalities of the regulations, so I can't
speak to that at all, but I have seen the data that was collected recently
and shared, the data collected by the Bay of Plenty Regional Council,
and I have reviewed that and noted their value. I don't think that's
10 inconsistent with expectations. Basically they had a scenario where the
ship released five holds in 2½ hours. We're assuming the ships are
releasing, in most of the modelling, over ten hours, those ships, those
holds. If you were to adjust that value - the 1.54 they collected - by the
factor of four, the model, if they did do it that way, that number would
15 be down to about 0.38 PPM. I think it's really a matter of thinking
about the modelling, what was modelled and what was assumed. Every
two-hour opening, it seemed like a good idea to me and the expert panel
did go that way, but that particular ship there did it all in 2½ hours,
which tended to make the concentration higher than it would have been
if they'd followed the recommendation that this panel produced.

MS BARRY-PICENO: In terms of it going over 2½ hours, do you consider that that's been
pushed for the referencing to economic efficiency reasons?

20 DR SULLIVAN: I really don't know, but I guess I'll just stand by my statement that in
terms of air quality management, it would seem to me that the ships, if
they could have released every two hours, it would be a beneficial thing
to the environment. If that's feasible, that would be better.

25 MS BARRY-PICENO: Thank you.

DR SULLIVAN: You're welcome.

30 CHAIR: Thank you for that. Ms Barclay, you had a question.

MS BARCLAY: Yes. I've just got two points to raise to you, Dr Sullivan. One of them,
I just wanted to point out that there are issues with the monitoring data.
The other point is that you've pegged effectively your assessment
35 criteria based on the percentile, which is based on the monitoring data,
and you did this by showing us slide 27. The point that I wish to raise
here is that the monitoring data is basically a snapshot in space and time
and I think any modeller would agree that sometimes we just miss the
plume entirely. These are such highly variable plumes, they are going
all over the place, so the monitoring really isn't as reliable as we'd like
40 to think it is.

One of the other things I wanted to point out with monitoring is that
WorkSafe did some measures and we noticed collocated PID monitors
and SUMMA canisters, which we recognise as being the better quality
45 measures of methyl bromide, were something like three orders of
magnitude difference at the same location.

[12.15 pm]

- 5 The other point I want to make is that monitors tens of metres apart could be two orders of magnitude difference, so to peg your criteria at a percentile of 99.8 per cent or something based on the monitoring to me is not very reliable. I do confer that the issue at stake here is very high significant emission rates of methyl bromide happening on the order of minutes and for that reason, a concentration and assessment criteria in the order of an hour or less is important for both people on the port and at the port boundary.
- 10 DR SULLIVAN: That's a lot of questions.
- CHAIR: Okay, hold up a minute, hold up a minute. I didn't hear a question for clarification there, so Ms Barclay, this isn't your time to submit. If you have a question for clarification, happy to hear that, otherwise we'll carry on.
- 15 MS BARCLAY: I guess the question is how safe does Dr Sullivan feel pegging his assessment criteria on the monitoring data?
- 20 DR SULLIVAN: Let me answer that question.
- CHAIR: Hold up, hold up. We're getting into cross-examination here. We're not going to do that, thank you. Do you have something for clarification? Dr Sullivan's evidence outlines his experience and qualifications. It will be the Decision-making Committee's role to determine how much weight it places on Dr Sullivan's evidence. Do you have any further questions, Ms Barclay?
- 25 MS BARCLAY: No, thank you.
- CHAIR: Okay. Any other questions? All right. Thank you, Dr Sullivan, for your time.
- 30 DR TODOROSKI: Sorry, I was hoping to ask one final question, if I may.
- CHAIR: Sure.
- 40 DR TODOROSKI: Aleks Todoroski. This may not be within the purview of the DMC and I'm happy for that to be corrected by the Chair. My question to Dr Sullivan is whether there was any exploration of other factors such as time of day and wind direction as a control measure as part of the work that he did in advising his client.
- 45 DR SULLIVAN: We did consider time of day, Aleks, in terms of presenting the frequencies, the probabilities, as a function of our day and season and so forth. We didn't try to isolate the data to show distributions, you know, from 6.00 am to meantime and so forth but we looked at the

entire spectrum of hours. We did consider probabilities of a release by ships or log stacks on a diurnal basis.

5 DR TODOROSKI: And in the context of control measure, I guess, rather than just the modelling aspect of the model?

10 DR SULLIVAN: It wasn't part of the expert statement. I mean, we could have had a scenario, you know, changing the ships, doing it only emitting in the daytime versus night time, for example. No reason that couldn't be run, but that wasn't part of one of the scenarios that were identified.

15 CHAIR: Thank you. Thank you for that. I think the questions are done for now.
Mr Slyfield, I think we need to do a bit of an agenda check here. I'm just conscious that we have yet to hear from the rest of your witnesses and also the EPA staff assessment report and WorkSafe. We did originally schedule for a 2.40 pm conclusion and there's a number of moving parts here to see whether we can do that or whether we need to extend the time. The question then is making sure that we just get through this business. Any feedback from you?

20 MR SLYFIELD: Yes, perhaps it will help if I can offer this guidance. There are six witnesses still remaining on STIMBR's list, the first three of those being Dr Fletcher, Dr Pemberton and Mr Murray. I am expecting they'll be able to give the DMC a five-minute presentation of their evidence, so perhaps only 15 minutes collectively, plus any question time. That's difficult to judge.

30 [12.20 pm]

35 The other three, being Mr Gear, Dr Clapham, Mr Leesteere, I am not proposing to ask them to present anything but simply to make all three of them available to answer any questions on the basis of the written material already in front of the DMC. Depending on how many questions there are there, we should be able to cut through them reasonably sharply as well. That's the best answer I can give at the moment, Mr Chair.

40 CHAIR: Okay, let's give that a go. Thank you.

45 MR SLYFIELD: Thank you. Dr Fletcher, we're in your hands, please, to give us that succinct presentation of the statement, on the understanding that that is taken as read by the DMC.

APPLICANT PRESENTATIONDR DAVID FLETCHER PRESENTING

5 DR FLETCHER: Good morning. My name is David Fletcher. I'm a statistician. I
worked at the University of Otago for 35 years, teaching statistics and
10 data analysis. I worked as a statistical consultant for 30 years, using,
very often, the Monte Carlo-type of modelling, the probabilistic
modelling approach, that David Sullivan has talked about. I had
experience using that for work with the Department of Conservation,
15 Ministry of Fisheries and others. I have no experience with air-
dispersion modelling, so that's clearly outside my field of expertise.
The purpose of my evidence statement is to put a statistician's
perspective on the use of the very high percentiles that are sometimes
reported in these modelling exercises.

20 In paragraph 12 I make the point that the percentiles that get reported
from a statistical aspect, it's important to view them as estimates, that
if the simulations were run again or they were run for even longer you'd
get different percentiles, parts per million, coming up as the 95th, 98th
percentiles and so on. Just like in any, say, statistical sampling exercise
like an opinion poll, the percentage in favour of a certain thing during
25 an opinion poll, is just an estimate from a population. What we'd really
like to know is what would happen in the next 24 or 100 years or
whatever in reality and the simulation is trying to show that.

30 The probabilistic nature, the Monte Carol nature, of the simulation
means that even if all the modelling is perfectly representing reality, it
involves probabilities to do with the weather, wind direction and so on
and so repetition of the simulations would give different results. For
the 95th and 98th percentiles, I would think it would give reasonably
35 reliable results in that they wouldn't vary too much, but it's the really
high percentiles that are where you would get a lot of variation and
what I've called lack of reliability.

40 I'd like to really jump to figure 3, which is just above paragraph 22,
because that - I'm conscious of the time - summarises the issues based
on some calculations I did looking not at trying in any way, obviously,
to try to simulate what David Sullivan has done but look at the
statistical features of this kind of simulation process. If you look at
45 figure 3, on the horizontal axis I've got the percentiles 95 up to -- I've
actually plotted up to the 99.9999th, almost 100th, percentile. On the
vertical axis is an idea of the reliability of the percentile you get out
from the simulations in terms of how much it can vary.

[12.25 pm]

I've been able to simulate where I've said, "This is the true 99th percentile, over 1 million years, this is the 99th percentile of what would happen", because I'm just looking at an artificial scenario to illustrate the pattern. Therefore, on the vertical axis I've been able to say from one set of simulations over 24 years we might get the 99th percentile is so many parts per million. I know the true 99th percentile because it's an artificial simulation I've carried out, and for the 95th, 96th up to 99th percentile, the relative error is down around 4 per cent or 5 per cent. You might be plus or minus 4 per cent or 5 per cent out in your estimation process, which seems reliable. But as soon as you get close to the ends of this, the really high percentiles, that's when the relative error will go up dramatically. It's what David Sullivan has referred to as the outliers you can get with the 100th percentile, the artefacts that can arise, as have been alluded to before.

In summary, I would say the conclusions I've given in paragraphs 26 - 29 -- maybe the simplest way for me to explain those is that if you take the 98th percentile from a set of simulation results, you'd say 2 per cent of the time we might get concentrations above that. I'd say, based on what I've seen from the modelling that David Sullivan has done, those 98th percentiles would be reliable in that sense.

The 99.9th percentile, to say that that concentration would be exceeded 1 per cent of the time is not a particularly reliable statement, I'd say. That figure, that parts per million at the 99.9th percentile, could be off by quite a way in terms of what would happen in practice, even if all the simulation modelling has been done perfectly and it's just part of the Monte Carlo process. Estimation of these very high upper percentiles can be really difficult. It's a statistical issue because we're trying to do something extremely hard with data.

That concludes what I need to say, I think.

QUESTIONS

CHAIR: Thank you. Dr Belton, questions?

DR BELTON: No questions from me, thanks.

DR PHILLIPS: Thank you, Dr Fletcher. I guess I've got more of course a comment than a question. Someone told me once that all models are uncertain -- no, all models are wrong but some are wronger than others, and all models have levels of uncertainty in them. The challenge for us in using these models to make our decision is how important are those outliers, as someone pointed out earlier on. Something that only happens once every 24 years might be so significant in its level of impact that it is actually something that we need to consider.

5 It's like taking the modelling -- how do we decide where that boundary is in terms of this particular application? This is my question to you. I'm asking you not to just speak as a statistician but to actually put it into the context. If you were living in Tauranga and there was a ship hold that was fumigating and it had a huge release - just being hypothetical here - just give us a bit more insight from that perspective if you can. Thank you.

10 DR FLETCHER: Yes, I'll try, except my answer is more along the lines of my area of ignorance around environmental health hazards would not permit me to say too much because I wouldn't -- in doing the work I was commissioned to do for this evidence statement, I felt that I needed to know more about assessing environmental risk from a probabilistic sense in terms of what's called the TEL or whatever -- how these things are decided.

[12.30 pm]

20 So, if someone came to me and said, "Right, let's look at the data on the health side as well as the fumigation side", then I'd be in a better position to answer that question. It did occur to me during providing my evidence that that aspect could also -- it would be very useful to know how these levels are decided upon from an environmental risk point of view. Sorry, that doesn't really answer your question.

25 DR PHILLIPS: That's fine. Thank you very much anyway.

CHAIR: Thank you. No questions from me. We'll go to the EPA team now.

30 MR BAILEY: No questions from us, thanks.

35 DR TODOROSKI: I'd like to ask a question if I could. It's the same question I asked Dr Sullivan, but it may be more relevant for a statistician. The results were presented for both ships and logs and statistically they're very, very different data sets, the ships being many orders of magnitude higher than the logs. In the context that the criteria in New Zealand are at 99.9th percentile, what can we draw from a combined data set that's a 98th percentile, which includes a few very large ship events and a much larger number of lower log fumigation events as to the maximum extent of the possible impact at the criteria?

40 DR FLETCHER: The simple answer is I'm not sure. I'd have to think about that, what the impact would be on the kind of evidence I provided. I've assumed a very straightforward simple distribution for -- skewed distribution for the concentrations. I don't know what the impact of that sort of mixing of sources would be.

- 5 DR TODOROSKI: I guess the question is as a statistician, if I'm taking one set of limited data that's thousands of times higher than all of the other data in the other larger set of data, if I combine those two sets of data and then take a 98th percentile, what can that tell me about a criteria at a 99.9th percentile?
- DR FLETCHER: I don't understand that question, I'm afraid. When you say what can you tell me I'm not sure what you mean.
- 10 DR TODOROSKI: Okay. The issue is around ships having emissions potentially a thousand or so times higher than the logs, where their emissions can be higher and, therefore, the impacts in that range. If I'm required to look at a criteria of compliance at a 99.9th percentile and I'm taking a data set which is very small numbers of very high values, and combining it with a data set which has a very large number of much lower value, and then from that combined data I only look at the 98th percentile, or in other words I'm getting rid of the majority of these high numbers, how can I be comparing that against a criteria at a 99.9th?
- 15
- 20 DR FLETCHER: So is your question that the 98th percentile is ignoring 2 per cent of the data? Is that the problem?
- DR TODOROSKI: It's ignoring the ship data, in essence. How can we bring that data back into relevance and consider it?
- 25
- DR FLETCHER: So what fraction of the data is ship data?
- DR TODOROSKI: Well, that's hard to answer but there are approximately six ships a year and I've tried to work out exactly how many logs are fumigated but I get very different numbers with the data so I'm not in a position to be able to answer that.
- 30
- DR FLETCHER: Right.
- 35 [12.35 pm]
- DR TODOROSKI: I can say that there are nominally six ships a year and potentially thousands of log fumigation events.
- 40 DR FLETCHER: So is your concern that if you took the ships alone -- because I don't really understand the context as fully as others. If you took the ships alone, your 98th percentile would be much higher. Is that the question?
- 45 DR TODOROSKI: Well, yes, I guess the question is that if we are taking 2 per cent of the data of the ships and logs combined out, so removing that top 2 per cent, we're removing a very large fraction of the ships data, potentially the majority of the ships data, and therefore when we try and analyse

what we have, we're not really looking at what's actually occurring. We're looking at something different.

5 DR FLETCHER: Okay. So isn't the question to separate those two sources and look at the distribution separately? Wouldn't that be the way to do it, to solve that issue?

10 DR TODOROSKI: Well, I think so but that's not what we have in front of us. We have a combined data set and then only as a percentile of it to work with, so with what we've got before us, how might we be able to ascertain the potential impact of a 99.9th percentile?

15 DR FLETCHER: Well, I would argue that the 99.9th percentile of any data set of this kind is not very reliable anyway in the sense that it could be quite a way off from what the 99.9th percentile will be in practice. Even if you got all your weather predictors perfectly, because of the Monte Carlo simulation process that estimation of those percentiles is just so unreliable compared to the 95th, 98th, even the 99th.

20 DR TODOROSKI: When you say unreliable you mean in a statistical sense rather than a (overspeaking)?

25 DR FLETCHER: I mean in a statistical sense. That's my -- yes. So if we were to repeat the simulations infinitely often and look to the 99.9th percentile, doing simulations for 24 years might provide a not very good estimate of that 99.9th percentile. So that's the point I'm trying to make.

