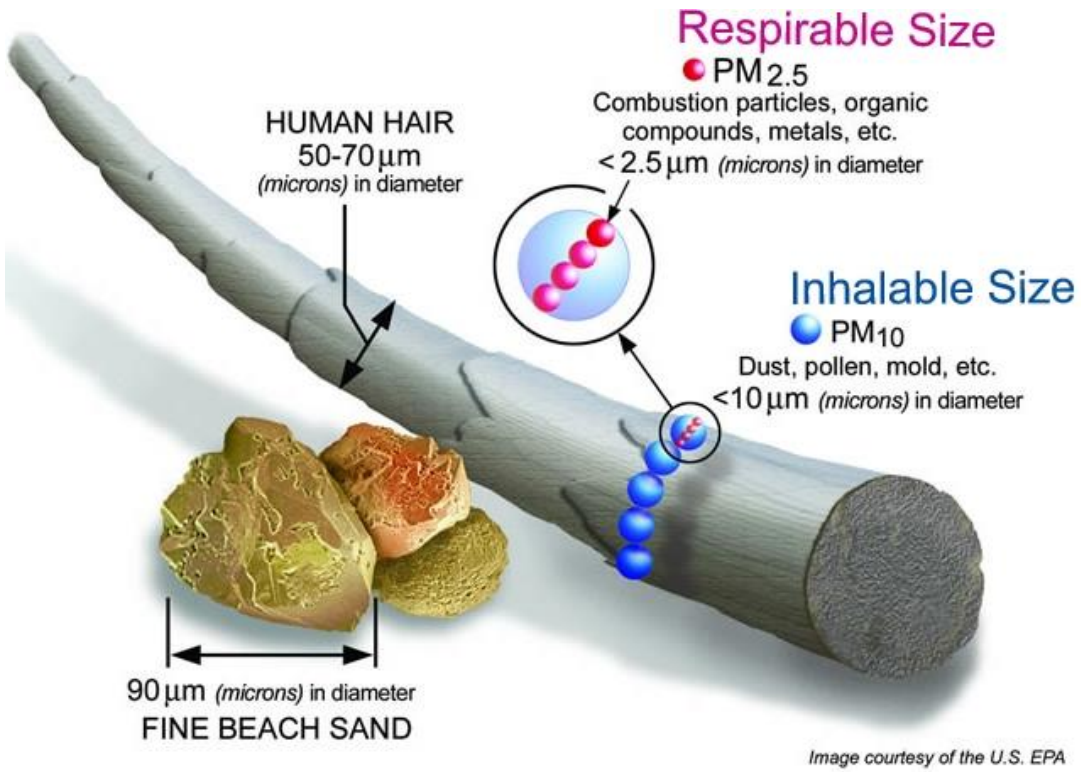
Construction dust

https://www.youtube.com/watch?v=Mwu_I4kUI9M

The problem with respirable dust

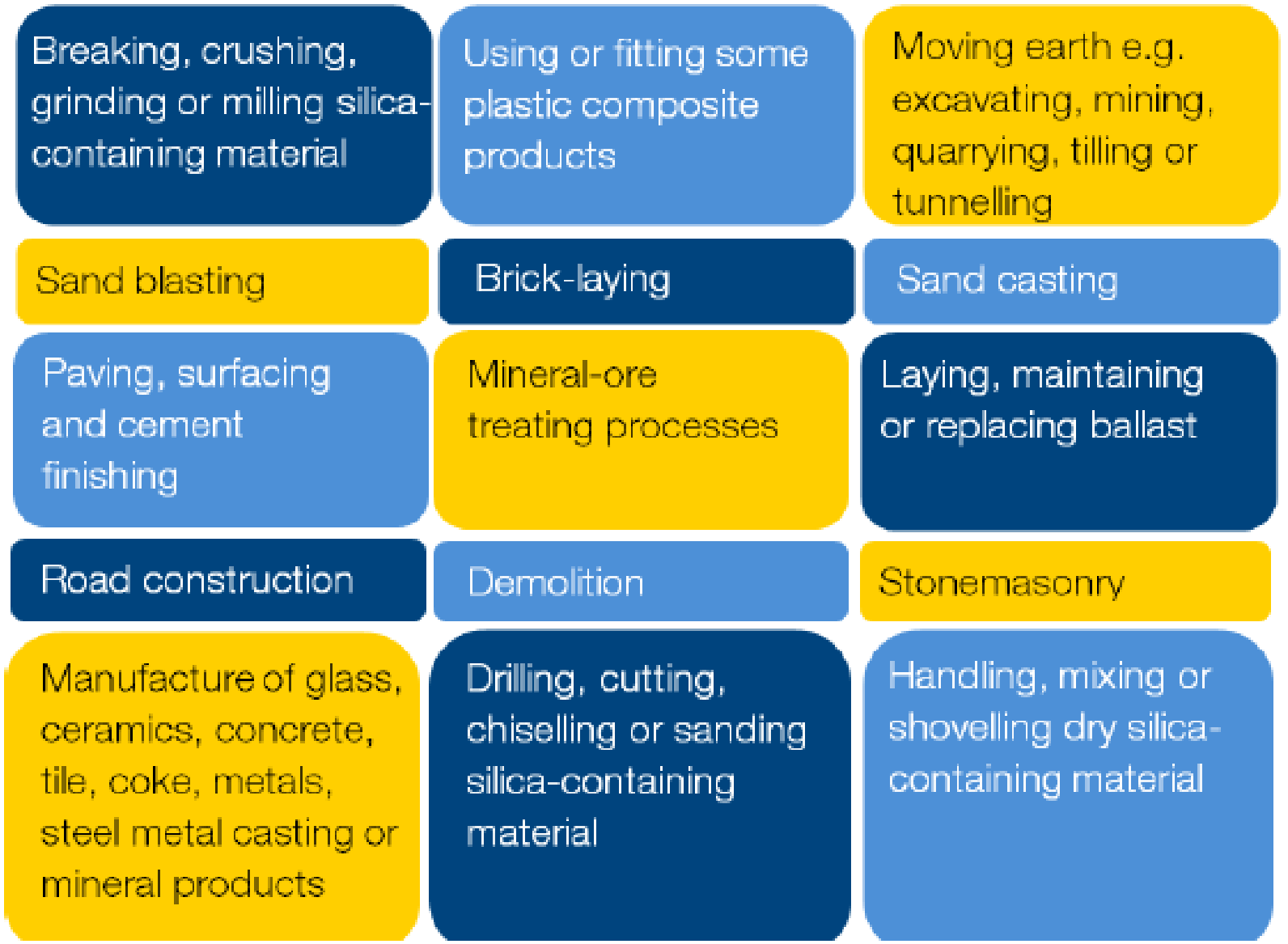


Work and Exposure to Silica

- Approx 587,000 workers exposed to silica dust in 2011 at work
- Estimated that 5758 will develop lung cancer over course of their life
- Estimated that 230 workers develop lung cancer yearly from past exposure to silica dust at work – this risk increases with long term and repeated high level exposure

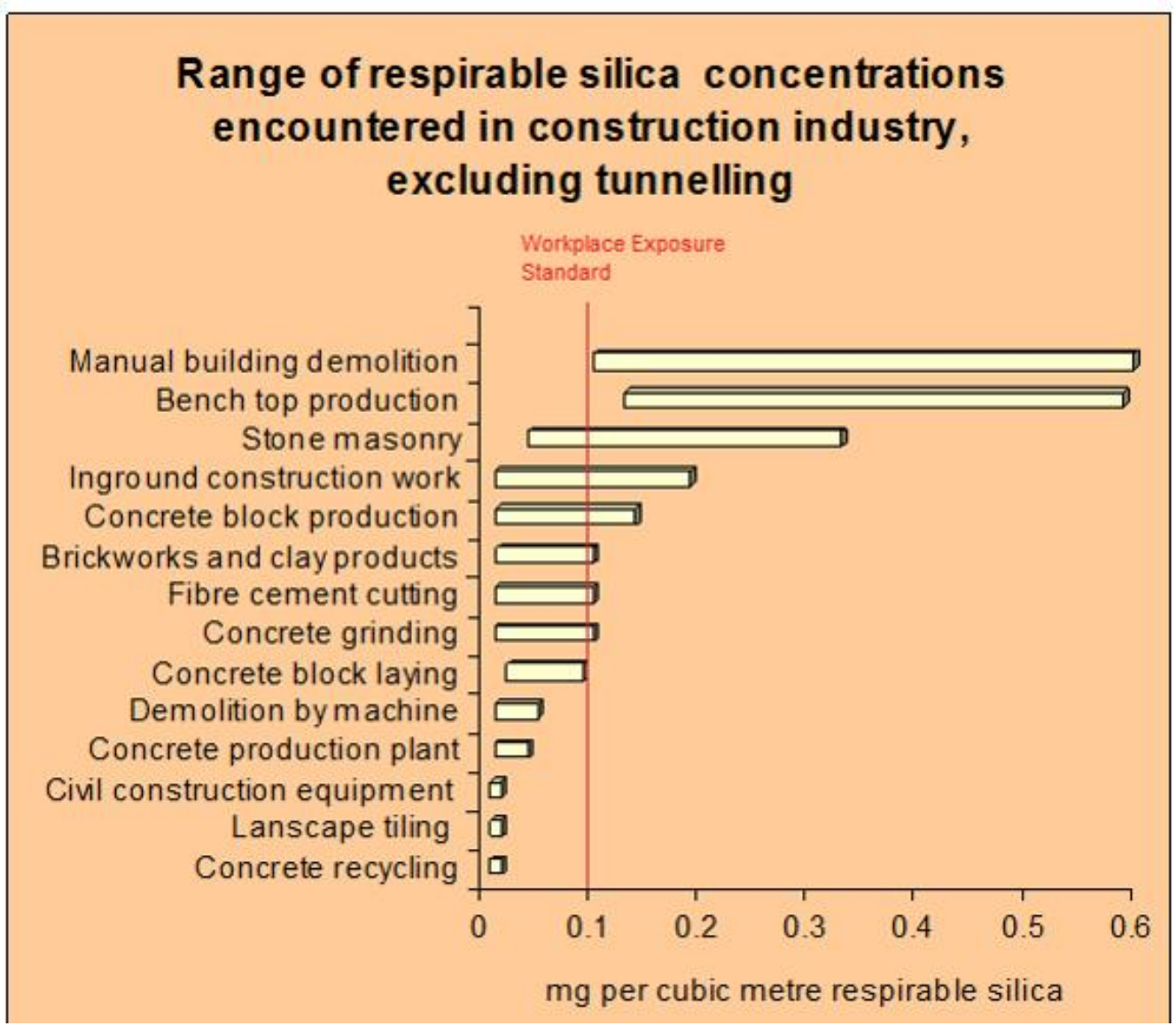
Source Cancer Council Australia

Occupations with exposure to Silica



Respirable Crystalline Silica (RCS)

Workplace exposure standard (8h TWA)


Range of respirable silica concentrations encountered in construction industry, excluding tunnelling
Workplace Exposure Standard
Manual building demolition
Bench top production
Stone masonry
Inground construction work
Concrete block production
Brickworks and clay products
Fibre cement cutting
Concrete grinding
Concrete block laying
Demolition by machine
Concrete production plant
Civil construction equipment
Lanscape tiling
Concrete recycling
0
0.1
0.2
0.3
0.4
0.5
0.6
mg per cubic metre respirable silica

