

Agenda



- What is crystalline silica?
- Health effects
- High risk industries
- Legal requirements
- High risk tasks
- Approach to control
- New guidance

What is silica?

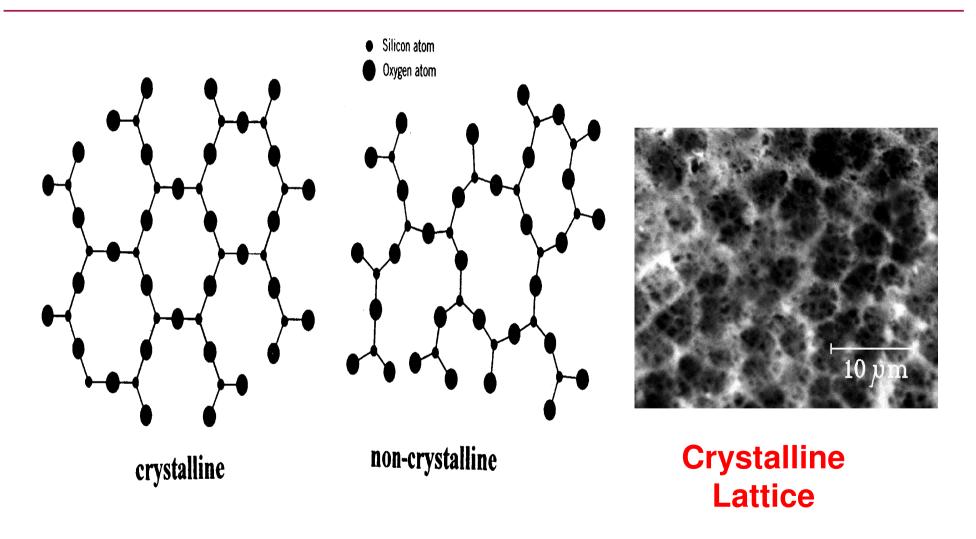


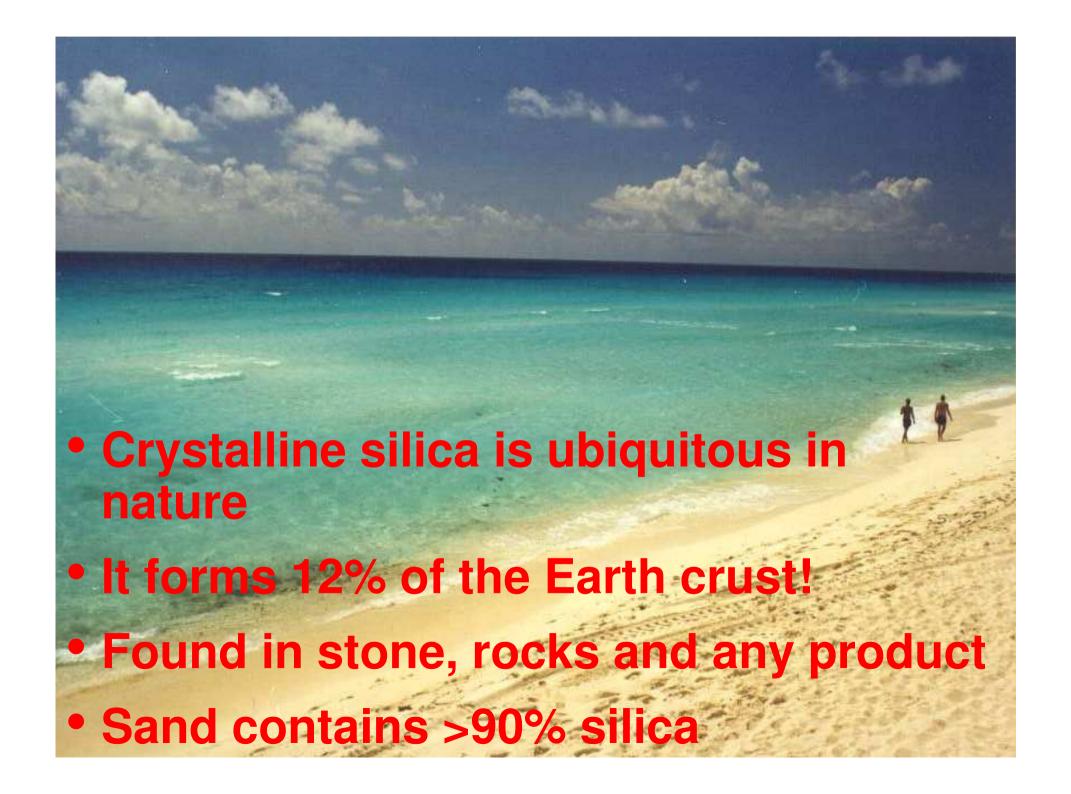
- Chemically it is silicon dioxide (SiO2)
- It exists in two forms:
 - -crystalline eg quartz
 - -amorphous eg opal

