3M Transcript for the following interview: Ep 49 Terry Gorman – When & Why, Replacing RPE Filters

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This is 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, 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 Science and Safety podcast everyone. I'm Mark Reggers, an occupational hygienist who likes to ask questions why, how, and please explain.

(R) Today, I'm asking all those questions to Terry Gorman. Welcome back, Terry.

(G) Hey, Mark. How are you going?

(R) Back again. Like I keep saying, you do such a great job. I can't not have you back in the studio. And today, we're talking about when and why to change your respiratory protection filters. But before we get into the finer detail of that, Terry, can you please introduce yourself with your background? What do you do?

(G) Thanks Mark. Yes, I'm an occupational hygienist and have been so for many years, a few decades now. Yes, I got my original grounding in government hygiene work and for the last 20 years now I've been working with 3M Australia in the safety equipment field looking at the protection and the worker sides of all that sort of equipment.

(R) So, all the PPE stuff which we know is at the bottom of the hierarchy controls but just for a refresh which we like to do with any of our PPE related topics, why is PPE at the bottom? It seems to effective when you can just chuck a respirator on?

(G) Yes, it certainly can be effective but the question mark if you like over PPE is that first P, personal. Once we involve people, you involve a whole lot of behaviours, a whole lot of potential issues. While on paper it's a very straightforward good solution. In practice it's not a simple thing. Many people think it is. It can be simple but sometimes it becomes more complicated. You have to get the wearer onsite, there's fitting issues, there's a whole lot of that personal behaviour stuff that has to be dealt with. So, all of these things come into play although certainly, PPE or the personal side still comes into play because there's places where it has to be used in a temporary sense or even longer term.

(R) So, PPE's down the bottom. For workplaces, very broadly, what are some of those higher order controls that workplaces should be looking at considering to see if it is reasonably practical before they get down and have to rely on PPE to protect their workers?

(G) So, the ideal is to completely get rid of the hazard, get rid of the chemical that's in use or rid of the process; just disappear it. Clearly, that's not always possible. Sometimes you can substitute, use a process that is less hazardous or a chemical that has less issues associated with it. We can look at administrative controls where you can adjust let's say the details as to how the product's used. We've got isolation where we're putting the product in a container or a box or some sort of enclosure, something to control the hazard and reduce the chance of exposure to the workers. And then, we get down towards the bottom. We're getting back towards the PPE approach.

(R) So, our very first two episodes we did was with yourself and we did touch on this particular topic a little bit, but it is such a common question I know I get, and you most likely get asked as well. So, we thought we want to go back and do a specific episode just on when and why to change respiratory filters because just like many things, they don't last forever. They do have limitations around them and we want our workers to know what they are to make sure they're still being protected. So, when we look at respiratory protective equipment, we have air purifying and air supply type equipment. Can you just broadly cover what are the differences between those two and what are we looking at when we start talking about filters?

(G) Right. So, air purifying is as described. You have a respirator that is purifying the air that you're breathing. So, whether it's your lungs providing the power or a battery powered PAPR.

Those systems have filters, either lung powered or mechanically powered and the filters in that equipment needs to be changed at required intervals I'd say.

The supplied air side is where you are getting clean air from a distant source or a source carried on the person as in the case of a self-contained breathing apparatus, but the air is already clean. It's being supplied to you and you are getting that clean air to breathe in your contaminated workplace.

(R) So, when we're talking about filters, we are talking about that air purifying category of respiratory protective equipment. Upfront, when it would not be suitable to use an air purifying type of respirator?

(G) Well, the first one to think about is the oxygen deficient atmosphere. So, if we've got any question about the presence of oxygen in the air, we've got a major issue regardless of the filtration. So, that is always something to consider when looking at confined spaces or places where the air may have had some degradation for some reason. So, oxygen deficient atmospheres require special attention. Other areas where filters could not be suitable is where the concentrations are extreme. So, above the rated protection given by the respirator or the product that is being considered. So, at some point you can overload, overwhelm the protection of a respirator. You need to have a knowledge of the type of exposures that you're getting so that you can get the right respirator to deal with those concentrations. So, sometimes it becomes a very specialised response because of those extreme situations.

