

3M Transcript for the following interview: Ep - 52 Debbie Dietrich, Exposure Monitoring Part 2 Mark Reggers (R) Debbie Dietrich (D)

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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.

Welcome to the 3M Science of Safety podcast everyone. I am Mark Reggers, an occupational hygienist, who likes to ask the questions Why, How, and Please Explain.

(R) Today, I'm talking with Debbie Dietrich again from SKC. Welcome, Debbie.

(D) Thank you very much. I'm very happy to be back.

(R) You are back again because this is the second part of a conversation we're continuing on with. So, if you haven't heard the first part of the chat with Debbie, I do recommend you do go and take a listen to that now before you listen to the second part because it will make a lot more sense because we are building upon

what we spoke about in those explanations. But just in case people are wanting to jump straight into this second part, can you please introduce yourself, where are you from, who are you and a little bit of your background if that's okay?

(D) Okay. I am born and raised in Pittsburgh, Pennsylvania but when I turned 21, I realised that I wanted to get out of that cold weather. So, I moved to the sunny south to Houston, Texas to get my Master's Degree in Industrial Hygiene and I decided of course to stay in the great state of Texas after getting my degree. I joined SKC in 1984 which is 35 years ago, and I have really had a fun time working for SKC and just having a great time with all the hygienists all around the world. Of course, Australia is my favourite destination and you'll see me almost every year at the Australian Institute of Occupational Hygienists Conference.

(R) My very first year at a conference, I did attend one of your sessions which I do highly recommend if you can get along to any one of those conferences here in Australia. But continuing on with our conversation, we finished up talking about I guess three different parts of the sampling setup. So, you've got your pump, we have our flow metre and we have the sampling head. Now, is that the same for passive samplers? How does that work compared to what you explained in our last chat?

(D) Okay, passive samplers do not require the use of a pump. They are small badges that contain sample collection media and they are clipped on the shirt collar, so you collect a sample in the breathing zone of the worker. How the contaminant is collected is the gas or vapour diffuses onto the sample media. Think of when you spray air spray in a room. Eventually, you will smell that air freshener in another room. That's because the gas or vapour diffuses from an area of high concentration to low concentration. This is the same principle of operation with a passive sampler. If you have benzene in your facility (in the air of your manufacturing plant or petroleum refinery) and the worker is wearing the small

badge typically with activated charcoal absorbent material, the benzene will diffuse from an area of high concentration in the refinery or the manufacturing site and will diffuse to an area to lower concentration onto the badge. Scientists can determine and advise you the rate at which individual chemicals diffuse and there's no pump required. So, after sampling, the passive samplers are sent to a qualified laboratory for analysis like sorbent tubes. Just one is collected with the pump and the other is collected through the diffusion of a chemical from the plant air to the passive sampler.

(R) So, that takes away the weight of the pump that the worker may be having to wear. Is there only a limited amount of chemicals passive samplers are suitable for because I'd imagine most workers would always choose the option to not wear a pump if they don't have to?

(D) There are several different types of passive samplers out there. The most commonly used passive sampler is for organic vapours such as benzene, toluene and xylene and the absorbent material is activated charcoal. Other types of passive samplers contain different types of collection media. One is a filter paper that is chemically treated, and it's put inside of a badge holder to collect more specialty compounds such as formaldehyde or nitrogen dioxide. You can't collect these compounds on a charcoal badge. Now, you can't really use passive samples for any gas and vapour reliably. It is best practice to only use passive samplers if the manufacturer of the device or some sort of government agency or some scientific body has tested and verified the accuracy of the passive sampler for your specific target compound. If testing has been done, reliability has been confirmed, you can use them with the same accuracy that you can use an active sampler pump and tube. Also, if the testing has been done, there is usually some sort of report available to document the results and verify performance. SKC has a number of research reports online for our passive samplers and our compliance agency, US OSHA, has also published methods using SKC passive samplers documenting

reliability. If there is no published data anywhere and no one can put a report in your hand to show they produce reliable results, in my opinion, passive samplers are a screening device. They give you some idea of what your levels are but they're not going to have the accuracy of an active sampling method unless they've been tested, and you have some sort of proof.

(R) So, once a sample has been collected ... I'm going to go back to your analogy that we spoke about last time of the recipe ... how do they know what laboratory to send it to because there's all these different chemicals and all these different methods and all these different types of equipment? What type of questions should a workplace or an occupational hygienist be asking of a laboratory to make sure they can actually test for what they've collected?

(D) Analysis of occupational hygiene samples is done by those labs that have specialised knowledge in this area and they have demonstrated proficiency to competently perform the measurements required. In the US, the American Industrial Hygiene Association, A-I-H-A, has a global laboratory accreditation program. Many laboratories outside of the US are accredited by AIHA. In Australia, lab accreditation is handled by NATA, N-A-T-A. So, it's very important that you have a lab that has experience in this area.

