

3M Transcript for the following interview: Ep 63 Peter Knott – Coal Dust and Black Lung Pt 2

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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. 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'm Mark Reggers, an occupational hygienist who likes to ask the questions why, how and please explain.

(R) Today, I'm asking those questions to Peter Knott from GCG. Welcome, Peter.

(K) Thanks, Mark.

(R) We've got you back again to finish off part two around coal dust and black lung. So, for those that haven't listened to part one, I do highly recommend you go and listen to that, because that will help give that background to ... we spoke about coal dust and black lung and some of those associated health effects. But for those that haven't listened, they're going to power on with part two, can you please introduce yourself? Who are you, where are you from and a little bit of your background, if that's okay?

(K) Yeah, I'm an occupational hygienist. I have been for about 30 years or so. Worked in power stations, aluminium smelters, mines, worked for 3M for a bit and now do consulting work for an Australian company GCG.

(R) Excellent. So, we're continuing our conversation about coal dust. So, in many of our previous episodes, we've spoken about exposure standards. Are there exposure standards and what are they for coal dust?

(K) Well, currently, there are exposure standards for coal dust in Australia. They are at the time of this recording, up for review, and they're pretty much following some of the internationally accepted standards set by ACGIH.

(R) So, whenever you're listening to this, do go check what those exposures standards are. I know you're a bit reluctant to mention a number because ...

(K) They'll probably change.

(R) Exactly right. We have done those previous episodes where irrespective of what the number is, whatever it is, controls are where the focus should be to bring it down to as low as reasonably practicable.

(K) Most definitely.

(R) What impact does the shift ... because in coal mining there's 10, 11, 12-hour shifts. What impact does that have on the exposure standard, whatever that is?

(K) Well, it depends on the approach that's taken to make the adjustment to the exposure standard. So, there are a number of methods that are used around the world by regulators and others to take into account the longer period of a person's daily exposure and it may well be the longer period of their roster. So, if they're doing seven 12-hour shifts, that means they're going to be at work for a lot longer with a lot less time in between exposures for the body to eliminate some of the contaminant that's been ingested. So, the Australian Institute of Occupational Hygienists have a guidance note on how to make adjustments for extended shifts

and it allows individuals to look at the ones that most closely represent what their situation is and to make up their mind.

(R) We previously did an episode about direct reading exposure monitoring and video exposure monitoring. How is coal dust measured, or how is that exposure assessment undertaken with coal dust?

(K) So, there's a particular instrument that's been around for a number of years that was developed in the US, which is a microbalance tapered element, oscillating microbalance, that has been ruggedized and it measures the weight of dust that guys are exposed to in the air in real time, over their shift. So, it's able to give them a real time measurement of their dust exposure over the shift. There's other methods which use light scattering methods, but they can be affected by any other particles in the air. So, if there's diesel, if there's water droplets, that sort of stuff, you can get some positive interferences from those.

(R) What about the traditional exposure monitoring? You mentioned the direct reading ones there. What about the traditional methods?

(K) Well, the traditional methods are some would say always the best. For compliance monitoring, so measuring exposure to the exposure standard, and that's what the regulators are asking people to do, then there's respirable cyclones that meet the ISO sampling curve, collect the coal dust on the filter that filters, then weighed and the mass of deposit of coal dust is calculated. And from that, you get your full shift average exposure.

(R) So, we've got that number, which is great for a workplace, but it really comes down to the controls, what are we going to do in the workplace. So, we're going to talk hierarchy of controls. We'll start from the top there with elimination, going through all the steps. What should workplaces be considering, or maybe they've already got in place, that would be handy for our listeners that may not be as familiar with the coal mines and dust control?

(K) Well, I guess eliminating exposure is the goal. So, that means are you able to perform mining activities without exposing people. And there are probably some instances where you may be able to take people out of particular locations, so their exposure is essentially eliminated. But at this stage, a lot of underground mining activities are hands-on and people are in the firing line. One of the main sources of controls is ventilation, so that's primarily to reduce gas build up, to remove gases coming out of the seam, to ensure that there's adequate oxygen supplies, and to remove dust and contaminants that are generation through the process. So, making sure that ventilation systems are properly designed, maintained, operated, as in most jurisdictions are a statutory requirement because the last thing we want is to have some of the horrible accidents of the past that have been caused by poor ventilation.

(R) What about water sprays and capturing any kind of dust on a construction site? How is that applied in a mining situation with coal dust?

(K) Yeah, well, they use lots of water, that's one of the things, and most mining equipment these days is fitted with a range of sprays and they're designed in various configurations and patterns to either knock down and wet surfaces or to provide an atomising spray which will agglomerate particles in the air, or combinations of the two.

(R) Is that to do with the droplet size, or to get those different effects happening there?

(K) Yeah, exactly and also to push or direct the airflow away from the working areas. So, bear in mind now, a water spray or an atomising spray is a combination of air and water. So, you're pushing air in there as well, so it's almost like a little form of push ventilation as well, so you're pushing the air away from an area. You're adding atomised water into it, so you're going to wet surfaces. You're going to reduce airborne particles. They're going to agglomerate with the droplets, water

droplets, get bigger, fall out of the air. And then, you're also directing all that contaminated air away from people.

(R) What does a scrubber system do?

(K) So, scrubbers are essentially a vacuum inlet and then water sprays will knock down that contaminated air, clean the air out of it, and then basically recycle that back into the environment. So, they're trying to remove as much of the highly contaminated, localised dust as possible, get rid of it, move it away from the area, take all the dust out of it, or as much dust as possible out of it, and then push that air back in.