 Crystalline means the atoms or molecules are arranged in a regular pattern

What does Crystalline mean?







Silica containing rocks



Sandstone: >70%

• Shale: 40-60%

Slate: upto 40%

Granite: upto 20-30%

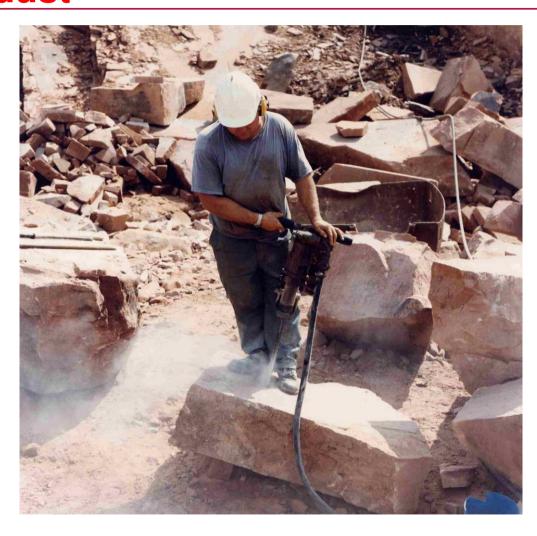
Basalt up to 5%

 Limestone, marble: upto 2%



Processing/cutting/finishing stone or its products generates fine airborne silica dust

