Why Protect Your Lungs

Evette Boyes
HSENi Scientific Services
Exposure to Respirable Dust & Crystalline Silica causes Lung Disease

- **Silicosis** – progressive, irreversible, scarring of the lungs
- **Acute silicosis** – rapidly progressive, often fatal
- **Lung Cancer**
- **COPD** Chronic Obstructive Pulmonary Disease - bronchitis, emphysema, severe breathlessness, prolonged coughing and chronic disability
- **Tuberculosis, Kidney disease, Arthritis** – increased risk of developing disease.
Estimated Deaths per year – www.hse.gov.uk

18 – Silicosis (2013 with similar numbers over the previous 5yrs)

600 – Lung Cancer related to silica exposure

4000 – related to COPD

Reference - HSE statistics 2014/2015
Workplace Exposure Limit ‘WEL’
set in order to help protect the health of workers

WELs = concentrations of hazardous substances in the air, averaged over a specified period of time, long-term (8 hours) or short-term (15 minutes)

Respirable Crystalline Silica WEL = 0.1 mg/m$^3$

Respirable dust WEL = 4 mg/m$^3$

Both of these limits are based on an 8-hour reference period

The COSHH Regulations require employers to prevent or control exposure to hazardous substances.

www.hse.gov.uk/coshh.
The maximum daily silica exposure is tiny when compared to the size of a penny.
Respirable dust sampler

100 µm - thickness of a coat of paint

80 µm - average width of human hair (ranges from 18 to 180 µm)

40 µm - Lower limit of visibility (naked eye)

0.1-10 µm - Respirable dust range

0.1 µm — 90% of particles in wood smoke are smaller than this (ranges from 0.007 to 3 micrometres)
Range of exposures for job types  
Calculated as an 8-hour time weighted average concentration in mg/m³

<table>
<thead>
<tr>
<th>Job Title /Description</th>
<th>Respirable dust mg/m³</th>
<th>Respirable Crystalline silica mg/m³</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quarry Manager / Site Foreman</td>
<td>0.25 to 1.27</td>
<td>0.05 to 0.22</td>
</tr>
<tr>
<td>Plant / Crusher operator</td>
<td>0.05 to 5.92</td>
<td>0.06 to 1.32</td>
</tr>
<tr>
<td>Quarry fitter</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operator – Shovel, Excavator, Dumper truck</td>
<td>0.09 to 0.32</td>
<td>&lt;0.02 to 0.08</td>
</tr>
<tr>
<td>HSENI Inspector</td>
<td>0.22 to 0.44</td>
<td>0.05 to 0.10</td>
</tr>
</tbody>
</table>
### Specific Activities – Quarry Manager / Site Foreman

<table>
<thead>
<tr>
<th>Job Title /Description</th>
<th>Time period measured (minutes)</th>
<th>Respirable dust measured mg/m³</th>
<th>8-hour TWA Respirable dust mg/m³</th>
<th>Respirable Crystalline silica measured mg/m³</th>
<th>8-hour TWA Respirable Crystalline silica mg/m³</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quarry Manager</td>
<td>Involved in a conveyor repair</td>
<td>181</td>
<td>0.24</td>
<td>0.25</td>
<td>0.05</td>
</tr>
<tr>
<td>Site Foreman</td>
<td>General plant maintenance &amp; repairs</td>
<td>136</td>
<td>1.54</td>
<td>1.27</td>
<td>0.20</td>
</tr>
<tr>
<td></td>
<td>Crusher plant</td>
<td>126</td>
<td>0.59</td>
<td></td>
<td>0.18</td>
</tr>
</tbody>
</table>
### Specific Activities – Plant / Crusher operator

<table>
<thead>
<tr>
<th>Specific Activity</th>
<th>Time period measured (minutes)</th>
<th>Respirable dust measured mg/m³</th>
<th>8-hour TWA Respirable dust mg/m³</th>
<th>Respirable Crystalline silica measured mg/m³</th>
<th>8-hour TWA Respirable Crystalline silica mg/m³</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Control room, operational checks cleaning up spillages. Approx 60 minutes spent cleaning inside crusher on second sample period</td>
<td>148</td>
<td>0.21</td>
<td>5.92</td>
<td>0.09</td>
<td>1.32</td>
</tr>
<tr>
<td></td>
<td>118</td>
<td>10.41</td>
<td></td>
<td>2.27</td>
<td></td>
</tr>
<tr>
<td>2. As above Approx 60 minutes cleaning outside crusher on second sample period</td>
<td>143</td>
<td>0.33</td>
<td>0.28</td>
<td>0.13</td>
<td>0.13</td>
</tr>
<tr>
<td></td>
<td>120</td>
<td>0.10</td>
<td></td>
<td>0.08</td>
<td></td>
</tr>
<tr>
<td>3. Crusher &amp; screen plant attending broken conveyor</td>
<td>151</td>
<td>1.21</td>
<td>1.18</td>
<td>0.27</td>
<td>0.26</td>
</tr>
<tr>
<td>4. Crusher plant Control room, not remote &amp; not air tight</td>
<td>145</td>
<td>1.04</td>
<td>1.01</td>
<td>0.22</td>
<td>0.21</td>
</tr>
</tbody>
</table>
### Specific Activities – Excavator & HSENI Quarry Inspection

