

# Respirable dust and airborne pollutant research

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## Respirable dust and Silica

- Particles  $< 10 \mu\text{m}$  enters the gas exchange region of the lungs (alveoli)
- Silicosis: caused by crystalline silica (quartz)
- Silicosis can not be stopped, but can be **prevented**
- Other lung or respiratory diseases
- Occupational Exposure Limit (OEL)  
for Silica:  $0.1 \text{ mg/m}^3$

# Diesel Particulate Matter (DPM)

- Fine and ultrafine particles ( $< 1 \mu\text{m}$ ) from diesel exhaust emissions
- Short-term: headaches, dizziness, coughing, nausea, light-headedness, and difficult breathing
- Long-term: COPD or even lung cancer
- No OEL for DPM in South Africa. Following international trends (MSHA in USA)

# Sampling for Silica and DPM

- Filter in a cassette and sampling pump
- Sampling over entire shift of worker (TWA exposure)
- Analysis to determine the milligram of pollutant
- Determine exposure level

# Control of Silica and DPM exposure

- Respirators or dust masks
- Water spray to reduce the amount of dust
- Improved ventilation to dilute the air
- Engine filters to reduce DPM in exhaust emissions

# Limitations of controls

- PPE not worn because of discomfort and obstruction
- Water, ventilation and engine filters:  
Improves conditions, but does not eliminate the problem

# Silica research by CMI

- Silicosis eradication programme: Milestone 2013
- CSIR Occupational hygienists – mining
- Control at source – reduce airborne pollutants
- Current research – dust controls
- Non-mining industries – silica exposure

# DPM research by CMI

- Instruction/guidance document to establish South African exposure levels
- Sampling techniques evaluated
- Error factors for different mining commodities
- Engine deterioration

# Analytical Laboratory of the CMI

SANAS accredited for four methods:

- Direct-on-filter analysis of silica using XRD
  - Gravimetric weighing of respirable dust
  - Particle size analysis of respirable dust
  - Diesel particulate matter analysis
- Only lab in South Africa accredited for all methods (except gravimetric weighing)

## Further Information

<http://www.csir.co.za/publications.html>

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# Questions

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