

occupational hygiene MATTERS

Issue # 134 • March 2016



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UPCOMING EVENTS 2016 SEMINAR SERIES

Environmental Noise; Assessment,
Management and Challenges for
Hygienists

<http://tinyurl.com/zq3hvyd>

COMING SOON

GHS for Occupational Hygienists
Asbestos in Soil
Leadership

FROM THE PRESIDENT • CAROLINE LANGLEY



After 100 days in office, Council has reflected on what we have achieved. Most of our work has been behind the scenes, setting up projects, teams and systems that will bear fruit for our members.

We held the first formal **Council induction** in January; it was a great learning process for all and identified a number of improvements for following years.

Deb Glass has kindly agreed to Chair our **Mentoring Committee** leading a team of Gerard Tiernan, Dustin Bennett and Terry Gorman. They will run a mentoring pilot over the next 6 months and road test our mentor systems and tools as they are developed. We aim to iron out any bugs before the program

launch later in the year.

Council is currently reviewing the **Seminar Program**. In the interim three technical seminars are planned in the coming months, all of practical interest to members: Environmental Noise, Asbestos in Soils and GHS Implementation for Occupational Hygienists. Watch out for these in coming weeks and register early to ensure your place.

Council has merged the **Newsletter and Communications Committee** with revised Terms of Reference reflecting the need to broaden our communication, including social media. The post conference 'blast' was a great effort from the Committee and we look forward to more.

Council has been working for the last year to ensure strong & transparent financial systems. In February we made a significant decision to **outsource our bookkeeping to 'IDS Bookkeeping'** a fully qualified and registered premium service. This will free up administration resources to focus on member services, improve financial planning budgeting and control, and ensure timely reporting. It will also provide an additional layer of security to ensure robust financial management of members' funds. IDS Bookkeeping is an innovative social enterprise developed by Independent Disability Services, that provides accredited bookkeeping training and employment for people with a disability. All IDS profits go back to the community supporting people with a disability; AIOH is delighted to support this community initiative and we look forward to a strong working relationship.

The Executive has taken time out to complete a **mid-term review of the AIOH Strategic Plan 2013 to 2018**. This will provide a focus for incoming Councils. We will publish a summary of progress to date and look forward to feedback from members.

Council has also revised and updated a number of important **policies** that provide guidance and ensure internal consistency and quality in our operations. They include Advertising, Conflict of Interest, External Representation and Committees Policies. These will be accessible via our website soon.





The AIOH has provided two formal **submissions to Safe Work Australia**: on the Role of Chemical Exposure Standards on Work Health and Safety Laws; and Proposed Amendments to Work Health and Safety Requirements for Inorganic Lead. We have also participated in a review of the Mesothelioma Registry coordinated by PwC. Both Council and SWA are continuing to benefit from regular discussions on a range of topics.

Council has sought and accepted legal advice on the best model and structure for the setup of the 'AIOH Foundation'. The '**AIOH Foundation**' will be established as an independent charitable entity. It will provide a vehicle for members

to raise money and make charitable donations and or personal bequests, for improving occupational hygiene and workplace health in Australia. There is still much groundwork to do, but we look forward to keeping members up to date on progress.

Council has continued the focus on nurturing our **international relationships** with a particular focus on activities in our region. The AIOH has kindly accepted an invitation from Dr Doo Yong Park President of the **Asian Network of Occupational Hygiene**, to join its Board and attend their first conference in Hanoi in June. We strongly support ANOH, and look forward to working with them to assist occupational hygiene societies in the region.

I am delighted to announce the formation of an independent **Indonesian Industrial Hygiene Association**. The AIOH has accepted an invitation to speak at their inaugural seminar and society launch in Jakarta on 31 May 2016. Members will also be pleased to hear that IOHA has accepted the **Vietnam Industrial Hygiene Association** as a member. These are all exciting developments, and indicate the profession's global stature and potential for positive influence is growing.

As you can see it has been a busy time, and Council is working hard to deliver on our commitments to members. I look forward to reporting on how we are progressing in our next newsletter.

We would love to hear any feedback from you that can assist us to develop further and lift the value of AIOH for members. Send your thoughts and ideas to me at admin@aioh.org.au.

FROM THE EXECUTIVE DIRECTOR • BARRY WESTHORPE



EFFECTIVE CONSULTING

THINK

You may recall during Perry Logan's Leadership seminar at our Perth Conference that different personality types were discussed. It seems that a number of consultants are A-type personalities i.e. they are ambitious and driven. The ability to not only focus on the tasks at hand, but also to think critically about the work to be performed is important.

For example, your client may be asking you to find cost savings in a health and safety process, first, try to understand why this is critical to the business. Are costs too high/profits too low? Has there been incidents either official or not recorded? Knowing how to think this way may help you develop better insights and solutions for your client.