Examples of crystalline silica content

Approximate crystalline silica content of different materials	
Sandstone	70–90%
Concrete, mortar	25–70%
Tile	30–45%
Granite	20–45%, typically 30%
Slate	20–40%
Brick	Up to 30%
Limestone	2%
Marble	2%

Dust extraction

Dust extraction

Table 2 classes and suitability of industrial vacuum cleaners (Source: AS/NZS60335.2.69)

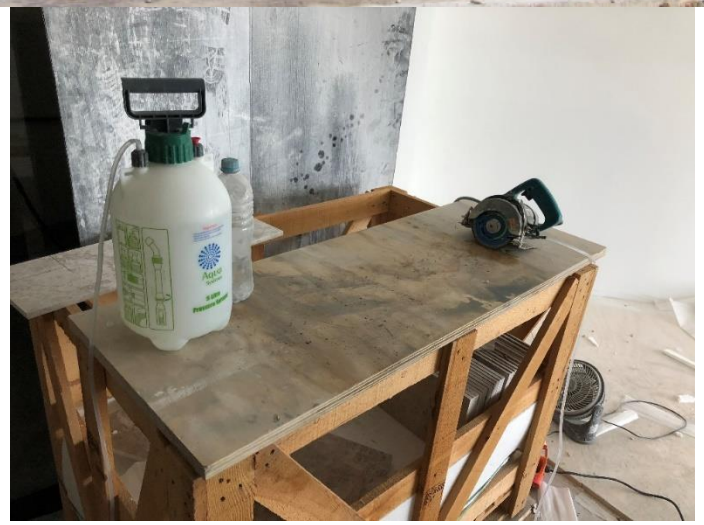
Dust class	Required for
L (light hazard) 	Dusts with a workplace exposure standard greater than 1mg/m3 (8-hourTWA*) (excluding wood dusts) Examples include: • calcium carbonate (e.g. plaster, plasterboard, gypsum) • aluminium (e.g. dusts from polishing and machining)
M (medium hazard) 	Dusts with a workplace exposure standard greater than or equal to 0.1mg/m3 (8hTWA) and all wood dusts Examples include: • chromium • wood dust
H (high hazard) 	Dusts with a workplace exposure standard less than 0.1mg/m3 (8hTWA), carcinogenic dusts, pathogenic dusts Examples include: • respirable crystalline silica (RCS) (e.g. dust from concrete, fibre cement board, bricks, blocks, pavers, stone benchtops and headstones) • asbestos

