Risk Reduction in the Context of Occupational Exposure to Respirable Crystalline Silica

BOHS Response to All-Party Parliamentary Group on Respiratory Health Call for Evidence to Update Report:

Silica: the Next Asbestos?

This response consists of two parts.

Part I

Presents a general introduction and systematic overview of the opportunities to manage risks arising from RCS. It is a fuller response than was possible when responding to the B & CE call for evidence. It focuses on the opportunities to control and prevent risk in the workplace. It is hoped that this will be of some use to the Group.

Part II

Focuses directly on recent developments in the control of RCS, including post-contamination options, which is probably best understood within the context provided by Part I. However, it does directly respond to the APPGs call for evidence.

(Responses to Professor Kevin Bampton, CEO, British Occupational Hygiene Society kevin.bampton@bohs.org)

About the British Occupational Hygiene Society

The British Occupational Hygiene Society is a scientific charity and the Chartered Society for Worker Health Protection. We are the professional body for occupational hygienists, the scientists who provide the expertise to prevent and control exposures that lead to workplace diseases. It is also the home of the Faculty of Asbestos Analysis and Management, the UK's leading independent body in the science and practice of control, detection and understanding of asbestos exposure risk.

Since the 1950s it has been a leading and authoritative voice in understanding the prevention of workplace disease and works closely with the Occupational Hygiene teams in the Health and Safety Executive in pursuit of its mission to make the UK a country where occupational exposures are not an appreciable cause of death or disease.

Since 2015, it has led a significant educational and technical campaign, Breathe Freely to raise awareness of the potential to control respiratory illnesses arising from construction. This campaign is now global, being adopted by all of the major English-speaking economies of the world. The control of respirable crystalline silica is at the heart of this campaign.

INTRODUCTION

BOHS made a targeted response to the B & CE consultation leading to the APPG Report in 2020.

The consulted questions left room for more detailed feedback on how the UK can more effectively control the respiratory health burden caused by exposure to respirable crystalline silica.

BOHS therefore welcomes the focus on the management of risk, as well as the opportunity to review latest developments in helping to address those risks.


Part 1

1. The Economic Case for RCS Risk Reduction

The epidemic of RCS-related illnesses is the result of a political, social and economic choice. Unlike cancers caused by genetic predisposition, silica exposure is entirely preventable, because it results from personal, business, industrial and policy choices. However, to remove these risks would require sacrifices and costs or, in other words, prioritisation and investment on behalf of the private and public sectors. However, like the cost of environmental pollution, the price is always paid and the cost of remediation of the damage is often greater in every sense than the cost of prevention.

The challenge is to determine how to allocate the burden in a way that enables us to meet other social priorities, such as the need for affordable housing, viability of SMEs in the construction sector and competitiveness in the UK economy. However, in economic terms, tackling RCS exposure is about reducing future economic burdens at all levels.

The economic burden of RCS falls largely on the public purse, but in turn is reflected in higher taxes. Without data relating to the direct burden of RCS in the cause of respiratory disease, it is hard to estimate the true cost of the risk being realised, besides the suffering, loss of life and loss of quality of life. However, if we looked at COPD, an illness associated with RCS exposure

The average COPD-sufferer's retirement age is 56 life expectancy (at worst) is 75 (Kostkenvuo et al, 2011; Shavelle et al 2009).

The average treatment cost per patient was just over £40,000 in 2016 (McLean et al, 2016)

The average additional benefits cost during early retirement period (11 years) £26,000 (Citizen's Advice Bureau Benefits Calculator).

The average additional benefits cost post-retirement (9 years) £14,000 (Citizen's Advice Bureau Benefits Calculator).

The amount of lost revenue per person in tax/NI because of early retirement (based on average construction worker salary) (£100,000) (HMRC calculator)

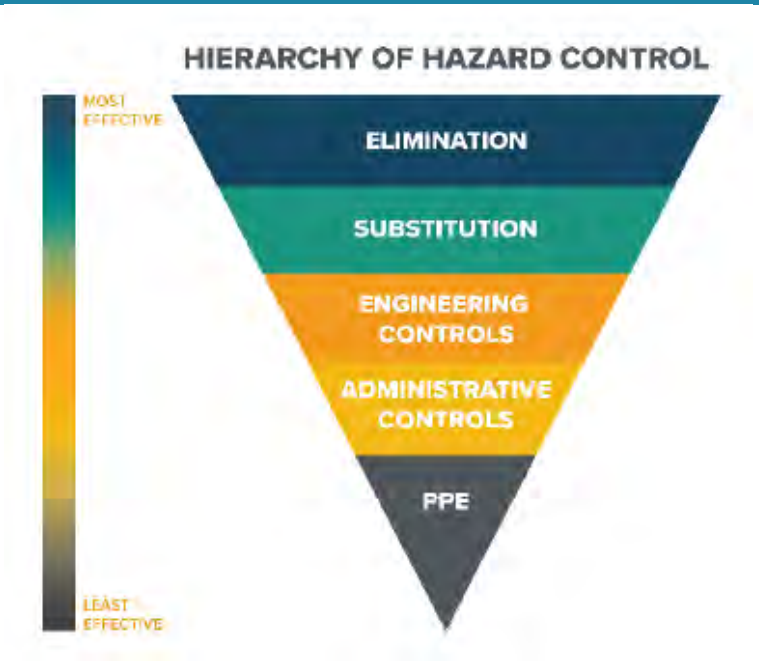
This amounts to the cost to public purse of an average of £180,000 per person. With an estimated 135,000 COPD sufferers as a result of workplace exposure (HSE:2021; Blanc P, Toren K (2007)), this amounts to £1.3bn per year. This does not include the additional burden because of additional premature demand on health and social care resources. A significant proportion of this cost for this one disease will lie at the feet of RCS exposure. We believe the business case for regulatory intervention, for

shifting a burden onto business to innovate to protect can and should be developed.

Addressing the RCS risk through prevention has a bigger public policy and economic benefit that goes beyond the moral desire to shake off a Victorian tolerance of “occupational hazards”. The controls needed to prevent this waste of money and life and quality of life are unlikely ever to exceed the costs of not doing so.unlikely ever to exceed the costs of not doing so.

We recommend that more economic modelling is undertaken to consider the potential long-term savings of RCS control and the options for incentivisation, investment and better enforcement to support RCS risk reduction.

2. THE HIERARCHY OF CONTROLS AND RCS



Occupational Hygienists are accustomed to addressing the controlling of exposure risks through the application of the hierarchy of controls. This focuses on managing risks from the generically most effective means to the least effective, preferring the most effective as the first response, but having a fail-safe to the next level of control, downwards towards personal protective equipment.

When this fails, then it fails to danger, i.e. there is no further protection and no means for the wearer to know that it has failed.

