ENVIRONMENTAL PROTECTION AUTHORITY HEARING

Application APP202804: To import EDN, a fumigant for use on timber/logs under commercial conditions

HEARING at

Rydges Rotorua, 272 Fenton Street, Rotorua

on 28-29 August 2018

Decision-Making Committee

Dr John Taylor (Chair)

Dr Kerry Laing

Dr Ngaire Phillips

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TRANSCRIPT OF PROCEEDINGS

I N D E X

28 AUGUST 2018

29 AUGUST 2018

[10.34 a.m.]

CHAIR: Tena koutou katoa. Thank you very much everybody for attending this hearing to consider the importation and use of Ethanedinitrile as a fumigant on logs under commercial conditions.

My name is John Taylor, I'm the Chair of the Decision-Making Committee. On my left is Dr Ngaire Phillips and on my right is Dr Kerry Laing, and collectively we are the Decision-Making Committee delegated powers and privileges by the Environmental Protection Authority and the HSNO Committee under section 29 of the HSNO Act.

Before we proceed any further this morning I would like to invite Mr Julian Jackson to give us the mihi.

(Mihi by Julian Jackson)

MR JACKSON: I have just welcomed you with a karakia and it's really a metaphor for concentrating the mind on the matters at hand and thinking about conducive conditions in which you can have a productive hearing.

I would just like to do a little waiata to complete the process.

(Waiata by Julian Jackson)

MR JACKSON: It's not that love and compassion is a new thing, it comes down to us through the generations and it's just a proverb about one of the most essential qualities in life for human beings.

CHAIR: Kia ora, Julian. As I said, we are the Decision-Making Committee on this application and, as such, the purpose of the hearing today is to provide us with as much information as we consider necessary to approach our task, which is to make a decision on this application.

The hearing is also an opportunity for those submitters who have indicated they wish to submit in person to present their case and, if so, to ask

questions of clarification of the Applicant or of the EPA staff themselves, or indeed to be asked questions of clarification by any of those parties as well as the Decision-Making Committee. I'd ask you all to please speak clearly into the microphone. In a moment I'll ask you to identify yourselves to the hearing.

Before we do that, just a few housekeeping items. If there are any media present can I refer you please to Mr Mark Wardle of the Environmental Protection Authority who is sitting in the back. He is the sole point of contact for media for the day's proceedings. All cellphones are to be switched off. The emergency exits, I'm obliged to point out there's one over there at the back of this room, otherwise exit through the lobby, and the toilets are also to be accessed through the lobby, if you turn right on leaving through the door behind me to the left.

So, I'll ask please the Applicant and the Applicant's lead to identify members of their team at this point.

MS GEAR: Good morning, I'm Helen Gear who wrote the application. I'm representing Draslovka of whom we've got Pavel Bruzek from Draslovka in the Czech Republic, Kade McConville from Draslovka Services in Australia, Dr Swaminathan, and Dr Matt Hall behind me. Phoning in we'll have Dr David Sullivan from Environmental Consulting to answer any questions on the modelling.

CHAIR: Thank you. Application team from the Environmental Protection Authority, could you identify your members please.

DR VAUGHAN: Good morning, my name is Teresa Vaughan, I'm the application lead on this application from the EPA. Next to me I have Richard Mohan who is our ecotoxicologist, and next to him we have James Deyo who is our toxicologist. Behind me I've got Julian Jackson who is our cultural specialist, we have got a hazardous

substances in the workplace specialist from WorkSafe, is Susan Collier, and we've also got Bruce Graham who is our modelling specialist, and later on today we will have Philippa Gibson who is also from WorkSafe joining us. Thank you.

CHAIR: Thank you. And, we have three submissions from the public. Would the submitters like to identify themselves please.

MR BROWNING: I'm Steffan Browning for Tauranga Moana Fumigation Action Group.

MR WEISS: I'm Sam Weiss from Bay of Plenty Regional Council.

CHAIR: Okay, we may have a third submitter from Quarantine Scientific join us later on in the day.

Okay, before we begin with the Applicant I would just like to bring you all up to speed with where we are in the proceedings around this application at this point. Last week we had a one-day hearing in Wellington. Immediately prior to that hearing the EPA had received information from the Applicant and some information from one of the submitters in a time where it was not possible for that information to be considered by the Decision-Making Committee or indeed the EPA staff prior to the hearing.

On being advised of the nature of the information I decided that we would permit, the Decision-Making Committee would permit the Applicant to present that information at the hearing in Wellington last week but in doing so we would issue a direction in a minute with our intent to interrogate that information by a clear process in the future. The details of that direction and minute are available, they were made available on August 23rd on the EPA's website. It essentially describes that we intend to allow the Applicant and the EPA, and indeed any submitter through nomination of a duly qualified expert to enter into a period of expert

conferencing, and this expert conferencing is essentially to attempt to resolve matters of scientific and technical disagreement around two principal components of the application, which are the air dispersion modelling and the establishment of tolerable exposure limits to the substance under proposition.

So, any submitter here today, any member of the public may engage in this process of expert conferencing under the discretion of the Decision-Making Committee that their nominated expert is duly qualified to participate and provide the Decision-Making Committee with what they're looking for. This is not an opportunity for public debate on other merits of the application.

Following this period of expert conferencing a report will be produced which will then be considered by the Decision-Making Committee and we'll go from there based on the content of that report.

The other point which was raised, which had not previously been raised in information publically made available through the EPA website, was the intention of the Decision-Making Committee to conduct a site visit at the Port of Tauranga to observe first-hand operations involving fumigation of logs. Details of that and the rationale for that visit are also available in a document on the EPA website. I think I'm able to tell you that we intend, we're planning to go there this Friday and are all looking forward to it very much.

Okay, with that I will invite the Applicant to bring her case to the hearing.

MS GEAR: Thank you very much. I'm asking Kade to lead-off, I led-off in Wellington. We've just added a quick summary up the front of the main issues we feel came out of the meeting last Tuesday so they can be addressed.

The rest of the presentation is essentially the same as the one that was presented in Wellington.

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PRESENTATION BY APPLICANT

MR McCONVILLE: My name is Kade McConville, I'm the Executive Director of Draslovka Services Group based in Melbourne, Australia. First of all I would like to thank the DMC for again allowing us to present our case, and also to obviously WorkSafe and EPA for your review of our documentation thus far.

What I wanted to do is initially just give you an overview of who Draslovka is, Pavel will obviously cover that off in more detail, but also to bring to light what Draslovka is and how we see ourselves moving forward.

So, as I said, I represent Draslovka Services Group. I represent the basically business-to-customer arm of the business. Draslovka, as a chemical manufacturer, has traditionally been a business-to-business customer supplying into distributors and customers alike. However, through this process and over the last couple of years the business has changed so that we have a full control over the substance, from basically raw materials all the way through to the point of use, all the way through to working with the actual customer applying this chemical.

I think that, again, I want it to be known that I'm working with this chemical on a day-to-day basis. I apply tonnes of this chemical, I get my hands dirty. I don't want to bring emotion into it but at the same time I have a 2 year-old daughter and I definitely want to be around for a long time. So, for me, I wouldn't be dealing with nor would I give any of my staff, any of my applicators, any chance of risk in the field which I believe were inappropriate.

So, again, thank you very much, I think that the learning experience we got from last week was invaluable for this whole process and I believe we learnt from that

so I hope that we can bring across a lot of factual information, both in our application but also bring to light some of the issues or errors which were highlighted last week.

So, in light of last week and because we did the summary at the end it didn't really give everyone a chance to understand what we were trying to achieve with our presentation. So, what we've done is we've highlighted five main points. These five main points cover the main issues or the main objections that we have to the application - oh, to the summary and the review.

So, the first one is around the justification for the removal of the need for scrubbing or recapture. Basically I've put some open-ended questions there and I'm not going to read them all out but I'll highlight a couple of in each one. So, really, we need to understand what is the purpose of scrubbing or recapture, and the difference between what is scrubbing and what is recapture? Can we accurately measure the endpoint concentration of EDN? I think that that's one of the key points here because, in the end, for other substances, that the endpoint concentration is not measured whereas we have the ability to measure that concentration before the ventilation occurs.

The next point is around the TEL increase from 0.034 to 0.50 ppm, the recognition that the toxicology of the cyanide group is well-studied and it's known. There is a lot of data out there to support our arguments and thus the multiplication factors which are challenging the extra species, intraspecies, we need to understand that in more detail and with the toxicologists within the EPA, with working with WorkSafe, and our own internal toxicology teams.

Buffer zone reduction is a key point for us. The revised modelling which was based already on conservative inputs, including increased loading factor and increased stack size which also resulted in a lower endpoint concentration, means that we would like to contest the proposed buffer zone of 120 metres down to a proposed buffer zone of 20 metres based on already conservative modelling.

A re-entry period. During the application and during our discussions last week it was highlighted that perhaps there was a misconception or a misunderstanding between the EPA, WorkSafe and Draslovka around what a re-entry period actually was or what it meant. In saying that, in the APVMA registration in Australia where the substance is already registered, the APVMA have stipulated a re-entry period of 24 hours based on a number of uncertainties due to a lack of robust data presented by the previous Applicant. In saying that, we've been able to present the data in the package and also in the appendices to support the need for no re-entry period to be stipulated on our label. Hence, we question the relevance of the re-entry period in New Zealand based on the science package presented in the robust data presented.

Personal protective equipment, this is kind of my passionate point because I'm obviously involved with the substance on a day-to-day basis. The PPE which is available has been proven to be more than adequate for the anticipated levels of EDN within the buffer zone. What this means is that we understand the need for the hierarchy of controls and how they're managed in the field. However, some controls, including the elimination or the substitution, are merely not possible. However, through administrative controls, PPE, we're able to control those risks and be able to

limit the exposure of the workers, of bystanders, in the field by implementing those measures.

One of the things that came up last week was around the use of air purifying respirators and the appropriate filters for free air concentrations above the IDLH of active substances. Now, in saying that, what we have been able to find within the last week is that the IDLH is actually exceeded for nearly all fumigants which are already registered in New Zealand, including hydrogen cyanide, including methyl bromide, and phosphine. So therefore the use of air purifying respirators and appropriate filters for free air concentrations above the IDLH of active substances already approved in New Zealand and internationally is well-justified and well-used on a daily basis.

Thirdly, the mandatory use, maintenance and calibration of EDN personal safety detectors. There were questions raised last week around the calibration schedule, around the maintenance of personal protective detectors. We already have that in place and we'll cover that during personal protective equipment statements later on.

The next point was around basically we obviously highlighted some errors and raised those during last week's session, but basically our question to the DMC is how would the DMC like the Applicant to address these concerns? Obviously it has not been as a part of our application, but we believe that, you know, it's justified in order to present clarification on any points which we believed were inaccurate. The Applicant has compiled supporting documentation. We've compiled in particular four main documents. The first document is the concerns about exposure of workers due to 10% permeation through tarps; the second is around the inaccurate IDLH levels which were quoted during last

week's meeting; the scrubbing, WorkSafe requested further information on this which we have been able to provide in additional documentation; an effective low wind speed of EDN into water. These four documents are compiled, they're ready for submission if the DMC would accept those, otherwise we have those available at this time. Alternatively, they can also be discussed during the expert hearings.

CHAIR: Can I just intervene here, please. The errors that you're referring to, would you like to tell me whose errors these are?

MR McCONVILLE: I believe that some of the, especially the submitters last week were using inaccurate figures in their -

CHAIR: So, I think at this point I have to make it clear, and I did try to make this clear to you last week, the identification of a point of view as an error is in this forum somewhat subjective. We appreciate that you have presented some data to us. I am well aware that you presented anecdotally further data last week on things like trials you had run in scrubbing, but you haven't provided information to the DMC in a sufficient period of time for it to become part of your application package, and the way that we conduct the hearing and the consideration, is not through a series of iterative questions and answers and additional pieces of information dropped in, we have to have some sort of solid base of evidence for us to make our consideration.

So, I think it's not fair of you to refer unsubstantiated to errors on the part of submitters' submissions when it's clear that there's a number of data gaps in this process and we have indicated, clearly I hope, the process by which we intend to try to resolve those data gaps through the expert conferencing that will take place.

All right, so I hope that's clear and I hope that we can avoid a situation where you're trying to preempt the outcome of that expert conferencing by referring to the content of others' submissions as errors when there isn't an opportunity or clear evidence to base that assumption on.

MR McCONVILLE: If I can make one comment. The errors which we are alluding to are not based on point of view, they're based on factual numbers which were misquoted in the submission, so therefore we don't believe that this is attacking anyone's point of view. It's merely clarifying a number or a data point which has been maybe a factor of 10 or 100 out which we believe is, you know, perhaps, perhaps could be seen as negative towards our application.

CHAIR: Okay, so these errors refer to submissions that were made at the hearing in Wellington last week where you did have an opportunity at the end of that hearing to address the submissions made at that forum.

MR McCONVILLE: Yes. Yes, which we did, we raised those points at that time. All we're saying is that we have also documented that in the case that the DMC would like to see it as documented process.

CHAIR: So, I think what we'll do is we'll skip that because the opportunity for you to address those errors, if there may be so, will come to you in the form of the expert conferencing. Those submitters aren't here, they don't have a right of reply to your assessment of their information. So, we can skip that and get to the next point of your presentation, please.

MR McCONVILLE: Totally agree, totally agree. Okay, so one of the last points on there is obviously there are also ten subject matter experts in the room which are all here and they all have knowledge on EDN globally. Again, not a part of this but if there are questions,

you know, at any point during the day, those people are available to answer those questions as well.

So, as we move forward, so basically why is EDN a potential replacement for methyl bromide?

The New Zealand EPA reassessed methyl bromide in 2010. At that time the EPA imposed greater controls on methyl bromide and also stated that from 2020 no methyl bromide emissions are to be released. As we move very very rapidly towards that 2020 goal, we believe that EDN is a suitable replacement and we have the data to support that and which will be presented through today. At the time STIMBR identified EDN as a possible solution to the 2020 deadline and the research was supported by industry, by STIMBR, by Draslovka, by the forestry industry within New Zealand.

The application's background is that this is a new fumigant, these don't come around very often. The New Zealand EPA and WorkSafe are working through a legislative change and we are willing to, again, work with WorkSafe and EPA through that process to fully understand the implications of this new product.

There's obviously a very high interest in EDN's potential as a fumigant both in New Zealand and globally. We have multiple registrations running globally. All of those registrations are pending and everyone's eyes are on New Zealand.

WorkSafe being involved in this process is very strong for us, it allows us to get good controls and realistic and commercially acceptable controls on our product which will then be seen throughout the world as the leaders. And, we also understand that this is only the second time, I believe, that WorkSafe has been involved in this process - no, Teresa is shaking her head. WorkSafe are involved in this process, and moving forward through WorkSafe working with the EPA, are going

to be able to give a robust assessment of what's necessary in order to apply this product safely.

So, just to give you an overview of the representatives which are here from Draslovka. We have Pavel Bruzek, who is the Chairman of the Board of Directors, bpb Partners and co-owner of Draslovka. He is also the Chairman of the Cyanides Sector Group based in Europe.

Again, I'm the Executive Director of Draslovka Services seeing the product all the way through to the end customer, to the end user. I'm responsible, personally responsible for the commercialisation of EDN globally, and development of application tools and protocols for the in-field application of EDN.

Dr Swaminathan is the regulatory affairs specialist for Draslovka Services Group. He was previously with BOC, the previous Applicant, and he is responsible for working with the scientists and modellers involved with EDN research and analysis.

Dr Matthew Hall, our research scientist, research chemist, previously responsible for fumigation studies at Plant & Food Research involving EDN and methyl bromide between 2014 and 2018.

Helen Gear, as you heard before, is the Draslovka representative in New Zealand and author of the application. She is a STIMBR Board Member herself, of the horticultural industry and wife of the STIMBR research director.

And today, based on the previous hearing, Dr Adam Jonas, who is the head of EDN registration, principal toxicologist, will not be attending. In his place will be Dr David Sullivan who is the environmental modelling expert from Sullivan Environmental in order to answer any questions in that regard, and also David Sullivan

will be available at the end of our presentation in order to save some time during this process of connecting in and getting it working.

I'll hand it over to Pavel Bruzek who is going to give you an overview of Draslovka, who they are, and what they do.

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MR BRUZEK: So hello everyone, I'll just try to keep it brief. You already heard me probably in the meeting that we had in Wellington.

I'm representing the family office that we currently have and operates in Prague, which is four families. Currently we are the second generation of the owners and family members, and we would define ourselves as being and R&D venture capital and sustainable- based company and people. So, basically anything that we do is connected somehow with sustainability and with an environmental view on the things, so we are trying to always rethink what is currently in the market and coming back with better solutions, and that's in everything that we do.

We currently stand on four to five pillars, while the key one is the production of electric energy and utilities through like utilising what is available in the earth. So, we are currently using, holding a portfolio of soil and wind production units of electric energy through Europe, from Poland through Czech Republic to UK, Italy and several other countries. Also, we are one of the biggest developers in Prague and in Czech Republic where we are focusing on sustainable buildings and sustainable living. So, basically buildings that are having triple A class, or the highest class in terms of the energy efficacy per square metre

and trying to build this again to save the energy and have long-term buildings that are saving something from our environment.

One of our biggest divisions is currently chemicals and I'm representing also the chemicals, and my father started the chemical company back in the days. We currently have more than 113 years of experience in chemistry. So, the company I'm representing has been established in 1905 and always been focused on cyanides. Based on that I'm also presenting like cyanide sector group of Suffolk which is the like European, let's say or even international chemical sector group based, who is focussing on addressing issues and problems that industry might have for the future.

We are manufacturing cyanides and we are manufacturing cyanides while using them for liken environmentally friendly or environmentally sustainable things. So, employing them in manufacturing of fumigants, biocides, feed additives, food additives, essential and non-essential amino acids, chemical specialties, especially chemicals, and also utilising them in the production of fragrances. So, it's not only about cyanides and we really like the cyanide molecule because it has been always with us as a part of the environment, and actually the body and humans and even like the environment can actually deal with the cyanide molecule really well.

So, we also employ a lot of R&D and we are supporting about 12 start-up companies in our portfolio. Most of them are there for actually addressing big issues that the society or the science is actually trying it address, mainly focusing on diagnostic of cancer, cancer treatment, and advanced ways to address IBD and different kinds of autoimmune diseases. This is done in

the US, in the Czech Republic, in Europe and Israel, this is our main focus.

Well, regarding Draslovka, back to the topic, what we actually do, I think I already covered that. And, where we do that? We currently produce in Czech Republic and currently we are undergoing the assessment of where to place roughly one to two more factories because we are trying to bring our products like closer to the market. As you know, our fumigants are mainly liquified gases in the cylinders so we are transporting a lot of steel, so we are trying to also, like that part of the process be more lean and more economic, so we would like to establish one factory in Asia Pacific and one factory in the United States.

We have a very lean manufacturing process which is basically starting with our very key raw materials which in our case is mainly ammonia and natural gas and oxygen out of the air, which is still for free and I hope it will be for some time, and manufacturing all the downstream chemicals through the process till the endpoint chemical. This is then packaged and we control, so the packaging, filling, getting the product to the customer, and then using it in the field. So, we are covering and understanding and trying to understand the whole process and being in control of that.

So, why EDN? I think you will hear that question on several occasions. It's just carbon and nitrogen and basically it's very unstable in the environment and therefore is decomposes to the CO2 and different forms of the nitrogen molecule. We are strong believers in fumigants of the 21st Century that should do the job, they need to be toxic unfortunately, but once they do their job they should convert to something that is not an issue for the environment. And in the case of EDN, which is also a soil fumigant, can actually be eaten by

the plants and can be utilised by the environment or by the plants somehow.

Well, we actually didn't come up with this brilliant idea, this is coming from CSIRO from Australia and we have always been a manufacturer of EDN. However, we have seen that the previous partner that we have been cooperating with was not putting enough money into this process and didn't actually answer the scientific questions of the APVMA and probably also of the EPA here very well, so we took over the process. We bought also the registration and sales part of the project and we started to invest quite a lot of money into this process to address the biggest questions and gaps that have been created over several years.

Well, we are focusing on Australia and New Zealand because of the history in the first place, especially in Australia because this product is coming from Australia, and in the case of New Zealand because we believe, and it was very refreshing for us, that actually New Zealand is having a very robust process that employs experts in the field, which sounds logical but it's not always the case. We are currently running and undergoing registration in about 16 to 20 countries and actually it's sometimes an exception that the application is being treated and being over-viewed by the exerts and not only the bureaucrats. So, that's why we focused on New Zealand, to actually have a chance to critically and scientifically discuss the science behind the chemical and not being too emotional about that. And, we believe that also New Zealand is very well-recognised on its view on safety, its approach to safety, and environmental assessment and environmental footprint of any chemical or any process that is currently being used on the port.

We also are always trying to support the local industry and local community in the places where we go. So, we actually made a significant investment into local R&D activities and most of the studies we have tried to conduct with the State-owned companies in order to show that the data are robust and are coming from a trustful partner in the current destination.

Currently in STIMBR we invested more than NZD 2 million, and in terms of the whole EDN up-to-date we invested more than about 25 million Euro into the project to make it work.

Well, I think that's more or less it and I'm going to hand back to Kade to tell you a bit more about the chemical.

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MR McCONVILLE: So, basically the review of the application thus far has suggested some uncertainties which have unfortunately also influenced the proposed controls, which we believe in some cases are unwarranted. Again, we're going to cover some main points. This goes back to my initial overview. The loading factor and the effects after the release during ventilation will be covered off by Matt Hall; the updated modelling will be covered off by Dr Swami but also again supported by David Sullivan; the TEL concerns will be covered by Helen Gear; buffer zones, again by Swami; protecting worker safety, again being able to show you what the detectors look like, how big they are, how they're used in the field, and be able to give an overview of that; scrubbing, the suggestion that scrubbing is required and our belief in why it is not; permissions; and, also revised controls and what our suggestions are.

EDN, what is it? EDN, or C2N2, as you can see is made up of purely carbon and nitrogen. It is slightly more dense than air. It is not as dense as other fumigants. It is less dense than water. It is flammable. These risks are controlled throughout the fumigation process, as any flammable fumigant is. Its boiling point is minus 21, therefore it cannot exist as a liquid outside of the cylinder. As soon as you release it from the cylinder it will immediately turn into a gas. In the environment it diffuses very quickly in air and degrades rapidly in soil, as is supported by the studies conducted by [ASWA] and [ASWA] laboratories in the US which are also included in the application. It does not move into aqueous environments. It is not an ozone-depleting substance or a greenhouse gas. And, more importantly, it does not bio-accumulate and is broken down into CO2 and ammonia-based products. In target pests the CN molecule is responsible for the toxic action. It prevents mitochondria using oxygen leading to cellular asphyxiation - sorry, I'm reading this part because I'm not a toxicologist - and at low levels is broken down and excreted by the body.

Basically just to give you some background on that as well, is we mention in here that the mode of action on target pests is exactly the same for hydrogen cyanide, which is already registered in New Zealand as a fumigant.

EDN hazard classifications. This is just a summary table, it is basically to show that there has been no changes to what is being proposed by Draslovka and what is being proposed by the EPA. I won't go through that in detail.

Following on from that is the questions around stack sizes and actual on-port application of this product. The stack size is based on real industry data compiled

by Genera, who is New Zealand's largest fumigation company. They are actually the largest fumigator in the Asia Pacific region focusing on timber fumigation primarily but also on soil fumigation in Australia as well as commodity fumigation throughout Asia Pacific in different areas. Genera undertakes in the vicinity of 90% of New Zealand's log fumigations, hence why we went to them to get this data, which we believe are also conservative figures for the inputs into modelling. Figures taken from Genera's fumigation database, which has details of every stack fumigated, in the end they don't want to be under-charging their customers so that's why they're going to give you the biggest numbers possible and not too far under that. All data collected for the 2017 calendar year.

What we were able to do is confirm that in 2017 the average log stack size was increased from 750 cubic metres to 1,000 cubic metres as an average. Stack size is influenced by the way out of the port and the height of the book end against which the logs are stacked. Stacks have reached maximum limit of 6 metres high. What we have to be mindful of is that it's not the fumigator who is actually determining the size of these stacks, it is the Marshaller, and the Marshaller is a professional person based on the port who is controlling this process on a day-to-day basis. We are very confident that these stack sizes will not be increased any further than what they are now.

We also confirm that the 2017 loading factor was in fact 58%. However, we have used the more conservative figure of 55% for our modelling. In saying that, Mark Self, who is the COE of Genera, will be here and will be available for questions at any time this afternoon.

So next we have Matt Hall. Matt's going to go through some of the details on load factor. So I'll hand over to Matt.

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DR HALL: Thank you, Kade. So, my experience with EDN goes back about five years, researching and working actively with EDN at Plant & Food Research, I led a research group there, and that organisation currently are global leaders in disinfestation, particularly with EDN, for logs and so I'll be presenting some information today around endpoint concentrations.

And initially, this is not something that we're normally interested in from a research perspective. Why we want to know the sorption curve and the profile and the concentration over time is really around insect efficacy, and so organisations like MPI and our trading partners need that sort of information to understand how much concentration is available to provide efficacy. So, this is a secondary benefit in that we're establishing the endpoint concentration and assessing risk as an input for modelling and so on.

So, what happens when you put the fumigant in a treated space. You've got depletion over time, and that's occurring typically for every fumigant and is referred to as sorption, and you get adsorption and absorption, and so that's the molecules are going into and onto the substrate, in this case logs, but it can be fruit, it can be vehicles, it can be a whole range of different commodities.

So, we've done a lot of work around this for EDN and we've defined what are the parameters which influence sorption. We've looked at surface area being a significant factor and dose, and it's proportional to

those. So, as surface area changes and as dose change, the sorption profile changes accordingly. But it doesn't account for any losses through the tarpaulin, for example. These are conservative estimates where it's in a completely sealed chamber and the concentrations reflect that.

This is quite awkward because I can't quite see the next points, so I'll just move over. Can I move over here? No. (Laptop provided to speaker). Oh, thanks Kade.

Today I'll present some information that was presented last week around this loading and why loading is so important for understanding endpoint concentration, because it's one of the significant factors we've identified as influencing that. So using the loading for 37%, which has previously been used, and then using a multiplication factor there is not representative of conditions. And looking at scaling from lab to larger-scale fumigations is a practice that commonly occurs and is mathematically justified and straightforward.

So, the first piece of work here. In 2013 we're looking at sawn timber because we thought that the solubility of EDN would rule it out for use on logs which have a high moisture content, so we initially looked at that and we looked at a number of factors. So, dose, moisture content of the sawn timber, end-grain sealing and load factor. And end-grain sealing we weren't proposing to seal the ends of grains, it relates to surface area and available surface area for sorption to take place.

We proposed - this is a published paper, we proposed a two-phased exponential model here which the formula describes. The first part of it is the first exponential drop and then the decay after that. So, we

started to build our understanding here of how that concentration changes over time.

So, the next piece of work we looked at was logs, so how does it perform with logs, because we had shown that moisture content was really not a significant factor in dictating how sorption occurs which was a surprise to us at that stage. We put a number of additional samples in that transitional period, we've simplified the model which is now just a simple exponential decay function. So, as we are building up thousands and thousands of data points, we're understanding very well how concentration will change for all of these parameters.

So, the work that was done at Tokoroa in 2016 was at a much larger scale. There are some questions around the concentrations which I'm very aware of, but this is at a larger scale and the response is still the same, and it fit that exponential, that simplified exponential decay function that we'd previously defined. So, it shows what is happening in a 28 litre chamber, a sealed chamber in the laboratory, actually can be applied with reasonable accuracy to what's happening in the field with the tarpaulin, under a 750 cubic metre stack.

So, since that work in 2016 the dose and the duration have changed and so we needed to undertake some modelling work to define where does that endpoint concentration sit for the longer treatment period of 24 hours and a higher dose, because at that stage we were expecting the dose to be much lower than what it currently is. And so we have a huge number of factors here with doses and time. We already know from the previous work that moisture content, end-grain sealing et cetera are not significant factors which influence endpoint concentration. So, we have all this knowledge that's going into it.

So, what we were able to do is compare. So the top figure there is from laboratory information and the bottom is from the work that was done at Tokoroa, again with the understanding that that line may ever so slightly be higher than where it currently sits, but the response over time is very similar and the modelling using that same modified formula fits the information very accurately.

So, this is a little bit of information around - this is a recent paper that was published this year around hydrogen cyanide and whether EDN decomposes to hydrogen cyanide to treatment of logs, in which case the answer is that it does not, down the bottom here. So, we have EDN sorption, normal sorption profile there, so that represents a chamber with logs in it at two different temperatures, and this one represents EDN without any log. So this is gives us no sorption, for example, and sorption on the left-hand side. And the purpose of this is not around HCN but this piece of work for the first time showed us that you get a higher rate of sorption at 20 degrees compared to 10, and so all that modelling work done by the Brierley report was at 10 degrees. And so these values are conservative estimates in a very sealed chamber and are conservative values in their own right.

So, originally in the submission the information sourced from the Brierley report, the average loading was 37% which was used in the Graham report for estimates, and we made an adjustment to a loading of 50%. So, at that time the information coming from industry was that the low-end average loading is around 50%, and so we made a mathematical adjustment to our model to a loading of 50% and that's what was done at the time. So, quite a significant difference between what the endpoint concentration at 50% here, a 50%

loading, and 37%, and since then working with the information that's come in from Genera it looks like that endpoint conservative loading estimate sits more around 55%, in which case we've used the model again to go back into, which has got thousands and thousands of data point which are able to predict these things with confidence, and the confidence is provided, to account for that change in loading. So, the information was presented I believe for the first time last week.

So, what that means is that when we provide a number like this 0.8 grams per metre cubed remaining in the treated space after 24 hours for a dose of 150 grams and a loading of 55%, this is backed up by a very very good understanding of the factors which influence sorption. And this estimate is coming from a sealed environment, not from a commercial situation where there may be slight diffusion of the gas through the tarpaulin. It's also coming from the low-end data, not estimate, low-end data for loading, so therefore represents a good input for that subsequent modelling work done by Sullivans. Thank you. The next presenter is Swami.

MR BROWNING: Mr Chair, could I just ask a question from the floor. If we've got any questions of clarification, are we better to do it while the expert or presenter is up there, or are we going to ask them collectively later?

CHAIR: At the previous hearing we reserved questions until the Applicant's case was presented. I think we can do that today.

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DR SWAMINATHAN: Yes, good morning. Before going into selecting the right model for timber fumigation, especially for EDN fumigation at the Tauranga Port, we did some extensive search, like we discussed with the

best modeller who is working with the US EPA, we discussed with them and they provided the situation. And also we looked into this regulatory approval in the US and also in Australia, and also we looked at what's really happening in the field situation, that's at the biggest port in New Zealand. We looked at that carefully, what is actually happening in the commercial situation, and also we looked at the lab data created from the Plant & Food.

So, we used all this information to select the right model and based on our extensive search, we did an extensive search and based on that one we finally decided air modelling, AERMOD is the best model that suits for EDN fumigation at the Tauranga Port.

So, why did we choose? Because it was developed by the US EPA and also the American Meteorological Society, and it was officially approved by the US EPA in 2005 for regulatory approval, and it is also approved by some of the Australian States, like AERMOD was approved, and it's also accepted by the New Zealand authority. And AERMOD replaced another model called [AUSPLUME], and based on these characteristics we found that AERMOD was the suitable model for EDN fumigation and we did that AERMOD for timber fumigation.

During this modelling we have to create a number of inputs. We used the Plant & Food data, the loading factor, and we discussed with Genera about the loading factor and the tarpaulin. We include all those inputs into the modelling, but also we took some conservative approach. So, for 24 hours fumigation we used the permeation data collected from the lab, and for the ventilation we used the Plant & Food endpoint concentration data.

So, for this treatment time of 24 hours, we did a study based on the standard approval method, and in that

study we didn't use any logs in that chamber. So it was without logs and there was a 10% permeation through the tarp during the study. The main thing is there was a high concentration that was inside the chamber throughout the 24 hours treatment time and that was permeated through the tarp. But when you see a commercial situation, there will be 55% to 58% loading factor of logs and EDN will be absorbed by the logs, and during this 24 hour treatment time there will be a steady decrease of EDN so the chances for permeation through the tarp will be very very minimum. But we used our worst case scenario taking the data from a situation that the EDN was applied without the logs, that's one thing.

And the second thing is doing the permeation study we used the highest dose rate of 164 but in the modelling we used 150. The dose rate used in the 24 hours is 164. So that's the second one.

And the third one is we have modelled with the highest dose rate of 150 grams for 24 hours, but the efficacy study that's created with Plant & Food, currently they are - that would be something that China and India, that shows that at 5 to 10 degrees the maximum dose rate will be around 120 grams but we model at the highest dose rate of 150. This 120 is for 5 to 10 degrees but at 20 degrees we expect around 75 grams, so that's the dose rate we are looking around. Again we used a conservative approach.

And the final one is the [files] for the data. This [files] for the data is from Tauranga port. We used what is exactly in Tauranga port, that's the one we used for modelling. Even the Tauranga meteorological, the department says it refers to, and it's also supportive of the [WLF] data. That's already there in their website, you can have check on that one. They support

the [WLF] data. I also discussed this with Sullivan and they told that it's already mentioned in their data, and we used [files] for the data 24 hours. That's the main thing. Because when first they have only the daytime weather, so that's the reason we have to go to [WLF] and the New Zealand Meteorological Departments supports [WLF] data. So that's the suitable weather data we used for EDN modelling.

Okay, the modelling parameters. Again, a lot of information here. So, we submitted to modelling of February based on the available information at that time, it's purely based on our extensive search. But we came with some suggestions, so we've gone through carefully into Bruce's assessment and we also discussed with Genera, one of the largest fumigators, and we considered both those things and came with some changes.

One is the tarpaulin 1,000 metres cubed, and the other one is we increased the height from 2.5 to 3 metres. And also we discussed with Genera in the previous modelling submitted in February we used 50% loading factor, but when we checked with Genera they told they use up to 58% loading factor. So, again, we have to change and we have to model, and we went to Plant & Food and they provided the endpoint concentration, and we used that endpoint concentration in the revised modelling, and also the worst case scenario we used in the revised modelling is the 95th percentile for 30 stacks for 24 hours, because that's the particular scenario which increased the buffer zone from 20 metre to 120 metres to protect the bystanders. So, we checked that particular one and we used the revised inputs to develop the revised modelling.

So, based on the revised modelling, based on the worst case scenario of 30 stacks, 24 hours, 95th percentile, we got this following exposure maximum

concentration for 24 hours for 50, 100 and 150. And I will talk about 150 grams per metre cubed.
So, at the 95th percentile the maximum downwind EDN concentration at 20 metres from the stack is 0.016 ppm which is well below the TEL recommended by New Zealand EPA which is 0.034. So, we propose the 20 metre buffer zone for EDN fumigation.

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MS GEAR: Thank you Swami. Now, one of the other areas we have come back to the EPA is actually to ask the EPA to reconsider the setting of the TEL. The EPA have proposed a TEL of 0.034 parts per million which is very conservative, and Draslovka considers it should be set at 0.56 parts per million. There was a mistake on Kade's slide. We're looking at that for 0.56 average for 24 hours.

While Swami has shown that actually the modelling indicates that even at the lower rate suggested by the EPA, that we can accommodate, we know that still a 20 metre buffer would be reasonable to keep bystanders and the public safe, because this is a very, it's one of the first times that EDN will be registered internationally, it is of concern that Draslovka that a very low TEL will be set, because obviously it sets the benchmark to a certain extent.

As Kade said, a lot is known about cyanide sensitivities and the toxicology of cyanide, it's been studied extensively for years, and so we come to it with a level of certainty. We note that the EPA has used uncertainty factors of 10 times, both for translating data in the lab from other species through to humans, and also for covering off differences in the human population. As I said, we know those sensitivities.

Rats are known to be more sensitive to humans. And, as an aside, the rhesus monkeys that were also part of the trial that our TEL effectively is based on, are known to be more sensitive than humans, and after six months continuous exposure to 25 parts per million there were no adverse effects. We're asking for a much lower TEL than that.

The document that we submitted immediately before the hearings actually covers off the new approach to TELs. We note that the NCR in 2001, and also WorkSafe in their February WES, have actually used these uncertainty factors in their calculations where you have, rather than an uncertainty factor of 10 we're asking for an uncertainty factor of 2 to translate from rats through to humans, and then an uncertainty factor of 3 for humans, because actually the ability of different ages within the human population to actually metabolise the cyanide molecule is not dependent on age. That gives us a total uncertainty factor of 6[].

We also note that EDN doesn't bio-accumulate. The human body has ways, or every living thing has ways of denaturing, and breaking down and excreting hydrogen cyanide. So we don't have the same chronic concerns that you'd have for a lot of other chemicals. I actually presented the calculations very quickly at the last presentation. We've taken those out of today's presentation but they are contained in the document.

So on to the next one. Tarpaulin removal is the one other area I would like to cover off. It is another area of uncertainty that was identified by Dr Graham. He talked in his analysis of the modelling that has sort of actually prompted a lot of this more recent information to be provided to the EPA, he says that tarpaulins, he talks about an instantaneous release of

EDN from a log stack and puts in place an uncertainty factor of 2.

What we would like to point out is that you cannot instantaneously remove a tarpaulin. The tarpaulin in practice, and I'm sure the DMC will see this, is a very controlled process, it has its own standard operating procedure, and with methyl bromide - and the method that we are proposing is used to apply EDN is very similar or is exactly the same, EDN is potentially a drop-in chemical. With methyl bromide the fumigators or the tarp removers are monitoring all the time to ensure that you don't get too much release of methyl bromide. They see this as a part of the process they can control very well. They remove it by actually using wire ropes and a winch which is on the back of a tractor. They have one person controlling the winch and the other person monitoring the amount of free methyl bromide. We would anticipate that exactly the same process will be used here, so that if you start to remove and there's too much coming out, you can stop the process before there's any more removal. So, we maintain that we don't need that uncertainty factor to be built into the assessment of the modelling.

We also note that with shiphold ventilation and with container ventilation, one has even more control. You can actually re-shut the hatches or the doors, so again we can control the release.

We also note that there was, and Matt mentioned it in his presentation, tarpaulin permeability. The figures that have been provided to the EPA in the application note up to 10% permeability. That is from a log-free situation and, as Matt described so well, the logs are having a significant effect on the amount of EDN and you will get a decline over time. Thank you. I'm now going to pass this on to Swami to talk about buffer zones.

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DR SWAMINATHAN: We've gone through the modelling outputs. So we've gone through the modelling output, what is the ppm level, and also we've gone through what is happening in the field, what's the real situation in the Tauranga Port. So, we looked at the two situations and in our application we propose the following buffer zone based on the modelling and also what's happening in the real field situation scenario currently for methyl bromide.

Based on these two understandings we gave different zones for different areas. For example, fumigation area, you can see that's the wood, that's the fumigation area. And surrounding those logs we propose 5 metres, so that's the one. The second one is the risk area where the fumigators will be moving around, which is like 5 to 15 metres, that's the second one. And the third is the buffer zone we propose is 15 metres to 20 metres where the other port workers may be moving around. And the final one is also a buffer zone, which is like 20 metres, that's merely for the bystanders. This is based on the modelling results in the field situation, what's happening. Based on that one we have proposed the following in our application.

Based on the modelling assessment, Bruce states that anyone closer than 10 metres can be exposed to 700 to 5,200 ppm. Workers can safely work at less 10, or more than 10 metres from the log piles without PPE. These two recommendations are based on an uncertainty factor of 7.4 and also another uncertainty factor of 2. This 700 and 5,200 ppm really comes within the different loading factor 50 and 37. To compensate that one, Bruce Graham, Dr Bruce used a 7.4 for uncertainty factor but

we have shown that Genera used up to a loading factor of 58%, and based on Plant & Food study we know that the endpoint concentration is 0.5% of the initially applied dose rate. And the second uncertainty factor of 2 is based on the tarp volume from 700 to 1,500 but we found that average is around 1,000 metres square.

So based on that one, like Bruce suggested the buffer zone of 120 metres to protect bystanders, but we revised that one with the new input based on what is really happening in the field situation and we are able to prove that at 20 metres the levels are below the TEL levels, so we are proposing still 20 metres for timber fumigation.