On-tool extraction

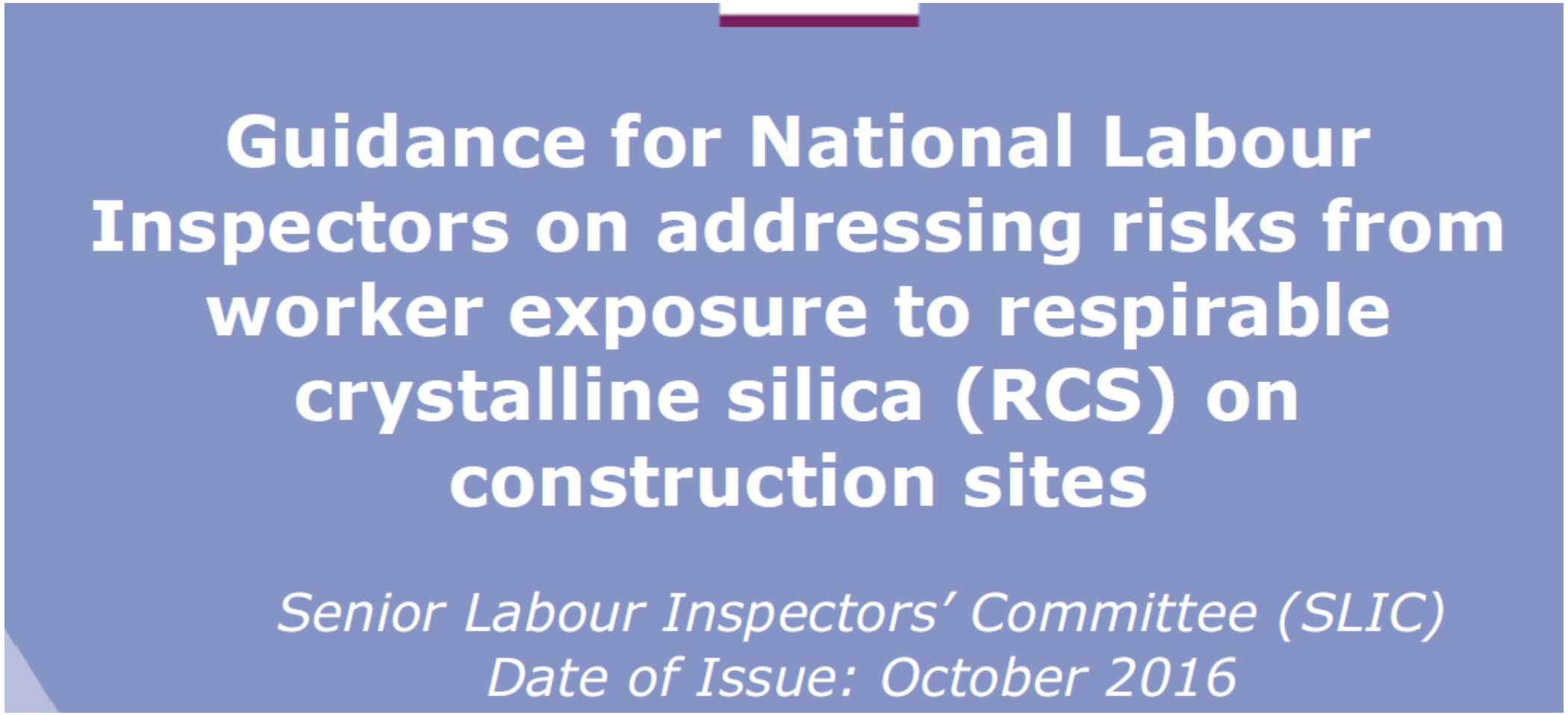
On Tool Extraction systems

On Tool Extraction systems

Water suppression



Photos from following



2.1 Cutting concrete kerbs, blocks and paving with a cut-off masonry saw

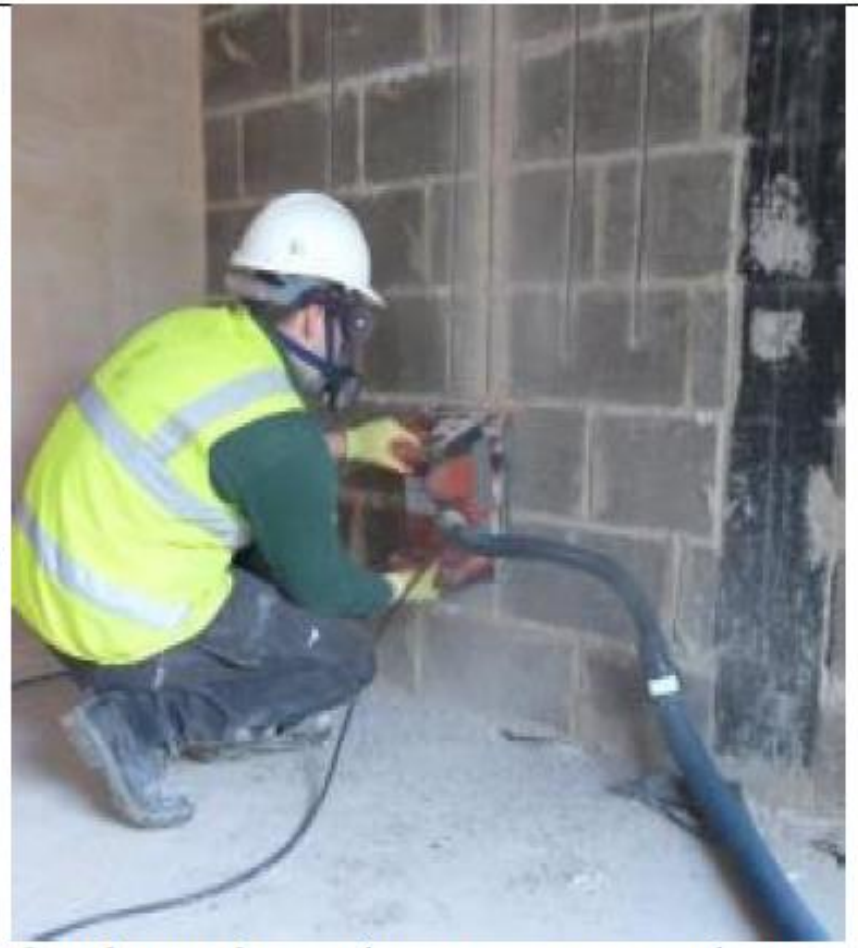
Poor practice – no dust suppression or RPE (HSE, GB)

Good practice – Water suppression and RPE (HSE, GB)

Good practice – Using a low energy solution such as a block splitter (HSA, IE)

2.2 Chasing concrete and raking mortar

Poor Practice – Chasing concrete with no on-tool extraction or RPE (Safer Sites Website, GB)



Good practice – Chasing concrete with on-tool extraction (HSE, GB)

2.3 Cutting roof tiles with cut-off saw

Poor Practice – Cutting roof tiles without control measures (National Federation of Roofing Contractors Ltd, GB)

Good practice – Cutting roofing tiles with a tile cutter (National Federation of Roofing Contractors Ltd, GB)

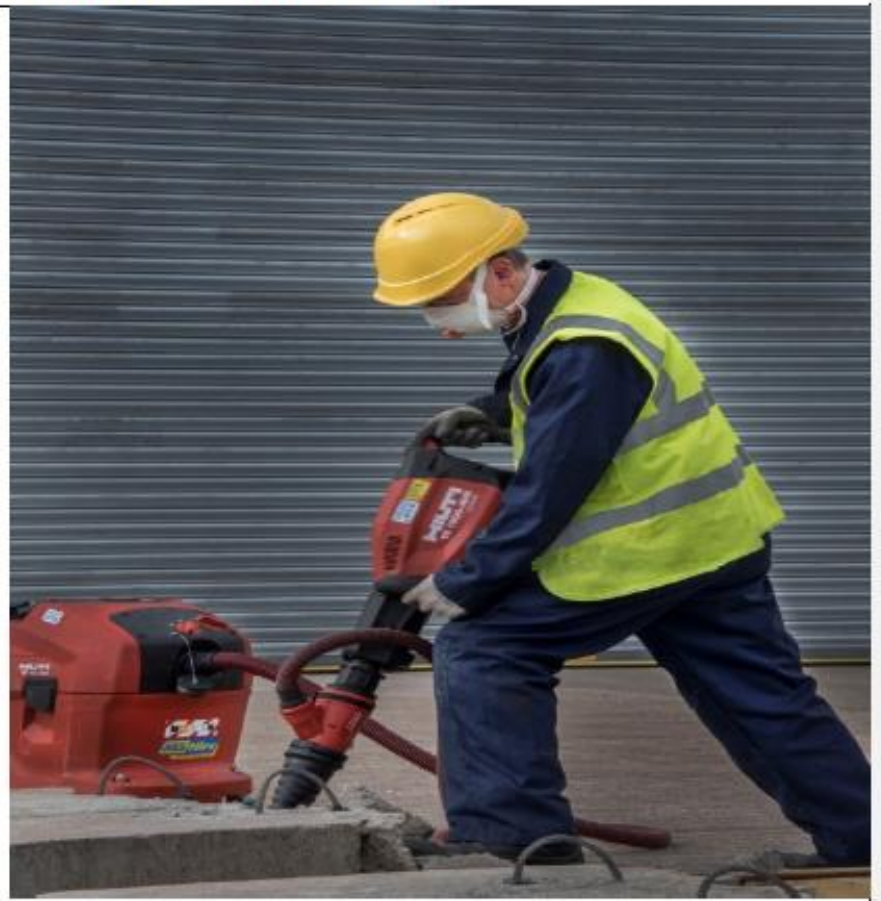
2.4 Scabbling or grinding concrete floors with hand-held tools

