REPORT

WorkSafe Western Australia silica compliance project

Government of **Western Australia**
Department of **Mines, Industry Regulation and Safety**

WORKSAFE

Silicosis is a serious and irreversible lung disease that can cause permanent disability and early death. Workers exposed to respirable crystalline silica (RCS) are also at increased risk for chronic obstructive pulmonary disease (COPD), kidney disease and lung cancer.

An increase in the number of workers diagnosed with silicosis and progressive massive fibrosis has been linked to working with engineered stone.

Exposure to RCS in the workplace not only harms stone workers, but can also harm others in the vicinity.

The WorkSafe WA silica compliance project found that silica controls were inadequate in many WA workplaces.

Action is needed to protect workers' health and ensure compliance with OSH laws.

WorkSafe WA undertook a proactive compliance project into engineered stone benchtop fabrication and installation to investigate RCS exposure risks and controls. The project also included a review of RCS dust hazards during wall chasing activities in the construction industry and sample preparation processes in assay laboratories.

Project aims

- To ensure silica risk workplaces comply with occupational safety and health laws in relation to controlling risks from RCS.
- To educate employers and workers about RCS health risks, health surveillance and controls.

What did WorkSafe do?

The silica compliance project included:

- workplace inspections undertaken between July 2018–May 2021
- education and information
- enforcement action
- health surveillance follow-ups
- air monitoring.

Project results

These included:

- 150 proactive workplace inspections
- over 1000 enforcement notices issued
- air monitoring conducted at 38 workplaces with 75% recording RCS levels above action levels[1]
- 365 workers attended health surveillance
- 24 cases of silicosis identified.

Background – engineered stone

Stone benchtops can be made from natural stone such as marble and granite or from engineered stone.

Engineered stone is a manufactured product made from combining crushed stone such as quartz (crystalline silica) with resins, pigments and adhesives to bind them together to form stone slabs.

Fabrication activities such as cutting, grinding, sanding and polishing engineered stone produces RCS dust.

Engineered stone products may contain up to 95% crystalline silica in comparison with natural stone (e.g. granite), which may contain 25% to 60% silica. Marble contains less than 5% silica. **The high proportion of silica means that there is a higher proportion of silica in the dust and therefore a greater risk of silicosis from dust exposure.**

Despite the lower levels of silica in natural stone, dust from this source also contains RCS and must be controlled.

Findings – engineered stone workers

Lack of information and training

- In many cases, workers were not provided with sufficient information and training on RCS hazards and appropriate control measures to reduce their exposure.

Use of high silica products

- Engineered stone containing very high proportions of silica was commonly used.
- Lower silica materials were available.

Lack of health surveillance

- Workers in silica risk occupations were not generally provided health surveillance until WorkSafe compliance action was taken.

1 Occupational hygienists use the term "action level" to refer to a level of half of the workplace exposure standard. It is the level at which it is appropriate to review control measures.

Workplace ventilation

- All of the workplaces relied on natural ventilation and had open roller doors to the workshop area.
- A minority of workplaces had local exhaust ventilation (LEV), consisting of an open plan spray booth type extraction system and exhaust fans in the ceiling. However, these were generally not designed for purpose and not located in close proximity to the source of dust (i.e. not near workers using hand tools).
- Most LEV systems were not maintained, and as such, they were ineffective.
- Workplace inspections and air monitoring results highlighted the need for effective LEV.

No extraction/LEV attached to hand tools and cutting equipment

- Stone fabricators used hand tools connected to water to grind, cut, sand and polish stone.
- Most workplaces did not have any form of extraction/LEV attached to hand tools and cutting equipment.
- Air monitoring results indicated that the use of hand tools presented a high risk of RCS exposure despite the use of water.