2.1 Elimination and Substitution

In seeking approaches to reduce the risk of disease arising from RCS exposure, there is no evidence to suggest that a significant departure from this hierarchy is merited. This means that in selecting materials, avoiding silica-based materials or silica-based components which need to be processed on site is the most effective risk reduction strategy. In previous decades this would be unthinkable, but as we aim towards a low carbon economy, reducing concrete masonry, tiles etc is a realistic objective.

2.2 Engineering Controls (and their Intersection with Behaviour)

Engineering controls in terms of e.g. Local Exhaust Ventilation (water suppression) are almost certainly more effective than PPE, in many circumstances. However, both engineering controls and PPE are dependent on behavioural, managerial and administrative infrastructure to ensure proper use, maintenance and application within process.

One key behavioural indicator is the presence or bundling of dust controls with dust-generating tools and machinery. While this is an engineering control, the immediate availability or pre-installation of controls is a huge behavioural influencer. Invariably, whereas safety guards have to be integrated and interconnected with main control mechanisms, dust shrouds and extraction systems are seldom directly integrated. Dust control add-ons are often not provided except by special order, and sometimes are almost impossible to use then the product is configured for ordinary operational use. Diagrams and guidance assume the absence of dust guards and routine servicing is often made harder when they are fitted, making the likelihood of them being discarded more likely.

Not only is this incomprehensible, but in many cases it is arguably illegal. The continued trend for DIY and self-build means that consumers are as likely to access power tools as professionals. It is not possible to buy a power tool to self-wire a plug or without a lock release switch, guards etc. However, it is almost impossible to buy power tools equipped to prevent exposure to RCS. This has the indirect social message of suggesting the risk is less serious. It is also contrary to the requirements of the Consumer Protection Act at the very least.

2.3 Administrative Controls

In addition, occupational health services which can lessen and manage exposure impact and are the potential point of articulation with general primary care sit within the frame of administrative control. This means that education, information,

but also management systems and interprofessional working can have very significant impacts on RCS control effectiveness. Dust control is very much seen as a shop floor exercise. It needs to be better integrated into organisational risk management in the way asbestos is required to be and mental health is moving towards. To do this requires focus.

The cost of RCS to society and the economy and the all-pervasive nature of materials containing silica merit legislative and regulatory focus, as has been found in Australia and Canada. This focus is reflected in a variety of behavioural aspects, but most notably in the language used by industry. It is immediately obvious when reading Australian process guides and documentation that the risk of silica dust exposure is always referenced by all authors, whereas it is almost never referenced in the UK counterparts.

The most effective driver of business administration is clarity in regulation and prioritisation in terms of risk. This is most directly realised through specific, measurable and realistic regulation that sets standards that can be controlled through effective management systems. Complexity, technicality, qualitative judgements etc seldom work well for organisations with limited management infrastructure. Thus, complex targets, such as refined Occupational Exposure limits will work well for industrial processes where there are refined quality assurance systems and static controls, they are likely to be unmanageable for a small building firm working as a sub-contractor on a development site.

Both engineering controls and PPE are dependent on behavioural, managerial and administrative infrastructure to ensure proper use, maintenance and application within process.

As demonstrated by the asbestos removal industry, probably the most effective approach is clear method statements, designed around a precautionary approach. Monitoring of RCS, where the risks are greatest (e.g. cutting tiles on a roof or small, internal demolition sites) is not reasonably going to happen because the costs involved. British Columbia has shown one way forward, which is the Silica Control Tool About the Silica Control Tool, which, accompanied by strict regulations and a public campaign with targeted enforcement enables planning of methods for control to reduce risk. On its own, the tool would not have the same impact in the UK as it works in tandem with regulation and enforcement. However, it is likely to be more impactful that trying to achieve real time monitoring. As evidenced by HSE, even where monitoring does take place, it is not translating into management and administrative actions or effective control in many circumstances.

3. The Limits of Hierarchy of Controls When Addressing Public Strategy

> ***We believe that RCS is an Exposure which can benefit from a national strategy, focused regulatory, educational and information support and is crucial to equalising health opportunities and reducing the burden on health and social care.***

The value of an effective and focused use of the hierarchy of controls to tackle respiratory risk has most recently been demonstrated by its effective application to COVID-19 controls within workplaces. It was particularly stark in January 2021 when non-occupational opportunities to be exposed to respiratory risk from COVID were restricted and, aside from in-hospital exposure. occupational exposure in the UK was the main potential route to infection. With the support of HSE and with limited novel tools at the disposal of workplaces, the UK was able to reduce the risk of transmission of COVID-19 significantly by systematic and focused use of the hierarchy of controls.

However, BOHS recognises that while the hierarchy of controls is an effective practical strategy for preventative workplace exposure controls, the pursuit of protection of workers from risks such as that from silica cannot begin or end with the hierarchy of controls. With long latency diseases that are endemic in the population as a result of economic, social and policy decisions, a broader perspective is required. This we term "sustainable workplace health." A national approach to reducing the risk of RCS exposure needs to more than a strategy for workplace risk control or a clinical management strategy, it needs to sustainable, systematic and targeted.

4. From Prevention of Exposure through to the Management of Disease

Moreover, occupational hygiene is used to "handing over" the baton of workplace health once exposure has occurred. Epidemiology has always been vital in understanding the mechanisms and pathways of exposures and levels of risk. However, the role of the clinician in managing occupational illnesses has been less of a concern to us as occupational hygienists.

In the systematic control of long latency diseases, this again is too restrictive an approach. Risk reduction in terms of RCS must also encompass better articulation between health responses and preventative measures. It includes reducing the impact of exposures, but also enabling feed back and feed forward for the management of that impact.

This is well-illustrated by a flowchart produced by the Council for Work and Health (Council for Work and Health Final Report (2016) – Planning the future: Implications for Occupational Health, Delivery and Training):