30 DR TODOROSKI: Yes. Is it a question? We would tend to do more than 24 years, but I appreciate that the modelling effort and time needed in this case is very high. But 100 or so, up to 250,000 years can be done in different circumstances and it does produce more statistically reliable results. Where's my question going? I'm still at a loss as to how we can use what's presented. You've said that the criteria is wrong, but the criteria is what it is. It is at a 99.9th percentile. It may be fair to say that it's generally applied to a source which may have continuous emissions. That's not intermittent. So you could be modelling every hour of the year for that source and then it becomes a modelling precision issue rather than a statistical issue. What we've got to grapple with, I guess, is this issue of infrequent events and a high percentile criteria with which to assess them, and it's a tricky one.

40 DR FLETCHER: It is. It is very tricky.

45 DR TODOROSKI: I'm straying away from the questions there, so I'll stop that. Thank you.

CHAIR: Thank you. We'll now go to -- if anyone else has any other questions. I think it would be helpful both for the recording and for the panel and everyone else listening if you said both your name and the organisation

you're with if you're with an organisation. That would be helpful. So, are there any other questions from submitters?

5

Okay, that is a no. Thank you, Dr Fletcher, I appreciate that. Thank you, Mr Slyfield.

MR SLYFIELD:

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Thank you, Mr Chair. That brings us to Dr Pemberton and I'm just conscious it's coming up on 2.00 am in the UK, where I think he is presently, so I'm sure he's been looking forward to this opportunity to get his presentation done and dusted. So, Dr Pemberton, can I hand over to you and ask you, bearing in mind the time that's already been taken up, to be as brief as you can be in giving us the highlights, please, of your statement of evidence?

15

[12.40 pm]

APPLICANT PRESENTATION

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DR MARK PEMBERTON PRESENTING

DR PEMBERTON:

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I'll try that, certainly. Good morning, everyone, or good afternoon now. Firstly, I'm a regulatory toxicologist. I have over 40 years' experience in working in the chemical industry. I retired eight years ago to become a consultant supporting the chemical industry in all three regions of the world. On this occasion I was contracted by STIMBR to provide an analysis of the human health effects that are likely to occur as a result of persons being exposed up to including a concentration of the 99.99th percentile of the values of MB predicted by Sullivan Environmental Consulting at the Port of Tauranga.

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Now, in order to make this analysis I first of all had to review the basis for the current TEL air standards set by EPA, the toxicities that they were trying to protect against and the windows of their susceptibility based upon what are recognised mode of action for those toxicities, and I found that the existing TEL air values were based on the health-based standards established in the USA decades ago and consequently found it necessary to research the background to these standards. This caused me to propose alternative TEL values that better reflect the current state of knowledge on the toxicity of MEB. Now, the current TEL air one hour is actually based upon a permissible exposure limit or PEL value set by California Environmental Health Hazard Assessment, OEHHA. That was set in 2000, but it's actually dated 2008 on their website. This PEL itself was based upon a study of workers from 1942 and that subsequently has been recognised as being a low quality and low reliability study.

40

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Now, the review by OEHHA has been criticised and superseded in reviews by the US National Advisory Committee on Acute Exposure

Guidelines in 2012, the North Carolina Department of Air Quality in 2019, and more recently by the Agency for Toxic Substances and Disease Registry in 2020. These more recent reviews concluded that studies in animals are more reliable as a basis for setting acute exposure standards than using the human data that was preferred by OEHHA back in 2000.

Now, on contrast to the approach taken by EPA, and consistent with several other agencies in the USA, I identified neurotoxicity as the lead health effect in the acute toxicity of methyl bromide. In this regard, the most sensitive indicator has been changes in neurotransmitter levels observed in rat brains after single eight-hour exposures to 31 PPM methyl bromide. Whilst that effect I believe is an effect level, this was significantly below the threshold for functional deficits, which was around 200 parts per million, so I concluded that this is sufficient to act as a sensitive end point for departure of setting a health-based standard for MEB for one-hour exposure.

By applying time scaling to go from the eight-hour exposure in the animals to the one-hour exposure in humans and applying appropriate chemical-specific assessment factors, I identified two TELs, a TEL of 58 parts per million for functional deficits and clinical effects, and a TEL of 15 PPM for changes in neurotransmitter levels. The lower TEL value of 15 PPM represents the most sensitive indicator of potential adversity in humans. I can use this to better predict health effects that might occur with people, excursion at the 99.99 per cent percentile.

[12.45 pm]

The current TEL 24-hour value is an adoption of the acute 24-hour reference concentration or RFC established by USCPA in 2008, but according to their website, this was actually last updated in 1992. It is based upon olfactory effects in a chronic inhalation study in rats and justified by EPA at that time as a need to protect humans from developmental toxicity of methyl bromide. However, not only have more recent studies shown that methyl bromide is not a selective developmental intoxicant at exposure levels that don't produce material toxicity, but more recent regulatory reviews include that neurotoxicity, not olfactory effects, is the most relevant health end point for human risk assessments.

Furthermore, I consider it unreliable to predict likely health effects that might occur during a 24-hour exposure period on the basis of a toxicology end point identifying a 2-year exposure study that may not be expressed or at least within the same range of concentrations during that relatively short time period. In my opinion, the 24-hour TEL can more appropriately be extrapolated from the most sensitive measure of

acute toxicity that are changes in neurotransmitter levels in the rat brains to simulate our exposures to methyl bromide at 31 PPM.

5 After correcting for time scaling - from 8 out of 24 hours in this case -
and applying appropriate chemical-specific safety factors, this leads to
a conservative 24-hour TEL of 1.2 PPM. Now, the current TEL
chronic is based upon the same USCPA reference concentration and
therefore suffers from the same limitations as the existing TEL air 24
10 hours in that nasal lesions are not the most relevant end point for
humans. In the case of the TEL air chronic, I consider that there's
sufficient evidence of repeat inhalation studies in animals upon which
a reliable prediction of the chronic toxicity of methyl bromide in
humans can be made.

15 These studies point to the presence of a threshold in animals of around
25 parts per million below which adverse effects are not observed,
irrespective of the study duration. This threshold is also below the level
of 31 parts per million in which sensitive change of neurotransmitter
levels were observed in rat brains after eight hours' exposure and below
20 the threshold for clinical neurological effects, which is around 200
parts per million. By applying adjustments to account for the
difference in duration of exposure for animals and humans and
appropriate chemical-specific assessment factors, we can derive a TEL
air chronic at 0.17 PPM.

25 Overall, I have low confidence in any prediction of likely human health
effects that are made based upon the current TEL values set by EPA,
as they are based upon outdated derivations and use default assessment
factors as opposed to chemical-specific assessment factors that better
30 reflect our current state of knowledge on the toxicity of methyl
bromide, and as recognised by several US governmental agencies in
recent years.

35 Now, since the 99.9 percentile values of MEB exposure predicted by
Sullivan Environmental Consulting Limited at the port for one hour, 24
hour and annual exposures are well below the respective TELs that I
derive, I come to the overall conclusion that persons exposed to methyl
bromide at these levels and for these durations would not experience
40 any adverse health effects whatsoever. Hopefully that was within five
minutes. Thank you.

CHAIR: Dr Phillips.

QUESTIONS

45 DR PHILLIPS: Thank you, Dr Pemberton. I guess the only question I have really, is it
still his intention for these TELs to be part of the application? Because
they are currently not and they're not within the scope that we are

currently considering in reassessment. While it's obviously very useful science and it needs to be reviewed, I'm just wondering what relevance it has to this application.

5

[12.50 pm]

MR SLYFIELD: That's a question that I should answer, Dr Phillips, and I can confirm that we --

10 DR PHILLIPS: Yes, I was going to ask you that, but I asked Dr Pemberton first.

MR SLYFIELD: I'm happy to hear his answer. I can say for STIMBR's perspective that they're not within the application, no.

15 DR PHILLIPS: Sorry, Mr Wilson, but could I ask Mr Slyfield another question relating to this, even though this is Dr Pemberton's time? Could you explain why this work was presented then?

20 MR SLYFIELD: The work is presented - and this may become clearer on a rereading of Dr Pemberton's statement of evidence now that you've heard him present - because he was effectively asked to provide advice on the health effects of emissions. He was asked to do that on the basis of the higher bounds estimated in Dr Sullivan's modelling, namely the 99.99th, in order to --

25

DR PHILLIPS: Yes. No, I understand that.

30 MR SLYFIELD: Yes, and in the course of doing that, he examined the TELs to assess whether they -- I'm not a doctor, but perhaps if I can put it from a lay perspective, my understanding is when you look at the TELs, such as they are, he said that they could not be assumed to be representative of the level at which a health effect occurs, which is indeed, as I understand it, the very purpose of a TEL is to set that threshold at which one assumes the health effect kicks in. He was not confident that that was the case. He looked at the research behind the TELs in order to understand the basis on which the current TELs had been set. In the interests of being very clear about whether there is or is not a health effect, his evidence has proceeded along those lines, rather than perhaps taking an assumption that the TELs route was going to help him.

40

DR PHILLIPS: I understand all that, but the fact is that this reassessment is not considering a review of the TELs.

45 MR SLYFIELD: That's correct.

DR PHILLIPS: Yes. So his evidence is immaterial to our decision is my point.

MR SLYFIELD: I'm not going to debate any of that with you, Dr Phillips.

DR PHILLIPS: Thank you very much, Dr Pemberton. That's all.

5 DR PEMBERTON: Thank you.

CHAIR: Dr Belton.

10 DR BELTON: No, Ngaire has covered my question, thank you.

CHAIR: Thank you, Dr Pemberton, nothing from me. I did have a few questions but with the previous discussion those have been addressed. Now I will go to our EPA staff team.

15 MR BAILEY: We don't have any questions at this time, mainly because we received ten days ago large volumes of data we have to check around the clarity and the detail of the information provided by Dr Pemberton. We have not been able to complete that to be able to ask questions at this time.

20 CHAIR: Thank you. Any submitters have questions for Dr Pemberton? Okay, Dr Pemberton, I hope the weather is better over there than it is here. Thank you so much for staying out of bed at such a ridiculous time in your time zone.

25 DR PEMBERTON: Thank you very much.

CHAIR: Mr Slyfield.

30 MR SLYFIELD: Thank you, Mr Chair. That brings us to Mr Murray, who is online with us and you have a statement already from him. I will hand over to Mr Murray and ask you first just to confirm the contents of your statement and then give us the brief highlights you wish to take the DMC through.

35 APPLICANT PRESENTATION

KIERAN MURRAY PRESENTING

40 MR MURRAY: Thank you. My name is Kieran Murray. I prepared a statement of evidence dated 27 July and I confirm the contents of that statement. I am an economists. My qualifications and experience are summarised in my evidence.

[12.55 pm]

45 I assessed the economic costs and benefits of two alternative futures, one with the recapture standard as it is presently - that is the standard that would take effect in April 2021 - and a future with the recapture

amended so as to be achievable with existing or foreseeable technology. In preparing my assessment I adhered to the guidance in the methodology order as I focus on the economic costs and benefits accruing to New Zealand as a whole.

5

The recapture standard in its present form would impact on export of logs to India and China and the import and export of several types of fresh produce. In the interests of time I won't summarise those impacts. They were covered in Mr Hammond's statement earlier this morning. The key impact with respect of log exports are that logs could no longer be exported to India and I assume that those logs would be on-sold to China. Logs could no longer be top-stowed on ships, therefore requiring a greater shipping cost or number of ship journeys to export the logs.

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I set out an estimate. I quantified two primary economic impacts from those changes to log exports. The higher shipping costs would reduce the effective price received for all exports of logs to China. That would be including logs that are currently sent to India if they can be sold into China. Those lower effective prices would mean it would be no longer economic for some forests to be harvested and that reduction in harvest volumes would in turn have two effects that I quantify: a further reduction in income to the forestry sector and an increase in unemployment in the forestry sector with the associated increases in benefit payments and loss of taxation to the Government. I quantify those financial impacts. There would also be a social cost due to high levels of unemployment. I outline those but do not quantify them.

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The recapture standard would also impact on import and export of fresh produce, as Mr Hammond outlined. I provide a quantitative estimate of the impact of the export of apples to Japan. There would be other impacts in terms of less choice and variety to New Zealand consumers, that I do not quantify.

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I summarise those quantitative impacts in table 9 at the end of my evidence. The economic benefit from avoiding those economic costs would be of the order or \$2.3 billion to £3.3 billion - that's in present-value terms - over 10 years. There would be some costs savings, because if the standard cannot be achieved then fumigation costs would be avoided. I estimate those costs at about \$55 million, again in present value terms over ten years.

45

Hence the net economic benefit of amending the recapture standard to be achievable with existing or foreseeable technology would be of the order of \$2.2 billion to \$3.2 billion. Those impacts could be expected to be concentrated in logistics where forestry is a significant regional activity, in particular Gisborne, Tasman/Nelson and Northland. There

are some other regions that I identify in my evidence that have forestry as significant activities as well.

5 As New Zealand is currently experiencing an economic downturn as a result of measures to combat Covid-19, that economic uncertainty is likely to mean that the economic costs that I estimate are likely to be towards the upper end of that range rather than the midpoint, because of those uncertainties and the lack of the higher levels of underutilisation of resources, unemployment and so forth that are currently occurring in the economy.

[1.00 pm]

15 Mr Chair, that's a very quick summary of my evidence that you have in front of you. Perhaps in the interests of time I could turn it over to you for questions.

QUESTIONS

20 CHAIR: Thank you. Dr Belton?

DR BELTON: Thanks. Just one point of clarification. In the study I didn't see - maybe I missed it - account taken of the costs of recapture of methyl bromide. I realise that we haven't been given any estimates of those but presumably they would be relevant in a cost comparison of the proposed new standard measures for losses that will come without any change.

MR MURRAY: I assumed a comparison between an achievable standard and the standard that would be imposed, you're correct. I don't attempt to estimate what the cost of different technologies would be. I do set out the costs of current recapture costs relative, for example, to phosphine in the hold and the costs currently of fumigation, but I don't attempt to estimate any additional cost from additional technologies.

35 DR BELTON: Okay, thank you. That's it from me, thanks.

DR PHILLIPS: And I have no questions, thank you very much.

40 CHAIR: Thank you. Neither do I have questions. Thank you for your evidence. I'll hand now over to the EPA team.

MR BAILEY: Dr Belton asked the question that we were going to ask, so we're good.

45 CHAIR: Okay, great. On to submitters. Any questions?

I've got from the team Nicole had a question.

MS SMITH: I've got my mic on, if I can speak now? It's Nicole Smith.

CHAIR: Thank you, yes. Please ask your question.

5 MS SMITH: Thank you. I am a resident of Tauranga, near the port, and I am also
part of the TMFAG group. I think my question was similar to that
asked by Dr Belton but I just wanted to check. It's a question about the
assumptions that you were asked to make. If those assumptions were
10 changed and we were to assume that a technology was available to
achieve the existing recapture requirements as extended out, regardless
of cost, is any of your evidence still applicable?