And we also have different zones for that one. For example, at the fumigation zone, like 5 metres, we know that the worker exposure's WES will exceed above 3 ppm. So when you're entering into that area you need to have PPE and also you need to use a monitor. And also in the WES zone, that's within 5 and 15 metres - no, sorry, that's a typo error, that's 15 metres, not 5 to 15 metres. In that area there is, some cases there might be like it can, the WES can exceed that sometimes above 3 ppm so you have to use monitor and the PPE when you are moving into those zones. And the third zone is the buffer zone which we expect that the level will be less than 3 ppm, which is also agreed by Bruce in the assessment document, and we agree with that assessment also. And outside the buffer zone we expect 0.016 ppm which is based on the modelling results. So we propose a 20 metre buffer zone to protect bystanders, and a buffer zone of 15 to 20 metres, like 15 metres for the port workers.

As Kade mentioned in the introduction session, the APVMA proposed 24 hours handling period of treated timber with PPE. This is based on 6 hours fumigation

and the lack of robust data, we didn't provide any sorption data at that time, it was around 2012. But from 2012 to 2017 we did a lot of studies and Plant & Food already did the desorption study and we have submitted the new supporting document to EPA for rehandling, and we also extended the treatment time from 6 hours to 24 hours.

So, I suggest EPA to look into the new data and not into the APVMA, because the APVMA is old data, 6 hours treatment time, no desorption data. With our new proposal we are extending the treatment time to 24 hours and Plant & Food studies shows that the endpoint concentration is very low, and Plant & Food also did studies on desorption which shows that within half an hour EDN can be desorbed from the wood. So we submitted that new. So we recommend WorkSafe to consider the re-entry period. And I also understand the field situation what's happening, because they have only 36 hours window time during summer peak season where there is a long flying season, so they need to work around that 36 hours. Imposing a 24 hours will have some implications on that 36 hours. So we ask WorkSafe to carefully consider the new data submitted to the EPA and not the APVMA data.

And also we also want to inform that EDN only affects workers by inhalation. Dermal absorption is not a mode of toxicity, and there are also standard operating procedures available, and the Hall 2014 data shows that after 1.5 hours there is no detectable concentration of EDN emitting from the timber and we ask WorkSafe and the EPA to carefully consider that data for suggesting the re-entry for EDN timber fumigation.

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MR McCONVILLE: Unfortunately I've been advised that my props did not arrive today so I don't have the detectors here but I can physically show you with my hands how big things are.

So, to monitor fumigations on port we basically have two robust detectors which have been proven in the field as well as been proven against or calibrated against GC data. The first one is what's called the MSA Ultima XA. In the Czech Republic at the manufacturing facility there are approximately 360 detectors located all around the boundary of the manufacturing facility. All of those are real-time monitoring of the concentrations. We have taken that same technology and we have implemented that into a hand-held detector. It is the same system, it is exactly the same actual sensor technology. In the end it is principally a hazard warning device to protect staff. It is a hand-held instrument able to detect between 1 to 50 ppm. It is used to measure EDN levels in the work areas, so not underneath the tarp, not in high concentration areas, it is only for personal protection.

It says it can have. No, it does have, an audible and visual alarm that activates at 5 ppm. It has a guaranteed response time of 12 seconds, which is it is typically 6 seconds. A failure message on the detector does mean that it, it has two meanings, the first one being that there is an issue with the detector, secondly it could mean that the concentration is exceeding 50 ppm. In that case the worker merely walks out of the fumigation area into an area of safety as per standard operating procedure for fumigation. This unit costs approximately USD 2,000.

The second instrument, one of the issues raised was how do we actually measure the concentration accurately underneath the tarp. As stated previously, the endpoint

concentration could be anywhere, from the original data, from 700 to 5,200 ppm. However, through our modelling and through our endpoint concentration data we know that that is going to be around about 700 ppm endpoint concentration, even lower. What that means is that we needed a detector which was able to accurately determine what the concentration was underneath that tarp before the ventilation occurs. Using a Riken FI-8000 which is developed in Japan, it's used to monitor the concentrations under the tarpaulin. It measures approximately and accurately between 185 and 138,772 ppm. It does measure it in grams per cubic metre. It's hand-held with an inbuilt pump. It's approximately this big, it weighs about 2 kilograms. This unit allows for the remote monitoring with sampling lines going in underneath the tarp, so that the workers do not need to be opening up the tarp to put this detector under. They can have sampling lines already in place, again as per standard operating procedure. It can be connected, inserted through pipes into the stack at multiple points. We already use that method in Australia because there is a 3 sampling point methodology in Australia for the determination of the concentration. This unit is approximately USD 3500 but, again, you're not needing one of these per person, you're needing one of these per applicator who is responsible for that application[].

In terms of PPE, the personal protective equipment required if the WES exceeded 3 ppm, and EDN principally affects workers through inhalation and I think they're the two key points here. I'm going to give you basically going the different zones that were discussed by Swami under the buffer zone requirements. Basically there's a fumigation zone which is close in to the actual stack or the log stack. In this case you need an EDN personal detector as shown as the MSA Ultima, closed

toed shoes, nitrile gloves, long sleeves and long pants, and a full face air purifying respirator. As you'll note there is a side point there. There is a sub-text just saying that self-contained breathing apparatus is on standby only as per standard operating procedure for fumigation, and that is already the same requirement as what is used by Genera on a day-to-day basis for the fumigation with phosphine, with methyl bromide and also with HCN.

In the risk area it's as per fumigation. We appreciate that the EDN exposure is only through inhalation. However, the use of long sleeves/long pants is also to protect the applicator in the case of a leakage from the cylinder directly during application, but this is very very rare if the standard operating procedure is followed correctly. In the buffer zone, again, same thing but the air purifying respirator can be on standby. Again, this is current process which is employed on the port.

Beyond the buffer zone, obviously no PPE. This is where we expect bystanders to be and where the public is. Again, SCBA on standby only as per standard operating procedure for fumigation.

It's a very bad picture of me but basically the personal protective - sorry, one of the issues around the self-contained breathing apparatus and filters was that Dr Graham predicted that the instantaneous concentrations of between 700 to 5,200 ppm during that period. WorkSafe were concerned that people needing to be trained for SCBA, which is true, not anyone can use this and a lot of people can even be claustrophobic by using self-contained breathing apparatus. Some PCBUs do not insist that workers use SCBA. Again, it's a part of standard operating procedure. Yes, it forms one of the lower points of the hierarchy of controls but at the

same time it is a documented procedure with an engineering control in behind it.

What we've shown is that the concentration at the end of fumigation can be accurately measured. We're not releasing 5,200 ppm, we are releasing below 700 ppm. EDN concentrations under the tarp will fall with time from 150 grams per cubic metre all the way down to approximately 357 ppm after 24 hours at 55% loading. Fumigators have standard operating procedures and use SCBA during fumigation and ventilation with methyl bromide.

So, as an example the only person who is wearing self-contained breathing apparatus during the ventilation process is the driver of the forklift during a methyl bromide ventilation process, apart from that all users are wearing filter masks or air purifying filters. Staff are trained and are aware of the importance of PPE, obviously filter masks and SCBA where required during releases from the tarp, during high wind conditions which were unexpected, and supported obviously by regular health monitoring which we also support as a part of the EPA controls.

Filters. The filters named in the standard there at table 4.5 wouldn't provide the range of protection factors that may arise. What we recommend, Draslovka recommends applicators involved in ventilation should change filters daily as per standard operating procedures but we also support the use of self-contained breathing apparatus, again for the forklift driver as what is currently employed. We note also that the standard which is stipulated applies to cyanides generally and not EDN specifically. Therefore, Draslovka undertook third party investigations into the suitability of air purifying filters for EDN. In this case what you can see in this table here, in the second

column is the input concentration for that filter. What it's saying there is that there are two different filters. The main one which we use in the field for soil fumigation is A2B2, which is the final column there. What that means is that even if there was an instantaneous release of EDN from a timber stack, that you are protected for 9 minutes in that concentration continuously. Not just a one-off, it's a continuous exposure of that concentration over the service life to 5 ppm breakthrough concentration. What we do see is that when we look at the endpoint concentration of let's say around 350 ppm, what we can see is that, if we use 500 as the example - this is continuous exposure, this is in an enclosed environment, same inlet concentration all the time until the breakthrough - what we see in the field is if you were to get a 350 ppm peak, that that would dissipate very very quickly in the air as can be seen by the modelling.

One of the issues which was raised the other day was that because the concentration underneath the tarp is above the IDLH, that the filter masks cannot be used. However, that IDLH of 50 ppm is specifically referring to hydrogen cyanide. The IDLH for EDN is not defined. However, in New Zealand currently, filter masks for substances which are already registered, which are already above the IDLH, are currently used.

Scrubbing. Scrubbing is one of our points of contention that we definitely want to investigate further. WorkSafe states that APVMA indicates that the residual EDN can be between 8% and 39% of the initial dose rate, and this is based on 6 hours fumigation. Dr Graham estimates residual EDN of 700 to 5,200 ppm based on 24 hours fumigation and is considering scrubbing or recapture to remove risk.

We appreciate WorkSafe's concerns at the high atmospheric concentrations quoted in the sources. However, we have also shown consistently low end concentrations of approximately 0.5% of the initial dose rate after 24 hours, not after 6 hours as was presented in the APVMA data. In addition, the Riken FI-8000 allows us to accurately measure that concentration, which is currently not done for other fumigants. So, we can accurately determine what that concentration is before ventilation.

We note that no scrubber can remove 100% of any fumigant, not just EDN. All you're doing with other fumigants is merely removing the head space concentration, you're not removing a desorption concentration. With EDN we already know what that data is, we can support that with science which is coming from Plant & Food. Extending the fumigation will result in continued decreases of EDN without scrubbing. However, it does begin to flatline and it gets to a point where there is no longer any need to continue on with the fumigation because the decrease is so low or is not rapid. Scrubbing as an activity in its own right results in additional potential risks to the operators as well as a logistical nightmare on a port. Scrubbing creates further toxic waste in the process, merely transferring the issue and not mitigating it.

As we heard the other day, there was a suggestion to deep bury carbon in the ground. Yes, that is a process but, again, you're not getting rid of the issue, you're merely transferring it from point A to point B.

So, in the end we know that scrubbing, in its own right EDN will be breaking down and the endpoint concentration means that only a very very small concentration will be released to the atmosphere compared to the release of other fumigants which have

much higher endpoint concentrations, not due to the science but due to biosecurity reasons.

In addition, and what we discussed last week, our primary focus for Draslovka is for the approval of tarpaulin fumigation. However, in addition we are seeking, we do support the registration of this product for the fumigation of shipholds and containers. There is no additional risks added during that process. However, and we do have the supporting data in order to come back with an additional application if necessary but we would like to present that as a part of the presentation application if possible.

So, we are confident in the data for the tarpaulins. We are also confident in the data for the shipholds. We know based on modelling that there is no additional risk. We also note that containers are relatively small and if correctly sealed also do not provide any - provide no additional risks.

We are again supportive of the application, however our primary target is for the fumigation under tarpaulin.

Okay, so in terms of flammability. WorkSafe has stated that containers and holds are likely to contain non-intrinsically safe ignition sources and a flammable atmosphere exists during fumigation.

The shipping industry, when we went back to our experts, ships used for fumigation transport of logs do not contain any potential ignition sources, ie fans or lights which can potentially cause these sparks. Just because an ignition source exists doesn't mean that there's going to be a flammability concern. The reason is, is that every substance has what's called a UEL and a LEL and only within this range is it flammable. All fumigants, including current fumigants which are registered in New Zealand, all pose a flammability risk

during application. We note that through the data we can show that the flammability issue only exists for the first one hour of fumigation. That graph's a little bit unclear but, yes, approximately one hour.

The dose rate, as you can see this is based on 150 grams per cubic metre, which is the highest dose rate which we're going for. Again, there are other fumigants there which also pose exactly the same risk, but again, they are mitigated. Intrinsically safe equipment or the removal of any ignition sources is always a part of fumigation process. I'll hand back over to Helen to cover off permissions.

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MS GEAR: So, we're on the home straight, we've been talking for a while. There were just a couple of issues that came up when we looked at the permission or the controls that the EPA indicated they wanted to place on EDN.

The EPA indicated that it was considering a number of permissions in their own right. We have no objection to permissions but we do note that they do require site-specific risk assessments, we do realise that there will be a range of sites, and there was also the suggestion that a permission will be put in place to protect sea birds. Permissions just take time, they're another cost on our fumigators and everybody involved. We recognise that regional councils and port authorities effectively asked for risk assessments to be done, so there are already some protections in those processes and we don't really want to add extra cost. Those risks will be covered off by the councils, port authority and also the requirements of health and safety, which is even more important today than it was at the time that this application was put in. We also don't want to

cause damage to sea birds. We recognise that especially in New Zealand, where birds are important to all of us, that we don't want to add any extra risk, we don't want to kill-off sea birds, but sea birds are not present in high numbers in the ports but also it's not a good place for a sea bird to actually set up a colony. We also recognise that the modelling shows that beyond 20 metres we're talking about exceptionally low levels. The EPA recognises that, really, we're only looking at that long-term risk potentially causing harm, that the effect or the threat for a sea bird flying over a fumigation itself will not cause any problems. So, we just ask that the EPA reconsider those, or the DMC reconsider that in their final recommendations.

So, what I want to do now is come back to the controls. Really, after all the talking when we look at the controls that were presented by the EPA, you'll see here we've gone through the controls that were in the staff memo document, we are asking that the TEL be reconsidered. And then on the next page, we don't ask for any further change to the controls that have been suggested by the EPA but we do note with concern that the WorkSafe report brings up a number of areas that we would like them to consider very carefully.

We don't think there is a good basis to introduce scrubbing. WorkSafe did ask for more information on scrubbing. We have gone through and listed those in a document if they wish to receive it, or we can read it out later if that's requested.

We support health monitoring, we support buffer zones but we would be perturbed if those buffer zones increased to 120 metres for the public, we feel those are unwarranted.

And, we would like you to consider very carefully putting in a re-entry zone. We can monitor, we can

reassure those workers on the port with the monitors that are available that it's at a safe level, and, as Matt pointed out, we are expecting very low desorption rates. In the lab, he was telling me today, they normally would scrub - they would have ten ventilations in a set time or ten air changes so that they could then measure levels of other fumigants that are desorbing, whether it's phosphine or methyl bromide, that double the length of time because they just weren't picking up enough EDN to measure, that the levels are very low and the desorption is very low. And, as I say, we've got that onsite monitoring which hopefully will cover off those controls.

Kade would just like now to reflect on those points he brought up at the beginning of the presentation and then I know he will be passing it over for questions.

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MR McCONVILLE: So, just in conclusion. As we stated at the start, there are the five main points which we believe need further clarification which we're willing to work through the expert panel to get further clarity on these in order to support our application.

Again, these are the justification for the removal of the need of scrubbing or recapture; the increase of the TEL from 0.034 ppm to 0.56, not 0.50; a buffer zone reduction from 120 metres down to 20 metres based on the available modelling; a re-entry period, a reassessment of that or clarification of what the requirements of that are; and, also personal protective equipment requirements which are necessary in order to not impede the workers but also to provide a safe working environment. We believe that the standard operating procedures which are already in place for the use of

other fumigants are more than adequate for the application of EDN, and we invite you to look at those and to work through the standard operating procedures which are already in place, again because we believe that EDN is a drop-in replacement for the current processes in place. Thank you very much.

CHAIR: Thank you to the Applicant and members of your team. So I'll now invite this presentation open for questions, beginning with the Decision-Making Committee. I'll also invite the staff of the EPA to voice any questions, and all the submitters too. Please speak into the microphone when you have a question. Kerry.

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QUESTIONS TO THE APPLICANT

DR LAING: Thanks John, thanks to the Applicant team again for a good presentation. I guess I would like to make a couple of comments first before getting to questions. I guess one of the problems we've had with the application is the changing numbers as we go through, and I hope that with the parties expressing their willingness to work together that we will finally get to a position where we eliminate the differences or they reduce to a minimum. But I get the impression, and it may be an unkind impression, that every time Draslovka gets an opinion or something that they don't like, we get a different set of numbers, and I don't want to go there any further.

The other point I would like to make is around uncertainty. The DMCs deal with uncertainty all the time and I guess there's a framework out there that says, if we are too uncertain, then we decline an application. Otherwise we would couch our decision in a

very precautionary way, and I guess that's where it leads me into my first questions which are directed to Matt.

Congratulations for all the work that has been done in the background there. You will be aware that the laboratory results are all couched there in terms of an uncertainty which is of the order of plus or minus 60% to 70%, and therefore when the modelling is based on that intermediate value, and people have talked about it being very conservative or worst case scenario, there is in fact a range that could have been put in there and perhaps something at the top limit should have been there. So, all I'm really asking you to do is to confirm that there is uncertainty in those numbers of quite a significant order?

DR HALL: There is for every modelled number and I think you're right, you can take the averages as the input or you can take the upper error of that average as the input value, but those numbers are very defensible I think from a modelling perspective, from an accuracy perspective. But there is inherent error involved in them of course.

DR LAING: Okay, and that leads on to the second point. Unfortunately I guess the field trials were conducted slightly differently so there are differences and it only went for a ten hour fumigation period and there was unable to be some measurements taken at the back end. You've shown some curves where there is similarity between what was done in the lab and what was done in the field but we actually haven't got a clear steer on the endpoint of a 24 hour fumigation in the field, so that's another area of uncertainty that comes into it.

DR HALL: Sure, and I think the figures that I've presented comparing what was done in the laboratory at a very small scale versus what was done at Tokoroa with a

different dose, 50 grams per cubic metre for ten hours. What those figures illustrate is that the response curve, that sorption curve, is quite similar between what happens in the lab and therefore what happens in the field. But you're right in that we don't have that large-scale information for 24 hours for a higher dose at a much larger scale but I think the information that we've presented shows that it can be scaled and the same response - or a very very similar, not the same, a very similar response measured between two vastly different volumes.

DR LAING: Yes, I understand that but I'm just trying to make the point, I mean, I guess I'll move on to questions to David, is really around the area of what do the modelling results mean and what sort of adjustment, if any, factors are required. Is David on the line?

DR SWAMINATHAN: We have some issues like hearing because the mic is here and they can't properly hear the voice.

MR BROWN: We can repeat the question and he can answer back.

DR LAING: I'm not hearing that straight. Clarify for me please?

MR BROWN: We can repeat your question to the poly conference phone and then you'll be able to hear him answer back but we may need to repeat your question so he can hear.

DR LAING: That could be a complicated process. Okay, I'll start with some of the questions that I asked last week and the first one was related to the wind rose and it was really for the room's understanding. Looking at the wind rose and the points of each fan, is the turquoise colour at the end represents the percentage of the wind blowing in that direction for the highest wind speed?

DR SWAMINATHAN: David, can you hear me?

DR SULLIVAN: Yes, I can.

DR SWAMINATHAN: This question is regarding the weather data and the wind graph you have provided with the different

colours and the directions. Can you please explain that one in more detail so the Committee can understand how the weather data is calibrated, like wind speed and the wind direction and the different colours used in that graph?

DR SULLIVAN: Okay, one second here and I'll pull it up on my computer so just bear with me a little bit. Let me get the report up here, just one second. Okay, see the wind rose is, let's see, I'm just trying to locate it on my graph here. I'll also zoom in. Do you have a picture of the current wind rose on the screen there?

DR LAING: Well, I've got it in front of me.

DR SULLIVAN: Okay, I just wanted to confirm that. Let me zoom into my picture here, so just one second. First of all, as explained, the wind rose shows the frequency of winds from the direction that it's pointing to. So, the greatest frequency of winds are coming from the west to west-southwest, and heavy flows from the southeast and also a slight secondary from the north to northwest. And then each of those colours within each of those frequency bands indicate the wind speed and the frequency of winds in those wind speed categories. Maybe I'll zoom in here too so I can identify.

So, the winds vary from nearly calm, like 1 metre per second and 2.1 metre per second are in quite of like a grey area that's very near the circle where the station site is identified, and as you go up from yellow, red and blue the wind speeds increase as the scale shows on the right side from 2.1 up to 8.8 metres per second as you increase, change the colours. And, obviously the highest wind speeds are in the very light blue at greater than 11.1 metres per second. And in this case you can see the greatest frequency, the highest wind speed also occurs in the most frequent wind directions from the west and west-southwest. The very light shades

on the end of those shows a greater frequency of those wind speeds as well to any other arrows that are on that wind rose. Is that enough explanation or do you need a little more detail?

DR LAING: No, that's fine thank you. My next question is related to the fumigation period which uses the laboratory data on permeability or diffusion through the tarpaulin and I guess a calculation is given there that finishes up with the data given in micrograms per centimetre squared per second. I just want to know whether when that is fed into the air dispersion modelling, whether an equivalent concentration or a quantity in grams, kilograms, is also fed in?

DR SWAMINATHAN: Okay, David, the provided permeability data, the Committee is asking how you convert that metre squared data to gram per metre cubed, and how you use that in the modelling; can you please explain that one?

DR SULLIVAN: You might have to say that one more time. I didn't quite get the whole question there I'm sorry.

DR SWAMINATHAN: You have used this [hosane] permeability study -

DR PHILLIPS: Swami, can I just make a suggestion. If this fellow can hear you through that microphone, why don't you just give that microphone to Kerry?

DR SWAMINATHAN: I'd have to take the whole thing to Kerry. That's the mic. Kerry will come over there.

(Dr Laing moves to where the microphone is)

DR SWAMINATHAN: It is mainly relevant to the [hosane] permeability study.

DR SULLIVAN: Do you need explanation of the wind with the emission rates, is that what your question is?

DR SWAMINATHAN: Yes, we will explain that question.

DR SULLIVAN: Okay, go ahead I'm sorry.

DR LAING: No, the question is, you obviously used the laboratory data on the permeability or the permeation

through the tarpaulin to calculate a flux in micrograms per square centimetre per second. I wondered if in what is fed into the model, that is also converted to a quantity, a dose, in terms of grams or kilograms of EDN; are there two separate parameters fed into the modelling or only that concentration?

DR SULLIVAN: Well, do you have the report in front of you? There's an actual equation that shows how those emissions were calculated, do you have that report in front of you?

DR LAING: I've now moved to be able to talk to you so I haven't got it in front of me, but I understand -

DR SULLIVAN: In section 3.2 there's an equation that shows how the equation uses the various input parameters as given to us, like the air space and the residual concentration, and so forth, those are plugged into the equation. But other assumptions of, I guess of the total square metres or square area of the source being modelled and that comes up with a derivation of the emission rate in micrograms per square metre per second.

DR LAING: I understand that quite clearly. I just want to know, in terms of what is fed into the model, do you convert that into a concentration in terms of parts per million, or whatever it may be, or a total dose rate?

DR SULLIVAN: The actual model can take in the micrograms per square metre per second. As when you model area sources within the AERMOD model, it takes that unit as given as grams per second per square metre and it takes that exact value directly in the model and converts it to micrograms per cubic metre in the model.

DR LAING: The related question is to, when you do the ventilation stage where you've got a concentration in terms of grams per cubic metre, or whatever it may be, whether that just gets fed into the model as grams per

cubic metre or it also has a dose, a quantity of EDN associated with it in terms of grams or kilograms?

DR SULLIVAN: No, as I said, the direct model input is as grams per square metre per second units that are given at the end of that equation. The equation uses the residual concentration of 0.8 grams per cubic metre, say for an example, and does the calculation and what comes out is the grams per square metre per second value can be fed directly into the model. That's the units the model requires. No other conversion is necessary for model input.

DR LAING: I understand that but I guess it related to some of the comments that Bruce Graham made when he wanted to double the size of the stack and it was unclear to me if you were doing that. If the stack was doubled in size, the final concentration -

DR SULLIVAN: In total volume or are you talking in square metres? Because square metres is in the equation. We do take the square metres footprint of the source in the equation.

DR LAING: Yes, but if the stack was double the size from what you originally modelled, it would still have the same area and it would still have the same concentration in grams per cubic metre.

DR SULLIVAN: Right -

DR LAING: But in fact there was - no, let me finish please -

DR SULLIVAN: The model would count that in the initial dispersion of the source but it doesn't change the actual emission rate by the volume, it does it mainly by the area. It doesn't affect that other than it changes how it gets initially dispersed from the source. If you increase the size of the source as initial dispersion which can affect. So, if you do increase the source size, there's a higher increase in initial dispersion.

DR LAING: I understand that but if we haven't changed the source size and there is twice the quantity there in terms of kilograms, how is that modelled or how would that be modelled?

DR SULLIVAN: Just as I said, it only - well, it's modelled at a source that shows the height of the source, the height of the source is included along with the footprint area or coverage, so both the X and Y aerial coverage and then the height of the source is modelled with those dimensions. But the emission rate that is being derived is derived only if the area of the source changed, not the total volume. There is an air space calculation. The air space calculation, that increased, then you would have an increase in the emission rates. So, the air space we assumed in these particular runs was 450 cubic metres so that if the air space actually increased the total volume, then that air space would result in a higher emission rate.

DR LAING: Yes, understand that. What I would like some clarification on, because I don't really understand, what has gone into a calculation to give you a one hour average and then correspondingly a 24 hour average?

DR SULLIVAN: Well, the model when it proposes its calculation, it automatically calculates hourly concentrations, so that's an automatic output. If do require other averaging times, it will take those individual hourly concentration values and solve it and then divide by the number of hours. So, it automatically produces that 3 hour or 24 hour concentration, whatever you're wanting to derive. It automatically calculates in hourly concentrations in the model and stores those values.

DR LAING: I think I understand that in terms of the model will go through and it will select an hour and you've got the associated MET data in terms of wind speed and

direction to go with that, and it will then either connect that with something during the fumigation period or something in the ventilation period.

DR SULLIVAN: Right, each hour it's modelled in that sequence of emissions.

DR LAING: Okay, and then you can average it over a 24 hour period if you like, and I guess my question is related, Bruce Graham found that the 24 hour average being higher than a 1 hour average, in his terms, was surprising. Did you find it surprising or do you have a reason for it?

DR SULLIVAN: I'm sorry, go ahead with your question.

DR LAING: The question was, did you find that surprising or is there a logical explanation, other than what Bruce has put forward, for why the 24 hour average is higher?

DR SULLIVAN: If you were just to take the model as a direct, if you were to take it as being a maximum 1 hour or 24 hour concentration relative comparatively, you will see 1 hour usually greater than 24 hour is this probability distribution of 95th percentile and so forth. When you do that it takes all those hourly values and for a given receptor for the total number of hourly values, that could be a large number of zeros because the wind direction doesn't take the plume in that direction. So therefore that receptor receives a whole series of zeros because of that, and if you distribute that and then try to take the 95th percentile as you go down the list of maximum concentrations, they will tend to sometimes be lower on a 1 hour basis because there's just more zeros for a given receptor.

DR LAING: Now I've got a question related to your table 3 and the data that's in there, and comparing that with the isopleths. Can you tell me what the connection between the table and the isopleth contours are?

DR SULLIVAN: Let me just look at that table. One second here. Which figure are you referring to?

DR LAING: Well, let's just deal with your first figure which is dealing with a single stack. I mean, the principle is the same all the way through but if you've got a table that gives a concentration at a certain distance, what is the -

DR SULLIVAN: Yes, 20 metres distance.

DR LAING: Yes, what is the correlation between that number and the contours in an isopleth?

DR SULLIVAN: Well, it's taking the data that's graphically shown in the isopleth analysis and then taking the 20 metre distance from the source in any given direction towards where the maximums are occurring and at the 20 metres distance, that's the concentration at 20 metres as a maximum value in that whole isopleth plot at the 20 metre distance from the source.

DR LAING: So that means if I drew a circle centered on the source at 20 metres and looked at the contour concentrations around that circle, that would basically give me the same number that was in the table?

DR SULLIVAN: No, not necessarily a circle because you're modelling, in this case we're modelling a rectangle. So it's not necessarily a circle, it's a 20 metre rectangle that's greater than the source parameters, of 20 metres from the source and rectangular in size.

DR LAING: That was my next question, that it would be a 20 metre distance out from the rectangle. That's fine.

DR SULLIVAN: That's correct. In any given distance in applying the maximum value, the 20 metre distance.

DR LAING: Looking at the isopleths themselves, and I guess looking at a single source is the easiest to look at, and comparing it with the wind rose data, the concentration shown in the isopleths is always high - well, I'm assuming that although you've only got

a grid there for the isopleths, that's actually north-south up and down the page and west-east across the page?

DR SULLIVAN: We show what the receptor grid was for the modelling analysis, that should be earlier in the report. We have receptor grids that were modelled for each single source and multiple source scenarios, so it's a pretty, a large cartesian area that even encircles the area. So it's distributed around the source, not necessarily within the source but all around the source at a given distance resolution for the grid fields.

DR LAING: But my point is, looking at the isopleths the highest concentrations are centered immediately to the north, and if you look at the wider contours the higher concentrations extend further to the north and the south than they do to the east, which is where the predominant wind would be in terms of occurrence and strength, and I don't understand -

DR SULLIVAN: Okay, I might have to take the figure right in front of me. Is that the 1 hour or is that the 24 hour concentration isopleth?

DR LAING: It doesn't really matter, the patterns are the same whether it's 1 hour or 24 hour, and it also extends when you start to look at multiple stacks as well. The same pattern is -

DR SULLIVAN: They are under certain conditions. So, 1 hour situations can be from the south and southerly direction for 1 hour that could produce an extremely high value and it doesn't necessarily have to be a prevailing flow to produce that maximum, because 1 hour could be any direction and for a given dispersion condition can produce a maximum value towards the north. On a 24 hour basis you'll see more in line with the wind rose, but the 1 hour you could potentially see it in any given

direction because a given 1 hour could produce a maximum value.

DR LAING: I think there is a similar pattern in the 24 hour isopleths as well and it just does not square up to me that it doesn't fit with the wind rose.

DR SULLIVAN: Okay. Again, I would have to see the exact figure. I don't have the particular analysis in front of me right now, but the ones I was looking at in the most recent modelling showed a pretty consistent maximums to the northeast and east of the site which match the multiple sources I have.

DR LAING: Perhaps I should clarify for you, at this stage we are primarily operating on the information that was in your original report and was provided to us in advance, and not the more recent information that was provided immediately before the hearing.

DR SULLIVAN: Okay, all right. Well, I'd have to go back and search for that if you want to bear with me while I go and get the original report, I could do that.

DR LAING: I think we can leave it. We will be able to deal with this subsequently.

DR SULLIVAN: Okay.

DR LAING: It's just what's modelled in the isopleths does not square with me, particularly with what would happen in practice. If you looked at fumigation and the fact that you have another stack within a 1 metre of that, it seems to me that although there would be diffusion out of the end of the logs, they would primarily move between the stacks and move where the predominant wind is. But it's just that I have some doubts about some of the information that's in the isopleths and the analysis. But thanks very much.

DR SULLIVAN: Okay.

DR PHILLIPS: So I guess now I've actually had an opportunity to look at the information that you provided on TEL, I

can actually ask some questions about it which I was not able to do last time because it was brand new to us and we'd had no opportunity to review it.

I just want to clarify, so it's definitely 0.56 not 0.5 as in the first and last of Kade's slides?

MS GEAR: Yes.

DR PHILLIPS: I was interested to note that in your original application you were proposing 0.98, so one 1 ppm, so what's changed? Whoever wants to answer that. Thanks Helen.

MS GEAR: I think what we'll have to do is read a response that Dr Adam Jonas provided to Dr Deyo during the intervening period, because that was a question that was asked by Dr James Deyo. If you give me half a minute, and I will actually provide you, just give me a minute while I find it.

DR PHILLIPS: Perhaps I should be asking James instead.

MS GEAR: Because it's actually a beautiful email he produced where he's actually got coloured parts where assumptions flow through to the resulting equations. Do you want me to read it?

DR DEYO: I mean I don't have it in front of me but I guess the specific question -

DR PHILLIPS: Just the general gist.

DR DEYO: I'm not sure what has changed in their position relative to going essentially from a 1 to a 0.5.

DR PHILLIPS: 0.56. All right, so you can't answer that off the top of your head, Helen?

MS GEAR: My computer always takes a long time.

DR PHILLIPS: Okay, maybe I'll just go on to ask the next question which also relates to the TEL and your new information, and this may be just my lack of understanding of how this calculation, maybe the calculations would have helped to have seen it, but I note that reference is made to the uncertainty factors

that you guys used that you referred to the NRC 2001 acute exposure guidelines, and I was just wondering is it standard practice to use acute exposure guidelines to calculate what, I understand a TES is a chronic measure, so why would you use acute guidelines, is there some reason for why that is?

MR BRUZEK: I think we can refer back to Adam Jonas about that. It's too much deep into the toxicology so unfortunately I'm not able to answer that. Regarding what changed our mind, is basically we had been discussing also the WES back in the days, and based on the WES approach of EPA we have taken into consideration the view of how EPA is looking on calculating WES. In Europe we have slightly different standards so we have been approaching this by the European levels.

DR PHILLIPS: I understand the TEL is the WES which is an acute exposure measure and the TEL the EPA has suggested which is a chronic exposure.

MR BRUZEK: Yes.

DR PHILLIPS: So, you can't justify using what's done in the WES as the reason for setting a TEL that I can see.

MR BRUZEK: Yes, I think you're right about it but I will let Helen get back to Adam's email which is explaining almost everything.

MS GEAR: I think we would probably add to that and I know we've got the expert panel on the TES and we will have Dr Jonas who is very expert in this area.

DR PHILLIPS: Yes, absolutely.

MS GEAR: But we do note that with cyanides, that they don't bio-accumulate and it's more the acute approach that's important here rather than the longer-term approach.

DR PHILLIPS: To me that seems slightly illogical because you're trying to set a chronic value, so I don't quite buy that.

MS GEAR: I think I'll leave it to the experts. So, would you be happy if I read out the rationale that was sent to us following the, that we've already passed on to Dr Jonas and I think this is the only way I can represent this area fairly and truly.

DR PHILLIPS: Okay, thank you.

MS GEAR: Okay, so I'll read it out.

DR PHILLIPS: Yep, great.

MS GEAR: So, Dr Deyo asked why we've come back with a different figure than the one that we put in the application. Dr Jonas comes back and says:

"Yes, you are right the values are different. The 1 ppm is calculated in a different way than that in the New Zealand EPA document. The 0.56 part per million value is the result of the same equation as used in the New Zealand EPA document. Draslovka wanted to align with the New Zealand EPA calculation in the response. I used the uncertainty factor already applied in the WES calculation and by the NCR documents. The NIOSH ACGIH documents, and their respective safety values, seems to be almost in line with these uncertainty factors, at least in the orders of magnitude. That does not mean that Draslovka does not support the previous number, it is just for the discussion about the value it is probably easier to use the same equation.

The previous calculation, 1 part per million from Draslovka, did not use the recalculation from humans to rats because of the known higher sensitivity of rats. It might seem from the EPA calculations that recalculation from rat to human is more conservative, but actually it does not do too much difference. I just wanted to point that out. I did not want to go to the calculation details in the new document which was sent to the EPA. I think there are more important points.

But when the question is raised I would like to provide the following reason. The calculations" -

So, in table 22 from the EPA's memo on page 57 it shows that the rats' six months inhalation of EDN calculated from Lewis TR et al 1984 on decreased weight gain showed that the NOAEL of milligrams per kilogram of body weight per day was 11.2 parts per million equivalent to 23.83 milligrams per metre cubed. The uncertainty factor was 100, the absorption factor 100. The TEL, as we've talked of, was the 0.34 parts per million and the justification given by the EPA that this is the only well-controlled chronic exposure study that was utilised EDN".

DR PHILLIPS: I think we're actually now getting into the discussion that needs to happen between the EPA -

MS GEAR: This is quite detailed.

DR PHILLIPS: This is too detailed for my question. So thank you, I might leave it at that. I just still am struggling to understand why, maybe this is to Swami, about why you used average log size and not say median. I understand that you reported 95th percentile but in terms of log size, stack size sorry, I just wondered why average was used? It would be really interesting to get an idea of what the variability is because we don't really have that.

MS GEAR: Could I add before I pass over to Swami, as you'll see on the ports tomorrow there isn't a uniform stack size.

DR PHILLIPS: No, that's okay, I don't have a problem with that but you have chosen a uniform stack size which happens to be the average. Now, why didn't you use median, for example, they give a better indication of the variability.

MR BRUZEK: If I can add something to that. Like basically we have done, again some searching. We have had a

meeting with Genera yesterday once again assessing the information. Again like we've been told once again that basically in more than 95% to 99% of cases, the log size doesn't go over 1,000 cubes.

DR PHILLIPS: So that's actually not an average then, is it?

MR BRUZEK: It's actually not an average, it is basically what they have told us. We are also only working from the information we get from them. They said their standard log size is between 435 to I think 650. I think Mark will be here in the afternoon and he can say to that. Actually they are running into difficulties to even do log size of 1,000 cubic metres and more in the ports, from the point of view of safety, from the point of view of manipulation with all the logs, and therefore their actual regular size, the 1,000 seems to be like an overshot by ourselves.

DR PHILLIPS: I guess the challenge for us is that we're trying to get as much evidence here as we can based on the data that's been presented to us, and so if you keep coming up with new numbers and the numbers keep changing it makes it really challenging for us.

MR BRUZEK: As I say we are not the commercial applicator and it's very problematic from our side, we are - by the information.

DR PHILLIPS: I appreciate that, but you are the Applicant.

MR BRUZEK: I understand that but in Europe the maximum size and we are limiting the maximum size to 1,000 cubes, that's why we also used that number and we have been confident in that number. And to be honest we would even be confident in being told it cannot be more than 1,000. Same thing, we want to measure, we want the local applicators to measure how much is at the endpoint.

DR PHILLIPS: Thank you very much, that's all.

CHAIR: We're running a bit ahead of time but I still think it's worth examining this in a bit more detail. I've only got one question and it's related to the question Ngaire just asked. In the data you've presented for determine the endpoint concentration of EDN under a log stack, the loading factor is quite a critical parameter. The loading factor in your trial at Tokoroa was 37%?

DR HALL: No, the 37% was the average load factor from the small-scale laboratory studies. The load factor in the trial at Tokoroa was not measured.

CHAIR: All right, I understand that. Is it routinely measured then on the port?

DR HALL: No.

CHAIR: You referred to information given to you by Genera, a dataset that allowed you to determine the average load factor in your calculations. Was that dataset made available to the EPA?

MS GEAR: We've found this quite frustrating. When Dr Graham actually produced the report and questioned the size of the stack we looked at it and said, we really need to go back and reconfirm this with Genera. Genera does keep records of every single fumigation it does. It does that because on a charging basis, it also does that for regulatory basis, and I believe it calculates, and we need to check this with Mark Self this afternoon, and you can ask the question or whatever, but I believe they work out the loading factor because they also do that as part of their calculation for the application. So, they went to the data they had and provided us with the data that they said from 2017 was the most up-to-date data.

CHAIR: But this data wasn't shared with the EPA, it's not available?

MS GEAR: If you want the data, we can ask Genera to provide us with the data. We didn't get the data, we asked for the averages. So, we're at fault perhaps for not

interrogating that data as well as we could but we did go to industry and ask for the best data available in New Zealand.

CHAIR: Okay, thank you. Do you have a question?

DR LAING: I don't have a question but it's really a comment related to that which is back to the first comment I made about numbers and I understand you might have difficulty in getting stuff out of Genera, and it would be interesting to ask Mark some questions this afternoon, but my understanding was when you wound up last week you provided some information to us that said an average stack size was 1,000 plus or minus 100 but it might be bigger than that and 58% was an average loading rate. We come back this morning and those numbers are different again.

MS GEAR: Excuse me, how do you mean they're different again?

DR LAING: Well, we're now saying that 1,000 is the maximum and that 58% isn't an average, it ranges between 55% and 58% and we've used 55%, so.

MS GEAR: The figures 55% to 58% are unchanged, they were in the presentation we provided, oh, and I don't think that has changed. We have always said that in the modelling we asked for the 55% to be used after we have confirmed that it varies from 55% to 58%.

CHAIR: Okay, thank you. That concludes the questions from the Decision-Making Committee. I'm going to invite any members of the EPA staff to ask questions if they have them at this time.