(R) Well, there is also circumstances where for certain contaminants, the recommendation is supplied air straight away irrespective of the amount. And would that be another situation that workplaces need to be looking at, what's the hazards and what's the recommendations?

(G) Sure. There is not a filter for every possible contaminant known. So, there are material substances that we don't have filters that will work to capture those. The solution there is, as you say, airline system where you are getting your clean air from an external source and you are not exposed to that local contaminant in the air that you cannot filter.

(R) For workplaces, Terry, where would they start if they want to know about respiratory protection and selecting filters? Is there a good starting point that they should go and read as a beginning point?

(G) Well, the first thing is to know your enemy. So, the good starting point is to make sure you've got a safety data sheet for the materials that are in use in the workplace. There might be a few of those; there might be lots depending on the type of work and the scale of the work being done in your workplace. But those safety data sheets give you an indication of what's in the product, starts telling you the components of the product, starts giving you an idea of what is hazardous and what is maybe not so hazardous in the components. You can look at the information in the SDS to give you a guidance on the PPE that might be needed and look at what options you have in terms of the protection that is available that you can source. I would like to put in a caveat to that …

(R) Yes?

(G) ... in that we see a lot of SDSs from a lot of manufacturers and I've got to say the quality of information will vary. So, we see SDSs that are excellent, good information, cover all the bases, say the right things. We see SDSs that are very poor and say the wrong things or say nothing at all or say, "Use a respirator, full stop," and that's obviously not solving many of your problems. So, there can be an issue there in getting the right basic information, but it certainly is a good starting place in general.

(R) My favourite one is, "Use respiratory protection that meets Australian Standards 1716 and 1715," but that's every respirator that is ... it meets all the standards, so it really doesn't help that way at all.

(G) Yes, it's a half-hearted attempt to supply information really.

(R) So, what you're saying is we need to find out, what are we working with, what are our workers going to be exposed whatever it may be through looking at an SDS? Another common one I try and remind workplaces, you may not have an SDS, but you may be cutting wood or drilling into concrete, construction materials, you don't have an SDS to say there's maybe silica in concrete as well. So, that's another area that workplaces I think need to keep in mind. SDS is one part, absolutely, but what are you disturbing? What are you doing, because there may not be actual SDSs around there?

(G) Yes, that's certainly true. You have materials that are potential sources as you say. You start drilling something. You're creating a powder. You start spreading out a liquid. It can evaporate and create a vapour. So, there is secondary issues, and these clearly can be important, things like silica and other materials that are significant.

(R) So, looking at filters, are there different classifications of filters that when a workplace is looking up respiratory filters from wherever they're getting their safety gear from, are there different types that stand out that break down to different hazards you've just alluded to?

(G) Yeah, sure. Filters come in a whole lot of types, rated to do different jobs. The basic categories are particulates and that is as it sounds, particles of some style of type. And the other chunk if you like, gas and vapours. They're considered the same in terms of respiratory protection. Those are the two high level classifications and one or both of those might be present in the materials that are being used in a workplace.

(R) So, particulates, I often hear fume, dust, mist, fibre. They would all be categorised as a type of particulate?

(G) Sure, yep. Anything that creates a small particle is going to look at needing a particle filter given that it's there in enough concentration to require it but if the particle is being produced at a high enough level then you need to look at a particle filter appropriately rated for that hazard.

(R) So, a workplace is using a particulate respirator be it a disposable or half face or full face, why do filters need to be changed? What happens?

(G) Well, the filter that's doing its job, it's capturing those particles. The particles are getting held in the web of the filter if you like. It's a random bed of fibres. The particles get caught on those fibres. The more the filter is used, the more particles are getting into those fibres, into that bed of fibres and it's getting harder and harder for the air to find a way through that increasing labyrinth if you like. So, at some point the breathing resistance or the airflow resistance through that filter becomes significant. It becomes harder for you to pull air through it with your lungs or for your battery powered machine to pull air through it with the motor. That then becomes too difficult to breathe through, becomes too hard to get airflow through, it's too clogged, it's time to change that filter. That might happen in a short term, it might be in a few hours if you're in a fairly dusty environment. It might take hours and hours, days and days, weeks and weeks in some cases for the filter to get clogged enough to require changing. So, there's no one answer. It's a use-specific answer.