MR MURRAY: Yes, I think it is, because if that technology were to come at a cost, then
15 that technology would be a cost that exporters would -- if we take logs,
for example. Exporters of logs would need to incur -- that's a cost that's
borne by the exporters not by the importing country. So the impacts
that I've set out in my evidence can be approximately scaled for that.
If the impact on exporters is an increase in fumigation costs as opposed
20 to an increase in the cost of transport, the cost of extra shipping, then
we can use the same approach to determine what the economic impact
would be.

MS SMITH: Sorry, just to clarify. If logs were continuing to be exported at the
25 volume that the timber companies want them to be exported at because
they are able to achieve the export levels they want to, then all of the
wider impacts on the economy would not need to be taken into account
because they wouldn't apply, would they?

[1.05 pm]

30 MR MURRAY: That's not correct. There would be two impacts. One is that for the
logs that are exported, the producers of those logs would receive a
lower net income because they would incur the cost of the new
fumigation technology. That would be passed on to them and they
35 would incur that cost. They would have a lower income, therefore the
communities that rely on that income wouldn't have that income.

40 The second impact is that if the effective log price is reduced because
of those additional costs, then there will be some forests that become
uneconomic to harvest. There's a wide distribution of costs for
harvesting forests in New Zealand. Some are large plantation forests
with good access to roads, near to ports, have a relatively low cost to
harvest. There are others that are in remote communities without good
45 roading or infrastructure and are costly to harvest. So if the price that's
received for logs after all of the costs, including the costs of fumigation,
that price falls, some of those forests would become uneconomic to
harvest and that has an impact.

What my evidence does is set up the framework so that -- for some alternative views of costs but they can be tracked through to provide the decision Committee in broad ranges of the orders of magnitude of impacts for those alternative scenarios.

5

MS SMITH: Thank you.

10

CHAIR: Thank you. Okay, any other questions? No. Mr Slyfield, my stomach is telling me that now is a good time for a break. If you're happy with that, I'd suggest we do take a lunch break. I do want to check now for the remainder of our day so that as we go into lunch we know how to plan out the remainder of our time together today. So, if memory serves, you still had one of your witnesses that would like to speak and then there's three that are available for questions if we have them.

15

MR SLYFIELD: It's overstated, sir. It's only three available for questions at this stage.

20

CHAIR: Okay, all right, great. That may not take long but then again, who knows? So I think we should still pause here. Then we've got the EPA staff report afterwards, which is in total for questions is scheduled for one hour and 20 by the looks of it. Then after that WorkSafe, which is scheduled for one hour inclusive of questions. That would still put us into -- it could be closing on 4.00 or thereabouts. I just want to double check in terms of the EPA staff, STIMBR, DMC and WorkSafe, all of you but you'll all be speaking, is that going to create issues?

25

MR SLYFIELD: None for STIMBR, sir.

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CHAIR: EPA keen, you guys are okay? DMC members, you guys? You're okay to stay on until 4.00?

MR BAILEY: Yes, we have no issues with staying until 4.00.

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CHAIR: Okay. And Dr Phillips? Yes. WorkSafe, are you okay to stay on until about 4.00?

MS GIBSON: It's okay for WorkSafe. I just have to check with Chris Bender, who's our witness, one of our witnesses.

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CHAIR: Okay.

MS GIBSON: I think Chris will be on time.

45

MR BENDER: Yes, I'm Chris. That's fine with me as well.

MS GIBSON: All right, okay. So that's good for WorkSafe, no problem.

CHAIR: Okay, all right. Thank you. If any submitters need to leave at the scheduled time of 2.40 and have questions, I would appreciate you putting those in writing to the EPA team so that they can be put and maybe I don't know what we do with process here, maybe provide you a response in writing or something. But we'll endeavour to get your questions asked and answered.

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All right, so on that note, it is now 1.10 pm. Let's allow two minutes to log out, so that's 1.12 pm. What do we have, 45 minutes? 1.57 pm, does that work? All right, we'll see you back here at 1.57 pm. Thank you.

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ADJOURNED [1.10 pm]

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RESUMED [1.57 pm]

CHAIR: Kia ora. Can everybody hear me? Okay then. So, as I understand it, we've now got an opportunity, Mr Slyfield, just ensuring I'm on track here, an opportunity if you've got any questions for Mr Gear, Ms Chapham and Mr or Ms Leesteere?

20

MR SLYFIELD: Ms -- sorry, Mr Leesteere.

CHAIR: Mr, okay. Is that correct?

25

MR SLYFIELD: That's correct. That is the line-up, and if we can just deal with those sequentially, sir, I think that would make things easiest to understand. So, perhaps if I can just call Mr Gear first and we can deal with any questions to him.

30

CHAIR: Okay. Mr Gear, did you get connectivity issues worked out?

MR GEAR: Yes, thank you, Steven. I think we've got them all fixed. It seems to be an internet problem.

35

CHAIR: Okay, no worries. So let's go to you, Dr Phillips. Have you got any questions for Mr Gear?

QUESTIONS

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DR PHILLIPS: No, I don't have any questions for you, thanks.

MR GEAR: Thanks.

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CHAIR: Dr Belton?

DR BELTON: None from me either.

MR GEAR: Thank you.

CHAIR: Thank you for your evidence and, yes, I'm the same, that was self-explanatory, so thank you very much.

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MR GEAR: Thank you.

MR SLYFIELD: Thank you, sir. Well, that brings us to Ms Chapham.

10 CHAIR: We'll do that in the same order. Dr Phillips?

DR PHILLIPS: Sorry, no, I actually don't have any questions for the remaining witnesses. Thank you.

15 CHAIR: Okay. Dr Belton?

DR BELTON: And me neither, yes.

[2.00 pm]

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CHAIR: Okay, I'm the same too, thank you. On that note, before the three of you leave us, sorry, I should have opened that up first to others. So, can I first ask EPA staff if you have any questions for those last three people?

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MR BAILEY: No questions.

CHAIR: Okay, thank you. And submitters, any questions? Okay. We'll take the silence as completed at this phase, so applicant, Mr Slyfield, thank you and your team for your submissions today, we appreciate it.

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MR SLYFIELD: Thank you, Mr Chair, we appreciate having the time to do that.

CHAIR: So, moving now to -- actually one thing I didn't check on the break in terms of order of asking questions, after we've done this we'll hear from the EPA staff. We'll then ask the panel if we've got questions and then go to the applicant and then to the submitters. Okay, so let's hand over now to the EPA staff team to talk to their report.

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EPA STAFF ASSESSMENT REPORT

BEN DEEBLE PRESENTING

MR DEEBLE: Okay, cool. Are we on? Can everyone hear us?

45

CHAIR: Yes, thanks.

MR DEEBLE: All right. Yes, so just a bit of context, I guess, with the staff report presentation is that it reflects the staff report at the time of writing, so some of those updates from STIMBR's witnesses that we received at a similar time of publishing won't be included in here.

5

But moving on, so just a brief introduction to the EPA. We're New Zealand's national environmental regulator and we're charged with protecting our environment, enhancing our way of life and the economy. So, I will start the presentation with a bit of background to methyl bromide, cover off the application, the processing decisions in the application, our review of the submissions, a review of the classification. From there, Lee will take over and talk to our Māori assessment, the modelling, the controls and the EPA staff conclusion. Then at the end Aleks Todoroski will present some information on the modelling he's done for us.

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So, moving on, so a bit of background on methyl bromide and its regulatory history. Methyl bromide is used primarily as a fumigant for Quarantine and Pre-Shipment uses, so that's QPS, and its primary use relates to export and import of products. It was transferred into the HSNO Act from previous legislation so it didn't go originally through a new approval process. However, it has undergone a full reassessment, which took place in 2010 and the significant change from that reassessment was the introduction of the recapture control, which is what we're here to discuss now. Under this control recapture technology must be used to recapture gas so that five ppm or less remains in the headspace. To allow for the development and implementation of this technology, the DMC set the control as taking effect in October 2020. However, we note during the current reassessment a direction was given by the current DMC to waive this requirement until April 2021 to allow for the reassessment decision to be completed.

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Moving through to the application, so as everyone will know, the application was submitted by Stakeholders in Methyl Bromide Reduction, or STIMBR. It looks to clarify the controls, specifically those relating to the performance targets for recapture, and the feasibility of those controls. Some of the changes proposed include a change to the recapture target from five ppm to 80 per cent of methyl bromide remaining in the headspace following fumigation, a ten-year extension to ship holds, siting that technology for this requires further developments, and the refinement of the buffer zone. We understand that these have now changed a little bit but are proceeding forward with our assessment as it was.

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[2.05 pm]

5 So, the first step in the assessment is to go through a pathway determination to decide whether the reassessment should be processed as a modified reassessment or a full reassessment. The chief executive of the EPA is the decision maker for this process and decided that a modified reassessment was appropriate and that the application should be publicly notified.

10 Moving forward, also within this process the pathway decision outlines the scope of the reassessment. So the scope for this reassessment covers the hazard classification, an assessment of the benefits associated with the use of methyl bromide in relation to the changes proposed, controls which could be applied to mitigate the risks associated with the use and, yes, particularly is focused on the changes proposed by the applicant in the application. Furthermore, a notable aspect of the decision to proceed with a modified reassessment is that the possibility of replication of the approval of methyl bromide as a whole is not within the scope. This would require a full reassessment to be considered.

20 So, moving on to the submissions analysis, during the submission period we received 72 submissions. Of these, originally 37 submitters requested to be heard at a hearing. Yes, at the point of analysis those were the numbers. Obviously, with the change in dates there's been a change in the number of submitters who are now speaking.

25 We received a balance of different views as we'll show in graphs here, between decline, neutral and approve, so these in this graph, it's worth noting that these are the groupings that submitters put themselves in. Following this, we did an analysis of the submissions to kind of group them a bit more detailed, so this is our assessment of where we viewed submitters' positions. The majority of those submitters in opposition outright oppose the reassessment proposals, a small group wanted some changes to the proposals, but otherwise outright opposed the reassessment position.

35 We had a group who were neutral between opposing and supporting, but otherwise there was a bit more split seen in the positions for those submitters who supported the reassessment, so a bit more of a detailed breakdown. As I said before, those submitters who opposed generally outright oppose the reassessment. Many of these submitters want the use of methyl bromide ceased completely, generally expressing concerns for the health of those adjacent to fumigation sites.

40 Many also cited that they believed that industry had had sufficient time to develop and invest in recapture to meet the requirements of the 2010 reassessment or to look at alternatives to methyl bromide use or recapture. Some submitters also proposed that there may already be either alternative recapture technology available or alternatives to

methyl bromide and that these should be implemented instead of continuing to use methyl bromide.

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There were two submissions that were received who were opposed unless there were some changes to the proposal. The two main themes we saw here were a reduced extension to ship holds and a move towards phasing out methyl bromide use as a whole and leading towards overall prohibition.

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Moving on to neutral submitters, some submitters that were neutral didn't declare a position either way. Mostly submitters noted a need for a balance between the effects of degraded ozone layer and the biosecurity benefits of controlling pests on imports for both human health and for the environment.

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[2.10 pm]

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Generally, a lot of these submitters were overall against the use of methyl bromide, but accepted that there would be significant effects if methyl bromide were not available. One submitter here also requested a reduction in the proposed extension to ship holds.

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Moving into submitters, so we received some submitters who were in favour of a reassessment of the recapture requirements that wanted a more restricted position taken than that which was proposed by the applicant. Some common themes we saw here were again a reduction in the ship hold extension or some submitters indicating that they believed that allowing longer terms for ship holds would shift to greater use of ship holds than tarps to avoid the economic cost of applying recapture technology. Some submitters in this group are also suppliers of alternative recapture technology and indicated that they believed targets with lower residual methyl bromide would be achievable than those proposed by the applicant.

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Moving to those who generally supported the application, this is where the majority of industry responses fell. The general theme of these submitters was that they require the use of methyl bromide to meet export requirements, so import requirements of trade partners or to protect imports to New Zealand from pests and the effect on markets. For context, the majority of these submitters were considering their position along with the context that the 5 PPM requirement was not achievable and therefore effectively methyl bromide would become unusable if there wasn't a change.

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Then there were some submitters that we had that supported, but wanted less restrictive requirements than those originally proposed by the applicant. These fell into two categories: a reduction in the recapture target, with a few submitters nominating a target of 75 per

cent. A number of these submitters also wanted a delay to the commencement date of the recapture control to allow additional time to invest in infrastructure. We also note that we received a request from New Zealand fresh produce importers for an exemption of fresh produce from any recapture requirements. That's the conclusion of our submission analysis as it sits in the staff report.

We're just going to talk about the benefits analysis, although I will move through this relatively quickly, noting that it largely relies on information we received from submitters, the applicant and MPI, who will have either talked to the information or will likely talk to it as we go through the hearing. As you probably hear a lot, the primary use and therefore primary benefit to methyl bromide use is for the fumigation of logs, particularly those exported to China and India, where these are part of trade requirements. There's also benefits associated with the import and export of other products. However, the volumes used here are comparably small to those of logs, so we would expect comparably smaller benefits.

Talking about logs, the applicant's assessment, as we received it, and the application valued - including monetising additional environmental benefits - forestry to be valued at \$12.9 billion, of which \$6.9 billion was exports. From an additional information request, we had a value from methyl bromide-treated logs at \$1.1 billion. Our MPI assessment that we received in their submission valued this at \$792 million, with a further \$60 million on other fumigated products, but a consistent theme that we did receive from both submitters, MPI and the applicant, was highlighting the importance of methyl bromide in maintaining access to Indian and Chinese markets.

[2.15 pm]

I just want to talk quickly to regional benefits. You will hear a lot of discussion around the use at Tauranga as well as Northport and Napier. These are the main ports at which methyl bromide is fumigated under tarps or at ship holds. However, we would note that there are regional benefits that are a lot more widespread, so a lot of logs are shipped from other regions and then shipped to Tauranga, Northport or Napier to be fumigated and then exported on, so the point to note in this table is that the port of origin refers to where logs are first shipped from, so not where they are exported from.

Then just a quick discussion on the benefits associated with other products, so MPI and submitters provided some indication of values for treated exports for other products. We've summed these up in our staff report in a bit more detail and collated them together. We received a lot of information particularly on the percentage of exports fumigated for specific crops, but the value of methyl bromide to these crops was

not always specified, but from what we did collate we had an indicated value of around \$7.1 million for vegetables and \$41.8 for fruit from the value provided by methyl bromide to these industries.

5 We also received some information on the value provided for imports
with a collated value of \$1.6 billion provided by methyl bromide on
imported products. It was repeatedly noted in submissions that methyl
10 bromide is often the preferred fumigation substance in closed system
fumigations due to its good penetration into a variety of crops and
products and its effectiveness against a variety of pests, with some
imports often having high levels of pests and almost always needing
fumigation.

15 I'm just going to quickly talk to the international obligations. The
obvious one and the primary international obligation that we have to
consider under the HSNO Act is New Zealand's obligations to the
Montreal Protocol on substances that deplete the ozone layer. It has
20 been noted that QPS is exempt from the limitations which apply to the
Montreal Protocol. However, there is a general obligation to limit
methyl bromide use and to employ recapture and recovery and
recycling techniques until alternatives for QPS use can be
implemented.