Poor Practice – Using a hand-held scabbler without on tool extraction (David Flynn Ltd, IE)

Good practice – Using a hand-held grinder with on-tool extraction (HSE, GB)

2.5 Hand-held breaker in enclosed space (without ventilation)

Poor Practice – Using a hand-held breaker without on-tool extraction (DLI, CY)



Good practice – Using a hand-held breaker with on-tool extraction (HSE, GB)

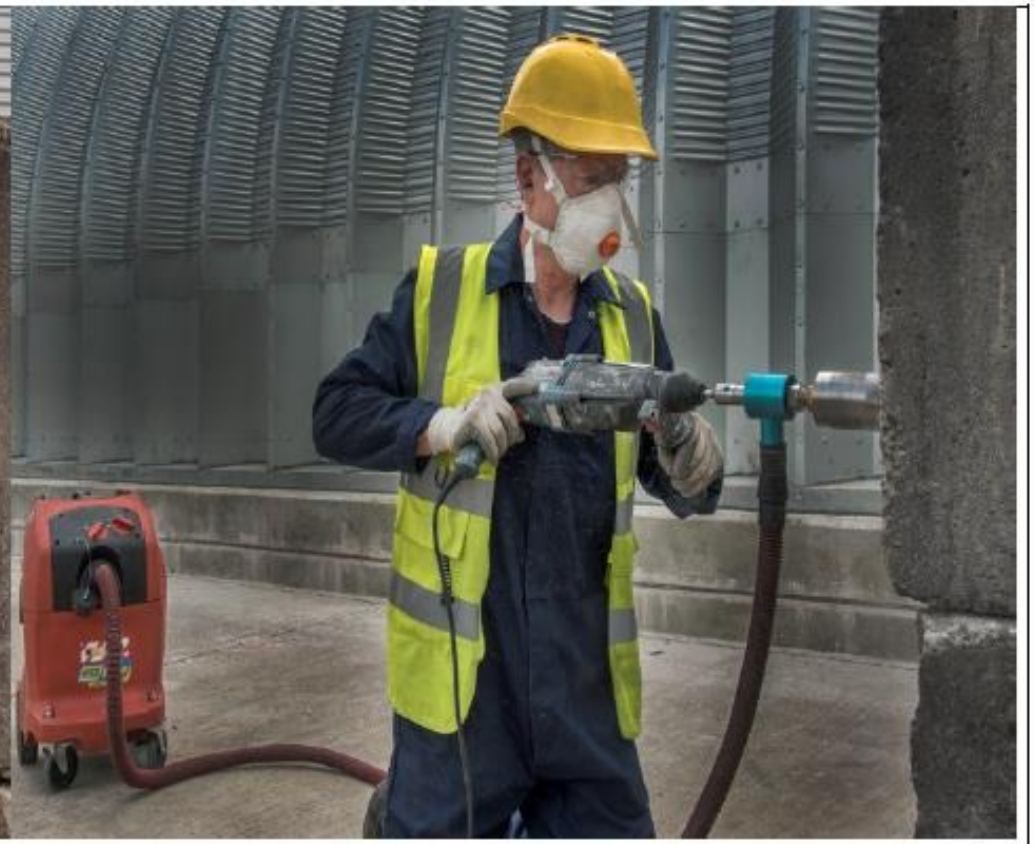
2.6 Drilling small diameter holes in concrete floors, walls and ceiling

Poor practice – Using Hand-held drill with no on-tool extraction (David Flynn Ltd, IE)

Good practice – Using a hand-held drill with integrated cassette (HSE, GB)

2.7 Dry coring

Poor Practice – Using hand-held corer with no extraction or RPE (HSE, GB)



Good practice – Dust extraction on the core drill and RPE (HSE, GB)

2.10 Removing small rubble, dust and debris

Poor Practice – Removal of rubble using dry sweeping (HSE, GB)

Good practice – Removal of dust using high-efficiency filter vacuum (HSE, GB)

2.11 Bench-top masonry saw

Poor Practice – No/insufficient water suppression and lack of RPE (HSE, GB)

Good practice – Use of water suppression (shown) and RPE worn by the operator (HSE, GB)

2.12 Wall sanding

Poor Practice – Use of a pole sander without extraction (HSE, GB)

Good practice – Use of pole sander with extraction (HSE, GB)

2.13 Sanding concrete floors

Poor Practice – sanding concrete floors without on-tool extraction (GDWW, B)

Good practice – sanding concrete floors with on-tool extraction (HSE, GB)

2.14 Utility vehicle demolition

Good Practice – Utility vehicle cabin fitted with in-cab ventilation and material wetted before loading and transportation (MTS group Ltd, GB and JCB, GB)

Good practice – Use of remote controlled utility vehicle (SWEA, S)

RPE: Respiratory Protection

Now … or … Later

Respirators

vs.

