

3M Transcript for the following interview: Ep-41 Methyl Bromide Mark

Reggers (R) Terry Gorman (G)

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Welcome to the 3M Science of Safety podcast presented by 3M Australia and New Zealand Personal Safety Division. This is a podcast that is curious about the signs and systems of all things work, health and safety, that keep workers safe and protect their health. I am Mark Reggers, an occupational hygienist, who likes to ask the questions Why, How, and Please Explain. Whether you are a safety professional, occupational hygienist, or someone with any level of WHS responsibility in the workplace, maybe you are a user of safety products or maybe you are a bit of a safety nerd who finds this stuff really interesting, then this is a podcast for you.

(R) Today we are talking all about Methyl Bromide with Terry Gorman. Welcome back Terry.

(G) Thank you, Mark, good to be back.

(R) You've become a bit of a regular. For those who haven't listened to our previous episodes, can you please introduce yourself? Where are you from, what do you do, and maybe a little bit of your background.

(G) I work for 3M Australia and New Zealand in a support role for our safety products. I am an occupational hygienist and have been involved in safety for many years.

(R) If you do want to know, you can go listen to the other ones, he does quote the actual number of years.

(G) ... days and dates, etc. And so, specialising in recent years in PPE and respiratory protection being a major component of that.

(R) We're talking methyl bromide, so very much a respiratory concern for workers. Let's go right back to what is methyl bromide, and where would you find methyl bromide maybe in a workplace?

(G) Yes, methyl bromide is a gas, a colourless gas that is used as a fumigant, so the most common place to find it is in dealing with fumigation of materials. It is commonly used in containers to fumigate the contents and get them to a safe level in terms of the insect or other activity inside the contents.

(R) So, its containers on a ship that may take weeks and months, making sure whatever is trapped in those containers is not going to do more damage and harm.

(G) Yes, well, clearly you can accidentally put a bunch of insects inside a container when you load it up, the insects can be present in furniture or woodwork or anything like that, they will make the journey across the ocean to Australia or other countries use the same approach, and when the container arrives it gets hit with a fumigation that is designed to kill those little critters and thereby keep them out of the country.

(R) So predominantly as you say fumigation, using pest ...

(G) Absolutely.

(R) ...or pretty much just the fumigation container side of things.

(G) It's probably used a bit wider than that, but virtually all of my interaction and experience with it has been in terms of container fumigation.

(R) So what kind of effect does methyl bromide have on workers, obviously in that particular industry and other industries, what is the concern if there is exposure or high exposures?

(G) Well there certainly can be health effects. Too much of it like anything is too much, and you can have issues. It is a gas that can cause problems to the central nervous system, headaches, nausea, long-term damage to the kidneys and the liver, and issues with the lungs, inflammation, all sorts of nasty response to the lung tissue, so it is a case of the dose and the type of damage that that dose can occur either acutely in the short-term or over a longer periods as well.

(R) We could spend an hour just going on about the health effects, but it is not good for workers and we absolutely want to be avoiding all and any exposures where practicable.

(G) Sure, like any contaminant, it needs to be controlled to a level that is considered appropriate. It has an exposure standard set by Safe Work Australia, 5 PPM, and we want to obviously keep exposures well below that to give us a margin of safety.

(R) Can you smell methyl bromide?

(G) Methyl bromide itself is odourless but it is commonly mixed with another chemical, typically chloropicrin, which has a very noticeable odour and thereby acts as a warning to workers, if they can smell anything they know there is an exposure.

(R) And that is much the case I believe with lots of different gasses to mix something in there so there is an alert that people can say, hey, I am smelling something.

(G) Sure, that's right, and that is why they mix a chemical in with natural gas, again, to give it that odour and a warning, if you like, that there has been some leakage or some sort of exposure happening.

(R) You mentioned the exposure standard, 5 parts per million, how does a workplace go about, if I am a company that is unloading containers and I want to try to get an idea of what kind of levels my workers have been exposed at, how do they go about doing that?

(G) There are some ways to measure it. It is not a simple thing. It can be complicated instrumentation, or what many would consider complicated, so it is not something that is very easy to do, and it is not widely done in my experience, people take it on more on faith and rely on other methods to control rather than spending time and money on measuring.

(R) The workers, you were saying earlier, may know or may not know. When are they most at risk? When they first open the container doors, I am assuming, or the people who are actually putting the fumigant in?

(G) Putting the fumigant in is normally not an issue. They've got ways to do that that are sealed, and the fumigant goes inside the container, the container is shut, and there should be minimal or no leakage. The problems occur at the other end of the process when it is time to open the doors. The person opening the doors has to be careful they don't get a gigantic face full when they do that. The container itself should be ventilated before that point, they can get flushed through with ambient clean air, that way blowing the methyl bromide out of the container and away and

reducing the levels inside, that way when they do open and look to go inside, in theory the container has been nicely flushed out and there should not be any hazardous levels left. That is not always the case, of course, but that is the thought process.

(R) I was going to say, depending on what has been packed, there is a wide variety of stuff, there could be pockets, maybe, in between, depending on when you are unloading stuff, there could be little pockets that are still there.

