

3M Transcript for the following interview: Episode 80 - Australian Nuclear Science and Nuclear Organisation (ANSTO)

Mark Reggers (R) Carmen Naylor (N)

Introduction: The 3M Science of Safety podcast is a free publication. The information presented in this podcast is general only, and you should always seek the advice of a licensed or certified professional in relation to your specific work or task.

Welcome to the 3M Science of Safety podcast presented by 3M Australia and New Zealand Personal Safety Division. This is the 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 equipment 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 about the Australian Nuclear Science and Technology Organisation most commonly known as ANSTO, with Carmen Naylor. Welcome, Carmen.

(N) Hi Mark. How are you?

(R) I'm doing very well. Can you please introduce yourself? Who are you and where are you from?

(N) As you said, my name is Carmen Naylor. I'm a certified occupational hygienist of the Australian Institute of Occupational Hygiene and I work for high reliability at

ANSTO. I've worked in the field of occupational health for over a decade. My early career in corporate health programs until I developed an interest in occupational hygiene and the science behind occupational health risk management. I've worked in the mining sector where we were actually first introduced, Mark, also the freight and aviation industry and now at ANSTO. In 2017, I also returned to the University of Wollongong, or as I like to call it, the mother ship, to pursue a PhD in the field of occupational hygiene and toxicology. I'm also mum to a two-year-old, which has now stolen the job for best job in the world.

(R) So, Carmen, you said you worked for ANSTO, but who are ANSTO and what do they do?

(N) ANSTO stands for the Australian Nuclear Science and Technology Organisation. It is one of Australia's largest public research organisations and just for a little bit of history, my husband's grandfather was actually a marine engineer who helped commission the first research reactor at ANSTO called HIFAR. This was in operation between 1958 and 2007 and if you have ever seen images of HIFAR, I've been fortunate enough to visit it. It literally looks and has the feel of a submarine.

(R) But a nuclear submarine.

(N) Yeah, hence the people who designed it. At ANSTO, we undertake a wide range of activities that benefit Australia through the application of nuclear based science. We also operate much of Australia's landmark infrastructure, including one of the world's most modern nuclear research reactors called OPAL, a suite of neutron beam instruments, the Australian Synchrotron, the National Research Cyclotron and the Centre for Accelerator Science. And what I think is most important and what you may not know is that ANSTO actually help improve people when being treated for serious illness and disease such as cancer, and with one in two Australians benefiting from the nuclear medicines produced from OPAL.

(R) Probably most people don't think about where this nuclear medicine actually comes from, so good to try and help highlight where this stuff actually does come from.

(N) Exactly and I just happened to work in that field hands on before even coming to ANSTO. So, when I worked in cardiac rehab as a cardiac stress technologist, I actually used to help assist with nuclear stress tests. And during this process, a small amount of the radioisotope is actually injected into the patient. It flows around their bloodstream and then this test helps determine areas of the heart which may not be receiving enough blood flow and whether the patient, for instance, would be suitable for different types of cardiac rehabilitation.

(R) Now, you mentioned at the start, they're one of Australia's largest public research organisations, so what type of research is actually being undertaken at ANSTO?

(N) A lot. So, ANSTO provides the Australian and international community with products and services to improve human health, support industry and protect the environment. ANSTO undertakes research within key areas and this is all aligned with issues of national priority such as human health. This research theme aims at reducing risks which lead to illness and disease and I specifically work quite closely with the scientists in this workgroup as my research at the University of Wollongong specifically is concerned with occupational health. Other key areas of focus include research into environmental sustainability and the nuclear fuel cycle. In summary, there are a lot of smart people working within my workplace.

(R) It sounds like it would a very interesting place to work, but when we talk about hazards in the workplace, we think of a mine or a manufacturing plant with very repetitious and well known hazards, but in a research facility, how are the hazards different when it comes to identifying them because you're doing research which has maybe never been done before.

(N) Correct. I think it's important to highlight that the potential hazards associated with ANSTO's activities are similar to those at any large industrial site or research facility. We still have human resources, administrative workers and asset management and services groups, like any organisation. However, working in a research environment means that there is non-routine operations, multiple agents' people are working with and a level of non-repetitiveness. This is really enjoyable as a safety professional because I get to deal with a little bit of everything and I think I've heard Terry Gorman say that in the past in a few of his other podcasts as well.

(R) A good learning ground to get that exposure to different things.

(N) Indeed.

(R) So, can you give us a couple of those different types of hazards as an example?

(N) Okay, so there are many different types of health and safety hazards in a research setting. Again, like all other workplaces, this includes chemical substances, cryogenic liquids, working with strong corrosives, acids, alkalines, powders, dusts, gases, physical hazards such as heat, cold, noise, nonionizing and ionising radiation, manual handling or body stresses such as trips, slips, falls, biological hazards such as working with animals, psychological hazards like study-work life balance, for instance. Traditional safety issues, again, around working with mechanicals hazards such as plant and equipment that may tear, cut or result in an impact injury that can cause injury. All these hazards need to be identified, assessed and controlled to prevent harm like any other workplace.