RESOURCEFULNESS

You may be asked to solve problems that are new to you or new to the industry you are working in. If help is needed you can approach your team, your manager, your peers, internal experts, and other external resources. It's likely that someone has managed a similar or the same problem before, or can assist you think to "think differently" about the context of the problem. Your effort will also show that you are the type that "doesn't give up" easily.

SPECIALISE

Develop a skill or a particular knowledge that differentiates you from others, ideally in a growth area of occupational hygiene.

DELIVER

Do what you said you'd do, when you said you were going to do it, with consistent quality and detail required.

This builds credibility and trust.

ASK

To understand, clarify and then restate your understanding.

This will provide all parties with the assurance that your work is "on the right track".



VALE GERRY COLES • DOUG RHODES



Gerry was one of the most serious thinkers in the fraternity of occupational hygienists, and was one of the founding fathers of the Australian Institute of Occupational Hygienists. I first met Gerry in 1978 at a meeting in Sydney of the Scientists responsible for the ultimate establishment of the Australian Institute of Occupational Hygienists in 1980.

Not long after, Gerry, together with Tony Findlay, assisted Howard Kusnetz, a leading industrial hygienist from the U.S., in proctoring the first Australian four paper examination in 1982, to join the American Board of Industrial Hygienists, as a Certified Industrial Hygienist.

Gerry Coles used to come to Sydney in the mid 1980's when I was the Occupational Hygienist for the Shell Refinery Company based at the Shell refinery in Clyde, just west of Sydney. Gerry was then the Senior Occupational Hygienist for Shell Australia, based in Melbourne, and he would come and look at the work I was doing on a Thermal Desorption Unit, an instrument that

extracted the workplace airborne contaminants into a gas chromatograph by controlled heating of the desorption tube. Gerry was convinced this was the way hygienists would monitor the workplace for years to come, and in fact he was largely responsible for getting the instrument purchased.



In 1984 I was transferred from Sydney to become the Senior Occupational Hygienist for the Shell Company based in Melbourne. Gerry was the current occupational hygienist and he insisted in giving me a handover that lasted in excess of 6 months, for which I was extremely grateful. During the handover period he took me to every significant Shell location around Australia, and where Shell had a considerable presence. Upon his retirement from Shell Gerry established himself as a valuable resource for Deakin University's occupational hygiene programme based in Waurin Ponds, just outside of Geelong.

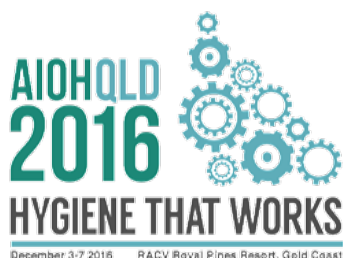
Gerry had considerable experience in occupational hygiene activities in a number of countries including Uganda (prior to Idi Amin), in the UK for British Rail and of course here in Australia. He was extremely confident in working out the implications of numerous pieces of any new occupational health legislation and would spend many long hours putting together responses to various state government initiatives in the fields of occupational health and safety.

Gerry was very particular and thorough, and yet to many he was too detailed in preparing his reports. He was often accused of spending too much time on his excellent report details and too little time on coming up with practical solutions to the problem.

Gerry would come to many of the AIOH Conferences in his short shorts and do lap after lap prior to the proceedings starting each morning. He was a dedicated attendee who listened to every word of a presentation and would often ask well thought out questions while actually knowing the answers himself.

Gerry's special hobby was sailing and he would often take his sailing boat out from Werribee, where he lived, and launch it in the Bay. It was a hobby that Ingrid and he enjoyed together and they would spend hours just experiencing the winds on the Bay. Ultimately when they both retired, Gerry and Ingrid, together with their boat, moved into a lovely home near the water at Metung, a popular seaside resort near the Lakes Entrance. Here they would spend many hours enjoying the peaceful winds that swept across Lake King and Swan Reach Bay.

Finally I would like to say that Gerry Coles will be missed by many of his friends as a person who thought deeply about his work, a morally dedicated man, and who will be remembered as one of the truly great occupational hygienists.



AIOH2016 • CALL FOR PAPERS

The 2016 AIOH Conference Committee are actively seeking out potential speakers who will share their experiences and knowledge, to make a difference to occupational hygiene practices.

Areas of interest include:

- Successful case histories illustrating how occupational hygiene/health has delivered value and improvements.
- Cost effective and practical control solutions.
- Framing a business case for control and the delivery of value.
- Continuous improvement of successful hygiene that works. "If I could do this again I would."

Perhaps your work fits our criteria or you may be aware of a colleague who has a great story to share?

If you do then, submit an abstract to present a paper, poster or Ignite presentation!

