# Silica series: Best practice in the prevention of illness and disease in tunnel construction workers

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### Virtual Seminar Series - Transcript

I was fortunate enough to receive a Churchill Fellowship in 2016. My Churchill Fellowship was on investigating best practice to prevent illness and disease in tunnel construction workers. I'm going to go through a very level presentation of some of the gold I found as part of that journey.

To kick it off, I thought I'd set the context. I want you to think about how much energy, effort, systems, and resources we all put into preventing one fatality due to a safety incident at work each and every year. It's money well spent, it's systems and resources well spent. But, how much energy, effort, systems, and resources do we put in to preventing fatality due to illness and disease?

Because, this is how many men and women, by comparison will actually succumb to fatality due to that. The ratio is one to eight. Have a think about within your own organisations how much focus do you put on health, in addition to safety? They're both incredibly important, however sometimes I think the balance is skewed.

To put it into context in the tunnel industry we'll plan to tunnel further in the next seven years than we have in more than past two decades. Almost two thirds of all the tunnelling in Australia occurs in Sydney and all tunnelling will encounter shale and Hawkesbury Sandstone. That sandstone, and to smaller extent shale mainly consists of quartz and tunnelling through any quartz containing rock generates a carcinogenic dust known as respirable crystalline silica.

Over exposure to silica dust is known to cause an incurable disease called silicosis, as well as lung cancer. The risk of developing silicosis from exposure to silica dust at our current legal limit over a worker's working life is estimated to be between anywhere from 12% to 77% of workers.

However, silica from freshly fractured rock is more toxic than any other type of silica dust and during tunnel construction crystalline silica exposures have been measured to be more than 20 times that legal limit. The common last line of defence applied to protect the health of our tunnel workers can tend to be the P2 dust mask.

To put that into perspective, I thought I'd use this picture from Work Health and Safety Queensland of a five cent coin to try to show just how much that legal limit or that workplace exposure standard is for silica dust. Now, this small amount of dust represents the workplace exposure standard, like the daily exposure, for silica dust at the moment in Australia.

Now I want you to cast your mind back to every single construction project that you've ever driven by and think about how much dust you actually saw coming out of that basement excavation, for example. It's probably a little bit more than what is showing on the screen.

This is a snapshot of Australian tunnelling in terms of kilometres to be tunnelled over time from ‘95 to 2021. We're obviously in the peak of an infrastructure boom, but it presents an opportune time at this point to not only look outwards internationally but also learn from our past.

It was at this point that I thought, "What a great opportunity to actually go and try to get a Churchill Fellowship so that we can actually go and have a look at international best practice and see what we can doing better in Australian tunnelling."

As part of the Churchill Fellowship I've visited quite a number of major tunnel projects, including Thames Tideway in the UK, Crossrail, High Speed Rail 2, Belchen Renovation Tunnel, AlpTransit Gotthard, and a number of projects in the US. Including the SR-99 Alaskan Way Viaduct, which was amazing.

Also visited some research institutions and some major conferences such as the World Tunnel Congress in Norway. But, before I went, I spent a lot of time actually looking at existing best practice frameworks for health and safety to establish eight elements for investigation.

The first and the most important was *leadership*, because I wanted to understand what impact leadership had on actually driving better health outcomes for tunnel workers at the tunnel phase, per se.

I wanted to look at the impacts and the importance of *health in design*, how well international organisations were at *engagement and collaboration*. I wanted to look at *standards*, both contractual and legal standards. I wanted to look at *targeted management* or things that would specifically reduce silica dust exposure.

This is *program management*, which is the systematic way that a health and safety system is applied. I wanted to look at *training and awareness* campaigns and what could we be doing better. And lastly, and also most importantly, *sustainability*. How can we make sure that any initiative we do in Australia is sustainable and actually is retained, no matter who is in charge or who is delivering that tunnel project?

I'll start with leadership. I found that visible and effective leadership, actually starting with the client organisation was found to be an essential part of preventing illness and disease by the time work is started onsite. How many of you put that level of leadership and importance on health in the way that you do business? Because, internationally it's very, very strong.

Leadership at that client level was demonstrated to create more stakeholders that also began to drive health within their own organisation and focusing on occupational health started way at the beginning, in the design stage before tenders were awarded, and they continued to be promoted and outlined through contractual requirements and tender evaluation. Therefore, the clients made it very clear from the outset to all contractors what the standard would be. There was no surprises.

Internationally, I found some great examples in the UK on engagement and collaboration. I saw that groups such as the BOHS, Breathe Freely Campaign. Some initiatives through the transforming tunnel safety groups allowed multiple projects to actually come together and share knowledge so that good practices were adopted earlier than they may have been otherwise and these industry groups both raised awareness, but also drove a best practice approach beyond mere compliance.

Engagement with research partners enabled a greater understanding of the magnitude of the issues, leading to better control measures being implemented. In Norway, for example they have a really good collaboration with local research institutions and Thames Tideway have a really good partnership with Loughbrough University. It's great that Sydney Metro, have that type of relationship with RMIT as well.