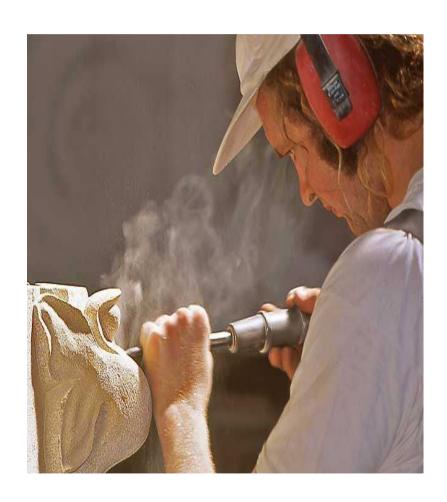




Dangerous dust

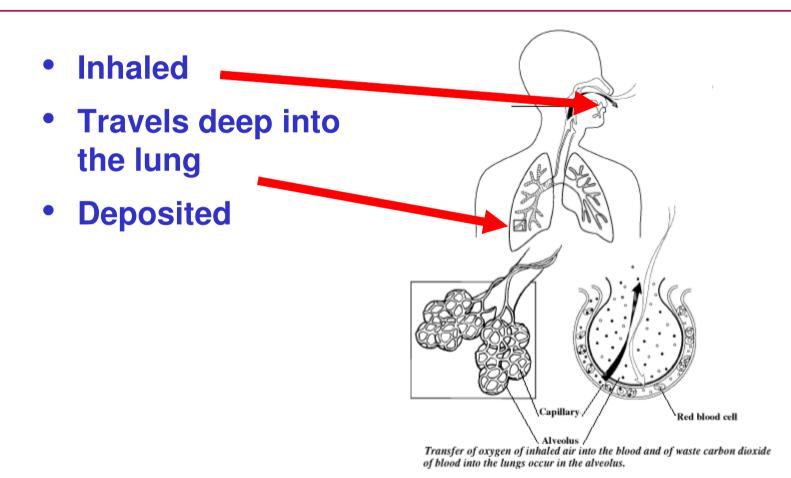


- The dust you can see is generally referred to as **inhalable**
- The dust you can't see is referred to as respirable
- <7 microns: reach deep into the lungs</p>



The journey of fine dust



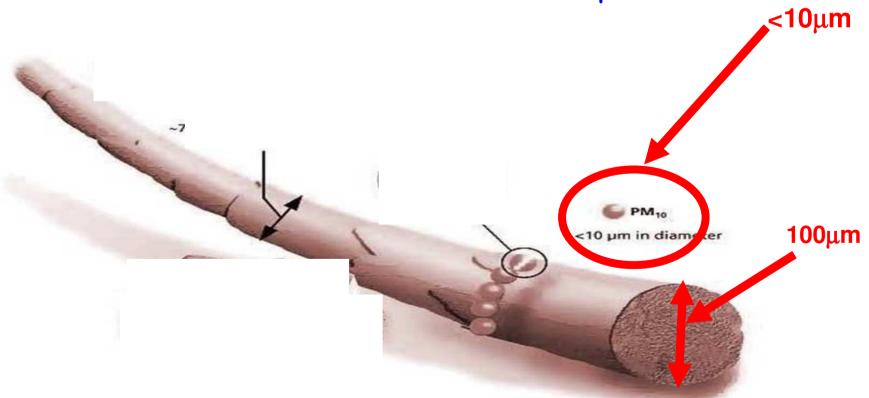


...Fine dust is easily inhaled



- Respirable dust = 7 μm or less
 - A micron is one millionth of a metre.

– Human hair varies between 40 to 100 μm thick.



Silica Health Effects

Exposure to silica dust can cause:

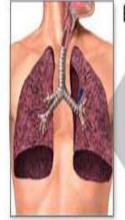
- Irritation:
 - eyes, skin, nose and throat
- Lung diseases:
 - chronic obstructive pulmonary disease (COPD)
 - silicosis
 - lung cancer

Chronic Obstructive Pulmonary Disease (COPD)



- COPD symptoms:
 - Chronic bronchitis
 - Production of extra mucous
 - Difficulty in breathing
 - Wheezy breathing
 - Increased chest infections
- Combination is COPD

COPD (Chronic Obstructive Pulmonary Disorder)



Enlarged view of air sacs (alveoli)



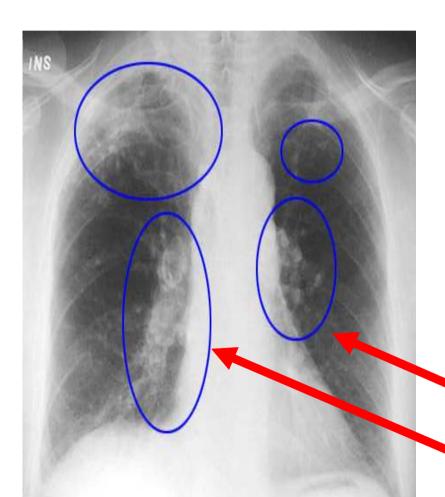
Emphysema: weakened and collasped air sacs with excess mucus



Normal healthy air sacs

Health Effects: Silicosis





- Small nodules of scar tissue develop in the lungs
- Impaired lung function, leading to chronic bronchitis with cough and breathlessness
- Lung cancer risk is greater with silicosis