FOR MORE INFORMATION VISIT

<https://aioh.cvent.com/AIOH2016C>

NATIONAL REGISTER OF WORKPLACE HEALTH AND SAFETY PROFESSIONALS • DEREK MILLER – PRESIDENT NZOHS

The Health and Safety Association of New Zealand ([HASANZ](#)) is a representative body for workplace health and safety professions in New Zealand. The New Zealand Occupational Hygiene Society (NZOHS) has been involved with HASANZ since its establishment.



HASANZ has a number of [objectives](#). A priority area is improving access to quality advice for businesses and lifting the professional standard of workplace health and safety. In other words, increased professionalism equals increased confidence in health and safety advice and services. As part of this process HASANZ is developing an online register of competent health and safety professionals, working alongside the New Zealand business community to ensure that their needs are met.

The intent of this professional register is to make quality health and safety advice more easily available to businesses, workers and industry bodies or the general public, and help reassure them that there are competent professionals that they can rely on to give them advice suited to their needs. The HASANZ register will give New Zealanders access to a range of expertise across all workplace health and safety disciplines, including occupational hygienists. With the introduction of the new Health and Safety at Work Act, businesses will need to manage their risks more effectively and the register will help them find the right professionals to assist with this, if required.

This register will list both independent consultants and in-house professionals in health and safety. It is important to note that only individuals, not companies, will be able to register because the competence of the person is what is important, not the reputation of the firm. To be on the national register a professional must be a member of a New Zealand professional body at a level determined by the organisation. In addition, the professional body must meet the professional practice requirements for HASANZ membership.

Help is at hand while the register is being developed! For businesses who need to access good advice now, HASANZ has developed a handy checklist of “[5 Quick Questions](#)” to help them choose qualified and competent health and safety advisors. Along with this, they have developed a partner resource called “Choosing a Workplace Health and Safety Advisor” (also available on the HASANZ website).

When the register is ready, anyone wanting to be listed will need to meet the registration standard of a HASANZ full member association (for occupational hygienists the NZOHS information on membership is available at www.nzohs.org.nz). The registration standard for NZOHS members is under development and more information on this will be forthcoming as systems and processes are finalised. It is expected that the register will be ready late 2016.

WA CHAPTER SUNDOWNER, MARCH 2016 • JANINE MCLEMENTS

The first WA Chapter Sundowner for 2016 was held just recently, on March 14, at the ChemCentre Seminar Room, Curtin University, Bentley. The event kicked off with attendees making the most of the opportunity to mingle and enjoy drinks and tasty finger food ahead of the formal proceedings which were opened by WA SLO, Dr Barry Chesson.

Barry provided an update of Council activities and touched on the focus areas for the coming year. He encouraged those present to explore the updated AIOH website and to consider providing feedback on the new layout and features to the AIOH office. He also listed the following tentative dates for other WA 2016 Sundowners.

- 23rd May
- 22nd August (coinciding with Hearing Awareness Week)
- 21st November

So, save the dates and stay tuned for more detail on presentation topics.



Barry then welcomed Michael Tunnecliffe, Clinical Psychologist (pictured left), to the podium to speak to the group regarding “Resilience – How to Master the Art of Bounce-back”. Michael has worked in psychology in the public and private sectors for over 30 years and is currently a Director with BSS Employee Assistance, a significant provider of employee assistance programs and mental health and fitness for work services to the resource sector. His work has also included provision of training and consultancy services focused on workplace stress and mental well-being and a senior role with the Psychology Unit with the WA Police.





As Michael explored his topic, he drew on that background to complement his slides with real life examples and sound practical advice that kept the group engaged. He highlighted the range of problems stress can cause including the negative impact on the way we function generally, our physical health and our relationships. An author himself, he touched on the popularity of self-help books related to the issue to illustrate how common the concern is. The nods from audience made it clear that this psycho-social health concern is one occupational hygiene personnel also have “exposure” to, either directly or indirectly, in the workplace or otherwise.

A particularly valuable take-away from the session was what Michael titled the “Seven Keys to Personal Resilience”. Again, he drew upon his experience to expand upon each of these keys - Robustness, Responsibility, Reflection, Regulation, Remembering, Relationships and Recoil – in a way that connected with the audience. And, while exploring each point, Michael suggested tools and tips that again drew nods from the group.

Next up, Barry introduced Gary de-Vries, a Director of ASSA, a local safety solutions consultancy. Gary, who has been involved in the establishment of Australasia Laughter Yoga, spoke with passion on an appropriate follow-on to the resilience topic – Laughter Yoga. During his short session Gary shared how he became interested in the area and the benefits it is said to bring. Then those present were treated to a short introductory audience participation session. That truly brought smiles to everyone’s faces and was a great way to finish the formal part of the evening!

The WA Chapter of the AIOH would like to thank both Michael and Gary for their valuable and enjoyable presentations, and to acknowledge Greg Payne and Sarit Kanabar for their excellent work manning the registration desk. A particularly special mention though goes to the ChemCentre, for providing the venue, staff to assist with set-up and AV matters, and on-going financial contributions to our Sundowner events.