DR VAUGHAN: I just have one question and potentially Matt can answer it. You mentioned that in that trial you did, EDN does not significantly decompose to hydrogen cyanide during fumigation and I was just wondering whether you investigated whether any of the our breakdown products, or the products that you've said that HCN then breaks down to, the carbon dioxide and the

ammonia-based products, whether you investigated the presence of that to potentially account for HCN then going on and breaking down to form something else?

DR HALL: At that particular time when that study was completed, in 2015 I believe, that was not a question we were looking to ask at that stage, we were focused on hydrogen cyanide and how that changes over time and how the impurity within the product, you know, where that sits. So, experimentally Plant & Food were working with different cylinders from different manufacturing dates and so on, so it was a different question that we were asking. So, no, we did not look at ammonia, CO2 or other compounds.

DR MOHAN: I just had a quick question for you, Kade, about the monitors. So, are you proposing that the workers would have two monitors for every time that they do a ventilation? You described the two monitors which monitor essentially different concentrations but every single time you do, you pull the tarps off there would be a monitor there?

MR McCONVILLE: Yes, definitely. So you would always measure the concentration under the tarp before the ventilation. The other detector is a safety detector and every person, every worker who is in that fumigation zone would have a personal detector with them during that period.

DR MOHAN: And what about training, would you guys provide the training to the workers, is that right?

MR McCONVILLE: We don't undertake training, we're not a certified training organisation, but we would be outsourcing that to the detector trainers. So, for example, even Draeger, MSA and other equipment suppliers all provide a training regime or a training programme for detector use which is generally certified training. I'm not sure what that requirement is in New Zealand,

whether there is a requirement for that training to be certified and take place, but we do recommend and we do it in Australia, that all of our applicators are certified trained in detector use.

MS GIBSON: Hi, I'm Philippa Gibson from WorkSafe. It's been stated a couple of times today that an air purifying respirator is used in New Zealand for methyl bromide where concentrations exceed the immediately dangerous to life and health. It's absolutely considered by every organisation around the world that that's poor practice. That both 3M and Draeger, the manufacturers of respirators, Draeger who manufacture an EDN filter for respirators make it very clear you never use filtering face pieces where the IDLH concentration might be exceeded. The New Zealand Standard for respirators says the same thing. OSHA, NIOSH, CDC are the Canadian centre for occupational health and safety, all say the same thing. Essentially that is bad practice being applied if what you're saying is correct there. So, it does concern WorkSafe if bad practice is commonplace in terms of respiratory protection around methyl bromide, and if that bad practice is being used as a basis for then setting or promoting certain controls around EDN control. Not so much a question, I suppose, but that's an observation from WorkSafe.

CHAIR: Was that a question?

MS GIBSON: That was kind of my question.

CHAIR: I think in the interests of time, I know and you'll all be aware that we're well behind schedule. The staff will be presenting and WorkSafe will be presenting after the break. So, at this point I'm going to invite any questions from any of the submitters to the Applicant on what we've heard this morning.

MR BROWNING: I'm not sure exactly who I'll be asking them to of the Applicant but one I'll just ask is do you

anticipate that Genera will be doing all the fumigations using EDN?

MR BRUZEK: Well, commercially we don't expect to have an exclusivity with any producer here. We basically are trying to only make sure that anyone that is using chemical is being a certified fumigator, that he's well-trained and he's following the recommendations that we are giving and that are on the label. So, basically we are not selling any product that we produce to anyone that doesn't undergo our internal certification process, plus any certification process that is required by the local regulation.

MR BROWNING: And if there are records of non-compliance, would that change your view on who you supply?

MR McCONVILLE: Yes, definitely. So, we have a three-stage product stewardship process which also involves basically a cancellation of their use of the product. They must go through both a theoretical, basically a screening, a theoretical as well as a hands-on practical training which they are certified for under our own internal certification process. If there is non-compliance with these standards, that is policed from two sides. That is policed locally through the EPA and through their controls, but also from us. So we will obviously get indications of these non-compliances and therefore we can assess their suitability for the ongoing use of EDN.

MR BROWNING: And what about local non-compliance, for example with the local Council; if there's non-compliance to their requirements and maybe WorkSafe's, would you be considering that as well?

MR McCONVILLE: Definitely.

MR BROWNING: There was discussion around EDN's flammability and it's almost a throw-away thing to say, well, hey, there's lots of other flammable products used in a range

of situations. So, I've got a question. What other flammable or even explosive gases are used in similar volumes under tarpaulins or even ship's hold, what's a similar situation?

MR McCONVILLE: Methyl bromide is flammable between 9% and 16%.

MR BROWNING: And EDN is much more flammable, isn't it?

MR McCONVILLE: They are both classified as 2.1 products under the UN coding system, so they're both flammable. However, yes, methyl bromide has a narrower range. EDN has a broader range. However, methyl bromide still falls through between the UEL and the LEL during application and therefore ignition sources must be eliminated.

MR BROWNING: So, has there been a situation or an experiment where a log stack, or similar to something like a thousand cubic metres that has been fully charged with EDN as would be expected, has actually been ignited to see what would happen?

MR McCONVILLE: No.

MR BROWNING: But that's a real risk, isn't it?

MR McCONVILLE: I wouldn't think so because, in the end you are dealing with a very isolated situation where the ignition sources are already eliminated from that process using standard operating procedures. Those ignition sources are always eliminated from inside the tarp, there is no ignition sources within a tarp environment, so therefore we believe that in order to undertake that would be even riskier.

MR BROWNING: And so you take human error out of the equation all together?

MR McCONVILLE: No, because there is also other factors which are contributing to that and that is also the fact that when you have a fresh timber stack, you're dealing with a certain moisture content within those logs. You are

dealing with a large volume. However, it is only a controlled process during the first hour of application. It is an isolated case in an isolated environment under control.

DR SWAMINATHAN: Just to add, another fumigant phosphine is also used which is higher flammable than EDN and methyl bromide which is also currently use in a ship's hold. It is instantaneously flammable. Phosphine is the highest UEL and LEL level compared to EDN or methyl bromide and it's currently used in ship's hold.

CHAIR: Can you repeat that please, I didn't hear what the fumigant you were referring to was?

DR SWAMINATHAN: Phosphine, there is another fumigant called phosphine which has a wide range of UEL and LEL level and it's currently used in ship's hold fumigation which is higher flammable than EDN and methyl bromide.

MR BROWNING: And just for my clarity, are you saying that phosphine is as flammable as EDN or is it just classified within a range to be the same as EDN?

MR McCONVILLE: Sorry, we don't understand the question.

MR BROWNING: I heard a comparison with phosphine then but I'm not sure where phosphine's flash point is relative to EDN's, would be another way of putting it.

MR McCONVILLE: So basically with phosphine, yes, it has a wider range and the flammability issue still exists for phosphine. Yes, EDN also poses that flammability risk, as we've already stated. That flammability risk only exists for a very short period of time. Once it falls below LEL that risk is non-existent.

MR BROWNING: Maybe that's a good segue to another issue. In terms of some of the measurements, including TELs and WELs, you will be aware, and I'm just checking, that tarpaulins have vented instantaneously or been vented by weather or whatever cause, decay, in effectively every port that they've been used in, in New Zealand, and

effectively every year that they've been used, is that correct?

MR McCONVILLE: Sorry, you were referring to tarp damage?

MR BROWNING: Yes, and not necessarily even damage, just for whatever range of reasons have vented instantaneously, whether it's the weather that's ripped them off or whether the tarp has been damaged?

MR McCONVILLE: Yes, there are always instances of that with any fumigant, including EDN, including methyl bromide. In those cases emergency response procedure goes into place. Emergency equipment, including self-contained breathing apparatus goes into place for that as well, and again, I believe in New Zealand it is a reportable incident. Up until now I am unsure of what the current fumigators are doing in terms of reporting, that is outside the scope of our registration.

MR BROWNING: And if there was that instantaneous release, how about the flammability or the risk of flammability from other ignition sources a little further away?

MR McCONVILLE: In terms of if you were to apply full dose and therefore have what you're referring to as an instantaneous release, which is the entire tarp coming off in one second, or half a second -

MR BROWNING: More significant.

MR McCONVILLE: Therefore you are releasing EDN into the air in which it is dissipating very very rapidly and dispersing very rapidly. You would not have a flammability risk outside of the buffer zone.

MR BROWNING: And that's a 20 metre buffer zone, a 5 metre, or a 60 metre?

MR McCONVILLE: So that is a 5 metre application or fumigation zone with a 20 metre buffer zone for bystanders.

MR BROWNING: So just to get this right, you are suggesting, and I have to say that I'm disagreeing but I'm just

checking, that you're suggesting that at 20 metres with significant venting, that there wouldn't be a flammability issue if there was an ignition source at 20-21 metres?

MR McCONVILLE: Correct.

MR BROWNING: And how would we know that, where would we go to check that, the veracity of your opinion?

MR McCONVILLE: We can go back to the modelling data, we can also go back to the fact that we have air dissipation data over a period of time, and the idea being that as soon as you start applying this product it starts to absorb immediately into the timber and starts to break down. So a lot of planets would need to align in order to get that kind of release scenario and in order to pose any kind of flammability risk outside of the buffer zone.

DR SWAMINATHAN: Just to add to that point, flammability is really to a metre cubed how much volume of gas you are applying. When you are eliminating that one the flammable risk will straight away go because you are exposing the whole volume to the atmosphere and there is no restricted environment or a particular enclosure where you have this concentration. So, this concentration we are mentioning is only in that particular treatment area, so 500 metre cube or 1,000 metre cube, it's only in that one. When you are opening that one, the risk is eliminated.

MR BROWNING: So that's having some sort of confidence in modelling on your part. I just had a question on that but maybe not in order. I'll come back to it, it may be in my submission. There was a slide that I believe suggests that EDN does not significantly decompose to hydrogen cyanide, is that correct?

DR HALL: Yes, that's correct. In 2015, as I mentioned in a response to a previous question, we did that work which

is peer review published this year indicating that EDN does not break down in the presence of a humid moist environment, it does not break down into hydrogen cyanide.

MR BROWNING: And so the actual action of EDN as a fumigant is by what actual compound?

MS GEAR: The actual action, EDN breaks down in the presence of water to two cyanide ions effectively, decomposes -

MR BRUZEK: It dissociates to two CN ions. So it is still essentially from the toxicology point of view the same chemical. However, like the purpose of the work was if we convert it heavily into hydrogen cyanide, this is from the physical and chemical properties point of view into a different chemical and would fundamentally affect the modelling. So that's why this work has been conducted. They share very similar modes of action from a toxicity point of view, basically essentially the same one.

MR BROWNING: So that's almost a red herring to suggest the science, it doesn't significantly decompose to hydrogen cyanide we've still got effectively a similar action --

MR BRUZEK: Yes.

MR BROWNING: -- and a similarly toxic compound?

MR BRUZEK: Yes.

MR BROWNING: And I would ask who did the science and is it referenced, because I didn't see any reference when that was presented?

MS GEAR: If you have a look in the appendices of the Applicant's application, I think it's pages 83 to about 87, there is a lot of information about the breakdown of EDN in the atmosphere and it discusses those pathways.

MR BROWNING: And that science is referenced there, that particular one that was just mentioned. Thank you.

MS GEAR: Yes. Could I perhaps add too that the reason that the work was done by Plant & Food, during the application to the APVMA there was a lot of speculation as to what would happen to hydrogen cyanide levels during the EDN fumigation process. There wasn't adequate information at that stage and that's why we worked with Plant & Food to make sure that this area was clarified so that the potential for increasing levels of hydrogen cyanide could be clarified for all time.

MR BROWNING: And I'm not sure if it can be because one, you've suggested, one of the notes I've taken is that moisture is not a significant factor in the limited lab experiments and yet moisture is obviously a significant factor in terms of the decomposition of EDN to those different cyanide products, and so any stack of logs is going to have some variation to another stack of logs or another - you know, the matter of how long they've been stored, what the weather conditions are at the time, there is going to be that variability, isn't there?

MS GEAR: There will be some variability but I'll pass it over to Matt who is more up-to-date with log moistures and HCN production.

DR HALL: So there's a number of aspects there. So, the first one relates to sorption, so the fumigant going into and onto the substrate and we have shown very clearly that moisture content does not significantly influence sorption, so that's the exponential depletion of concentration over time, that that information is very clear over a number of studies and, again, published.

The second aspect relates to break down into HCN and we have not looked at that under different moisture content conditions but we have looked at it under representative conditions for fumigation of recently

felled pine logs, I can't recall the moisture content but it is in those reports.

So, yes, sorption is not influenced by moisture content but the break down, we have not looked at various moisture contents but we can show that for a typical fumigation of pine logs with EDN, that we get no significant break down into hydrogen cyanide.

MR BROWNING: And there will be other timbers, logs, and exported as well no doubt, not just pine, particularly in the future, would that be correct? What about Douglas Fir, what about Eucalypt?

MS GEAR: It is possible that other logs would be treated. They would be a very small percentage and I'm sure that some of the industry members can comment on the percentage of logs that are Pinus Radiata. I would note that at the moment EDN is being used in the Czech Republic on Norway Spruce and that there is research underway in the United States in various laboratories looking at a range of timbers. So, while that information isn't available today, that information will become more available over time, that's the only justification I can give at the moment. But the vast majority will be Pinus Radiata from New Zealand.

MR BROWNING: Now, you mentioned that EDN was not bio-accumulative. Can you be sure, do you have even the information to suggest that there is no damage at acute levels, that damage may actually be cumulative on further exposures, such as in methyl bromide, and I think we've seen Professor Ian Shaw point out that in acute exposure to methyl bromide, while there may be a pass in terms of the immediate effect or symptoms, that further exposures to methyl bromide or similar would potentially end up with chronic effects. So, while the EDN, or maybe the cyanide products, may not be bio-accumulative, do you have any confidence or

information around potentially neurotoxic damage that may actually be cumulative, do we have that?

MS GEAR: I think Dr Deyo from EPA will be able to answer that.

DR DEYO: That's pretty much exactly why there's two sets of exposure set-ups, one protecting against acute exposure where it is really based on life-threatening concern where detoxification systems are overwhelmed in a high exposure situation, and then relative to the difference with a TEL being substantially lower to protect against similar methyl bromide, longer term lower level exposures and it's not due to the cyanide, it's due to the metabolites, and that's why there are different assessment factors set for acute exposure verse a chronic exposure similar to cyanide levels that have been established for drinking water as well as in food supplies.

MR BROWNING: And so that's a good reason for a low TEL to allow for the unknown parts?

DR DEYO: The TEL is in line with a lot of the levels already established for food and drinking water.

MR BROWNING: My next question in a similar health area was for the dermal absorption. It was quoted today as not being a mode of toxicity but it certainly is for the cyanide, and so are we saying that there is no risk to anyone of cyanide exposure from this EDN application?

DR DEYO: Dermal, and that's due to the physical chemical properties of the hydrogen cyanide being a lipophilic, or able to be absorbed through the skin, whereas EDN is not. The study that supported that was rabbits were exposed to 10 parts per million which -

MR BROWNING: Of EDN?

DR DEYO: Of EDN, and showed no effects. So, there would be a small level of concern relative to perhaps dermal perspiration in some, if it breaks down to HCN within

the sweat but in general I would have to believe minimal concern relative to the general atmospheric levels that are all estimated below ppm.

MR BROWNING: So workers in these lovely ports of Tauranga and Northport in those conditions won't sweat and won't be having any risk of cyanide -

DR DEYO: I think the risk would be negligible relative to a dermal exposure, far below what would be concerned relative to inhalation.

MR BROWNING: Thank you. So, my last question is to do with scrubbing. There was a suggestion that there was an issue with toxic waste from scrubbing and that that would transfer the issues to maybe even future generations or there would be a legacy. I'm correct in hearing that, aren't I, that's been a proposition?

MR BRUZEK: Well, this comment was made rather to general scrubbing and how scrubbing should be used. Basically we cannot compare two chemicals that are totally different and EDN is contained only from carbons and nitrogens, if it will get it to the carbon and get it to the soil, this is actually how it's being used in the soil fumigation, converts to a fertiliser that is very hard to dissolve in the water, [oximide] eaten by the plant, this is not a problem of EDN actually. However, in getting scrubbing or any form of destroying, destruction of any fumigant brings additional risks, additional issues to the port and to the workers. By connecting the devices, disconnecting the devices, moving the devices around the workplace, by actually adding the whole set of risks to the mix. So in a case of a self-scrubbing chemical that is very unstable in the environment, we see that as actually not helping the case but actually making the situation worse.

MR BROWNING: So, you're saying that in fact, and it is in your own evidence, that it does break down in the soil?

MR BRUZEK: Yes.

MR BROWNING: So it's actually just whatever the chemical scrubbers, if it's something more than carbon, is the actual toxicity that would be transferred, and I'll just park the issue about how recapture or scrubbing is applied at the moment, I'm just getting this other point clear. In the EDN itself there is not a long-term issue with it being put into deep landfill or something like that?

MR BRUZEK: Yes, I'm not saying that it's a good thing to do because it adds cost, it adds additional risks. But yes, you're totally right, it wouldn't create an environmental issue because EDN is currently a registered fumigant for the soil, for applying in the soil in Australia with a buffer zone of 5 metres and with a dose rate of up to I think 50 grams per square metre. We constantly showed the environmental, the composition of EDN in different types of soils and different PH levels, how fast EDN decomposes to the ammonia-based nitrogen that is here held as ammonia or as a nitrates and different types of nitrates in the soil that is then being consumed and utilised by the plant into CO2. This is being done in the United States at a GOP standard with the environmental labs at the University of California.

MR BROWNING: Thank you. So on the point of the risks associated with installing recapture equipment, I'm hearing that, some of that could be installed at the time of fumigation and then the connections made to the gear, I'll call it the hoses, the pipes, at the ventilation time they could be capped and uncapped at the appropriate time - I'll finish my question before you answer that part of it, what is that part of the question - I'll let you answer that.

MR McCONVILLE: I believe that the current scrubbing or recapture technology which already exists has not undertaken a techno-economic analysis on exactly what impact that would have on the port itself. There is no current system which it can be scaled up to a commercial scale for EDN. There is current systems which are working at a lab, on a lab base. Two of those are in Australia and one of those is situated here at Plant & Food in Palmerston North. They have all got inherent issues in terms of basically again waste and maintenance which goes on with that. In addition to that though is again scaling that up to a commercial scale where you are trying to fumigate 30 log stacks, for example in one day, having a dynamic process on the ports, having people, having additional equipment lying around. It is a logistical nightmare in order to do scrubbing on a port of the size of Tauranga.

MR BROWNING: It's also a bit of a logistical nightmare for families that are affected with ill-health. I wasn't able to be in Wellington but I believe Nordiko have said very clearly that they have no doubt they can scale up to suit any recapture necessary with this technology, and they certainly can for methyl bromide, if industry would supply them the logs so they can show what they can do. Does this suggest -

MS GEAR: Could I perhaps just make a comment, well answer the question really that has been asked about whether or not Nordika - well, Nordika's statement that they will be able to recapture the EDN. I think we need to make it clear that there are two ways in which EDN can be recaptured that we know of at the moment. One is to use activated charcoal, which was one of the methods suggested by Nordiko in Wellington. They haven't actually yet set that up or field tested it anywhere.

MR BROWNING: For EDN?

MS GEAR: For EDN. The two EDN scrubbers that are in use in the Southern Hemisphere are one at New South Wales, the DPI, the other one was the Plant & Food. It has a liquid scrubber which has sodium hydrochloride and sodium hydroxide. For every kilogram of EDN that you need to recapture, you need 62 litres of that substance. I think that's right, isn't it, Pavel?

MR BRUZEK: Yes.

MS GEAR: It's a highly exothermic reaction so you need a lot of bulk or else you run into heat problems. What happens is that in that chemical reaction you're also producing a toxic waste that needs to be disposed of somewhere and in quite large quantities. The two scrubbers that are in place at the moment are both relatively small. We don't know how much the one in New South Wales has used, but the one in Plant & Food, how much would you put through a year, Matt?

DR SWAMINATHAN: The one in New South Wales it's to collect from 1 metre cubed chamber, that's a liquid scrubber. So we are talking about 1,000 metre cubed but the one used in New South Wales is a lab study and it's a chamber volume of 1 metre cubed.

MS GEAR: So quite a lot smaller. The one that's being used in Palmerston North has a lot of problems and they've needed to, they've had breakthroughs several times and they've needed to do a lot of re-engineering during the time. So, we've got that as one of our potential scrubbers. It's going to need work to work it up. The other one is activated carbon which hasn't yet been trialled in the field.

MR BRUZEK: And if I may just add one more thing. What we are also saying is that the efficacy of self-scrubbing for the nature that's EDN is approximately 99.5% of the initial dose. Actually, if you will be trying to get a commercial available solution that will bring or show

anything near to it for any other fumigant that's on the market, it's not available. So, currently we are comparing like two incomparable things and instead of letting nature do its own job, we are going to be adding more chemicals and more sources of risk and that's why we don't believe it's a viable thing how to approach it.

MR BROWNING: How many research projects have substantiated your suggestion that the actual fumigation material, the logs in this case, will take that maybe 99% of the product; is it just the one that we've heard so far?

MR BRUZEK: Yes, but I think we can ask Matt how many repetitions has been done on that work. Actually also we are saying that we are measuring the quantity and we want to measure and we want to make it like obligatory to measure the endpoint concentration before the ventilation, and that's the only way how we can actually gain confidence in the data that we are showing and actually from what is the model, it will become a reality. Because we want to measure, we want to make the local applicators responsible for making even a record of what is actually present at the end of fumigation and has the process actually really done what we are saying and what we are expecting.

MR BROWNING: So we need significant trials to have confidence in the figures that you're talking about, and that would include with the applicator you are suggesting?

CHAIR: So I would like to remind the submitter here that the policy on questions is to ask questions of factual clarity, not to speculate or cross-examine.

MR BROWNING: Yes, it's a fine line sometimes, I accept your point there.

CHAIR: It is a fine line, I think you've crossed it.

MR BROWNING: It's just I'm getting responses that don't necessarily stack up or don't have much substance behind

them and I'm just trying to get that in the open so that we, and particularly yourselves who are making the decisions around this are as informed as possible. One last part to my question, that I do recall. With the difficulties around -

DR HALL: Can I just respond to that last question around substance and clarity around endpoint concentration. So Plant & Food has over five years' experience working with EDN measuring endpoint concentrations, measuring concentrations immediately after the dose is applied, multiple times during the dose. I've presented some information today around the models that we've had peer reviewed around initially it was a two-phase exponential decay. We've modified that. We have thousands and thousands and thousands and thousands of data points sitting in spreadsheets that we can model and understand the interaction between a whole range of factors; temperature, loading, end-grain sealing which relates to surface area. We understand this surface chemistry for this chemical extremely well. I would struggle to understand what else we could possibly do.

MR BROWNING: Thanks. So, with the issues with potential recapture and tarpaulin venting and some of the other risks around flammability, what consideration have you done in terms of designated contained sites, eg buildings or bunkers for fumigations as opposed to tarpaulins where everything can be controlled, managed, including monitoring?

MS GEAR: As the Applicant for the registration of Draslovka, we haven't considered that.

MR BROWNING: Thank you, that's all.

CHAIR: Are there any further questions from any of the other submitters? Yes.

MR WEISS: I have a couple, I'll try and be brief. My first one relates to chemistry which was never my strong point

but I understand that EDN, the formula is C2N2 and that elsewhere it was stated that EDN is broken down into carbon dioxide and ammonia. It was also stated that cyanide, CN is responsible for the toxic action of the chemical and so I'm trying to understand the relationship between these different compounds and at the time of ventilation is there both EDN and cyanide present and are they both responsible for the toxic action and, if so, are they both present when the tarps are lifted, and if that's the case how does the meter that measures the levels deal with those different compounds present and perhaps how does the modelling address it as well?

MR BRUZEK: Yes, well, I don't know when you specifically refer to cyanides if it's hydrogen cyanide, that's clear. Basically the key differences, I would call to make it simpler is like a chemical packaging. The one is carbon carbon bond which is kind of hard to break in any other way than basically reacting it and [...ralising], that's EDN, that's why EDN is decomposing within the environment and it's not that easy actually to make any form of cyanide other than having a dissociated, and I'm not saying like destroyed or deconstructed, dissociated CN group when the water is present.

So, both hydrogen cyanide and EDN will be present at the end of fumigation. However, hydrogen cyanide from the point of view of its physical properties, it's how light is it, how fast it dissipates, it's even faster than with EDN and it's present at much lower concentrations than the initial dose of EDN. Both have been measured and Matt's work actually showed that there are no significant levels of hydrogen cyanide being present at the end of fumigation or being created during fumigation.

The source of hydrogen cyanide in EDN is mainly from as an impurity that is getting into the product as the matter of production, and we are limited on the amount of this impurity in the final active or in the final formulation by getting this impurity below 1%, and that has been taken into consideration.

MR WEISS: Thank you. I'm still not entirely clear how the cyanide is responsible for the toxic action but I'll leave that for now and just go onto my second and final question. So, I'm look for clarification really that the value used in the modelling based on the residual concentration prior to ventilation is around the 0.8 grams per cubed or the equivalent in parts per million of around 700, and this is less than 1% of the introduced value of 150 grams per cube. In summary, is the modelling based on that 0.8 grams cubed, that less than 1% of the introduced concentration?

DR SWAMINATHAN: Okay, so there is two things. Based on the loading factor, in our first modelling we used 50% loading factor and the endpoint concentration was around 1.5 grams. That's one relate to 700 ppm, not 0.8 gram. So 0.8 grams related to roughly around 400 ppm, so that same point concentration, we used that in the modelling.

MR WEISS: Okay, thank you.

CHAIR: If there are no more questions we'll have a shortened break for lunch. I don't think there are any more submitters. Given that we're running ahead of time and you're not a submitter here at this hearing we'll pause for lunch today.

MR GEAR: My apologies, I did not understand I could not ask questions here. I assumed that we could.

CHAIR: My understanding, and I'll be corrected by the EPA legal team, is that the floor for questions is open to registered submitters only.

MS GEAR: He was a registered submitter and attended the first, does that mean that he can't ask questions?

CHAIR: I'm aware of that and he had the opportunity to submit here again today.

MR GEAR: And I asked and was turned down.

CHAIR: Okay, in that case Ian I'm happy to allow you the question.

MR GEAR: Thank you, Mr Chair. I have a question of Pavel. You referred to cost before. One of the things that really is concerning my constituents, the levy payers who fund STIMBR, is the cost of EDN when it comes to the market. We operate a very very tight structure within the forest industry. We took a hit two weeks ago with a decreased log price of about USD 15 per tonne. What is the relativity of the cost of EDN, given that it has similar treatment rates to methyl bromide, in coming to the market? Will we expect to see an increase in the cost of fumigations?

MR BRUZEK: Basically I cannot really refer to the direct pricing because that's a part of a trade secret. But however, we can say that normally if you have something that's environmentally more sustainable and more viable, it comes at a higher price. However, we managed to get a price down so it should be comparable or at the same part like the former methyl bromide fumigation while being environmentally much more viable and sustainable, so that's all I can say within the NDAs that bound with.

CHAIR: Further questions? As I was saying before we're ahead of schedule but it's been a very full morning. We'll resume at 2.15. If any of the hearing parties are concerned that they're going to miss a flight or a bus or a train, then I think we have an opportunity to capture some time in the second scheduled questions from the DMC at 3.30 this afternoon. So we should be able to

pull back quite a bit of time. For the time being let's break for lunch and resume at 2.15, thank you.

(Hearing adjourned from 1.41 pm until 2.17 pm)

CHAIR: Thanks for your patience everybody, we would like to resume the hearing and the next presentation is to be given by Teresa Vaughan on behalf of the EPA.

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PRESENTATION BY THE
ENVIRONMENTAL PROTECTION AGENCY

DR VAUGHAN: Tena koutou katoa. As already mentioned I'm Teresa Vaughan and I was the application lead on the EDN application on the side of the EPA. So today what I'm just going to do is just give you a high level summary of the EPA staff assessment on this application.

I just notice that this is basically a summary of the information in the staff report, it doesn't take into account the new information provided last week by both the Applicant and STIMBR, because we haven't had an opportunity to properly review that yet.

As mentioned already the Applicant has applied to import or manufacture EDN and EDN is a gas containing Ethanedinitrile. Ethanedinitrile is a flammable toxic gas, as has already been mentioned, and is intended as a fumigant for timber and logs under commercial conditions prior to export. As already mentioned by the Applicant, both in the atmosphere and in the body when Ethanedinitrile comes into contact with water, it reacts to form hydrogen cyanide.

So, just before we get started we wanted to clarify that this approval could be seen as sort of a first step in being able to use EDN to treat logs prior to export. Before this can be used commercially this does need to be accepted by New Zealand's trading partners. It is noted that both Malaysia and Australia already accept EDN as a treatment for logs entering their country but I would note that China and India, New Zealand's major trading partners when it comes to logs, and currently China accepts methyl bromide and phosphine fumigation and mechanical debarking, while India only accepts methyl bromide fumigation.

Upon reviewing the information supplied by the Applicant the EPA classified Ethanedinitrile as a highly flammable gas, acutely toxic by inhalation and highly ecotoxic to aquatic organisms. It is also noted that we haven't classified for toxicity to soil organisms, terrestrial vertebrates and terrestrial invertebrates and this is due to a lack of appropriate data on which to base our classification but we note that it's considered likely that EDN will pose harm to these organisms.

This application was open for public submission because it was considered that there would be a high level of public interest in this application and 43 submissions were received. As you can see from this table we received submissions from a range of viewpoints and over the three days of hearings for this application we're going to hear from the full spectrum of views on the EDN application. Given this, and in the interests of time, I'm only going to give a high level summary of the issues raised in the submissions.

First up, the importance of the forestry industry to New Zealand was covered extensively in the submissions. It's acknowledged that the forestry industry employs a large number of people, both indirectly and directly, and down in Wellington we had it confirmed by MPI that in the year to March 2018 the forestry industry reached $2.2 billion in exports.

As already mention the by the Applicant Ethanedinitrile is considered to be a possible alternative to methyl bromide, and this was covered in the submissions. This is important because methyl bromide is an ozone layer depleting substance and having an alternative to this would be highly desirable and is considered a benefit of Ethanedinitrile. The benefits of EDN were also covered extensively in the

submissions, as was the flammability of EDN and the consequences of this. Also in STIMBR's submissions they mentioned that when they did a large-scale log trial using EDN as a fumigant, the logs at the end smelt different than they did going in and this was ascribed to the presence of ammonia at the end of the fumigation. Also the history of non-compliance in methyl bromide fumigations was brought up in submissions, as well as the opinion of several submitters that there was insufficient information to fully understand the risks of using EDN as a fumigant, and several submitters requested that any controls placed in the potential approval be unambiguous, easy to follow and easy to enforce.

So, as mentioned, EDN is intended as a fumigant to control insect pests on timber and logs prior to export. The proposed application rate is 150 grams per cubic metre for 24 hours with one application prior to export. It is noted that in the submissions and also in the Applicant's presentation, that the actual rate that is used when this is, and if EDN is approved the actual rate that would be used depends on efficacy studies that were not completed at the time of application, and then also those discussions with our trading partners that we ask for acceptance of EDN as a phytosanitary treatment. Also mentioned by the Applicant they have applied for use under tarpaulin, in shipping containers, in fumigation chambers, or similar structures, and in ship's holds.

It's already been outlined that obviously EDN is a flammable gas and when it is used the highest rate that a flammable atmosphere exists at the beginning of a fumigation. Given this, the EPA proposes that the prescribed controls for a highly flammable gas, or a 2.1.1A gas, apply to EDN. And then also there is

concern, as already has been mentioned, EDN being used in shipping containers but this will be covered more extensively by the WorkSafe presentation after this.

Okay, so our human health risk assessment was based on two things, the air concentration dispersion modelling and then also toxicity study data. So just a few comments about the air dispersion modelling, some of which have already been covered. It was based on a dataset for the Port of Tauranga. Because of this it is considered that the results of the modelling is generally applicable to other ports but it is noted that they may not fully estimate the potential risks were EDN to be used at small ports, such as Picton, or at ports with significantly different weather patterns. It is proposed that this uncertainty could be used through a potential permission control which would just require a site specific risk assessment to be carried out before a permission to use EDN at that particular site could be granted.

It is also noted that the modelling we received modelled exposures from fumigations of log piles under tarpaulins and doesn't address the other use patterns that have been applied for.

Firstly we evaluated the risk to workers. This was done by comparing the modelled exposures to the WES values proposed by WorkSafe and it was found that the modelled exposures were below the WES values, thus the risk to workers from this is considered negligible, however, with the caveat that workers could be exposed to a high concentration when the tarps are removed from the log piles and it is considered that we could potentially manage this risk through the use of scrubbing which would limit the amount of EDN available at the end to be released or through the use of appropriate personal protective equipment.

Next the risks to bystanders or the general public were investigated and we investigated two different types of exposures. The first was a short-term exposure, anything from 10 minutes to 8 hours, and in that case negligible risks were identified. But when we came to looking at the longer-term lists, so those that are more representative for people living in the vicinity of the port, non-negligible risks were identified. So this was done by comparing the modelled exposures to a tolerable exposure limit proposed by the EPA. Again, to manage these unacceptable risks, a range of controls were identified, including buffer zones. It is noted, as has already been mentioned by the Applicant, that EDN always has a small amount of hydrogen cyanide present in it as a manufacturing impurity. It is noted that hydrogen cyanide is itself highly toxic and so to minimise the risks associated with the presence of hydrogen cyanide in EDN a control is proposed to limit the amount of this to less than 1% per volume. Now, I note that EPA has the jurisdiction of managing risks to human health from workplace exposures, so the EPA risk assessment was provided to WorkSafe and they provided advice over whether they thought that those risks that were identified could be managed. So, this will be covered further in their presentation.

So, next we looked at the risks to the environment. Firstly modelling was provided that indicated that EDN is more likely to stay in the atmosphere than it is to move into water, soil or sediment. Ethanedinitrile is considered to be reactive and readily breaks down and does not persist in the environment, and that the most common break down pathway is reaction with water to form hydrogen cyanide and cyanic acid which themselves can then break down further to form carbon dioxide and

ammonia-based products, as has already been outlined by the Applicant. Given this, Ethanedinitrile is not expected to bio-accumulate.

So, as already mentioned Ethanedinitrile would prefer to stay in the atmosphere than to move into water body. So it is considered there is no exposure pathway to aquatic organisms. However, it is considered under still conditions the likelihood that EDN would move into water bodies will be increased. Given that there is likely to be water bodies in the vicinity of ports where EDN is going to be used, a control was proposed outlining the atmospheric conditions under which EDN could be vented to minimise the likelihood of exposure of Ethanedinitrile to aquatic organisms. There is also a control proposed prohibiting the application of EDN onto or into water, and it is considered with the proposed controls in place the risks to aquatic organisms is negligible.

Next the risk to earthworms, other soil organisms and non-target plants were assessed and it is considered that these organisms are highly unlikely to be present where EDN is going to be used. That is because ports are very unlikely to have soil organisms or non-target plants close to where fumigations are occurring. Given this, the likelihood of exposure to EDN is considered to be low and the risks to these organisms negligible.

So, there is considered to be risks to birds from inhalation of EDN and we note that there's no reliable estimate of exposure of birds to EDN from fumigation activities. Given this the risk to birds is considered unknown and a precautionary approach has been taken. As noted by the Applicant, ports are considered to be an undesirable location for birds but it is also considered likely that sea birds might be in the vicinity. As such we have proposed a control stating that EDN should not

be used where sea bird colonies are known to exist, or can only be used where water bird colonies are not known to exist. A precautionary approach could also include the application of a permission control where sea bird colonies in the vicinity of a port could be identified.

As I said earlier, we have not classified for toxicity to pollinators and other non-target insects. However, it is considered highly likely that EDN will pose risks to these organisms as EDN is designed to kill insect pests in logs. However, it is noted that the likelihood of exposure of these organisms to EDN in low and with the proposed controls in place the risk is negligible.

Next a cultural risk assessment was carried out. As already mentioned EDN is toxic by inhalation and there is concern regarding the risk that this poses to the public, especially vulnerable people such as the elderly and children who may gather at community locations in the vicinity of ports such as schools and maraes. It is also noted that Maori have higher levels of respiratory diseases than non-Maori and that they are also represented in occupations where they might become exposed during work time to EDN. However, it is noted that if the appropriate controls and requirements are put in place, it is considered that there is negligible risk.

As already mentioned EDN is highly toxic to aquatic organisms and if it enters harbour waters it could pose risks to the culturally significant aquatic species. However, it is noted that with the proposed controls in place the risk of this is considered negligible.

Again there is a potential of EDN to harm culturally significant soil organisms. It is also noted that EDN is registered as a soil fumigant in Australia so it is known to pose risk to soil organisms but it is noted

that the fumigations will only take place under tarpaulins on hard and permeable surfaces and it is considered highly unlikely that important indigenous species will be present at these locations. EDN is intended to kill insects and therefore there is a risk that it will harm culturally significant insects. The most vulnerable insects for this are those that spend part of their life-cycle in the bark or body of woods. Now, Aotearoa does have several species that like to burrow into the bark and trunk of woods. However, they prefer dead or dying wood so they are unlikely to come into contact with EDN on freshly harvested logs. It is also noted that other winged insects that might be living on pine plantations would fly away when they were disrupted by harvesting activities. So therefore the risks to culturally significant species of insects are considered negligible.

As noted already EDN has the potential to harm birds and in particular culturally significant birds that may frequent coastal locations such as ports. But as already noted, fumigation locations are often highly unfavourable locations for birds and with the proposed controls in place this risk is also considered negligible.

There are also a number of benefits of approving EDN for Maori. It is noted that the log export industry and the forestry industry in general employ a large number of Maori. So, the availability of EDN would support social and economic opportunities for Maori in rural areas and the continued productive use of Maori land for growing pines.

There are two international conventions that could be applicable to this application. It is noted firstly that the convention on the prohibition, development, production, stockpiling and use of chemical weapons and

their destruction could be relevant, so while Ethanedinitrile is not listed on this convention it could be considered to fall under the definition of a toxic chemical in this convention. So any approval of EDN would need to just be aware of New Zealand's obligations under this convention. And then, as mentioned before, the Montreal Protocol is particularly relevant, not because Ethanedinitrile falls under it but because methyl bromide does fall under this. Methyl bromide, as mentioned, is an ozone-depleting substance and under the Montreal Protocol we have phased out all use of methyl bromide apart from pre shipment or quarantine use, which is what it is currently used for as a phytosanitary treatment for logs, therefore the approval of a potential alternative is highly desirous and will help to meet New Zealand's obligations under this protocol.

There are a range of potential costs associated with this potential approval. There's the potential set-up costs. Now, as has already been mentioned by the Applicant, several people consider that this could be used as a drop-in alternative to methyl bromide. Under this scenario there would be minimal set-up costs, and it has also been proposed in the submissions that there would be similar operating costs to the current methyl bromide fumigations. So, in this scenario the costs are not considered significant. However, if scrubbing or recapture are required this could add significant costs to the use of EDN. However, there is uncertainty surrounding the costs associated with scrubbing or recapture, and also the potential indirect costs that would result from an inability of ports to throughput logs at the same rate that they currently do. Then there is also uncertainty regarding the costs of

potential monitoring requirements, both health monitoring and air quality monitoring.

There are a number of benefits associated with the potential approval of EDN and I'll just give a summary of those now.

As already mentioned the continued viability of the forestry industry is considered a huge benefit of EDN. As I have already mentioned it is not an ozone layer depleting substance so it is consistent with New Zealand's obligations under the Montreal Protocol. It has already been stated by the Applicant that EDN does not readily enter water, soil or sediment. It dissipates quickly in the atmosphere, does not bio-accumulate and in the atmosphere it breaks down into carbon dioxide and ammonia-based products. As such it is considered an environmentally sustainable fumigant and so I note that the EPA agrees that it would readily enter water, soil or sediment but I also note that we've not received any data that quantifies the rate at which EDN breaks down in the environment or that quantifies the amount of those breakdown products. It is also noted that EDN has lacatory effect at a concentration of 16 ppm and it was proposed that this could be used as an early warning instead of using monitoring equipment. It is just noted that that level is higher than the WES values proposed by WorkSafe and as such we do not consider this to be an acceptable means to determine exposure. It is also noted that EDN controls a range of boring insects on wood and from the MPI submission we noted that MPI supports its use to control these insects and as a phytosanitary treatment. In conclusion there is a range of non-negligible benefits associated with the approval of EDN, and these range from low to a high level of benefit.