(G) Sure is, yes, pockets or dead spaces that aren't very well flushed by any fan movement or fan blowing through the container, so there needs to be care taken to protect the workers from those extra exposures that may occur after the ventilation, and these potentially can be quite high depending on the concentrations in those dead spaces. The other issue is temperature, so these materials have been gassed there is a residual amount of methyl bromide in there. The hotter the container gets, release of that methyl bromide that was absorbed into some of the materials in the container can again cause the levels inside to peak and give you an exposure or potential exposure.

(R) So, a fairly ever-changing environment, depending on all those factors which, time of the year, where it is being shipped from, shipped to.

(G) Yeah, all of those things come into play, and it is also let's say a moving workplace where people are dealing with containers in different locations, different ways, different days, so they need to be very aware of the situation each time and make sure they do the right things to protect the people involved.

(R) So, I'm a business, I've received a container, and we will go through the hierarchy of controls, what is the step down when we're talking specifically about

methyl bromide that a workplace should be thinking about, considering, all the way down to PPE.

(G) Well, of course, the first one is to not use it in the first place, and that is the ideal. It is a very good product. It does what it's supposed to do, it is very good and doing that killing of bugs that we talked about, so it is not a simple product to replace with something that is just as good.

(R) I can't spray Mortein in the...

(G) Mortein, maybe not. Methyl bromide is very good in terms of seeping or getting into surfaces, so we can kill bugs that are within wood to quite deep levels. Not many materials can do that, or not many gasses can do that. So that is why it has continued to be used across the world, it is that good and there is nothing to replace it at this point. There are other ways. Some containers can be heat treated, and elevated temperature can cause an improvement in the killing action, if you like, but again, it is all done on a case-by-case basis, where the containers come from, what the potential possibilities inside are that cause the fumigation pathway to be selected.

(R) So not reasonably practical to eliminate, unfortunately. What else can a workplace be looking at?

(G) Well, the next really good control is the ventilation, so they need to be very clear on, or have a good process to ventilate these containers, make sure they get fresh air flowing through for significant periods, getting them flushed out, removing all of that residual, or as much as they possibly can, and thereby reducing the potential for exposure to the workers when they do have to go inside. So, they don't need to do a five-minute flush, they need to flush for significant time and make sure they do the best they can in terms of flushing out.

(R) Can you recapture, so you've got the methyl bromide coming out of the container, can you capture it and re-use it from that point of view rather than just letting it out and being diluted into the natural environment?

(G) Yes, there are recovery systems. These have not been used historically, let's say, so probably not in all cases even today, but there certainly are scavenger systems that will take that exiting flush out air and clean out the MBR and give the fresh air a way into the atmosphere.

(R) And workers? What would you be educating workers on in this space from a control point of view?

(G) Well, I would be certainly educating them on the contaminant and its issues so that they are aware of the problem, they are aware of the potential health issues, and also training them in the appropriate steps in the process, making sure they know the ventilation has occurred, making sure all those steps are taken effectively for the right periods, and also any equipment they've got to protect themselves, PPE, respirators, etc, make sure they know how to get those and use them appropriately.

(R) So now we're at the bottom of the hierarchy, PPE, so respiratory hazard, half face mask, gas vapour cartridge, we're talking about it's a gas, it's as simple as that, like a lot of other contaminants?

(G) Well it's not as simple as that, unfortunately, because we don't really know each time what contaminant levels there are, so we haven't got a clear line in the sand to know what concentrations of methyl bromide we need to deal with.

(R) So, under the exposure standard, way over the exposure standard, that's what you are referring to, it could be anything in between.

(G) Correct, those dead spaces we talked about can come into play, where it was a nice low level let's call it at the front of the container, by the time you get halfway through and start moving boxes or materials around and out of the way, you can start releasing those pockets and your exposures can go up.

(R) And being a container, we talk about ventilation in occupational hygiene, but it is a confined environment with the way that it is designed, being a container, so not quite as straightforward as taking off the sides would be good, but that's ...

(G) That's correct, those containers are made solid, quite rightly, and thereby only having sort of the one path for the air to go in one end and out the other in terms of the flush out process.

(R) So, from a respiratory protection point of view, it's not quite that straightforward with all these different variables, what should workplaces be looking at or considering?

(G) Well, filters are problematic. We don't know the levels, we don't know how long the filters will last, and filters themselves intrinsically do not work very well against methyl bromide. It is a very mobile gas and the carbon that is typically used to capture it slows it down but doesn't really hold onto it, so the methyl bromide will break through those filters relatively quickly. The higher the humidity, the worse that effect is, so the water in the air competes on the carbon for the active sites and again, the methyl bromide will break through more readily, so from our point of view at 3M filters are problematic. They are not going to work in all circumstances, so we recommend use of a supplied air system where you are getting your air from a clean source down the other end of the location, and the

clean air supplied to the workers who can then be protected inside the container when the methyl bromide levels are going up and down as we say.

(R) I know some of the first chats we had we spoke about gas and vapour cartridges and you said at that point that gas and vapour cartridges are not suitable for every gas that is out there, this is one of those ones where it sort of falls in that category of like, is it not reliable in the long term for a worker's exposure point of view.