Gary de-Vries introduces the audience to the concept of laughter yoga and gets them involved!!

SA CHAPTER SUNDOWNER, FEBRUARY 2016 • JWALIT PARIKH

The AIOH SA Chapter meeting was held at lunch time on Friday 19th February 2016. Twenty three people representing industry, defence, government, consulting and academia/ research attended this chapter meeting.



Mr Joe Pedicini, Principal Environmental Engineer for LBW Environmental Projects, delivered his presentation titled “**Contaminated Site Management in South Australia – Changing Regulatory Drivers and Experience**”. Joe has extensive experience in the field of environmental consulting. Initially working in air quality and water quality in 1988 but specialising in contaminated land since 1996 in South Australia. Joe has provided site-wide contaminated land strategy and management advice, independent reviews of monitoring programs, site assessments and reports, managed a large number of contaminated site assessments and remediation projects (for both soil and groundwater) and contaminated land audits for a wide range of clients including defence, state government, councils, residential developers, manufacturing, petroleum and mining. In 2015 Joe was admitted as a member of Site Contamination Practitioners Australia as a Certified Practitioner Site Assessment and Management (CP SAM).

Joe’s presentation outlined history of contaminated site management in South Australia starting from 1993 when the Environment Protection Act was introduced through to 2016 when EPA guidance is being amended to reflect ASC NEPM. The role and the work of site contamination consultant had changed from experience based evaluation, to meaningful data collection since the introduction of NEPM measure in 1999. Quantum advances have

been achieved in the regulatory history of South Australia since early 2000s with the development of EPA guidelines and introduction of site contamination auditor scheme in 2008. Joe's presentation was engaging with various examples of his experiences and futuristic views on regulation, evidence and guideline based evaluations of the potentially contaminated sites.

Mr Holger Schwarz, Senior Regional Manager for Narda Safety Test Solutions delivered his presentation on **"Electromagnetic Fields – Instrumentation and Measurement"**. Holger has over 25 years' experience in RF test-equipment and spectrum analysis, first at Wandel & Goltermann and then its successor Narda Safety Test Solutions, which was founded in 2000 and is one of the leading providers of high quality, application tailored measurement solutions covering RF Safety, EMC and RF Testing. In his role, Holger is currently responsible for Australia, France, North America, Asia and New Zealand.

Holger discussed on the short term and long term biological effects of the EMF and the influences of the distance and the frequencies on the biological effects.

Holger provided background on the setting up of the limit values or guidelines for the EMF exposures, workplace safety zones and installation of different hazard warning signs.

With a varied range of examples and demonstrations, Holger also discussed what, when, why, how and where to of the usefulness of personal monitors, broadband monitors and spectrum analysers.

Towards the end the attendees were briefed about the upcoming AIOH seminars, AIOH position paper on "Nickel and Its Compounds-draft for member comment", membership forms and application process for new attendees. Attendees continued their discussion on the two interesting topics of the day whilst networking over lunch.

The SA AIOH Chapter would like to thank Joe Pedicini and Holger Schwarz for delivering very captivating sessions and we look forward to our next meeting planned for May this year.



NT CHAPTER SUNDOWNER, MARCH 2016 • BROOKE BEST

On a typical sweltering Northern Territory evening, fifteen passionate hygienists came together to attend the inaugural NT Chapter gathering on Saturday 19th March. In true laid-back Territory style, our first catch up was a casual 'Meet and Greet' event held at the Darwin Waterfront. With a fantastic afternoon tropical storm, we hoped the ambient temperature would cool down for the evening festivities, but alas, the humidity was out in force. As Territorians, we were well equipped to manage our heat stress! The event began with refreshments at the Wharf One – Terrace Bar, then we moved next door for some wood fired pizzas to continue our conversations which lasted late into the evening (it's hard to break up a group of excited hygienists)!



Our first NT Chapter event was lucky enough to coincide with the AIOH Basics Principles Course being held that week in Darwin. Lucky for us we were able to network with HSE professionals from other remote areas of Australia, like Kununurra and Townsville, who were in town for the course. The event enabled us to expand our networks and contacts, and brainstorm future NT Chapter events – keep an eye out for our next event scheduled for June!

RESIGNATION OF HONORARY TREASURER

Due to personal reasons our Treasurer Dianne Allen has reluctantly advised of her resignation as Treasurer.

We wish Di well and thank her for her enormous contribution to AIOH as our Treasurer.

Council will manage the vacancy in accordance with the Rules and Statement of Purpose (Rule 24).