<table>
<thead>
<tr>
<th>Job Title /Description</th>
<th>Time period measured minutes</th>
<th>Respirable dust measured mg/m³</th>
<th>8-hour TWA Respirable dust mg/m³</th>
<th>Respirable Crystalline silica measured mg/m³</th>
<th>8-hour TWA Respirable Crystalline silica mg/m³</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Excavator</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Air conditioned cab</td>
<td>270 (116-310)</td>
<td>0.28</td>
<td>0.32 (0.09 – 0.32)</td>
<td>0.07</td>
<td>0.08 (0.03 – 0.05)</td>
</tr>
<tr>
<td>Crusher broken for part of the time and operator</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carried out rock transfer and loading during this time</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>K Logan Quarry Inspection</strong></td>
<td>141</td>
<td>0.71</td>
<td>0.22 (x1 Visit) 0.44 (x2 Visit)</td>
<td>0.16</td>
<td>0.05 (x1 Visit) 0.10 (x2 Visit)</td>
</tr>
</tbody>
</table>
The COSHH Regulations require employers to prevent or adequately control exposure to hazardous substances.

The Principles of good control practice are set out in the Regs - Schedule 2A.

They must all be applied to obtain effective and reliable control.

- Minimise emission, release and spread
- Consider routes of exposure
- Choose control measures proportionate to the risk
- Choose effective control options
- Personal protective equipment & Respiratory Protection – the final control option
- Review the effectiveness of controls
- Provide information instruction and training
- New measures should not create new risks

www.hse.gov.uk/coshh/detail/goodpractice.htm
Realistically there will always be dust generated through quarrying activities:-

- drilling, blasting, crushing, screening
- disturbance of settled dust
- cleaning or maintenance
- walking / vehicle transport
- natural air movement & windblown dust

Protect the worker from the dust –

Minimise & suppress the dust – work methods, process control

Remove the requirement for the worker to be in the area - design and automate the process

Isolate the worker – refuges and control rooms, remote from the working area

Clean and maintain plant, working area, refuges, vehicle cabs – remove dust use a vacuum with high efficiency particle (HEPA) filter or wet cleaning methods

Respiratory Protective Equipment – RPE is a last resort and may be needed in addition to all of the above
Respiratory Protective Equipment – must be

**Adequate for the amount of dust**
P3 Filter or greater if required
- FFP3 disposable or half mask gives a protection factor of 20
- Full face P3 filter respirator = PF40
- Powered respirator masks or hoods with helmets = PF40
- Constant flow airlines with mask, hoods, helmet = PF40

**Suitable for the purpose & compatible with other PPE**

**Face fitted** for the individual operator (clean shaven)

**Worn Correctly** - Filters and disposable masks changed regularly

**Kept clean, maintained & stored** to prevent contamination

**Regularly examined and tested** and records kept

**Training** - to use, check & clean the respirator
FFP3 disposable or half mask gives a protection factor of 20
Full face P3 filter respirator = PF40
Powered respirator masks or hoods with helmets = PF40
Constant flow airlines with mask, hoods, helmet = PF40

Constant flow airlines with Full Suit = PF10 to 200
Health Surveillance – for those exposed to respirable crystalline silica

must be provided for –

- Workers who are regularly exposed to RCS dust and there is a reasonable likelihood that silicosis may develop.

- Where there is reliance on RPE as an exposure control measure

- Employees who have been exposed to RCS for 15 years (working for one or more employers) should be given a PA Chest X-ray.

COSH Essentials : General Guidance G404

Health Surveillance for those exposed to respirable crystalline silica (RCS)
Supplementary guidance for occupational heath professionals
(amended January 2016)
HSE Web Communities – Quarry and Stone Workers

‘STOP DUST BEFORE IT STOPS YOU’

HSE – Video
Introducing and Managing Respiratory Protective Equipment in the Workplace

HSE - HSG53
Respiratory Protective Equipment at Work

HSE - INDG 463
Control of Exposure to Dust

www.hse.gov.uk
COSHH Essentials in Quarries - Silica
Thank You