Now, there's just a couple of points of uncertainty associated with this application. Firstly, the risk assessment has been based on modelling so, as mentioned, we don't have any real-world data as to what this is like if it's used on a commercial scale and there is some uncertainty about the inputs into that modelling which has already been outlined a little bit in the Applicant's presentation. Whether or not scrubbing or recapture will be required, what effect this would have on the residual risks and what controls would need to be put into place and then the costs involved with this, and then also, as mentioned before, the amount of ammonia that's present at the end of the fumigation but it's noted that if scrubbing or recapture was required, this wouldn't be considered a significant issue.

Finally, a range of controls have been proposed and most of these have already been touched on by the Applicant so I'll just run through them very quickly.

A TEL and some WES values have been proposed as exposure limits. There are a number of requirements that fall under WorkSafe's jurisdiction so they will run through those in their presentation, and then there is a range of additional controls that have been proposed by the EPA, just a maximum application rate that is the same as that applied for by the Applicant, and then the rest of the additional controls that have been discussed already in this presentation and also in the Applicant's. So, in the interests of time I'll move on to our conclusions.

Overall non-negligible risks to human health have been identified and there is uncertainty regarding what WorkSafe requirements will be put in place to manage that and thus there are uncertain residual risks. The risks to the environment can be managed with the proposed controls and if scrubbing or recapture are

required, then some of those controls may not even be necessary. It all depends on what that residual level of risk is. EDN is not considered likely to pose significant risk or impact on Maori interests and there's uncertainty regarding the costs associated with EDN, but I note that there are potentially significant benefits associated with the approval of EDN. Overall, it is considered that the benefits outweigh the risks to the environment when the appropriate controls are put in place but it is uncertain whether WorkSafe would require scrubbing or recapture, how this might affect the residual risks and what controls should be put in place to manage the residual risks.

So, overall it is considered there is insufficient information to be assured that WorkSafe and the EPA can put in place the most appropriate requirements and controls to mitigate the risks associated with the use of EDN.

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PRESENTATION BY WORKSAFE

MS COLLIER: Good afternoon, my name is Susan Collier, hazardous substance technical specialist at WorkSafe New Zealand and I'm going to go through a number of areas of concern to WorkSafe.

This is a new process, so firstly I'm going to explain how the process now works and what part EPA plays in this process, then I'm going to have a look at hazardous substances and risk management under the Health and Safety at Work Act, a little bit about upstream duties, and then I'm going to pass you over to my colleague, Philippa Gibson, who is an occupational hygienist, she is the principal specialist for work-related health at WorkSafe New Zealand and she's going to talk about Ethanedinitrile risk management.

As of the 1st of December last year there is a new legislative framework in place for hazardous substances. Previously the EPA looked after all the controls for hazardous substances in New Zealand basically. So as of 1st of December the responsibility for the workplace controls moved over to WorkSafe New Zealand. We have the Health and Safety at Work Hazardous Substance Regulations which we look after, and we can also put in place additional requirements under what are called Safe Work Instruments, and I'll talk a little bit more about those later.

Under HSNO we now have these things called EPA notices. Most of the regulations moved to EPA notices, although there are still regulations that exist as well, and then there may be put on individual substance controls. Unfortunately that's just made it get a little bit more complicated for the people following them but I assure you, we're still going to provide the

data for a substance on the EPA website which has all the controls to make it simple for people.

One of WorkSafe's major concerns is that the statistics for workplaces are not great. These are estimated figures but for work-related health diseases every year it's estimated that 600-900 people die in New Zealand, and this is ten times higher than the number of deaths from accidents that occur. Often you hear about those people that are dying but actually there's a whole lot of other people that over time are being killed through the work they do.

So, why are we here? Well, we're working with the EPA to make sure that any new substances that are approved have the controls in place so that the risks they pose can be managed. What we do is we review the risk assessments that are produced by the EPA to determine whether the controls in the regulations are going to manage those risks. We also make some comments on upstream duties because our legislation has some duties for the importers, manufacturers, suppliers and designers of substances, and if we find that the regulations do not have requirements set there that are going to manage the risk for substances, we can set additional or modified controls by way of a Safe Work Instrument.

So, because these processes are new I'm just going to explain to you what a Safe Work Instrument is and where we get the powers to create Safe Work Instruments.

The Health and Safety at Work Act, sections 227 and 228, give us these powers. Under section 227 the Minister may approve, revoke or amend a Safe Work Instrument. Just bear that in mind, that they do actually have to be approved by the Minister, so there's a whole extra process that goes with that for us to provide information to the Minister to prove that we

actually need these controls. These are developed by WorkSafe and the purpose of a Safe Work Instrument is to define terms, prescribe matters and make other provisions in relation to any activity including the control of substances, and that's what it sets out in section 227. Section 228 says a Safe Work Instrument only has legal effect if it is referred to in the regulations, so we must have some sort of hook in the regulations that allows us to create a Safe Work Instrument.

I'm just going to try and explain how it will work with the EDN. We actually in the hazardous substance regulations have Part 13, which is for Class 6 and 8 substances, and obviously Ethanedinitrile is a Class 6 substance. We also have Part 14 which is specific fumigant controls. Those are additional controls that fumigants have. Unfortunately there are no hooks in Part 14, the fumigants, that are relevant to Ethanedinitrile. There are some hooks but they're very specific, mainly for soil fumigation. In the methyl bromide controls there is no hook to add an extra substance to have those same controls. That's why if we do some specific EDN controls to manage the health risks, we will have to use regulation 13.46 of the hazardous substance regulations and that allows us to add additional and modified requirements and Safe Work Instruments for Class 6 and 8 substances. So, the Minister may approve a Safe Work Instrument for the purpose of this regulation if satisfied that compliance with the provisions of the regulations that apply to Class 6 or 8 substances will not appropriately control risks associated with a substance. What we're saying is the regulations are not going to manage the risks, so that's what we would have to prove to the Minister.

Further, in regulation 13.46, when the Minister decides whether to approve a Safe Work Instrument under this part, he has to take certain things into consideration. The first thing is that these new provisions will eliminate or minimise relevant risks so far as reasonably practicable and whether it is practicable for relevant duty holders to comply with those provisions, so they have to be practical as well, and whether compliance with a modified form of those provisions or with additional or alternative requirements, would be more practical and no less effective in eliminating or minimising risks and whether a modified form of those additions or alternative requirements would be appropriate to the nature of the hazards and risk being considered.

Now, I think you might have a question about what "reasonably practicable" so I've got it on my phone here, because this is an important point, there is the definition in our Act of what "reasonably practicable" is so I'm just going to read it out. It means, "That which or was at a particular time reasonably able to be done in relation to ensuring health and safety, taking into account and weighing up all relevant matters including the likelihood of the hazard or the risk concerned occurring; the degree of harm that might result from the hazard or risk and what the person concerned knows or ought reasonably to know about the hazard or risk and ways of eliminating or minimising the risk; and, the availability and suitability of ways to eliminate or minimise the risk; and, after assessing the extent of the risk and the available ways of eliminating or minimising the risk, the cost associated with available ways of minimising or eliminating the risk including whether the cost is grossly disproportionate to the risk".

So, I guess our point is that cost is a last consideration on that list, so we need to look at what the options are before we can rule them out.

If we decide we want to create some new controls for EDN we're going to have to go through a process. So, as I mentioned, WorkSafe develops a draft Safe Work Instrument. That would then have to go out for public consultation, which would probably be four to six weeks where the public can make submissions and obviously any submitters here or the Applicant even can make submissions on that process. WorkSafe would consider those submissions and provide a Safe Work Instrument if appropriate. WorkSafe would publish a summary of the submissions. We would present a final draft of the Safe Work Instrument to the Minister. The Minister would then consider the Safe Work Instrument and then, if it's approved, the Safe Work Instrument would be published in the New Zealand Gazette and all things that are gazetted in New Zealand take 28 days to come into force.

So hopefully you can now understand Safe Work Instruments. Now I'm just going to talk about risk management and hazardous substance.

Our views that we put forward are based on this principle, so consistent with the purpose of the Health and Safety at Work Act. In setting controls WorkSafe aims to provide workers and others affected by work the highest level of protection which is reasonably practicable.

When we're looking at risk, legislation requires that a hierarchy of controls is followed in managing risk. Just in case you're not aware of what hierarchy of controls looks like, this is set out here. You should start at the top. The first thing is elimination. I guess an example of an elimination, you could do debarking instead of using a fumigant. That would be an

example of an elimination. But if that's not possible or reasonably practicable, then you would move down to the next step which would be minimisation and in terms of minimisation there is also a hierarchy. So substitution. In this case you could say, say EDN is safer that methyl bromide, that could be a substitution. Substituting for a less hazardous substance. Obviously if you could substitute for a non-hazardous substance but I don't think that's really possible for fumigation, that's the sort of step you would take. Then isolation, so you prevent contact. As an example the tarpaulin over the, while you're fumigating, that sort of isolates the fumigant under the tarpaulin so you're not so worried about exposure then. And engineering controls are other measures. And if you still have risk that remains, then put administrative controls in place, things like training and procedures would be administrative controls. And if you still have some residual risk, then personal protective equipment. So, basically PPE is our lowest level of risk management we consider. That's why we try and promote other higher levels of risk management rather than going straight to PPE.

Upstream duties. The Act, sections 39-42, requires designers, manufacturers, suppliers and importers not to supply, manufacture, import, design substances that are hazardous where it's reasonably practicable. Obviously Ethanedinitrile is the active and that's what's doing the job, so you need that in this case. But if you had a mixture of an active ingredient, say for a pesticide, and then some other components, we would like to see that the other components didn't add extra hazards like extra I-corrosion, or something like that, because it's a hazard that that product doesn't need because it's the active that's actually doing the job. So, we are trying

to promote that sort of behaviour in people making applications, getting substances approved.

The other part of upstream duties is that those importers, manufacturers, suppliers and designers are required to provide information for the PCBUs that are going to be using these substances. So, the information is set out in legislation and it says the following things, that "The information must be about the purpose for which the substance was designed or manufactured. Any hazardous properties of the substance" - and those things are quite obvious and generally covered in the safety data sheet - "and any conditions to ensure the substance is without risks to human health and safety when used for the purpose for which it was designed or manufactured". That's actually quite a high bar. Like, how do you use a substance without risks to health and safety?

So, as I said, we do have some regulations and if a substance has an intrinsic property, it's flammable, it gets those controls. For EDN we have regulations in place that would apply whether it's approved or not, even if it was illegally here they would apply. So, in terms of the hazardous substance regulations, Parts 2 to 5 have a whole lot of generic requirements that apply to any substance, it doesn't matter what the classification is. You have to have an inventory, you have to label things, have safety data sheets, correct packaging if you decant or transfer, but I don't think that's relevant in this case. Then there's emergency management, signage, information and training requirements that will always apply for hazardous substance.

So, once you get certain hazardous different parts of the regulation will then apply. Because Ethanedinitrile is a flammable gas, Parts 8, 10 and 11, relevant parts

of those regulations will apply. So, Part 13 is the requirements for toxic substances. The relevant parts will apply based on the toxicity. And then Part 14, as I mentioned before, is additional requirements for fumigants. So, previously, like methyl bromide, if you looked at the controls for methyl bromide when it was reassessed, there was a whole lot of additional 77A controls added on at the end of the, if you looked at the controls document. Well, most of those are actually now included in this Part 14, so they've become some generic fumigant controls, and that includes the requirements to be a certified handler, to have a controlled substance license, notification and signage requirements, and some operational requirements like supervision and ventilation procedures, and the other one is record-keeping. So, those controls will automatically apply to Ethanedinitrile if it's approved as a fumigant.

I would now like to pass you over to Philippa who will talk about Ethanedinitrile risk management specifics.

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MS GIBSON: Tena koutou katoa. Sorry, I've got a bit of a cold today. The key thing around Ethanedinitrile from WorkSafe's perspective is, one, that we don't oppose the idea of it being used but we would expect to see it being used in accordance with the Health and Safety at Work Act and that the highest level of protection is provided to people who might be exposed to it.

There are a number of reasons why it's difficult for WorkSafe to make judgements around what would be appropriate controls, and also a number of reasons why it's difficult for the people who would be using it to

be able to assess risk and manage risk, and those relate to things around limitations around protective equipment, limitations around monitoring equipment, limitations around the data in terms of dispersion, limitations around the risk criteria such as workplace exposure standards and immediately dangerous to life and health levels, issues around for example the effect of temperature on the amounts of residual gas and whether or not there is significant permeation through the tarp. So, I just want to go over some of those in a little bit more detail.

As Susan has pointed out, there is a legal duty for PCBUs to apply the hierarchy of control. To go straight to the bottom of the hierarchy, straight to "we will use protective equipment to control the risk" is not in line with the legal requirement. So, the argument around reasonable practicability has to go through the whole hierarchy from elimination through the higher forms of minimisation, and only if it's not reasonably practicable to do those higher levels is it then acceptable to go to protective equipment as the chief form of control of risk.

There are some issues around using protective equipment aside from that not applying the hierarchy of control. One is around there is uncertainty, it is not knowing what the IDLH or the immediately dangerous to life and health level is for EDN. So, therefore, in terms of determining whether or not you could use air purifying respirators, which like I say is bad practice if you're above IDLH, there's an issue there, and then also depending on what the airborne concentrations are for the workers say removing the tarp, that has a big impact on what kind of respirator is used. For example, even if it's below IDLH, the concentrations might be above levels which can be sufficiently reduced by

filtering face-pieces. It's also a consideration that not all workers can wear respiratory protection.

The very first step in any programme for developing or implementing respiratory protection in the workplace, the first consideration is medical considerations around who can and can't use respirators. Certain people can't use them. People with epilepsy should be precluded from using respiratory protection in case they fall and it becomes dislodged and therefore they're breathing the contaminated air. People with cardiovascular or respiratory disease should also be precluded from wearing respiratory protection because of the pressure that's put on their cardiovascular system and their lungs from the resistance of the filters.

In terms of dispersion, there is a number of uncertainties around that and the modelling really, one thing that's really critical from the WorkSafe perspective is that the modelling is based on 1 and 24 hour TELs, 1 and 24 hour averaged concentrations at distances from the tarpaulin, and that doesn't take into account the really critical potentially high short exposures that occur close to the tarpaulin for people working around the tarp, removing the tarp, or doing their routine checks around the tarp, and that's where WorkSafe sees a considerable gap in the data, is around what are those very high short-term exposures, which of course that has implications for how people are protected.

There's also a big difference in applying, a TEL is not the same thing as a workplace exposure standard. A TEL is set at a particular distance and measured at a particular distance. The workplace exposure standard doesn't have distance or a location, it is where the worker is, because an exposure standard is there to assess the exposure experienced by a person as they move

around their workplace, as they move close to and further away from the contamination. So, they are very different things. We can't apply the results of 1 and 24 hour TEL monitoring to assess worker risk. So, for us there is quite a big gap there around data around the acute exposures. And you could actually have, I just did some calculations, you could have some fairly significant say 100 ppm exposures for a 6 second period. The reason I use 6 seconds is because the gas meter that's been mentioned earlier has a 6 second response time. So, let's say for 6 seconds there is measurement of 100 parts per million and for the rest of an hour there's no exposure to EDN, that would equal an average level of 0.03 ppm. So, it all sounds very well, it sounds quite low, but that's not taking into account you've got this significant 100 ppm peak right at the beginning.

In terms of exposure monitoring, there are limitations around the gas meters. This was raised earlier by the Applicant as well. That the MSA Ultima can only measure up to 50 ppm and then from that point on it will give an indication that there's an error, that there is a failure. Now, that could either mean that the concentrations are above 50 or that there actually is a failure in the equipment, and also the error in the meter is about plus or minus 2 ppm. So, the lowest measure it can read it 2 ppm in effect. And the other meter that the Applicant's talked about, there's a Riken which starts measuring at 185 ppm. So there's a big gap in measurement ability between 50 ppm and 185 ppm, probably really really critical values in terms of risk, acute risk and sudden short high peaks. So, that's another uncertainty that makes it difficult to assess risk is what I'm saying.

In terms of the workplace exposure standard, I won't talk about that much because there doesn't really appear to be too much dispute about the proposed other values that WorkSafe has set. Feel free to ask questions after though if you want.

So, in determining the controls, like I say, there are a bunch of uncertainties that make it difficult for WorkSafe to really be able to decide what would be appropriate controls and whether or not we would require these additional controls to be complied with. So, the things that have to be considered are the HSWA. The purpose of HSWA is that persons conducting a business or undertaking have regard for the highest level of protection for workers. You don't go to the lowest, you have regard for the highest. You have to apply the hierarchy of controls. So, going straight to PPE is not a sufficient argument in terms of complying with the law. And also, as Susan pointed out, the definition of "reasonably practicable", it's only after you consider the risk itself and the degree of harm, and all those kinds of things and the methods available, can you then consider the cost of doing those things, and only if it's grossly disproportionate to the risk can you then ignore that higher level of control and go further down the hierarchy. And, of course the limitations. Knowing the limitations that we have around risk assessment and risk management in the situation is really critical in actually determining what would be an appropriate method to control. Just on that, tarpaulins are not a form of isolation when they're removed obviously, and there is potential for failure of them anyway when they're in place.

Do you want to do the rest, I'm going to cough, sorry.

MS GIBSON: So, as Pip said, PPE should not be the first or the only control to be considered. In terms of the hierarchy of controls, we perceive recapture as the highest level that we could probably meet for Ethanedinitrile, so that's why we have said we're considering that. So, what we need to determine is, is that reasonably practicable, actually does it work, how efficient is it, all those sort of things which I don't think we've actually got the answers to some of these questions yet. That's why we've started there and we want to see what actually is reasonably practicable.

We've got some information on what the risks that may be created by recapture are but we don't have any information on what a system might look like for a big log stack of Ethanedinitrile, how much that would cost and a number of other things. So, I guess we're still in a position where we still don't quite understand what would be reasonably practicable.

In terms of re-entry periods and buffer zones. Re-entry is for the worker, so that's a period of time that after you've done your fumigation and vented it, anybody that goes back into that area would be required to wear PPE. I don't think we were thinking about 24 hours, it may even be an hour or an hour and a half or something, but we haven't really thought about that because if we do recapture then a lot of the other things might not be needed, so that's why we haven't come to any firm ideas about what these numbers might be. And buffer zones is exactly the same. If you did recapture, then buffer zones would be completely different. We're just hoping to get some more information so that we can carefully consider what are the controls that will manage the risk to the workers and to the bystanders. Because as I think what I read out before, it's actually not just workers, it's "and

others" that the Health and Safety at Work Act considers. So, somebody doing work in the workplace has to consider how that is going to affect people outside as part of the health and safety legislation.

MS COLLIER: I think I can come back. Just in terms of the flammability issue, this is the last slide, that's been raised, whether or not it would comply with the hazardous substance requirements around establishing a hazardous area. Flammability in ship's holds and shipping containers is to be confirmed because there is a specific standard that has to be complied with. So, a bit more information on that would have to come from WorkSafe.

In terms of health monitoring, it's not just a nice thing to do, it's actually a legal requirement to do it. So, we don't see it as necessarily a PCBU going above and beyond to provide health monitoring, it's actually legally required if it's reasonably practicable. And in terms of health monitoring for EDN, because it can cause hearing loss even without noise, which is termed ototoxic, then we would expect hearing testing, and also because of respiratory issues or respiratory health effects then we would expect lung function testing as well. And, given the relevance of those tests in relation to the exposure and the costs are not grossly disproportionate, then those things would be required just as a standard part of the law. So they wouldn't be extra controls, it's already there in the law.

And in terms of biological exposure monitoring there is opportunities to test both blood and urine in terms of chronic and acute exposures. So, we would expect to see those as well. But, like I say, they're already covered in the law anyway in terms of legal requirements around risk management. So, that's it from us.

CHAIR: Thank you very much Teresa, Susan and Philippa. Questions to follow now. Questions first from the DMC, then the Applicant and any submitters.

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DR PHILLIPS: I guess I just had, I was just sort of interested, this is more from your report than from the presentation, and following on from my questions to the Applicant about the TEL and how it was calculated. I was wondering if the EPA staff can just give some clarification on the method that they used for deriving the TEL and why there's such a difference in the uncertainty factors, because that would be quite useful for us to be able to compare I guess?

DR DEYO: The TEL, when it comes to cyanide there is a lot of information in the databases because there's lots of different cyanides that are used in industry, from sodium cyanides to copper cyanides, to organic cyanides such as acetonitriles, so there's lots of different forms of cyanide that are utilised and present in the workplace. Cyanide is formed from auto emissions, it's formed from cigarette smoke and so there's a lot of information on cyanide out there. But what a lot of that information does is provide generally a qualitative assessment. When we're looking at EDN and we have to come up with a TEL you have to have a defined number of where you think things are reasonably safe or demonstrating a risk.

When you look at the data for EDN there technically is not very much data. There's one study out there in which they expose rodents and primates for a period of six months and then there's some studies associated with looking at genotoxicity. So, a lot of the data in regard to looking at the hazardous endpoints is from a

qualitative nature. Cyanides generally aren't considered to be carcinogens. Is there a study from EDN that says it's carcinogenic? No. So, you rely on the general body of evidence of all the other studies out there.

So, when setting the TEL we've looked at what is the study out there to be utilise. Well, that would be the one study that's been referenced by Lewis. That study, we looked at that and when you are studying a TEL you have to take into account a lot of uncertainties as well as a lot of variations. There's variations between people, children, adults, so there's wide variations within what they call intersusceptibilities or interspecies variations. There's uncertainties when you go from looking at animal data and applying it to humans.

In addition to those sets of factors the EPA also looked at, well, what does the study utilise to make your assessment, how strong of a study is it, how long was it run, what did they see in that study. And, so if you're making an assessment to say for a long-term chronic exposure it's best to take animal data from a long-term study. You can't derive an acute LD50 study and apply it to a long-term chronic exposure, unless you want to add lots of uncertainty factors based on that.

So, the study we utilised was conducted by Lewis et al. That study was of a six month study. Such a study is considered a sub-chronic study. That study also was conducted at a laboratory that had some serious situations associated with it. That study also utilised one sex, it had a small number of ends. And so there were a lot of issues that the EPA had concerns with that study. It does nevertheless represent a relatively well-controlled study to assess, and they did assess probably most of the major concerns known about cyanides

in assessing whether EDN also would have those same phenomena.

And, so when the EPA looked at that study there was only two doses utilised, usually a study has three doses, but nonetheless there didn't seem to be much of an effect in primates. And the rodents, at the high dose, that dose I believe is 11 ppm and 25 ppm, in the high dose it was a significant body weight loss greater than 10%, it was around 13%, and in light of the fact that there was no information associated with feed intake, food consumption, body weights over time, body weights which were started at initiation of the study, it was hard to not preclude that endpoint as being considered an adverse effect. So, the EPA utilised the lowest dose in that study as what they call a point of departure where don't you believe an effect is going to occur, and from there you apply the assessments and uncertainty factors to basically clarify, because you are extrapolating from species and studies and inter-human variations.

So, in that regard cyanide is very similar between humans and animals, and so we did use, it was being presented a 10 and 10. I believe we used an assessment factor of either a 4 or a 5 for that. The difference between going from humans to animals, again - or actually we just did that. So, now you look at what's the variation within humans, and again, with cyanide the major concern is it is readily metabolised by an enzyme called rhodanase. There's generally very little variation in regard to that between infants and adults and so forth, so I believe we used a factor of again 4 or 5, I'm trying to recall, so that gave us essentially an uncertainty factor of 20.

From there we looked at both the study length, which it's a sub-chronic study as opposed to a chronic study

which could involve other assessment factors added to it. We looked at the quality of the study which we also believed to be not of a sufficient standard and quality as compared to something that would be conducted more of a current time period. So we got the study length, the study itself, and then the overall database quality.

The overall database quality as mentioned, Ethanedinitrile is exposed inhalation-wise, whereas most of the data on cyanide is through ingestion. Ingestion tends to be less toxic because the material that is absorbed first hits the liver where it can be detoxified whereas coming in through the lungs, it first goes throughout the body before it hits detoxification. There is an absence of information as to how much EDN is absorbed through the lungs to directly compare what they would call the toxicokinetics, what are the blood levels of cyanide from an oral exposure to compare it to inhalation exposure to really make a solid assessment of how big of a difference that difference in exposure route makes.

So, essentially we are looking at things such as quality of study, database and duration. We chose a factor of 5 for that and that gives you essentially an uncertainty of 100 which has been kind of traditionally used, but it is kind of a quick and dirty way if you don't have information on a lot of the understanding of the blood kinetics and just to do a more scientific way. But we did look at it and we took five different factors into account in setting that level.

When that level was then quantified back to what does that air concentrate, when you breathe that it does ultimately result in how much estimated milligram per kilogram or technically a dose you would be exposed to on a daily basis. It is in the ballpark of essentially what has been set for drinking water standards. It's

been set, it's in the ballpark of levels that have also been established for the presence of cyanide in food, from its use as a fumigant in foods. And so that's how TEL came about.

DR PHILLIPS: Thank you, that is very useful actually, great.

DR LAING: Thanks John. As you might expect my questions are related to something that's in the application and only indirectly addressed in the presentation. So, I'm talking to you Bruce.

I asked the question about 1 hour averages and 24 hour averages and Dr Sullivan answered that as well. I would have to say I'm still confused and I will leave it to the experts to sort out and in fact provide something back that I can understand.

I've got two questions. One is related, and I guess I couch it in the terms that the assumptions that are built into modelling, some will overestimate risk and others will underestimate it, and that's just a function of what goes in there, but just looking at the modelling we've got an area source that's been modelled with a dispersion from a specified stack height, but if I look at the logs and consider the properties of EDN, it's more dense than air and therefore we're going to have residual EDN in the logs, and it's not going to go up and very little of it is going to go out the end, it's mainly going to go out the sides and I just wonder whether using 2.5 as the height of the stack or the release should in fact be lower, and if it was would you expect the plume to stay at a higher concentration and travel to a further distance if it was modelled at a lower height than the stack height?

MR GRAHAM: Ideally this should have been modelled as a volume source rather than an area suspended 2.5 or 3.3 metres above the ground, and that would have picked up the potential for the gases to move sideways at varying

heights. The work that was done in Australia some years ago by the CSIRO did actually show some stratification occurring in the log piles during fumigation. It wasn't great, you didn't end up with all of the EDN sitting at the bottom of the pile, it was probably only about a 20% differential, but it does mean that the stuff coming out at ground level is slightly more concentrated than the stuff higher. Whether or not that's significant really depends on how far away you are from the log pile. By the time the plume has travelled or would be moved 10 to 20 metres, there's probably no great difference in effect as to whether it's coming off the top or at the side.

I think all your question really reflects, though, is the fact that modelling, even though it's very complicated takes a very simplistic approach to what's actually happening in real life, and so we have to treat the results with a high degree of uncertainty, which is one of the reasons that it's recommended that you'd assume that the results are only reliable to a factor of 2.

DR LAING: Thanks very much, Bruce. The second question is related. If I can read what's written in your report which is basically talking about contours but we got the clarification this morning that the numbers in the tables are much the same as what's in the contours. You said:

"It should be noted that the contour plots represent combined effects of multiple fumigations throughout the year. On any one occasion the concentration plume would only travel in a single downward direction away from the log piles".

So, to me that indicates that if we're looking at an overall picture that's being drawn up for the year, there are a significant number of occasions where a

plume would go in a certain direction at a higher concentration to a further distance than what is there, and that to me seems that it's going to have an impact on buffer zones but not necessarily have effect on a TEL. The results averaged over a year I think are appropriate for a TEL for further away, but isolated instances of higher concentrations for further distances must have an impact on buffer zones?

MR GRAHAM: They would but that's not what happens. The contours are based on the maximum predicted level for each receptor point, that's the term that Dr Sullivan was using. They set up a grid all around the site and the computer basically churns out all the numbers for each grid and then the plotting software takes the highest value that's predicted for each of those grid points, puts them in the system and draws the plot. So, where you're suggesting that if the contour plot shows that say the concentration goes out to one unit at a certain distance and direction, then the model isn't predicting it will ever go over that value, most times it will be below that value.

DR LAING: Okay, that clarifies it greatly, thank you.

CHAIR: No questions from me so I'll invite the Applicant if they wish to address any questions to the Authority staff.

MR McCONVILLE: First of all, again not wanting to dwell on other substances but one of the things I want clarification for from the EPA in particular is, for methyl bromide is scrubbing for an environmental protection, or is it for a worker safety perspective considering that it's still valid until 2020 without full recapture?

DR MOHAN: The reason it was applied in the reassessment is due to our obligations under the Montreal Protocols, so yes, it's to protect the ozone layer.

MR McCONVILLE: In light of that, I suppose this is to Philippa and Susan, do you consider scrubbing a minimisation, or do you consider it an engineering control?

MS GIBSON: Well, engineering controls are a form of minimisation. So, yes, it would be a minimisation tool.

MR McCONVILLE: Because I noted that in Teresa's presentation you have jumped directly from scrubbing to appropriate PPE on I believe slide 2 or 3 where there hasn't been the consideration of the other hierarchies of control in there. So, I suppose where I'm getting to from a question perspective is, have the other controls been taken into consideration within this EPA assessment, because from what I can see it's one end or the other end of that?

DR VAUGHAN: I can just answer that. So, you'll note on that slide when I said it could be managed through scrubbing or recapture and appropriate PPE. So, I'm not saying it's one end or the other, I'm saying we don't know how good scrubbing or recapture is or is it going to be required because we don't know whether it's reasonably practicable, but it may be it's reasonably practicable but it doesn't eliminate all the risks, in which case appropriate PPE, which will be determined once we know what the residual risks are, would be required to manage that risk to human health. So, that's what I was trying to get across there.

MR McCONVILLE: Okay, that's fine. So, again, coming back to methyl bromide where we have an endpoint concentration of 39,400 ppm at the end of fumigation, yet the PPE requirements are not the same as what are being proposed for EDN, however it's well above the 250 ppm IDLH. We're a little bit lost as to why that provision is in place for other substances?

MS GIBSON: Well, PPE is covered by the Health and Safety at Work Act, so any requirements around PPE, there's no requirement to have a specific type of respirator for methyl bromide under HSWA but you have to have appropriate. So, appropriate respiratory protection would be where you're working in an IDLH atmosphere you have breathing apparatus, that would be seen as appropriate by WorkSafe. And just in terms of deciding what kind of controls should be used to manage risk, that's the duty not of WorkSafe or of EPA, it's the duty of the person using that chemical or the person conducting the business or undertaking, and the law requires them to decide what kind of controls are put in place according to the hierarchy of control.

MR McCONVILLE: In the presentation you also mentioned that, or in the report you mentioned that beyond 10 metres, that no PPE would be required beyond 10 metres. Has that changed or is that still relevant?

MS COLLIER: WorkSafe never said that.

MS GEAR: Just a question from me. I note it's not written in the controls but there's been a suggestion that if scrubbing isn't put in place there will be a restriction on ventilation at less than 5 kilometres an hour. I was just wondering how the EPA calculated that figure, and that was on the basis that it might enter water?

DR MOHAN: I guess, and we didn't actually calculate that figure. That particular control and the requirements around the permission were based on the uncertainties. So, yes, we don't actually have any information on how toxic EDN is to birds. We've got actually no information about the exposure and whether the birds would actually be present there. So, the reasoning for that is really just to reduce the exposure as much as possible, so that's where that number came from.

MS GEAR: I wasn't looking for an answer about the effect on the birds, it was the - and you made reference today that it could move into water and that one of the controls that would be put in place is that it shouldn't be applied directly to water, but in the last hearing we heard about the fact that you're thinking about putting in a control so that you're not releasing EDN or you're not ventilating at less than 5 kilometres per hour in case the EDN moves into the water because it wouldn't be moving very quickly, and I'm just wondering if you've done a calculation to see whether or not that's warranted?

DR VAUGHAN: So that's based on the idea that under windy conditions EDN will dissipate more quickly and it makes moving into the water, that of course is going to be present around port sites, more unfavourable. So we haven't done a calculation to determine at what wind speed it would, you know, at maximum amount, how much goes into water. What it is, is just to limit the conditions under which it is vented so as to minimise any times that it's possible that it will move into water. The idea is at low wind speed or under inversion conditions, that increases the likelihood that it would move into water and so in order to protect aquatic organisms there was just the proposal of the control to basically not allow venting under those conditions.

MS GEAR: Would the EPA be interested in the calculation that Draslovka has undertaken which shows that even in still conditions, very small amounts will move into the water and if it does, the breakdown to period is very small, and in that case we feel there wouldn't be the need to put that restriction in.

DR VAUGHAN: At this point I would consider it would be the DMC's decision whether or not to accept any further information.

MS GEAR: Thank you.

CHAIR: I take it from that that the Applicants are suggesting presenting some new information in this calculation?

MS GEAR: It can be calculated from the information that has been proposed, put forward in the application. We would just like to present it so that they - you're saying is it there, I can't point you to which page but we could tell you which page it is on.

DR SWAMINATHAN: It was submitted in the previous applications and what we have done is we have used the modelling distance because we have proposed 20 metres, that excludes water bodies. So at 20 metres we calculated the concentration based on an EDN constant and when it's mixed with water whether it's a risk to that aquatic organism, and the New Zealand EPA already calculated, there is a draft document already available on their website, which says the risk factor for aquatic organism and we've compared that one to the level we observed based on the modelling, and we form that it's very very low level. But that data is already provided along with the application and it was not look into it, that's the one we want to say.

CHAIR: Okay, thank you. Any further questions from the Applicant?

MR McCONVILLE: Yes, just one more to Philippa and Susan. You mentioned on slide 10 the process of the implementation of a new Safe Work Instrument and the process of doing that, and then does that Safe Work Instrument then become a regulation, is that how it works?

MS COLLIER: Because the Safe Work Instrument has to be referred to in regulations, it becomes like a regulation, it becomes mandatory. It's not actually a

regulation, there is a particular term for it but it is a mandatory control, yes.

MR McCONVILLE: So, then if those controls are in place and that new Safe Work Instrument is implemented, do previously approved fumigants and substances then get governed by the same Safe Work Instruments?

MS COLLIER: That is possible but in this case we're talking about requirements specifically for Ethanedinitrile. But, I guess at any time WorkSafe could come along and say, well, actually we don't think the fumigant controls are managing the risks and we could create a Safe Work Instrument for all fumigants. We do have the powers to do that.

Safe Work Instruments are generally thought of by WorkSafe not to be things to be used for specific substances, they actually like the idea of a more generic applying to a class of substances or, you know, a group of things, or whatever, rather than individual substances. So, we don't necessarily plan on doing Safe Work Instruments for lots of substances but only in cases where we think it's really necessary.

MS GEAR: One more question. WorkSafe indicated in their presentation today that at the moment they don't have enough information on scrubbing to make some, well make some decisions and clear up some of these uncertainties. Can I ask how they are looking to gain that information going forward?

MS GIBSON: From the people who would be planning to use the chemical, because they're the duty-holders that have to consider the hierarchy of control. So, it's not something WorkSafe would be going out to gather that information, we would be expecting the people who are planning on using the chemical, or the people supplying the chemical for example, to actually be providing that information to us.

MS GEAR: And so how can those people provide you with the information?

MS GIBSON: How physically do you mean?

MS GEAR: Yes.

MS GIBSON: In an email, is that what you're meaning?

MS GEAR: Well, I offered earlier today, I said we'd put together an article, a document on scrubbing, and I was informed that we're not allowed to put any more information into the area. I'm just wondering how that information can be supplied to you.

DR VAUGHAN: I would just note that the Safe Work Instrument process is a separate process to what's going on here. This is an EPA process and then once the Safe Work Instrument process starts, that's a WorkSafe process. So, you can definitely feed that information into the WorkSafe process, it's just that this is a separate process to that.

MS GEAR: So bearing that in mind, I notice in the staff memo in several places you mention that a decision needs to be made about scrubbing before you can determine the balance of your controls. Will the EPA have enough information at the end of the day to make that decision, or the DMC have enough information to make that decision?

DR VAUGHAN: Would the DMC like to answer that or would you like me to answer our proposed approach?

CHAIR: Well, I can tell you that the DMC will reach that conclusion at the end of the hearing process and the subsequent conferencing process that will go ahead. If we're not satisfied that we have enough information to make a solid decision around that, then we won't make a solid decision but that doesn't mean we'll approve the application without scrubbing.

MS GEAR: Thank you.

CHAIR: Okay, if there are no further questions from the Applicants, submitters, you now have an opportunity to ask questions of the EPA or WorkSafe staff.

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MR BROWNING: This is to the EPA. I'm looking at methyl bromide as a comparative in terms of how it's been monitored and the reporting to the EPA. We're aware that there's been at the RMA level a number of consent breaches but I've also questioned the reporting back to the EPA and it's certainly been unavailable from the EPA back to the public, some of the information that should have been reported in at times. What is the history of both reporting EPA satisfaction with fumigator's level of reporting, and what has EPA done when there have been lapses in meeting the EPA controls?

DR MOHAN: That's not really a question we can answer now because it's the hazardous substance compliance team who deal with those questions, so I'm not sure of the answer.

MR BROWNING: So I suppose the question still is, as an EPA submission what is the process when things go wrong, as have gone wrong, where does the public get its satisfaction from to see that there's due process, and I think that would be very useful to know in terms of where you're going to be setting different standards and levels?

DR VAUGHAN: I can answer that in terms of where the compliance functions actually sit. So, as of the 1st of December last year, if there is a breach that puts people at risk from workplace activities, compliance with those functions sits with WorkSafe. WorkSafe also has the compliance roles for disposal in a workplace and they also have the compliance functions for the

environmental controls in a workplace. Under HSNO the EPA has the compliance function for environmental effects from non-workplace activities, and also councils, both local and regional councils have a compliance role in there as well. So, I would note that probably going forward you are dealing with three different compliance agencies and so it just depends on what the breach effects depends on who you go to, to get your satisfaction.

MR BROWNING: So, if there's a breach at the boundary, let's say at a port boundary and where there's an expectation there, does it then pop over from WorkSafe to the EPA?

DR VAUGHAN: My understanding, and you can correct me if it's wrong, it depends on what it effects. So, if there's a breach at the boundary and it say kills off a bunch of sea birds, that would be EPA, if it's outside of the workplace. But if it's putting humans at risk, that sits with WorkSafe.

MR BROWNING: You have no information there on past history of breaches in terms of the EPA's responsibilities?

DR VAUGHAN: I don't have that information to hand for methyl bromide, no, sorry.

MR BROWNING: And then I look further back to WorkSafe, in terms of your short period of time that you've had that responsibility I guess. I'm aware that WorkSafe has been involved with the Port of Tauranga on the March 2018 incident. It had discrepancies in its evaluation compared with the Bay of Plenty Regional Council. I'm grappling with that to have confidence in where these settings are going to be. So, what assurances can you give the public that following an EPA decision you'll be able to - I mean, I've seen your hierarchy there but I'm just not seeing things come through, and I'm sorry, Chair, I'm grappling with that a little bit.

CHAIR: You addressed the question I think, or a query a moment ago to this table to perhaps ascertain as to how important the issue of historical compliance with controls around methyl bromide would be to the DMC in the making its decision, and I can tell you that it is of significance, it is something that we are aware of because the integrity of any control that we set is only as good as the reality with which we can expect that control to be adhered to.

As to how we get information on compliance history, well, the hearing process is not over yet and by the time it is and by the time we're capable of making our decision I'm confident that we will have more access, sufficient access to that information to make a decision in confidence.

But, yes, I think it's a valid question. The compliance history with which controls can be imposed on an approval is certainly relevant to the outcome of the application.

MR BROWNING: Thank you.

MR WEISS: I just have a question of the EPA. I'll phrase it in the form of a question at least. So, when proposing your control for not releasing EDN at wind speeds less than 5 kilometres per hour because of ostensibly the aquatic toxicity, is there also the consideration given to the potential increased risk those conditions pose to worker safety? Because in our experience, under low wind conditions or an inversion layer where there's slower dilution of the gas, the movement of the gas is very unpredictable and potentially there's a higher risk posed to nearby workers?