In the short term the Treasurers responsibilities will be managed by the Executive





SPECIAL FEATURE • 2015 3M BEST CONFERENCE PAPER

HAVE YOU GOT YOUR HEAD IN THE SAND? Respirable Crystalline Silica Exposures of Restoration Stonemasons

Authors: Alamango K^{1,2}, Whitelaw J.L² and Apthorpe L²
Pickford & Rhyder Consulting¹, University Of Wollongong²

Keywords: silica exposure, respirable, crystalline, stonemasons, grinding, sandstone

ABSTRACT

Restoration stonemasons play a vital role in preserving culturally significant heritage buildings and the majority of culturally significant buildings in Sydney are constructed using Sydney sandstone, with an average silica content of 75%. Stonemasons conducting the close inspection required for precision sandstone grinding restoration works are considered at significant risk of exposure to respirable crystalline silica (RCS).

An occupational hygiene survey was conducted to assess the risk of RCS exposure of restoration stonemasons conducting various tasks. Exposure monitoring for respirable dust (RD) and RCS was undertaken and the task of grinding sandstone determined as the highest exposure risk. 'Spinning' and 'Chopping out' tasks were identified as 'high risk' activities with excessive exposures of 4, 6 and 12 mg/m³, well above the workplace exposure standard (WES) of 0.1 mg/m³.

Short duration task monitoring was conducted to better evaluate worker exposures and job rotation during the highest risk grinding task was not determined as a suitable control to reduce stonemason exposures. A trial was undertaken using on-tool dust collecting shrouds attached to local exhaust ventilation (LEV) system to evaluate the effectiveness and suitability to grinding tasks, with a 99% exposure reduction achieved.

Reducing stonemason exposures below the WES was still not possible for grinding tasks; and numerous control measures were recommended to ensure workers are not exposed to concentrations of RCS likely to cause risk to health. Implementation of a combination of control measures is essential in reducing RCS exposure risk. Controls selected in line with the hierarchy of controls include:- mini enclosures, wet methods of dust suppression, on-tool dust collection shrouds and local exhaust ventilation (LEV); along with appropriate respiratory protection commensurate to exposure and powered air purifying respirators (PAPR) when grinding sandstone.

Stonemasons grinding sandstone are considered at high risk of RCS exposure. They were encouraged to participate in equipment trials and evaluate their effectiveness. The more informed the stonemasons became, the more inspired they were to reduce their RCS exposure and integrate small, effective changes during sandstone restoration activities. Utilising knowledge from industry experts was invaluable in ensuring a successful trial, and gaining the confidence of the cohort. Throughout the risk assessment process, the stonemasons increased their knowledge and understanding of RCS.

1. INTRODUCTION & BACKGROUND

Silica is an extremely common mineral and tens of millions of workers worldwide are exposed to this substance on a daily basis, with many workers suffering diseases caused by respirable crystalline silica RCS. Known as alpha quartz or crystalline silica, it is found in most types of rock, soil, sand, clay and gravel (AIOH 2009). As a major component in building materials such as stone, tiles, concrete and bricks, it poses a risk to health for many workers in a broad range of occupations and industries conducting crushing, blasting, grinding and cutting activities.

Commonly referred to as 'silica', a higher risk profile is specifically associated with the inhalation of respirable sized crystalline silica particles (generally <10 µm) to the lower regions of the lungs (AS2985-2009), leading to the fibrotic lung disease 'silicosis'. 'Acute' and 'accelerated' forms of silicosis are an increasing concern as rapid death can occur within months and/or several years of exposure (Leung et al 2012), where workers are exposed to RCS concentrations ranging from 1.5 to above 10 mg/m³ (NIOSH 2002). 'Chronic' silicosis often diagnosed after 10 and 30 years of RCS exposure.

RCS is classified as 'carcinogenic to humans Group 1' by the International Agency for Research on Cancer (IARC 1997), as a 'definite lung carcinogen' by the USA National Toxicology Program (NTP 2000), and is the second highest occupational carcinogen in Great Britain with exposure to RCS considered to become one of the main causes of occupational cancer in the future (HSE 2014). Whilst the carcinogenic status of RCS is widely recognised around the world, it is currently not listed as a carcinogen on the SafeWork Australia Hazardous Substances Information System (HSIS), even though it was identified in Australia as an occupational carcinogenic agent requiring priority preventative action in 2012 (Fernandez et al 2012).

The majority of culturally significant buildings in Sydney are constructed using Sydney sandstone, with an average silica content of 75%. Therefore Sydney sandstone constitutes a significant health risk for restoration stonemasons preserving heritage sandstone buildings, and occupational hygiene assessment for RCS was conducted.



2. SITE & PROCESS DESCRIPTION

The majority of heritage restoration works undertaken at the site are conducted in-situ on sandstone buildings by stonemasons, with work areas often located on elevated scaffold. Site operators use a variety of manual and power tools such as lump hammers, chisels, angle grinders, jackhammers and saws.