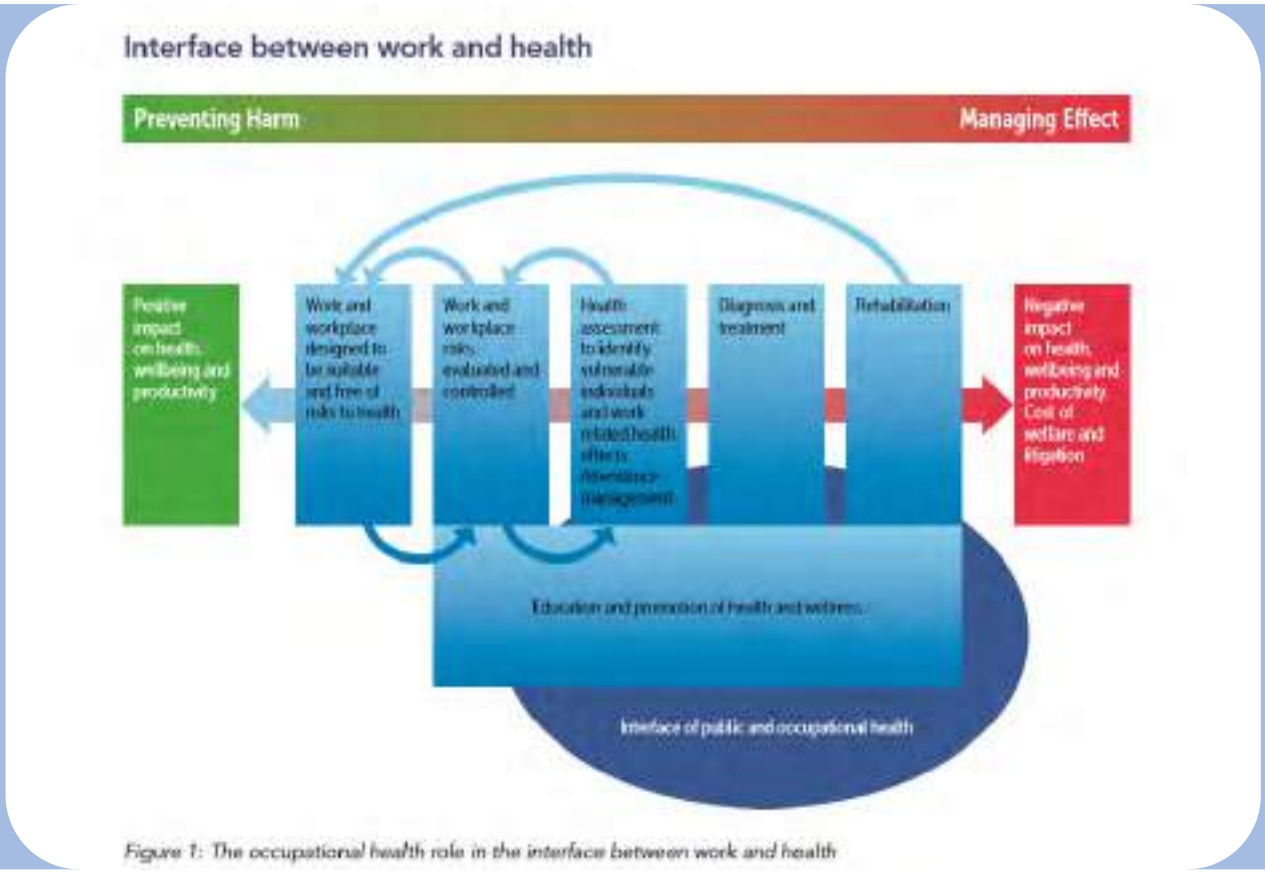


Figure 1: The occupational health role in the interface between work and health

A significant failure is the poor articulation of worker health information between professionals concerned with RCS exposure. Occupational Health physicians, even those on large infrastructure projects do not feed back to occupational hygienists when they identify respiratory conditions, so that exposure sources can be identified. Similarly, continuity of care is interrupted with no systematic and effective translation of occupational health surveillance, even where it has been mandated to primary care providers.

This failure to communicate removes the opportunity to detect and remove risks to other workers or of continued exposure. It also removes the information to inform management of risk and epidemiological data.

This is a relatively simple interprofessional fix and the Society of Occupational Medicine and British Occupational Hygiene Society can and will find ways to ensure this articulation is understood as a professional expectation.

We are committed to supporting better interprofessional practices between occupational hygienists, occupational health practitioners and primary care and recommend the development of systems within primary care and beyond to ensure continuity of care and worker health information.

5. Strategic Approaches Reducing the risk of RCS exposure

An RCS risk reduction strategy for UK needs to identify that RCS exposure con be analysed in the context of several different dimensions of economic activity.

5.1 Sectoral risk reduction

We recommend sector-specific approaches, including regulatory, educational and information focuses to engage with the cultures, behaviours, contractual relationships, systems and processes that drive risk management and behavioural change.

RCS exposure focuses around a set of sectors, notably construction, restoration and refurbishment, mining, construction materials manufacture etc. Each represents relatively static communities, supply chains, communities of practice, economic and legal frameworks. To be effective in securing systematic change, risk management strategies need to aligned to sectors and the populations in them. Sector-based campaigns have achieved changes in levels of awareness, investment, design and planning.

The move to a low carbon economy, the role of HSE as building regulator, UKAS role in standards setting for construction materials and related developments give an unprecedented opportunity to build RCS risk control into the construction sector, for example.

5.2 Materials risk

We believe that there is a role for working with leaders in the materials, manufacturing and construction sector to promote materials development away from a dependence on products that create RCS through the requirement for further processing for use. UK incentives towards low carbon economies can re realigned slightly to enable and encourage this. The UK has the material science expertise to lead the world in this area.

Silica-bearing materials are central to our current approach to construction, in particular. Concrete blocks are ubiquitous, for example. Their convenience is at the cost of the environment, but also the health of those who manufacture and install them.

Similarly, tiles are our most widely-used roofing material, again problematic from environmental perspectives, but presenting one of the hardest to control exposure risks because of roof-level cutting for ridges and gutters. As we move towards a low carbon economy, materials choice in construction can effectively reduce the risk. The most effective impact on asbestosis was the removal of asbestos from use in building.

5.3 Process risk

We believe that incentives and promotion of process improvements to design out RCS, together with clearer method statements, proper enforcement of control requirements, , tight application of consumer protection laws, combined with integration into broader air quality initiatives need to be in place to reduce risk. Supervisor-only risk assessments, the installation of LEV (which may be poorly maintained or never switched on) and ill-fitting RPE cannot continue to be the benchmark of standard practice.

RCS derives from materials, but the respirable dust risk arises from processes. By systematically considering the processing of RCS-bearing materials, the risk can be reduced.

This starts right at the top of regulation with the need for smarter regulatory thinking. A simple example is this. An easily understood example. The maximum length of a rear extension in planning rules is 3m or 4m (with consultation). The lengths are arbitrary, yet the selected lengths are impossible to achieve with standard bricks or blocks and mortar spacing without at least two cuts per course, at least one of which could not be a pre-made half brick or block and will always need a clean cut that can only be achieved by a (typically powered) masonry saw. Even with a wet cut, the residue dries and often reverts to becoming resuspended. This arbitrary measurement creates at least 60 cut bricks per extension unnecessarily (as well as waste and additional CO2). Regulatory design around planning building and construction standards can be a significant driver of lower risk without any real appreciable costs, other than thought.

Contractors building concrete tunnel inserts for HS2 have realised that wet-casting, rather than dry finishing and pre-formed perforations can significantly increase efficiency and reduce RCS exposure. Tighter method statements around required controls in relation to common processes are likely to help ensure that risk is reduced, but this needs to aligned to proper enforcement of existing regulations.

Initiatives such as off-site construction can ensure that larger organisations can more effectively control RCS and are able to demonstrate significant benefits in this regard if well-designed, as illustrated by work by Health in Construction Leadership Group.

