

3M Transcript for the following interview: Ep-48 Indoor Air Quality

Mark Reggers (R) Kevin White (W)

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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're talking with Kevin White about indoor air quality. Welcome back, Kevin.

(W) Thanks, Mark. Good to be back.

(R) For those that haven't listened to our previous episode we did together on mould, can you please introduce yourself? Who are you? Where are you from and what do you do?

(W) Absolutely. I've been doing this for about 18 years with much of my time focused on the built and indoor environment, looking at all of the issues around exposure to contaminants in the indoor environment and the workplace.

(R) So, we're talking about indoor air quality. How would you describe what indoor air quality is in the built environment to someone that may not have come across this topic before?

(W) Well, indoor air quality is a mix of things. It's really about is the air that you're breathing in, is it safe? Does it have very many contaminants in it, and typically, this is looked at in a range of different ways. Often, it's just thought of as the physical parameters like temperature, relative humidity, those sorts of things and the amount of light that's in the environment, but it's also the amount of carbon dioxide, which is a measure of the amount or it's a surrogate for the amount of fresh air that's coming into the building that we might look at in our carbon dioxide and combustion by-products. There might be dust, volatile organic compounds, solvents, even dioxins from your photocopiers and printers, so there's a range of chemical and physical things that go to make up indoor air quality, not least of which includes particles and mould.

(R) Because last time we spoke, we spoke about mould. We were talking about how we spend a lot more time indoors these days. So, is indoor air quality becoming more of an issue in Australia, New Zealand? Is it a big concern globally as well from what you've seen?

(W) I believe it's a really big issue for the entire developed world. There's a lot of international literature out there. There's large international organisations that specialise in this area. There's indoor air quality magazines so it's a big issue around the world and particularly because we spend so much time indoors. If we're not indoors in our job, we're indoors at our home or travelling indoors in our

car or a train or a bus from work to home. We spend probably 80% of our time indoors. 40 years ago, that was probably a lot less and our buildings are a lot tighter air wise. So, contaminants that are in there, they're in there in higher concentrations.

(R) So, some of those contaminants that you've mentioned before, what are those individual ones? If you're going into a workplace or you're going into do an assessment, what are the specific contaminants or characteristics that you're actually looking at?

(W) Well, it really depends on the workplace environment. So, if we're talking about an office, we would talk about the amount of airflow that's happening through the heating, air conditioning, venting system, the HVAC system. Is there enough air movement? Is the carbon dioxide level too high? If it's too high, there's not enough fresh air coming through. Are there combustion by products in there? Is the fresh air intake near the shopping centre where all the cars come and go? Are we getting lots of diesel particulate matter or carbon dioxide level? Those are the things that we might be concerned with in an office. We might also be concerned with the amount of dust and the temperature and the relative humidity. But if we go to the workplace environment where we're looking at say the industrial or manufacturing sector, we might be also looking then at things like welding fumes and acid mists. If you're someone that handles a lot of fibre, you're handling hay or cardboard, you're looking at fibre and all those sorts of particulates and there are standards for exposure to those things and we find quite often that people are being exposed to higher levels of those than they should be.

(R) I mean, that's fairly broad. Is there typical health effects from indoor air quality that you most typically see in an office environment, as an example?

(W) Much like mould, the health effects are broad and varied and they can be as simple as a loss of productivity. You're a little bit vague, a little bit out of touch, out of focus and some research has suggested that on average poor indoor air quality, you lose about six minutes a day in productivity which doesn't sound like very much but it's actually billions of dollars in lost productivity when you look at it nationally. And that's just the tip of the iceberg. It can be headaches. It can be absenteeism, because everybody's different. Everybody is susceptible to different types of contaminants.

(R) I was going to ask; does it affect people the same or it is really is an individual response?

(W) Well, it depends on the type of contaminant. So, if we're talking about for example combustion by products, that's probably going to have a similar effect to most people. If you were talking about exposure to high levels of nitrogen oxides, you might be feeling a bit sick and a bit out of touch maybe six to eight hours later but that will probably be the same for everybody. But if we talk about volatile organic compounds, solvents, mould and different types of particulates, it can vary broadly, depending on your age, your genetic makeup, your susceptibility to these things and your previous exposure.

(R) Now, I've heard of the term sick building syndrome. Can you explain what that is, because I'm assuming it doesn't mean the building itself is sick.

(W) No, it doesn't mean the building is sick, but it can be showing signs and symptoms of things that are causing people to feel sick or just not at 100% of their game in the building. So, sick building syndrome is really this holistic thing of looking at everything; looking at the air quality delivered by the HVAC system, the amount of dust in the air, the volatile organic compounds, even things like how old is the furnishings in the building? Has it been recently refurbished? Are the

materials in there giving off gases that will make you feel sick? So, it's really related to your general wellbeing within a building and often when we call a building 'sick', out of sick building syndrome, we have high levels of absenteeism, problems with morale and productivity.

