The Quarry Industry - Dust and your HEALTH

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What is Respirable Crystalline Silica?

- Silica is a natural substance found in rocks, sand, clay, bricks, concrete
- Due to it's abundancy, it is present in nearly all quarry operations
- When rock is crushed and screened a fine dust is created
- Some of this fine dust is small enough to reach deep inside the lung (respirable crystalline silica – RCS) and causes harm to health

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The quantity of silica contained in stone and other materials varies considerably between different types of stone:

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%

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Health effects of Dust and RCS

- Silicosis / acute silicosis
- Chronic Obstructive Pulmonary Disease
- Lung cancer
- Tuberculosis, Kidney disease, Arthritis

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Silicosis

- Breathing in crystalline silica dust can cause silicosis, which in severe cases can be fatal. When silica dust enters the lungs, it causes inflammation and eventually the formation of scar tissue making it difficult for the lungs to uptake oxygen. This leads to severe breathing problems and an increased risk of lung infections e.g. tuberculosis. Silicosis is an irreversible condition with no cure

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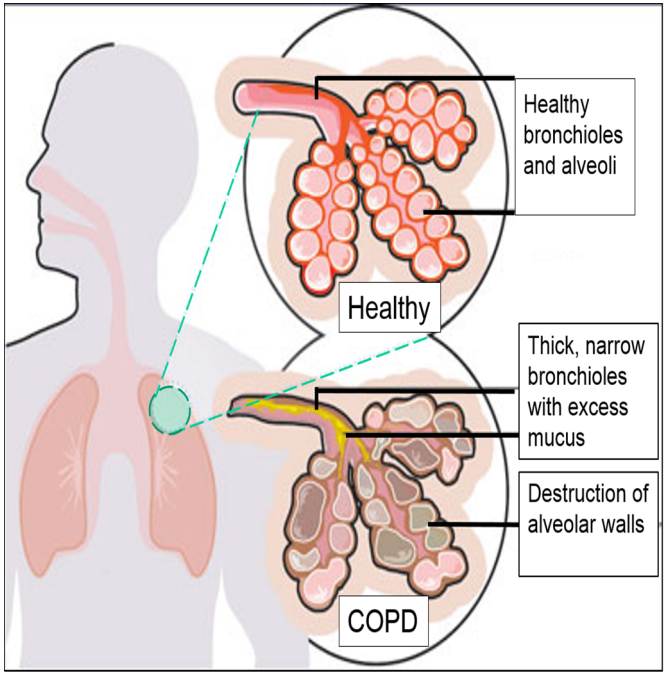
COPD

- COPD is a group of lung diseases including bronchitis and emphysema resulting in severe breathlessness, prolonged chronic cough with the production of sputum, tightening of the chest, and wheezing
- Symptoms may not appear until significant lung damage has occurred
- COPD may cause many health complications such as respiratory infections, heart problems and lung cancer



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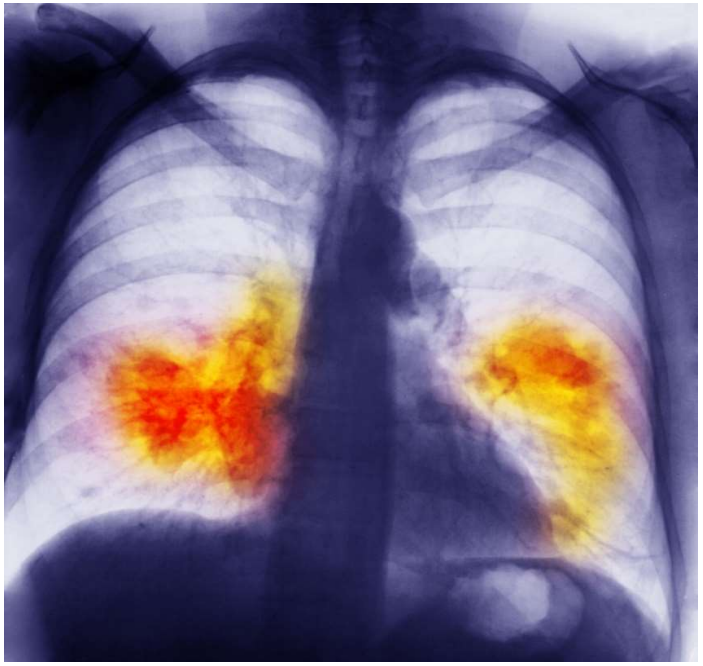
Lung Cancer

- Lung cancer is a disease where abnormal cells grow uncontrollably into tumours, interfering with lung function
- These abnormal cancer cells can also travel, causing damage to other parts of the body and causing the cancer to spread to other organs
- Most cases of lung cancer are incurable