HSE inspectors on building sites should immediately question whether RCS is being controlled legally, if there is only the

widespread use of dust masks, since these are to be used when all other more effective controls have failed. Leading construction companies and clients in the Health in Construction Leadership Group have committed to remove reliance on single use dust masks on any of their sites by 2030. Our enforcement needs to align with known data about the lack of mask effectiveness and the clear legal duty not to opt for the level of protection which is least reliable and fails to danger. This does not require new legislation, but the proper enforcement of existing legislation by our regulator.

> **HSE inspectors on building sites should immediately question whether RCS is being controlled legally.**

At the other end of the spectrum, it is almost impossible to buy an angle grinder with a bundled dust shroud through the most popular online retailers. Given the known risks, the notion that not even consumer DIYers are protected from RCS, it indicates that we actively permit health risks that would be impermissible in any sector. We equally have a higher tolerance of lethal health exposures that would never be tolerable in terms of safety risks. Like smoking, we need to tackle the social acceptability of construction dust. This should be aligned with initiatives to reduce the particulate matter associated with building and demolition, such as the Supplementary Planning Guidance for London London Plan Annual Monitoring Report 9, but also a campaign to ensure that all handheld tools capable of generating RCS and consumables, such as discs and drills are properly labelled and ideally not sold without dust control.

5.4 Materials risk

We believe that behavioural change is the fundamental way in which RCS risk can be managed, Without behavioural change, other than elimination and substitution, other controls are not going to prevent unnecessary RCS exposure.

RCS exposure results from the absence of controls, the presence of potentially hazardous materials and processes that lead to the creation of the risk, without tools designed to control that inherent risk. However, as HSE's excellent research into RCS in the Brickmaking industry illustrates RR689 - Silica baseline survey: Annex 1 - Brickmaking industry (hse.gov.uk), the challenges are not technological, regulatory or even attitudinal.

At heart, behavioural issues that underpin effective controls are determinate of managing workplace exposure risks. As HSE's Senior Psychologist, Peter Kelly, observes, behaviour drives attitude, rather than vice versa. Workplace behaviours need to change in order to make regulatory change and technological innovation effective. In brick-making, despite the presence of monitoring, awareness of risk, installation of compliant LEV and availability of RPE, control effectiveness was still found to be poor.

In order to be effective any risk reduction strategies need systematic approaches to incentivise operational behaviour and to underpin how that behaviour reduces risk.

RCS risk and the sectoral, materials and process risks and how to manage them needs to be an essential part of construction apprenticeships, degrees etc. In addition, the Construction Skills Certification Scheme and accompanying card system could and should be modified to ensure RCS is more prominent. In particular the CITB HS&E test should invariably ensure that awareness of RCS risks are included. It is possible to go onto a construction site without being made aware of RCS. This is unacceptable.

Behavioural change relies on the prioritisation of action through a business. In sectors and businesses where RCS exposure is a risk, there needs to be a regulatory requirement that elevates it to the level of a corporate risk, with the requirement for a management plan to help direct procurement, HR and other priorities. In the context of asbestos management, this has certainly ensured the visibility of the issue in relation to duty-holders.

Sanction and reward is important. Safety boots are exempt from VAT when bought by individuals. Individuals should not be able to purchase RCS generating tools without access adequate controls being integrated because of consumer protection issues, but a VAT incentive may also help.

At heart, behavioural change is about education. No worker who is likely to be exposed to RCS should be left in any doubt about its risks and it should be referred to at all levels of training and education. At present this is not the case. We need to work with Apprentice Standards Providers, Universities, Colleges of Further Education, sector training organisations and others ensure highly impactful messages are delivered.


Part 2

6.0 Developments in RCS Risk Reduction

The management of risk can be divided into managing likelihood of damaging exposure and the severity of the impact of exposure. Both can have an impact on societal risk. By reducing the likelihood of exposure, we can reduce the number of people who are harmed. By reducing the impact of exposure, we can increase life expectancy and perhaps severity and type of disease.

It is easy to look at risk therefore from a population risk perspective, i.e. how many people are more or less adversely impacted. However, while a risk profile may appear better because the same number of people become less ill because of better treatment and management, this is not the only determinant of impact. It does not encompass the full nature of risk, including economic, social and personal.

Better treatment, earlier diagnosis, more innovative treatments etc are good news for those we have already failed when it comes to preventable diseases, but they all come at greater cost than reductions in the number of people exposed. When balancing the scales of cost, we have to also consider the demand on specialist resources such as medical research, treatment, oncology staff, occupational health practitioners.

Reducing the impact of RCS exposures that have already caused illness can actually increase the burden of care and cost in areas which is already under strain. In this way, innovation that produces better outcomes for victims of RCS exposure may actually increase the risk to society, while reducing the impact on the individual.

6.1 Managing and designing out risk

As prevention specialists, we feel that the major developments in the management of RCS risk are on the prevention side. They realise both individual health benefits and reduce social and economic risk.

Regulation

Internationally, RCS continues to be a subject of concern. In Australia, examples of State-led innovations include Victoria's Occupational Health and Safety Amendment (Crystalline Silica) Regulations 2021. Some of this brings Victoria in line with UK approaches, but innovations such as Australia's first licensing regime for engineered stone, including increased manufacturer and supplier duties and additional regulatory oversight of high-risk crystalline silica work outside of engineered stone across all industries, provide insights into possible regulatory approaches. Importantly, this is underpinned by continuing research in tandem with the regulatory approach.

Research

Effective preventative regulation needs to be supported by a shop-floor evidence base. Quite simply, understanding the epidemiology and diagnosis of RCS-induced diseases has limited value in informing legislation and regulation. The root of effective regulation is to understand the mechanisms of exposure in the workplace and the behaviours that can influence them. To understand that, it is necessary to research and observe, rather than assume.

A valuable development, which is coming to fruition in another area of workplace exposure gives us a sense of direction. Metal Working Fluids continue to be a significant respirable hazard, although work with manufacturers has reduced the risk of cancer. Organisations such as the UK Lubricants Association have provided better guidance to ensure their safe use and management. There is advanced technology that uses artificial intelligence to manage risks in relation to metal working fluids. Detection methods have become harder, rather than easier because of the change in the chemical composition of these fluids as respirable mists. However, exposure to metal working fluids continues to be widespread.

Researchers at HSE's science division who have done innovative work in other areas, such as the use of genetics to determine the nature of biological risks in metal working fluids, turned their attention to the question of why machine workers were still being exposed and embarked on behavioural studies. These are helping to inform the strategy to deal with metal working fluid exposure. The same approach needs to be employed in understanding exposures. Why does someone use a broom, when there is a vacuum cleaner in the corner? Why do road workers turn off water dust suppression which is fitted on road planing vehicles as standard? Why does someone forget to turn on the LEV system?

Innovations in workplace behavioural research can influence education, training, messaging, management and regulation. There just needs to be a focus on publicly-funded research into behavioural dimensions of RCS exposure.