Fit-testing

Respirator Fit Test

Qualitative

Quantitative

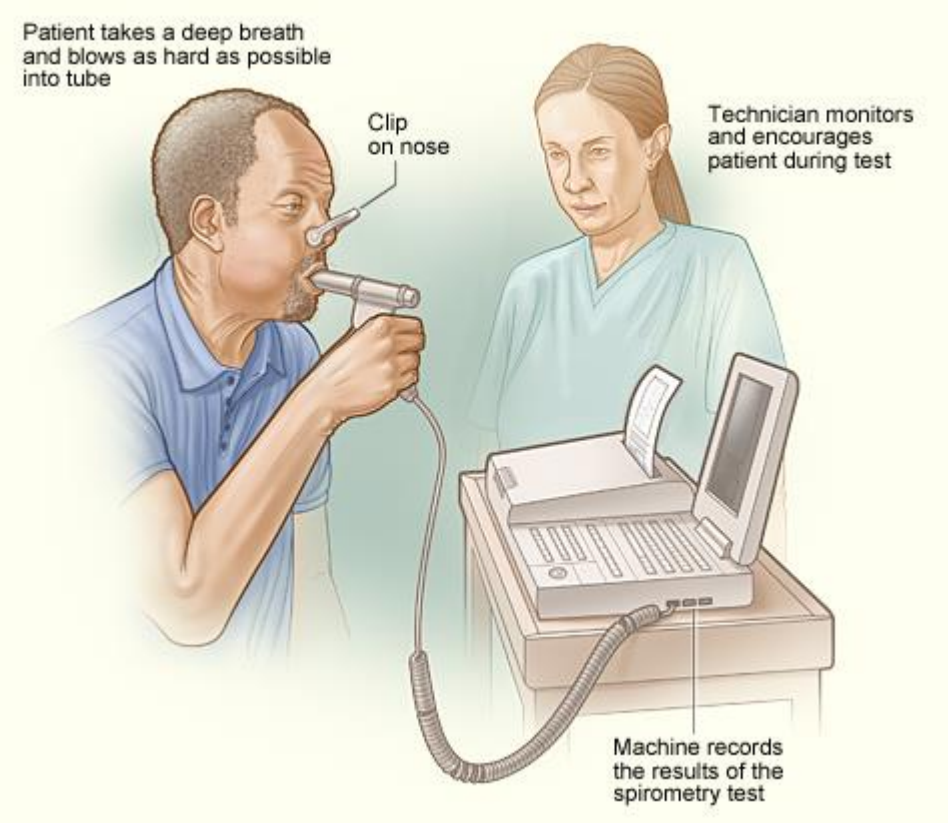
Fit Check

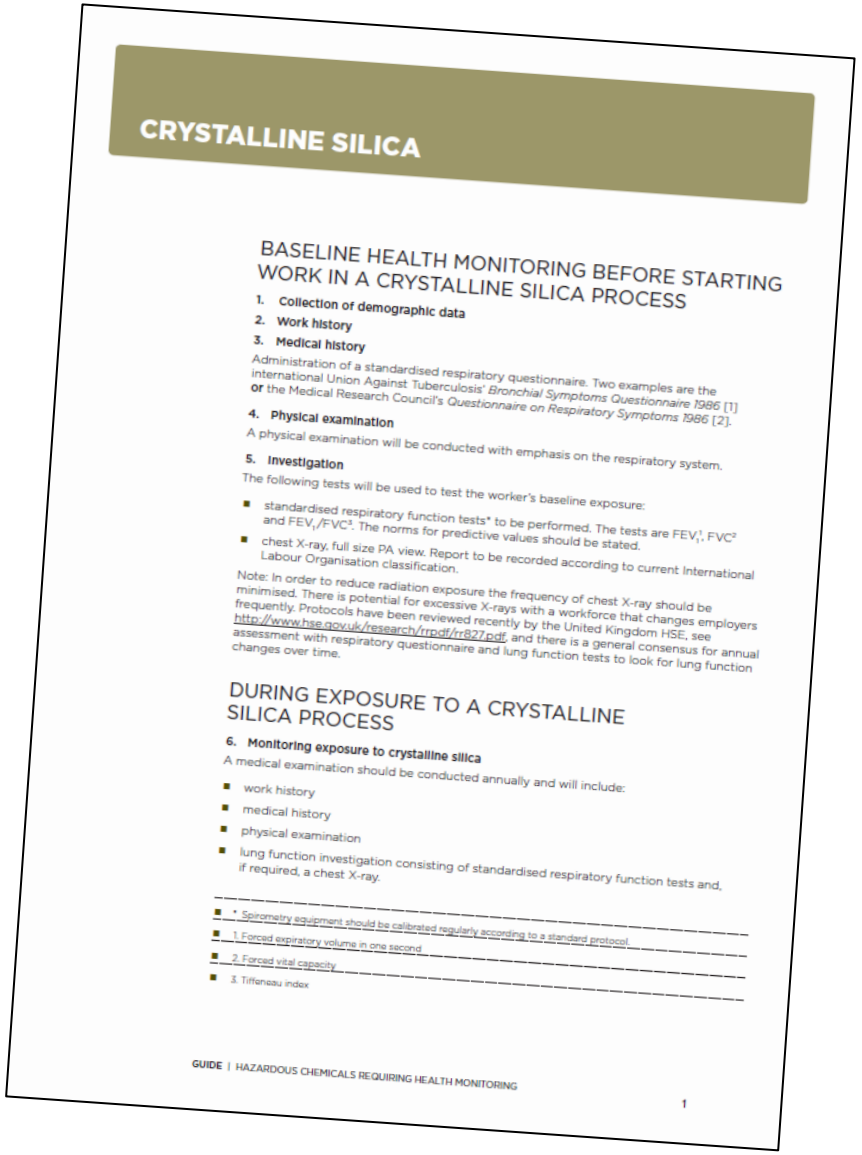
Housekeeping

Exposure monitoring

- *Australian Standard 2985:2009 Workplace Atmospheres - Method of sampling and gravimetric determination of respirable dust.*
- *Sampling must be undertaken in the breathing zone of the worker*
- *Repeat sampling provides a better idea of likely exposure*

Health monitoring





CRYSTALLINE SILICA

BASELINE HEALTH MONITORING BEFORE STARTING WORK IN A CRYSTALLINE SILICA PROCESS

1. **Collection of demographic data**
2. **Work history**
3. **Medical history**

Administration of a standardised respiratory questionnaire. Two examples are the international Union Against Tuberculosis' *Bronchial Symptoms Questionnaire 1986* [1] **or** the Medical Research Council's *Questionnaire on Respiratory Symptoms 1986* [2].