Shadows on X-Rays indicating silicosis

Lung Cancer









Smoking



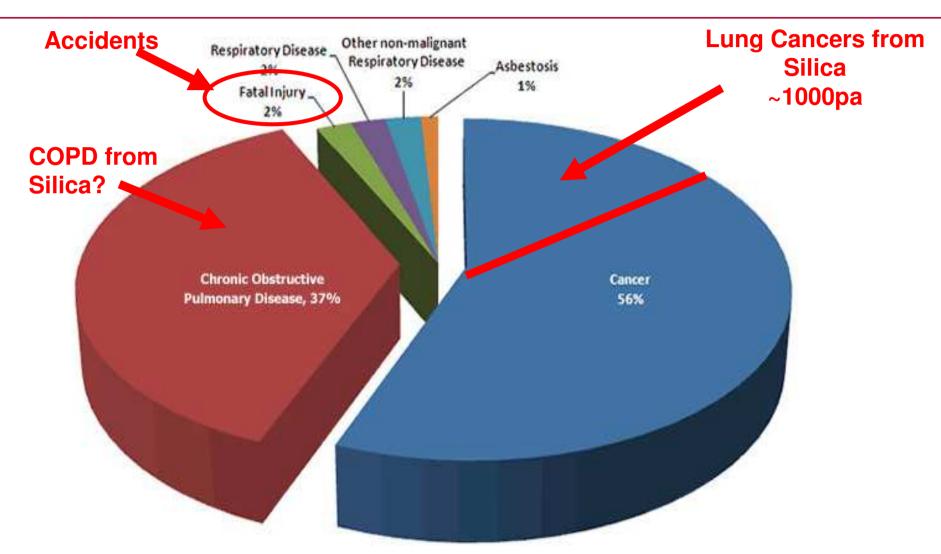
 Smoking damages protective mechanisms in lungs

 Makes people more susceptible to workplace COPD

 Silica workers who smoke: 5 times more likely to get lung cancer than non-smokers.

Annual work-related deaths (estimated 8000-12000)