Public Projects to Drive Change and Educate the Supply Chain

Major UK infrastructure projects are leading the way by understanding that RCS exposure risk needs to be managed from the top downwards. In Hinkley Point, measures of occupational hygiene are separated out from measures of occupational health and measures of safety, so that the effectiveness of contractors in preventing exposures and managing risks that arise has visibility from the top of the contract structure. Rather than tracking exposures and incidents alone, the effectiveness of controls are a focus for management, aiming at managing the control of risk, rather than the impact or likelihood.

Tunnelling has been a traditional RCS high risk activity. Modern methods, particularly the use of concrete tubes have added to the burden of potential disease through tube manufacture and in-place modification methods. Contractors on HS2 have taken simple and practical process and design steps to remove the need for further processing or modifying for fixing concrete tubes.

Parliament's own Restoration and Renewal Project offers the possibility to build on these approaches, as one of the UK's biggest projects to involve natural stone. Silica control standards can and should be built into this project to prevent exposure. The duration of these projects create unique circumstances for RCS-induced diseases. Normally, exposure happens over a long period of time, but the employer or project is likely to change in the period before longer latency respirable diseases manifest. In the case of Restoration and Renewal, it is entirely possible that the same workers could be exposed, work on the project and display symptoms of disease during the life cycle of the project. Parliament itself can quite literally make the difference here, with a Parliamentary Committee taking oversight of the project.

Building Information Management (BIM)

Innovations arising from the application of BIM in the interface between construction and Health and Safety offer further opportunities for the reduction of silica exposure risk. Building Information Modelling allows the transmission of data around risk to all participants of a construction process. It is already being used to map carbon footprints and is demonstrating potential around safety hazards and even asbestos management. It is conceivable that BIM can be used to predict, plan for and identify control opportunities for RCS. It should certainly be an aspiration to enable this, as BIM becomes the common platform for larger scale construction management.

6.2 Monitoring Exposure Levels

6.2.1 Context

Exposure monitoring in contexts where there is a risk of exceeding WELs may be effective and recommended to determine the effectiveness of controls. Exposure monitoring is not a control system itself. It is the canary in the coalmine. Moreover, again it is dependent for its effectiveness on deployment. Put the canary in the wrong part of the mine and it will be singing as miners are choking. If nobody checks the cage, then it is not an indicator. BOHS, HSE and occupational hygienists continually see evidence of exposure monitoring that is not deployed at times, or exposure monitoring being undertaken in places and in contexts where it will not provide protection for workplaces.

Exposure monitoring is often used by employers to show that they have not got a problem, to signal compliance, rather than to aim to realistically test the effectiveness of controls. The sectors and industries where there is greatest risk of RCS exposure are also the areas where the effective and reliable deployment of exposure monitoring is unlikely to be possible. If we consider cutting of tiles for valleys on a roof, small construction or demolition sites, then the likelihood of investment in advanced monitoring is limited and the investment and technical requirement may be better invested in proven controls and having clear method statements ingrained in workers to manage exposure risks.

6.2.2 Determining risk

When tackling dust, first a suitable and sufficient assessment of the risk must be undertaken with subsequent actions in applying protection measures appropriate to the activity. Although risk assessments are a requirement, the skills to undertake them may be limited in many of the riskiest contexts.

During this risk assessment and control selection process, the employer must consider the nature and concentration of the contaminant cloud. Hazardous dusts such as silica are very fine and invisible to the naked eye. The employer's monitoring strategy for toxic substances should follow that outlined in HSE's document HSG173. Should the initial appraisal reveal that more information is needed (e.g. the extent and nature of the contaminant cloud could not be fully understood by simple qualitative tests such as a Tyndall beam) then monitoring may be necessary via a basic survey carried out to further assess the extent of the risk.

And in some cases, this may lead into the need for a more detailed survey, if the extent and pattern of exposure cannot be confidently assessed by a basic survey. The decision to undertaken monitoring should be made following this strategy and COSHH regulation 10.

6.2.3 Different Approaches to Monitoring

Exposure monitoring can be performed to inform the risk assessment, check the effectiveness of controls, or confirm that a Workplace Exposure Limits has not been exceeded. And subsequently continue to be undertaken at regular intervals as a check on those controls. The HSE's MDHS 14/4 and 101 outlines how dust / silica exposure samples can be taken and thus compared to the Workplace Exposure Limit.

Developments since the report in 2020 see the launch of real time personal monitoring systems. The investment and innovation is to be welcomed and the deployment of any technology to further reinforce controls is welcome. Personal exposure monitoring serves a valid purpose but may have short comings in certain situations. For example, processes which operate intermittently at irregular intervals (and so periodic exposure monitoring is difficult), or where excursions above the exposure standard could cause serious, possibly irreversible, acute effects, or if a fixed-site monitor is needed to act as a suitable warning devices to alert on any breaches of containment.

In cases such as these, data-logging particulate monitoring can play a part in this risk assessment and exposure control strategy. This can offer real-time feedback so that quick actions can be taken under these circumstances. This monitor can even form part of a control strategy if linked to trigger an alarm or slow/stop a dust-generating mechanism should set levels be breached. Although it must be understood that in the case of silica the principle of As Low As Reasonably Practicable should of course be paramount and exposure levels be kept well below the Workplace Exposure Limit.

Continual monitoring, when deployed in areas which are realistically

representative of high exposure areas, could feasibly be helpful in keeping track of long-term low-level exposures. However, we must be very cautious about this. If we look at feedback from occupational hygienists and HSE inspectors about Local Exhaust Ventilation systems, we see that they are present, but sometimes improperly sited, not switched on, poorly maintained and poorly understood by shop floor staff. The recent campaign to deploy CO2 monitors for the control of COVID-19 reflected much the same issue. When looking at noise monitoring, where technology has long been available, similar problems arise.

6.2.4 The Relationship Between Monitoring and Standards

The standards for compliance with Occupational Exposure Limits are set out in BS EN 689:2018, which is referred to by the HSE in its guidance. However, this is a paid-for standard, which means that for many organisations, the cost of proper monitoring and for smaller consultants. Aside from the cost of technology, the inaccessibility of materials to provide definitive guidance on effective use of that technology needs addressing.

One of the purposes of exposure monitoring is for testing compliance against the Workplace Exposure Limit (WEL compliance assurance is an essential part of proving adequate control- see COSHH reg 7 paragraph 7). Despite well-publicised claims by some manufacturers, their devices cannot do this. That is because the Workplace Exposure Limits are written specifically for personal exposure monitoring via the HSE's method statements (MDHS - see EH40 for explanation).

As far as BOHS is aware, the only real-time instrument that we know of that is coming close to WEL-compliance testing, is the HAZ-DUST 7204 which samples concurrently to derive the correction factors to then be able to compare the real-time data to the WELs.

The HSE does not state that instantaneous second-by-second readings on dust levels is needed. And for good reason. Firstly, if every dust cloud in the whole of the UK needed a real-time monitor to keep a data-log of the dust levels, this would mean millions and millions of monitors required. This is implausible. This is in a context where people will not buy vacuum cleaner bags and brooms are still found lying around in major infrastructure projects.