4. **Physical examination**

A physical examination will be conducted with emphasis on the respiratory system.

5. **Investigation**

The following tests will be used to test the worker's baseline exposure:

- standardised respiratory function tests* to be performed. The tests are FEV_1[1], FVC[2] and FEV_1/FVC[3]. The norms for predictive values should be stated.
- chest X-ray, full size PA view. Report to be recorded according to current International Labour Organisation classification.

Note: In order to reduce radiation exposure the frequency of chest X-ray should be minimised. There is potential for excessive X-rays with a workforce that changes employers frequently. Protocols have been reviewed recently by the United Kingdom HSE, see http://www.hse.gov.uk/research/rrpdf/rr827.pdf, and there is a general consensus for annual assessment with respiratory questionnaire and lung function tests to look for lung function changes over time.

DURING EXPOSURE TO A CRYSTALLINE SILICA PROCESS

6. **Monitoring exposure to crystalline silica**

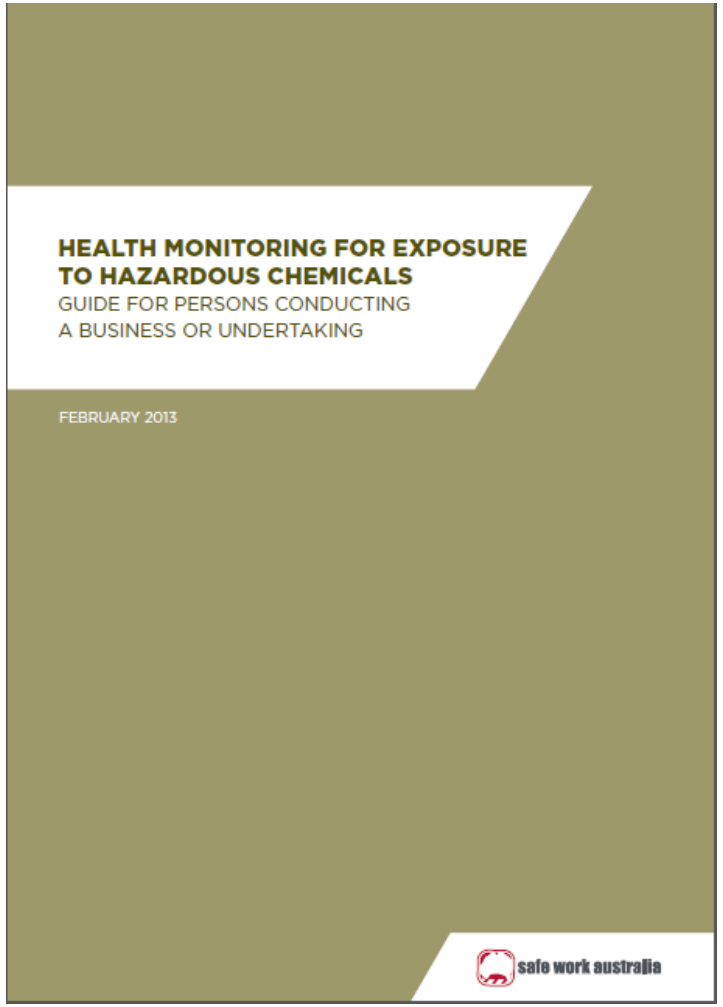
A medical examination should be conducted annually and will include:

- work history
- medical history
- physical examination
- lung function investigation consisting of standardised respiratory function tests and, if required, a chest X-ray.

* Spirometry equipment should be calibrated regularly according to a standard protocol.

1. Forced expiratory volume in one second
2. Forced vital capacity
3. Tiffeneau index

Significant risk?



‘Significant risk’ means people in the workplace are likely to be exposed to silica dust at a level that could adversely affect their health.

Description	Health monitoring required?
Significant risk, effectively controlled	No
Significant risk, inadequate control	Yes
Uncertain risk, hazard or degree of exposure	Yes

Health monitoring

Level of exposure	Known control measures are in place	Not all known control measures are in place
Exposure is well below a level that could harm health*	✗	✗
Exposure is at a level that could harm health*	✗	✓
Exposure to a chemical that is highly toxic	✗	✓
It is reasonably foreseeable leaks or spills may occur	✗	✓
Uncertain about the risk to health or level of exposure	✓	✓

* Where a workplace exposure standard (WES) for an airborne contaminant has been established, exposure over 50 percent of the WES indicates controls may not be adequate.