Risk of Disease



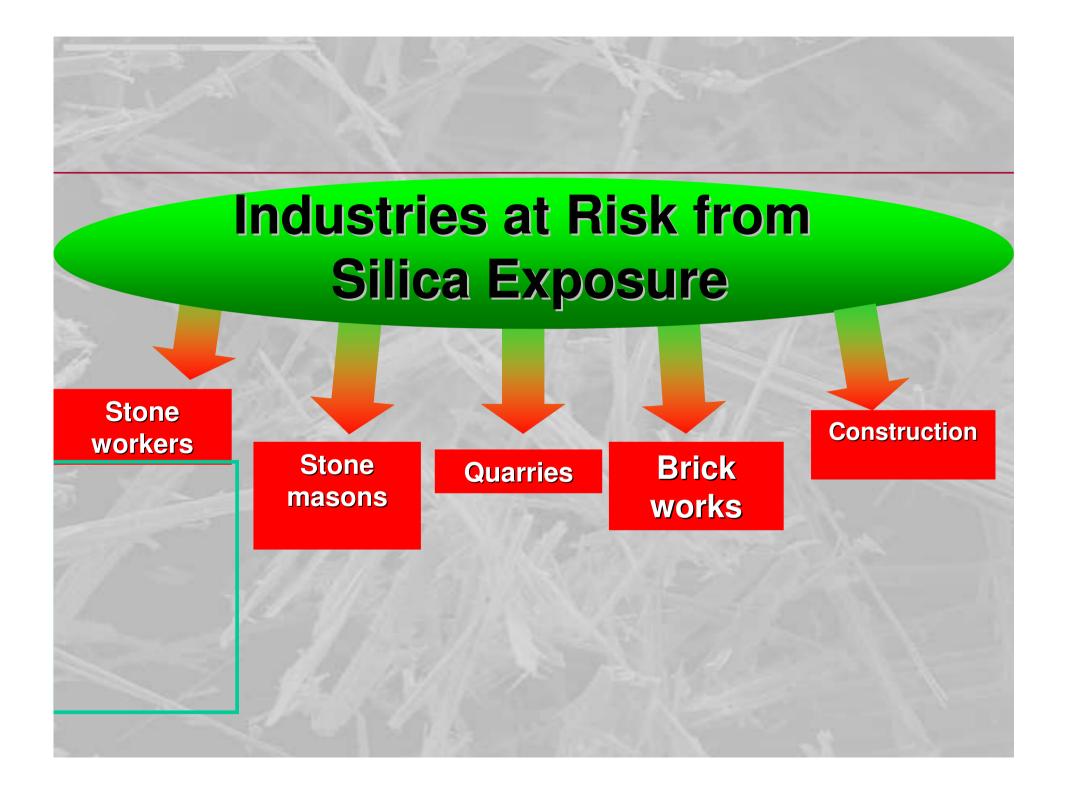
 Silica is NOT an acute poison

BUT

- Every exposure is important
- Every exposure increases risk of developing disease

 Higher the dust levels and longer the exposure period (ie dose), the greater the risk

 Every exposure must be prevented or reduced to ALARP



Lung CancerStatistics are imprecise:

- Estimated 800-1000 lung cancer deaths per year related to past silica exposure
 - Construction workers, quarry workers, slate workers, stone masons/stone working,
 - 15-20 a week
- Research suggests silica is the second most important cause of occupational lung cancer after asbestos
- Silica lung cancer in top five of all occuaptional cancers

Research on Occupational Cancer: Report by Dr L Rushton: www.hse.gov.uk/cancer/research.htm



Health and Safety Law

 COSHH Regulations 2002 (as amended)

 New ACOP published December 2013

 Available to download free or to buy

COSHH main features:

-A33833 /13K3

Apply controls

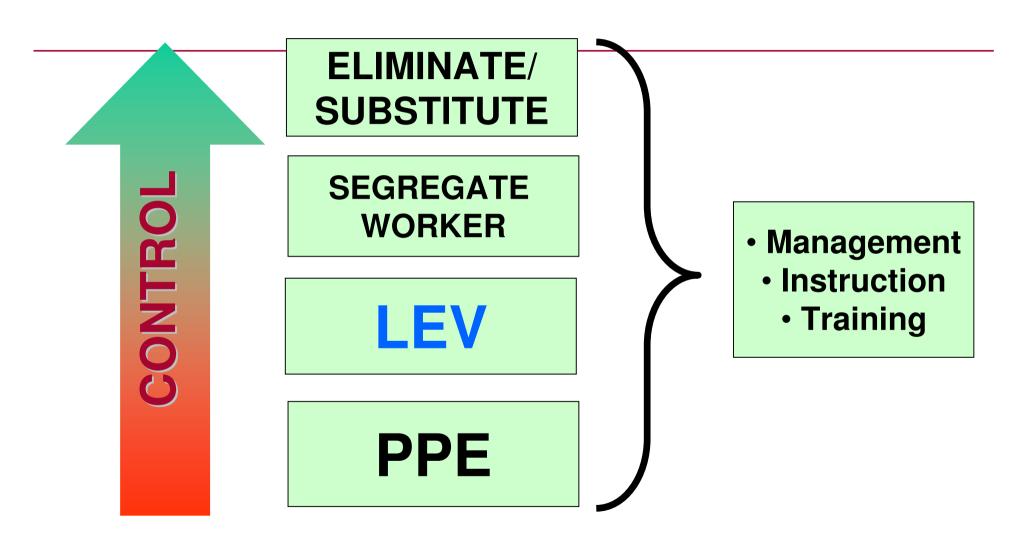
Maintain controls

Youthork

Health surveillance

Provide training

Hierarchy of Control



Focus on Construction

Poor Industry Appreciation of Silica Risks

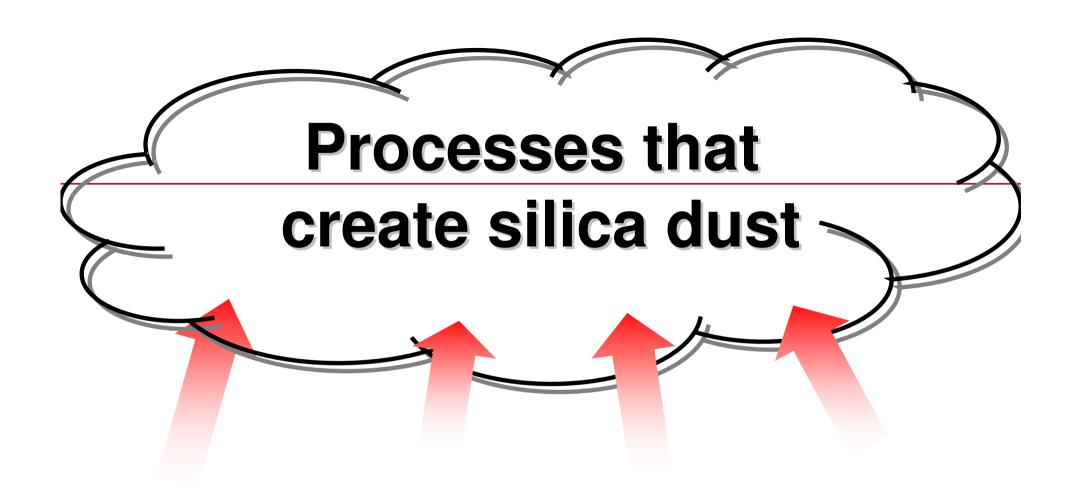
- Workers not aware of health risks
- Underestimation of exposure levels
- Will accept element of discomfort while working
- In some cases require convincing that control measures work
- Controls cause inconvenience

Key dust producing applications

Slab/tile cutting

Cutting

Drilling



Other Tasks

- Abrasive blasting/cleaning
- Internal structural demolition

Dust/Silica Exposures

Jobs	Duration (Min)	Respirable General Dust (mg m³)	RCS (mg m³)
Dry Grit Blasting			
- Sandstone	280	75	1.2
- Bricks/ paviors	208	18.7	0.16
Grinders			
- Mortar Removal	Indicative 8 hour	21.8	6.6
- Cement floor	Indicative 8 hour	5.2	2.0
- Wall chasing	??	18.9	6.9
Breaking Concrete			
- Internal Wall	Indicative 8 hour	1.2	0.2
- Crusher/ jackhammer/ shovelling	Indicative 8 hour	1.3	0.37
Dry Hand Sweeping	Indicative 8 hour	5.0	0.69

WEL = 0.1mg/m3 (8-hr TWA)

Exposure vs Disease

Exposure to RCS mg/m ³ (8-hour TWA)	Risk of developing silicosis within 15 years following exposure
0.02	0.25%
0.04	0.5%
0.1	2.5%
0.3	20%

Silica Dust: Exposures

Concrete, Granite etc:

- •Some Tasks ALWAYS produce very high levels:
 - Cut-off saws
 - Grinders
 - Chasers
 - Grit Blasting

Dust/Silica Exposure

- Some tasks can produce high exposures in particular conditions:
 - Pneumatic drilling / coring with poor ventilation
 - Internal structural demolition
 - Dry sweeping indoors

Tasks often short term

HSL found significant short term exposures:

- Silica: 0.02 0.1 mg/m3 8hrTWA
- BUT task specific exposure 1.7 9.9 mg/m3
- Respirable dust: 3.9 50 mg/m3

How much dust?

- Depends upon:
 - Stone type
 - Process/activity
 - Extent of degradation/destruction
 - Energy
 - Conditions
 - Controls

How much fine dust?