Various activities are conducted at this site including 'chopping out' old weathered and degraded stone with grinder and jack hammer, 'spinning' with grinders, drilling out and pinning sandstone, patching and re-pointing stone, dry sweeping, dry shovelling waste, manual carrying and disposal of waste into skip bins etc.



Figure 1: Lump hammer & chisel Figure 2: 'Spinning' with angle grinder Figure 3: 'Chopping out' with grinder

Source: K. Alamango 2015

Excessive sandstone dust and debris can often be present on work surfaces. Controls such as wet dust suppression methods are not utilised to reduce the generation of dust, and water sprays aren't suitable for use with grinders. Respiratory protection is usually the only control used to protect operators from RCS exposure, and may be worn when conducting highly dusty tasks, and not when adjacent to dusty processes.

3. MEASUREMENT STRATEGY

An occupational hygiene study was conducted to assess the risk of RCS exposure of a small cohort of 7 workers replacing weathered sandstone on buildings, with personal exposure monitoring for respirable dust (RD) and RCS undertaken.

SIMPEDS miniature size-selecting cyclones were operated at a flow-rate of 2.2 Litres/min, and calibrated pre and post sampling using a calibrated secondary flowmeter as per AS2985-2009. Personal samples were taken within the operator breathing zone to estimate worker exposure to respirable dust (RD) and RCS during a representative work period of (e.g. 8 hours).

When required, 2 hour and 15 minute short term samples were taken during highly dusty tasks. Samples were taken and analysed in accordance with AS 2985-2009 'Workplace Atmospheres - Method for Sampling and Gravimetric Determination of Respirable Dust' in conjunction with the 'Direct on filter method' of the National Health & Medical Research Council (NH&MRC) 'Methods for Measurement of Quartz in Respirable Airborne Dust by Infrared Spectroscopy and X-Ray Diffractometry', October 1984.

The samples were analysed by NATA accredited laboratory Pickford & Rhyder Consulting using gravimetric techniques and the airborne concentration of RD was calculated using the total volume of air passed through the filter as per (AS2985-2009). RCS analysis by Fourier Transform Infrared (FTIR) Spectroscopy was chosen as its sensitivity has been determined superior to X-ray Diffraction (XRD) with detection limits of as low as 1 to 3 micrograms reported (Ojima 2003).

Results were compared with the current SafeWork Australia Workplace Exposure Standards (WES) for respirable crystalline silica of 0.1 mg/m³ 8 hour, time weighted average (TWA). To place restraint on exposure excursions significantly higher than the WES, results were also compared with the (NOHSC 2001) permissible variation guidelines, where short term (30 minute) exposures should not exceed 0.3 mg/m³ and single short term (15 min) values should not exceed 0.5 mg/m³.

Safework Australia does not publish a WES for respirable dust; however results were compared with the (AIOH 2014) 'Dusts - Not Otherwise Specified' (DNOS) trigger value of 1 mg/m³ (TWA), where trigger values are considered reasonable benchmarks for control implementation.

4. MEASUREMENT RESULTS

The estimated RD and RCS results, for 18 personal samples as measured over three days at the site are summarised in RCS ascending exposure order as follows:-

OPERATOR & TASK (8 hour samples, unless task samples as indicated below)	Respirable Dust (AIOH DNOS trigger value 1 mg/m ³)	Respirable Crystalline Silica WES 0.1 mg/m ³
Site Manager, supervising works	0.03	0.010
Site Manager, supervising works	0.04	0.024
Labourer, dry sweeping & water washing	0.40	0.115
Labourer, clean-up & pointing and clean with water gurney	0.31	0.140
Stonemason, water gurney cleaning, colour match/stone patching	0.30	0.179
Stonemason, drilling out pins, prepping stone for patching	0.55	0.323
Stonemason grinding and core drilling	0.51	0.350
Stonemason Patching, hand chiselling, opening up joints with grinder for 12 mins (2 hours)	1.20	0.824
Stonemason Grinder 'spinning' with dust shroud (15 mins)	2.11	1.21
Stonemason, indenting stone dressing with grinder	7.06	4*
Stonemason, spinning with grinder, patching & re-tooling with chisels	6.77	4*
Stonemason, stone preparation grinding, hammer & chisel	1.56	6*
Stonemason Grinder 'chopping out' with dust shroud (15 mins)	8.60	6.45
Stonemason, 'chopping out' using grinder & jackhammer	20.5	12*
Stonemason, demolish stone/'chopping out' using grinder & demolition hammer for 40 mins (2 hours)	19.5	15*
Stonemason, Grinder 'spinning' no dust shroud (15 mins)	170	97*
Stonemason, Grinder 'chopping out' no dust shroud (15 mins)	629	472*

BELOW RCS WES & AIOH RD DNOS trigger value

ABOVE RCS WES & AIOH RD DNOS trigger value

RD: Detection Limit 0.01 mg RCS: Detection Limit 0.005 mg

*Result calculated using percentage of RCS in stonemason RD samples as quartz amount exceeded FTIR calibration range of 1.0 mg per filter

5. DISCUSSION

RCS results for all stonemasons exceeded the WES of 0.1 mg/m³, with some exposures calculated at 40, 60 and 120 times above WES. These results highlight significant risk for workers. RD results for stonemasons conducting spinning and chopping out tasks ranged from 7 to 20 times above the DNOS trigger value of 1 mg/m³.