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Estimated UK deaths per year

- 18 – Silicosis
- 600 – Lung Cancer related to silica exposure (20)
- 4000 – related to COPD (165)

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A review of the Register of Deaths for Quarry Workers in Northern Ireland over the period 1997 to 2006 revealed the following: -

- **A total of 267 Quarry Workers died of which 37 died of either Chronic Obstructive Pulmonary Disease (COPD) or Chronic Bronchitis. This represents 13.8% of the deaths.**
- **The British Lung Foundation provides information on deaths from COPD in the general population. In 2012 COPD accounted for 15,245 deaths of males. This represents 2.7% of the UK general population.**

Death rates for COPD in Northern Ireland were similar to the rates in the UK generally with a slight increase among males.

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A Quarry worker in Northern Ireland is

OVER 5 TIMES

more likely to die from COPD or Chronic Bronchitis than a male member of the general population

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Estimated Cost

- Estimated cost to Northern Ireland of work related ill health is £238 million

(Estimated cost to NI of work place accidents is £113m)

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The Law

- Employers have a legal duty of care to their employees under Article 4 of The Health and Safety at Work (Northern Ireland) Order 1978

- Employees also have legal duties at work under Article 8 of The Health and Safety at Work (Northern Ireland) Order 1978

- In order to reduce worker exposure to dust, both employers and employees must comply with 'The Control of Substances Hazardous to Health Regulations Northern Ireland 2003' (COSHH)

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Employers COSHH Duties

- Risk assessment
- Involve & inform employees
- Choose control measures (RPE is final control measure)
- Maintain control measures
- Information, instruction & training – employees
- Monitoring (controls effective?)
- Health surveillance (in appropriate cases)

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Workplace Exposure Limit ‘WEL’

WELs = concentrations of hazardous substances in the air, averaged over a specified period of time, long-term (8 hours) or short-term (15 minutes) set in order to help protect the health of workers

Respirable Crystalline Silica WEL = 0.1 mg/m^3

Respirable dust WEL = 4 mg/m^3

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The maximum daily silica exposure is tiny when compared to the size of a penny

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Range of exposures for job types
Calculated as an 8-hour time weighted average concentration in mg/m^3

Job Title /Description	Respirable Dust ($4mg/m^3$) mg/m^3	Respirable Crystalline Silica ($0.1mg/m^3$) mg/m^3
Quarry Manager / Site Foreman	0.25 to 1.27	0.05 to 0.22
Plant / Crusher operator Quarry fitter	0.05 to 5.92	0.06 to 1.32
Operator – Shovel, Excavator, Dumper truck	0.09 to 0.32	<0.02 to 0.08
HSENI Inspector	0.22 to 0.44	0.05 to 0.10

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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 – use a H class 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

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Dust Strategy

Areas to focus:

- Control Rooms
- Vehicles
- Welfare Facilities
- Cleaning & Maintenance of Plant

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Control Rooms

- Doors & windows kept closed (maintain seals, self closing doors)
- Air conditioning (filter)
- Reduce dirt/dust being carried into room
- Floors easy to clean (tiles, linoleum)
- Clean using vacuum cleaner / mop
- Wet wipes

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Vacuum

- Choose a H class unit fitted with a HEPA filter
- Fitted with a low flow indicator
- Pre-filter fitted
- Consider waste capacity ie frequency of emptying

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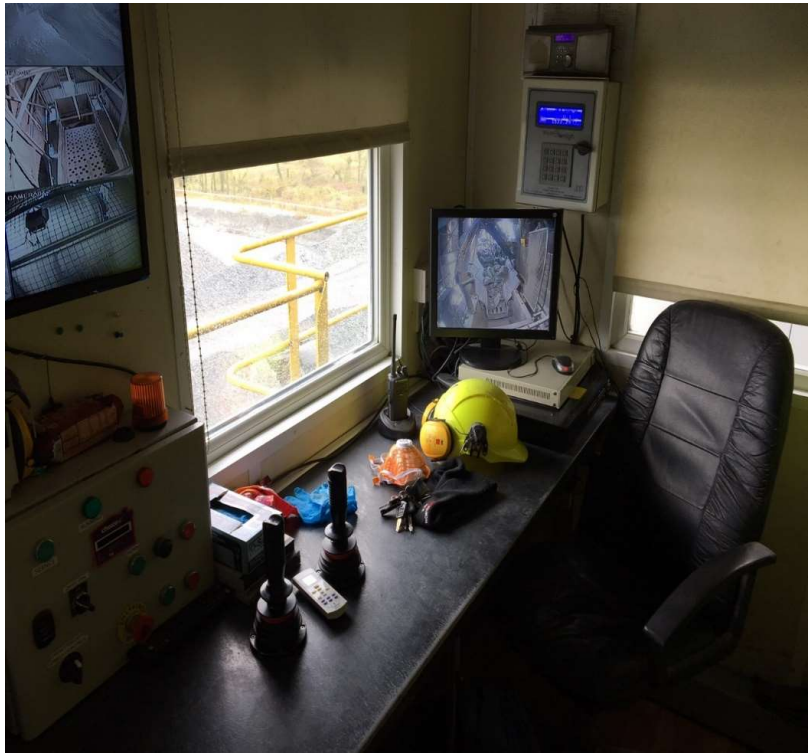
Control Room