Inadequate respiratory protective equipment

- Workers frequently were not clean shaven. Facial hair compromises the effectiveness of close fitting respiratory protective equipment (RPE).
- RPE was not consistently used, fit tested or fit checked.
- Some workers were using the incorrect type of RPE, e.g. a surgical mask.
- Respirator storage, cleaning and maintenance was inadequate. Dirty respirators increase exposure.
- Workers regularly put on and took off their RPE in the fabrication workshop based on their own task, and did not consider exposure from other processes in the area.
- Stone workers, administrative workers, maintenance personnel and visitors also went in and out of fabrication workshops for short periods of time, typically without wearing RPE.
- Powered air purifying respirators (PAPR) were used in a minority of workplaces. These offer higher protection and comfort than filter style respirators.

When talking to workers about their perception of risk it was generally their belief that if they did not see dust there was no risk.

However, even when there is no visible dust, workers may be at risk due to exposure to microscopic dust particles of crystalline silica.

Inadequate process water recovery systems

- Visual inspections often showed opaque/cloudy/dirty water used as a dust suppressant, indicating the presence of suspended particulates (RCS contamination).
- Process water was not adequately purified (inadequate filters or flocculent).
- Applying this water to rotating blades on tools aerosolises the recycled water, generating water mist, which may increase the level of RCS in the air. These water droplets may disperse and settle onto surfaces and tools and dry out, potentially becoming an inhalation risk.

Poor hygiene practices

- Workers did not always wash their hands and face before meal breaks.
- Workplace amenities often contained a build-up of white dust on surfaces.
- Many workers were not going home clean and were taking their contaminated clothing home, thereby increasing the potential risk of non-employees (e.g. members of an employee's household) inhaling RCS when the clothing is laundered.
- Some workers removed their RPE first, before changing into clean clothing, which increased the risk of inhaling residual RCS.
- In some cases workers used compressed air to blow the dust off their clothing before they went home, which also potentially increased RCS exposure. Blowing compressed air onto yourself or another is not permitted due to risks including potentially fatal air embolism (compressed air entering the blood stream and blocking blood vessels); hearing damage; and eye injury from flying dust.

Hazardous substances and processes

- Many hazardous substances including chemical solvents, adhesives/bonding agents, pigments, acids and cleaning products were commonly used in stone workshops.
- These chemicals can be sensitisers, which may also adversely affect the respiratory and immune system.

Enforcement action taken

Enforcement notices were issued on the following common compliance issues.

RCS controls

- workers not clean shaven where fitted respirators were in use
- inadequate respiratory protection – not used correctly or consistently, unsuitable, no fit tests or checks, incorrectly stored or maintained
- lack of RCS information and training
- dust accumulation, workplace cleanliness
- workers not going home clean
- inadequate water recycling system, e.g. poor filtration, lack of chemical treatment.

Hazardous substances

- no health surveillance for RCS exposure
- no hazardous substances register/ safety data sheets
- no risk assessment for hazardous substances
- no hazardous substances information, training or training records
- insufficient labelling and poor practices when decanting chemicals.

Plant and equipment

- no registration of plant, e.g. air receiver
- unsafe storage of stone slabs
- no marking of safe working loads
- inadequate forklift compliance – lack of maintenance, records, jib/attachments without de-rated load charts, damaged seats or seat belt, no operator manual, no high risk work licence.

Electrical

- no residual current device (RCD) testing
- inadequate electrical equipment testing, maintenance and lockout.

Other

- fire extinguishers – insufficient in number and/or inadequate maintenance
- no emergency evacuation plan
- no first aid supplies or first aid trained person.

Health surveillance

The project highlighted the importance of health surveillance for all workers with a health risk from RCS exposure. Some workers participated in either the WorkSafe Health Surveillance Recall Project or the WA Silicosis Screening Project (WASSP – a joint initiative with the Institute for Respiratory Health).

Between July 2018 and May 2021, 365 workers participated in health surveillance. Twenty-four cases of silicosis were identified in Western Australian stone workers.

Ninety of these workers participated in the WorkSafe Recall Project. Participants, who all had more than five years' industry experience working with industry stone, received a low dose CT scan, after previously having health surveillance with a chest X-ray. Seven of these workers were found to have silicosis based on the low dose CT scan, which was not identified on chest X-rays.