(R) Now, with particulate filters, I've seen P1, P2 and P3 which I know are the different ratings. What is the difference between those particular categories and how should workplaces be using those different ratings or understanding in their workplace?

(G) So, P1 is the first rating. It's for mechanically generated particulates produced by mechanical action; sanding, grinding, crushing, sawing …

(R) Drilling.

(G) Drilling, yeah, sure. All those sorts of operations are creating a relatively large particle. They're still microscopic many of them but that's the concept. Those large particles are captured appropriately by a P1 filter. If we have thermally generated particulates, we need to go to a P2.

(R) So, what's a thermally generated particulate?

(G) P2s will do thermally and mechanically. Thermally generated particulates are those from a let's say a hot operation. Welding fume is the classic, molten metal, plasma cutting, anywhere where there's that high energy input into the operation and that, if you like, breaks the particles down even smaller than they would have been by the mechanical action that we've talked about. And therefore, you need an increased performance from the filter to capture more of those smaller particles that are produced. So, P2 is the rating for those thermally generated types.

(R) So, I see a dust cloud. There's going to be a lot of stuff in there that I can't see which is going to be that smaller range of particulates in that dust cloud. So, not what you can see is necessarily going to be an indication of what's there or what you need to be protected against.

(G) Yes, absolutely. You certainly can get a good exposure from something that is essentially invisible or in most light situations. There's plenty of stuff there that you can't see. We've all seen the light come through the window and you see the floaties that are in the air. They're there all the time and small ones that we'll never see. Either way, if you create enough of a contaminant, you will need a respirator or a filter to capture those particles to prevent them getting into your lungs.

(R) So, we've got P1, mechanically generated particulates, P2, mechanically and thermally generated particulates. P3, what does that cover?

(G) P3 will cover all particulates. It's for use when you need high levels of protection. So, high protection factors. The respirator needs to knock down the potential exposure by a large proportion and make sure then that the worker is not being overexposed to the contaminant. So, P3s are for those higher concentration type exposures.

(R) Or also very highly toxic materials. When you look at the asbestos space and friable asbestos, P3 is the minimum level of protection that is expected or specified by the regulations. So, that makes sense. If you want a higher level of protection, you reduce a larger exposure amount as a known minimum. So, there's that circumstance as well I know I've come across.

(G) Yeah, sure. You're looking at a material that's very hazardous and has a low exposure standard level. You want high protection factors which indicates a P3 to reduce that down to as low as possible. So, that makes perfect sense. The more of a health issue the exposure is, you'll want to use higher and higher protection levels to reduce exposures to the people in that workplace.

(R) What about pre-filters? I know I've seen in my travels you'll have pre-filters as well as the P1, P2 and P3. What are they actually doing?

(G) So, pre-filters are not rated under the standards. So, they're not given a P rating. They're to stop the sticks and bricks.

(R) The big stuff. The real big stuff.

(G) The real big stuff. The stuff that is chunky. So, that is there to protect the main filter so that the pre-filter captures the really giant particles, let's call it, on our scale and the smaller particles will go straight through the pre-filter which is not a high efficiency filter at all. It's very full of holes and does not stop all of that small stuff we're concerned about, but it will stop the really big stuff and it's there to extend the life of that main filter and get full value from that.

(R) Something I've read in the Australian Standard and it does come up quite a bit; in the Standard it says, "If you're wearing a P3 filter and you're wearing it on a half face mask, it is treated the same from a protection factor point of view, the same as a P2." Why is that the case? You've just said P3s for highly toxic stuff but we're treating it the same as a P2 which is a lower level of efficiency.

(G) Sure. The difference is we're then talking about the protection factor of the unit and when we're talking a half mask, the filter can do its job. The P3 filter will still act like a P3. The P2 would act like a P2. And indeed, a P1 would act like a P1 on a half mask. The issue is that the protection given by a half mask, the restriction or the limiting factor is the face fit. So, the filters will do their job. They're up to the mark and doing what they are rated to do but the face fit can make a massive difference in the protection given. That mask must fit your face or the wearer's face to a level so that they're getting the protection that is expected. So, face fit if you like is the weak spot. So, we don't care then what filter's a P2 or a P3. It's the face fit. It becomes a major component and therefore we make sure we've got the right filter and we've got a face fit on that product as well for the wearer.