- Measured in mg/m3
 - Bag of sugar = 1kg / 1000 grams / 1 million mg
 - Teaspoon of sugar = 5 grams / 5000 mg



Managing Silica Dust Risks:

- Plan
- Act
- Check

PLAN THE WORK

COSHH requires:

- Prevent exposure to employees where reasonably practicable:
 - Overriding duty
 - Do this by substitution
 - Eliminates or reduces risk
- Adequately control where not reasonably practicable:
 - Higher the risk the better the controls needed
 - Not exceed exposure levels

PLAN THE WORK

Identify High Risk Tasks:

Consider the:

- Material
- Task
- Work area
- Time (duration)
- Frequency

Act: Elimination

- Design Out
- Alternative grit blasting media
- Work processes

Hierarchy of Control

Select Low Silica product

Hierarchy of Control

Less dusty process

Act: Control at Source

Water Suppression

Control at Source: Water

All air / engine driven masonry tools accept Water

• mains

hand pressurised bottle

Water reduces RCS dust emissions by 90%

Mains Water



- Good for large jobs
- Only need0.5 l/min

- Access to source
- Mobility on site
- Freezing

Act: Water Suppression

Water Sources

Water Bottle

- Portable
- Holds ~8 litre(1 bucket)
- Lasts 4 mins
- ½ l/min flow
- More or less flow will be ineffective

LEV

- May suit when water inappropriate
- •Ensure HEPA filter
- Electricitysupply -generator

Hierarchy of Control

LEV reduces dust emissions (by 90%)

Act: On-Tool Extraction

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On-tool Extraction is a system approach

Tool and Capture Hood

Tubing

Dust extractor and filter

Act: On-Tool Extraction

Different classifications:

Dust Class	Suitable for dusts with WEL	Degree of penetration
L (Light Hazard)	Greater than 1mg.m3	Less than 1%
M (Medium Hazard)	Greater / equal to 0.1mg.m3	Less than 0.1%
H (High Hazard)	Less than 0.1mg.m3 including carcinogenic dusts	Less than 0.005%

Choosing On-Tool Extraction

Capture Hood:

Most important part. Can be designed in or retro-fitted. Check it:

- Is designed for the tool and the work being done.
- Sits as close as possible to the work surface when in use.
- Is easy to use and does not interfere with the work unnecessarily.

Silica Dust – Construction Control strategy

A package of controls is required:

- "Control at source"
 - LEV: On-tool extraction
 - or Water suppression
- RPE
- Training

Remember

Use of powered tools substantially increases the risk

RPE: Will be needed to supplement other controls and on its own will NOT provide sufficient protection

Selecting RPE

RPE Must be . . .

Adequate

Suitable

Type of RPE required

Disposable (FFP3)

Ori-nasal P3 filter

Power Assisted

FFP3/ori-nasal masks must......

Fit correctly: Need fit test

Be worn correctly

Assigned Protection Factors

- E.g. APF = 20 means user breathes in 20x less dust compared with workplace air
- Need APF 20

All offer APF 20 when used with a P3 filter

Check and maintain controls: Managing Control

Control	Issues Limiting Effectiveness
Water Suppression	 Lack of correct pressure / water flow rate; Blocked spray jets; Inadequate supply of water for all of the work; Just damping areas before work or pouring water from a container; User with inadequate training.
On-Tool Extraction	 Wrong captor hood being used; Poor connection between the tool and extraction unit; Wrong type of extraction unit / insufficient airflow; Poor maintenance; User with inadequate training.
RPE	 RPE that does not give high enough protection for risk; Does not fit the wearer – no / inadequate face fit testing; Stubble or other PPE affecting the face-seal on tight fitting masks; Not suitable for the work / environment; Not properly worn – loose/twisted straps; Not stored, maintained or cleaned properly; User with inadequate training.