Another 40% of these workers had other findings identified on the low dose CT scan, which may be due either to silica exposure or other respiratory issues. These workers were referred for further medical review.

In January 2021, the OSH Regulations 1996 were amended to require a low dose chest CT scan instead of a chest X-ray for silica health surveillance. The appointed medical practitioner overseeing health surveillance is authorised to make decisions on appropriate tests based on risk and consideration of WorkSafe guidance material.

Regular health surveillance will help identify early changes to the lungs such that further exposure can be avoided, and will assist in ensuring that workplace controls are adequate.

During the project it was noted that low dose CT is less available in regional areas, and this has been raised with radiological service providers and is being addressed.

Positive outcomes

Workplaces made improvements such as:

- implementation of "a go home clean policy" including provision of laundry (washing machine on-site), change area and showers
- provision of Powered Air Purifying Respirators or other suitable respirators
- use of clean water on hand tools
- installation of new/improved recycled waste water treatment systems
- upgraded standards of housekeeping and cleanliness in the workplaces
- policies preventing installers cutting on-site
- purchase of automated CNC machines
- purchase of LEV systems which can be placed close to contaminant source
- appointment of an OSH consultant to assist with compliance requirements and undertake air monitoring.

The results of air monitoring (117 samples) indicated that the current work practices of fabricating engineered stone benchtops generate elevated levels of RCS in the workplace, i.e. workplace engineering and process controls are not sufficiently effective. This presents a significant risk to worker health and places reliance on correct and consistent use of RPE.

Air monitoring

Engineered stone work

The workplace exposure standard (WES) for RCS is 0.05 mg/m^3 as an 8 hour time weighted average (TWA). For respirable dust 1 mg/m^3 has been recommended as an 8 hour TWA at which controls should be reviewed.

Sixty-seven personal samples were collected across 20 stone workshops and a further 22 personal samples were taken from installers. Generally, stone workers in fabrication workshops recorded higher RCS exposure than benchtop installers. In some cases, this was because the stone was not worked (cut/ground) on site as it had been cut to size in the factory.

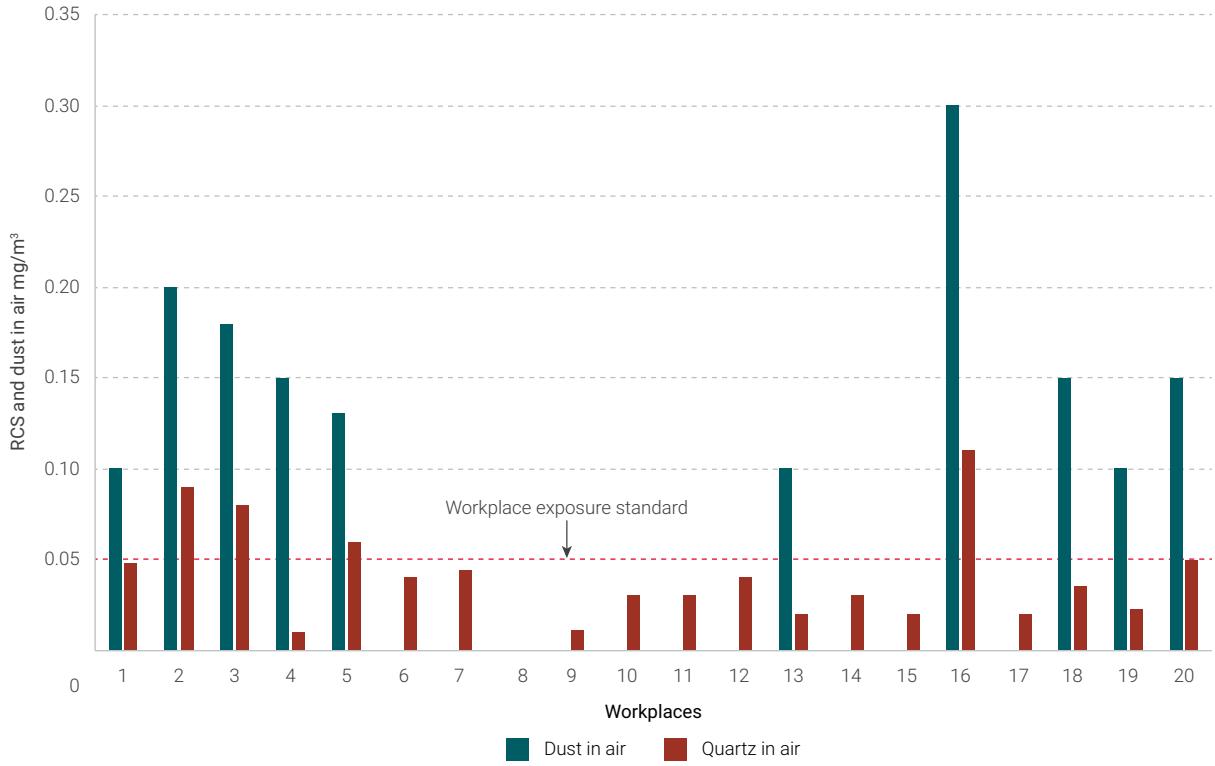
Where cutting/grinding was done during installation, high dust levels were generated even if some water was used.