(R) When would a particulate filter not be suitable? I know at the start we spoke about oxygen deficient environment which applies to both gas and vapour and particulates. Is there any areas or workplaces or situations that a particulate filter would not be suited for?

(G) Well, if there's particulates, it will be suitable but if you've got exposure to gas and vapours then a particulate filter is not going to help you against those categories. So, we're now talking no longer chunks of material. We're talking about molecular or in some cases even atomic structures so that the size and the capture mechanisms involved are different. So, we need a different approach.

(R) That goes back to that risk assessment when looking at the SDS, what is the type of contaminant, i.e. particulates? So, now we'll get into the gas and vapour space. So, it's different structurally as you've said. How do gas and vapour filters work to capture and hold these gases and vapours of all different types?

(G) So, we use a treated surface material to capture those gases and vapours. We treat the surface of an appropriate material so that it does have the affinity to react with those molecules of the material we're worried about and hold onto them and capture them. So, the most commonly used component in gas vapour filters is carbon, activated carbon, most commonly made from coconut shells. They burn it under appropriate low oxygen conditions and appropriate temperatures etcetera. You create a what looks like small amounts of ash or soot or …

(R) Sand?

(G) … sandy type small particles of carbon, sand sized. And those have an activated surface which will catch various different types of contaminants depending on the way that carbon is then treated. So, we can then find a filter that will be able to capture not all again but many of the common gas vapour components found in workplaces.

(R) You alluded to it, there's not a gas and vapour cartridge for every single type of gas and vapour out there. What are some, types of contaminants not suitable for gas and vapour cartridges? Are there any that come to mind that commonly pop up?

(G) Yeah, well, there certainly is. Any of the inert gases and any material that has a very small molecule size so hydrogen for example is not captured. LPG gas, barbeque gas, those things are not captured. Refrigerant gases are not captured. They're too mobile. They don't react with those surfaces that we've talked about and they will essentially go straight through your carbon filter and you'll breathe it in. Whether that's a problem obviously depends on the concentrations etcetera as we said. But yeah, you certainly need to find out what your enemy is in these cases and make sure your filter is able to capture that.

(R) So, for the different categories or colours and classifications of gas and vapour filters, can you run through those? So, if someone were to pick up any whatever brand of gas and vapour cartridge, what are the things that are going to stand out to them or they should be looking at to know what it's actually suitable for?

(G) So, all gas and vapour filters should be marked with their appropriate rating. If we go through some of the common ones, A is the most common. That is for organic vapours with boiling points greater than 65 degrees Celsius. That's your common let's say, common solvents, fuels, those sorts of materials will fit into that category. So, for paints, materials that use solvents, they will all use an organic vapour type A filter. Type B filters are for acid gas, chlorine for example, hydrogen sulphide, hydrogen chloride. There's a number of those and again, they are rated to deal with certain amounts of those types of materials. Type E filters rated to deal with sulphur dioxide and inorganic gases. K filters are rated for ammonia. Hg are rated for mercury and so on. The other thing you'll see is that this letter will often have a number associated with it. So, an A1 or an E1 or a K2; that is an indication of the capacity of the filter so what size capacity it will have. In the Australian Standard there's four capacities. The smallest one is AUS, as in, A-U-S, The next size up is one. The next size is two. And the largest size is three. So, you can have an A1, a K2, etcetera.

(R) So, an A1 to an A2, both will capture organic gases and vapours above 65-degree boiling point but the A2 will have more carbon. So, like a smaller bucket to a bigger bucket. Both will capture it, i.e. hold it. It's a very simple analogy but obviously, you'll get a longer life out of the bigger bucket so to speak.

(G) Exactly right. You've just increased your capacity. It will last longer against a certain concentration because it is a bigger bucket.

(R) So, I know there's an AX type gas vapour which is for organic gases and vapours with a boiling point underneath 65 degrees. You mentioned A. What does the boiling point have to do with from a filter capture point of view? Why is that such a highlighted fact when you look at any kind of literature or brochures around this stuff?