(G) Yes, if we had a very good picture of the circumstances and we knew the concentrations inside the container, and we knew the time frame, we knew all those things, then there could potentially be a reasonable use of filter and it would work properly in that context. But, because of the variability, as you said, all these things, the atmospheres are changing, the concentrations are changing, the filter becomes a bit of an issue, and it is better to be on the conservative side of that discussion, and airline gives you consistent protection, fresh air for the whole time you are using it.

(R) So, I've seen sometimes people will mention an AX filter for the use of methyl bromide, which is the low boiling point, where does that come into the situation from what you have just said?

(G) Yes, AX filters are essentially a very large organic vapour A filter, so they have a bigger bed and more capacity for organic vapours. That basically means it takes longer for methyl bromide or other...

(R) ...low boiling point gases...

(G) ...low boiling point gases, yep, to break through. That again in certain contexts could be okay, but you need to be very clear on those exposures. If you've got

significantly high levels of methyl bromide you are going to get that breakthrough very quickly, and again, we are not sure often in a container situation what those concentrations are, how long is that filter going to last, are you going to take the risk that you will be in there, the filter will fill up, and it will stop working. You will then be breathing in the methyl bromide at whatever concentration there is. So again, if you knew all of the details, the humidity was low, you knew the concentrations, then an AX filter potentially could be used in those circumstances, but in my experience that is not a common thing at all and it becomes a big question mark to go down that path.

(R) I believe the Australian Standard 1715 which you are a member of says that AX filters are also single use, or single shift filters. Is that for the reason where you are expecting that breakthrough after a period of time, and so that is a safety buffer in there?

(G) Yes, correct. The AX is aimed at low boiling point organics, low boiling point is another way of saying very volatile, very mobile, they want to evaporate at normal temperatures, so that is the problem. They are so keen to do that they will be caught on the bed, re-evaporate, slide through the bed, get caught again, re-evaporate, slide through the bed, eventually they will come out the other side way quicker than many other materials, and that is the problem. The short service life of that filter under high exposures and higher temperatures means that you've got to be very cautious. Single shift use is the most you would use a filter but with some of these materials you will not even go close to a full shift before it is going to break through, you can be talking minutes in many cases.

(R) The point of all this hierarchy of controls is protect the worker, so as a workplace and as a hygienist, I am not going to be relying on something if I don't have confidence and surety that my workers are going to be protected in this very variable, fluid situation.

(G) Exactly right. It is okay, as I said, within very restricted definitions, it might work for a filter but in the real world we know we have to have that safety margin, that confidence in the protection, and that is why airline I believe is the way to go. You've got that surety that you are getting clean air and you are not relying on a filter working to protect the workers.

(R) So, I'm a consumer, and I've purchased lots of wonderful items from shops, do me as a purchaser, is there any risk of me being exposed with some of this methyl bromide, that maybe on different materials or furniture that methyl bromide has been used in that transporting situation.

(G) I don't think so. I've heard of cases where the company involved has fumigated the wrong container and ended up spoiling the contents, whether they be foodstuffs or some sort of material that can absorb the methyl bromide and cause some degradation of that product. That is obviously found out at the time. Normal fumigation, as I said, they rely on the ventilation, they rely on that flushing out, they do clearances in many cases, and the methyl bromide being so volatile will fairly quickly evaporate as we just talked about, it will evaporate very quickly and disperse, so I have not heard of any end user getting a problem with the methyl bromide in terms of a container delivery or anything like that.

(R) A fair few steps in the process by the time it gets to me as the purchaser, or our listeners as purchasers, so it kind of makes sense there.

(G) Sure, you've got all that time involved as well which allows for all of that off-gassing and dilution of the problem.

(R) If I'm a workplace and I want to find out a bit more information about methyl bromide, because maybe I am receiving containers, what are a couple of good starting points that workplaces can go to read up on this?

(G) There is information from the government on methyl bromide and fumigation, so they can look up information from the Border Force. And 3M has information, I am sure there is other information on the web from various authorities around the world that would give you the bones and the framework of the methyl bromide issues.

(R) Very much from a workplace point of view, generally that particular industry receiving containers, that is more than the...hopefully they should be clued up on this stuff, but you never can get too much information I believe.

(G) Sure, yep, always seeking the latest and the greatest information, that can only help.

(R) Thanks for coming in again, Terry, we really appreciate your time today.

(G) You're welcome, Mark, any time.

(R) Thanks for listening, everyone. If you have any questions, comments, suggestions for future topics or guests you think it would be great to get into the studio, you can shoot us an email to scienceofsafetyanz@mmm.com. You can also contact us via that email if you need any help or information around PPE, methyl bromide PPE, or supplied air equipment, 3M are certainly here to help. You can also visit our website, 3M.com.au/sospodcast which has a transcript of the conversation we have just had and all our previous episodes that we have recorded as well. Be sure to subscribe to the podcast through Apple podcasts, Spotify, Sound Cloud, Stitcher, Google podcasts, or wherever else you get your podcast

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