Industrial Dust Matters
Exposure / Effects / Limits / Control

Mike Slater
BOHS President 2013/14
a healthy working environment for everyone
How many people are exposed to dust at work?
Estimated as 9,200,000

Source: John Cherrie, IOM
How does exposure occur?
Dust exposures typically occur when:

- Handling powders
- Cutting, grinding, drilling etc.
- Handling friable materials
- Disturbing dust settled on surfaces
What are the health effects?
Fibrosis
Emphysema:
- Alveolar membranes break down

Airways (bronchi):
- Airways

Lung:
- Air sacs (alveoli)

Chronic bronchitis:
- Inflammation and excess mucus
Lung Cancer
Occupational cancer deaths by cause in Great Britain, 2005

- Asbestos
- Silica
- Diesel exhaust emissions
- Mineral oils
- Shift work
- Working as painter
- Other agents
Occupational cancer deaths by cause in Great Britain, 2005

- Asbestos
- Silica
- Diesel exhaust emissions
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- Working as painter
- Other agents
Respiratory disease

- Irritation
- Fibrosis
- COPD
- Asthma
- Lung cancer
Nanoparticles
Evaluating the risks?
HSG173 - A Structured Approach

Initial Appraisal → Basic Survey → Detailed Survey
EH40/2005 Workplace exposure limits

Containing the list of workplace exposure limits for use with the Control of Substances Hazardous to Health Regulations (as amended)

This is a free-to-download, web-friendly version of EH40 (second section edition, published 2011). This version has been adapted for online use from HSE’s current printed version.

You can buy the book at www.hsebooks.co.uk and bookshops.

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This latest version of EH 40 has been updated to include new and revised workplace exposure limits (MELs) introduced by the 2nd and 3rd Indicative Occupational Exposure Limit Values (IOELV) Directive. It will guide those responsible for controlling exposure to hazardous substances at work.
<table>
<thead>
<tr>
<th>Substance</th>
<th>CAS Number</th>
<th>Workplace exposure limit</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Long-term exposure limit</td>
<td>Short-term exposure limit</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(8-hr TWA reference</td>
<td>(15 minute reference period)</td>
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<tr>
<td></td>
<td></td>
<td>period)</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>ppm</td>
<td>mg.m⁻³</td>
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<tr>
<td>Chloroform</td>
<td>67-66-3</td>
<td>2</td>
<td>9.9</td>
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<tr>
<td>Chloromethane</td>
<td>74-87-3</td>
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<td>105</td>
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<tr>
<td>1-Chloro-4-nitrobenzene</td>
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<td>1</td>
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<tr>
<td>Chlorosulphonic acid</td>
<td>7790-94-5</td>
<td>-</td>
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<tr>
<td>Chlorpyrifos (ISO)</td>
<td>2921-88-2</td>
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<tr>
<td>Chromium</td>
<td>7440-47-3</td>
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<tr>
<td>Chromium (II) compounds (as Cr)</td>
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<tr>
<td>Chromium (III) compounds (as Cr)</td>
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<tr>
<td>Chromium (VI) compounds (as Cr)</td>
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<td>0.05</td>
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<tr>
<td>Cobalt and Cobalt compounds (as Co)</td>
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<td>0.1</td>
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<tr>
<td>Copper fume dusts and mists (as Cu)</td>
<td>7440-50-8</td>
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<tr>
<td>Cotton dust</td>
<td>(see paras 19–21)</td>
<td>-</td>
<td>2.5</td>
</tr>
</tbody>
</table>
Brick Making – Silica Exposures

- 19% > WEL
- 40% > 50% WEL
- 41% < 50% WEL
Stone Cutting – Silica Exposures

- > WEL: 29%
- > 50% WEL: 44%
- < 50% WEL: 27%
Risk of silicosis

Percentage Risk of Silicosis After 15 Years Work

Exposure to Air Concentration of RCS for 15 Years (mg.m⁻³)
Risk of silicosis

Percentage Risk of Silicosis After 15 Years Work

Exposure to Air Concentration of RCS for 15 Years (mg.m$^{-3}$)
“Low toxicity” dusts

“Substantial concentration of dust”

• 10 mg/m$^3$ inhalable
• 4 mg/m$^3$ respirable
“until safe limits are put in place, employers should aim to keep exposure to respirable dust below 1 mg/m³ and inhalable dust below 5 mg/m³”
TUC advice to safety representatives:

“try to ensure that employers follow a precautionary standard of 2.5 mg/m³ for inhalable dust ... and 1 mg/m³ for respirable dust.”
A Commentary for the Annals of Occupational Hygiene: Low-Toxicity Dusts: Current Exposure Guidelines Are Not Sufficiently Protective

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Exposure to low-toxicity dusts, which have previously been viewed as ‘nuisance dusts’, can cause chronic obstructive pulmonary disease or other nonmalignant respiratory disease. In Britain, the ‘de facto’ airborne exposure limits for these dusts have remained unchanged for >30 years; currently, they are 10 mg m⁻³ for inhalable dust and 4 mg m⁻³ for respirable dust. During this time, exposures in industry have decreased and although in the past, many occupational dust exposures may have exceeded these limits, today this is less likely. However, there is good evidence from epidemiology and toxicology studies that current dust exposures may still present a risk to workers and that for some of those who are affected, there are devastating health consequences. Numerous researchers and others have drawn attention to the necessity to control dust exposures to levels lower than are currently accepted in Britain. It is proposed that until regulators agree on the safe occupational exposure limits for low-toxicity dusts, health and safety professionals should consider 1 mg m⁻³ of respirable dusts as a more appropriate guideline than the value of 4 mg m⁻³ currently used in Britain.

Keywords: COPD; COSSH; inhalable dust; lung function; OEL; respirable dust

INTRODUCTION

Dusts are invariably complex mixtures with variable composition. Even materials that are often described as if they are homogeneous, for example, cigarette dust, are actually highly variable in composition. Some components in these airborne dusts are known to be toxic to humans when inhaled; the prime example of this is perhaps crystalline silica—most commonly found in the form of quartz. For more than a century, inhalation of high concentrations of fine (respirable) crystalline silica has been known to cause silicosis in stonemasons, miners, and other similar groups of workers (Crom, 1980). However, in the past, exposure to dusts with low crystalline silica content was not linked with toxicity and many were characterized as ‘nuisance’ dusts, whose effects were thought to be a mere irritation. The US Bureau of Mines explained:

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Controlling exposure to dust
Prevention

Engineering

Work practices

PPE
Prevention

Engineering

Work practices

PPE

- Reduce exposure time
- Increase distance
- Working methods
- Standard procedures
Prevention

Engineering

Work practices

PPE
Prevention
Engineering
Work practices
PPE

Supervision
Maintenance
Procedures
Auditing
Testing
Health surveillance
Monitoring
Information
Training

BOHS The Chartered Society for Worker Health Protection
Directory of Occupational Hygiene Services
2013/14
A healthy working environment for everyone

http://www.bohs.org/OHServices-directory/
Steve Perkins Introduction to BOHS
275 views 2 months ago
Steve Perkins, Chief Executive introduces BOHS, which entered 2013 as a Society incorporated by Royal Charter; a resounding affirmation to the expertise, qualifications and competence of BOHS and its members, and the significant public benefit they provide.

www.bohs.org

http://www.youtube.com/channel/UC0pTnkODflHad5s9dpuPrpw?feature=watch