25 Then I will just quickly talk to the hazard classification and changes
that we received in the application. In the application, the applicant
provided a general review of information regarding human health and
environment risks for methyl bromide, so this was information that had
30 been published or received since the 2010 reassessment, so newer than
what we had previously reassessed. One key classification that's been
looked at is the review of carcinogenicity data, so that's our 6.7 has no
classification, which the review which was provided by the applicant
suggested should be subject to a further review of the detailed
35 information. The EPA conducted a review of the evidence associated
with the applicant's review and concluded that there was not sufficient
evidence to support a change in classification for our carcinogenicity
classification. So the changes that we did proposed by the EPA are in
addition to the respiratory irritant classification, which is 6.1(e) and this
40 comes from the information we received for the 6.9(a) classification
and a lowering of the acute inhalation toxicity from 6.1(b) to 6.1(c),
which would be consistent with overseas classifications in the
European Union and in Japan.

I am just going to pass over to my colleague Lee who will continue.

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EPA STAFF ASSESSMENT REPORTLEE BAILEY PRESENTING

5 MR BAILEY: Tēnā koutou. As I introduced myself at the beginning, my name is Lee Bailey. I'm a senior advisor with the reassessments team.

[2.20 pm]

10 I'll go through the second half of the EPA's presentation. So, as part of
all approvals and all applications for hazardous substances and new
organs, we have to consider the impact on Māori cultural indications
and the Treaty of Waitangi. From the Māori perspectives report
15 produced with the EPA and backed up by submissions from several iwi
and hapū, three key areas come out. One is the impact on te hauora and
human health and wellbeing. With Māori being highly represented in
workplaces where methyl bromide is used, it has a potential impact on
their health. As well there are marae and other Māori facilities close to
ports where fumigation takes place.

20 Connected to that, the requested change could adversely affect the
ability of Māori to exercise their kaitiakitanga roles and guardianship
roles, particularly if they don't know fumigations are happening. We
also recognise that there are benefits from methyl bromide with Māori
25 owned businesses a substantial part of the forestry in Aotearoa.

The next few slides I will talk about are on the modelling which we
have covered already today. So a few basics on the spatial modelling.
It is useful to indicate how far methyl bromide can travel. It needs to
30 be a careful selection of the model, the parameters and processing tools
following to make sure the scenarios both modelled are realistic and
our interpretation is realistic and the monitoring data can support the
validation of the model.

35 In their application STIMBR provided modelling reports from
Sullivans and they use a model called AERMOD. The result of that
modelling was (inaudible) less than 25 metres. That was reviewed by
the EPA's expert, Aleks Todoroski, who you've heard from already.
That was heavily criticised in the Bay of Plenty submission. Their
40 expert also heavily criticised that same report.

As a result, we commissioned our own modelling. Dr Todoroski used
a tool called CALPUFF. The information that they used setting up their
model was the same information that was in the applicant's modelling
45 reports provided with their application. We do acknowledge that the
material and information that came to light during expert conferencing
is not taken into account in that model but it was the information
available at the time.

5 SEC provide a range of percentiles in their work, and based on the information they provided to us in that means that they're the only percentiles that we move forward with using and those in buffer zones up to 1.9 kilometres. This was reviewed by a third party for the EPA which recognised that the approach was a sound modelling approach but could have some underestimates of the amount of methyl bromide released related to the size of log stacks used in the model.

10 Aleks Todoroski will talk briefly around his modelling and his work for us at the end, and because those buffer zone differences are so large, between 25 metres and 1.9 kilometres, the decision-making committee directed expert conferencing to resolve some of those issues and agree a modelling approach.

15 There were three rounds of conferencing, in January, March and June of this year. They agreed the model to be used would be CALPUFF. They agreed a series of scenarios to be modelled and agreed on the weather data to be used, and these are the scenarios that the expert conferencing agreed should be modelled. The DMC directed the applicant to conduct the modelling based on that conferencing and the applicant commissioned SEC to redo the modelling.

20 We know that not all of those scenarios were modelled and that their focus was on the 98 percentile results. The report itself states it's a factual report only. And talking of scenarios, those three in red the modelling was not available in those reports and it was not clear to us during the review if the scenario in orange there was also conducted or not and to what extent.

30 **[2.25 pm]**

35 So, from a review of that second round of SEC modelling, the impact of ship hold fumigations on the results was not clear and the review by (inaudible) found critical errors in a (inaudible) data files approach, that the report text did not match the data files and, as we've already noted, not all scenarios were modelled and non-compliance with New Zealand guidance documents and lack of comparison with New Zealand limits.

40 As a result of those critical errors highlighted by the review for us, we go back and rely on modelling reports that have been provided to us through the application process and submissions are in response to further information. So we had two reports that were provided originally as part of resource consent applications and then the third modelling report is produced as part of WorkSafe's monitoring programme.

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5 The very high level comparison between the models here, we didn't take the Beca model forward in our review. The approach that the risk (inaudible) was trying to achieve was with force ventilation rather than the lifting of sheets, etc, after fumigation was complete. Because of that difference in use pattern we didn't think it was appropriate to carry that model forward. We did look at Golder because that was based on (inaudible) more closely at the time for that work. We have used that going forward.

10 In bold for Golder is the values we have taken proposed for buff zones. Again, based on information from Science(?) Global in their submissions and reviews of modelling reports, and from our experience that the 100 percentile models matched monitoring better that is the reason why we've chosen the 100 percentile in our recommendations, 15 which is why without recapture we've used the values from Todoroski models, given the time of the SEC report. Those were the results available to us in an appropriate scenario.

20 We know that PDP did do some work on log stacks, but they were finding they were finding that they were getting significant underestimates in their report from the modelling compare to their monitoring. Because of that we felt we couldn't rely on that to provide information about how far methyl bromide would travel and in the (inaudible) in brackets, the result from SEC's recent modelling and that 25 distance is based on the 30-day recapture in their base model and how far downwind methyl bromide would travel.

30 As you can see in this graph here, for how far the different models predict methyl bromide will travel until the one hour TEL value is reached with two values from Todoroski, one with recapture and one with 80 per cent recapture based on 120 grams of methyl bromide per metre cubed of airspace. In green are the results from the Golder model. Then in blue with the dots is the result from SEC's most recent 35 modelling at the 99.99 percentile.

40 These are all geocet(?) images from coracle(?) pictures and images provided in those reports. We don't have the software at the EPA to be able to use the data files provided and create these ourselves, so we have relied on the coracle information provided in those reports. Where there are gaps in these curves is where either the image crops off, whether that be the edge of what was provided or sometimes - in the next slide particularly - where there are things like key bars and headings in the way. This is the similar plan for ship holds. As you can see it's a lot bigger. Again, with Todoroski lines for both recapture, 45 in a recapture, both those are larger than the Golders' line in green again.

[2.30 pm]

5 And noting that the modelling produced and the images produced by SEC in their recent report extend between the two lines produced by Golder and by TAS because, as I said, Golder represented the use pattern on site more closely to the TAS modelling. They had only done with recapture, which is why we've relied on that information in red to that information in our recommendations to the DMC.

10 So, going on to the controls of how methyl bromide could be used satisfactorily, we have not reviewed the TALs. It was not something that was proposed to be reviewed by the applicant and at the start of the application we saw no reason to review that, so therefore no change is proposed.

15 For the recapture, we propose that the recapture of 80 per cent methyl bromide at the end of (inaudible) mitigations, based on the applicant's proposal in their application form. We're also proposing 95 per cent recapture of methyl bromide in shipping containers. The information provided by the applicant in their application form and their further
20 information indicates that that percentage of recapture is possible by a variety of different technical providers. We think, therefore, that it's reasonable to propose that the recapture control for those.

25 For clarity, our proposal is for the recapture to occur on all fumigations with no averaging within or between sites that conduct fumigations. We do note the lead-in time indicated by Genera in their further information request responds to a direction that informed the DMC that it would need up to two years to install all the equipment they would need to recapture under tarpaulins, but noting the shed proposal
30 suggested by STIMBR this morning to phase that in. We propose a five-year lead-in time for ship-hold fumigations rather than the ten requested.

35 For buffer zones, without recapture those buffer zones for containers is not changed. Fumigation under sheets with no recapture, we propose 625 metres and for ship-hold fumigations 1.9 kilometres. These are supplementary to the requirements in the Health and Safety at Work Act and the associated Hazardous Substances regulations.

40 With recapture - and this is with recapture at 80per cent - we propose that the buffer zones be the same as being no recapture for containers and that the fumigation under-sheet buffer zone with recapture 80per cent is 300 metres or 1 kilometre for ship-hold fumigations, based on
45 the modelling work we reviewed. For clarity, these are downwind buffer zones to sensitive areas, which include non-occupational bystanders, which include occupied residential and commercial and industrial premises off the port, public open space, marae and other

Māori facilities. Again, these last two are to recognise the Treaty partner status of Māori to the process and their role as kaitiakitanga.

5 Because the modelling for recapture considered the ship holds being opened every two hours - and that was agreed again at expert conferencing, which was discussed this morning - we propose that that is included as interval and a control, just to make sure that the risks that we're managing by the buffer zones actually match practice on site. Again, these are supplementary to the requirements in the HSW Regulations.

10 For monitoring, based on regulator feedback of difficulties various regulators have had in some data provided to them, we're proposing supplementary requirements just to provide better quality to those compliance monitoring enforcement agencies -- because the recapture definition changes from a concentration of 5 ppm, to the proposed in the application form of 80per cent of the value concentration left in the head space at the end of fumigation it's important to know how much methyl bromide at the end of that fumigation phase. The other is there to help the regulators to check compliance.

[2.35 pm]

25 With that change in proposal of the recapture definition, it's important to bring the two regimes into line with the monitoring aspects, so these proposals are to align monitoring requirements with recapture and without recapture, and again it's supplementary to requirements in the HSW regulations.

30 Where TL values are identified to have been exceeded, we're proposing some additional requirements: who to notify for all exceedances and to notify those exceedances in a shorter timeframe than currently. The current timeframe is five days, we're proposing one day. That's to allow bi-monitoring to take place if agencies feel that it's necessary in that instance. Again, the other information there is to help regulators understand the reasons for exceedances and to help them in their compliance monitoring enforcements roles. Again these are supplementary to HSW regulations.

40 For the annual reporting, in a similar manner these are based on regulatory feedback to help with compliance monitoring enforcement functions and just to clarify and to help understand what is going on around site and alert to any exceedances.

45 At the minute a number of parties are required to be notified that fumigation is going to take place. These are mainly WorkSafe and the Public Officer of Health. We're proposing that these are supplemented by two new requirements, one to notify the regional council because

Of their role with discharges under the RMA, and to notify neighbouring marae and Māori facilities so they can help comply and fulfil their kaitiakitanga and guardianship responsibilities.

5 We did in a staff report consider some potential alternative controls for
how to manage methyl bromide. The main one we considered would
be around permissions on the use of the methyl bromide site. Such
10 control could be used to achieve a focus on monitoring, recording and
reporting requirements, as we supposed in supplementary to existing
regulations. Permission would allow site visits and risk assessment to
take place. At that point the EPA would need to set some controls and
permissions. One we're proposing as part of this modified
15 reassessment. On top of that we would need to manage the interactions
with the Resource Management Act carefully.

A final note that's not really been discussed today, and very brief, the
20 approval for methyl bromide also allows for its use to treat potato wart.
Changes to those roles and controls were not considered nor changes
proposed and so far we propose that those controls are carried forward
should any modifications to the approval be granted by the DMC.

The conclusion of EPA staff is that with the controls outlined as we
25 proposed, that the adverse effects can be managed appropriately. We
do acknowledge there are significant benefits from the use of methyl
bromide and that with use of those controls the residual risks are
outweighed by the benefits and that recapture and recovery is in line
with international best practice. Our conclusion is without the
30 proposed controls the adverse effects cannot be managed appropriately
and we consider that these will outweigh the benefits.

I will now pass across to Aleks Todoroski. Aleks if you can talk
through these slides and just let me know when you need the slide
moving forward.

35 EPA STAFF ASSESSMENT REPORT

ALEKS TODOROSKI PRESENTING

40 DR TODOROSKI: Sure. Yes, Aleks Todoroski. I've been assisting EPA, as I said before.
I have 20 years of experience in air-dispersion modelling, including 10
years at New South Wales EPA where I was the principal of air quality.

[2.40 pm]

45 I produced three reports. One was a review of the initial 2018 - 19
Sullivan modelling. That's largely superseded so I won't talk about
that. The second report that I produced was a modelling exercise for
the EPA based on that original Sullivan work, which I'll talk about.

The third thing that I did was a review of the 2020 Sullivan report and I'll touch on that.

5 I thought it might be useful to talk about how my modelling might be able to be interpreted. It is quite different to that done by Sullivan. It's not a probabilistic approach using Monte Carlo, it's a deterministic approach. Some of the reasons for that are simply a lack of access to the data you would need to be able to do something more involved and more elaborate and detailed and accurate. But also I felt that there's a need to look at what the worst case could possibly be, and that's one of the primary ways to look at this work.

15 The other aspects with how this work differs to some of the other modelling is that it's fairly simplistic in the source scenarios. There's one ship in a fixed location and there are five holds. Those holds were allowed to all open at the one time. The emissions were then allowed to increase over two hours and then decrease for another four hours, a total of six hours for one ship. That's quite different to some of the other ways of interpreting things but that was the information that we were able to use at the time. The other difference is that we're looking at three relatively large log stacks. They're in a fixed position in the middle of the areas where log-stack fumigation could occur. In reality, of, the log stacks could be in various areas. The point of doing the modelling as I did was to try to work out what the maximum possible buffer you would need to be in reality. I'll talk about that in more detail.

30 This modelling also looked at a range of doses, ranging from 40 to 120 milligrams per cubic metre, at a range of recapture ranging from zero recapture to 90 per cent recapture. That applied to all of the logs or all of the ship holds. It wasn't a case of 70 per cent of the logs being subject to 80 per cent recapture, it was 100 per cent of the logs subject to the recapture rate shown there. Clearly, obviously, the point of that was to see whether varying the dose or the capture road, how big a deal is that really. Are we getting the benefit in terms of who's impacted or not by doing these things?

40 The other thing I looked at was the hour of day. We know that at night time generally there's poorer dispersion so that when ventilation occurs at night time we tend to find more impacts. We thought that was fairly important. At the time we understood that ship emissions could occur at any hour of the day. We weren't quite clear as to when the log fumigations occur. There was some evidence to suggest things were happening in the night. It wasn't clear. So we modelled all possible hours. Important to note that we modelled each hour independently. In effect, we had a separate model for every single hour, so there isn't carryover of emissions from, say, 1.00 pm into the 2.00 pm modelling hour. The purpose of that modelling where I show a diurnal variation

is to see what would be the impact if I was to start the ventilation in this hour, and it's focused on that event alone, not the sum total of the hour before and the hour after and so on.

5 The modelling when it's done like this, I presented the worst-case hour, the 100th percentile, but I also looked at 99.99, 99.9, a range of percentiles down to the 95th percentile, and I also looked at the average level from all of the data.