Results for short duration (2 hour) samples for spinning and chopping out tasks were 8 and 150 times above the WES, and they well exceeded the permissible variation guideline of 0.3 mg/m³. Based on these results, a common control strategy such as job rotation would not be suitable.

The use of half face negative pressure respirators was the predominant method of RCS control for workers, however many exposures far exceeded the protection factor achievable by the respirators of 'ten times' the WES. In addition, the majority of operators had beards and/or significant stubble growth, and would not be adequately protected against RCS exposure (AS/NZS 1712:2009). This type of respiratory protection is considered ineffective for workers with facial hair.

Water, whilst generally not used for dust suppression on this site, is highly desirable as a control method as it not only reduces the generation of airborne dust, but also rapidly ages RCS dust, thereby reducing its toxic effect on lung cells (AIOH 2009). Dust captured at the source is the preferred method of controlling dust as it reduces contamination of the work area and reduces exposures for operators and adjacent workers. Therefore, to assess the effectiveness and suitability as a control method, and to quantify potential RCS reductions, equipment trials were undertaken using on-tool dust collection shrouds and local exhaust ventilation (LEV) systems to capture and control dust.



6. EQUIPMENT TRIALS

Trials were carried out using on-tool dust shrouds and an LEV system provided by Makita Australia. The trials were conducted by on-site stonemasons with and without dust collecting shrouds to assess effectiveness. The stonemasons were initially sceptical speculating that the use of dust shrouds would make tasks more difficult and not provide any benefit. The assistance and knowledge from Makita, an industry expert, was invaluable in ensuring a successful trial. They were able to recommend new and innovative tools incorporating anti-vibration technology and dust collection shrouds for a variety of equipment and stonemason tasks. This strategy proved very successful, ultimately gaining the confidence of site personnel.



Results for short term (15 minute) samples for stonemasons conducting spinning and chopping out tasks without dust shrouds were extreme at 97 and 472 mg/m^3 , and well exceeded the permissible variation guideline of 0.5 mg/m^3 . Where worker RCS exposures are greater than 1 mg/m^3 in an 8 hour work shift, there is greater risk of acute silicosis (HSE 2006), and immediate action should be taken to reduce the generation of dust.



Figure 4: 'Chopping out' no dust shroud, Figure 5: 'Chopping out' with dust shroud, Figure 6: 'Spinning' with shroud
Source K. Alamango 2015

The trials for spinning and chopping out tasks with dust shrouds were very successful in reducing RCS concentrations by a notable 99%. However, even with dust shrouds and LEV, RCS concentrations were still 12 and 64 times above the WES for these tasks. Therefore implementation of combination of engineering controls along with a fully comprehensive respiratory protection program in accordance with AS/NZS 1715 is essential to adequately protect workers.

7. RESPIRATORY PROTECTION

The current respirators do not provide sufficient protection for many site tasks, only providing protection for operators exposed to RCS concentrations of up to 10 times the WES, if worn correctly by clean shaven, fit tested operators. It is noted that most site operators had full beards or several days' stubble growth meaning this type of respirator would have limited effectiveness due to inadequate facial seal.

Respirators must be suitable for the level of risk associated with individual tasks, with a variety provided to suit all workers, face sizes and shapes, and selected for RCS use from Australian Standard:- 'AS/NZS 1715:2009:- Selection use and maintenance of respiratory protective devices' with fit testing, respirator use and training mandatory requirements.

Respirators supplied for use were half face negative pressure respirators with replaceable particulate cartridges, for which most operators had not been fit tested. For this workforce, a powered air purifying respirator (PAPR) with P2 filter (e.g. 3M Versaflo M-406 PAPR belt mounted air units) is suitable where high levels of particulate protection is required (e.g. over 10 times and less than 50 times the WES) i.e. for most spinning tasks, or when operators have facial hair growth such as beard, goatee or stubble.

PAPR's with P3 filters are suitable to protect operators from RCS exposures up to and exceeding 100 times the WES, i.e. during chopping out tasks. Whilst PAPR's are widely recognised as appropriate for abrasive blasting activities, stonemasons conducting grinding activities are often exposed to RCS concentrations far in excess of abrasive blasters (HSE 2012), making PAPR's highly suitable for stonemasons. A clean shaven policy may be considered for operators not required to use PAPR's.