(G) Organic vapours and boiling points are connected in terms of their structure and their molecule size. So, some materials are very resistant to temperature and will not vaporise or become a vapour until the temperature gets up higher, 80, 100, 120, 150, whatever degrees because of its structure. It's a larger molecule for example, it'll have a higher boiling point. Smaller molecules will create vapour at a lower temperature. The Standards have set the changeover if you like at 65 degrees C. Above that, you can use A filters. Below that, they tell you to use an AX filter. AX filters will capture organic vapours above 65 but they are aimed at capturing those more slippery type ones that have boiling points below 65. So, there's a range of those organics that are very difficult to catch and the larger typically larger AX filters give you some capacity for that. There's a number of questions associated with use of an AX filter. They still do not capture every known organic vapour with a low boiling point. So, you must make sure that the filter is rated for the organic vapour that you are interested in protecting your workers from. It is typically a larger filter and some of those may not be able to be used on a half face mask. The Australian Standard says, "No filter should be over 300 grams on a half mask." Once the weight gets up, the filters start pulling the mask off your face and affecting the face fit we talked about earlier. So, if you have filters above that 300 grams total weight, you need to go to a full-face mask to provide the platform and provide the protection. So, AX filters, you need to be cautious. You need to be making sure you're identifying the contaminant gases and seeing if AX is required. Then you've got to get the right product to go with that and make sure that it's providing protection.

(R) Now, when it comes to the life of a gas and vapour filter, I imagine it's the same as a particulate where you've got all those variables in the workplace, the amount of the gas and vapourable contaminant in the air, the work rate, all those variabilities. But is a gas and vapour similar to a particulate where you're relying on a breathing resistance for the worker to know when it's time to change your filter? Is that the same or different?

(G) Well, it's definitely different. So, gas and vapour filters do not increase breathing resistance as they load up. So, there's no discernible increase. You cannot tell that it's half full or one third full or whatever. It does not work that way. You have a capacity in that filter. As you say, a bucket is a good analogy. You can fill that bucket up very slowly drop by drop. You can fill it up much more quickly by pouring it in if you like but when that bucket is full, that's it. It's full. It will not hold anymore, and you will get spillage. Or in this case, you'll get the gas or vapour going straight through the filter, not being caught at all and you're being exposed. So, gas and vapour filters do not give increased breathing resistance. They do not give warming. They just fail. And thereby, they are much more of an issue than a particle filter. The particle filter becomes harder to breathe through, but it continues to work. It does not fail. So, you do still get protection as long as you can keep breathing. Gas and vapour filters are go, no go. They're working until they're full then not working and you are now exposed to the contaminant. So, you've got a problem.

(R) Can a worker rely on their nose? When they smell the contaminant, that is an indicator for them to change it because that's something you'll hear in different workplaces. Is that a reliable indicator?

(G) It's an indicator but not reliable. A few reasons, A, does the material you're worried about have an odour at all? So, it might not have an odour so there's no way you can rely on your nose. B, noses aren't noses. Some people have very sensitive noses and would smell the breakthrough very quickly for some things. Other people, their noses are nowhere near as sensitive and they can be breathing it in and still not realising it at a level that is of concern. Your nose performance can vary. We all know our nose doesn't work so well when we've got a cold or some nasal related issue. So, again, you've got a very bad indicator for exposure to that material. So, while it certainly is used and if you do start smelling something, clearly, you've got a question mark going on, "What's happening now? Is the filter failing or has the mark slipped on my face," or whatever? So, it certainly is an indicator in that sense but not one to rely on. You would need to get much more, let's say, some more stable assessment to make sure you can change your filters before you get to that breakthrough condition.

(R)But what can a workplace use that is reliable? What information should they be going out and collecting to give them confidence to say to their workers, "You should be changing your cartridge at this point or that point," depending on their circumstance?