DR DEYO: First off I'm not really sure how to answer it other than there's going be exposure compliances relative to the WES that would need to be maintained, and as indicated, if they start pulling off the tarp and

values are not, going higher probably than what they predicted, I believe they're supposed to stop the process. So, I would say it's whether the wind is blowing or not blowing, they're compelled to stay within the work exposure safe levels.

CHAIR: Any further questions, any submitters?

MR GEAR: Mr Chair, can I just clarify, are submitters who are not submitting today able to ask questions or not? I just want to follow on from where we were before lunch.

CHAIR: Yes, Mr Gear, following on from your earlier question today I'm prepared to allow any question from a submitter who has indicated that they wish to submit in person, whether it's at this hearing or any other hearing.

MR GEAR: I do have a question and it's addressed to both agencies that are sitting in the room. I sit here struggling at the moment to understand how you would rationalise creating an environment in which this sustainable product, from everything that STIMBR has seen from it, can actually fairly be given a chance to get up on its feet and prove its capabilities. So, the question is can I be assured that this product, EDN, is going to be given a truly fair and rational chance to exhibit its advantages?

CHAIR: So, I would answer that question because the purpose, as I outlined today this morning, of today's hearing is to give this DMC the chance to ensure that this compound is safe to use for the purpose that the Applicant has requested, and that's the primary purpose of this hearing and of this process. I think what you've asked both members of both agencies is not consistent with the purpose of the process, and I think you're well aware of the purpose of the process here today. I'm quite satisfied that there has been significant opportunity

for the Applicants to present their case and indeed supplement that case as they've gone along with additional information, and as I indicated at the outset we're in a process now where we can enter some more specific detailed negotiation to resolve some of the scientific and technical difficulties which are at the heart of the difficulty of this decision that we're making. But the onus of the process is not to provide an opportunity for the regulatory agencies to prove why EDN should not be accepted as an industrial fumigant for the logging industry, the onus of the process is to ensure and prove as far as possible the environmental safety and toxicological safety of the compound. I hope that's a satisfactory answer.

MR GEAR: Thank you very much. I don't think we're disputing anything around what you've just said. It helps understand, or the Board members that I have here with me today, a number of them in this room, helps give them an understanding, Mr Chairman, of where we are at in the process. Thank you.

CHAIR: Okay, if there are no other questions from submitters I think we'll take a 10 minute break at this point and resume promptly at 5 past 4 with the first of the three submissions from the submitters who are here.

(Hearing adjourned from 3.55 p.m. until 4.07 p.m.)

CHAIR: Welcome back, thanks everyone for returning on time. We now have to end the day three submissions, the first of which is from Steffan Browning on behalf of the Tauranga Moana Fumigant Action Group. 15 minutes, Steffan.

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SUBMISSION BY TAURANGA MOANA
FUMIGATION ACTION GROUP

MR BROWNING: Kia ora tatou, I'm Stephen Browning, I'm here representing the Tauranga Moana Fumigation Action Group. That group was formed from the Environment Court decision regarding [Enviro Fume] when they were declined an application for release of methyl bromide at the Port of Tauranga. That Court found that the Applicant was unlikely to be able to meet a range of requirements and they thought including HSNO but certainly RMA requirements and those set by the EPA; certainly expressed grave concern about the current fumigation practices at that port.

The Tauranga Moana Fumigation Action Group is a community group. It does have a strong connection with unions, both Maritime Union of New Zealand and Rail and Maritime Transport Union. It has a strong connection with local Iwi as well. Effectively the action group wants any fumigant recaptured and for dedicated facilities for fumigation to be carried out, and I'll come back to some of these things.

On a personal level I have been involved with the issue of log fumigations for a very long time. I was acquainted with the people that started back in, or the widows that started a group called Campaigning Against Toxic Sprays in Nelson following the deaths of their husbands to Motor Neurone Disease, and all their husbands were working at or coming by that port and their fumigation facilities. That ended up with a reference to the Environment Court for the Nelson Port Air Plan and the Port of Nelson went to full recapture after that, even though there was a small amount of, very limited provision for limited release of that fumigant, I think one or two containers an hour

depending how far from the boundary and so they said let's recapture the lot.

That has in a way pushed logs north. Ships will load their hold, cargo at that port, and then if it needs fumigation because it's going to India or China, or wherever, it will get loaded up in Tauranga or Northport, maybe Napier for its deck cargo after that has been fumigated in another port. So it's a bit of a nimby in some respects.

I got particularly involved, I come from Marlborough and have lived at times in Picton, and I was also a spokesperson for the Soil and Health Association that have already submitted to you. We campaigned vigorously in Blenheim and Picton against the release of methyl bromide at that port, and ultimately that was stopped and the only fumigation that happens there is phosphine being put into ship's holds that are then released at sea in transit.

The information that was put to us by the industry, the log exporting industry, MPI and others, was deeply concerning because they were always dodging what might actually be happening. I have taken videos of the log stacks being uncovered in the middle of the night, because in that port that was decided by Genera, who were the fumigators, that that was the safest time to do it when the community were all wrapped up in their homes in Picton. So you've got Shakespeare Bay, a little gap between the hills with the prevailing wind actually going that way through into Picton. Eventually we got some testing done in Picton to see if there was any gas discernible and there was but it was at very low levels. It has said nothing to do with what the plume might have been going between the monitoring places which was hundreds of metres apart.

I was also involved, if I take it back a step, with the methyl bromide assessment in 2010 and Helen Atkins was the then Chair of the Committee and was later the counsel in the Environment Court case in Tauranga against [Enviro Fume]. I had some concerns about that but that was the path that she chose to take.

After Picton, or in fact partly overlapping, we also campaigned in terms of what was happening in the centre of Wellington at the Port of Wellington, CentrePort, and ultimately they require recapture for any fumigations done on the wharf, and that's where I got my best examples in front of me of tarpaulins venting, being ripped by a good ol' Wellington wind, and might say, well, then the gas disperses quickly but, there again, the same fumigator, Genera were using either dodgy tarps or they weren't able to be held down. But the greater Wellington Regional Council chose to stop those fumigations and it was just a lapse on their part that they did not include ship's holds, but I think two holds of ships, or maybe three in total over two ships, have been done since and I think that has stopped now due to public pressure. Part of the reason as well was the fact that there was people there as well that appeared to have suffered from Motor Neurone Disease after being exposed to fumigations at that port, albeit it maybe not log fumigations, it may have been car fumigations in one point. Auckland has since moved to recapture as well.

So, the logs get loaded up and moved to another port just moving the issue north where industry has carried on doing that because it's not prepared to pay the cost of recapture using the system that is available, and it has been contested here. But this industry has contested things left, right, and centre forever and a day, it seems, and while the Decision-Making Committee is interested in the toxicity and the things around EDN,

there is a contextual background of where industry and how industry submits, and it's over a range of things. It's over the social cost in terms of forestry and workers on the hills, the environmental cost on those same hills, it's effectively destroyed the estuary where I also live in Havelock and many estuaries around the country with the sediments that come down. Regardless of them touting Forest Stewardship Council certification, FSC's certification, when they choose who their auditors are the level of responsibility is poor.

In preparing for this I was wanting to check with some people. I learnt from a friend who's a fresh water specialist, advocate, academic. He told me about his father passing away from Motor Neurone Disease and his father blames it being at Shakespeare Bay at Picton when some log stacks, the tarps got pulled back and he was down in his boat where he had a mooring and did not feel well that day, and then later came down with Motor Neurone Disease and has since passed away at the early age of the early 70s. And I only learnt that one yesterday, it's just another one. And, you know, industry might not want to pay for recapture, industry might not want to pay for proper containment, but by hang, there's people out there and we don't know - that one would not be caught in WorkSafe's statistics because it's not a workplace statistic.

And, for the Environment Court in Tauranga I used the services of Dr David McLean from the Centre for Public Health Research at Massey and they were working on, as epidemiologists, on methyl bromide and I don't think the paper has been fully released but it effectively says if you're working or living within 500 metres of a fumigation facility, or some of it was desk-topping with agriculture, you have twice the chance of getting Motor

Neurone Disease, and that's without the stats around cancers.

So, now we have EDN. We don't know because not enough of it has been shown here what the issues are with toxicity. We've heard some evidence but there's a whole lot of unknowns, just like there is with Motor Neurone Disease and methyl bromide. Our organisation thinks it's absolutely critical that whatever the fumigant is, because a fumigant has got to be darn toxic to do the job, and I've had a role in Parliament as a biosecurity spokesperson for the Green Party, I've got no doubt about the need for these sorts of fumigants and chemicals to ensure biosecurity, both for goods coming into this country but also to be fair enough to the countries that we export to as well, so yes, we need them, but we've got to use them fully safely.

We heard this morning, doom and gloom, the log prices dropped considerably recently. Well, I heard that more than a decade ago when we tried to get better forestry practices in terms of harvest so our hills didn't look like a third world country and were sliding into the sea effectively. Oh no, the log prices are too low. Log prices are significantly higher now than then, and log prices are significantly higher in my understanding than in 2010 when the EPA was talking recapture in terms of the ozone layer. But for a good social conscience and for us to have good effective decisions at a national level, we need to be looking very much at the people first.

So, our organisation is highly concerned that this material is going to cause very very similar problems. Different problems, no doubt, because a different toxicity path but it's a neurotoxin as well, and we're just not hearing anything about it. The industry pushes back when Ian Shaw comes out and talks about the

linkages with Motor Neurone Disease from methyl bromide. It says, oh no, the stats aren't strong enough. Well, there were six deaths in that port and there's been others. Do we actually have to have a hundred deaths? With EDN are we going to have to have some accidents and some harm? We just had an incident in Tauranga recently where four workers went to hospital to be checked over after having an exposure event, following that is four abatement notices handed to the existing four for that fumigator.

CHAIR: One minute.

MR BROWNING: I probably will need a little bit more. I think the industry seems to get one hang of a lot of time but I'll try to speed up. I'll jump to air dispersion modelling. The results vary significantly depending on the assumptions made. It's not a perfect science and there's always uncertainty, we've heard that. I note that Dr Terry Brady in his report on the March incident pointed out that, effectively in my words, that it is inherently flawed, it certainly is unlikely to be able to be used as evidence in a retrospective legal environment considering that case looking back at it when they were trying to analyse what had gone on. Uncertainty in emission rates, influence of large piles of logs and the behaviour of the dispersing plume, that's a topography on the flat area of the Port of Tauranga.

In 2007 our community group in Picton at the time, Guardians of the Sounds, approached him, as it worked out, and here's a quote he may not like it now but his quote he made at the time is around monitoring, where to put monitors. "Trying to monitor an invisible plume of methyl bromide with a hand-held worker exposure meter is like trying to catch a mosquito with a bird net, completely worthless". There's massive issues to do

with monitoring but there's also issues to do with modelling and so they're quite different.

I have noted that the Applicant here, and STIMBR effectively, we've heard that the figures keep changing, we think that both the EPA and WorkSafe need to be going to the most precautionary levels possible and effectively forcing the hand to recapture. Recapture could happen. Nordiko, I've had a lot of communications with Nordiko, met with them several times. I don't care whether it's Nordiko or who it is, and I see Mark here from Genera and he's trialling different systems, but Nordiko tell me that they can't even test it on a decent stack of logs because industry is basically blocking them. When I've had the discussion with industry, even at lunchtime, they say, yes, that's because they won't sign a non-disclosure clause. Nordiko are happy to be totally transparent and open with trials of their system. It can be upgraded, there's no reason for it not to be upgraded and if there's a better system, well and good. Industry has also said that, well, there's a legacy issue disposing of the carbon. It is not any more than cyanide in that soil micro organisms also do their work on methyl bromide as it comes up through the soil.

I realise I've done my time. I would like to refer to the [Enviro Fume] decision and I would ask the DMC whether it may accept that or make a point of looking through that decision to see what Judge Smith and that Court came up with in terms of Tauranga, and Tauranga is just one port, but the deep concern they had at both compliance but even the exposure of workers, and including the Court, and yourselves maybe, when visiting that port for whatever reason. There's lots of different people there and there's people in the nearby communities.

Now, remember back in Nelson Environment Court case, the local paper actually imposed the plume path of methyl bromide from that port over the town of Nelson and it was somewhat significantly more than what we're seeing in the modelling by anybody here, but that was the model that was being used at the time and it went right down through out towards Stoke, obviously dissipating to some degree. But then you get Professor Ian Shaw saying even the low levels of instantaneous exposure to methyl bromide may be causing problems for people, and I mentioned it before in questions.

So, I've got material that I would have possibly read out. I don't think I need to if you think you can find your way to look at that Environment Court decision. I'm happy to supply it to the EPA to look at that, in fact the EPA will have that decision as well.

So, we're opposed to EDN only on the basis that we're not confident that there's enough information known about it. We have got Maori members that are very concerned, they're concerned about the methyl bromide for that matter and what might happen around the sea, but in fact EDN would be even more of a threat because of the nature of EDN and water. And they were concerned about residuals in bark, residuals in the dust on the port getting washed in stormwater or whatever into the port. I suppose one last thing, and I have to say that the EPA's presentation, and this has happened forever and a day, I've been involved with a number of ERMA and then EPA submissions and the likes. They say appropriate or proposed controls in place will make the risks negligible. I don't believe that because those controls invariably aren't monitored, aren't met, or are underestimated and so I'm asking this Committee, the EPA, and then WorkSafe under the new legislation, to go hard and make sure that workers and the broader

community, they've got the ultimate protection. Thank you.

CHAIR: Thank you for your submission. Just to reiterate the Committee will take into account historical levels of compliance as a factor in making its decision. Questions for Steffan Browning, Kerry.

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DR LAING: Thanks John. Thanks you, Steffan, for your presentation. I guess it's a difficulty in looking at the context and the historical methyl bromide with the methyl bromide history, and trying to compare that with what is proposed here. (Dr Laing asked to speak into microphone). Sorry, we'll start again. I realise that the methyl bromide history is important but I mean our perception, and I hope you will have the same feeling, is that EDN is quite different and the residual concentrations should be significantly different from methyl bromide, and therefore some of those problems that have arisen in the past may not be manifest here.

I've got some questions and they're really related to the comments that you've made around scrubbing and how it might readily be put in place and I know you asked the Applicant the question this morning to which they answered they hadn't given any consideration, but what consideration have you given to whether a purpose-built facility is practicable, economic and would cope with the various things that were described around port logistics and the like?

MR BROWNING: Yes, well that's an issue. Of course EPA has this theoretical balancing except its first provisions, a bit like WorkSafe, it's the environment and human protection first before economic balances. So I'm not sure how you're going to do that. In China, for

example, there are facilities where large volume fumigations happen in chambers and then the residual from that chamber is dumped into another chamber and the likes. So, it's a matter of will, both at a national level and maybe port and regional level. We believe that there is an opportunity for the Port of Tauranga but it could be in my view at Northport, where a particular facility is built to do large-scale log fumigations. The level of investment will be millions of course but, you know, relative to this, the third largest export industry's ability to pay, I think it shouldn't be a problem.

The Port of Tauranga's Chief Executive has put to me that what about bunkers where you can just put a tarp across a concrete-walled facility. That would be a great start where you've got full control, well, almost full control, there's still accidents but much better than having tarps draped over log stacks and, as I said earlier, every port has had problems with log stacks venting at some stage.

So, there will be the cheap version and there will be the far more sophisticated version. The cost, we've looked at it, we think it's practicable. Where there's deaths, there's people that we can't attribute it all the time, but we know this stuff is deadly in that sense and so we think it is affordable. It is a very big industry, it's had a lot of public money already and it's time it contributed a bit more itself.

DR LAING: It's a pity you weren't in Wellington, we did discuss this to a fair extent with Wil from Nordiko and in particular we did talk about the facility in Shanghai, so we're aware that there can be massive structures put in place. But it comes back to this balancing act that we've talked about before, as to what is required by way of a control or economic investment

compared with what you're trying to manage and how great a problem is that that you should do it? And I guess that's the balancing question we have to face up to.

MR BROWNING: I think if you set the standards at the correct level, it may be that the ripple from that is that those investments are seen to be practicable and realistic, and the Environment Court pointed out that this is a major thing, and WorkSafe may say about who's actually in control of this, is it the fumigator, is it the exporter, is it the port, is it the regional council? In fact, the Court suggested it was everybody, and I say at a national level maybe there are some other strategies we can look at, but in your case if you set what is actually required for worker and environmental safety, the rest may follow.

Over lunch I actually rang Nordiko, I was quite concerned about what I was hearing about the Plant & Food recapture system, and Nordiko are fine to do it with just carbon, they don't need the liquid system, the liquid system is to try and reduce the amount of carbon and the volumes but that's not the issue. And interestingly enough, Plant & Food have ordered one exactly the same after, you know, they've had five years of use and they've ordered one exactly the same as they've used before and Nordiko have not heard of these problems that we've heard here today. So, I don't know where the truth lies there but I'm hearing problems there. Can use a straight carbon filter, and if there's a problem with those sodium thiosulfate and caustic soda and the volumes, and the volumes, by the way, I gather are not quite as described here either.

DR LAING: I'm sure I don't know where the truth is either as to Nordiko's scrubbing systems, but one of the things you've postulated there, and it's one of the controls that I think was mentioned by Bruce Graham, is that what

we might be required to do is set a control over what residual concentration there is at the end of fumigation and how they comply with worker safety health and from thereon, there may be a range of options that they can use to do that and we would be leaving it to their discretion.

MR BROWNING: Do you mean that by if, it's been touted that it's only 1% of residual gas, and you go, well, okay, we're getting very low levels, and our organisation, in fact I've missed it in my submission, suggested that one of the conditions would be that there are trials on the commercial level, not just at 750 cubic metre stack but in real-life trials to affirm that before anything on a regular basis continues, because we've got the numbers changing all the time. It seems to be very surprising to be getting down as low a percentage as that, but maybe that is the chemistry. But there's too many variables and we just think that, yes, that's why we say dedicated facilities would be optimum but otherwise recapture regardless.

DR LAING: My understanding is that commercial scale trials for a significant length of time could not take place without us giving an approval for EDN to be imported or used.

MR BROWNING: Or an interim approval, I don't know. I hear you.

DR PHILLIPS: Thank you very much for your interesting talk. I just had one question that related to your submission and it was just a question to you. You made a comment about how there had been no environmental assessments specifically done for the Tauranga port and you had concerns about the need for these kind of local scale studies to get a real handle on what the environmental and health issues were at a local level.

My question is that the EPA has proposed a permission control which would require those sorts of studies to actually be done. I know that's only one part of your overall concern but if that permission control was in place, would that alleviate your concerns in that particular area?

MR BROWNING: I just had a little bit of a hearing thing then. If there was a permission for a -

DR PHILLIPS: The EPA is proposing a control, and this relates to the fact that, the observation that perhaps the modelling was done in Tauranga and may be relevant to that area and other similar ports but it may not be relevant to places like Picton, and so I guess I took that a little bit further to try and address your concern around the fact that there weren't environmental assessments done in some of these areas. I was sort of thinking, well, would that go some way to alleviating your concern on that particular issue?

MR BROWNING: Yes, your decision needs to reflect this being held in numerous places. Napier, it's got some similarity to Nelson; Picton is quite unique, I don't know if it's unique; Gisborne if they were to do it; Lyttleton. Yes, the decision would need to be strong enough that - I think I might have still missed it but are you suggesting that with the EPA's suggested control, that local application and modelling would happen?

DR PHILLIPS: That's my understanding, something along those lines anyway.

MR BROWNING: The thing is it is still - if you're monitoring you'd have a monitor over here and a monitor over there and one 200 metres away and you get whatever you get at those monitoring stations, and you've got no idea what's in-between, and that's how bad modelling and monitoring potentially is. Yes, you do need something, workers

need to be covered for the immediate vicinity but these invisible gases, there's not even a suggestion that there are smoke tests done, or something like that, where you can actually have something of a similar specific density visible where you can say that's where it's going this minute, but of course that can change in five minutes or ten minutes as well.

DR PHILLIPS: But that permission control doesn't relate to monitoring, that relates to doing site-specific assessments. That's quite different from baseline monitoring.

MR BROWNING: I would suggest it is necessary to have site-specific, but I will still have my doubts as to how far they can go and so I'm really looking for very strong controls.

CHAIR: Thank you, Steffan. No other questions from me. Are there any questions from the EPA staff?

DR VAUGHAN: No questions from us.

CHAIR: Applicants?

MS GEAR: Could I just ask the question of Mr Browning, is he aware that at 15 parts per million, and I know that is above the WES and above the TEL, but that above 15 parts per million the majority of the population would get extreme eye-watering similar to cutting up onions and so while we might not have a monitor everywhere, those high plumes will be picked up by practically every individual.

MR BROWNING: The concern about that, and I noticed that STIMBR, there seems to be some issue around the odour as well of fumigant released, we don't know what's happening at 1 part per million, the toxicologists may have some views around that, so waiting until your eyes water or you can smell it as some kind of monitor is really well past the gate post in our view.

MS GEAR: I'm not offering it as a monitoring system. I'm just saying that that is in part a back-up for the script, the situation you describe where any monitors will be quite a distance apart.

MR BROWNING: There was a mention on the odour as well and of course there's no stenching agent suggested with this just as there's no stenching agent with methyl bromide, and that might be helpful, although there was some mention of an almond-like odour in STIMBR's submission and almond of course is cyanide, but they are like, no, no, there's no cyanide problem but there's an almond-like odour. So, yes, I come full of scepticism I have to admit.

MR McCONVILLE: First of all, I wasn't quite sure if we were talking about methyl bromide or EDN, but when it comes to your opposition of the application I was a little bit confused. I'm not sure if you're opposing it or whether you're approving it with scrubbing/recapture, there was a bit of a disconnect there. So, can you clarify whether you're opposing the application or whether you're approving the application based on the controls which are in place and the potential for scrubbing or recapture?

MR BROWNING: We don't think there's enough information to approve it but if it was to be approved, recapture at a minimum. Methyl bromide, we have a problem with methyl bromide but most of that is in the air because it's not recaptured. It's a very effective fumigant. Industry could do everybody a favour by getting into recapture this year in a significant way wherever the logs are fumigated, and then it would be meeting its 2020 obligation at the same time.

MR McCONVILLE: So, in the case of scrubbing or, sorry, recapture, do you propose recapture or scrubbing?

MR BROWNING: Well, for us it doesn't matter as long as it's not released to the atmosphere.

MR McCONVILLE: So, in that case, what do you believe is the acceptable scrubbing efficacy?

MR BROWNING: Well, are you looking at a numbers parts per million?

MR McCONVILLE: I'm looking at a percentage in terms of efficiency.

MR BROWNING: I don't know about percentage because you'll fumigate at different levels and then a percentage could be anywhere I guess. I rely on the toxicologist and their parts per million approach, and I suspect it shouldn't be much different than methyl bromide and you have your range of acceptances with TELs, the WES.

I agree with Bay of Plenty Regional Council where suggesting we have some shorter time values set, because waiting for eight hour averages when all your spikes are evened out and won't even trigger anything, and yet you've hurt someone, are no good. We actually need back to the 10 minute/15 minute type values, values for that, and instantaneous. What happens if a worker gets a spike or a release? What happens if they over 15 minutes get whatever? They're the sort of values we really need here if we're going to protect people.

MR McCONVILLE: What kind of monitoring system do you suggest?

MR BROWNING: Well, you've got a range of them and I know some of them range in the prices that you put up there and others would be quarter of a million dollars. Again, another good reason to have proper containment or specific facilities where those sort of costs don't go all crazy because you've got to have ten of them around the place to get any semblance of order.

It is interesting to note that the gas is heavier than air but under certain conditions, of course, you'll

get levels of lift to do with temperature, humidity, the inversion layer thing. One of my questions to the EPA was how often are they really checked, that the inversion layer controls are being met? Who's testing it? You know, low winds, and all of that. That's rubbish. It's needed but it's rubbish in terms of application, because how often are fumigations being held up for two or three days because the weather conditions don't suit or don't meet the conditions? They don't. So, those sort of things concern us.

MR McCONVILLE: But I think that again, with the reference back to methyl bromide we're not focusing on EDN and as the global commercialisation head for EDN, I've never been approached by Nordiko, to be honest I've never been approached by Genera, in order to look at any kind of scrubbing technology for EDN. We've always stood by the fact that this substance will control itself, that the endpoint concentration, we've done it, again as Matt Hall said previously, we've got thousands of data points which represent that. We have engineering controls in place using equipment.

MR BROWNING: Have you approached Nordiko yourself?

MR McCONVILLE: We've had no necessity to.

CHAIR: Once again, just in the interests of time, and I'm mindful that we still have a couple of submitters who deserve a chance to submit, can we keep any remaining questions and answers very brief please and to the point.

MR McCONVILLE: Yes. So again, just coming back to my original question, whether this is in opposition to the application or whether it is an approval based on the controls which are in place; that's all I want to understand.

MR BROWNING: If there's better information, then EDN is definitely better than methyl bromide in terms of worker

and environmental safety, we wouldn't have a problem with EDN. We don't think the information is there and recapture can deal with the ozone layer for methyl bromide, so we know that. There's maybe a neutral approach if the information was there, but as it stands we don't think the information is there.

CHAIR: Thank you, no further questions. Thank you for your presentation. Now we move on. The next scheduled presenter is John Armstrong from Quarantine Systems Ltd.

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SUBMISSION BY QUARANTINE SCIENTIFIC LTD

DR ARMSTRONG: Please bear with me if I start coughing. My voice is going a little bit. I'm allergic to sulfur compounds and I'm moving very swiftly through my TEL for sulfur.

My name is Jack Armstrong, that's my nickname. I go by that rather than my given name of John. Formerly I was with the US Department of Agricultural at Agriculture and Research Service. I was a research entomologist and I spent 40 years with the USDA, 31 of those years developing quarantine treatments for the export of product through marketing channels. I immigrated to New Zealand eight years ago and I have a consulting company called Quarantine Scientific Ltd that specialises in scientific support in the areas of biosecurity, phytosanitary treatments and market access. I've been very fortunate to be able to work with the Crown Research Institutes, some ministries and industry organisations in this capacity.

In 2014 under the auspices of a Ministry of Business and Innovation education project with Scion, I led a team of Plant & Food Research scientists that conducted a survey of all known literature on potential alternatives for methyl bromide. We reviewed in-depth 15 major and 18 minor fumigants, chemical treatments, ie insecticides, non-chemical treatments, for example controlled atmospheres, energy treatments such as irradiation and others, and physical treatments such as heat. We also looked at pest management systems and debarking. We found that only Ethanedinitrile, I'll refer to it mostly as EDN, offered any potential for replacing methyl bromide. A distant second was sulfuryl fluoride, which is a known greenhouse gas and is not

useful for controlling insect eggs without unacceptably high concentrations or long fumigation times.

There was one area that does show promise for heating logs, it's called dual heating. It has been developed by the University of Canterbury and it would be good for treating very small or niche consignments of logs and timber on logs but unfortunately it won't be available by 2020 for even those small export items. Hence, EDN was the only potential treatment worldwide that can be readily adapted and applied under commercial conditions safely and economically by 2020.

Initially we did not have confidence in EDN because we did not think it would work, primarily because of the reported rapid breakdown and the solubility in water and we thought this would be a big issue with logs. I was one of the people who originally did not believe it would work. Then later Plant & Food Research showed this to be untrue. It turned out that the rapid breakdown was actually beneficial in killing the target pests we were interested in.

This is the product that came out of that, this is double-sided. Other than textbooks this is the largest document I've ever been involved with and it is on the STIMBR website if you're interested in it. It has been looked at internationally and Plant & Food has received good feedback.

After EDN was identified as the only potential methyl bromide alternative, I led a team of Plant & Food Research and Scion scientists that included both entomologists, foresters and an economist. We carried out a Techno-Economic Analysis of EDN. This Techno-Economic Analysis reviewed all aspects of replacing methyl bromide with EDN for treating log exports. The analysis was used to inform the STIMBR Board regarding the viability of using EDN commercially

for the treatment of export logs in identified areas of research that would be needed to prove its efficacy to MPI, and research that would be needed to register EDN in New Zealand. The Techno-Economic Analysis provided enough confidence that the STIMBR Board chose to invest heavily in the EDN research that has provided the many datasets that have been made available today.

In 2017 I carried out an independent review for STIMBR of all available and potential technologies for the use of recapture and destruction, ie scrubbing of methyl bromide and by extension EDN. The scrubbing would be done at the end of fumigation. I found that there are no suitable commercially available technologies that can provide the efficacy and economics required by the log export industry. Most methyl bromide recapture and destruction systems that work, do so only on a small scale in a closed system or in the laboratory. There may be an exception in the future. There is a methyl bromide scrubbing system that is currently under development by Genera but whether or not it is available by 2020 will depend on its scrubbing efficiency.

Because EDN is a new fumigant, there are no commercially available EDN scrubbing systems. Moreover, the review found that technologies touted for the use in the New Zealand log export industry were unproven, no more than desk-top exercises and they lacked preliminary efficacy data, there were no engineering specifications and the commercial adaptability and/or economic studies were also lacking.

I would like to make a quick comment about what I've heard about companies that say they can upscale their product for the recapture or destruction of EDN. It is my view from what I learned that there are no systems that can be upscaled. Anyone who says they have a

system that they can scale-up is not telling the truth. That scale-up would require huge amounts of internal or external resources. Therefore, I suspect that anyone saying that they can scale-up to meet the New Zealand export log industry needs, is either looking for money to help them with that project, or is looking for a way in to better set themselves up to be able to in the future scale-up. I don't believe any of that could be ready, from my reviews, to be done by 2020.

While we're on the subject of scrubbing and for the purpose of clarification I want to address the term that we've been hearing here called "self-scrubbing", a rather non-scientific way of describing something that happens with EDN and I don't want it to be misconstrued. The molecules of methyl bromide or phosphine, which are currently used to fumigate logs, do not break down during fumigation or immediately after they are released into the environment. Because of sorption these molecules are bound to the wood and released over time. As we know, methyl bromide breaks down in the ozone layer in the upper atmosphere. Phosphine molecules break down rapidly when they are exposed to adequate amounts of sunlight. The EDN molecule, however, breaks down rapidly in the presence of water, for example during fumigation, and unlike methyl bromide or phosphine the EDN molecule breaks down to carbon dioxide and ammonia-based products with only significant amounts of the original molecule remaining in the treated space at the end of the fumigation. That amount released in the atmosphere also breaks down into carbon dioxide and ammonia-based compounds. The term "self-scrubbing" has been used to characterise that breakdown process, and it needs to be linked specifically to the breakdown of EDN. It does not occur with any other fumigant molecule that I know of.

To conclude my points, EDN is the only available fumigant that can be used by the New Zealand log industry. There are no commercially available recapture or destruction technologies that can be used by that export industry. EDN breaks down rapidly in the presence of moisture to carbon dioxide and ammonia-based products. Insignificant amounts of the original molecule in the treated space after a 24 hour fumigation would break down rapidly in the atmosphere. Because EDN molecules are not persistent like those of methyl bromide or phosphine, and only small amounts would remain after the 24 hour fumigation, no recapture or destruction is needed, even if such a system were available. Thank you.

CHAIR: Thank you for your presentation. Ngaire?

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

DR LAING: Thanks very much, Jack, I don't have any questions either.

CHAIR: And nor do I, thank you very much for your presentation. EPA staff, do you have any questions?

DR VAUGHAN: No, we don't have any questions either.

CHAIR: Applicant?

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MR BRUZEK: Jack, just a quick question. You mentioned the availability of technologies on the market and just to have the numbers comparable. Like, how long it would actually take to reach a similar efficacy that we can see that EDN is able to achieve, which is about 99% to 99.5% of self-scrubbing, as you call that, with methyl bromide or other fumigants?

DR ARMSTRONG: Based on the data that is available, it appears that it would require say 24 hours under a tarp fumigation to be able to reach the same scrubbing, if

you want to call it that, the same elimination of the EDN molecule that occurs when you would use a recapture device say after six hours of fumigation. This was proved from the early work with EDN in Australia.

MR McCONVILLE: Just following on from that, because it was one part of the answer, how long would it take based on current scrubbing/recapture technologies to get 99.5% efficacy for methyl bromide scrubbing?

DR ARMSTRONG: I don't believe there are any systems available at this time that can give you that. Based on gas laws and physics it would be very difficult to reach that point. Economically it could be astronomical. Let me switch that to a liquor, think about ethyl alcohol. If you want ethyl alcohol to be rubbing alcohol at say 70%, that's not a problem, it's very cheap and easy to manufacture and it's inexpensive to purchase. If you want that to go to 90% ETOH alcohol, then it gets much more expensive. If you're talking about 99% ETOH for use in micro-biological laboratories, then you're talking about extremely expensive to make, extremely expensive to purchase. That's the analogy I'd use.

CHAIR: Are there any questions from the remaining submitters? Thank you very much for your presentation. Okay, the final submitter today, two names in front of me Sam Weiss and Eddie Grogan on behalf of Bay of Plenty Regional Council.

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SUBMISSION BY BAY OF PLENTY REGIONAL COUNCIL

MR WEISS: Good afternoon Mr Chairman, committee members, ladies and gentlemen. Thank you for all being here, thank you for all still being awake. I know it's 5 o'clock and we're probably all keen to get home, so I'll try and make this quick.

Bay of Plenty, we are one of the largest users, or one of the largest uses of fumigants occur in our region. Let me just say, I'm Sam Weiss, work for the Regional Council. I've been involved in this space for a number of years. So, we're one of the largest users. In fact, the only other larger user is Northport, and at Northport they don't actually require consent. However, in our region fumigation is discretionary, it does require resource consent. Consent was first issued in 2005 to Genera, the main fumigator, and Council were involved in the ERMA reassessment in 2010, to which I personally submitted, then there was a comprehensive consent review in 2014.

Now, the reason we're here is not because we necessarily support or oppose this application but because we want to help ensure that EDN is used in a way that's protective of human health and that of the public. We recognise that EDN is potentially an important, or may play an important role and provide an extra tool in the biosecurity toolbox. So, most of my comments today are related to a port situation where greater volumes are used typically than elsewhere. And by way of a comparison, a shipping container for methyl bromide might use 4 kilograms, a log row may use 100, and a ship might use roughly 3 tonnes or 3,000 kilograms. So, I will just show you a few slides here.

This is Tauranga and you can see the port, there's the logs quite visible there. There's also a port on

the other side, and the container fumigation happens on that side which is Sulphur Point. That's at the Port of Tauranga. That gives you an idea of the scale of the fumigation operation. When you stand there and see the scale of it, it is quite something to behold. I think someone has worked out that on average there's a truck full of logs fumigated every two minutes if it was all done end to end. So, there's a lot of logs.

That's bird's eye view. A couple of things to note. The tarps there, the black tarpaulins, sometimes you might see 10 or 15 next to each other. Here they're a little bit more spread out.

So many of the proposed controls it seems rely heavily on the dispersion modelling results provided by the Applicant, and we've heard that the modelling was done on about 400 ppm or less than 1% of the amount of chemical that's introduced. We're quite keen to see a copy of the original Brierley report because it does seem a lot of the controls hinge on it, things around buffer distance, the need for recapture and so on, and Dr Graham's report, it also states that the modelling is based on these reduced EDN concentrations as determined by laboratory studies, and he goes on to say there's no real-world data to support the use of these very low concentrations.

So, Council is also concerned that this modelling may not necessarily reflect the real-world performance, or at least perhaps the residual concentration under the tarpaulin, and therefore underestimate the amount of gas that's released into the environment, especially because it seemed earlier on, we were told that the laboratory work that was done was based on a 28 litre sealed chamber representing essentially 750,000 litres underneath the log stack. We also heard earlier on from a submitter that certain technologies have been

discounted purely on the basis that they haven't, or apparently haven't progressed much past a lab scale. So, there's obviously some challenges with lab scale testing that don't always represent full scale.

But we certainly support a control setting a maximum level of EDN prior to the release to atmosphere to limit potential exposure levels which we believe should apply regardless if recapture is used or not. Clear procedures should be specified, including that sampling be required from at least two or three locations under the tarpaulin to ensure that a representative sample of the gas is obtained.

The rate of gas release is also a critical determinant of downwind concentration and the Sullivan report seems to assume that gas is released in a uniform way over 1 hour but this assumption is certainly not consistent with our observation of the removal of many tarpaulins often taking no more than about five or ten minutes, and we're concerned that modelling based on an assumption of a straight line release over 1 hour will grossly under-predict the short-term spike in EDN gas levels.

In Draslovka's response of 20 August 2018 in relation to Dr Graham's comments about the need for some uncertainty factors, they state that tarpaulin removal is a very controlled process, and we heard that again this morning. However, from our experience the tarpaulin removal process, while it is reasonably well-controlled when it's obvious to the operators that they're being observed, when observed less obviously, shall we say covertly, it tends to be a relatively uncontrolled process.

In relation to the worker exposure standard, it's much easier to demonstrate compliance or non-compliance against a short-term exposure limit. Over longer

periods it becomes a lot more difficult due to a range of factors. Therefore, in addition to the proposed instantaneous worker exposure standard and the ATR worker exposure standard time weighted average, we believe a short-term limit such as over 10 to 15 minutes is also required, such as apparently introduced by France, Germany, Finland and other European nations.

In terms of public protection, it's noted that while there is considerable discussion in the EPA science memo about a 24 hour tolerable exposure limit, or the TEL, there's no mention of a 1 hour TEL or an annual TEL, both of which have been set for methyl bromide use, and we believe it's important to establish TELs for both 1 hour and annual to provide the public with confidence that their exposure level is within safe limits.

The location for the required sampling for both the worker exposure standards and the TEL needs to be clearly and unambiguously specified to avoid a situation where the fumigator may be able to sample in a location far from being the worst case, as is occurring now with methyl bromide fumigation in certain wind conditions.

The buffer zones proposed by the EPA in the science memo are 20 metres for workers and 120 metres for the general public. Many port workers such as loader drivers and office workers are not in any way connected to the fumigation activity, and Council believes that these port workers should be afforded the same degree of protection as the general public. This is not the case currently for methyl bromide fumigation. Currently the fumigator is able to treat the entire port as the buffer zone and so the buffer zone may extend in some cases for over a kilometre in a given direction. The worker exposure standard then applies to everybody on the port and the fumigator only needs to meet the much more stringent TEL at the port boundary. We suggest that a

control is required so that the entire port cannot be treated as the buffer.

Photoionization devices, or PIDs, are currently used by both the fumigator and regulators to assess the levels of methyl bromide in the atmosphere. However, because the meters not only respond to methyl bromide but also to other VOCs there can be some debate around the interpretation of results. Having reliable meters that are accurate and produce unequivocal results is fundamental to ensuring the public and port workers are protected. We have some concerns around the accuracy of the proposed meters and it's been discussed earlier, the errors and the gaps in the reading. In various documents, and we had a small discussion about that this morning and I'm still a little bit confused, which might say something about my chemistry, but it is stated that EDN breaks down by hydrolysis to cyanide, and then presumably further to ammonia and carbon dioxide. Now, it seems to be then that the gas under the tarpaulin when released will be a mixture of the hydrogen cyanide and the EDN, and I'm struggling to see how that couldn't be the case. So, given that the TELs and WES are set for EDN, and the gas meters measure EDN, how will the additional toxicity introduced by the cyanide component be taken into account, or will the meter under-represent the toxicity?

It's also important that fumigators are required to verify meter readings using evacuated cannisters periodically to determine the extent of interference by other gases and to verify readings, in addition of course to the periodic calibration that they would be doing anyway. The science memo recommends that PPE be worn by workers within 20 metres of fumigation of multiple log stacks but in practice PPE is often not worn. Council believes that all staff working within 20

metres, or some appropriate distance, should where a personal alarm monitoring device which alarms at a certain air concentration, and I was heartened to hear that the proposed device is able to do that, although I understand the current meters that are used are particularly small that are worn for personal exposure monitoring and I'm not sure of the size of these current ones that are proposed for EDN.

Paragraph 23 of the EPA science document stated that for some multiple log rows, the exposure at 120 metres under some conditions was eight times the TEL, and to bring the exposure down to an acceptable level controls would need to be set. This would appear to be a good case for recapture. Other controls that we think may be necessary are things like having a ban on night venting or in still conditions, and, as I had alluded to before, we have some concerns around venting in very still conditions where the movement of the fumigant is quite unpredictable, and when you're down on the port, as I have been on many occasions in still conditions, it's remarkable how the wind conditions can change very rapidly over a short space of time. So, venting in low wind conditions presents a much higher degree of risk to workers.