6.2.5 Understanding the Data

COSHH 6 Approved Code of Practice states that an estimate of exposure is needed. This may involve exposure monitoring. The initial exposure monitoring aids the risk assessment to then help determine the controls needed. And subsequent monitoring at regular intervals (not continuous) as a check on the controls. Just as you would regularly review the risk assessment, in cases where it is suspected to be invalid e.g. the process has changed and may have effected exposure levels, controls have deteriorated, etc.

Realistically, individual measurements are not going to provide a view or real risk from exposure. The epidemiological data indicates that it is the sustained exposure

that gives rise to disease. This requires ongoing analysis of the exposure levels to account for variability. BOHS and its Netherlands counterpart, NVvA, provide free guidance, based around the HSE statistical standard EN689 to enable this to be undertaken. The BOHS/NVvA guidance on testing compliance is established as a standard for addressing this difficult question. By applying the methods in the guidance (following EN689) testers can account for this variability. The UTL95,70 is a figure used in exposure monitoring testing compliance and can be easily run through the BWStat software after the initial screening samples have been taken.

Real-time monitors like other monitors provide data, but that data needs to interpreted properly and acted on. Thus, while logically, it would appear to be a step in the right direction to move to more real time monitoring, behaviourally, this may even be retrograde if it is associated with current behaviours and trends in the use of monitoring to avoid proper assessment of risk.

6.2.6 Replacing the Risk of Human Error

Exposure monitoring sits low down the hierarchy of controls. It provides data which should prompt administrative action. It can add expense and over-complicate matters. In many ways the risk is exemplified by some of the advertising for real time exposure monitoring. Pictures of rooms filled with dust where silica-bearing materials are being processed do not need real time exposure monitoring to reveal the risk. It is self-evident.

If we contrast this with other areas of safety, we can see how convoluted the thinking has become. We do not have ever-more refined electrical monitoring devices for the user to monitor whether there might be a risk of electrocution, we limit the current and have a cut-out. Equally, we do not have finely calibrated thermometers for the user to measure whether a computer is over-heating, we have a fan that trips and thermal cut-out.

A shroud with a hose connector and a switch linked to suction is cheap and simple technology that can be applied at source of RCS. If it has a power interlock, extraction happens when the tool is running and the tool cannot run unless extraction is running. RCS controls should be as mandatory on tools as RCD controls are on certain electrical installations. It's not a new innovation or a new insight, but it is new thinking.

6.3 Developments in the Monitoring of Health

Health Surveillance will continue to be vital as we continue to fail to control exposure. The first step in health surveillance is having accessible and understandable means by which employers, supervisors, worker representatives and employees understand when it is needed. The current model and language around health surveillance is around the legal

requirement under health and safety law. This may inadvertently be expressed in a way which discourages employers from undertaking health surveillance where it may be beneficial for workers and it may also increase the threshold needed to prove negligence in cases of failure to protect workers.

BOHS is not in a position to make comments about developments in the clinical diagnosis and treatment of RCS-induced diseases. However, we note with interest the development of prognostic capabilities relating to biomarkers, see for example Perez (2021) Serum levels of inflammatory mediators as prognostic biomarker in silica exposed workers | Scientific Reports (nature.com) which provides hope of early prediction of disease, based on blood tests.

Through the pandemic, where spirometry in the UK was reduced to practically nothing and where a backlog in Xray and Tomography appointments is likely to impact the usual screening,.such alternative and prospective tools may become invaluable in health surveillance.

6.4 Opportunities through Primary Care

Continuity of medical information between Occupational Health and surveillance and primary care providers can be strengthened and initiatives such as the review of the SEQOHS standards for Occupational Health Providers provide excellent opportunities for the OH profession to facilitate this at an institutional level.

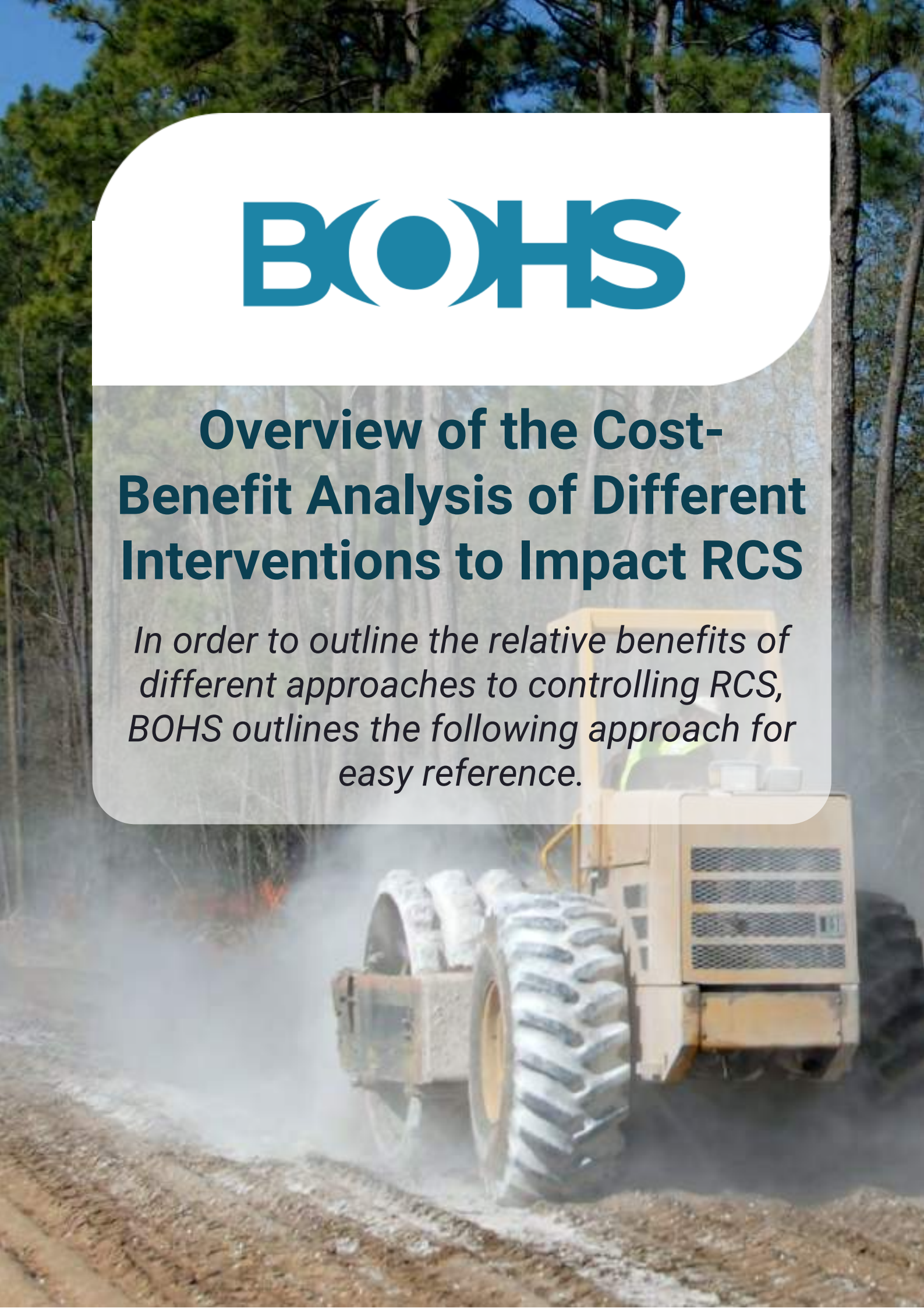
The Society of Occupational Medicine have recently developed guidance for their members in construction, but a more focused approach by Occupational Health Professionals on their legal duties to undertake surveillance in relation to high-risk occupations and guidance on approaches to surveillance is needed.