10 [2.45 pm]

15 That modelling has ventilation occurring in every hour that it could occur. So, for example, we looked at the ships separately. We started a ship ventilation event at any hour of the day and so, therefore, we had 24 models to run for the whole period. We modelled five years of data.

20 The reason that I'm showing the higher percentiles, including the 100th percentiles, is to look at what effect the weather has on the potential emissions. So when I'm looking at a 100th percentile versus a 99.9th percentile, I'm looking at those nominally nine hours of worst-case emissions and seeing how things occur. When I'm looking at a 99th percentile I'm looking at the 88th worst hour of air dispersion in the year. The point of doing that is to understand how the meteorological conditions in this area may affect the emissions of methyl bromide.

25 Okay. How accurate was this modelling? Well, at the time of this modelling I only had access to two monitoring events, which were done, I believe, by Bay of Plenty Regional Council. They happened to have been done at the time that we actually modelled the emissions. So we modelled the five years of historical data and we had modelled a ship in the exact position that the actual ship was at the time that it was actually measured. This sort of validation is indicative and there's really only two pieces of information, but the model did reflect that fairly well for emissions in the 80 to 120 milligram per cubic metre range. One set of data it was almost exact in space and time. The other set of data it predicted the same level at the same distance but it was around I think 15 or 20 degrees off in terms of the wind angle as to what did occur. That could well be just dumb luck. That's a very limited set of data so at best I can only interpret that as indicative. It does, however, give me a sense that the model's not too crazy high or too crazy low would be perhaps another way of looking at that.

40 I think that covers that. The other things I wanted to cover were in the next slide, if that can be shown. This was my review of the latest Sullivan modelling. I had fairly limited time to do this so I wasn't able to explore everything in detail. But a fairly important point is that we took the same weather data and we ran essentially our model with that weather data and made a like for like comparison. Frankly, we didn't

5 really find any particular difference between our models. When we look at the raw data that Sullivan's CALPUFF model was producing and the raw data that our model was producing, they are the same. So it essentially boils down to then how those results are analysed and treated, the statistical stuff in there. So we're not seeing any technical issues in the model.

10 We found an issue with the FORTRAN code. Dr Sullivan has talked about that earlier today and I guess we'll see more about that later. When I looked at that, I was seeing discrepancies in the order of 30 to 40 per cent between the raw numbers and the numbers that were being pulled out. It was not affecting all of the data. I'm not sure what the error was exactly. In every one of those examples that I looked at, I found the same code was being used and similar sorts of errors, so I'll let Dr Sullivan explain that.

15 The key thing, though, was this reliance on percentiles lower than the 99.9. The 99.9 is the percentile that's specified in the guidance. In fact, it's the 100th percentile that's specified in the guidance but you may use the 99.9 where you've got more robust data and information, which this would be a reasonable case for that.

[2.50 pm]

25 I do agree with Dr Sullivan about the presence of outliers and so on, but perhaps not to the extent that has been presented. My modelling is not showing major outliers. I would go back and say the earlier generation models such as ISC and so on, what the model did with the static gas in plume did not really reflect reality as well. I find that with the very well resolved meteorological data set and the use of CALPUFF, the presence of outliers is limited and very often what appears to be an outlier when you look at it very closely is usually some sort of change in the wind that occurred halfway through the hour or some stalling of the weather or something like that. The model actually can teach you things if you look really closely. So, I'm not convinced that the outliers are quite as significant as they used to be with earlier generation models than they are now.

30
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40 The key issue that I had is that I think there's a role for the 100th percentile approach and the Monte Carlo approach, the statistical approach. I would have very much liked to have seen both done as was recommended by the experts and both analysed holistically. I felt it's not quite appropriate for the EPA to be modelling something in the level of detail that the proponent would need to model it. It's just the data and the detail that EPA would need just isn't available to it, so this really needs to come from the proponent, in my view, as a third party modeller. So I was a little disappointed to see that, but the key thing here with the approach is that what's being modelled is representing the

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5 fraction of time that these events actually occur in a year. So for ships it would be six ship events. I think we're looking at five or so hours to open the holds and then the emissions would be present and being dispersed in the air for some time after that. For the log stacks, I wasn't able to determine exactly what was modelled. The data provided shows 51,000 hours of ventilation in a year. There's only 8,760 hours. Obviously, there's overlap when the logs are being vented. It's the reason why a third party modeller is not really able to produce a very detailed model.

10 Nevertheless, the modelling approach that was taken there is using eight model runs over three years. It's not 100 per cent random, I would say. The FORTRAN code generating that uses a fixed seed. It's getting very technical but it will produce the same set of hours every time you use the same seed. A truly random model would generate a seed input with some other random number, like the time clock on your machine to the hundredth second or some other thing like that that you don't have any control over. I think that's a minor point.

20 The key point, though, is that with the Monte Carlo approach, for ships in particular, there are far, far more hours of weather conditions in a year that were not modelled than were modelled. The big difference with my modelling is I've looked at every hour and I've found the impacts that occur when the worst dispersion occurs, the 99.9th, which is the ninth highest hour of poor dispersion, and so on down the line, 25 down to the 95th and even the average. I'm not convinced that it's reliable to be modelling what occurs only eight times and then taking a 98th percentile and throwing the top 2 per cent away.

30 **[2.55 pm]**

35 In particular when the ships and the logs are put together in the dataset and mixed up. That would be far more reliable for the logs on their own. You're losing the top 2 per cent of what's a large number of hours of fumigation, but for the ships in particular, which are only happening a very small fraction of the time of the year, perhaps less than 1 per cent or maybe closer to 0.5 per cent of the time in the year, to be then throwing out the top data there when there's more than a 99 per cent probability of worse data occurring in the year, I don't think that's right.

40 The next thing was the validation. The thing we were hoping to see from that reporting was a validation where the available data was matched in space and time, so we actually had the actual events occurring as they occurred matched with the weather data that occurred at that time. Now, all right, it's a different way of looking at the 45 validation and it's true that these models are not brilliant at getting things right in space and time, there's no question about that.

5 What I find is if you look at the data plus or minus one hour or plus or minus two hours, these models actually do match very well in space and time if you give it that tolerance or if you give it an angle for the wind tolerance they do tend to be very reliable at the scale of impact at a particular distance as long as you can move your distance in a slight arc left or right around the actual point.

10 Really that's about it, so I'm not trying to say that there's any fundamental problem with using Monte Carlo, that's a perfectly valid approach to use. My belief is that it should have been looking at the 99.9 because that's the guideline, and in particular when you're only modelling things that aren't happening a lot. I think it could have been improved by doing more than eight runs, but it's quite an onerous task and I can understand why that was done. That's all I have.

15 MR BAILEY: Back to you, Mr Wilson.

CHAIR: Okay, thank you for that. Dr Belton, in your hands.

20 QUESTIONS

DR BELTON: Thank you, Mr Wilson. I guess the first question is how do the changes to the application that were confirmed this morning impact on the recommendations and conclusions of the staff report?

25 MR BAILEY: I think the recommendations from the staff report of when recapture is not taking place are still valid and still remain. We would have to reconsider proposals for when recapture takes place. Sorry, if we could go back to slide 34 and 33, because the modelling conducted and provided to us this year combined ship hold and logs in their draft representations provided to us in the report, you can see the line at which the 1 parts per million 1-hour TEL would be reached in the Sullivans' modelling extends beyond that for both the Golder and the TS modelling conducted. If we go on to the next slide as well. That's particularly for when we look at recapture from ship holds. Although they are not the same extent, there is a small difference in distance between the 80 per cent recapture modelled by TAS and the 30 per cent modelled by Sullivans.

40 [3.00 pm]

45 They're similar enough to give some confidence that both models are in the same ballpark, but the changes that Sullivans have made to their model in response to the errors identified, we would have to go back and probably further review what the graphical outcomes of those models would be, given any proposed changes to the recapture for both ship holds and log stacks separately and combined. Does that answer your question, Derek?

DR BELTON: It begins to. How long is that going to take? What other information do you need to help do that or have we got the information?

5 MR BAILEY: At the minute we would need to see the outputs in sort of graphical format as well as table format for the models at 30 per cent for the different percentiles, particularly as we're proposing to use the 100 percentile in our recommendations to you, although I do note that the graph shown on the screen from Sullivans' modelling is at the 99.99
10 percentile. From there we'd have to do a review, again a check of do the data files and the report text match and are we satisfied, with support from our expert, that the information being presented can be relied on and is free of critical errors. I'm sure there will be discussions of - as with any model - small parameter values, but it would be to see
15 a report produced with graphical outputs for the different percentiles and different rates separated for log stacks and ship holds that we could then review.

DR BELTON: What sort of timeframe would we need to go through all of that?
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MR BAILEY: I couldn't tell you the timeframe that they would need to produce an updated report. That would be for the applicant to advise. I know we asked Dr Todoroski to turn this review around really quickly and you've just heard Aleks say he preferred a little more time, so it may
25 take us a month or six weeks to conduct a detailed review of any proposals in the models.

DR BELTON: For me that's the most critical question, is in mapping how we go forward with this. There probably is more detail, but maybe that's not
30 relevant to us now, so I'll leave it at that for the moment, thanks, Tipene.

DR TODOROSKI: I may be able to add something there, but I'm not really sure that it's relevant. In our original modelling we looked at the 80 per cent control scenario and did more detailed analysis on that. However, we also have
35 a 50 per cent control scenario and it would be very straightforward to look at a 30 per cent control scenario. That could be done in a matter of days. However, that's simply for three logs in a stationary position and that may not be the most relevant thing to be looking at.

40 CHAIR: Dr Phillips.

DR PHILLIPS: Derek has asked one of my questions, so this is for the EPA. My next question was you saw Dr Pemberton's presentation and you've seen his evidence. Do you consider that the TELs need revising?
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MR BAILEY: Although we acknowledge that the TELs are relevant to the whole of this risk assessment and reassessment, from the information provided by Dr Pemberton in his evidence statement we do have questions about

the sufficiency of the level of detail or the lack of clarity in some of the critical aspects in that submission for us to be able to provide a definitive view on that at the minute.

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[3.05 pm]

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If we were to provide a more thorough evaluation of the submission, then we would need some clarifications from Dr Pemberton. Also that evidence relies quite heavily on a very large document that we would need to have analysed in quite detail by our toxicology team. It's not an answer I can give you at this time, I'm afraid, Dr Phillips.

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DR PHILLIPS:

No, that's fine. That's kind of what I expected you to say. I guess the other thing too is that that assessment is based on Dr Sullivan's report and it was based on the report prior to the final revisions, I think. It's a little bit hard to keep track of which model or report we're talking about. So there may also be, I guess, some additional questions around that as well, as well as the adding to the questions around any additional modelling that might need to be done of the 30 per cent as well. By the sounds of it, there's a fair bit of extra work that would need to be done on that.

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MR BAILEY:

Dr Phillips, in addition to that, we are aware that the value in New South Wales is an order of magnitude lower than the one that we use in New Zealand and that would then result in a two order of magnitude difference between different points values. That would need to be taken into account and the reasons for those differences understood if we were to suggest any revisions to the TEL values.

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DR PHILLIPS:

Yes. We're sort of stepping over almost into the HSWA legislation here to some extent, aren't we, and what's already set in place that came out of the 2010 decision?

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MR BAILEY:

Yes.

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DR PHILLIPS:

Beside the fact that it's actually not the subject of this application, but I just thought it would be interesting to explore it seeing that it's being discussed. I'm not sure you'll be able to answer this question. I'm just interested in -- I guess for me this question of concentration versus percentage. I struggle with that personally just because for me concentration is something that I can relate to because to me the concern I have with it mainly is that it really depends on your starting point concentration. I appreciate that there's a whole lot of parameters -- Dr Armstrong articulated very well a whole lot of different things that happen underneath a tarp - we'll just talk about tarps here - that can influence how much is left in the headspace after a period of time. Do you have any idea how variable the input

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concentration is at the start of the recapture or, no, the fumigation process, sorry?

5 MR BAILEY: At the start of the fumigation process it depends on the destination country and their requirements. China can be up to 120 grams per metre cubed for 16 hours of fumigation; with exports to India with 80 grams per metre cubed for 24 hours of fumigation. I think again as some of the experts this morning indicated, the details on that may be better answered by either Genera or MPI.

10 DR PHILLIPS: I kind of assumed that that number might vary a bit depending on the size of the log stack and this sort of thing, but are you saying that this is a requirement that all log stacks that go to China have to start with 120, say?

15 MR BAILEY: So the amount of methyl bromide will differ by log stack size. It's 120 grams per metre cubed of the area underneath the tarp, in the case of China, that needs to be fumigated, or if you have a bigger log stack the amount of methyl bromide will be higher than a smaller log stack, even though the concentration in the headspace will be the same.

20 DR PHILLIPS: Yes. I'm trying to get my head around that one. All right, thank you. I thought I had a question for Dr Todoroski. No, I'll just leave it there at the moment, thanks, Chair, and if I have any more questions I can come back at the end.

[3.10 pm]

30 CHAIR: Thank you, and my apologies if I repeat something. I had technical issues of my own and I thought you guys dropped out, but it was actually me. So, just acknowledging, too, that I've seen questions which we'll come to from participants.

35 This morning I asked a question of Mr Hammond regarding a suggestion that the quantity of -- the Bay of Plenty position that the quantity of ships in the hold, fumigation in ship holds be limited to a certain amount. He gave a response about -- my words, not his, but the potential of a constraint on trade. I would be interested in your comments on this, of a control such as setting the amount.

40 MR BAILEY: Yes. I don't think we can comment on the impacts of things like trade. The way we've approached it with the control of -- without recapture, of a focus on a 1.9 kilometres, we think would ... I'm pausing to -- we may have to come back to you on this, but my initial thoughts are that the control we set by the buffer zone would help manage that and we at this time don't have an initial thought on whether we should restrict the amount of ship hold fumigation to that site in 2018. If that's a

question we can think about and come back to the DMC at a later point if you need clarity on that question?

5 DR TODOROSKI: I may be able to add something there. The modelling that I have done is based on the amount released from a ship, not how many ships are modelled. Because I've modelled them in any hour of the year, so therefore those 100th percentile values would accommodate any number of ships fumigating whenever they would like, but they show impacts, unfortunately.

10 CHAIR: Thank you. I'm not sure we need any more information at this stage. It was more curiosity in terms of that as a potential control. You did mention buffer zones so that leads into my next question. Mr Slyfield in his submission submitted that buffer controls are outside the jurisdiction of this reassessment. I don't agree or disagree at this stage. 15 Then your table 13.74 or at 13.74 of your report does recommend buffer zone distances, and then with references to (inaudible) and so on. Could you clarify whether in your view it is the DMC's role to set buffer controls or is it a moot point in that under regulation 14.29(1) 20 the PCBU would have to maintain TEL at the boundary? So I'm just interested whether we have a role in setting of buffer zones.