The ERMA methyl bromide decision states that when using recapture, many of the controls no longer apply. For example, they said when methyl bromide is recaptured there's no need for a buffer distance, there's no need for any reporting, so the values that are reported to the EPA, I understand that they wouldn't include the levels of fumigant that's applied when recapture is used and there's largely no need for monitoring. However, we believe that even if recapture is applied to EDN, similar controls must remain in place, with the possible exception of a reduced buffer distance.

STIMBR and Draslovka have both stated that EPA controls are considered to be the bare minimum requirements and that further controls are imposed by some regional councils. They appear to be suggesting that the EPA and WorkSafe should therefore impose a very basic level of control since the regional councils will likely tighten the requirements. As I mentioned before, the Bay of Plenty Regional Council is one of the very few where resource consent is required, and even our strong preference is that the EPA and WorkSafe set controls that are clear, robust, practical and sufficiently protective of port workers and the general public so that resource consents can mirror those requirements. Any future consent attempting to set controls that are not consistent with EPA requirements are likely to be opposed and may be challenged in Court. It is therefore somewhat contradictory that in a recent submission by STIMBR to the Regional Council in relation to the air quality plan they opposed Council seeking more stringent conditions relating to fumigation over and above EPA requirements.

In conclusion, apart from being very toxic and dangerous, fumigants are notoriously difficult to track and to measure. It's very challenging to prove a breach of the gas level or equally to prove compliance when gases are invisible and largely unpredictable. For this reason the controls are very important. We need controls which are clear, unambiguous and which allow the regulator, the public and the workers to have confidence in the fumigation process. We hope that our experiences from the controls around methyl bromide will help inform the process for establishing any future fumigant controls for chemicals such as EDN so that the health of the public and port workers is not put at risk. Thank you.

CHAIR: Thank you for your submission. Before we take questions from the DMC can I invite the Applicant and the EPA staff to address the point raised in this submission about the separate components posed by both EDN and its break down hydrogen cyanide product during the fumigation, how was that addressed in the risk assessment?

DR DEYO: I believe within the application that it indicated that there wasn't any HCN that comes off the logs and so what HCN is formed is - HCN is a loose molecule, so to speak, so the cyanide is probably binding into the logs. So, the bottom line is HCN wasn't noted to be in the atmosphere to do a risk assessment on.

MR BRUZEK: If I can add to that. Basically, first of all HCN is an approved fumigant with its own controls in New Zealand. All the controls are being set including all the limitations, so that's one of the reasons why it wasn't considered too much. The other reason is that we are having a limit on the quality of the product and its contamination with ACM that is being set at 1% and so it needs to be 1%. In reality we are reaching much lower numbers but that's the second point. And the third point is actually that HCN essentially is having much smaller issue with the dilution in the air. That gas is much lighter than the air and therefore modelling the EDN and its emissions in the atmosphere are several times covering in potential contamination with HCN that can be contained as in impurity. And lastly, we have proved through the studies with the PFR that HCN is not being formed during the fumigation. So only the levels that are there as a contaminant can be present in the mixture, so it's a fact on the total modelling study, are negligible.

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CHAIR: I hope that clarifies something for you. I have a question regarding operations at the port. Given your familiarity with the port do you think operations there could be reorganised in some way such that the area used for fumigation of logs could be physically isolated from the rest of the port operation; is there a potential for invoking the isolation that's part and parcel of the WorkSafe safety hierarchy?

MR WEISS: It's probably a question for the port but I certainly believe there's potential to restrict the area of fumigation beyond what it is at the moment, because at the moment essentially fumigation is restricted to some degree but it still occurs through a widespread area. I suppose the other aspect to that is, of course, the smaller the area is that the fumigation is restricted to, the more requirement there may be to double-handle the logs, and each time the logs are handled, it adds extra cost.

CHAIR: Can I ask you another question about your belief in the integrity of the controls and the compliance with which the industry manages and executes the controls. You said you've seen a number of exercises take place which don't strictly meet the operational constraints that are supposed to be applied. Would you like to comment further on that; do you think there is a frequent lapse in compliance to best practice or stipulated practice with respect to controls?

MR WEISS: That comment I made was specifically in relation to the speed with which the tarpaulins were removed which clearly will impact on the degree of a spike to the atmosphere. There is no requirement, either in the EPA, or at the time ERMA decision, or in the resource consent for a certain period that those tarps need to be pulled off. In fact, under the current legislation the

only protection for workers is the WES, the TWA which is an 8 hour value. So, again, you could have some workers exposed to a very high short-term spike but over 8 hours they're within the 5 parts per million. So, that's why again I think it's essential that we have a short-term protection.

I know that there has been the introduction of WorkSafe documents talking about WES biological exposure indices and within there they do talk about a ceiling value and a STEL, so the ceiling value of five times and the short-term exposure limit which is for 15 minutes, I think, of three times the WES, in other words 15 parts per million, but I understand that that's not enforceable legislation.

But it really does seem to me that it's absolutely critical that we have those shorter-term values because my belief, and in fact I'm happy to be corrected, I see the CEO of Genera is here, my belief is that Genera has never exceeded the annual TEL or the 8 hour WES value, I've certainly never had one reported, whereas I think they've probably at least come close to exceeding a 1 hour TEL. I think there's lots of reasons for that. It's just difficult when fumigation occurs in different areas, and staff are moving to different areas, and where do the meters go, and the process for working out a longer term one isn't clear and there's a lot more potential to - I'll say it the other way, it's much easier to demonstrate compliance or non-compliance with a short-term value. So, we're strongly in favour of having a 1 hour TEL as well as a 10 or 15 minute WES.

DR PHILLIPS: I don't have any questions but thank you, it was very informative.

MR WEISS: Thank you.

DR LAING: Thanks John. Thanks Sam. I guess John covered partly what I was going to ask, which was around

compliance, and we don't want to really deal with methyl bromide here but we've had a fair amount of discussion on it and I guess it was just a query. We've heard in various submissions about abatement notices, enforcement orders, and I think your own submission refers to exceedances of excursion limits. So, can you clarify for me, just with respect to Genera and Tauranga, just how many non-compliances have there been, not related to tarpaulin removal?

MR WEISS: I can say, and this is on the public record, that Genera now, I think it has eight abatement notices that are current, and four of those have been served in the past, or since the 8 March incident where there were some workers that took themselves to hospital believing they had been exposed to methyl bromide.

One of the challenges in terms of demonstrating exposure, and we took some legal advice on that incident, was unless we could prove through the blood levels of bromine, or bromide rather, that they were particularly elevated, there was no legal case according to our legal counsel. Those compounds break down very quickly and they can be influenced by the amount of seafood you eat. So, to prove that someone has been exposed to a high level is exceedingly difficult.

But I have to say that Genera has also made some particularly positive steps. We believe they're putting a lot of effort into meeting their recapture targets, for example, because, as you probably know, under the consent there is a requirement for recapture that is in advance of the EPA requirements, and that is no easy task for them. So, we believe they are putting huge amounts of resources into that and they had separated it into both recapture for containers and separately into logs. They are now required to recapture from 100% of containers, and for the last two months they've been

doing that, and their recapture, we believe they're on track now for recapturing possibly even 60% from logs as well. That's a big step-up from the current 20% that's required. That kicks in on the 1st of November.

So, even though there have been these non-compliances, and in some cases that may have been due to misunderstandings or some ambiguity in the wording of requirements, an abatement notice isn't a hugely punitive device it just clearly says, you know, this is the Council's interpretation of the requirements and this is what our expectation will be from here on forward.

DR LAING: I'd also be interested in methyl bromide monitoring results but I'll just leave those for now. I think you suggest in your information that methyl bromide monitoring is required at 3 minute intervals and it should be changed to a 30 to 60 second interval. I don't know whether you're proposing that just for methyl bromide or you think that's something that should apply to EDN as well?

MR WEISS: That's one of those details that I think needs to be specified in the legislation, because often with all of these controls the devil is in the detail, and if it can be argued a certain way, or if it's not entirely clear, then it just creates a real problem for the regulator, whether that's WorkSafe or a regional council if they choose to adopt the same requirements. And with the meters, like I'm very familiar with the PID meter used to monitor the methyl bromide, you can set the interval over which the gas is averaged. So, you can set it for anything from 5 seconds up to several minutes, and then you'll get a reading. There may be a peak reading during that period or an average reading. And it seems to me that the shorter that interval is,

the more information is captured and the better picture is presented.

DR LAING: Okay, thanks very much.

CHAIR: Are there any questions of the submitter from the EPA?

MS GIBSON: I just want to point out a couple of things about WESs and TELs, that they're very different things. There is no legal requirement anywhere for anybody to report an exceedance, or workplace exposure standard. That is not a legal requirement. The legal requirement is that if a concentration exceeds a WES for methyl bromide, and just for methyl bromide, then there is a duty for the duty-holder to review their controls but not to notify WorkSafe or anybody. So, that's why nobody has been notified of an exceedance of a workplace exposure standard, because there's no need to do so.

Basically what it says is that if a PCBU finds that there is something indicating that exposure is not well-controlled, then they need to review and update those and change those controls. It also says that - it does not say that a person can't be in an atmosphere that's greater than 5 ppm, it says that no person shall be exposed to a concentration exceeding 5 ppm. So, a person could work in an atmosphere of greater than 5 ppm as long as they were appropriately protected.

The mixing up of TEL and WES seems to happen quite a lot. They're very different things, done for very different purposes and for different audiences. In terms of the WES for methyl bromide, it is a prescribed exposure standard so a legal requirement to ensure nobody is exposed to a concentration exceeding it. It does have an 8 hour time weighted average but, as such, you can apply, like you were mentioning the excursion limit which is in the absence of sufficient data to set a short-term exposure limit, which is a reason why we

didn't, then you apply a default basically of three times the exposure standard as your de facto short-term exposure limit.

I just wanted to clarify some things around exposure standards there and duties.

DR DEYO: Just to follow on from that, a three times exposure limit would be at the level where it would be approximately 15 part per million which is the level which would produce the eye irritation.

MR WEISS: Sorry, that three times, that was -

MS GIBSON: That was for methyl bromide, because we were talking about methyl bromide, not for EDN.

DR DEYO: Okay, never mind. Well, either three times the WES value being assessed for EDN would be - and also within the science mode short-term exposure threshold limits were set up in the US by various agencies through the NRC, which has been cited, in which they looked at a lot of variety of chemicals which had an acute hazard nature with them, and within that they do have a short-term exposure limit of approximately 30 minutes for EDN which is 17 parts per million, which would be at an eye irritation level, and for a 10 minute period for up to 50 parts per million. These are for the general population and I would say if you're experiencing those levels outside the work area at those levels, what would be back in the work level would be scary.

CHAIR: Great, thanks. I think there was a question in there somewhere. Applicants, would you wish to ask a question of this submitter?

MR McCONVILLE: You made a comment about the, especially around the sampling time of particular monitors, and basically with a detector you do have what's called a response time. That response time has a great effect on the actual accuracy of that detector. So, as you go down in sampling time you also decrease accuracy of that

detector. I suppose from our perspective - and there is a question - from our perspective we've been looking around for years and working with many suppliers. In the end, if there's a solution it's a mermaid in the ocean, so for us, we'd like to know whether you know of technologies in that space with shorter response times?

MR WEISS: I can't tell you where that mermaid is but my point was that having reliable data, reliable meters, is really integral to protecting the workers and the public.

MR McCONVILLE: And this is more a question to the DMC just around protocol. There's been a lot of questions raised and a lot of things said, like around Genera in general. The CEO of Genera is here and I wasn't sure whether it was appropriate for any questions to be asked of Genera while he is here. At the time we did not feel it was appropriate to have Genera on our, as the Applicant, due to impartiality. But as Mark is here, there is the opportunity to ask questions should you allow it.

CHAIR: We're aware of that and we have agreed that some of us will ask some questions of Mr Self if he's willing to answer that, it's certainly pertinent to the purpose of the hearing. So, thanks for pointing that out. Any further questions from any of the submitters to this submitter?

MR BRUZEK: Just the one question, it's rather a confirmation. You mentioned that there is actually a requirement of recapturing 60% of what is currently being fumigated under the tarp. Does this 60% refer to, if I dose 1 tonne, that I need to recapture at least 600 kilograms off the dosage, or of 60% fumigations I need to recapture everything?

MR WEISS: The requirement is that 60% of the fumigated log stacks have recapture technology applied, and that's in recognition of the fact that a lot of the gas is

absorbed into the logs and then it's going to escape into the atmosphere over the next 2 or 4 or 12 hours, so that gas isn't going to be recaptured. So, the recapture percentage specified in the resource consent relates to the percentage of log stacks that the recapture technology is applied to.

MR BRUZEK: So, there is actually no requirement for the efficacy of that technology being applied?

MR WEISS: The requirement is for effective recapture.

MR BROWNING: I was going to ask that question as well but apart from that I'm very interested in how that is measured. What monitoring devices are used to ensure that those controls from the Council are being met, and if that included containers? Basically what monitors you are using, and how much confidence, or is it self-reporting from Genera, or is Bay of Plenty Regional Council actually monitoring how effective the recapturing is?

MR WEISS: Two parts to that question. We do have a photoionization device, it's a MiniRAE 3000. So we are down there periodically. We measure the levels of gas at the perimeter at various places on the port. We're also in the process of installing a series of monitors, or monitoring stations, that are going to be measuring a number of contaminants, including sulfur dioxide, particulate matter and methyl bromide, or at least volatile organic compounds, and so we're spending over a million dollars in the next three years to put up those monitoring stations. But in terms of the actual percentages of containers and logs that are recaptured, we largely rely on the reporting of Genera to establish that.

MR BROWNING: And given more resources you'd be checking on that a little bit more independently, would you?

MR WEISS: Possibly, but you've got to think about there's an awful lot of fumigation happening down at the port and it's not uncommon for compliance work to be based on reporting of the consent holders themselves, and while that has its limitations, in reality that's what most regulators rely on, and they then would go on and carry out spot audits to verify those reported results.

MR BROWNING: Do you think this is a big enough industry to maybe have somebody hired specifically to ensure that fumigations are, or recapturing is done appropriately?

MR WEISS: Possibly, although the question is who's going to pay for it. Council certainly isn't going to pay for it, Mark might not be happy to pay for it, and I'm not sure that the ratepayers should be paying for it.

MR BROWNING: It's probably an industry problem, isn't it?

MR WEISS: Maybe.

MR GEAR: Sam, I have a couple of questions, things that you were talking about and reflecting around methyl bromide compliance. How many of those abatement notices that you refer to, the eight, are being contested by Genera and how many of them are about to be?

MR WEISS: Thanks for bringing that up, that's a point I should have mentioned. So, of the most recent four that were issued subsequent to the 8th of March incident, all four of those have been appealed and there was an application for those abatement notices also to have a stay placed on them which meant that they didn't take effect, and Council didn't oppose that apart from one abatement notice which required that the fumigator advise us if there's any complaints related to the activity. So now for those four notices, they are currently subject to mediation and the Judge has agreed that parties will attempt mediation in the next couple of weeks and the intention is to report back to him I think on Friday the 6th of September to see if we've

been able to reach a common position, and if not he will likely hear the arguments himself.

MR GEAR: So that's the recent four. What about the remaining four?

MR WEISS: The earlier four weren't appealed and they are in effect.

MR GEAR: The other thing that I'm unclear of and you did make reference to, you said that back in March some people reported themselves to the hospital. How many of those people, or firstly how many were there, and how many consented to having blood tests, and the third part of that question, what time elapsed before those blood tests were taken?

MR WEISS: My understanding is that there were three or four people who took themselves to hospital after feeling unwell and believing they were exposed. Only two of those agreed to be interviewed by Regional Council staff, and people have speculated as to the reasons why the other one or two didn't want to be interviewed. We were provided with the blood test results for those two and the medical records but there were some difficulties around, or problems with when those blood tests were taken and in some cases they weren't taken soon enough or they weren't tested for the right constituents. That does remind me of a point I wanted to make, that for EDN as part of that biological monitoring there needs to be clarity from perhaps the poisons centre, that if there's a call they're able to provide quick advice of what you need to sample for, how soon you need to do it, because it seems for those people at least, they didn't have the correct blood tests done within a timely manner. So, if there was a basis for any sort of further enforcement action on the basis of excess blood levels, that evidence was lost.

MR GEAR: Two more questions. In these incidents that you're reflecting upon, what time were those people, or some of them, absenting themselves from the site and what time was the venting commencing, do you know that?

MR WEISS: Are you referring to the 8 March incident?

MR GEAR: Yes.

MR WEISS: I don't know those details. That incident was investigated by our lead investigator and he produced quite an extensive report, and we actually released publically an edited version of that report for anyone who wants to see it, and it still has quite a lot of detail but clearly not the sort of detail that would identify any of the affected parties.

MR GEAR: I'm a little bit interested to hear you say that there was some confusion around what should be sampled in the bloods and when those samples should be taken. As someone reporting that to this meeting are you able to tell me whether or not the medical officer of health was aware of the international standards for bromine testing in the blood?

MR WEISS: I didn't ask him if he was aware of the standards but we certainly passed on the information that we had to him so that he could get involved in that process to the extent that he saw fit.

MR GEAR: Okay, thank you.

CHAIR: Thank you, are there any further questions for this submitter?

MR BROWNING: Mr Chair, I thought I should inform you too that our community group has joined those appeals as a section 274 party, as I did to the [Enviro Fume] one, and so they'll be involved with that as well. We're very sure that Judge Smith actually wanted to see the fumigator in front of them at some stage so I'm hoping mediation works well.

CHAIR: Thank you for that point of information. At this point there are two final scheduled session of the hearing. The first is a period of questions that may be asked by members of this Decision-Making Committee. I've consulted with my colleagues on this table and we feel the only questions we have at this time are in fact for the fumigator, and because of his availability we would be grateful if he would answer a few questions. Kerry.

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QUESTIONS TO GENERA

DR LAING: Thanks, John. I've only got a couple of questions, Mark, and the first one is related to the info that you've recently provided on stack sizes and loading rates, and I wonder if that information is going to be made available to the EPA?

MR SELF: I'm Mark Self, the CEO of Genera. Yes. I would like to talk to that, though. I understand that the accuracy of your modelling is critically dependent on the appropriateness of the inputs and I've seen some information backwards and forwards about the size of log stacks, the number of log stacks and the operations. I think that's a fundamental part of what needs to go in, in the right quantum to make the answers come out right.

Log stacks are currently up to about 1,000 cubic metres. Ideally they would all be that size, and the numbers of log stacks are sometimes up to perhaps 30, but those two will not happen at the same time. We need to look at it in the context of how busy that piece of real estate at the port is, how many ships come, and the ability of all of the marshallers, log loaders and the fumigator to actually process that amount of fumigated logs at any time. If the logistics was organised enough to deliver large log stacks, there would be a much smaller number of them.

So, if you look at this, you know, 400 odd ships in a year, split that amongst the ports and look at how many each port can handle to be leaving in a day and that the maximum amount of top stow loaded on the ship that can be fumigated is up to a maximum of about 8,000 cubic metres. It's not conceivable, from what I understand, that the port, and I'm there quite a lot, that you could actually get anything like, I think it was 30 log stacks

of 1,500 cubic metres available at any one time. It just couldn't happen.

A much more credible ceiling on the inputs would be something like cap your model at 20,000 cubic metres regardless of log stack size and have your inputs either representing a smaller number of stacks of large stacks, or a larger number of smaller stacks, but cap the total. Because you've sort of got the worst case scenario in number and the worst case scenario in terms of maximum volume, and multiply those together and the capacity for the port isn't such that they can happen. Is that clear?

DR LAING: That sort of covered the second question I had, which is really around how do you calculate or measure stack size and loading rate?

MR SELF: Loading rate is a function of the volume of logs inside a ship's hold compared with the bulk capacity of the hold. It's not crystal clear when you try and articulate well because the volume of a ship is often expressed in bale volume, which is a historical reference to the size of cotton bales or the size of wool bales, and the volume of logs is the Japanese agricultural standard which is measured according to taper and size of logs. So, you've got two volume measurements which are essentially like comparing apples with bananas, it doesn't quite work that way.

However, in commonsense terms, the amount of - and I gave the numbers to Kade who was in Wellington, it's nominally if you multiply the volume of logs and thereby 1.7, that will be your total volume of logs inside any given enclosure.

CHAIR: Just a very quick question from me, Mark. We heard today from one submitter that on occasion the tarpaulins are vented and the gas escapes. What protocol do you have or what quality assurance schemes do you have in

place to ensure the integrity of the tarpaulins you use for fumigation?

MR SELF: We certainly number the rollers that are on and we monitor the tarpaulins. From what I have seen in operations, the damage and ripping of tarpaulins is nothing to do with the quality of the tarpaulins themselves, it is actually an extreme weather occurrence or an incident. We're required to report all of those to the Council and to the port and so there's a certain regulatory monitoring of those incidences, and one of the references that I've seen in terms of the risk posed by that is USDA reference that said, well, when that happens you've got winds exceeding 25 knots. The duration of any plume going past at that speed is quite brief. So, we have measures in place operationally that we do not cover logs when the forecast is predicted to be close to 25 knots, and we do not apply any fumigant when the forecast is that it is likely to exceed that.

DR PHILLIPS: I guess that relates to the discussion we had before about the efficacy of the recapture technology, and Jack was asked about whether he could comment about the efficacy in relation to the resource consent condition that he was talking about going up from 20% to 60% of logs be involved, and it had recapture involved in their treatment process. I mean, we just talked about monitoring so are you able to give us any indication of what the efficacy of the recapture - because Genera is actually involved in the recapture process as well.

MR SELF: Absolutely.

DR PHILLIPS: So, are you able to give us any idea of what the efficacy of that treatment is?

MR SELF: Yes, I can. I must say, recapture is like a hobby of mine as well as my day job so I've been everywhere on the planet that I can see systems that have

methyl bromide recapture. I've looked at everything in California, Miami, China, Australia. There was nothing available that suited us and we even invested a few millions in recapture research. I'd say of the world's three leading technologies now, we've got them all in our lab on trial. If you're at the port on Friday one of them will be there, I think, possibly two or three of them will be there to be seen if you want to. Nordiko hasn't fallen into that because I don't think that leaving a legacy is actually a credible recapture. We have been involved in recapture efficacy work and that was essentially imposed on us by the client and STIMBR, and others, and the forest industry wanted to see, so we provided the recapture gear, did that and the trials on efficacy were done by Plant & Food Research and monitored by STIMBR. So, we had a modest input to the trial so as objective as it could be, and I don't have it on me but the recapture system that we had, that was a gas liquid scrubber, so we've got three quite discrete technologies, captured essentially something like over 95% of the available methyl bromide in I think it was three hours that particular one.

The efficacy of recapture though needs to be taken in context, and I've often used a fairly glib statement and said, if God built you your recapture equipment and you were able to go in and take away all of the methyl bromide available in the head space in an instant and leave the covers on, and then come back and do some monitoring after a period of time, the desorption would have replaced the amount in the head space back to well above the level that you captured down to. So, that's relevant to methyl bromide. I don't think that is relevant to the EDN discussion.

CHAIR: Because we have significantly run over time I'm going to draw proceedings to a close. I know in the schedule

the Applicants have a right of response to matters that have been raised today. You have the same response opportunity tomorrow and I hope you'll keep your powder dry, as it were, until that point in the process, there are only three further submitters.

Thank you very much, Mr Self, for being available at the hearing today. I know you didn't indicate an intention to submit but we found your answers enlightening to the process.

I'm now going to call an adjournment until 9.30 tomorrow. Yes, the Applicant wishes to say something?

MR McCONVILLE: Just one question. Under the protocol can we comment on today's proceedings at tomorrow's closing?

CHAIR: Yes. I want to thank everybody today, the Applicants, the EPA and WorkSafe staff, the stenographer, the EPA staff in the background, all the submitters who have attended. It's been a long day, it's been very valuable. I'll adjourn the hearing until 9.30 tomorrow and look forward to seeing those members who will be back tomorrow again. Julian, can you close the ceremony for us.

(Closing karakia by Julian Jackson)

(Hearing adjourned at 6.00 p.m.)

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29 AUGUST 2018

[9.30 a.m.]

CHAIR: Kia ora tatou, good morning everybody. For those that have joined us yesterday and weren't here yesterday, I'm John Taylor, the Chair of the Decision-Making Committee. On my right is Dr Kerry Laing, on my left Dr Ngaire Phillips and we are the Decision-Making Committee of the EPA here to consider the application to import EDN fumigant for use on timber and logs under commercial conditions. I would like to commence the day by inviting Mr Julian Jackson to give us the mihi.

(Mihi by Julian Jackson)

MR JACKSON: So, I've just recited a karakia which focuses our attention on the matters at hand and I followed that with a little waiata, and essentially that was saying compassion, truth and peace is the way of life and that's the way forward, sets you free. Thank you very much.

CHAIR: Kia ora Julian. Now, this is the last day of the hearing. We've got three submissions from members of the public. We're all by this stage reasonably familiar with who each other is but for the benefit of those who have joined us today I would like to ask the Applicant team, the EPA team, and any other submitters who are in the room to identify themselves, using the microphone please.

MS GEAR: Yes, good morning I'm Helen Gear and I'm the New Zealand representative for Draslovka, the Applicant, and on the team with me we've got Pavel Bruzek who is the owner of, part owner, co-owner of Draslovka in the Czech Republic; Kade McConville who is in charge of Draslovka Services working out of Australia and looking after the commercialisation and the operational use of

EDN globally; and, Dr Swaminathan who looks after the regulatory affairs of Draslovka Services.

CHAIR: Thanks Helen. EPA.

DR VAUGHAN: Good morning, I'm Teresa Vaughan. For those who aren't familiar I'm the application lead from the Environmental Protection Authority on this application, and next to me I have Richard Mohan who is the ecotoxicologist, again from the EPA, and James Deyo who is our toxicologist from the EPA. Behind me we have Julian Jackson who is also from the EPA, he is our cultural specialist, and then we have Susan Collier from WorkSafe, and Dr Bruce Graham who is our modelling specialist. Thank you.

CHAIR: Thank you, and submitters, can you identify yourselves please.

MR HAMMOND: Kia ora everyone, I'm Don Hammond, I'm Chairman of STIMBR and I'm a forestry consultant based here in Rotorua.

MR PROCTER: Good morning, I'm Mark Proctor from TPT Forests, we are log exporters from a number of ports throughout New Zealand and look forward to speaking to you guys today.

MR BROWNING: Steffan Browning for Tauranga Moana Fumigation Action Group.

MR DALE: Kia ora tatou, Russell Dale from the New Zealand Forest Owners Association.

MR GEAR: Ian Gear here from STIMBR.

MR OLSEN: Kia ora, Shane Olsen here representing the Ministry for Primary Industries.

DR ARMSTRONG: James Armstrong from Quarantine Scientific.

CHAIR: Thank you. Before we begin I would just like to remind, advise all parties that all documentation pertaining to the application; EPA responses, all submitters' submissions and accessory documents are available on the EPA website for public viewing.

Okay, without further ado we would like to kick the day off by inviting the first of our submitters, Mr Mark Proctor of TPT Forests to bring his presentation please.

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SUBMISSION BY TPT FORESTS LIMITED

MR PROCTER: Kia ora tatou, hello everybody. Thank you Mr Chair and fellow Decision-Making Committee members for the opportunity to come and speak at this very important hearing, I really do appreciate the opportunity.

My name is Mark Procter, I'm from TPT Forests, I'm a director and owner of that company. TPT is one of New Zealand's largest log and lumber exporters to our Pacific rim markets. Our business is predominantly log exports to China, Korea, India and Japan. We have, and do also export from Australia to these same markets, and very recently from the USA to these same markets.

I've come today as a practitioner of log exports and representative of forest owners and managers, and owners of processing facilities which rely on log exports as a key part of their everyday business. I'm also here today to represent individuals and communities that rely on log exports for their day-to-day livelihood. I'm not an expert and I'm not an expert in the science behind the subject of the matter of the day. We very much rely on the experts in the room, predominantly and specifically STIMBR, and the researchers and the scientists that sit behind them, and of course we rely on the EPA and WorkSafe who we work closely with in these issues. Therefore, our application and my outline today is very much at a high level and not on the details and the science.

TPT represents 14 different clients throughout New Zealand whom own forests, manage forests and who own domestic processing facilities such as sawmills and pulp paper mills. Accordingly, we're significant exporters from the ports of Tauranga, Northport, Napier, New Plymouth, Wellington, Nelson, Timaru, Dunedin and Port Chalmers. Of New Zealand's current annual log export volume, of around 20 million cubic metres per annum, TPT manages about 25% of that or just over 5 million cubic metres per annum, and on a revenue basis some $1 billion is contributed to the New Zealand economy.

The majority of the logs are shipped by bulk vessels carrying between 35,000 cubic metres and 50,000 cubic metres per voyage, but also we pack 40 foot containers with the logs to the same markets. Clearly with this scale, the immediate employment and contribution to local community is significant which, of course, when extended, considering the individuals, the businesses, the communities involved in establishing the forests, harvesting the forests, trucking and railing the logs to the customers and the organisations managing forests of that entire process. Furthermore, when considering the ancillary services providing the industry, such as machinery sales, maintenance sales, auto-electricians, fuel and tyre providers, the list goes on. So, the contribution to the wider community in the country is significant.

TPT has a more diverse market mix than many others involved in the log export from New Zealand but still China and India make up more than 70% of our total sales. As a result, and the reason we're here today, means we're required to fumigate the majority of our logs we deliver to our international customers. As an example, in our case we are required to phytosanitary

treat 3.6 million cubic metres per annum of which about one-third of that is required to be treated from our trade partners with methyl bromide, either in ship's hold or on land. You would have heard about this over the last few days but Japan and Korea fumigate on arrival with methyl bromide, and therefore there in-port regulations do not require us to fumigate here in New Zealand. China and India, however, require New Zealand exporters to undertake the appropriate phytosanitary treatment here in New Zealand or in transit before they're delivered to those markets.

To undertake the appropriate treatment we currently have a toolbox, and that toolbox is made up of methyl bromide fumigation onshore and in ship's hold. It includes phosphine in transit in ship's hold, and it includes debarking. However, as we know, one of those tools in the toolbox, being methyl bromide, is planned to be removed in October 2020, if not before, and if all the stars are not aligned and neither an alternative such as EDN or recapture is in place by that time, the industry, the Government and the country and our international customers have a serious issue on our hands.

There is very good progress being made with recapture technology for methyl bromide without doubt, but it's ground-breaking work particularly at the scale we're required to recapture, so there's a long way to go and unfortunately October 2020 is looming quickly.

From all the research and tests undertaken to date, EDN is clearly the supporting and/or replacement tool for methyl bromide, and as a result TPT and our clients support its successful application. From our perspective we need a phytosanitary toolbox and not just a single tool because things change, and one thing we know is that Kiwis are adaptable and the forest industry

is adaptable but our trade partners can change and do change, therefore we need a toolbox that is adaptable and that can change as those requirements change. Currently India will only accept methyl bromide. China currently accepts phosphine and methyl bromide treatment but who's to say the Japanese and Koreans won't change their mind and require us to fumigate before leaving New Zealand.

I would like to make the point that debarking is a treatment currently used and it's been further developed and pursued by several exporters but it is not a full-proof phytosanitary treatment as insects can, and do from time to time, get through the process and in the case if intercepted in China, those debarked logs are then required to be fumigated in China which can be, and is costly, and the worst case, refusal for those logs to be discharged. India does not accept debarking. Some low grades are physically not effectively and economically able to be debarked. Finally, it requires scale to be cost effective. So, for those thinking debarking is a silver bullet, it's not, it's only part of the toolbox.

So, we're looking forward to EDN being part of the toolbox to be used across all ports in New Zealand for containers, under tarpaulin and in ship's hold, but as important as the business and the commercial trade aspects are, the social, environmental, health and safety aspects are very important to us as well. With the likes of EDN we are looking to future-proof this business by ensuring we use sustainable products and processes that meet our trade partners' needs, while as givens, while as givens we have the controls and the work practices to meet the environmental obligations we have signed up to as a country, and we provide the safe

workplaces for individuals as well as the neighbors from where we operate.

We ask that the EPA and WorkSafe work with the industry and local bodies to establish those workable controls to grow and protect what is an important part of the industry and the wider community. Unless there's more behind the science that would say otherwise, we would anticipate those controls to be similar to those already in place for other phytosanitary treatments currently used. Excessive additional controls will undoubtedly impact the efficiency and cost of the operations which need due consideration and we ask the Decision-Making Committee, EPA and WorkSafe to work with the industry collaboratively to balance the emotive reactions and the research and science in this respect. This process of a new fumigant under the new Government structures is new ground for us all and it's important we get it right.

So, Mr Chairman, in closing we fully support the registration of EDN for fumigation and thank you for the opportunity to speak and we look forward to the specific parties in dealing with the controls required for this to be successful. Thank you very much.

CHAIR: Thank you, Mark. If you don't mind we might have a few questions for you. Ngaire.

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DR PHILLIPS: Thank you for your presentation. I just have one question which actually relates to your submission and just a line in your submission on the last page, and you're talking about, you're concerned about requiring fumigation for extended periods greater than 24 hours which will have a significant impact on your operation.

But the question I ask relates to, you say, "Ideally controls for 16 hours and 24 hours are specified".

Does that mean that you would like the fumigation to only last 16 hours, is that what you're meaning by that statement?

MR PROCTER: What we're getting at is that if the controls required for EDN, or any other new fumigant, as long as they're within the realms that we currently operate, then that's fine, if they were to extend beyond that it will cause a range of other operational efficiency levels.

DR PHILLIPS: The realms that you currently operate under in terms of times?

MR PROCTER: Can I refer that to somebody from STIMBR.

DR PHILLIPS: I'm just trying to get at what the 16 hours actually means because everything we've heard to date, the modelling and everything is based on 24 hours fumigation, and you made a comment about controls for 16 hours and 24 hours. I just want to know what the aim is with the 16 hours -

MR PROCTER: Can I just refer to maybe Mr Gear from STIMBR to help us?

DR PHILLIPS: It's actually your submission.

MR PROCTER: We've relied on the expertise from STIMBR to help with that.

MR GEAR: With permission, Mr Chair, what the reference is there is currently with the treatment schedules that are operated, we have 24 hour and 16 hour fumigations for methyl bromide depending on the market requirements; so China, 16 hours but with a higher rate, India, 24 hours at a lower rate, or set at a lower rate. That's what the reference is to.

DR PHILLIPS: Okay, so are you proposing that there could be 16 hour fumigations for EDN --

MR GEAR: No.

DR PHILLIPS: -- which is what this application is for?

MR GEAR: The EDN efficacy has been proven at close to 24 hours which is what we were testing for.

DR PHILLIPS: I understand that.

MR GEAR: And we allow, within that we get the breakdown of the EDN. So, if we go to a shorter fumigation, one, we don't have the same efficacy necessarily and, two, we would have larger quantities of EDN under the tarpaulin at 16 hours.

DR PHILLIPS: Yes, I understand. Thank you, that's fine. That's all thank you.

CHAIR: Thank you for your presentation. I note you refer to the desirability of having an adaptable toolbox from which to execute your trade obligations with your trading partners. One of those was debarking which you implied, or stated it was actually an improved method of certifying logs for import into China. Can you tell me what proportion of logs exported to China are debarked from New Zealand?

MR PROCTER: Currently I'd estimate, and it is only an estimate, probably less than 5-10%.

CHAIR: So, debarking I'm assuming is a reasonably safe tool to use from the perspective of the workers employed relative to the use of chemical fumigants. Why do you think the proportion of logs that are debarked is not greater, what's the main issue there?

MR PROCTER: It's a good point and, as I alluded to, the logs that we are exporting, generally speaking, are not - are steel tubes or pencils, so they have defects and branches. And what can occur, and does occur, is if the debarker is unable to remove all of the bark, even to the specified level, the 2% and 5%, even if there is bark on the logs and there are insects infested in those bark pockets, when they arrive in the market they don't meet the phytosanitary requirements of being insect

free. Therefore, the scale of the logs that need to be barked with that risk is too great.

CHAIR: In the industry's experience, in the history of the export of debarked logs to China, how frequently are debarked logs met with some resistance to their acceptance?

MR PROCTER: I'm sure MPI folk can probably answer that question but I know specifically that probably in the recent two months there has been cargo arrive in China debarked and has had to be re-fumigated in China. A fact.

CHAIR: I think, as you can gather, I'm trying to establish when you may have many tools available to you, why is it that you select one tool over another to such a degree; is it simply cost, is it expediency, is it environmental factors et cetera? How adaptable are you to using the adaptable toolbox, is what I'm saying?

MR PROCTER: Look, as an analogy it's no different to the toolbox you have in your workshop, right. There's different tools in there for different uses.

DR LAING: Thanks very much, Mark. I don't have any further questions.

CHAIR: EPA staff first and then the Applicant and then submitters to ask any questions.

DR VAUGHAN: We don't have any questions, thank you.

CHAIR: Applicant?

MS GEAR: No questions from Draslovka.

CHAIR: Any questions from any of the submitters, Steffan Browning?

MR BROWNING: Yes, thank you. Would you or your company supply logs for Nordiko, or any other recapture specialist, to allow them to transparently trial or present their ability to recapture methyl bromide, or EDN if it came to it but methyl bromide right now, from

log stacks, or for that matter ship's hold, would you supply logs to allow that to happen?

MR PROCTER: Thanks for the question, Steffan. The industry through STIMBR has been in discussions with Nordiko for some time. Of late specifically the industry has also been in touch with Nordiko, and the answer to your question is, yes, no question. However - excuse me, however -

MR BROWNING: That would be transparently without a non-disclosure agreement?

MR PROCTER: No, sorry Steffan, I said, however, the other part of the, the answer to the question is for a process or a contractor to work on the port facilities, they are required to meet obligations of environmental health and safety standards. If Nordiko can provide those standards that are acceptable to the port companies, great. There are other parts of the process that we feel are important and so the outcomes of such trials need to be very well-managed and therefore the industry have requested a non-disclosure statement. And, so as long as Nordiko are prepared to meet the requirements for a successful trial, the answer to your question is, yes, and we have been trying to work with Nordiko for some time.

MR BROWNING: There is a possibility of another site at one of the hubs of log transport. The point being here, would you do it without a non-disclosure statement required? They want to be totally open and industry seems to be wanting to have some control over the results.

MR PROCTER: Our preference is for a non-disclosure agreement.

MR BROWNING: Thanks for your answer.

MR OLSEN: Shane Olsen here from the Ministry for Primary Industries. Just a question for you, Mark. What would

be the implications as an exporter if you were to - it relates to an earlier question from the panel - it was required during the fumigation process for it to take 48 hours, just as a hypothetical scenario, what would that have in terms of an implication on your exports and the port environment if that was to happen? So, the process involving treatment, and currently people focus on it being only a 24 hour process and that's the overseas market requirements, but if that was to hypothetically double through New Zealand controls?

MR PROCTER: Good question and I haven't done the maths on it, however, what we do know, New Zealand is exporting 20 million cubic metres per annum. Go back to 2008-2010 we were exporting 5.5 million cubic metres per annum. The port infrastructure all the other logistics infrastructure, ie trucking, harvesting, on-port activities having to run at very efficient levels to allow that to occur. Any further disruption or time taken for each stage of the process is going to become problematic. Not to say we don't learn and we become adaptable to new rules and regulations and, you know, we just have to say that we're going to have to work with such regulations. However, we have vessels parked waiting to get access to berths currently throughout many ports in New Zealand. If we are going to extend the time of fumigation to your example of 48 hours, there will be vessels parked waiting to get hold of berths for longer periods of time, which of course is cost. Does that answer your question?

MR OLSEN: Yes, thanks Mark.

MR WEISS: Hi, Sam Weiss, Bay of Plenty Regional Council. I just have a question around how you mentioned that Japan and Korea, they accept logs and fumigate them upon arrival. Has there been or can you explain what work has been done to see if a similar approach could be

adopted by perhaps China, and India to some extent? Because presumably China has that capability given that if they find bugs on debarked logs they can fumigate them on arrival.

MR PROCTER: Thanks, Sam. I'm going to refer that to MPI because MPI, and the other appropriate bodies and authorities have been talking directly with those trade partners. However, suffice to say from TPT's perspective we are also engaged with customers and their local authorities around this matter, and both are very clear that the fumigation of the phytosanitary treatment is to be done prior to arrival. But Shane?