(R) Like most things, ask questions, get in contact with them and have that conversation rather than just assuming they're a lab. But yeah, have a chat with them.

(D) Exactly. You don't want to send them to a food safety lab as this is a completely different science.

(R) Absolutely. So, you mentioned also last chat that we had about most people think about gas detectors and they give you a number. Can direct reading instruments or gas detectors be used as an exposure monitoring tool?

(D) Direct reading instruments, devices like dust monitors and gas detectors, are useful and necessary in the field, 100% true. They allow you to do spot checks of chemical levels, to evaluate peak exposures, and look for highs and lows and the concentration levels. They help you to choose personal protective equipment in the field, evaluate controls, but the results of full-shift sampling with a direct reading instrument are really screening values. For the highest accuracy and for compliance monitoring, exposure monitoring should be done using sample collection media with lab analysis. This method provides the highest accuracy and is what we normally use for compliance with government regulations.

(R) It's like anything. It has its place, just understanding where its application is to get the outcome ...

(D) Absolutely, yeah.

(R) ... the result that you're looking to achieve and that goes with anything in life really. But it's understanding what is the purpose and what is the usefulness of me using this in this situation.

(D) Right, because with exposure monitoring with lab analysis, you're not getting the results back until a week, maybe two weeks. So, you have to make daily decisions in the field about how to keep your workers safe on any given job. And so, really the technologies go hand in hand. You have to have direct reading instruments. You want to have also the exposure monitoring devices with the highest accuracies.

(R) I am speaking with Peter Knott from GCG next week a bit more in depth about direct reading instruments and also video exposure monitoring. So, yeah, we'll definitely delve a bit more into that space. But when looking at sampling strategies, you hear about this worst-case approach. So, let's find the worker who's doing the dirtiest task and likely to have the most exposure. Let's measure them and make that as a worst case and apply that to everyone from a control point of view. And then, you have the random sampling approach. Can you explain a little bit more the difference between the two and where each of those may be more suitable in the workplace?

(D) Well, we just passed a new rule in the United States on silica and as part of that regulation on silica, US OSHA says that you must collect air samples that reflect exposures of each work shift, each job classification, and each work area. And they say if you have several employees doing the same task and the same shift in the same work area, you can do representative sampling by sampling those with a highest concentration. That is what they would recommend. And myself too, I do hygiene for SKC's manufacturing facility. I personally like to do worst case sampling when assessing exposure of SKC employees. But I will say that our work environment is very predictable. So, it's easy for me to choose the worst-case scenario. Other work environments may be much more complex and much less predictable (like construction). Construction is never the same from day to day. You may not know what happens every minute of the work shift. You could be wrong in your assessment of worst case. So, random sampling may help you discover exposures you didn't even know you had. In the end it all comes down to professional judgement. You know your workplace better than anybody and you ultimately have to exercise professional judgement in what's the best way to collect the samples. And again, I want to state that ONE air sample is never enough. I've been doing a lot of work myself training construction safety supervisors on the new U.S. silica rule. Many think, 'Oh, great. I'll just collect one or two samples and that's it.' No. You have to collect enough samples to be able to draw some good

conclusions. There are entire books written on exposure assessment strategies and there's statistics that you can run on how many samples you need to collect. A basic general rule that I think many people follow including myself is that five or six samples of the same situation is a minimum to let you know you some idea on what's happening. Once you have those five or six samples, then you're in a position to say, "Hmm, I have no chance of exposure. Nothing at all was detected," or, "Do I need to do a little more sampling?" or, "Do I seriously have a problem and need to jump to controls?" You need to collect several samples to get to that point.

(R) I know many times in my past working in the consultancy field and you go out to a workplace and they go, "Oh, you should have been here last week. It was way dusty. We were doing this particular task," or, "The wind was blowing on that direction on that particular day." So, yeah, it's about that confidence that you've got a good representative to make your decision going forward that this is representative and that's adequate, not adequate, etcetera. But yeah, one of the most common things I used to get going out, "You should have been here last week." "Well, yeah."

(D) Also, keep in mind that sometimes the workers will actually sabotage your sample. Sometimes you will get a result that is so high you can hardly believe it and it could be because the worker intentionally poured dust on the filter or stuck the tube inside a bottle of benzene. You always have that possibility. So, when you see a crazy high result, you have to also consider that the worker tampered with the sample. So, for all these reasons, professional judgement is absolutely a must.

(R) That leads in quite well to my next question about wanting to tap into your many years of experience in this particular field. What are some of the most common pitfalls for safety workplaces or safety professionals or occupational hygiene technicians like what you've just said there, those results. What are some other common pitfalls you could pass onto our listeners?