The pressures on primary care providers are considerable. However, there are opportunities within primary care to better identify and support RCS-induced disease and also to supplement situations where health surveillance has been undertaken.

It is important for prognosis, diagnosis and effective management of risk for primary healthcare providers to be aware of exposure. This is very important in sectors such as construction where there is inconsistency in the level to which health surveillance is maintained or where the risk of high levels of exposure may be perceived as being below the threshold. Given that sustained exposure is such an important factor in disease, reliance on health surveillance being required and maintained is insufficient to deal with whole life exposures where there is no continuity of employment.

RCS exposure should be a marker in healthcare systems, like smoking, leading to a better risk-based approach to ongoing health monitoring strategies. Without the engagement and education of nurses and GPs in the understanding of the RCS exposure, the potential for supporting the health of the types of workforce exposed to RCS is very limited.

Without Occupational Health professionals stepping up to prioritise systematic, risk-based monitoring and feeding back to employers and occupational hygienists where symptoms are developing and forward to primary care, the essential links to enable the management of long-term and general exposure will not be achieved.

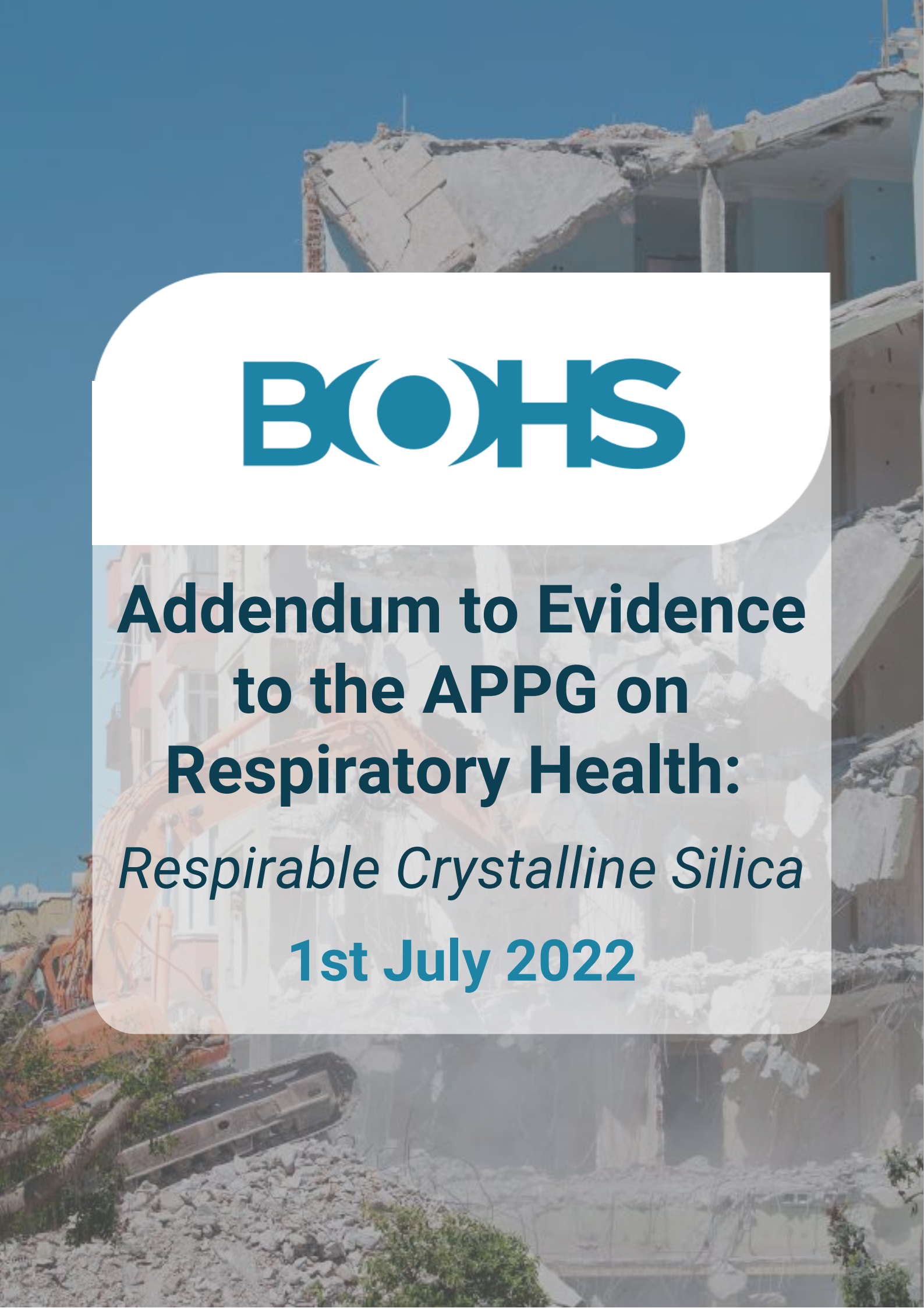


Overview of the Cost-Benefit Analysis of Different Interventions to Impact RCS

In order to outline the relative benefits of different approaches to controlling RCS, BOHS outlines the following approach for easy reference.