MR OLSEN: Yes, this was raised at the Wellington hearing as well. MPI have previously approached China and India, more recently last year China, about fumigating on arrival as currently Japan and Korea do, we understand that. That is completely off the table and so they don't, they're not willing to go there at all. In effect that's really just shifting the problem of treating with a chemical such as methyl bromide, or whatever chemical is used, to another country as well, and they've got their own things that they're trying to do as well in terms of meeting Montreal Protocol, etc etc. So, that's completely off the table and including when we raised it more recently, so that's not where we will be going. In the end the requirements for treatment are set by the overseas country and that's what we will have to meet, whether it be EDN, methyl bromide. In the fumigation space with these sorts of chemicals it's generally within a 24 hour period or less for that requirement for those types of chemicals, and that's what we'll need to meet.

CHAIR: Right, thank you. If there are no further questions, thank you, Mark, very much for your presentation this

morning. I would now like to invite Mr Don Hammond, Hammond Resource Management Ltd.

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SUBMISSION BY HAMMOND RESOURCE MANAGEMENT LTD

MR HAMMOND: Kia ora tatou, Mr Chair, thank you very much. Thank you for the opportunity to speak. This is an incredibly important issue for the forestry sector and for New Zealand Inc and I'm here both as a registered forestry consultant with my own business, and as Chair of STIMBR, and the two are inextricably linked.

So, my background. As I say, I'm a registered forestry consultant based here in Rotorua. I've had over 20 years as a consultant and more than 40 years, I'm sorry to say, in the forestry sector. Some would suggest I'm not clever enough to do anything else but here I am for my sins.

STIMBR, as we know, is an industry-funded research consortium that was established to find alternatives to the current use of methyl bromide. To date more than $20 million has been invested in that challenge, and I think if we reflect back on the key driver, which is the 2010 decision from the methyl bromide reassessment that all methyl bromide had to be recaptured by 2020, I think at the time everyone said, yep, we've got ten years, there's got to be a solution out there, somebody must have figured out how to do it, so there was general agreement that that was a fair sort of lead-in. What we've discovered since is that that isn't quite as easy as we'd thought.

I reflect a little bit on what you've just heard from Mark Proctor and I don't think we can underestimate the impact that any disruption to the export log trade has on local communities. Clearly it's important from a

New Zealand Inc economic perspective but the truck driver from Murapara or the bushman in Otago is less interested in New Zealand Inc than whether he has a job tomorrow. So, I'm not defending the export log trade, what I'm recognising is that we currently harvest north of 30 million tonnes of wood a year and we have a domestic consumption demand of a little over a third of that. And it's no different to a farmer who wants a piece of fillet steak, or somebody wants a fillet steak. You don't kill a cattle beast just together the fillet steak, you have to be able to sell the rest of it or the cattle beast stays in the paddock, and it's no different with forestry. If we can't sell the lower grades of logs and the logs that our domestic processors don't want, then you don't cut the tree down. And so we end up with this situation where there's large numbers of unharvested forests and clearly that's counter to current government policy of increasing the forest estate.

The export log trade and processed forest products are our third or fourth largest export earner and in the past year I think somebody told us yesterday, north of $2 billion worth of logs were exported, so it is a very significant contributor. But, as I say, unless we can sell the entire tree, we end up with a problem and it leads to forests not being harvested or it leads to the issues that we saw recently in Tolaga Bay where there's vast amounts of material left on the hill because there is no economic market for it and there are implications of doing that, of leaving all that material behind.

So, if we're going to export logs we need a range of options, and to use a previous phrase, we need a range of tools in the toolbox. Debarking is one of those tools that is a risk mitigation measure, and I think it's really important we understand the difference

between risk mitigation and phytosanitary treatment. Our trading partners require phytosanitary treatments and in the case of China they accept debarking as a risk mitigation, but until relatively recently that has been generally restricted to our better logs, so round cylindrical pruned logs, where the ability to achieve a high level of debarking without remaining bark pockets is reasonably good, and those same logs have no branch stubs left on them so there's few places for insects to hide. Yet, as we've heard, we still get rejected cargoes. If we try to debark lower grades of logs that are less cylindrical, have bark pockets and so on, that risk will rise quite substantially. It's also a numbers game. If we debark more and more logs, we increase the risk of those interceptions, and that is not only a significant cost, it's actually a threat to the trade. So, that's China.

Other countries like India, they're far more blunt, they just simply say, if it's not treated with methyl bromide, don't send it. And the option of fumigation offshore is attractive in a way, but it's attractive in the same way as putting your rubbish in the rubbish bin. It doesn't reduce the amount of rubbish, it just means somebody else has to get rid of it. So, if we say to our trading partners, how about you fumigate the logs on arrival, the ozone layer doesn't care which country the methyl bromide is released from, it still gets damaged and we have a global responsibility under the various protocols we signed up to, to not be party to increasing that. The further risk is that those countries, and there's already murmurings, but some of those countries that accept treatment on arrival are starting to say, why are we the villains, why don't you do it back home.

So, there is a risk that our demand for fumigation could actually rise in the future above where it is now simply because those other trading partners say, no, you do your own dirty work, we're not going to do it in our backyard. And that's quite apart from any changes in cost that fumigation on arrival might bring.

Now, I'm not a scientist but I do sit on a number of research boards and what I've learnt is the value of peer reviewed science as opposed to ideas, hearsay and unsubstantiated claims. I don't propose to discuss the science today, there's far more erudite people than me quite capable of that and you as a Decision-Making Committee have got all the science in front of you, and I'm sure you've got all the support you need to try and understand that science, and I think the opportunity of getting those scientific parties that have got some difference of opinion together to try and sort that out is something to be applauded.

What I really want to look at, though, is not so much the science but instead the strategic issues that we're actually addressing. The fundamental driver, as I've said, is that methyl bromide is an ozone depleting gas and therefore should not be released to the atmosphere. Now, I don't think there's any dispute around that, it's just how we prevent that from happening.

So, to address that STIMBR commissioned the 2014 report from Dr Jack Armstrong that you saw yesterday, an inch thick tome that showed there were neither alternative treatments, alternative fumigants or methodologies for recapturing methyl bromide at the scale required by the export log sector and there was no alternatives available. That report has been quoted throughout the world and is considered to be the most complete effort to understand what fumigation opportunities, what alternative treatment methodologies

are available. So, I think we can put a lot of credence in what's in that report. And, again, I repeat that methyl bromide remains the only fumigant that some of our trading partners, notably India, will accept.

And please also be conscious of the fact that fumigation is not a value-add, it is simply a cost. So we don't do it because it's fun, or to keep Genera in business, or anything else, we do it simply because our trading partners demand it. It's not even a New Zealand demand. MPI will allow us to ship logs overseas if our trading partners will accept them in the condition they're shipped. It's our trading partners who are saying, we need these logs to be fumigated.

That report that I just referred to from Jack Armstrong suggested that the only fumigant that possibly could replace methyl bromide was EDN and it was seen as potentially, and of course we're going back a few years now, but it was seen as a potential drop-in replacement for methyl bromide which meant that the existing systems for fumigation, and safety protocols and other workplace measures could continue to be adopted or adjusted as required going forward.

The challenge I put to the STIMBR Board at the time, was there any alternative that we wanted to look at, remembering that we're investing a lot of money in getting anything to this stage. Any alternative had to pass three tests. Firstly, it had to be technically feasible, does it kill bugs, very simply, in the kinds of timeframes that we just heard discussed, 24 hours or whatever. So, does it work. It had to be economically feasible. Remember the margin on export logs, the net return to the grower, a $2 or $3 change in that neat return can be 5%. So, there's not a lot of room to say, well, if we add $10 a cubic metre to fumigation costs, for example, that could wipe out quite easily on some

grades more than 20% of the return to the forest grower, so it is very cost sensitive. So, any replacement needed to be economically feasible and, as we heard yesterday, the cost of the chemical appears to be competitive but we also must consider the cost of application. How do we apply this stuff and the various controls that go with it. They must also be considered. And the third test is, is it socially acceptable. This was a result of the misplaced belief that EDN was simply cyanide hiding under a different name, and I recall the Board very clearly being completely opposed to any work on EDN because of the potential, of this consideration that we were dealing with cyanide, and I also recall the owner of Genera saying very bluntly he would not use this product and not expose his staff to it because he understood it to be cyanide.

So, to address those concerns and to actually make a decision about whether STIMBR wanted to pursue EDN we completed a technical economic study to try and figure out whether it could pass those three tests, and the result of that was that actually we allayed a lot of the concerns, we started to understand the chemistry and how it could be used. And I'd note at that stage that STIMBR was not committed to EDN and, if my memory serves me correct, did not even know, and no disrespect guys but did not even know that Draslovka existed. We simply had found through research that there was a chemical that was potentially, or a compound out there that was potentially suitable for what we needed.

So, what we now have as the result of three or four years of work is a potential replacement for methyl bromide, provided those hurdles of cost and efficacy and acceptance could be addressed. That resulted in several large pieces of work and those pieces of work form much of the basis of this

application, the science behind it. We know it works, we know it kills bugs, we know how long and how much we've got to use, for how long and how we treat and at what temperature, and all those other science things that you people need to address, and we also very strongly believe that the environmental outcomes are a quantum step forward from methyl bromide.

I also at this point want to note the role of Helen Gear. She is a member of the STIMBR Board and is married to the STIMBR Research Director, or maybe it's the other way round. Helen took on the role of Draslovka completely independently of STIMBR but with STIMBR's full knowledge. It's been a relationship, and I'm not referring to their domestic situation, it's been a relationship that has allowed the registration process to proceed as quickly and as efficiently as possible, and it has occurred in the full knowledge of the STIMBR Board. I think it's a really important consideration. Collectively the sector is looking for a solution and EDN appears to be that solution.

So, the chemistry. We've talked about scrubbing, or recapture, and there's no question that recapture is required where we're talking about methyl bromide, the reason being that the methyl bromide at the end of a fumigation is still there. Some of it is absorbed into the logs, half of it is sitting in the head space and needs to be recaptured so it doesn't get vented to the atmosphere.

EDN is different. With EDN we're working with a compound that's broken down, and this is my non-scientist terminology, but it's fundamentally broken down as part of that fumigation process and as the Plant & Food work has shown through vast amounts of peer reviewed science, there are negligible amounts of EDN remaining at the end of the fumigation. There was

debate yesterday about whether it's half a percent or 700 parts per million, or whatever the numbers are and I really don't want to get into the debate. The key point is that fundamentally there is nothing there to catch or to recapture or scrub, or anything else, and suggestions to the contrary have clearly failed to understand the science. The actual things that are happening under those tarpaulins while a fumigation is going on.

I would strongly urge the Decision-Making Committee to consider what is there to recapture, and recognise that recapture is nothing more than a feel-good or sales exercise that's not value-additive in any form. What we need to focus on is how do we have a registration that provides the controls to ensure safe but efficient use, because if the controls are too onerous, then ongoing use of methyl bromide is the only other option available to the export log sector. That to me is a completely perverse outcome and I think it would be something that we would collectively, all of us, struggle to defend to our communities.

Controls to ensure the safe use need to consider both the efficacy of the control for workers and implications for logistics at the ports. And we've just heard that every port in the country is bulging at the seems, there are already ships waiting their turn to load. So, any further delays or challenges to the logistics at the port face will exacerbate that situation. The key issue is congested space resulting in the need to move logs through fumigation process and on to the ships as quickly and as efficiently as possible. Additional movements add both cost, and in terms of picking the logs up and putting them down is actually quite expensive, but the bigger cost is just simply congestion and slower throughput through the ports, and that is a substantial cost and something that needs to be weighed

up in how we put controls in place that allow that efficient process to happen.

It's notable that the entire forestry sector is supportive of this product, of EDN, and from a cost perspective we've got no visibility over it. We have not been given the cost, any indication of cost, other than - and I hate using quote marks but it is, "it should be similar". The key point is, as an industry our focus is not on the cost, provided it meets those hurdles of being in the ballpark. Our key focus has been on environmental outcomes, improved environmental outcomes, safe use and efficiency of the product.

So, in conclusion, STIMBR very strongly supports the registration of EDN with appropriate controls as being the single best option available for fumigation to reduce the adverse effects that methyl bromide has on the ozone layer. This will not stop STIMBR working on other options such as debarking and dual heating and other technologies and recapture for methyl bromide technologies, but commercial delivery of those remains a long way off and thus the importance of a good decision, and a good decision being timely and with the appropriate controls, is imperative to the export log sector.

This registration process has not been without frustration for all parties involved. I'm sure the Government agencies, the DMC, the Applicants, the submitters will all nod their heads and agree that it has not been a simple process, and that's not to accord blame or anything to anyone. It wasn't helped by changing legislation in the middle of it, the changes particularly in the WorkSafe space. But it is what it is and we're at a point now where a decision can be made allowing all parties to move forward and put those trials and tribulations behind us. We look forward to

this product that offers an improved future coming to the market.

I'll close by repeating that STIMBR has turned over every nail and rock to identify alternatives to methyl bromide, or methodologies to recapture methyl bromide at the completion of the fumigation. Despite claims that there are recapture technologies out there that can work at the scale of the export industry, even the claimants admit they've never been used on full-scale log stacks. STIMBR is committed to finding alternatives to current practice with methyl bromide, and EDN in our view is that alternative, provided registration controls make it workable and cost effective. Thank you.

CHAIR: Thank you very much for your submission. Kerry.

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DR LAING: Both you and Mark have referred to a desire to have more tools in the toolbox and you've also referred to the ongoing work that STIMBR would do on the alternatives, but it seems to me that if EDN lives up to the claims that are made for it, that in fact the other tools will be thrown out of the toolbox and in fact there will be only one thing left. It seems to me that if EDN, if that's successful, then nobody will continue with methyl bromide and methyl bromide scrubbing, there will probably be a reduction in debarking, maybe some replacement of phosphine out there. So, I just wonder about the claims of, hey, we need more tools in the toolbox. Got any comment?

MR HAMMOND: Yes, appreciate the opportunity to comment on that. There's a few things, a few points I'd make. Firstly, if we look at just simply the cost relativities, phosphine - and the two Marks in the room

have got a better idea than I have, but phosphine is probably 25% of the cost of methyl bromide. So, if we think that EDN and methyl bromide are a similar cost, we're certainly not going to suddenly run away from phosphine, that will continue to be, as long as our trading partners accept it, will continue to be our first option. Debarking, on the other hand, is probably about double the cost of methyl bromide, so it's not an overly attractive option in terms of cost. That's the first point I'd make.

The second point I'd make, and unfortunately I'm old enough to know this, is that in the 1970s New Zealand started, well, actually it was before then but in the 70s it started to ramp up and we started an export log trade with a country called Japan, and Japan was the big economic growth power house in the world post the Second World War. But it wasn't too long before Japan became a more expensive economy and that trade moved to Korea. So Korea became the low-cost producer of radios and cars, and all those other things, and had a big demand for logs. And it's interesting that even today, many commentators refer to the "K grade" price of logs whereas in actual fact the proportion going to Korea is relatively modest. Subsequent to that we saw Taiwan and a few other places, and ultimately China where we sit today. And to put that in perspective, about 15 years ago our total export to China in the form of logs was 200,000 tonnes. Last year it was about 15 million, plus or minus a million. So, the growth over 15 years borders on exponential.

But for me Chairing STIMBR, my real question is what does the world look like in 10 or 15 years' time? I'm actually less concerned about what the world looks like today than positioning ourselves for that future growth. Now, lots of people are saying it's India, and maybe it

is, but that comes with its own challenges, as many people who do business there will tell you, and India at the moment only accepts methyl bromide. But is the future India, or is it Indonesia, or will it be that other increasingly low-cost economy called North America? Who knows but the key point is that we need to be able to adapt to whatever those new markets require and we need that range of tools.

A further point is that we actually don't know what future insects or pests we're going to have to deal with. So, at the moment our trading partners have a list of pests they don't want, and they say to us, you must treat with methyl bromide to kill these things. And one of the really interesting things, bit of an aside, but one of the really interesting things that EDN threw up is we thought initially, and unfortunately Matt Hall is not here, he could speak to it, but we thought that the susceptibility of the various pest species that we were trying to control with EDN would be the same as methyl bromide. And we got this outlier, one of the pests species, one of the life stage of one of the pest species sat right outside what we thought, and we thought, hello, we've had a research oops here. So we went back and redid it and redid it, and it showed to us that one particular life stage of one particular pest did not respond the way we expected it.

So, we need that range of tools in case we get a new pest in New Zealand that actually isn't susceptible to EDN or methyl bromide, or whatever we're using. So, we need that range of tools.

DR PHILLIPS: Just picking up on Kerry's point and also just about the comments particularly about the phosphine, I'm particularly interested in that, and I know this isn't your application but Glen Mackie and Russell Dale's applications have some numbers around how much of

phosphine is used in, they've quoted 75% of logs going to China are treated with phosphine. So, if China is a big market and phosphine is the preferred fumigant, how much of an impact is EDN going to have on the market?

MR HAMMOND: That's a really good question. There's a couple of points I would make around that. Phosphine is accepted by China and it remains, correct me if I'm wrong, but it remains under an experimental permit. So, that could change. We certainly hope it won't and we've been attempting to negotiate with the Indian officials to allow the use of phosphine for all of those not only economic reasons, but the environmental impacts of reducing methyl bromide use. But currently we export a couple of million tonnes, plus or minus, to India all of which has to be methyl bromide and the top stow logs on the boats to China also have to be methyl bromide or debarked. Phosphine can only be used in the holds of the ship. It takes ten days and so it's restricted to in the holds of the ship. So, for all of those reasons methyl bromide is still used to treat 3 or 4 million tonnes of logs a year.

Another piece of work, just to try and paint the picture, that STIMBR has been doing is that, and we heard this morning, China requires a high rate of methyl bromide for a shorter period, India accepts a lower rate of methyl bromide for a longer period. So we've been doing the science to try and understand, can we use lower rates of methyl bromide and achieve the same outcomes. And the answer is, yes, we can, but we still then have the hurdle of getting our trading partners to accept that change. So, not only are we looking at can we recapture methyl bromide, can we use less of it, are there alternative technologies, we're looking at every possible opportunity, again focusing on what the issue is, damage to the ozone layer, how do we

reduce that, and EDN allows us the opportunity, once our trading partners accept it, to actually dramatically reduce the amount of methyl bromide that we as a country use.

DR PHILLIPS: I have one more question. This probably might seen a little unusual but I'll ask it anyway. From what you've said the reason that you have to export logs is because they're the bits of the tree that the domestic market isn't interested in, I know it's simplistic but that's kind of essentially - that's part of my question, just to clarify is that understanding correct?

MR HAMMOND: It's a lot more complex than that. There are significant areas in the country where there is not a domestic processing capacity and at a high level we are currently harvesting, I think last year, 33 million tonnes and our domestic processing capacity running flat-out deals with about 14 million tonnes. So, we just simply don't have the capacity to process any more logs.

DR PHILLIPS: Okay, because my real question was, on that assumption that you've got all this poorer grade timber that you need to do something with, what is STIMBR doing in terms of looking for opportunities for improving or increasing the domestic market for that kind of timber, but you've now said that the processing facilities are not sufficient to take on more, but are there - I just sort of see, is there an opportunity here to increase the domestic market for this product, and obviously it would have to be at least at the same value as to what you're getting from the exports to be viable but, I mean, is STIMBR doing anything in that area or is the timber industry doing anything in that area?

MR HAMMOND: Apart from probably making noise I would have to say the short answer is, no, but there's probably only two or three people in this room that would not like to

see the vast majority of our logs processed in New Zealand, and those are the exporters and the fumigators, but I'm sure they would find a niche in a changed environment. But to put it in perspective, the sawmill down the road, the biggest sawmill in the Southern Hemisphere, Red Stag, has just invested somewhere in the order of $100 million increasing their capacity. That increase in capacity, and Tim's here, he might be able to correct me, but that increase in capacity is about 700,000 tonnes. So you've got to add some zeros on investment to actually suck up that volume of wood. I understand you're going to the port on Friday. It will give you a very clear picture of just how big this issue - it's not an issue but this export log trade is and if we want domestic processing, the scale that it has to happen at.

DR PHILLIPS: Okay, thank you.

CHAIR: Thank you, Don. You're the Chairperson of STIMBR. You've told us that STIMBR has invested a lot of million, I think $20 million plus in research towards successful replacements for methyl bromide. You've also mentioned in your presentation, in your submission, that you're appreciative of the value of peer reviewed science. Can I ask you as the Chairperson of STIMBR, are you happy with your investment and the return on your investment?

MR HAMMOND: Who's listening? The challenge that we face at the outset was we didn't actually know what the answer was and inevitably you go down a number of blind alleys to try and understand what options you may have going forwards. So, some of that is investment that ultimately you say, well actually, that didn't take us where we want to. One of the things I've learnt in science is that an unexpected answer, or a negative answer, is actually still good science. So, am I

pleased with the quality of the science? Absolutely. Have we got as far as we wanted to with that kind of investment? I mean, we could debate that adnauseum. And, as was just suggested, there's a whole bunch of other options out there about further processing, and all those sorts of things.

So, we've tried to focus on the key issue of how do we retain access to export log markets going forward. And so we've looked at reducing methyl bromide rates, recapturing methyl bromide, alternative fumigants, we've looked at dual heating, which in my personal view is potentially a long-term answer to some of our issues and a non-chemical thing, and I think if we're all honest we'd have to say that the world is trying its best to move away from chemical interventions, throughout the food space, the trade space, all of those sorts of things, and we're really very cognisant of that. But in the short-term we accept that chemical interventions in this space is what's going to keep the trade going.

CHAIR: So, I'm assuming then that the major prerogative for you in funding this research was to find a chemical that would meet the requirements of your trading partners for an effective fumigant, in other words something that killed a range of organisms that you're trading partners sought to keep out. That's the primary goal of efficacy, am I right?

MR HAMMOND: Only in part. Our focus was not on finding a chemical. Our focus was on the other part, what you suggested, that's keeping the trade channels open. So, if somebody came in and said "I've got a magic wand and I can kill all these bugs" and we could prove that scientifically and get MPI and MFAT to accept it, and take it to trading partners and they accepted it, we'd be delighted, but the reality is that in the short-term I think we have to accept that chemical intervention is

the one that's going to keep us going until we find something else. But it was not the focus. The focus was on keeping the trade going.

CHAIR: Where I'm going with this is to say that, you know, like you, I think that we and the EPA, and many in this process recognise the value of peer reviewed science. The more peer reviewed science there is on aspects that are not well-characterised, the easier life becomes for everybody involved. And there may be a view here counter to yours, you said that there are in fact vast amounts of peer reviewed science that indicate that there is no EDN left at the end of a fumigation. Now, this hearing has heard submissions from the Applicant and I think it's fair to say that there's one peer reviewed paper that reports the measurement of EDN in a log stack fumigation in the trial that was conducted by Dr Hall in Tokoroa. Now, we recognise that that's a peer reviewed study and it's valuable, but whether it's vast amounts of peer reviewed science or not I think has to be kept in perspective.

What I would like to know is that you indicate in your submission that the use of chemical fumigants, and you've said that chemical fumigants need to be carefully managed. Given the data gaps that have come to light in this hearing, can I ask you if STIMBR, or the industry in any other guise, is willing to make an investment to try and fill those data gaps as they relate to the exposure of workers on the port to the use of a chemical fumigant which is something that we haven't heard a great deal of peer reviewed science commenting on?

MR HAMMOND: Firstly, I'll correct what I said earlier. I accept your comment that there's not vast amounts of peer reviewed science, I should have said a lot of data points. So, I accept that correction.

STIMBR is committed, as I said, to ensuring our ability to continue trading export logs. If that requires investment into gaps in the knowledge, and that's fundamentally what most of our work has been, is we've sort of seen the big picture and said, we don't know this bit, let's invest in it, then we will continue to support that work. So, if there are key pieces of work that are required, then we will look to how we invest in that and cover it off. And our first port of call is generally the Crown Research Institutes because we get a very high level of independence, we get the pre-eminent scientists in the country in those particular spaces, but we're quite happy to have regularly brought in offshore expertise to try and assist us fill those data gaps. So, absolutely we'll continue working down that track. We don't see that ending with this.

CHAIR: Thank you. Questions from EPA of Mr Hammond?

DR VAUGHAN: We don't have any questions, thank you.

CHAIR: Any questions or comments from the Applicant?

MS GEAR: Just one question and in this situation I would like to put on my STIMBR Board hat.

Don, you were asked the question whether or not having a chemical replacement would stop STIMBR's future research, and I presume the intent of that question was to find out whether or not STIMBR would continue research looking at other options. If EDN is registered with workable controls, will STIMBR go on looking for other options, especially in a climate where as we've all acknowledged chemicals are becoming increasingly socially unacceptable?

MR HAMMOND: I would like to say, yes. Unfortunately I'm only the Chair and it's not a Board of one. So, with the support of the rest of the Board, which I expect to have and I see there's probably half the Board, maybe a

bit more than half the Board are in the room today, I absolutely believe that we will continue to look at those other opportunities.

As you know, we spent a lot of money, and it refers back to the Chair's question, on is there an ecological approach whereby there are periods when there are no insects, there is no risk on those logs. So, we've got a dataset of traps from throughout the country spread over four years catching insects to see whether there were periods where there was no risk. Unfortunately the answer was, no, there were no areas of any significance where there were no insects for any period of time, which means we have to continue with treatments of whatever sort. And so the science told us that that was not going to be an option. So, that was my reference before about we spent a lot of money on that, several million dollars over an extended period of time, to find out that actually that wasn't going to be a solution.

But we will continue to look for alternative opportunities to ensure that log trade continues. But we also have to recognise, as much as we might in New Zealand want to pursue a particular course of action which excludes chemicals or whatever, it ultimately comes down to what our trading partners accept. And so there's a lot of work to do with our trading partners in getting them up to speed with alternative options, because everyone understands chemicals, so any non-chemical intervention becomes a real challenge.

MR BRUZEK: Don, I have actually two questions. The first one is there was phosphine mentioned in your presentation and I just would like to understand how much data are about phosphine and the efficacy on timber logs out there, and if there any resistances being reported from that?

MR HAMMOND: Sorry, was the last bit about resistance?

MR BRUZEK: Yes, it was about like if there are some resistances. We have quite a lot of data on phosphine on our side because we have other fumigants on the market in Europe and we perfectly know that effects are the issue and I was just wanting to understand a bit more.

MR HAMMOND: Phosphine is incredibly important to the export log trade in New Zealand. As we've heard, it's plus or minus 70% of the logs that go to China, so that's a big number. I can't tell you what it is off the top of my head but it's a very big number. So, it is critically important for us to understand phosphine and for MPI to have some confidence in it and we've been continuing to evaluate a range of issues with phosphine and phosphine treatment on logs going to China, and we will continue to do some of that work, it's ongoing at the moment. But I think where we're at is we've got a system that's working pretty well and there doesn't appear to be, you know, do we put more phosphine in, or less, we're not getting those sorts of challenges or questions. So we, like everyone, have a limited budget and we're applying it to where we think we can get the greatest gains for the export logs sector.

CHAIR: Any questions from the submitters?

MR BROWNING: Thank you. You suggested that there was upwards of $20 million spent looking for alternatives to methyl bromide. How much was industry money and how much was taxpayer money?

MR HAMMOND: Ah, I can't give you the absolute numbers, Steffan. The money has been spent not only on looking for alternatives but also looking at recapture technologies. But there has been investment by the Government, there's been investment by, in this case Draslovka as the EDN Applicant, and we've sourced funding from wherever we can get it, but there has still

been a substantial industry investment in that work. And it's generally, most Government money, as you know, there has to be co-funding to support it.

MR BROWNING: Yes, so the PGP programme I think was 1.2 million each, I think. Okay, in the primary growth partnership, and that's PGP, investigation there was a small element of recapture looked at. Why didn't the industry not test full log stacks using the recapture technology that was already available by upscaling that technology, why didn't that happen? Was there not an intention to include recapture as one of the outcomes from that?

MR HAMMOND: So, as you've heard me say several times this morning we're interested in recapture technologies, we've had Plant & Food assess a number of technologies. We've had a raft of technologies put to us for validation and in each case - when I say "put to us", we get these proposals saying we've got a recapture technology, and our usual response is, okay, provide us some data that shows us that this actually looks as though it would work. Once we've got that data, then we will do some independent validation. We did one, two or three years ago and the good news and the bad news, it was a complete failure. The good news was that it was a complete failure and it wasn't, oh well, it sort of got close therefore if we changed a few things we might be able to develop something. This clearly did not have legs.

MR BROWNING: Was that the American liquid scrub method?

MR HAMMOND: I actually can't recall the details of it.

MR GEAR: No.

MR HAMMOND: No, I don't think it was. So, we've looked at a number of technologies and as I say, we've done validations using Plant & Food research so that it is completely independent, to validate the outcomes that

are claimed. Whenever we've had one of those things put to us we've asked for data, and in the case that I believe you're referring to, we continue to await that data. We have asked for data for several years now, it has not been forthcoming. It is our belief, and you confirmed it yesterday, that they have not done a full log stack, and, as you heard yesterday, it's difficult to scale-up from laboratory scale technologies to something of 700 or 1,000 cubic metres, it's not as simple as it sounds. Added to which, and you heard before, we have asked for a project plan and a non-disclosure agreement.

A non-disclosure agreement is not about muffling people, it's not about muzzling what they can say. It is about all of the parties agreeing on what and how and when information is released. Now, if there are a number of parties involved in that, that is standard business practice, that's all it is. And we've been unable to get a non-disclosure agreement, to sign a non-disclosure agreement, or a detailed project plan about who's going to measure what, using what technology, how many replicates, all those sorts of things. As you heard before, the forest industry is ready and willing to allow such - or to support such a test, such a validation, but until those documents are available it can't go any further.

MR BROWNING: Why don't you front-foot it and arrange a trial, even to your requirements that you would expect in a non-disclosure arrangement, why don't you front-foot it and allow that to happen?

MR HAMMOND: We have front-footed it, I have emailed the parties involved asking for that information. And we are willing, we've been ready for months. We've got agreement from the parties that we will do it. We've sorted out where it can happen, we are awaiting the

other party to provide the data, the project plan and the non-disclosure agreement.

Now, I don't believe this is the forum for us to have this debate but if you would like to pass back to them that I'm willing to meet with them, and that's been passed on previously, and that with a project plan and a non-disclosure agreement we will make this happen, that would be great.

MR BROWNING: You mentioned earlier while on the stand there today that recapture is not available at scale and the fumigation, you know, there wouldn't be value-add. I would ask you then, why not do the right thing, recapture and use it in marketing just the same way as you would use forest stewardship certification, FSC certification, use that to have product more easily accessing market; there could be a positive in recapture, couldn't there?

MR HAMMOND: There is absolutely a positive in recapture, and that's to the environment.

MR BROWNING: And workers.

MR HAMMOND: I think we've traversed the worker issue and I don't think that's the basis of this hearing. We are interested in recapture because at the moment our opportunity is methyl bromide, we don't have a second option. And so, in the short-term we need to figure out how to recapture it and to date there is no recapture technology capable of operating at the scale that the export log trade requires and without generating vast amounts of waste that are then buried in landfills. The forestry sector does not believe that's a sustainable solution, that's simply hiding the problem for later. What we are looking for is something that will endure, not hiding it for later.

MR BROWNING: What do you mean by "hiding it for later"?

MR HAMMOND: If I can quote you from a previous meeting, burying activated carbon contaminated with methyl bromide in landfills. We're talking vast volumes of it. We currently do that with small volumes out of containers but we are not happy about the idea of thousands of tonnes of it having to be buried every year.

CHAIR: I think before we go too much further along this track I should remind the hearing that this is not the reassessment, should that arise, of methyl bromide. So, we're not here to discuss methyl bromide recapture, we're here to discuss Ethanedinitrile and its proposed use for log fumigation.

MR BROWNING: I accept that, Mr Chair. Again, it's the context of how desperate we are for EDN which has a lot of unclear science, or not a lot unfortunately, and relative to alternatives that have to be weighed into the agreement. Just as you will look at the economics, we've had discussions around congestion at ports, and obviously fumigation times and recapture times would be part of that, and I was going to move to that. I expect that it's quite clear that there's strong debate around industry's absolute preparedness, or not, around recapture full stop, whether it be EDN or methyl bromide, and I would put it that it's cost-cutting and looking for excuses such as deep burial which is not actually the issue that it's made out to be.

So, I would just finish then maybe with one line which is around the congestion. What is the length of time - I'm sorry, for EDN it's 24 hour fumigation, I understand. What's the length of time or times depending on temperature and dosage for methyl bromide fumigation?

MR HAMMOND: There's people that know more about it than me but as was mentioned earlier, it's 16 hours and 24 hours.

MR BROWNING: Right, so that's temperature and dose I think. In terms of congestion at ports, and that time of fumigation is clearly part of that, recapture would be an add-on to that, with the anticipated increase in log exports, even from current levels, there are going to be logistical issues with congestion, they are going to be amplified in some ports because some ports will be exporting more and some less depending what is being harvested; is that correct, there will be an increased congestion regardless in the future?

MR HAMMOND: I would be speculating. My personal view is that, and the exporters have probably got a better idea than I have, partially it will be driven by log prices but I actually think we're getting very close to capacity in terms of transport, harvesting crews, space on the wharves. There's a whole bunch of factors that play into it. So despite projections that we're going to see a dramatic increase in log volumes over the next few years we're going to see a significant area of forest that comes up to maturity, but at the moment I don't believe the industry has the capacity through the supply chain to actually manage all that, so I think we'll see it spread.

MR BROWNING: So those trees will stay in the ground, you're suggesting?

MR HAMMOND: Not permanently. I think it will be spread over, instead of all coming up in say a 5 year window, it will be over say a 10 or 15 year window.

MR BROWNING: So congestion and port logistics has got to be managed regardless. I'll leave it at that, thank you.

MR HAMMOND: Mr Chair, I need to refute the suggestion that this is about cost-cutting. I said in my submission

that we actually don't know what the cost of using EDN is going to be. We've had an indication that the product itself might be comparable, but until we know what the controls are we have no idea what the cost is. So we're not driven by what is the cost of EDN and that's why we want to keep going with methyl bromide or any other suggestion. And debarking, as I said before, is somewhere in the order of double the cost of methyl bromide. You can play with the numbers but it is certainly four times, five times, six times the cost of phosphine. So, it's not a cost-driven procedure, it's about maintaining that export trade and we've invested a lot of money in trying to ensure that continues, and that's not been predicated on cost.

CHAIR: Any further questions from any of the submitters? MPI.

MR OLSEN: Shane from MPI again. MPI's interests, as clearly outlined in our submission, is to protect trade for our primary industry exports but also to manage risks to our environment and economy by having phytosanitary tools available in the future, which may include EDN.

You've talked about cost effectiveness, Don. I'm interested to know from you, given methyl bromide costs are increasing now, and definitely by 2020 if recapture is fully enforced, what are the key parameters; if EDN was to be successfully registered for use, what are the key cost-effective parameters that are needed to ensure there's a transition made by the primary industries to use this chemical, given methyl bromide is the only option and I'll repeat only option for India exports which makes up a large volume at the moment, so what are the key cost-effective parameters, if I can call it that, in order to enable the industries to transition to a new chemical, or whatever measure?

MR HAMMOND: I hope I understand the question, Shane. One of the attractions I guess of EDN is the ability to use the same logistical structures for fumigation as methyl bromide. So, if I shift to a different possibility, which is dual heating, completely different opportunity, ultimately maybe the answer, but it requires an immediate up-front capital cost of tens or hundreds of millions of dollars. So, clearly that would work against, you know, there would have to be a very strong business case to move to that. Now, I think ultimately that's a possibility but in the short-term one of the attractions, I guess, if you call it that, of EDN is that it fits pretty seamlessly into the current systems, and provided the controls that are put in place, buffers and those sorts of things, enable efficient work on the port, the logistics for space to remain similar, then the implication of cost there is not too significant. So, again, if EDN was shown to be an incredibly good chemical but it took five days to work, then it just simply wouldn't fit in the current logistical requirements at the port.

So, I hope I've given you a bit of a flavour. We've got a pretty big industry that's moving 30 million odd tonnes of wood, and you don't pick it up in the forest and move it once, you pick it up and put it down and pick it up and put it down. So there's a huge amount of work involved in that. Ensuring that remains efficient is vitally important, and that's probably the biggest part of the whole supply cost chain, is picking wood up and shifting it and putting it down, and so on. So congestion on the wharf, if there's ships having to sit out in the stream waiting for a berth, all of those things add to it, but they're probably around the fringes, it's that logistics on the wharf that is potentially one of the biggest costs. And even when we

looked at things like dual heating, we asked the question how much space does this need, because most of our wharves are already pretty congested and that's probably the single biggest factor in determining which way we want to go. I hope I've answered your question, I'm not sure.

MR WEISS: Don, speaking in relation to EDN you'd commented that at the end of the fumigation process there's essentially nothing left under the tarpaulin and that recapture would be merely a feel-good exercise. Now, I understand, or I'm assuming those comments are based on the lab studies which we've spoken about, or the laboratory or the small-scale undertaken in the 28 litre sealed containers, and it's interesting you just referred a few moments ago in response to a question that it's difficult to scale-up from a lab to a big log stack, but putting that issue aside for a moment. How do you reconcile those comments you made about, in particular recapture being nothing more than a feel-good exercise, with what it says in the science memo produced by the EPA, and I quote just a couple of sentences on page 49:

"The risks are not insignificant for the estimated exposure levels coming from a multiple log pile source. In this scenario after all the uncertainty adjustment factors are included, the modelled exposure is 0.266 parts per million (7.8 times above the tolerable exposure level at 120 metres, the further distance modelled)".

I'm just interested to hear your comment how you would reconcile this statement with recapture being merely a feel-good exercise?

MR HAMMOND: Firstly, Sam, thanks for the question. I'm not a scientist so I really can't, I don't want to dig into that detail but I accept the challenge, I suppose, of

going from a lab scale recapture or residual EDN level to full-scale, and my understanding, talking to the scientists and so on, and I would stand to be corrected, but my understanding is that those are mathematical models, that actually there's a high reliability in being able to scale them up. So, I would prefer to defer that question to the scientists because I can't, I'm not a scientist, I can't answer it directly.

MR WEISS: All right, just a follow-up question to that then, and it's my final question to you. To what extent does STIMBR and/or the log industry feel that they have any responsibility towards helping ensure the health and safety of either fumigators and/or port workers?

MR HAMMOND: I'm not really sure where you're going with this. I'll take you back a step. The forestry sector has been in the spotlight for some time now around its workplace safety record, some of which we can debate, but the issue is that there would be few, if any, sectors in the country that are not more sensitive to worker safety, health and safety, the public, and so on. So, we take those things, and I think you heard it from Mark this morning, we take worker and public safety extremely seriously and we do a huge amount, we put a huge amount of effort into ensuring that the risks are managed and managed appropriately, and we're looking to the expertise of Government agencies to provide the controls that will give us some confidence around that. We don't believe we are the experts per se in every health and safety aspect. We're looking for assistance from others, but to even suggest that we don't take that seriously is seriously wrong.

MR WEISS: I certainly wasn't suggesting that, I was merely asking to what extent you saw the industry having a responsibility for it?

MR HAMMOND: It's an absolute responsibility, there's no question.

MR GEAR: Thank you. Don, I sit here today as probably the only person in this room who has lost a brother in a forestry accident. Would you care to comment about the drive that I personally have put behind ensuring that we find something safe, thank you.

MR HAMMOND: Ian, those of us that - and respect your family loss but I don't think, the forestry people around the room, I think we can all name colleagues and friends and so on that we've lost to workplace accidents for a whole raft of reasons. And, so you are absolutely correct, that the safety of everybody involved in the sector has been absolutely paramount in what we've been looking at and there's no question that you've driven that very hard, that's been a key issue around the Board table, but I think it's almost, you come to a Board meeting and the Chair doesn't have to tell you to breathe, it's just something you do. And the Chair doesn't have to, in the case of the forestry sector, say, right, let's have this big korero about health and safety. It's an absolute given in every decision we make, is what are the implications on this for the people using it, the workers, the people around it, and all those other questions. And I referred in my submission to the three key points that I put to the Board around whether we look at EDN, and that is, does it work; is it cost effective, so, you know, if we had to invest hundred million dollars building something that it may not work; and the third was around social acceptability, and that social acceptability, social conscience, call it what you like part of that is around health and safety, can we keep people safe. Because, if we can't, we don't want to do it.