Examples of controls

- Using compressed air and vacuum at same time
- Bosch on tool systems

Case study

Fibre cement cladding installation

Case Study

- Project $20 million multi storey aged care facility in Birkdale South of Brisbane.
- External cladding 9mm compressed fibre cement sheeting (CFC)
- Mackay based contractor recently moved to SEQ

PAYNTER DIXON
BUILDING YOUR BUSINESS

Prior to Contractor arriving on site

- Pre-award evaluation interview conducted
- Contract issued to contractor

  Requiring compliance to

  – WHS Act 2011

  – WHS Regulation 2011

  – WHS Management Plan (copy provided with contract)
- SWMS received and reviewed

  Identifying

  – Cement sheeting as a hazardous chemical requiring SDS

  – Dust extraction and respirators

Setup on site

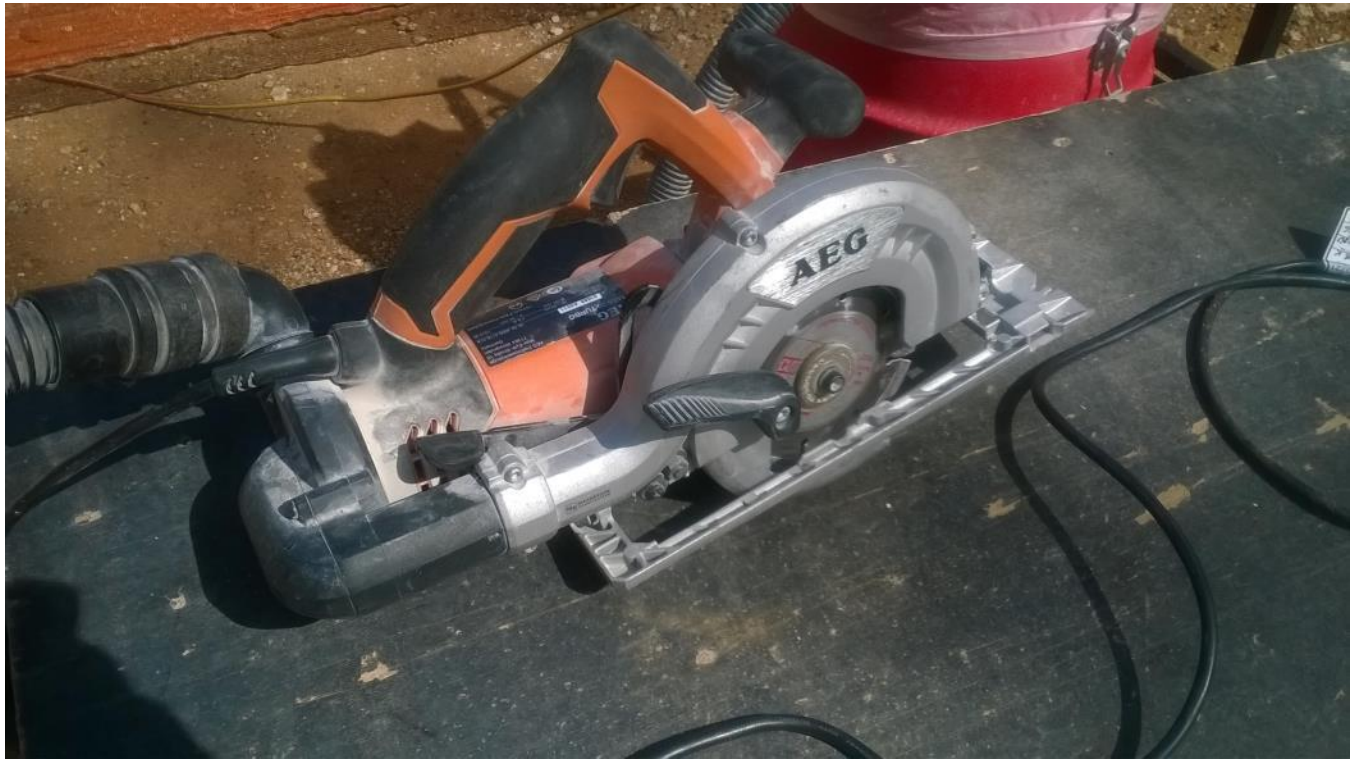
- Area out side of the structure
- Signage erected
- Area bunted off
- Power saw with dust extraction set up
- Vacuum connected to saw
- P2 Masks available for workers

Issues identified with initial setup

- Saw blade was a Diamond Turbo blade- not the blade recommended by the manufacturer of the CFC

Issues identified with initial setup

- Dust extraction power saw- not a dustless power saw



Issues identified with initial setup

- Extraction Vacuum- user manual stated for domestic use only and a non HEPA filter M or H Class

Corrective Actions Taken

- Consultation with workers and contractor
- Education on manufactures spec and Australian Standards
  - H class vacuum fitted with a HEPA filter
  - Dustless extraction saw
  - 4 toothed diamond tipped saw blade

So where to from here?

2nd attempt

- Plunge cut extraction saw with new blade- 8 toothed diamond tipped
  - large improvement but still not there.

2nd Attempt

- New vacuum supplied by a hire company- worse than the domestic vacuum first used

2nd Attempt

- New vacuum purchased- large improvement on previous two vacuums but still only a L class vacuum without a HEPA filter

2nd Attempt

- Dust escaping around the saw
  - Improved by having a backing board under the material being cut.
  - Improved by covering the securing nut access hole on the saw cover

Final Attempt

- H class, HEPA filter vacuum
- Full dustless saw

Contributing Factors

- Lack of awareness in industry
- Lack of supplier awareness- leading to the contractors confusion.
- Lack of information around vacuum classes
  - E.g. Silica is a carcinogenic, AS60335.2.69:2003

Resources

- WHSQ construction dust web page: https://www.worksafe.qld.gov.au/construction/workplace-hazards/silica-exposure-a-serious-risk-for-construction-workers
- WHSQ silica technical guide: https://www.worksafe.qld.gov.au/__data/assets/pdf_file/0008/83186/silica_managing_workplace.pdf
- Safe Work Australia – crystalline silica health monitoring: https://www.safeworkaustralia.gov.au/doc/crystalline-silica-health-monitoring

Enforcement

Prohibition notice: Uncontrolled (or ineffectively controlled) RCS exposures

Improvement notice:

- Use of engineering controls
  - Class of dust extractor/vacuum
  - Suitability/capability
- RPE
  - use
  - fit-testing
- SWMS