Internationally, I found some great examples of training and awareness campaigns. For those that haven't seen this, this is from Crossrails’ Health and Safety Impact Series. It's called, "Jenny’s story." It's a very short video that helps raise awareness of silica dust or dust exposure and things like this highlighted that we need to be doing more than a simple poster in a crib shed sort of campaign. Not to say that they're not useful, but internationally they're doing more.

I also found some great initiatives in the US. The use of helmet-cam or a lapel camera linked to a real-time dust monitor, which was able to help workers, and occupational hygienists, and health and safety professionals actually look at where peak sources of exposure were happening in the underground environment.

A really good example might be that you'll find peaks of exposure when heavy plant operators might sit down in a fabric seat, for example. But, you wouldn't actually see that dust when you're doing your day to day activity.

Construction and tunnelling projects internationally have mandated targeted contractual requirements that or refer to legal standards that are more stringing than what we have in Australia. Some countries have fantastic and very high grade legal requirements and where they're not there, then they're countered by very detailed contractual requirements by the client to close that gap.

I found internationally that ongoing, independent verification of exposure controls or things that should be in place, by some authority able to stop the work has demonstrated to drive compliance and further improvements. Therefore, lower risk of disease development. Really good examples of that would be the UK, Switzerland, and the USA.

When it came to health in design I saw that addressing health way at the beginning in the design stage resulted in many more higher order controls being able to be applied prior to construction. So not leaving it to the construction teams. If health risks weren't able to be eliminated, which is pretty rare for them to be able to be in construction, then there was a requirement to demonstrate internationally how those health risks could be managed all the way through the project life cycle, through to O&M.

Program risk management was really interesting, as part of the fellowship. I found that occupational hygiene as a discipline was managed together with occupational health and wellbeing as a holistic approach. Appreciating that, for example it's great to have a wellbeing program, but what are we actually doing about preventing exposures to things that cause illness and disease? What are we doing about that worker's health from a clinical perspective? I found it managed really well internationally. A great example is in the UK.

I found that initial health risk assessments were used to drive decisions on controls, monitoring, and health surveillance. As is the case at Sydney Metro and health surveillance through occupational physicians, complimented by competent heath clinical services, and a standardised approach for what is deemed fit for duty.

A centralised collection of data was observed and by doing that it enables people to look at trends, which then inform future interventions in policy. At the moment in Australia this area is incredibly lacking, because we don't have a centralised health surveillance system, so we're not able to have that sort of data.

There were many control measures that were observed internationally to specifically control exposures to silica dust and I'll say that many of these are not new to Australia. I've worked on many tunnelling projects where I've seen these implemented incredibly well, but what tends to fail us on some of these projects is that they're not always implemented each and every time and they're not consistently applied. That really goes back to leadership and the requirement to have it in place in the first place.

Internationally, every tunnelling project in the UK has or is in the process of developing some form of legacy learning website. Things like that ensures that good information is captured while fantastic team members are on the project and you don't lose that sort of good information when they go to the next tunnelling project that inevitably pops up.

Also, the use of benchmarking tools like the Occupational Health Maturity Matrix, which is a one to six scale, which is used to rank contractors in terms of their maturity in their systems of managing occupational health, were observed to really drive best practice and perhaps some healthy competition.

In summary, what is best practice? Well, I found that best practice involves leadership driven by the client, but working in collaboration with a very competent contractor and complimented by a strong regulator. I found that it involves major projects engaging, and collaborating throughout the supply chain. Also, with research institutions and with other major projects.

I found that health, medical surveillance, and wellbeing being managed holistically is best practice. Contractual requirements and tender evaluation occurring for health aspects in addition to safety is very important. There were many tools available to assess and control risks to health, but best practice involves them being implemented each and every time.

The use of performance metrics that really push best practice has resulted in healthy competition and a better control of health risks. Knowledge sharing is commonplace across legacy website and industry forums, such as today.

The Churchill Fellowship demonstrated some key areas for improvement for us in Australia. The first is leadership and the importance of such leadership across all operating client organisations in the importance of health, in addition to safety.

The second was to improve the way and the amount of collaboration and engagement we have across all our major tunnelling projects. The third was to strengthen our standards as an industry both legal and contractual, and to increase training and awareness around silica dust. Lastly, to improve our processes of health surveillance.

The Churchill Fellowship Report was published on the Churchill Trust website in July of last year. A lot has happened since that time, a lot of work has been done by our health and safety regulator, SafeWork NSW. A lot of work is being done by many clients and fantastic tunnelling contractors, many of whom are in this room and through the Australasian Tunnelling Society and the formation of an Air Quality Working Group. A lot is being done at Sydney Metro to even further improve the systems that we're working on.

In short, the Churchill Fellowship demonstrated some key areas for improvement and the industry has received an overwhelming response in how quick everyone's being at actually taking up some of the items that have been identified and really working to close them out and making some improvements.

I'd like to thank the Churchill Trust for sponsoring such a Churchill Fellowship, because this is an important issue that effects the health of thousands of Australian workers each and every year and it's great to finally shine a light on health, in addition to safety in this industry. Thank you.