Intervention	Potential population reach	Direct reduction of disease burden	Indirect reduction of disease burden	Economic impact	Economic cost	Assumed dependencies	Direct dependencies	Likely actual impact on disease	Ease/ speed of implementation
Lowering Workplace Exposure Limit	Variable, according to availability of exposure monitoring. Likely to have less impact in Wales and North East, for example, in construction sector, based on ONS stats.	Potentially thousands fewer instances if observed and dozens fewer deaths Previous data in APPG report overstates because of a miscalculation in relation to 1.8mg/m3.years	Potential impact on general air quality, depending on control systems	Potential significant savings in healthcare, benefits costs and additional revenue from taxation and productivity	Economic cost falls on HSE to enforce and industry to engage more technical monitoring equipment	It is assumed that employers recognise RCS risk, understand the WELs and monitor them, putting into effect control measures that work	HSE enforcement capability, availability of technology to measure Wels and availability of suitable controls to control to the requisite level	There is no direct evidence yet that the reduction in WELs for Silica to very low levels internationally has reduced disease burden, but it has raised awareness	UK HSE currently does not have a clear methodology for setting WELs, but has a relatively easy legislative and regulatory system for implementation.
Materials elimination initiative – Example moving to timber frame construction for new housing	Up to 2.4m construction workers	Hundreds fewer deaths (assuming 50% or more reduction in silica-generated by cutting and handling)	Potential reduction in exposure in those delivering typical masonry units. Risk of increasing wood dust exposure	Potential significant, as above. CO2 reduction in building method and opportunity for energy efficiency	Marginally higher costs of construction and therefore housing. Impact on domestic masonry industry	Mechanisms existing which can shift the construction method to timber frame	Materials supply, capabilities in the industry and compliance	Level of exposure likely to be significantly reduced for construction site workers and specific trades	Could be achieved by industry cooperation or as part of building materials and regulatory reform package, post-Grenfell
RCS dust extraction/ suppression as standard and removal of acceptability	All those at risk of exposure to RCS	If implemented should significantly reduce exposure	Potential to manage other workplace exposures arising from other risks,	As above, but likely to promote dust suppression and extraction industry . Environmental	Greater capital costs to industry, but may reduce consumables costs	That the education and compliance infrastructure is effective in securing actual change	That controls are properly identified, installed, operated, maintained and used	Could eliminate disease almost entirely	Existing law is in place that requires this, but it is not enforced. Economic incentives (such

Of dust masks		levels for all at risk	such as low-toxicity dusts	benefit of removing single use plastics					as tax and VAT together with a requirement that RCS controls are bundle retailed or marked as required, plus education required to address silica needed
Better diagnosis	Those already exposed to RCS	It may reduce the personal impact of disease	Better management of risks arising from co-morbidities or management of lifestyle and other factors which may exacerbate symptoms	Increased cost to health care in short term, but may reduce acute healthcare costs and enable better planning of social care. Probable increase in benefits costs	Economic costs fall on public purse. Reduced cost to employers as likely earlier departure from work	Self-referral or more systematic health surveillance to bring workers to healthcare	Healthcare infrastructure to deliver better diagnostic tools	It will not reduce the level of disease	Research investment, training and implementation costs, resource availability in healthcare



Addendum to Evidence to the APPG on Respiratory Health:

Respirable Crystalline Silica

1st July 2022

The vital contribution of Primary Care to not only diagnosis and treatment of silica risks, but to prevention and control of risk, has been highlighted internationally by a number of instances. In Australia, healthcare workers highlighted increased risk to miners, resulting in changed approached to regulation and practice.

Early onset respiratory illness amongst workers exposed to silica in the manufactured stone industry in Australia made national headlines and brought that industry into focus for the regulator. In the US, an Appalachian clinic identified increased instances of illness amongst miners, leading to changes in controls.

Ensuring that primary care and diagnostic capabilities are also enabled to assist in prevention of continuing workplace exposures requires widespread awareness and enabled paths of communication. In the context of workplace RCS exposure, which is a ubiquitous public health hazards, then proven approaches to enable this need to be enlisted to ensure effective interprofessional working.

A starting point would be for the Office for Health Improvement and Disparities to appreciate that RCS exposure has a particular impact on a section of the community less likely to have means and access to receive and understand health messages or have the opportunity to manage their health risk. It is also an area where the social and public health cost of failure to prevent weighs heavily on quality of life and the public purse.

It is a prime area where a focus in the “All Our Health” strategy would be particularly impactful. The levels of understanding required of the risks, exposures and mechanisms for protection are relatively unchallenging for health professionals to take on board. There are some excellent resources, case studies and examples to underpin the professional understanding some aspects of work and health.

Developing resources “All Our Health” in the area of RCS exposure and editing existing materials to highlight the risk could have a significant, widespread impact on awareness. Similarly, links to existing resources on this area from the HSE and Breathe Freely can easily and quickly provide context for better primary care conversations.

A revision to the “All Our Health” approach to respiratory disease Respiratory disease: applying All Our Health - GOV.UK (www.gov.uk) to explicitly recognise the role of occupational exposure in causing this and the specific management of risk in the context of silica would be highly desirable. Including basic messages to reinforce the use of proper fitting RPE or participating in health surveillance where there is a high risk would be highly impactful additions.

Using the linked approach of “Making Every Contact Count” Making Every Contact Count (MECC): practical resources - GOV.UK (www.gov.uk) and specifically extending workplace respiratory exposure to the approach pioneered by the Royal Society for Public Health with their “Everyday Interactions” methodology could enable impact on exposures and potentially highlight areas of workplace risk.

Those involved in aspects of diagnosis of diseases caused by respirable crystalline silica exposure need to be able to contribute their observations to intelligence about workplace exposures. Without this connection, our ability to prevent disease will be hampered significantly.

The existing mechanisms and flow of data and information within healthcare naturally follows the patient through their healthcare journey. However, the intelligence arising from incidence of occupational diseases does not naturally flow back towards the working context of the individual. This fundamentally undermines the ability to control preventable exposures in the workplace. However, there is a statutory duty on occupational health providers to feed back findings that indicate the need to better control workplace exposures to employers. (This should be explicitly extended to feed back to Occupational Hygiene providers, where they are being used by employers).

While this feedback is not happening as often and in as effective a manner as required, there is no necessary connection between primary care providers and Occupational health providers or employers, often because of the impact of long latency. However, the opportunity to share and leverage intelligence for prevention purposes could be leveraged more effectively if there was an Integrated Care architecture under the Health and Care Act 2022 set up around workplace health to bring together those who can impact most effectively on workplace health and help manage and predict the demands. RCS exposure is one area where recent international experience shows the real potential in bringing primary care, occupational health and hygiene professions and the Health and Safety Executive closer together.

The infrastructure exists already for a more joined-up approach to linking healthcare and health prevention in the protection of workers from RCS exposure. Relatively low cost and high impact initiatives can make a difference in making the connection between disease, cause and prevention, despite long latencies.

We recommend the development of an integrated prevention and care strategy of awareness, communication and collaboration within healthcare provision to enable clinical diagnosis to inform and drive prevention in the workplace.

BREATHE FREELY

BOHS British Occupational Hygiene Society

Controlling exposures to prevent occupational lung disease

Do you breathe freely?

Breathe Freely is a BOHS initiative aimed at reducing occupational lung disease in the UK, which causes significant debilitating ill-health and an estimated 13,000 deaths per year.

The campaign focuses on raising awareness about occupational lung disease and offering solutions to protect workers' health.

Visit www.breathefreely.org.uk for access to FREE guidance, tools and resources, which facilitate the recognition, evaluation and control of workplace exposures to prevent ill health.

BREATHE FREELY

Join us and be part of the solution

www.breathefreely.org.uk