(G) So, given you know what the contaminants are in your workplace, you would need to have some idea of the size of that exposure. Is it 10 parts per million of chemical X? Is it 500 parts per million? If you've got that sort of knowledge, you should be able to go to the manufacturer, tell them what you're dealing with, tell them what is happening, and they should be able to give you an estimate as to the length of time that filter may last under specific conditions. So, for example, you would be interested in things like the temperature that the materials are being used at. You would be interested in the breathing rate of the wearer. Imagine somebody's sitting down not working very hard is breathing at a normal rate and pulling air through the filters at a certain rate. Somebody who's working very hard physically, wearing that same mask will be pulling a whole lot more air through those filters in a minute and therefore filling up those filters at an enhanced rate. So, those two people while being exposed, let's say to the same concentration, the hard worker is going to fill his filters up quicker than the person doing the light work. So, we need to take that into account as well. Much more complicated than a particle filter. You've got to have a lot of inputs to give yourself an estimate of when you need to change those filters to be before that breakthrough happens.

(R) And for many workplaces, they'd be using multiple gases and doing different tasks at different rates. So, that adds another whole complexity over the top of the whole situation as well.

(G) Yes, it certainly can, and this can turn into a monster depending on, as you say, the complexity of the exposure. It can come down to the fact of finding the worst-case scenario. The chemical that is the highest concentration, the longest exposure in terms of each day. You use that as the canary if you like. You work out that that one is going to be filled every six hours or whatever it might be, then you can say, "Right. That's the one that's the limiting factor. We need to change our filters every six hours, eight hours, 20 hours," whatever the numbers are.

(R) Two weeks, three weeks, four weeks. Whatever the situation.

(G) Yeah, exactly. It'll depend. The all-situation depends. What I would say is don't turn it into a mathematical long-term assessment process in terms for the workers. Make it very simple for them. They need to change it every lunchtime, at the end of every day, every Friday afternoon, in the bin, the first of every month, in the bin. Whatever the numbers tell you, make it a nice simple change of schedule without complicating it and that way people will know clearly, "I'm going to change this every Friday." They start with a new set on Monday and on what the information you know, that will provide them with enough protection over their weekly exposure.

(R) Because you want that confidence that you're not relying on a worker to be exposed to a certain chemical albeit at a small amount. We don't want to be relying on that to be that change point. I've seen workplaces write in texta on the side of the filter whatever that frequency change period is just as another visual thing for workers. If they pick up a cartridge that's on a workbench or out of an area, they can use that as a, "No, time to change," purely from a confidence of still being protected when wearing this stuff.

(G) Sure. Yeah, there's filters where they've even got a panel on them to allow people to write the day they started using it, day and time or whatever's appropriate. So, absolutely, there should be a way to know that the filter I'm about to use is good or not. And obviously, when it doubt, toss the filter, start with a new one.

(R) How does humidity affect a gas and vapour cartridge? I know on some of our service life software that that is a form or section that you actually fill in asking on the humidity. How does that affect a gas and vapour cartridge?

(G) So, we talked about organic vapours earlier. The organic vapour carbon is affected by humidity. The other types are not. The organic vapour carbon, because it relies on the activated surface itself to capture the organic vapours, if we have high humidity in the breathing air, the water vapour in the air competes for those activated sites with the solvent or the organic vapour that you're concerned about. So, the water vapour starts filling up the carbon as well as the contaminant. So, the higher the humidity, the more effect that will have and if you have extremely high humidity, 90% or 95 or whatever it might be, it can reduce your service life of your filter by ... it can be a factor of 10 times. So, your filter in a dry winter's day might be lasting a hundred hours. In a hot summer day with 95% humidity along the coast, it maybe lasting 10 hours. So, it can be a significant effect.

(R) One of those factors to work into a workplace is situation whether that filter change schedule, whether it's the natural environment or a specific work that's creating that humidity. Yeah, another level of things to look into.

(G) Absolutely. So, it all requires a bit of planning, a bit of forethought and a structure to it. History has shown us you cannot rely on the average worker to accurately and repeatedly change the filters unless you've got a very straightforward, simple equation to do so, as I said, every day, every week, whatever.

(R) When I was in a workplace a couple of weeks ago and they had their mask hanging up on the wall and literally the whole thing was covered. I couldn't even see what type of cartridge it was. It was blocking up all the inhalation, exhalation valves which leads into my next question, how should these cartridges and filters be stored when not in use? It's one thing while they're being worn but how should they be handled and treated when not in use?