(R) What impact does operator positioning, job rotation have on a potential worker's exposure to coal dust?

(K) So, where you've got very localised dust sources that have been generated from a cutter head or a piece of machinery operating, then the air flow can be very directional around those sources. So, moving a person by often as little as a metre can have a very large impact on whether they're in that contaminated dust path or out of it. So, operator positioning has been one of the mantras of underground mining, of where people stand. In the past, it was often common for people to be on the exhaust side of long walls or cutters and things like that, and you just got showered in dust, and these days, that work practice is pretty much taboo unless there are really extenuating circumstances and quite critical reasons to be there.

(R) Can you have much automation in some of these environments, to take the worker out of the situation, as you alluded to before? Are we seeing more and more of that?

(K) Yeah, we are seeing more and more of it. Automation in those situations comes with [unintended] problems with maintaining that degree of automation, making sure that the equipment is doing what it's supposed to do, and underground mining is an environment that is tough on everything. So, if you're relying on sensors to

direct where your automation is going, those sensors are going to have to be pretty robust as well. But the big suppliers are working on those.

(R) Now, we're talking coal dust. We're talking a respiratory hazard. We get down to the bottom of hierarchy controls that we've spoken about many times in this podcast, talking about PPE and respiratory protective equipment. What type of respiratory protective equipment is suitable for coal dust?

(K) Well, it's a dust and it's mechanically generated, so you can go to Australian Standard 1715 and look up your tables for mechanically generated dust and it'll say P1 is essential. P1 is going to give you protection factor up to 10 times the exposure standard. So, if you're in environments where it's a lot higher than that, then that form of respiratory protection may be inadequate and you potentially would go to something a little bit higher that provides a higher protection factor, like powered air systems or full-face.

(R) We have touched on it a couple of times in this podcast. Obviously, the protection factor is not just based on the filter. It's a combination of the filter in the mask, positive or negative, so it really is understanding what are your exposure levels and if you do require it down at that PPE, RPE level, make sure you've got the right bit of gear suitable for your environment. But good to know that obviously we're starting from a P1, and then as we delve a bit more into the respiratory world of what may be suitable and practicable after that.

(K) Yep, but making sure with any negative pressure respirator, and I'm sure you've touched on it before, fit tested, clean shaven. If people have facial hair or they're not fit tested, it's a gamble.

(R) I always talk about the confidence and the reliability because this is this cumulative risk effect and we're worried about the exposure every single day being brought down as low as reasonably practicable; not a one off, not once a week. So, that standard respiratory 101, best practice, is absolutely required to get that

confidence out of your respiratory protection equipment. What other controls have you seen in your travels for coal dust?

(K) Probably the bulk of it I would say has been around the judicious use of water, the application of good engineering design principles around ventilation and water sprays. Now, bear in mind, water sprays, to be effective, to collect respirable dust which is going to have a particle size, an average particle size of around four, four and a half microns, for a water spray to be effective, the particles of water need to be close in size to the particles of dust you want to collect. It's not good having coarse sprays out there, like a shower, and you're trying to collect tiny dust particles, because the dust particles will just be completely missed by the big water droplets. So, making sure that you can match your controls to the physical hazard that you're trying to deal with is critical.

(R) I guess that's like any workplace situation; it's got to be a combination of all these controls and mining is a dangerous but required necessity in our current world, so applying all this in a workplace, there's a fair bit of work that goes into it. So, I appreciate the overview you have given us today.

(K) It's really a multidisciplinary approach to this, to controlling dust hazards. And often, it is little things done well that make an impact, rather than throwing big capital things into an application, and hoping that they're going to work.

(R) For those workplaces that do want to delve a bit more into workplace controls when we start talking about coal dust and dust in general, where would be a couple of good starting points you could recommend, as well as the GCG website, of course.

(K) One of the really neat things about coal mining having such a historical precedent and wealth of information out there is that a lot of this stuff has been done 20, 30, 40, 50, 60 years ago. So, the old US Bureau of Mines Data Repositories that are on the [Msure] website, as a historical ... their archives, has a

lot of old stuff in there which is really quite useful. It gives you a lot of context and a lot of the basics are in there.

(R) Hasn't changed after all those decades.

(K) Coal dust is coal dust. The NIOSH TIC, Technical Information Centre, there's a lot of good information on controls that I guess they've re-evaluated or refined or updated and things like that. There's always a lot of information on there.

(R) And I'd be pretty sure that the different coal regulators in Australia, across the country would have a whole heap of stuff as well, with probably a good starting point as well.

(K) Or like I said earlier, the regulator, the New South Wales Resources Regulator, Coal Services in the Queensland Department of Natural Resources and Mines would be the good places.

(R) So, if people want to get in contact with yourself or GCG, what would be the best way to do that?

(K) Through the GCG website at GCG.net.au.

(R) Excellent. Well, appreciate your time here today. I hope you've enjoyed yourself.

(K) Thanks very much, Mark. It's been fun.

(R) Well, thanks for listening everyone. You can get in contact with the show by sending an email to scienceofsafetyanz@mmm.com. If you have any further questions, or topic suggestions or you'd like some assistance in the 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 coal dust, the two episodes we've done with Peter, as well as a transcript of those conversations, plus it has information and similar resources for all the other previously recorded episodes. Be sure to subscribe and share through Apple

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