8. LOCAL EXHAUST VENTILATION (LEV) SYSTEMS

LEV systems for use with on-tool dust collection shrouds should be chosen as per the AS/NZS 60335.2.69:2012 'Requirements for wet/dry vacuum cleaners', with systems used for 'mineral dust (containing quartz)' required to be 'at least Class M'. In this document, Class M (Medium hazard) systems are suitable for use with hazardous substances with a WES of $\geq 0.1 \text{ mg}/\text{m}^3$ such as the Festool Australia CT361M. However, Class H (high hazard) systems are listed as 'suitable for use with carcinogenic dusts' with a WES of $< 0.1 \text{ mg}/\text{m}^3$.



The UK Health and Safety Executive (HSE 2012) recommend the use of a minimum Class M system with silica dusts, better maintain flow rate for superior capture and control of dust. European and International standards (i.e. EN 60335-2-69 and IEC 60335-2-69), recognise RCS as a carcinogen with Class H systems recommended.

There is much confusion with the Class of LEV system that should be used with RCS, and for any system in use, education and training is necessary. Most Australian industry suppliers recommend Class L (low hazard) systems for use with RCS and not the minimum requirement Class M system. In addition, whilst the RCS WES of 0.1 mg/m^3

is borderline for classification as per AS/NZS 60335.2.69:2012, as it is considered a carcinogenic dust by IARC only a Class H system should be chosen for use to ensure workers are adequately protected.

Simple, relevant and practical information should be created by Government legislators to provide guidance to Australian Small and Medium Enterprises (SME) and industry suppliers, to advise suitable LEV systems for the control of RCS.

9. RECOMMENDATIONS

Implementing a range of suitable control measures is required to reduce worker exposure and the generation of RCS dust in the workplace, including but not limited to:- use of mini enclosures for dust containment, on-tool dust shrouds, minimum Class M LEV systems, regular housekeeping, water for dust suppression, training, provision of clean laundered clothing.

Implementation of a fully comprehensive respirator program including:- fit testing, training and appropriate respiratory protection commensurate to RCS concentrations for different activities, including PAPR's for high risk operators.

Health monitoring including work and medical history, physical examination, chest X-ray and lung function tests along with workplace exposure monitoring are required for all workers exposed to RCS above 0.05 mg/m^3 as recommended by SafeWork Australia and the AIOH.

RCS is currently classified as a hazardous chemical by SafeWork Australia. The reclassification of RCS as an occupational carcinogen in Australia, in line with the IARC classification, is considered important to drive action towards ensuring the protection of workers who may be exposed to RCS.

As a priority, it is recommended a new RCS fact sheet is developed created by Government legislators to provide the latest RCS guidance information to small and medium enterprises (SME), equipment suppliers etc. Guidance material should include the IARC carcinogenic classification of RCS, requirements for worker health and workplace exposure monitoring, appropriate types of respiratory protection for worker tasks and exposure concentrations, and cost effective engineering controls including dust collection shrouds and at least the minimum Class M LEV systems for use with RCS.

The creation of industry networking groups is recommended to share knowledge, where SME occupational health personnel can connect with experts including occupational hygienists and equipment suppliers. Information such as exposure data and new generation equipment, would greatly assist stonemasons and SME's with the preparation of RCS risk assessments and minimisation of RCS exposures.

10. CONCLUSION

Sampling results indicate restoration stonemasons are exposed to excessive RCS concentrations of up to and at times in excess of 12 mg/m^3 , even with dust shrouds, and therefore may be susceptible to inflammatory lung responses and respiratory system diseases such as silicosis. There is also greater risk of acute silicosis when RCS exposures exceed 1 mg/m^3 .

Exposure monitoring and grinding trials confirmed it is not possible to reduce stonemason spinning and chopping out exposures to below the WES with dust shrouds, and implementation of a combination of engineering control measures, including PAPR's with P2 and P3 filters for some operators and tasks, is essential in reducing RCS risk.

Whilst initially resistant, this stonemason cohort became more engaged as they trialled new equipment and practices. They observed the great effect of integrating small changes such as regular housekeeping and hosing of work surfaces to improve their workplace and reduce potential exposures to RCS. The more informed the stonemasons became about RCS, the more inspired they were to reduce their RCS exposures.

Utilising knowledge from industry experts was invaluable in ensuring a successful trial, and gaining the confidence of site personnel. Throughout the RCS risk assessment process stonemasons increased their knowledge and understanding of this hazardous material.

11. LIMITATIONS

Whilst numerous chemical and physical hazards were recognised during the survey, this paper is limited to the assessment of RCS & RD exposures.

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NEXT EDITION

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All copy should be sent to the AIOH Administration Manager via email at laura@aioh.org.au.

We look forward to your contributions.

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