(G) Yes, for sure. So, gas and vapour filters, once they're opened out of their sealed packet and opened to the air if you like, will be able to absorb any rubbish that's floating around in the air whether it's the contaminant of interest that you're using at the workplace that day. If you finish with your mask and hang it up on the wall, it will absorb the remains, anything remaining in the workplace atmosphere for the other 16 hours of the day, so you are potentially filling your filters while you're not even wearing them. So, when you're not wearing your gas vapour filters, they should be placed in air tight container, zip lock bag, Tupperware box, whatever works, so that it is isolated from the workplace atmosphere. Ideally, it should be out of the workplace in a storage place with clean air. Then you know the exposures are only when you are actually using the product in anger if you like, rather than it filling up in the quiet hours and giving your reduced performance when you need it.

(R) If you can't tell how full one of these gas and vapour cartridges are, you're going to put it on and it may be going straight through. I know I was in a fibre glassing place and you could walk in and you could smell the styrene. As soon as you walked into the workshop you could smell it and I remember seeing a couple of gas and vapour cartridges. So, that would still work, if it's not capacity, but there's actually dollars there wasting because they're not getting the full life and value out of what they've purchased.

(G) Yeah, sure, wasting dollars and potentially by the time they've picked the filter up, it's full, so it's not going to work from minute one.

(R) So, what about the shelf life? Just say I haven't opened it up. I've purchased it and I buy a batch and it sits on my shelf or cupboard, is there a set shelf life for these particular products that workplaces should also be checking as well?

(G) Yes, every gas vapour filter in its sealed packet, as supplied by the manufacturer, should have an expiry date on it, so that you know it's good, it will work as expected up until a certain date. Usually it's a month and a year, May 2020 or whatever it might be. So, before you open a packet of filters, you should check the expiry date, make sure it's still within that date and then go ahead and use it, if that's correct.

If our listeners want to get more information, where would be a couple of good starting points they should head?

(G) Well, if you are seriously into respiratory protection and it's a big issue in your workplace, I would suggest the Australian Standard. That's 1715, Selection, Use and Maintenance of Respiratory Equipment. That deals with the different areas, deals with the different elements that need to be assessed, gives you the respiratory protection program elements that you need to have in place and be able to deal with appropriately. There's a number of different angles that all need to be looked at to make sure that you have that protection at the end of the day on the workshop floor. As I said, it's an initial assessment process and it's an ongoing, continuing, keep up the good work type process. So, it doesn't stop. It's a continuous thing. While respiratory protection is needed, it's a continuing program needed to keep it up to the levels expected.

(R) They can also visit the 3M website. We do have a lot of information to take in and those concepts from the Australian Standards, so please look at our website if you are looking for information. But Terry, if you had to sum up when and why to change your respiratory filters, why is it so critical for workplaces to have an understanding of this important factor to provide protection to their workers?

(G) Well, the filters are a crucial element of the picture as we said. The best reason I can give is that we, you've seen it, I've seen it and everybody in the business has seen it continually, workers are not changing their filters when they should, or they don't know when … more broadly, they don't know when to change their filters. Some people have no idea. Others have let's say jumbled concepts, so it's always something that needs attention. If you are in any doubt, you should be talking to your manufacturer or supplier if you have contacts with them. Talk to people who know; hygienists, people in the safety professional game. Find the information you need because if you don't know what you're dealing with, you will likely not end up with the right protection.

(R) I like to say to people I'm talking to, your tyres on your car don't last forever. They wear down. Similar, not exactly the same, but filters don't last forever as well, so you need to be changing it appropriately to make sure that protection is being achieved. Such a crucial aspect and I hope all our listeners have taken something away from today that they can implement in their workplace, even if it's a small change. That can be mean a big jump in protection for your workers as well. Terry, thank you once again for coming in. Yeah, I appreciate your time.

(G) Thanks, Mark. Anytime.

(R) 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 information around respiratory protective equipment, when to change your filters, filter change schedules as well, 3M are certainly here to help. You can also visit our website, 3m.com.au/sospodcast which has a transcript and resources of all the topics that Terry and I have been speaking about today, and plus information on all our previous episodes we have recorded. Be sure to subscribe and share the podcasts through Apple Podcasts, Spotify or 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 and leave us a review as it really does help other people to find the podcast. And as Jim Rohn said, "Motivation is what gets you started. Habit is what keeps you going." Thanks for listening and have a safe day.