(R) I'd imagine there'd be so much emphasis on that identification for tasks or research that may have never happened before or working with a material that doesn't exist before. So, what do your safety systems look like to manage this very broad range of hazards you've just mentioned?

(N) Overall, we have an overarching safety strategy, and this is to provide a safe and healthy workplace for all of our workers. Our safety strategy has adopted action areas identified in the Australian Work Health and Safety Strategy, aka, the Australian Strategy. Our management system is based on and certified against ISO 45001 and this is an International Safety Standard for Management Systems of Occupational Health and Safety. We have specific work health and safety and radiation protection leaders within high reliability that have subject matter expertise at ANSTO on areas such as chemical management, occupational hygiene, radiation safety, contractor safety, construction, safety management systems, compliance. There are also many other multiple functions within our organisation such as quality management leaders, environmental scientists, engineers that work together to ensure a conservative towards safety is taken. I also work closely with our Occupational Health Centre and this is staffed by a team of occupational health nurses, occupational physicians and allied health professionals who provide our staff with top quality level health and safety, including first aid, health promotion and immunisation programs, medical clearance for activities such as respirator use, confined space work, work at heights, and medical support for work related tasks such as audiometry, biological monitoring and of course, injury management. Being a research facility, it means changes in chemical use can occur quite frequently, so chemical are inventoried in our chemical management system where we can obtain reports regularly regarding their status and regulatory requirements. Initial chemical use specifically is firstly risk assessed by our staff. Where some of our research chemicals do not have a safety data sheet, our knowledgeable staff will also generate research safety data sheets.

(R) Now, I've done some previous episodes about what is occupational hygiene and what do occupational hygienists do, but what does your role as an occupational hygienist at ANSTO actually look like, factoring all that stuff you've just mentioned and the breadth of hazards that need to be assessed and managed and measured? What does your day look like?

(N) I guess working in a research environment, you need to consider factors such as continuous change. Working as an occupational hygienist in these types of operational conditions means that your first objective is to identify if hazards are present and provide advice regarding adequate control measures. Where I conduct quantitative measurements of exposures, the purpose of this is more often than not to demonstrate compliance with the workplace exposure standards. Workplace exposure standards are simply the maximum limit prescribed by legislation. As such, exposures should be maintained far below the workplace exposure standards as is reasonably practical. Where I conduct quantitative measurements of exposures, the purpose of this is more often than not to demonstrate compliance with the workplace exposure standard. For those who don't know, workplace exposure standards are simply the maximum upper limit prescribed by legislation. As such, exposures should be maintained far below the workplace exposure standard as is reasonably practical.

(R) And we have done some episodes about workplace exposure standards and recently spoke with Safe Work Australia about that whole review process they've been doing. So, definitely know what you're talking about there.

(N) Indeed. So, what I mean by compliance is that in other words my role is mainly to determine if exposure levels to a chemical hazard are acceptable or unacceptable. This is contrast as an occupational hygienist, for instance, working in a more routine environment, for instance mining, where your main objective is to conduct enough assessments to get an idea of average exposures, a baseline risk assessment. For example, the American Industrial Hygiene Association, in their strategy for assessing and managing occupational exposures, suggests that six to ten measurements are normally enough to obtain a reasonable estimate of worker exposure from each group. However, when working in a research setting, it is sometimes very unlikely that the same experiment is even going to be conducted six times to permit those numbers of measurements to occur. At the end of the day, this is not to say that this is not important. You just need to adapt your

occupational hygiene concepts, so that it is working best for you for your specific environment. So, what this means for me is where routine operations exist and where there are more opportunities to collect data, I would do so, to confirm and verify the controls are working as designed, and for example, the correct type of PPE is being utilised.

(R) Obviously, we don't want to go to PPE as our first control, as we've mentioned many times, and talk about the hierarchy of control. But as you brought that up, how do you determine what the correct type of PPE is being utilised from that exposure monitoring you just mentioned?

(N) There are some unique ways. I guess firstly, where you don't have exposure measurements or data to make this decision, my decision on the types of controls required would often come from a conservative decision-making process. Safety data sheets and manufacturers and suppliers of personal protective equipment can provide that critical information for you on the recommended PPE, for instance, for a chemical hazard. However, there is also a technique to use to calculate the correct protection factors for example of respiratory protective equipment. To determine if you are using the correct type of respirator, you can determine the minimum protection factor required by dividing the known airborne level by your workplace monitoring by the workplace exposure standard for that chemical. For example, lead dust; the exposure standard is or has been recently lowered to 0.05 milligrams per cubic metre. If I carried out exposure monitoring for this, and the ambient levels for this environment were, for instance, 0.01 milligrams per cubic metre, the minimum protection factor is five. Therefore, a P2 face mask, which provides protection factor of 10, would be considered adequate for that scenario.