MR BAILEY: We proposed the buffer zones because we believe that you do have a role in setting a supplementary to those set in the Health and Safety 25 (Hazardous Substances) Regulations. You're right that there are regulations there that require the PCBU, so the person controlling the business unit, to manage the risk such that TEL will not be exceeded outside the buffer zone, but as you can see from the conversations and discussions between the modern experts today it's prudent to set some 30 national direction on what percentile should be used for setting that assessment in that buffer zone.

[3.15 pm]

35 CHAIR: Thank you. Mr Slyfield, not for your response now but perhaps you might like to consider something in your right of reply, please.

40 Now, the same question that we asked earlier with the 30 per cent, with the applicant now suggesting a 30 per cent recapture and putting aside for the moment the rationale of that, my question to you is whether you can provide any advice or to help us to understand whether we should or should not consider this to be treated as a new application.

45 MR BAILEY: Can we come back to you on that one? The scope in the pathway determination was around the controls of use. The applicant could decide to withdraw their current application and submit a new one if they wanted to, but it would be up to you as the Decision-making Committee to seek if you had the evidence available in front of you

from all parties to the hearing, whether you were able to make a decision on 30 per cent, 50 per cent or 80 per cent.

CHAIR: Or deny the application altogether?

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MR BAILEY: Correct.

CHAIR: Okay, thank you. I would be interested in that and I acknowledge that it is the DMC's responsibility that we -- on the face of it, the technical evidence that's been provided is the evidence that's been provided, but there is an issue in my mind of fairness of the process in terms of what people have submitted against or for, and that's based on 80 per cent. I don't have a position. I'd just like some help in forming that position.

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So, Dr Todoroski, coming to you, just the one question really. Noting that the responsibility rests with the proponent to do the detailed modelling and so on and so forth, we see some lines in the maps that were shown and there's been lots of lines on lots of maps. I note that in some of the modelling TEL is reached in a residential zone by my reading of the maps. So, I am interested in your view as to what conclusion you draw regarding buffer zones based upon the modelling, including your own modelling.

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DR TODOROSKI: The modelling for the log stacks on the wharf, the majority of the analysis that I conducted there was based around an 80 per cent capture on all of the logs. That indicated that maybe with some minor adjustments to the hours in which it occurred, limiting it to daytime hours, maybe a few controls at the edges, there was no particular issue of impact for that. However, for the ships, what the results show is that there is the potential if the worst-case dispersion conditions arise when winds are towards receptors, for a fairly significant impact to arise.

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The subsequent things from that modelling that would help ameliorate that are this idea of allowing a two-hour gap between opening each hole, that would substantially reduce the potential scale of impact. We have not looked at that. Dr Sullivan's work has a one-hour gap but it hasn't looked at every hour of the year. So it lies somewhere in between. It would certainly be less than what we have presented in our modelling. It is quite likely to be smaller than the residential zone, and there was a question I saw in the chapter on (inaudible) that was quite pertinent. It says our modelling is at 120 but these ships are going to India where the dose is 72, so it is substantially lower.

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[3.20 pm]

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In the back of my report you will see results at 40 and 72 and other doses. I am just looking at those now. At 72, the maximum for one ship is only slightly into the residential area and if one was to stagger

those ship holds I'm fairly confident that would not reach into the residential area but it may reach into the shore areas where there are businesses and so on. I don't know if that's helpful, but that's about the best I can do to answer that right now.

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CHAIR: Okay. Thank you for that. Mr Glassie(?), I'll come to you in a moment if you feel that Dr Todoroski hasn't answered your question. So that's all from me. Thank you. I'll come back to my fellow DMC members in case there are any further questions before we carry on to the applicant.

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DR PHILLIPS: No, I'm all right, thanks.

CHAIR: Dr Belton?

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DR BELTON: Not from me either. Thanks.

CHAIR: Okay. Mr Slyfield, in your hands.

20 MR SLYFIELD:

No questions from the applicant, thank you sir.

CHAIR: Right, we have a question from Mr Glassie, which you've answered. Mr Weiss, you have a question?

25 MR WEISS:

Thank you. A question for Mr Bailey. You mentioned in your presentation that it's important to know how much methyl bromide is left at the end of the recapture process, prior to release. I think we can all understand that. Then you also proposed some controls around measuring methyl bromide at the end of the fumigation period and at the end of the recapture period so that the percentage reduction can be calculated in terms of recapture. I just wonder if you gave consideration to defining recapture and in terms of a final concentration under the tarpaulin given that when we look at the actual figures, the concentrations that those percentages relate to, we're in the vicinity off 3,000, almost 6,000 parts per million, which as you know is thousands of times higher than the current allowable concentration of one part per million?

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40 MR BAYLEY:

We did think about whether the control (inaudible) had been a percentage reduction could be a concentration value and do note that that was your request in your submission. It came down to conflicting information in the evidence provided by the applicant in their application form—the further information request about what techniques could achieve particular concentration values. I do note that Sumito(?) who I am sure will be speaking later did state the concentration values they could reach but given the information, and for the certainty of achievable control, that is why we proposed the

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same recapture concentration that the applicant had requested in their application form.

5 MR WEISS: Presumably that percentage relates to a certain concentration. So if the
modelling is done on a certain concentration, and the buffer distances
then reflect that concentration, then wouldn't it be clearer for all parties
to have that concentration stated up front? Otherwise, it's quite
uncertain and difficult for any person carrying out an audit of this
10 recapture process to determine whether or not it is complying with the
definition of recapture. It would be much simpler if there was a
concentration stated, that all parties are clear on what that needs to be,
because otherwise if that concentration is higher because of a
percentage, then it could be that in fact the models have under-
15 represented the levels of concentration at a distance, if they haven't
indeed taken that higher concentration into account.

[3.25 pm]

20 CHAIR: Mr Weiss, just a reminder that you are slipping into submitting rather
than asking questions. I will come now to the EPA, if you want to give
a response to that.

25 MR BAILEY: Pretty much a repeat of my previous answer of (inaudible) before about
with certainty what was achievable. I definitely do note the submission
by the Bay of Plenty Regional Council and Mr Weiss requesting a
particular concentration but because of the different volumes—the
concentration of methyl bromide for different markets and then the
information provided by the achievability of different techniques,
30 particularly with the variability of (inaudible) as well, that's why we
went with percentage reduction and also why we included the
requirement to measure the concentration at the end of fumigation as
part of the audit trail to then compare to the concentration at the end of
the recapture before venting.

35 CHAIR: Thank you. Mr Weiss, any further questions?

MR WEISS: Thank you.

40 CHAIR: Okay. Thank you. And next is a question from Mr Baker from Genera.
It's online for everybody to see, but just so it's on the record, the current
buffer zone management is based on a distance that can be
accommodated within a private premise such as a port. The
organisation discharging the fumigant governs the rate of release to
ensure (inaudible) are not exceeded at the buffer zone port boundary.
45 How does the EPA see the proposed buffer zone being applied in
practice, ie 1.9 km from a vessel.

- MR BAILEY: That buffer zone is based on the model results that we looked at and that's in the conversations we've already had today about what percentiles to pick and what concentrations to use when selecting that. But those buffer zones are for the protection of public health and we would expect operators to find locations always to be able to achieve such buffer zones in order to protect public health.
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- CHAIR: Thank you. Mr Baker, if you come on, if you have any further question there, otherwise we will go now to Ms Smith.
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- MS SMITH: Thank you. My question to the EPA is about the recommendation that there be effectively a further lead time before the recapture requirement that you have recommended comes in and what I was looking for was direction as to where it is in this large volume of material that we find the information that says that lead time is needed and who says it and what do they rely on.
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- MR BAILEY: Off the top of my head I can't remember the exact document. We can make sure it's provided, and I will make a note of it, maybe tomorrow so it can be recorded for the transcript, but it was a request directed to me from the DMC about what, if any, leading time was required. That information was provided by STIMBR but it was information provided, as I understand, by Genera. The applicant this morning indicated a phasing in of that leading time rather than in two years' time. That is something that the committee may want to consider as a variation to our proposed control.
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- [3.30 pm]**
- 30 MS SMITH: Just a follow up to that. If it was possible to persuade the EPA or the DMC that the reasons for that requested lead-in time didn't apply, would that be relevant to that recommendation for a lead-in time? What I mean in particular is if it were possible to achieve a scaleable commercial recapture process quickly, would that recommendation change?
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- MR BAILEY: The recommendation is based on information provided to us about what T&G(?) can achieve. Does that answer the question?
- 40 MS SMITH: Yes. Sorry, just one final follow-up. Just looking at paragraph 8.4 of your report, and there is a reference there to the fact that a number of the submitters were saying effectively they are not investing in the technology to achieve recapture because they have a concern that they may spend that money and then they have another option, which I assume is EDN. What would you recommend be required to make sure, if that lead-in time was given, that work did continue towards achieving it so we are not in the same position in another two years?
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MR BAILEY: I think that would be a question for any potential reassessment in that ten years if that requirement was not achievable at that point, subject to any alternatives - either technology or chemicals - that could replace it or even change the trading partner requirements. I don't think I can answer that now for this reassessment of what would happen in ten years if no progress had been made.

MS SMITH: Sorry, I said two years.

MR BAILEY: Sorry. The same answer, if the Committee were to set control along the lines with a two-year lead-in time then the science would apply, the controller to be complied with unless there's a further application.

CHAIR: Thank you that. Ms Barry-Piceno, you had a question, and if you wouldn't mind just letting us know which organisation you're from, if you are from an organisation. Thank you.

MS BARRY-PICENO: Yes, thank you, sir. I'm with the Tauranga Moana Fumigation Action Group. My question was to the EPA report, that's Mr Bailey and, I'm sorry, I don't recall the name of the other person who was beside Mr Bailey but it's for him as well.

[3.35 pm]

My question was to do with the reliance in the recommendation to the balancing of effects, and whether in the context of that the issue between efficacy versus efficiency has been balanced by them. What I mean by that is some of the statements made by the reporting officers referenced the benefits in regards to exporting to China and India in terms of the economic benefits, yet as I understand it from the evidence of the applicant China accepts a different form of treatment, namely Phosphine, than methyl bromide and there's also other alternative forms of treatments but the real reason why that's not preferred relates to efficacy reasons. So that as I understand it in terms of those figures, the primary issue comes down to the cost of India exports rather than China and that's the real focus, as I understand it. I just wonder whether the reporting officers have considered that in that context.

MR BAILEY: Could you summarise that question, Kate, because that was quite a long introduction? Could you summarise it and go again, please?

MS BARRY-PICENO: So in terms of the role that you have under the HSNO Act and what you have to consider which relates to a wide-ranging number of aspects in terms of people, communities and the environment, if I can sort of put it into a parallel, those are similar to considerations that fall under the RMA. Where those considerations are assessed generally in reports under the RMA under section 32, the courts have been quite clear that there's a difference in analysing efficacy in terms of managing adverse

5 effects as opposed to efficiency. Where the courts have landed on that
is efficacy is really an economic cost such that whilst there is obviously
for the applicants greater efficacy to, for example, not treat the logs on
land under tarps as opposed to in a ship hold, because it doubles
timeframes and therefore labour costs, that's different than an
efficiency argument in the context of looking at environmental
efficiencies that weigh up a range of measures. I wonder if it in terms
of your analysis you've looked at that, because it appears when you
provided your report you have focused on, for example, lumping
10 economic effects to do with China and India in the same manner but in
fact they're different because of that efficacy consideration.

MR BAILEY: I'd say not in the detail you're talking about.

15 MS BARRY-PICENO: So a follow-up question on that is did you, in terms of the figures that
were provided by the applicant's economist, did you get any economist
to do a peer review because I haven't seen that evidence?

MR BAILEY: Information from the applicant - as we present in the report and my
20 colleague, Mr Deeble, talked about when he talked through the first
half of our presentation - was also supported by information from the
Ministry of Primary Industries but, no, we didn't get an independent
economic review.

25 MS BARRY-PICENO: So just so I'm clear, in terms of the EPA's consideration of the figures,
where the costs have been treated as an absolute, there has been no
economic evidence to say, for example, if total recapture technology
was adopted what the economic benefit would be to New Zealand as a
net cost with those additional figures in place?

30 MR BAILEY: We have done no work in addition to that provided by the applicant.

MS BARRY-PICENO: Thank you.

35 CHAIR: Thank you. Did you have any further questions?

MS BARRY-PICENO: No, thank you, sir.

40 CHAIR: Any other submitters wish to ask a question for clarification? Okay,
wonderful. Well, thank you, team. Now, we've got WorkSafe up next,
however I just want to check people's appetite for a 'cuppa' or shall we
just plough on through?

45 MR BAILEY: There's a feeling in the room in Wellington that we would like a cup of
coffee, please.

CHAIR: Okay. I'm glad someone spoke otherwise we were going to carry on, that way it's not my idea. It's 3.38 pm, let's reconvene at 3.55. Okay, thank you.

5 **ADJOURNED** [3.39 pm]

RESUMED [3.54 pm]

10 CHAIR: Kia ora no tātou. Can you hear me all right? Yes, okay, great. So we now come to submission from WorkSafe.

[3.55 pm]

WORKSAFE PRESENTATION

15 PAUL MOENBOYD PRESENTING

MR MOENBOYD: (Māori content). My name's Paul Moenboyd and I'm from WorkSafe's regulatory frameworks team. We look after WorkSafe's regulatory tools and work with our technical specialists to provide input on work by other agencies, like this reassessment. So today I'm just going to walk through, as quickly as I can, WorkSafe's role in the system. So I'm just going to share my screen, if it works. Can everyone see that all right?

25 CHAIR: Yes, thank you.

MR MOENBOYD: Okay. So in 2017 the requirements for hazardous substances was split across the two regimes. The work requirement shifted to regulations under the Health and Safety at Work Act which are administered by the Ministry for Business Innovation and Employment (MBIE) and enforced by WorkSafe. If those regulations allow, WorkSafe can develop requirements for the Minister's approval using safe work instruments; whereas the requirements for importing and manufacturing hazardous substances, controls for public health and the environment and on new or reassessed hazardous substances remained under HSNO. The EPA sets controls under HSNO in EPA notices and in approvals and reassessments like the one today. So because the controls are split across two regimes WorkSafe can provide advice to the EPA and applications to approve or reassess hazardous substances. When we do that our role is to look at the default requirements in the regulations or safe work instruments and advise whether they're adequate for the substance, and if not whether we can develop a safe work instrument and if we did what it might look like. So in this reassessment we looked at the application, documentation such as the staff report and the current requirements for methyl bromide.

Methyl bromide has specific requirements in the regulations, many of which are based on the last reassessment in 2010. There are only a few

safe work instrument provisions for methyl bromide which I'll get to shortly.

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Once the reassessment is complete we'll take a look at the controls that the DMC sets and we'll think about what they mean for the requirements that we enforce. This might include providing advice to MBIE about what we think that means for the requirements under the regulations.

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A bit more really quickly on safe work instruments. We only make safe work instruments if regulations refer to them, so they're quite restricted. We have to consult on them and get approval from the Minister. They're subordinate to regulations, so if regulation sets specific requirements a safe work instrument can't override those unless there's a provision allowing this. They also have to be consistent with what the Act seeks to achieve, so the health and safety outcomes that the Act seeks to achieve, and with WorkSafe's wider goals. A safe work instrument that adds to or changes requirements must be at least as effective as the requirements that would otherwise apply. So we think about all of this when we provide advice to the EPA.