CHAIR: Are there any other questions from any of the submitters? Thank you, Mr Hammond. Okay, the final submitter this morning is from the New Zealand Forest Owners Association. I'm not sure if this is Glen Mackie or Russell Dale. You'll fill in the blanks, I'm sure.

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SUBMISSION BY NEW ZEALAND FOREST OWNERS ASSOCIATION

MR DALE: Kia ora tatou, Mr Chairman, thank you and your Decision-Making panel members, other submitters and attenders, thanks for the opportunity to be able to come along here today to speak in support of this application.

My name is Russell Dale and I'm the Research and Development Manager of the New Zealand Forest Owners Association. I'm also the CEO of a company called Forest Growers Research Ltd, and that is an industry-owned company that has been established to coordinate and manage research programmes for the benefit of New Zealand forest growers, large and small. Glen wasn't here earlier but with me is Glen Mackie who's the technical manager for the New Zealand Forest Owners Association.

Just a few comments on Forest Owners. The Forest Owners Association is the representative membership body for the commercial plantation sector, forest growing sector. Our members are responsible for the management of approximately 1.2 million hectares of commercial forest out of 1.7 million hectares, and they are responsible for and manage around about 80% of the annual forest harvest that we've heard about. As an association we also work very closely with the Farm and Forestry Association, and they in particular represent the interests of smaller growers, small forest owners and farm and foresters. Both of those associations together provide the secretarial support to the Forest Growers Levy Trust, which is a body that collects a compulsory levy from Forest Owners when they harvest their forest, and they use the funding from that levy to support a range of industry good activities, including research.

So, while I'm here representing the New Zealand Forest Owners, I am also the Forest Owners' representative on the Board of STIMBR. I've only been on that for three years but I am familiar with the work that is undertaken by STIMBR to reduce and find alternatives to methyl bromide. Glen Mackie, who is also here, is a former member of that Board and he's also very familiar with the effort being made by the forest growing sector to address the 2020 phase-out of methyl bromide release to the atmosphere.

So, just moving on. The New Zealand plantation forest harvest in 2017 was approximately 33.5 million cubic metres. There has been a significant increase in that harvest rate, as Don Hammond mentioned. The New Zealand domestic wood demand can be met from about 8 to 9 million cubic metres of logs. So, the surplus between 8 to 9 and 33, it really has to be exported, either in log form or in processed form. Of the harvest, 18.5 million cubic metres of logs, which was 55% of the total harvest, were exported in 2017, but I think later stats would indicate that that number is now closer to 20 million cubic metres annually. The value of those log exports, based on the latest MPI figures through to the March 2018 year, were $3.2 billion. So, log exports are a very significant revenue earner for New Zealand, export earner for New Zealand, and a very significant employer in our regions.

For many of our forest owners in regions where there is little domestic processing capacity, log exports are the only market option when their forests reach maturity. I can relate to that because I'm involved in a forest partnership that's currently being harvested north of Gisborne and there virtually are no domestic markets for those logs and we are totally reliant on

that export log market, and that is the situation in a number of regions around New Zealand.

As we've heard, about 80% of our export logs go to two markets, that's China and India. Based on MPI numbers, around 70% of the volume goes to China where exporter treatment with methyl bromide, phosphine, or debarking is required by the importing country. I think we've noted that debarking is not an accepted phytosanitary treatment but it is acknowledged as a risk mitigation treatment. Phosphine can only be used in the ship's hold. So all above-deck cargo going to China must be treated with methyl bromide or debarked. The balance of the logs that go to Korea and Japan where treatment on arrival is currently accepted by those countries, but with increased global biosecurity concerns we know that there is always potential for changes in the attitude of those importing countries. India, of course, currently requires all logs to be treated with methyl bromide, they will not accept phosphine treatment.

So, I think although Forest Owners would like to see more of the forest harvest processed in New Zealand, you know, we would all be in that boat, this is not the case for a variety of reasons. We could spend a lot of time discussing that but we don't have the processing capacity to deal with our total log harvest. Export markets are therefore extremely important for Forest Owners to balance grade mix which arises from the forest. The logs that are exported are typically primarily the lower grade parts of the tree, not entirely, but in those areas where there is strong domestic processing, typically the higher grades are processed locally and the lower grade component of the tree is what goes to export.

Where there is local demand for pulp logs, these are obviously directed to domestic pulp mills and fibre board plants, but we do have regions where there are no domestic markets for these lower grade pulp logs and this is particularly in areas like Gisborne, southern North Island, and parts of Northland. So, in those areas, if those forests are within an economic distance of a port there are some export opportunities for those pulp logs, but the specifications are generally tighter and a greater amount of material is left behind. If you're beyond an economic distance from the port, then generally there isn't an outlook for those pulp logs.

So, interruption to the India and China log markets would reduce demand and price for those lower grade of logs making harvesting from high cost forest particularly the smaller wood lines and those forests that are in more remote areas, it would make it pretty problematic for many forest owners. Having an efficient export supply chain is therefore critical to the success of Forest Owners' business throughout New Zealand.

Forest Owners fully support the phasing out of methyl bromide released to the atmosphere, but without a replacement the impact on our members, the wider forest growing sector and the New Zealand economy, as we've heard, will be very significant. The Forest Owners Association have fully supported the work at STIMBR since it was established in 2017 to undertake research into finding ways to reduce or eliminate the use of methyl bromide. As we've heard from Don, over $20 million has been invested, much of it funded by industry through a voluntary industry levy, and that has been invested in research to find alternatives to methyl bromide and also to reduce rates.

We're very familiar with the extensive international search for alternative fumigants commissioned by STIMBR

and we're also aware of the research undertaken by STIMBR to test the efficacy of lower rates of methyl bromide fumigation treatments. STIMBR has also investigated non-chemical alternatives. So, it hasn't just focused on chemicals, it has investigated non-chemical alternatives. These have included debarking within the forest and also at fixed debarking installations. The ecological approach that's been described, you know, can we have insect free zones or insect free time zones, and the dual heating of logs which has been referred to. So, all of those have been in the suite of research projects that have been investigated by STIMBR.

I'd mention that a separate but related project being developed by Forest Growers Research builds on some earlier work in the forest debarking by STIMBR and that involves a primary growth partnership with the Ministry for Primary Industries to develop, amongst some other automated products, a process so debark logs in the forest to an export standard using a modified log processor head, the processor head that's normally used to fell and manufacture logs. The challenge there, and it's a big challenge, is to see if we can adapt or build a processor that can debark in the forest to an export specification. That's a big challenge but the project has been under development for two years, it has been approved by MPI in principle, and that we're currently working through the final contracting stages for that programme with MPI.

I suppose despite all of this work, EDN has been identified as the only alternative, a viable alternative to date, and for this reason Forest Owners Association supports the application for registration of EDN by Draslovka.

Whilst I've work for the forestry industry for many years, I don't have the technical expertise to comment on the specific controls, but as an industry we are absolutely committed, and I just reinforce that from members of our association, we are absolutely committed to having safe workplaces for our employees and those of our service providers, whether they be in the forest harvesting trees, or handling our products on the wharf, or in transit. A point we would make is that those controls imposed, they must be workable and they must be logistically and economically sustainable to allow the export log trade to continue. As the harvest of small forests established in the 1990s increases, it doesn't actually take much of a log price adjustment or an increase in cost to start making a significant impact on the viability of those forests. Where controls are imposed we request that they are based on good science and obviously that they take into account the operational and logistical requirements. For example, we know that excessive buffer zones at ports and re-entry restrictions, they will impact on logistics and they do have the potential to result in EDN possibly not being used efficiently as an alternative to methyl bromide.

WorkSafe have suggested the use of scrubbing and while again, as I've noted, I'm not a technical expert, I think we have heard that from material presented to this hearing and the results from an operational trial on the EDN, undertaken either in late 2016 or early 2017, there was little or no EDN remaining after the 24 hour fumigation period.

Shiphold treatment is also important for the industry due to the increasing export log trade to India. This market has the potential to be increasingly important for New Zealand in the future and to help reduce the

heavy reliance we have on the China market. India, unlike China, will not accept phosphine treatment due to its concern with the introduction of a [pospersyris]. For this reason India will only accept methyl bromide treatment but EDN does offer an alternative that may be acceptable to the Indian Government, and those conversations have been raised already by MPI. Phosphine has not been accepted by the Indian Government as an accepted treatment.

We also support the registration for use at ports throughout New Zealand rather than the three existing ports that use methyl bromide. This would improve the efficiency of the export supply chain compared to the current arrangements where top stow cargo can only be loaded at Napier, Tauranga or Northport.

We haven't mentioned protecting New Zealand from imports, and of course the forest industry, our forest owners, they have a very strong interest in biosecurity, protecting our forests from imported agents. There are many around the world just waiting to get here to get into our forests, and having the tools and the means to actually deal with those as they come into the country is also equally important to us.

As forest owners we have a strong commitment to sustainability and EDN does offer the opportunity to reduce our impact on the environment through less use of methyl bromide and release of methyl bromide. Climate change, which we're seeing is resulting in increased storm intensities as well as droughts on the East Coast, that's not a friend to the forest industry. So, you know, we've got a strong interest in ensuring that our operations are sustainable.

I think our forest growers would undoubtedly have a longer term goal to reduce our dependence on chemical fumigants and we've taken steps in many parts of our

operations to do that, but whilst some of the alternatives that have been investigated show promise, the debarking, in-forest debarking, the dual heating, they show promise, we're not yet at the stage, apart from the use of debarking in some areas as a risk mitigation measure and for some markets, where they offer viable alternatives.

The forest industry has invested many millions of dollars into seeking alternatives to methyl bromide. Non-fumigant technologies have been researched extensively and are being introduced where appropriate but they're only part of the solution. EDN has proven to be capable of killing insect pests associated with New Zealand export logs and it does not have the ozone depleting properties of methyl bromide. Adequate controls obviously must be specified for its safe use but we submit that these controls must be sensible, based on good science, and properly address the actual risk if EDN is to be a viable export log fumigant.

So, in conclusion we strongly support the application for registration of EDN as an export log fumigant across New Zealand ports and we thank you for the opportunity to appear here today in support of the application. Thank you.

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CHAIR: Thank you very much. So from me, if I might ask the first question. You referred to good science, twice actually you referred to good science as being the driver for controls, workable controls that are considered to be acceptable for the industry. Could I ask you as a member of STIMBR and as a member of the forestry industry, is the industry prepared to financially back the acquisition of, ongoing acquisition

of good science so that controls can be based on just that and not the operational desires of the industry?

MR DALE: Well, I'm one member of the STIMBR Board. As the Forest Owners representative on that Board I would be sure that the view of the Forest Owners Association members would be to support research to understand, you know, to ensure that there is safety in our operations.

DR PHILLIPS: I just had one question. You just made a comment about there are places where forestry is happening but there is - and there's a domestic market but may not be economically viable for the foresters to get their timber to ports. I just wondered what happens in those cases where it's not viable for them to actually get export their leftover, the -

MR DALE: Oh, that was in relation to the lower grade pulp material, the residue?

DR PHILLIPS: Yes, that's what I'm talking about. So presumably there's a domestic market for the higher grade but you made a comment around where there are some areas where it's not financially practical for them to take their pulp logs to the exporters. So, what happens to those?

MR DALE: They would, like forest owners, there are many cases where forest owners would transport that lower grade material at a loss to get it to a market, because the alternative is to leave it in the forest and then, as we've heard, there can be, you know, if you get a major storm event, then some of that material can be mobilised. If for any reason you just cannot take it, you just can't - because there's a point where you say, well, I'm prepared as a forest owner to carry the loss on this component, but you reach a point where you say, where you just cannot go any further. So, in that case some pretty active measures are taken by forest owners to ensure that that material is left safely in the

forest so it can be left in the forest. Last week I was down in Motueka looking at a forest in Motueka and they had taken quite extensive measures to form pads or areas in the forest where that residue material that they couldn't take to a market, couldn't get a viable market, they had formed up these pads and they had stored it on there and secured it so it wouldn't be mobilised in the event of a storm.

DR PHILLIPS: Okay, thank you.

DR LAING: Thanks very much, Russell. One question of clarification, the answer might come from the Applicant rather than you. There's a reference in your final point in the submission to EDN being used for fumigation at temperatures below 10 degrees C. My understanding of the application is it's for temperatures at or above 10 degrees C. So, can one or other of the parties tell me what the answer is?

MS GEAR: At the moment in New Zealand most fumigations take place above 10 degrees Celsius. We have done all our research in the laboratory at 10 degrees Celsius. We know it is more efficient above 10 degrees Celsius. So, at this stage I think you should take it that we are asking for a 150 grams per cubic metres at 10 degrees Celsius.

DR LAING: That was my understanding of what's in the application so I was just trying to clarify that what Russell has got in his is not right, okay. That's all, thanks John.

CHAIR: Are there any questions from EPA staff?

DR VAUGHAN: Yes, I just have one question. So, in the event EDN is approved with workable controls, how likely do you think it is that other ports, so not the three that currently fumigate with methyl bromide, will start fumigating with EDN?

MR DALE: Sorry, you said how likely other ports?

DR VAUGHAN: Yes, do you think other ports will start fumigating with EDN, were it to be approved?

MR DALE: Well, methyl bromide is currently used in three ports. Look, I don't know, there are some issues with temperature treatments in ports at the bottom end of the South Island, particularly in winter, but we would be hopeful that other ports, if it is approved and the controls are acceptable, that it could be used at other ports, and particularly in hold treatment as well.

DR VAUGHAN: Thank you. We don't have any other questions.

CHAIR: Questions from the Applicant? No. Any questions from submitters?

MR BROWNING: Just you mentioned that methyl bromide is used in three ports. It was used in other ports. Do you imagine that EDN to be used more extensively in New Zealand if it was approved?

MR DALE: I think if the worker safety controls are adequate and I think it's seen as a non-ozone depleting agent, then that removes some of the opposition to the use of methyl bromide.

MR BROWNING: And if EDN needed recapture as well, where do you think it would be used?

MR DALE: Sorry, if EDN is?

MR BROWNING: If EDN required recapture as one of its controls, do you think there would be a more equal playing field, and do you think that other ports would be involved with the fumigation of export logs?

MR DALE: I think, as we've heard, recapture is not shown to be necessary, the information we're hearing from people who are specialists in this area saying that recapture is not necessary. I can't see the point of actually putting recapture in place if it's not actually required.

MR BROWNING: Thank you.

CHAIR: Okay, any further questions?

MR OLSEN: Shane from MPI again, Russell. I just wanted to expand on your comment around protecting New Zealand and the Forest Owners interests in that. As you might be aware, methyl bromide is also the only option for many imported goods, if we found something on an imported good or a pest on an imported good. I just wondered if you could just expand on your comments about how important having tools such as a chemical other than methyl bromide is for the forest industry to protect the forest industry and everything around in terms of the economy and the social interests of that industry?

MR DALE: Well, it's like, it's important that you really have as many tools in the toolbox that you can. Our forest industry, forest estate is worth something of the order of 40, I would estimate probably somewhere around $30-40 million. That's a pretty major investment that our forest owners have in the forest estate. Also not forgetting about the rest of the forest in New Zealand, our indigenous estate. So, I think having, and particularly if the pressure comes on to stop using methyl bromide for biosecurity reasons, not all imports come in, in containers where it is much easier to treat and recapture methyl bromide. I think it's important that we do have an alternative for treatment of imports as well, Shane.

CHAIR: No further questions. Thank you very much for your submission. So, that ends the submissions from members of the public, organisations who have indicated to the EPA that they wish to be heard in person at the hearing.

The remaining items on the hearing schedule are an opportunity for the DMC to ask questions of the Applicant and indeed for the Applicant to have a right of reply. There will be no further opportunities for submitters to ask questions, or any other party at the hearing. I'm going to call a short ten minute recess to

compose ourselves and we'll resume with those two final elements shortly.

(Hearing adjourned from 11.36 am until 11.50 am)

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CHAIR: The Decision-Making Committee have conferred and we really only have one question to ask at this point of the Applicant, so I'm going to ask it on our behalf.

Yesterday in your presentation you submitted to us some calculations based on data that you brought with you that identified a concentration of EDN that you predicted to be at the periphery of the fumigation zone, and that concentration was 0.016 parts per million. That concentration was within the proposed TEL submitted by WorkSafe. So essentially your calculations, your determination of how you would use EDN, met the constraints that had been proposed by WorkSafe. Nonetheless, you've chosen to invoke uncertainty factors distinctly different from those of the regulator to allow you to operate under a much higher TEL. Can you explain again to the hearing why you chose to take that course?

MR BRUZEK: Well, basically we are an international global company so if there is a TEL being imposed on the chemical, of course it's in our best interests to actually keep that number high and keep it a bit higher than what is being required in here. Actually the TEL seems to be pretty low and there are bigger uncertainty factors being operated in that, and even though we actually fitted within that frame, it is not something that we wouldn't be considering regarding TEL.

We see it as two separate topics, basically, because the TEL will be globally and internationally recognised once being set in New Zealand, and under different kinds

of conditions, like for example the use for soil or use for different kinds of set-ups of timber, like we can actually run into difficulties. As you can see, it is being quoted by EPA, everyone is looking at what is available in the other countries. So, even though we fitted in, we wanted to critically look on the multipliers that has been used in the terms of uncertainties for the TEL separately.

It doesn't have an impact on the buffer zone, you are right, but it doesn't still mean that we fully agree with that 0.036 I believe.

CHAIR: So, just to be clear and to inform other members, other submitters and attendees of the hearing, the issue of scientific disagreement or disagreement on points related to the proposed TELs will be now explored in a process of expert conferencing. Nevertheless, what I'm hearing from your answer, and you can have a further opportunity to influence me, is that your modelling, your calculations have met the constraints imposed on you by the regulator in New Zealand. Your course of action is determined by the freedom to operate you would like to have in other regulatory environments, not recognition -

MR BRUZEK: Exactly on a realistic level and Swami may add something to it.

DR SWAMINATHAN: And also in the future we may register for soil fumigation. So we don't want this to be effective for the soil fumigation, so that's one of those things in New Zealand.

CHAIR: Surely that will be a different application where a different constraint would -

MS GEAR: It would. In summary, could I say that contesting the TEL level is because of the fact that this is a relatively new chemical internationally, a lot of people are watching the decisions that New Zealand makes. It

is for that reason Draslovka is confident with the uncertainty factors that applied. We would like to ask EPA and yourselves to reconsider recognising that the uncertainty factors we are offering, we are still going to adequately protect the human population. And we ask it not for use in New Zealand with logs, because, as you've pointed out, the modelling shows we are within the TEL, but actually for the sake of the use on logs internationally in case other jurisdictions take other modelling approaches, or whatever.

We also know that it is more than likely Draslovka will come back and ask for a reassessment for soil registration. One of the submitters was the strawberry industry, and I know Mic Ahern, who submitted very well, they have real concerns. At the moment they are developing resistance to the only chemicals they have to use if their fields at the moment, and they're a crop that we do need to have some sort of fumigation if we're going to go on having strawberries, let alone exporting strawberries. So, we will be coming back. The TEL that we're applying for may be more applicable in that situation. We haven't modelled for the New Zealand situation for soil registration yet. Does that answer the question?

CHAIR: It does and I'll just follow that up with a statement that, as I'm sure you're aware, the statutory process to which you've submitted requires us to consider your application to use EDN for the purposes of log fumigation under commercial situations, therefore the extent to which we consider you might wish to use EDN for other purposes, or where you might, under which regulatory environments you might wish to use it, is not central to the consideration that we will be making of your application.

MS GEAR: Could I actually ask though that what we're asking for is that we are judged on the qualities of the chemical using a good robust approach.

CHAIR: So, I can reiterate that we have an obligation to consider the application using the best evidence available to us, and in fact we have no obligation to ensure that we acquire of you, or of any other party, that information should it not be available. That's not our obligation, you are the Applicant here. But I can absolutely assure you that we will be basing our decision on the best good science that's been provided to us.

And, as I say, the process won't end here. We have identified and you've agreed with this approach, that we have a series of different interpretations of aspects pertinent to the application, and these can only really be resolved by the process that we've outlined of expert conferencing. This is the next stage of our consideration of the application and beyond that we will enter further consideration.

So, we as a DMC have no questions further at this point. I'll invite you to make any final statements that you wish to make.

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FINAL STATEMENT BY THE APPLICANT

MR BRUZEK: Dear Decision-Making Committee, dear EPA, dear WorkSafe, dear submitters and representatives of the public, I'm speaking on behalf of Draslovka, Kolin, and as the Chairman of bpb Partners, and I would like to thank you for the whole three days of hearings. It has been a very nice and fruitful discussion and I really appreciate that. I would also like to thank the Decision-Making Committee for actually this additional step in the decision-making process so that we can actually openly discuss and clarify any open points that are out there.

Before I though actually leave the stage and give the floor over to Kade McConville for the final response to matters raised, I would like to stress a few things.

First of all, we are not a multi-national company, we are a family-based company and we are a family office with huge focus on innovation, sustainability, social responsibility and business ethics, and this is inherited in anything that we do right now.

I have heard a lot about EDN and the HCN during the like three days and I would like to highlight again that CN group is around for and has been in use for centuries. To my understanding the CN group is one of the most and well-described chemical groups out there, and information is widely available to the public, as for example [ascetic Czech] report and many others. As a matter of fact, the facts of CN group are well understood and controlled. Actually, CN group is naturally present in a large variety of foods and there are minimum residue levels being set globally and recognised globally. In addition to that let me stress that safety is our key priority anywhere in the world, including Czech Republic, because in the end we are

dealing with hazardous chemicals and hazardous substances.

Draslovka currently has more than 300 employees out of which almost 10% are dedicated to purely to R&D, and we have more than 113 years of experience in cyanide-based chemicals, including their production, handling, use and, most importantly, including their waste management. We currently are producing more than 12,000 tonnes of high purity liquid hydrogen cyanide a year, and approximately 25,000 tonnes of downstream CN-based products and compounds a year. Due to the fact we have been established in early 90s, 1900s, it is essentially all done in the centre of city Kolin and our closest neighbour is the main city train station for the public. Therefore, over the years we have developed and optimised a wide range of safety and waste management technologies and we currently operate a fully integrated monitoring system, three types industrial waste water treatment plants, four types of waste gas destruction units which have been developed, refined and implemented in our company over decades of day-to-day use.

We are the only producer of EDN in the world and if anyone globally understands the chemistry and commercialisation of this compound, it's us. EDN at the moment, we are able to produce approximately 1,500 tonnes of EDN per year. So, yes, we have the stationary and very efficient destruction unit for EDN sorted out and operational in our factory in Kolin for more than 4 years. Actually, and as it was mentioned by some of you, this piece of technology is not portable and the cost of this unit is millions of dollars. To be honest, we would be more than happy to sell you some of our waste management technologies that we have available and I'm sure that they will do its job and we will actually make a good profit on them. But, unfortunately for us,

and I have to say that fortunately for New Zealand forestry industry, this is not the style and this is not in line with our business ethics. Because, if we do not believe that something adds enough value and has diminishing returns while it involves its own inherited risks, we don't promote it at any cost. I understand that there are some companies out there that do not share our view and style of doing business and their business model is to create a problem and sell you an expensive solution. But we should always ask ourselves if the problem is really there, and if the solution that is being offered is actually reasonable and if it adds value for all the stakeholders of that.

But, ladies and gentlemen, in the end all I want and all we are asking for is not cutting any corners. We are asking for fair treatment and a same level playing field for everyone, and I have to say that after what I've seen here I'm very happy to say that my expectation is that this is exactly what we are getting and I would like to thank you for that.

We have heard quite a lot during these three days. Sometimes we didn't agree with you but we are certainly happy that you raised all the concerns and all the questions. So, thank you once again and now I hand over to Kade McConville to make the final statements.

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MR McCONVILLE: Thanks Pavel, and again, as Pavel said before, thank you to the DMC for this process, thank you to the EPA and to WorkSafe for your review of the data packages submitted. In the end it's been a great learning process for us. You know, we haven't gone through this process before so it's like we're beginners

in this, so it's good to see and it's been very interesting.

Again, for those of you who weren't here yesterday I do want to introduce myself because I think that it's important for the basis of the conversation.

I'm applying this product daily, I'm in the field daily. I'm assessing, defining and refining our commercial processes. I'm not sitting behind a desk risking the health and safety of my team.

We expect to apply 50 tonnes of EDN in the coming season all across Australia in the agricultural sectors for soil fumigation. My team is in the field today in Australia, in Queensland, applying 6 tonnes of EDN just today, to the highest levels of safety available in an agricultural environment based on the product label approved in Australia by the APVMA.

It is my teams at risk, it is my reputation, it is getting my hands dirty in the field to make this stuff work effectively but above all else safely. I'm 32 years-old, I have a very young family and the only thing I want for me, my family, my employees and their families, and the broader community is to get home healthy and safe.

As I mentioned yesterday at one point, at times I was confused whether this hearing was about methyl bromide or EDN, and as this is the case I'll be mentioning both substances in my closing because I feel that people need to make a direct comparison between the two to fully understand it. I'm not going to stand up here like William Wallace and blast my opinions at you and try to get you on board. All I'm trying to do is reiterate some of the facts and some of the things we've seen mentioned over the last couple of days.

I'm going to start with key terms. I've heard a number of key terms over the last three days, and these

are, chicken versus egg. The chicken versus egg scenario has been bandied around over the last three days of hearings and that is exactly what it is. You guys are the first ones to be assessing a robust data package in relation to EDN application which we believe can only be done in a way where you have commercialisation and registration actually working hand-in-hand.

Key term two is an adaptable toolbox, which is necessary. We live by this same mantra but in the end these tools need to be commercially viable, cost effective and safe for use. But just like the importing countries and their approved treatment options, for soil fumigation it is exactly the same issue. Hydrogen cyanide, ethyl formate, chloropicrin, 1,3-Dichloropropene, even methyl bromide, we apply them all, Draslovka Services applies them all; all of which, which I just mentioned, are currently registered in New Zealand. So, we too understand the necessity of having a complete toolbox for our customers.

Key term 3, uncertainty. The imposition of uncertainty can be clarified through open and transparent communication. Given an ability to discuss openly and hopefully now through the formation of the expert panels, we hope to be able to do this.

Key term 4 is data gaps. Data gaps basically refer to my comments on uncertainty. These two go hand-in-hand.

Key issues regarding the process. We understand that this process is under a new legislative framework and this has been somewhat a complicating factor throughout this process. And it has been, it's been frustrating I'm sure on both sides, as mentioned before. In the end this is an unusual application, it's a new fumigant and there are not many new fumigants coming on the market.

When we even go to do testing or studies, we are pushed into doing tests which you physically cannot do without substance, it's not possible. In saying that, there are multiple concurrent registrations being undertaken globally but in the end no-one wants to be the first cab off the rank.

We currently have, and I am responsible for the registration in Australia, Malaysia, South Africa, Turkey, South Korea, Israel, and our team in Czech Republic is responsible for the USA and the EU. As you can imagine I don't spend too much time at home.

The US Department of Agriculture is supportive of EDN for emergency use based on the efficacy data for pine wood nematode. In October 2017 an MPI and Department of Agriculture phytosanitary approval was granted between Australia and New Zealand, and I suppose the question that always gets raised is, so why is it not being used? Because it still needs to be approved in New Zealand. Unlike New Zealand, Europe completely banned the use of methyl bromide and encouraged the use of alternatives. That is not the case here. You've set a 2020 deadline with a need to recapture that product at that 2020 mark.

One of the things which was highlighted throughout the process was the APVMA registration for timber in Australia, and a reference back to that material. Let me clarify some points on that. Firstly, the registration package presented to the APVMA had more holes that a colander and the APVMA registered the product based on the available data at the time giving very restrictive controls to the previous Applicant. Once Draslovka took over that process we subsequently invested millions of dollars into the development of a robust data package. We believe that unfortunately a lot of weight has been given to the APVMA assessment based on a completely different use profile to what we

presented in our application, and we're not sure why as the data package presented to the New Zealand EPA dispelled pretty much the entire previous application or previous submission. In addition, we have already started the APVMA submission process with the new robust data package presented in New Zealand to reduce the buffer zone from 50 metres to 20 metres and the subsequent removal of the scrubbing requirement which were inherited from the previous registration - as you can imagine my frustration is quite high on the previous registrant - and we are confident this will be approved based on the new data package provided.

Therefore, given all of this registration activity globally, of course commercial data, application data is inherently limited. However, the data presented to the EPA is robust, based on not only our knowledge of the substance and 113 years of manufacturing knowledge and expertise in cyanide chemistry, but also strong science developed by your own local and intrinsic Crown Research Institutes such as Plant & Food Research.

Just reiterating before around the soil fumigation registration in Australia, because it's what I'm doing daily. We're doing 50 tonnes of product over the next season with a 5 metre buffer zone, no restriction on land size and with very limited personal protective equipment based on the MSDS and the OCS assessment within Australia. Original buffer zone under previous Applicant in Australia was 500 metres for soil fumigation. Subsequently, under Draslovka we addressed the data gaps from the previous Applicant and the APVMA have subsequently reduced the buffer zone from 500 metres to 5 metres.

In hold treatment, it's been again mentioned a couple of times today and it was mentioned on the first day. Again to reiterate, Draslovka fully supports the

application of EDN in shipholds but, again, our primary target is for the use of EDN under tarpaulins. We expect, or we accept the DMC's decision or the EPA's decision should we need to do a reassessment or further submission of data to support that, we're more than happy to.

Another thing that's come up, and I actually mentioned it pretty much at the finale of yesterday, was Genera, and in their defence, let's focus on both sides because I think that it's a key point to this. Genera fumigates the equivalent of a truck and trailer every 30 seconds, 24 hours a day, 7 days a week, 365 days a year. There has been a lot of sidetracking on to issues not directly in line with our application but let me bring balance to the discussion, that in the end Genera are going to be applying EDN 365 days a year. In the end all abatement notices received by Genera are merely technical breaches and not flagrant breaking of the regulations or risks to the public. So, let's keep everything in perspective.

Safe Work Instruments. It was something that I raised yesterday. The Safe Work Instruments need to be visited, we fully agree on this. However, it would be interesting to understand exactly how these same Safe Work Instruments will be imposed on current fumigant use. We agree with Sam Weiss that a nationally standardised system for fumigation needs to be implemented. We also support that in Australia. I'm currently working with the authorities on a nationally standardised system and a nationally standardised scheme for fumigation licensing across Australia, because we face exactly the same issues.

Current scrubbing and recapture. As you've probably heard, this is a sore point for most people. I would like to stress some points on this. One, equipment

manufacturers have not proven their technology for methyl bromide in an industrial on-port fumigation scenario. Yes, you can recapture. How are you going to do that doing 30 log stacks a day? There needs to be an assessment undertaken on that, in addition to what Don was mentioning before. The APVMA - I'll revert back to referring to the APVMA registration. The APVMA have imposed liquid scrubbing of EDN at the end of application based on the following. One, six hour treatment time. As you've noticed in all of our presentations we have a 24 hour treatment time. Scrubbing reaches equilibrium around 400 ppm in four hours, with scrubbing, after which there is no point continuing and therefore the concentration of 400 ppm was released into the environment based on the field data which in the end is similar to merely increasing the treatment time from 6 hours to 24 hours and releasing it into the environment. So, where is the justification there? Which, in the end, look, is similar to, as I said, 6 hours to 24 hours, and this data has already been submitted to the EPA but also to the APVMA for their reassessment.

New Zealand have imposed the restriction of no emissions of methyl bromide beyond 2020. My two open-ended questions are, what exactly does this mean, and what efficacy of scrubbing or recapture will be accepted? As we have heard numerous times, the abilities to scrub or recapture more than 50% of the initial concentration of methyl bromide, 50%, is almost impossible. So, where's the other 50% going?

The key point here is focus on practicality, focus on cost and focus on the associated safety, but above all else focus on the science.

If you want an engineering control in place for the standard operating procedure, Susan has mentioned

hierarchy of controls a number of times and I think that is very relevant. I use exactly the same line in all of my fumigation training. In the end, the hierarchy of controls stipulates engineering controls is one of the options. Scrubbing, yes, or recapture, yes, is an engineering control, but so is the use of a detector to monitor and determine the endpoint concentration of a fumigation. At the moment they do not monitor the endpoint concentration of a methyl bromide fumigation. However, we have the technology to do that as what has been presented over the last few days.

We are of course happy to undertake recapture trials with Nordiko at their cost, as we would do with any other equipment supplier. However, these trials would need to include EDN captured and non-captured, and methyl bromide as a direct comparison, and all three sets of data would be submitted. As Mr Browning seems quite entrenched with Nordiko I will expect a call from Nordiko in the coming days to discuss this further, but I also invite and encourage other equipment suppliers to get in contact with us.

Again, what I want to highlight are some of the direct methyl bromide comparisons, because we seem to be switching and changing between the two chemicals as if they're exactly the same thing. They're not. First of all, methyl bromide is much heavier than EDN. It pools, it swirls, it doesn't dissipate in the environment. EDN doesn't do that. EDN, yes, is heavier than air but it dissipates, it dilutes, it disappears from the environment. The endpoint concentration, and again, the DMC have highlighted that we keep changing figures, keep changing values. Those changing values have merely been in response to the reports provided by the EPA and what we can do to provide more data in support of our application.

So, I'm going to use the main figure that the endpoint concentration which we would be releasing into the atmosphere is 357 ppm for EDN. For biosecurity approval in New Zealand the endpoint concentration must be 50%. Therefore, the endpoint concentration for methyl bromide is 30,400 ppm which is 85 times the levels of EDN which would be released into the atmosphere. However, the buffer zone for methyl bromide is 50 metres. The proposed buffer zone for EDN is 120 metres. Is methyl bromide bio-accumulate? Yes. Is EDN? No. Does methyl bromide have a re-entry period? No. Does EDN? Maybe. What is the use of scrubbing or recapture for methyl bromide? Richard answered this question yesterday where I asked him, is it environmental scrubbing or is it for safety. The answer I got was environmental. However, the focus for the EDN has been on both safety and on environmental. Is methyl bromide ozone-depleting? Of course it is, that's why we're all here, otherwise we would just keep using the stuff. Is EDN? No. We have the data to support it, we have the environmental breakdown, we have the air data, we have the soil data, we have all this data which is being presented in the EPA package which we presented based on the data that we compiled from numerous labs around the world.

I would also like to highlight, again because I've stressed this point a couple of times, because many people have mentioned hydrogen cyanide. We are actually the supplier of all hydrogen cyanide which comes into New Zealand. Hydrogen cyanide registration in New Zealand is very broad. We can control storage pests in mills, warehouses, food factories, we can control rodents in warehouses and shipholds. We can do the fumigation of nursery stock, we can do the controlling of wood boring insects. We can also control storage

pests in empty shipholds based on the current label for hydrogen cyanide in New Zealand, approved label from the ACVM, and on top of that we can treat bananas. Every banana which is imported into this country is fumigated with hydrogen cyanide. The endpoint concentration for a hydrogen cyanide fumigation is 8,900 ppm. There is no scrubbing, there is no recapture and there is no buffer zone.

Modelling. There's been a number of comments around the modelling undertaken yet we're confident that the inputs which Sullivan Environmental have used in their AERMOD modelling reflects the field situation as worst case scenario. This is also reinforced by Mark Self, CEO of Genera, who gave the information yesterday. We completely understand that we have said averages, we have said maximums, we have said worst case scenarios. In the end you've now heard it from Mark. If there have been any changes in figures, values et cetera, these have merely been in response to and the necessity to provide further data to the EPA to answer uncertainties and fill data gaps.

There's been a question around the studies in the data which were presented. Remembering that Plant & Food research is a Crown Research Institute in New Zealand, it is world renowned which undertakes robust independent science. Their work is approved and accepted by many regulatory authorities globally because it is peer reviewed and published.

I believe that it's important to just highlight the process and, as I said, some of the frustrations that we had during this process, and I'm not going to go through it in detail but we believe that the process was a little bit all over the place and we weren't quite sure on the actual process that we were trying to follow. In particular, we only received, the day before the EPA

were due to release their assessment, the EPA advised that they did not have sufficient information for the DMC to make a decision. Ten days before the 10th of August the EPA released their suite of information, including science memo, staff memo, Dr Graham's report and WorkSafe report. Hence we scrambled. Within a very short timeframe Draslovka responded to the data gaps highlighted in these reports. However, these things take time and we did the best we could within the very short timeframe provided. This is one of the reasons behind the fact that the data was presented at the eleventh hour to the DMC and for that we apologise but at the same time it was the situation that we were in.

Beyond this application process our work only just gets started. The next part is to get bilateral biosecurity approval. Luckily that's not on me because I don't like politics, but those approval countries are the ones that are going to need to approve this product before it gets in. But they're not going to approve it before there's a registration. Chicken versus egg.

The five main points which we keep covering on each of our presentations. I reiterate that we have these five main points that we would like to work through, not dictate, not to tell EPA or WorkSafe what to do, but to work with clarity and transparency on what you require. The justification for the removal of the need for scrubbing or recapture because what is the purpose, or more to the point what efficacy are you trying to achieve?

The TEL. We would like to increase the TEL from 0.034 to 0.056. I corrected myself today. The reason is, and as described by Pavel in response to the DMC's question, was that in the end it is purely an uncertainty factor which is in this calculation. All we're doing is asking the question of, can we sit two

toxicology experts together to discuss what those uncertainty factors are. That's all we ask. We're not trying to dictate that we want a higher one to get around process, to get around procedures. We're just saying that let's sit together and understand why those uncertainties exist.

Buffer zone reduction. If we say that releasing 30,400 ppm of ozone depleting bio-accumulative and chronically toxic chemical into the atmosphere requires a 50 metre buffer zone but we can say releasing 700 ppm of non-ozone depleting self-decomposing non-chronically toxic chemical requires 120 metres, I'm lost.

Re-entry period. As we've discussed I think it just needs clarification of exactly what the requirement for that is.

And PPE. PPE, again Philippa and Susan and I, I believe that's a discussion to be had on how that's enforced, or what we do in that respect. Are we going to tell the applicator what they must use, or are we going to use statements such as "suitable respiratory equipment", because that can be misconstrued.

One thing we take away from this and which we will continue to reiterate is that whatever controls which are in place need to be unambiguous, easy to follow, and enforce. But I would like to add that these controls need to be safe and cost effective to implement and, above all else, need to be reasonably practicable, as per Susan Collier's definition yesterday. Controls need to be looked at not on face value but on the subsidiary safety risks which these controls can bring and how subsequently those risks are managed.

As we have heard time and time again, in order to support the New Zealand economy we need to find a practical solution which is commercially viable and which supports the New Zealand timber industry beyond

2020, and through the submissions you have heard I'm sure we can say that from an industry perspective EDN is a practical solution, it's not the only but it is a practical solution.

We look forward to working with the EPA and WorkSafe, and the expert panels through our subject matter experts so that, one, we hope for a fair assessment of the data which has been submitted; we hope that the data gaps in previous submissions, including that in Australia, are taken for what they are and what data they actually represent; we hope for a clear and transparent communication process regarding our areas of confusion, uncertainty or data gaps, and we look forward to continuing this approval process moving forward.

Thank you again to the DMC, the EPA, WorkSafe and all submitters, thank you very much.

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CHAIR: All right, that concludes the hearing to consider this application. I would like to echo Kade in thanking all the participants for submitting to the process, for providing the information that we will certainly take on board from this point on. I'd like to thank the members of the EPA staff that have worked to organise and facilitate our comfort and direction at this hearing, and I hope you all have a safe and pleasant return home. I say that in recognition of the somewhat wild weather that I can see out the window there. It remains for me only to ask Mr Julian Jackson to close proceedings for us.

(Closing karakia by Julian Jackson)

MR JACKSON: What I just said was we've reached the end of the hearing, we're now dispersing to the four winds. Wherever your travels take you, travel well. And, we've

been submerged by information and detail. Now is the time to power down and relax and carry on our way. Kia ora tatou Mauri ora.

CHAIR: Kia ora. The hearing now stands adjourned for further consideration.

(Hearing adjourned at 12.33 p.m.)

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