(R) And so, what we're trying to do when we talk about those protection factors is bring that exposure down underneath that workplace exposure standard which you've mentioned just before. So, that's good information. So, we talk about process safety. Is that something that ANSTO have in their bag of tools to manage these fluctuating risks and hazards you've been talking about?

(N) Yes. We have a very low tolerance for risk. Process safety in a research environment is very high. We have effective containment systems available, such as fume cupboards, glove boxes, ventilation systems. This low tolerance to risk includes a conservative approach to worker health and safety as well. A safe work method and environmental statement is conducted for each non-routine, high-risk or complex project that we work on. This risk assessment tool helps with the identification of hazards prior to the work commencing and allows for the risk to be determined and the correct controls to be implemented. We have safety assurance processes where there are established thresholds for risk managements. Where any of these categories are met, a full audit of the systems and hazards associated with that work are required before the work even commences. This audit addresses all reasonably foreseeable hazards, such as plant safety, chemical hazards, biological or physical hazards, waste disposal requirements and any other changes that may be needed. For example, improving existing training requirements for those workers, so that they are addressed before the work commences. These safety assessments require periodic reviews to assess the effectiveness of the implemented works as well. We also have change management tools to help our people recognise and respond to change. As an occupational hygienist working in these environments, you can adapt your assessment program to incorporate both a reactive and proactive approach. You often need to be on the lookout for changing work conditions and proactively be involved in this hazard analysis process.

(R) I know my personal working background; I've never worked anywhere like what you've just described as far as the range of hazards and systems being used to manage that. But to sum it all up and as far as a takeaway point about ANSTO and managing risk in this type of environment, what would you want to leave with our listeners today?

(N) I think what's important is occupational hygiene in a research environment has a number of benefits. It can assist with the management of change process to

evaluate for instance processes working with a new chemical. It also a great teaching educational tool to help workers understand that their work practices are indeed safe and well controlled. In addition, just because you have for instance a chemical like toluene on a benchtop doesn't mean that there is a high risk of exposure or a high flammability hazard for that instance. You need to be able to assess the likelihood of that exposure. As such, you need to have an understanding of the quantities of that material, the frequency that they're working with that product, the duration of the use, and what controls that they currently have in place that will have an impact on the exposure potential. This is where you actually need to identify more than just the chemical hazard that you're working with and this is why occupational hygienists can actually help with that risk assessment process. I also think, as a safety professional in these types of environments, or occupational hygienist, that you really need to embrace continuing education, leverage ideas through participation and continuing education sessions and sitting on expert committees such as workgroups, for example, RESP-FIT within the Australian Institute of Occupational Hygiene. So, by sharing best practice and the transmission of this knowledge across all of our systems of work will be important for enhancing safety, not only within my own organisation, but across all industries.

(R) For those that are interested about learning a bit more about ANSTO, because it is a fairly diverse and interesting place from what you've just described, where can people get more information?

(N) I guess, a great place to start would be the ANSTO website. There's a wealth of information there. Other websites I would encourage you to go to is AIOH, the Australian Institute of Occupational Hygienists website, the Breathe Freely Australia website, the American Industrial Hygienists Association website, Safe Work Australia. ComCare and ARPANSA also have great resources available and also Standards Australia; they have a number of standards available, for instance, Safety Principles for Working in Laboratories.

(R) Well, there's a lot of resources there, but I think if people are looking, there should be no shortage of good information about ANSTO, but also resource locations for safety and occupational hygiene as well. Thank you so much for coming in today, Carmen. I really appreciate it.

(N) Thank you, Mark. It's a great podcast and if I could just add as well, I wanted to do a bit of a shout out to Mark Rawlings to say also thank you. I know he's messaged you directly, suggesting that this would be a good topic for your podcast.

(R) Thank you so much for the feedback. Really appreciate it. Thanks for listening everyone. You can get in contact with the show by sending an email to scienceofsafetyanz@mmm.com if you have any questions or topic suggestions or guests you think would be great to get into the studio. We can also provide assistance around the appropriate selection, use and maintenance of PPE in your workplace. 3M are certainly here to help. You can also visit our website, 3m.com.au/sospodcast for further resources on ANSTO and any of those safety resources Carmen did mention. Be sure to subscribe, rate, review and share through Apple Podcasts, Spotify, Google Podcasts or wherever you get this podcast from. And as Albert Einstein said, "Information is not knowledge. The only source of knowledge is experience." Thanks for listening and have a safe day.