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For methyl bromide there are provisions for toxic and corrosive substances in part 13 of the regulations and in part 14. There is a general provision in part 13 but if we wanted to use that safe work instrument provision we'd have to consider also the specific provisions for methyl bromide in part 14 and those are quite limited. Those safe work instrument provisions refer to the people who can handle the fumigant, notification and signage requirements, restrictions on containers, requirements for ventilation, record keeping and for allowing an alternative fumigation method.

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So our advice to the EPA was that it was unlikely we could use a safe work instrument to address the matters that have been discussed in this reassessment, which is mainly the buffer zone, or that we capture requirements. However, as I said earlier, once the reassessment is complete we will think about what that means for us and discuss that further with MBIE. That's me. I'm a bit lost with my screen sharing here. I'll pass that over to Pip.

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[4.00 pm]

WORKSAFE PRESENTATION

PHILIPPA GIBSON PRESENTING

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MS GIBSON:

All right, hi. It's Philippa Gibson here from WorkSafe in the technical specialist team. I'm just going to talk to you very quickly about our

methyl bromide project that we've been doing. Are you seeing that okay, the purple screen?

CHAIR: Yes, thank you.

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MS GIBSON: Great. So, we've been carrying out a monitoring and modelling project involving the actual measurement of methyl bromide and modelling for those events at the Port of Tauranga. The monitoring locations have been, for the most part, at the boundary and some of them on the site. What we've been doing is taking measurements and actually using the data for that fumigation and the data from monitoring to then apply that to modelling -- sorry, to then model those actual events. The objective is to actually compare monitoring data with various models to help understand which would be the best models to use in terms of understanding the dispersion of the gas. We've looked at one-hour averages, 24-hour averages and doing PID monitoring every three seconds.

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We've used two methods side by side, the SUMMA canisters which are specific for methyl bromide - that's the sort of silvery canister on the right - and that's specific to methyl bromide. We take an hour-long sample or a 24-hour long sample and then having that side by side with a PID, which is the common method used for measuring methyl bromide which is, of course, non-specific and it picks up other gases that could be present such as pinings from timber, some of the compounds that come off vehicle emissions, etc. We've had those side by side to try and get some understanding of the comparison of the two results and how they compare, albeit there are limitations to that. To date we've done ten fumigation events. For each of those events we've had three or four one-hour averages measured using both PID and SUMMA canisters and we've also had one or two 24-hour averages measured for those events. We've done one ship, both holds, and nine log fumigations of different sizes with a total of 88 samples, 71 one-hour averages and 17 24-hour averages. Like I say, most of those have been at the boundary of the Port, though 23 percent have been within the boundary just due to some limitations around where we can actually place the samples.

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We've had slow progress due to the usual things that have been going on for everybody. Wind direction is really important because if the wind is blowing offshore we obviously can't go and set up our monitoring equipment and sometimes the wind changes direction very rapidly in completely the opposite direction so there's not an opportunity actually pick up the gear and relocate it. You just have to keep in mind that there are limitations with outdoor sampling where you're basically just taking a small spot and space, that you have a whole lot of variables including not only the weather, the location of the sample and what other things are in the environment that might

affect air dispersion or gas dispersion. There are a lot of variables with the fumigations themselves, the size, the amount of gas, the speed of the tarp removal appears to make a difference, etc.

5 The results we've got so far is that we've had no measured - as in from
monitoring - exceedances of the 24-hour or one-hour TELs at the
boundary. However, our modelling indicates that the one-hour TEL
10 could be exceeded at the boundary and we'll talk about that next. On
four occasions we've had measurements that were greater than 1 ppm
and that's seven samples in total. By that I mean that we've had three
occasions where both the TVOC and the SUMMA canister measured
greater than 1 and then there was one other occasion where the
SUMMA canister actually measured greater than 1. None of those
15 levels greater than 1 ppm were at the Port boundary. Two of the four
occasions 1 ppm was exceeded at less than 50 metres from the
fumigation. The measurements for those seven were between 1, give
or take error -- between 1 - 5 ppms was an one-hour average there. The
maximum sort of instantaneous ill-effect level of TVOC was 36 ppm
20 at about 30 metres from the fumigation.

One interesting point is that we've noticed large differences between
the TVOC and the SUMMA readings from side by side. For most of
the readings the comparisons -- the PID reading was greater than the
SUMMA which you would expect because theoretically it's picking up
25 methyl bromide plus other gases. However, there was actually quite a
significant proportion where the SUMMA canister gave a higher value
than the PID reading. That's interesting to observe but we do note there
are limitations in the direct comparison, even if you have the nozzles
or the inlets of both methods right beside each other it's normal to
30 actually have some variation between those two.

[4.05 pm]

35 The last slide from me, we do plan to keep on doing this project up to
20 events so we're halfway through at this stage. From now on we're
actually adding some additional elements to the monitoring where
we're going to do drone monitoring, with a drone with a PID on it
actually monitoring inside the plume or monitoring the plume itself on
the Port, above the Port, plus additional fixed PID monitoring points
40 plus one hour and 30 second measurements using FTIR, so infrared
methodology which is again very specific to methyl bromide. We will
do FTIR right beside the PID as well so that we can do further
comparison of the TVOC levels to actual methyl bromide levels.

45 Now we're going to hand it over to Chris Bender from PDP who will
talk about the modelling side of it.

WORKSAFE PRESENTATION

CHRIS BENDER PRESENTING

- 5 MR BENDER: Hello, everyone. Thanks, Philippa. Can you hear me all right?
- MS GIBSON: Yes.
- 10 MR BENDER: Okay, good. I'm Chris Bender, I currently work at Pattle Delamore Partners as a quality scientist. I have around 25 years of experience as an environmental scientist, with about 20 years of that being in the field of air quality. I'll just share my screen for my presentation to you. I'm struggling a bit here. Can someone point me to the screen-sharing button?
- 15 CHAIR: Try the bottom middle of your screen.
- MR BENDER: Yes, it is. Thank you.
- 20 CHAIR: Then click on which window you want to share.
- MR BENDER: Yes, all right. Can you see that?
- MS GIBSON: Yes.
- 25 MR BENDER: Good. All right, just a quick overview, as Philippa discussed there have been a number of dispersion modelling studies undertaken to date. As also discussed today, one of the key gaps that has been identified has been monitoring data to validate the modelling results so WorkSafe has commissioned this set or series of monitoring studies and has engaged us at PDP to model the specific parameters around those fumigation events and try and correlate them with the monitoring data. There's a link to our report which was submitted to the EPA which covers things in detail. I'll go through this quickly in the interests of time and if
- 30 anyone has any questions at the end then I'll be happy to answer.
- 35

[4.10 pm]

- 40 Again, the budgeted objectives to the actual monitoring data with the various models setups and approaches and methodologies that identified the most appropriate method for predicting dispersion to improve our understanding of dispersion from the fumigation sources to help set out upper zones. To develop our modelling approach we first reviewed the modelling undertaken to date, including Dr Sullivan and Dr Todoroski's work and decided that CALPUFF has the best
- 45 available model due to its ability to (inaudible) in variable winds, constant meteorology and set hourly timescale.

5 The traditional one-hour modelling, which is best-practice modelling to compare against the one-hour TEL. We didn't feel like we needed to do the 24-hour modelling because the TELs were well above autonomic(?) monitoring results of the 24-hour period that WorkSafe got and also it was quite hard to know what was happening at the port when the monitoring crew wasn't there. They were typically only there for an hour or two around the fumigation ventilations.

10 We also tried --because we had the high-time resolution data at one-minute both for meteorology and for the emissions, we tried something that's a bit new for us, which is to model at a one-minute time step. That's just to try and capture the high variability of fumigation events.

15 This slide shows the ten monitoring events to date. The orange bars there are the quantity in kilometres of methyl bromide released during the ventilation phase. There's 1 ship-hold fumigation, which is just over 1,400 kilograms, and the log stacks released between 22 kilograms and 169 kilograms and ranged from 2 log stacks to 11 log stacks.

20 This blue line is percentage release compared to the total methyl bromide applied. There's around 60 per cent capture, 60 per cent of the total -- no, excuse me. 60 per cent of the methyl bromide applied was released for the ship-hold fumigations and up to 91 per cent or 92 per cent was captured or absorbed into the logs for the log stacks.

25 Our inputs were meteorology, which we obtained from the Port of Tauranga monitoring sites, Bay of Plenty Regional Council sites and the monitoring team engaged by our worksite, which is Air Matters. They had a couple of portable stations that they borrowed from NIWA. Methyl bromide emissions were determined by Genera and they calculated that based on headspace and pre-ventilation concentration for each log stacks and ship holds. The source characteristics were determine by a combination of aerial imagery, (inaudible) notes from the monitoring staff and records from Genera.

35 The output are the meteorological datasets, which is what we're getting to, model predictions of methyl bromide as a ground-level concentration, and then a comparison of the monitoring versus the modelling results, which I'll show you in a bit.

40 For emissions estimation, this came from Genera. They're the ones who are allowed to be on the port and keep these records. They know the volume of the logs. They can estimate the volume of the total enclosure, and the difference is headspace. They don't normally do this, apparently, but for us, because we asked them to, they took records of the pre-ventilation concentration and from that we were able to calculate the total release for a log stack.

45

5 The other key parameter is the timing of the releases. That was highly variable because with the log stacks it could take from one to several minutes for a log stack as they pull the sheets off the stacks. There could be several minutes between stacks or they could be in quick succession, so it's key data for us.

10 Meteorological inputs. There's a wealth of data at the port, blue stations, and on the left were collecting at one-minute intervals and the ones on the right were at ten-minute intervals. Ten-minute intervals are run by the Bay Of Plenty Regional Council. We used those to draw up our one-hour time-step following sets. For the one-minute, sub-hourly monitoring, we used the port data and some of those NIWA data. Those datasets were developed for us by Atmospheric Science Global.

15 [4.15 pm]

20 First parametrisation is basically how you want to represent the source in the model. We picked volume sources as the most appropriate, based on previous reviews by other modellers for the other projects. For the log stacks, this is the example of an 11-log-stack ventilation. Each log stack is represented by a series of square volumes -- cubic, I guess I should say, volume sources. They would be released in succession based on the timing that was provided to us. The mass emission rate for each log stack also varied depending on what information we were given by Genera.

30 I'll just quickly -- this is just a part of the monitoring, PID measurements versus (inaudible) measurements that were discussed just previously. For lower concentrations it's mostly PIDs over-predicts. We suspect that's in part because there are a lot of (inaudible) at the port. That was confirmed in discussions with the lab. These canisters were analysed by GCMS and they could see the full spectrum of al VSEs that are in the samples. The amounts of (inaudible) were quite high relative to the methyl bromide mix but at the higher concentration they match a bit more and that's presumably because they're dominated by the high concentrations of methyl bromide.

40 There's a lot in this slide to unpack. There are all the modelling versus the monitoring results as one-hour averages. The blue bars are the monitoring results, the orange bars are modelling results. It illustrates how difficult it is to model correctly and get accurate results compared to your monitoring values. There's just so many layers of uncertainty in your estimations of emissions, wind speed and direction and how the model interprets all that. Over all it looks like there's quite a lot of variability, and there is, but as far as modelling validation goes it's not too bad, in my experience. Sometimes the model over-predicts, sometimes it under-predicts and sometimes it's pretty close.

5 So these are the four -- these four blue bars above the TEL line are the ones that Dr Todoroski was mentioning before. It shows it's not that frequent an occurrence but it does happen. I believe this one was right at the boundary (several inaudible words) within the boundary.

10 I just wanted to give a couple of examples of different types of plumes. Some of the model predictions near the source of the discharge, there's a very steep concentration gradients, meaning that it doesn't take much distance for you to get large differences in concentration. I think that's one of the points that Dr Todoroski was making in his last talk when he said that the distance in the model can be quite accurate but the plume could be a few degrees in either direction. That makes a huge difference in whether, for example, this monitoring site would be within the plume or not. When you look at the modelling results you can just look at the equivalent distance. For example, here you would be expecting the worst case at that distance and that could occur anywhere along this circular mark.

20 For the different types of plume dispersion, I chose this one because it has a pretty broad, diffuse plume, whereas this other one is a focused or concentrated plume. That's attributed mainly to the atmospheric prevalence or the atmospheric stability conditions. This first one had a very unstable atmosphere with a high mixing height, which has produced (inaudible) dispersion. You can see a broader plume, basically, just repeated over a wider space, whereas the second example had a neutral atmospheric stability and it had less turbulent mixing and a narrower, more focused plume, which appeared to be a less diffuse plume but it gives you higher concentrations at a greater distance relative to the mass-emission rate.

[4.20 pm]

35 I've just been talking about the one-hour modelling results so far because that's relevant to the one-hour TEL and gave us the best results. The one-minute modelling that we did gave us some interesting results as well, even though it did tend to under-predict over all. That's what Mr Bailey was referring to in his comment on our report. He said we under-predicted a lot of concentrations and I think that was referring to the one-minute modelling that we did.

45 The one-hour modelling matched relatively well but the value of the one-minute time step is that it gives you a feeling of what's happening within that one-hour period and it's not just a constant value of 1 ppm or whatever. The various heights vary quite a lot, as each time you remove a tarp the methyl bromide disperses quite quickly, from one to just a few minutes, depending how quickly the tarp is removed.

You can see that in -- this chart here is the 1.2-ppm exceedance at the boundary we saw earlier. This averaged over one hour is 1.2 ppm but you see peaks of up to 7 ppm.

5 I like visuals, so if I can get this to work ... apologies, it was working earlier on my laptop. Anyway, it's just to illustrate that as each log stack is uncovered the methyl bromide disperses downwind as a sort of a puff, a plume, and then you have a valley and then the next one will be released and then the next one and the next one and you can get quite high concentrations during those short-term peaks, which could be relevant if there were any not to exceed concentration or an STEL for methyl bromide.

10
15 So finally, conclusions and next steps, as we've seen with KDS(?), they are good for indicative measurements at best, but (inaudible) really provide your good standard, I would say the primary standard of measurement for methyl bromide. The model has indicated the exceedances of an RTEL behind port boundary is likely to occur although limited to near the port boundary. The next ten events will help us refine our conclusions; it is still a bit of a work in progress, and hopefully we will be able to make some recommendations on separation distances from that.

20
25 Control monitoring will be quite interesting, for one thing it will let us get a bit closer to the stacks and the transax(?) of the (inaudible) horizontally as well as vertically into what sort of a dispersion we are getting near that source. And the port FTR(?) measurements will give good high-time results data to compare with the PIDs and provide a little bit more information on how the different monitoring methods compare.

30
35 So thank you, so does anyone have any questions?

CHAIR: So is that the WorkSafe submissions; have you guys finished now?

MS GIBSON: Yes. That's us finished.

CHAIR: Okay. If you wouldn't mind unsharing your screen that would be great and we can see more people. Awesome, thank you.