(R) So, if I'm a building owner or I'm a workplace that's leasing an office space, I'd imagine the HVAC system, so the heating, ventilation, air conditioning, refrigeration systems would have a huge impact on indoor air quality and the effects on my workers or the people that are leasing it off me. How would you be explaining to them the importance of the HVAC system and indoor air quality?

(W) Mark, the HVAC system is pretty much at the core of all new buildings. It's an integral part of the building and yet from the day it's installed, we often neglect it. So, it's very important and its maintenance is very important. So, often we'll see facility managers, they'll get the coils cleaned and yet the coil is the part where recycled air hits the coil, it's cooled and then the cool air goes out again. That coil can heat as well, and we often see people clean that, but we don't see the supply legs, the ducts that are going to where everybody is sitting get cleaned. We might see some effort go into cleaning the little supply register, the little grill overhead, but often, that system of pipes gets full of contaminants, full of dust and debris despite having some filtration on it, which can then lead to mould growth and the off-gassing of other things. So, it's really important that we look at it and there is an Australian Standard that looks at this. But I feel that quite often it is overlooked.

(R) I know I've certainly seen in different buildings I've been in, you see those diffusers and you've got a dust spread around the ceiling and that's what you're talking about, is that dust build up that you've cleaned the coils, but obviously stuff is still getting in the system and building up over time. That's an easy visual check in an office if you're seeing that, that something's probably not right with your HVAC system.

(W) Exactly, yeah, so the HVAC system is supposed to supply clean, filtered air. And if there's a problem with the seals of the filters, then you get dust in those systems. If you start to get a build-up, then you know there's a problem. But there's other things as well. There's the return air pathway. So, you've got supply air. You've also got return air and quite often the return air pathways never get looked at and I've been in buildings, dare I say, even hospitals where that supply air system hasn't been cleaned in 20 years and we see everything is caked in two centimetres of dust and debris on the return air pathway. It's just not a good thing to have.

(R) So, they're not conducive to good indoor air quality parameters. Does what a building is actually made of, does that have an impact on indoor air quality?

(W) Absolutely, without a doubt. So, there's so many issues related to building materials and I'm not a building materials specialist, but I can tell you a little bit about it. So, for example, a lot of our modern products and furnishings are made from composite woods; MDF, chipboards, those sorts of products. They're glued together typically with a formaldehyde-based glue and that gives off formaldehyde. Now, formaldehyde is a class one carcinogen and if you can smell it, it's probably having an impact on you. And typically, new furniture, new furnishings, they're giving off these compounds. But it's not just those. It could be a whole bunch of other building products that are composites of plastics that can be giving off different gases; styrene, those sorts of things. Then we talk about carpet and perhaps the glues that hold those down. They can give off VOCs. Paints can give off VOCs. So, VOCs is a volatile organic compound and basically, it's a bunch of chemicals that gets released at room temperature over time depending on the temperature. But you've also got semi-volatile organic compounds so when it's really warm, they might be released and then they might condense somewhere. These are all part of the modern life that we live, and they

can all have impacts on us. So yes, the building products make a really big difference. Even the concrete floors that we use these days; if we don't let the concrete floors dry enough before we put down our floor finishes, then we can let the elevated moisture content degrade the adhesives and we start getting nasty VOCs. So, it's a really complicated thing.

(R) Is the off-gassing of all those materials, is that a bit like a new car smell, where you get that new car and you can smell...obviously a much smaller environment but it's all that stuff off-gassing from those plastics? Is that a way to think of it, but obviously in a much bigger, complex scale than just a car?

(W) Yeah, absolutely. It's pretty much exactly like that. You've got all these fresh new shiny products and they're all giving off gases over time; some very, very slowly and some much faster. So, if you for example were getting new office furniture, I see now sometimes in tenders where the materials have to be purchased and off-gassed for a month in a warehouse before they go into the new workplace. So, we need to think smarter about how we manage these products.

(R) So, with these indoor air-quality environments and assessing them, who can actually go and assess them? Is it a certain qualification that you need and how are they actually going about doing that? Do they just walk around with a gas detector and a thermometer and that's about it?

(W) Unfortunately, it's a little bit like mould again. There really aren't any indoor air quality standards. There's some standards in other parts of the world. Australia did have a standard but they withdrew it very quickly so there are some guidelines. There's some strong guidance around carbon dioxide. The federal government has something called the NEPM which is air quality standards for outdoor air for air sheds and quite often those are used as surrogates in your indoor environment in the legislative vacuum. And that's not bad but it gets a little bit complicated. Now,

who can do that? Well, anybody can say they're an indoor air quality professional unfortunately, so you really need to look for somebody that's got for example some involvement with organisations like CASANZ. That's the Clean Air Society of Australia and New Zealand. There's an organisation in Australia called IAQA, Indoor Air Quality Association. They've got a good membership base with technicians. If you're engaging someone and it's a complicated issue, you really want to engage someone that knows what they're talking about because again, it's not about just measuring numbers. There is a little bit more to it than this. You want to look at sources of contaminants, pathways of exposure and what is going on in the environment that people could be exposed to?