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Personnel Cleaning

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Personnel Cleaning Booth

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Quarry Vehicles

- Doors & windows kept closed (maintain seals)
- Air conditioning
- If pressurised cab – gauge (overpressure 10Pa)
- In cab filters (maintenance schedule)
- Cleaning vehicle cab (vacuum, wet wipes)
- Seat cover (wipeable fabric)

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Quarry Vehicles

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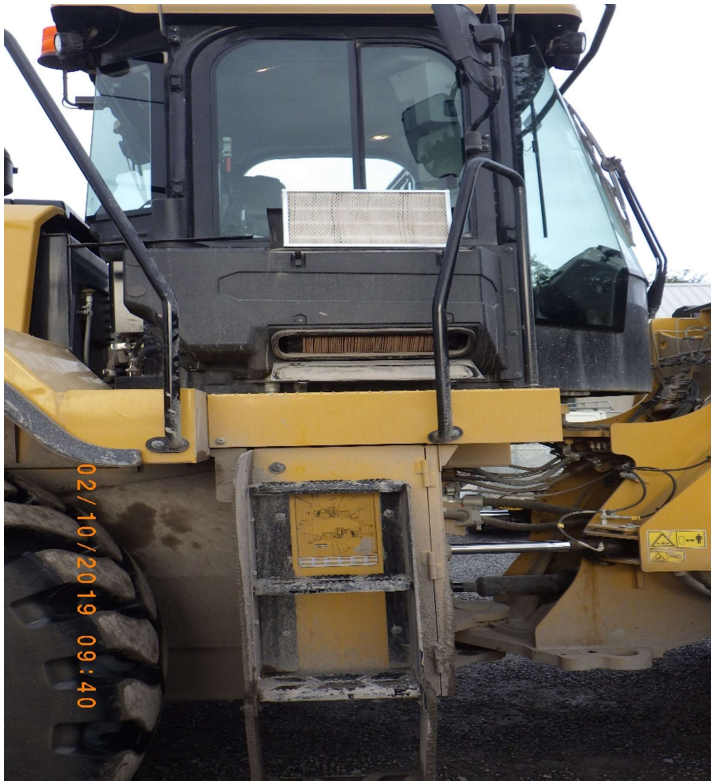
Cab Filters



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Welfare facilities

- Separate changing area and canteen
- Overalls removed before entering canteen
- Lockers provided for storage of PPE
- Hand washing facilities with warm water, soap and hand drying

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Welfare facilities

- Suitable floors – tiled , linoleum
- Walls – tiled, PVC
- Wet cleaning and/or vacuum
- Air conditioning

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Welfare Facilities

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Cleaning & Maintenance

- Don’t clean with a brush
- Don’t clean with compressed air
- Use a vacuum
- Crusher & Screen houses

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Cleaning & Maintenance

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Respiratory Protective Equipment is a last resort

Respiratory Protective Equipment – must be

Adequate for the amount of dust
P3 Filter or greater if required

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

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FFP3 disposable or half mask gives a protection factor of 20

Powered respirator mask with helmet = PF40

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Health Surveillance

- Where employees are regularly exposed to RCS dust and there is a reasonable likelihood that silicosis may develop, health surveillance must be provided
- Involve a health professional in your health surveillance programme

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Health Surveillance – Baseline Assessment

- Respiratory questionnaire
- Lung function assessment
- Consider chest X-ray for comparison to future X-rays

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Health Surveillance – Annual Assessment

- Respiratory questionnaire
- Lung function assessment with a comparison to both baseline and previous results

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After 15 years exposure to RCS

- Respiratory questionnaire
- Lung function assessment with a comparison to both baseline and previous results
- Chest X-ray at 15 years exposure to RCS and every 3 years after that (unless advised otherwise by health professional)

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Action

- Develop/review the company dust action plan
- Identify and detail the issues + remedial action
- Detail timescales to complete remedial action
- Identify person responsible
- Forward copy of action plan to HSENI

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