40
45 Just a reminder, before we get into the questions, everybody that has shown a presentation today, if you could please get it to the EPA so that everyone who is participating in this process can have a copy.

All right, Dr Phillips.

QUESTIONS

- 5 DR PHILLIPS: Okay, thank you, Dr Bender and WorkSafe, all of you. My questions really relate to that last presentation, Dr Bender, could you get out the graph, you had a graph very early on in your presentation and I just want to see if I understand correctly what it says. If you wouldn't mind sharing your screen again, probably just the first graph, which shows some model versus monitoring results.
- 10 [4.25 pm]
- MR BENDER: Sorry, the monitoring versus modelling results?
- 15 DR PHILLIPS: If you share your screen again.
- MR BENDER: Yes. Can you see that?
- 20 DR PHILLIPS: No, not yet. If you just go back to near the beginning of your presentation, sorry I didn't note the slide number, keep going.
- MR BENDER: This one?
- 25 DR PHILLIPS: Yes, yes. So just so I understand this, what this slide is showing, what my interpretation is, you've got on my left-hand side, kilograms methyl bromide released, okay, and then you've got percentage of total methyl bromide released, and now look at the other scale, so that's the same height.
- 30 MR BENDER: Yes, so Genera keeps records of the total high of methyl bromide and then they gave us what they estimated to be released, so that's basically, you could call it recapture, but I guess it's not all recapture, a lot of it would be due to emissions or absorption into logs.
- 35 DR PHILLIPS: Yes, that's what is the starting basis, so my question was, were all of these logs, I appreciate they're not all logs, but the log stacks, were they all subject to recapture?
- 40 MR BENDER: My understanding is that they were not. We were never quite clear when recapture was happening and when it wasn't. Yes, it was --
- DR PHILLIPS: Quite unfortunate really, is it not, that would have been some really good data, I was kind of vaguely excited by this graph actually, real data.
- 45 MR BENDER: Yes, we did try to get the information but we weren't able to unfortunately.

DR PHILLIPS: Yes, that kind of answers my question. Yes, I was just particularly interested to see whether this could actually give us a proper handle on what's happening in terms of percentage recapture but it doesn't, okay.

5 I think, Chair, that is probably the only question I have.

I did find your talk very useful, thank you very much, and it's nice to see some actual data. But we understand the challenges of models.

10 CHAIR: Questions?

DR PHILLIPS: That's it for my questions, sorry, there was only one.

15 CHAIR: Yes. Dr Belton?

DR BELTON: Thanks, Chair.

20 So really to all of you, I mean, when the discussion went on this morning, we identified that there was ongoing benefit in monitoring and getting monitoring data going forward. Who is going to give us recommendations on what that monitoring data should be to inform and refine the models that we're using? Is it WorkSafe, is it EPA, is it the consultants, or is it some mixture of you all?

25 MS GIBSON: Is that a question directed at WorkSafe?

DR BELTON: Yes, WorkSafe in the first instance, yes please.

30 MS GIBSON: Yes, so who should be determining what kind of monitoring going forward, is that the question?

DR BELTON: Yes, who's going to recommend that? I mean we need to work together on this but it's the sort of thing that can fall into a hole, if no one does, everyone could but no one does.

35 MS GIBSON: All right. I think we sort of went ahead to develop a monitoring programme in consultation with the modellers essentially because that's one of the critical aspects of gathering data is what would be useful for them, plus adding in wanting to look at the TELs and the boundary levels, and also just based on discussion with the consultants doing the monitoring in terms of what would be the best methodologies.

45 **[4.30 pm]**
So I think if your question is, should there be more discussion around what's involved in the monitoring and how that's formulated, we're

fully open to further discussion. So WorkSafe in itself didn't just come up with that idea, we discussed it with the consultants as well.

5 DR BELTON: Yes, sure. Really, I was just wanting to get a feel for where that goes going forward, I mean it's not completed yet, but this project will be completed in due course and I guess we need -- looking for how that's concluded and what the agreement is of what's required going forward.

10 MS GIBSON: I think it's possibly up to whoever wants to use the information, I suppose. In some sense I feel like WorkSafe is gathering this information for other people to use. So to some degree it is not so much about our area of work in terms of our regulatory side of things, this information that we're gathering, it's probably more for other people to be using in terms of decision making or understanding dispersion of the gas, for example.

15 DR BELTON: Okay, thanks. That's probably enough for me, thanks, Tipene.

20 CHAIR: Kia ora, Dr Phillips. You had another question?

DR PHILLIPS: Yes, sorry about that. This one is generally to the WorkSafe folk. You have seen the proposed buffer zones in the EPA staff report, do you have any comment on those?

25 MS GIBSON: Paul, would you like to address that?

30 MR MOENBOYD: We don't have any specific comment on those. We believe that any buffer zones do need to be grounded in evidence and in the available information. But once those buffer zones are determined, as I said earlier, that will mean that we need to think about what it means for us in terms of what the regulations say and we will probably need to work with MBIE to see what they think about that and generally respond to whatever the controls are that come out of this reassessment. But I mean we accept that the EPA has come up with these recommendations and with regards to their doing that we don't have any comment.

35 DR PHILLIPS: Okay. I did have one more question. Given the presentation by the applicant this morning and the indication of the change in percent recapture, how does that affect your assessment?

40 MR MOENBOYD: So the recapture is not specifically defined in our regulations. That's defined in the approval. Our definition of recapture is quite broad, so essentially it doesn't put any restrictions on what the EPA might decide that means. Essentially, we do just have to take a look at what comes out of this reassessment and decide what that means for us and what that means for the requirements that we enforce. But as far as what the regulations say, it's quite broad in that respect. It's not specific. I don't know if that answers your question.

DR PHILLIPS: Yes, it does. No, that's fine. Sorry, just one more question while I'm on that line of thinking. Just for my understanding, as you say, the current definition of recapture is very broad and I understand that the current rules around the application of buffer zones relates to whether or not recapture is present as opposed to a percentage.

[4.35 pm]

10 So if there is any level of recapture, then the way things currently stand, there would be no requirement for buffer zones. Is that correct?

MR MOENBOYD: That is our view. We have been doing a lot of thinking about this and it does appear that that is what the regulations say. As I say, that's why whatever comes out of this, it will mean that we need to think seriously about what that means and also work with MBIE, who administers the regulations.

DR PHILLIPS: Yes, okay. Great, thank you. Thank you, Chair.

CHAIR: I guess to labour the point, the discussion we've just had and based on a previous question, are you of the view that the DMC can set buffer zones?

MR MOENBOYD: Our view of the recommendations, we don't have any issues with the way that they're framed there. It appears to us that they are public health controls. I guess, as I've said, the question after that is what do we need to think about to ensure that the requirements we enforce are consistent and that we don't have any issue about the ability of the DMC to do that. MBIE might have a view on that, which is why, as I say, once a decision has been made we'll perhaps do some further work on that with MBIE.

CHAIR: The DMC sets buffer controls or not. Regulation 14.39(1) would still apply. Anyway, the TEL at the buffer zone boundary must be reached.

MR MOENBOYD: As I said, we've been doing some further thinking about that and we did provide that initial view, but there's also another view that it may be that if recapture is taking place, the buffer zones don't apply.

CHAIR: Okay. I think that's all the questions from me. I'll now ask the EPA team if you have any questions.

MR DEEBLE: No, we have no questions, sir, at this time. Did that come out? We have no questions at this time, thanks.

CHAIR: Yes, thank you. Yes, we got that. Mr Slyfield?

MR SLYFIELD: No questions from STIMBR, thank you, Mr Chair.

CHAIR: We do have a question here from Mr Glassie from MPI:

5 "If you are aware of the very recent Hynes EDL(?) paper on real-time monitoring with canisters of work that's associated with fumigation of containers and logs [I would have appreciated some commas in there] that showed exposure was less than the MB, WES and TEL which is relevant to modelling."

10 MS GIBSON: Hi, Ken. Short answer, no, not aware of it, haven't got it. Would appreciate it though if we can have access to that.

15 CHAIR: Okay, thank you. Any questions from anybody else?

MR WEISS: I have a question, Mr Chair. It's Sam Weiss, Bay of Plenty Regional Council.

20 CHAIR: My apologies, yes, your name was up. My apologies, Mr Weiss. Carry on.

25 MR WEISS: No problem. It's a question for PDP. In our experience, it's very difficult to know when we're actually located in the plume of any ventilation. I wondered if he had a comment on just how confident he was that their measurements were carried out in the plume and if he managed to get to the port to just see some of the complexities of the air movement for himself first-hand.

30 MR BENDER: I have to say, sir, no, I have not been there myself, but I've been in close contact with Air Matters, who have a monitoring team in the port. They've been doing the monitoring for WorkSafe and they make their best efforts to locate themselves directly downwind of any fumigation. Yes, they spend a good deal of effort arranging the site so that you have good representation, both longitude and lay downwind to try and get a
35 cross-section of the plume as well.

[4.40 pm]

40 I think the results show that pretty well, actually. They have been successful in getting directly downwind of the plumes when they can. Sometimes if there's a northerly, for example, the only ship hold engagement we had, there was a northerly and so they were forced to locate their sites around 700 metres downwind at the southern boundary of the port, but for the others they normally do their
45 monitoring during westerlies and they can get quite close to the fumigation events.

MR WEISS: You made the comment that in some cases the model supposedly over-predicts the ...

5 CHAIR: You cut out for a bit there, Mr Weiss. Okay, we'll come back to you. You sing out once you've sorted that out. Ms Barry-Piceno, you had a question.

10 MS BARRY-PICENO: Yes, thank you, sir. This is just to WorkSafe, and firstly I'd like to thank you that you've been doing this work in terms of modelling with PDP. It's excellent to see some actual data being properly and independently sourced from the Port of Tauranga.

15 Just in light of that, I probably want to go back to the 2018 events that are highlighted in that report because it would seem to me from the outside that that is when WorkSafe has actively become more involved in looking at this issue and monitoring it with this level of detail. Some of the details from here on, when those incidences occurred, the feedback that TMFAG received from the workers that actually went to hospital or went home sick on those two events was - this sort of information or evidence was indirectly from the unions - that those workers were, generally speaking, casual workers and therefore there was a general reluctance for workers that may be affected or working in that environment to report where they were feeling ill or that there'd been a methyl bromide incident.

25 Secondly, that there was a general reluctance with the workers to use any form of ventilator or protective equipment when they were working in ship holds. My question to WorkSafe around that verbal evidence that TMFAG received at the time of the 2018 events is that subsequent to that, as well as Air Matters undertaking modelling, is WorkSafe more actively being involved in looking at how the workers are interacting with the sites and with handling within the ship holds to ensure that those safety measures are being applied?

30 MS GIBSON: I think for the subject of this hearing that that's not entirely within what we are focusing on right now. Is essentially your question have we increased our focus on looking at worker exposure?

40 MS BARRY-PICENO: Yes. I just would note that in terms of HSNO and the protection of the environment, given that it includes people and community and the close interrelationship that WorkSafe has with EPA, I think the questions are related and pertinent in the overall assessment from submitters, who this is an important part of the process, to be part of a public participation process with all the parties involved.

45 MS GIBSON: Yes, we've certainly been active in looking at the risk management would be the appropriate way to put it in terms of the use of methyl bromide. Just from one point of view, work inside a ship's hold actually

is covered by Maritime Safety and not by WorkSafe. Our jurisdiction ends essentially at the gangway on to the ship, so we can't interact beyond that point, so we're land-based, if you like.

5

[4.45 pm]

MS BARRY-PICENO: Yes, I guess I just have a question about that too, and it follows on from the question that I think was raised by the previous speaker, that in terms of knowing how to go forward and interacting between the different agencies - because this definitely became apparent after the 2018 events - is that WorkSafe was pointing to the regional council; the regional council was pointing to WorkSafe. There's the EPA, there's now you're talking to Maritime Safety. There's the aspect around jurisdictionally what's land-based and what's harbour-based in terms of methyl bromide use at the port. I am just concerned and asking you a question, how do you see that best working in an integrated manner in terms of both the sharing of data and information and the overseeing compliance monitoring role.

MS GIBSON: I think any regulators who are an agency for the Health and Safety at Work Act can certainly share and work together, share information, so there's no problem there. We do work together within our legal framework around the sharing of information with other agencies as well.

25

MS BARRY-PICENO: And in terms of monitoring of compliance, who do you see as the lead agency to oversee the use of methyl bromide when it comes to the port and that interrelationship of land versus water? Do you work closely with Maritime Safety?

30

MS GIBSON: Well, to be honest we don't work closely with Maritime Safety because they have not engaged with us, is what I would say, as far as I'm aware. I'm not sure if there is anything, any further relationship going on there. But in terms of when I say that -- so the work on ships holds is essentially the workmanship is covered by Maritime Safety. It doesn't mean that we wouldn't be looking at the risk management because the risk management will be operated from land, essentially, for that activity. So if the company is doing a ship fumigation, they are also likely doing land fumigation, but their management of that risk will be essentially, if you like, land based and so we certainly engage and look at that and look at compliance assessment in terms of their activities as well. Do you see what I mean? So they might be doing work on the ship but they're likely to be land based, so we do look at their compliance assessment from that point of view.

45

MS BARRY-PICENO: So just to clarify, your response about your jurisdiction ending at the ramp, if you like, isn't quite correct, that you see that there is an oversight because of the close connection?

MS GIBSON: Well, yes, there will definitely be overlaps in terms of how the risk is managed. There will be a whole lot of risk management in place which is relevant wherever that gas is being used, essentially.

5

MS BARRY-PICENO: Thank you. That's the end of my questions. Thank you.

CHAIR: Thank you. Mr Weiss, we've got you back from the looks of it.

10 MR WEISS: Chair, the previous question pretty much covered what I was going to ask, thank you.

CHAIR: Okay, great. By the way, I've got a note from Mr Glassie from MPI that he's emailed the Hynes paper to the assessments. Just we'll take that as a courtesy. The DMC won't be reading that paper as part of these proceedings.

15

Any other questions? Okay. Well, colleagues, DMC members, have we any closing comments or questions before we adjourn for the day?

20

DR PHILLIPS: No, thank you.

DR BELTON: No, I'm good, thanks.

25 CHAIR: Okay. Dr Belton, I did send a calendar invite for a debrief after this, and in response to the reassessment -- to your query, Ms Barry-Piceno, we will have that paper posted on the EPA website for your information, the Hynes paper. So, yes, Dr Belton, I did send a calendar invite for a debrief after this.

30

[4.50 pm]

Well, thank you all for today. It's been a fairly information dense and engaging day, so thank you for your full and frank participation, including questions and responses to those questions. For tomorrow, we are both at a venue -- well, the DMC is still virtual but there is an option for an Auckland venue at 8.30 am. So we will adjourn for the day and reconvene tomorrow at 8.30 am. We look forward to seeing those of you that are keen there.

40

MR SLYFIELD: Thank you, Committee.

CHAIR: Kia ora.

45 **MATTER ADJOURNED AT 4.51 PM UNTIL
WEDNESDAY, 12 AUGUST 2020**