(D) Well, I would just say not following the method requirements whether it be the particular media to use, the flow rate to use, following the sample time recommended and the minimum and maximum air volume, not collecting enough samples to come to good conclusions, not properly calibrating the flow rate of the pump pre and post. And a funny story is that so many times when safety professionals in particular had crossed over or going to do occupational hygiene sampling, they would spend the money for a pump. And then, they would call me hysterically a week later saying, "Well, how do I set the flow rate?" And I'm like, "Well, use your calibrator." "What do you mean? I just spent a thousand dollars on this pump and it's not calibrated? What are you telling me?" And so, I like to bring that up because so many times people that are new to air sampling don't understand the term 'pump calibration'. We are not talking in most cases about a factory calibration, like you send an instrument back once a year. Calibration as it relates to sampling pumps means that you (the user) must calibrate your pump before and after every sample that you take. Then you use the average of the pre and post sample flow rate to be the flow rate that you'll use as your average flow rate throughout the day. This must be done every single time with every single sample. Also, tipping over a cyclone; if you're doing respirable dust sampling and you have a cyclone, which is a little preselector that you put in front of the filter to scrub out the larger particles. When you scrub out those larger particles, they fall into a little pot or a little cap in the bottom of the cyclone and those particles are discarded. If by chance the worker or you, a beginner sampler, tip over the cyclone before you remove it from the filter, all of those big particles that are in that little bottom cap land on the filter. So, your sample looks outrageously high because you have oversampled. All the big particles that should have been scrubbed out are now onto the filter. Another big problem with cyclones is many times people will use the wrong flow rate. All those different types of cyclones out there and each one requires a specified flow rate. Finally, again, using a passive sampler just for anything and everything without having any test data to prove that

that device is a reliable device for your specific contaminant. Now, some chemicals are extremely volatile and they're very hard to retain on a passive sampler. They will require a pump to actively pull the gas and vapour. So, again, you just can't use passive samplers for anything and everything without any test data.

(R) There really is so many things there, hence why this is a whole profession unto itself with occupational hygiene because I know we've only touched on a couple of these key elements, we've had two chats but as you say, there's full books and methods written about this. So, I don't want our listeners to feel overwhelmed but hence why there are occupational hygienists out there, the AIOH in Australia and fantastic resources like Debbie and SKC and Airmet in Australia as well which leads into, how can people get in contact with you, Debbie, and SKC if they do want a bit more help or information in this space?

(D) Okay. Well, if they want to contact me directly, the easiest way is just to send an email to the general email of skctech@skcinc.com. That is answered by me on most days unless I am off that day in which one of my co-workers will answer the question. You can also go to the SKC website at S-K-C-I-N-C.com and click on the training button where we have webinars. You can even listen to my nice American accent again on many of the webinars, on active sampling or passive sampling, a lot of different subjects. We also just have PowerPoints if you wanted to use them even in your own training classes. You can do internet search for methods. I suggest you use the words NIOSH, N-I-O-S-H. That's the National Institute of Occupational Safety and Health, Manual of Analytical Methods. That will link you to all of the current methods that we have from this US Government agency. And again, the Australian Institute of Occupational Hygienists, aioh.org.au, has a lot of training classes available. If you really want to become an occupation hygienist, there's some good educational programs also in Australia at the University of Wollongong, Edith Cowan University or RMIT.

(R) There's so much to this because it's so important to get that number right; so many decisions from that number from inadequate control to adequate control. So, I know most of the safety professionals listening are thinking, 'Wow, there's a lot here but we want to get it right. We want to have the confidence that we know what is going on.' So, thank you so much, Debbie, and I do recommend our listeners if you do have any questions, please get in contact with SKC. And Debbie, thank you once again for spending the time with us.

(D) Okay, thanks for having me. I really enjoy all of my Australian friends. It's great that we share expertise and share some friendship and I really enjoyed all these years working with you.

(R) Thanks for listening everyone. You can get in contact with the show by sending an email to scienceofsafetyanz@mmm.com or if you've got any further questions, any topic suggestions or if you'd like some assistance in your workplace when it comes to PPE or respiratory protective equipment, 3M are certainly here to help. You can also visit our website, 3m.com.au/sospodcast for further resources on exposure monitoring, the two chats we've just had as well as a transcript and further resources, plus it has all the other previous episodes that we have recorded with our wide ranging of guests. Be sure to subscribe and share through Apple Podcasts, Spotify, Google Podcasts or wherever you get this podcast from and as Joshua J Marine says, "Challenges is what makes life interesting and overcoming them is what makes life meaningful." Thanks for listening and have a safe day.