(R) So, it comes down to doing your due diligence that who you are engaging has that appropriate qualification and skill to undertake that work, by the sounds of it.

(W) Yes, that's right. You really do need to do some due diligence because there isn't any certification. I'm a certified environmental practitioner, so that means I've passed the bar, so to speak, in terms of my ethics and my knowledge in certain areas and it would be great to see something similar for this kind of space but there isn't. So, really look to the people who have got a track record and have got some qualifications and membership with associations.

(R) So, if I'm a building owner, I'm a workplace, how would I go about being proactive in regards to my indoor air quality issues or my HVAC systems rather than waiting until I've got workers off sick and my absenteeism is up, or the actual HVAC system breaks down? What can I do to be proactive in that space?

(W) I would recommend that anybody that's looking after a building really does a due diligence assessment, so look at the risks they might be exposing their people to as the controller of a building. And be aware of the legislation because that will cover most things. For example, it's a complicated field and I won't get into it but if

we talk about cooling towers, that's also part of the workplace environment and you can be exposed to those sorts of things in a workplace if your cooling towers aren't managed well. So, there's a whole bunch of legislative guidelines around air quality, particularly around HVAC systems. You need to understand those, and you need to be diligent in making sure that you do your checks and balances and also consider AIRA. They have some great documentation about HVAC. They have a hygiene guideline which is fantastic for helping people manage HVAC systems. So, it talks about the amount of dust in the system and when it should be cleaned and in what setting. So, look to those kind of guidance documents.

(R) Can I just put it all on my air conditioning service technician to say, "It's your job to look after the HVAC system. You need to make sure it works for all my workers."

(W) Well you could but if you did, you'd be leaving yourself open to legal ramifications. It's the duty of every person that's in control of a building. That could be the FM, or it could be the owner if they're managing it. It's their duty of care to make sure that people aren't exposed to things that could potentially impact on their health and that means the HVAC system; its maintenance and management is their responsibility, so these checks and balances have to be managed by the PCBU or the employer as a duty of care.

(R) It's probably not something I would've thought about before chatting with you Kevin that your HVAC system can have such a big impact on a worker's health just like an exposure to any kind of contaminant in an industrial environment but there could be hundreds of thousands of workers in cities across Australia and New Zealand that that's so critical to make sure that balance is right from an indoor quality point of view.

(W) Oh, absolutely. As I said, the HVAC system is so often not looked at and it's at the core of all our modern buildings and we have to manage it appropriately.

(R) So, in summing up indoor air quality, what would you want to leave our listeners today as a takeaway to how to think about indoor air quality going forward?

(W) A couple of critical areas that people want to be conscious of and that is if you're feeling a bit rundown at work and when you leave work or you're at home and you feel better, maybe there's something going on there and let's just make sure that all of the appropriate checks and balances have been put in place. Have you got enough fresh air because in the old days, they used to say the solution to pollution was dilution. Let's get some air flow happening because a lot of those contaminants that are going to be in there will be removed by that venting process. If you haven't got a HVAC system, make sure you've got windows open. Have you got issues with other contaminants? Is there new building products in there that maybe are having an impact on you? Have you got a headache? Is it because you've got some new office furniture? It's not rocket science. Again, it's a holistic jigsaw puzzle. Just think about all those little bits and pieces that come together because you're spending a lot of time indoors in an environment where there's lots of things that are unnatural, and they might have an impact on you. They need to be managed. A lot of people will think it's about temperature and comfort and I want to stress the point that it's not. It's all about all of these things we've spoken today about, and it needs to be taken seriously.

(R) For workplaces or facility managers that want to get a bit more information on indoor air quality, because there's a lot of things that you've hinted at today but certainly not enough time to delve into all of them, where could they head to, to do a bit of research?

(W) There's quite a lot of resources out there online. There's the PCA, the Property Council of Australia. There's AIRA, the organisation around heating and ventilation. There's also NIOSH. There's a lot of them. But it's all contextual and based around your circumstances so if you need more information, reach out to an IEP, someone that knows about indoor air quality.

(R) And we'll make your contact details available on our blog post for those that do want to speak to you but really appreciate your time today Kevin for jumping on the phone with us again.

(W) It's been a pleasure, Mark, and thanks for having me.

(R) Wonderful stuff. Well, thanks for listening everyone. If you have any questions, comments, suggestions for future topics or guests you think 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 around your PPE in your workplace and we can also put you in touch with Kevin around your indoor air quality questions that you may have. 3M are certainly here to help. You can also visit our website, 3m.com.au/sospodcast which has a transcript of the chat that Kevin and I have just had and links to some of those resources that Kevin did mention as well as all the previous episodes we have recorded. Be sure to subscribe to the podcast through Apple Podcasts, Spotify, Google Podcasts, or wherever you get this podcast from so you don't miss any future episodes and if you enjoyed the podcast or found it informative, we really would appreciate it if you can take a few moments to leave us a review as it really does help other people to find the podcast. And as Beverley Sills said, "There are no shortcuts to any place worth going." Thanks for listening and have a safe day.