The air monitoring results found:

- 25% of stone fabrication workers were exposed to RCS above the WES
- 33% of installers were exposed to RCS above the WES
- 40% of fabrication workers and 33% of installers recorded exposure to RCS above the action level (half the exposure standard i.e. 0.025 mg/m^3) but below the WES.

It is recommended that employers running stone fabrication workshops engage a competent person such as an occupational hygienist to conduct air monitoring every two years, or when production methods or exposures vary. Air monitoring is used to assess workers' exposure and whether controls are adequate.

Air monitoring results have highlighted the need for effective LEV in combination with water suppression where practicable when working with engineered stone.



Summary average results dust and RCS in fabrication workshop

Sample preparation areas in assay laboratories

Five workplaces were monitored (22 samples). There are several dust sources and work activities likely to contribute to elevated RCS levels at assay laboratories. These included the handling/sorting of dusty calico sample bags; milling and crushing processes; the use of compressed air to split samples or clean; and a lack of, or inefficient, local extraction ventilation (LEV). Results of monitoring found:

- 66% of assay laboratory workers (sample preparation) were exposed to RCS at levels above the WES
- assay laboratories must ensure LEV and systems of work are optimised to reduce RCS exposure as far as practicable
- assay laboratory sample preparation workers should be provided with health surveillance.

Wall chasing

Six workers were monitored at five work sites. LEV and wet cutting in combination were found to be the most effective controls for reducing dust exposures to the operator or persons nearby.

Task based monitoring was conducted (rather than taking eight hour averages).

RCS in air was between 0.19–0.49 mg/m^3 for dry "grinder vac" methods and 0.05 mg/m^3 for wet cutting with LEV. However, in some cases other dusty work was occurring nearby, which may have increased the results. Therefore, it was identified that:

- wall chasers should be provided with health surveillance.

Recommendations

Employers at silica risk workplaces (e.g. stone workshops, construction work, assay laboratories) should:

- identify silica risk tasks/processes
- assess workers' RCS exposure
- refer to the Further Information below and ensure all practicable controls are in place
- provide health surveillance to workers where there is a risk to health from RCS exposure
- monitor the effectiveness of controls periodically or when things change.

Further information

- Commission for Occupational Safety and Health – Guidance note – Working with stone: Product fabrication and installation
- WorkSafe – Checklist – Stone benchtop fabrication and installation
- WorkSafe – Dust hazards in assay labs
- WorkSafe – Safety alert 11/2018 - Stone benchtop workers at risk of silicosis
- WorkSafe – Silica Dust (respirable crystalline) – Health Surveillance – Guide for medical practitioners 2021
- WorkSafe – Bulletin – Issues with wall chasing – 2019
- Safe Work Australia – Guidance on the interpretation of workplace exposure standards for airborne contaminants
- WorkSafe NZ – Life Shavers Campaign – RPE

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