Construction Dust Partnership











Planned HSE Action

Information:

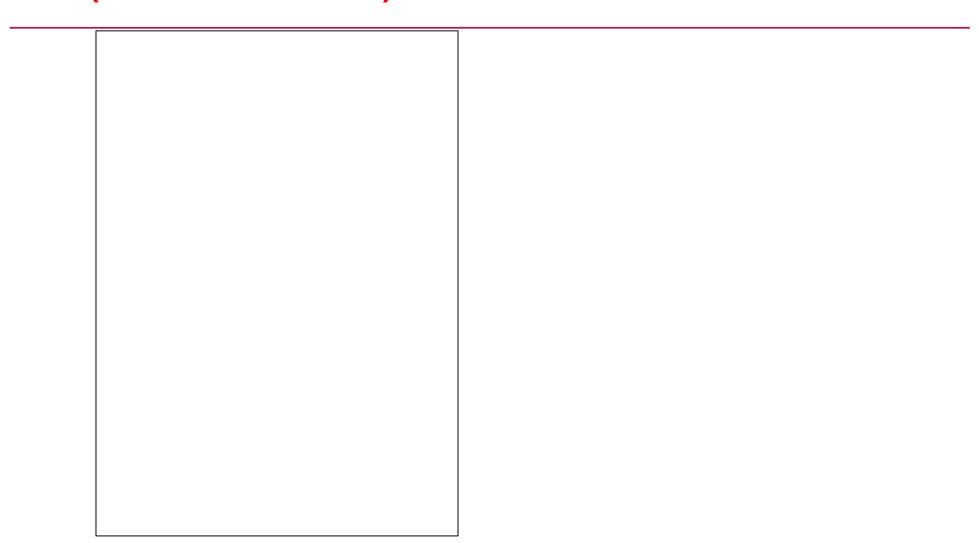
- Revising COSHH Essentials
- Exposure Level Visualisation (ELVis)
- Revising website

Planned HSE Action

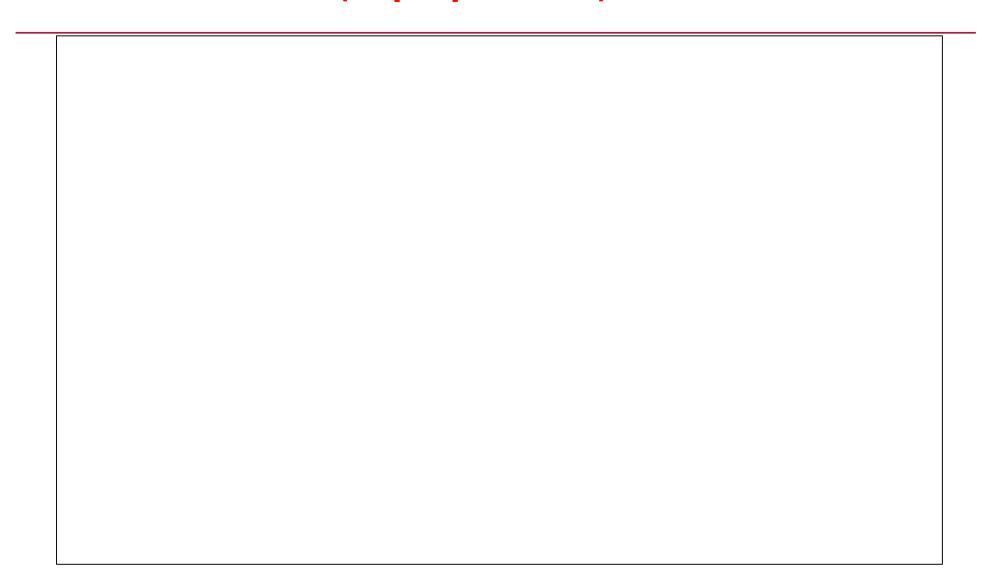
Action:

- Provision of information to Inspectors
- Remain priority topic
- WWT SHAD's

New HSE Guidance for Construction (Published 06/13)



New COSHH Essential Sheets for Construction (In preparation)



New HSE Guidance

In preparation

On-Tool Extraction

Work Undertaken:

- Meetings with manufacturers / trade associations
- HSL research
- Internal consultations
- Discussion document

Key Messages

Silica dust is hazardous

- Use dust controls:-
 - LEV or
 - Water
 - and RPE
 - P3 filter
 - APF 20
 - Fit tested

For more information: HSE website: www.hse.gov.uk