Silica Dust:
It will take your breath away

Enform’s Exposure Control Plan (ECP)
October 8, 2015
Outline

• What is silica?
• Why should I care?
• Exposure risk
• Exposure control
• Enform’s approach
• Questions?
What is silica

- Silica is naturally occurring and can be found everywhere (SiO$_2$)
- Silica can be crystalline (quartz) or non-crystalline (amorphous)
- Crystalline silica can be found in:
  - Rock
  - Sand
  - Products like cement, etc.
Why should I care?

- Silica is a hazard (primarily chronic) when it is breathed deep into the lungs (respirable).
- Silica causes the following illnesses:
  - Silicosis - lung scar tissue
  - Lung cancer
  - Bronchitis
  - Kidney disease
- Irreversible and progressive
Exposure risk

• Silica’s OEL
  – 8-hour TWA
  – What does that mean?
  – 2X lower than lead (0.05 mg/m³)
  – 400X lower than nuisance dust (10 mg/m³)

  – If it’s silica and it’s visible, overexposure is just a matter of time!
Exposure risk

• How do we re-think our perceptions of risk?
Exposure risk

• You may be thinking that I am exposed for only a few days, weeks or months, I will be ok, right?
• A worker at 100X the Silica OEL
  – With no respirator they get a working lifetime in 90 days
    • Even at 100X, acute health effects may not provide adequate warning
    • After 100X, risks are likely not linear,
      – i.e. high exposures for even short periods have more risk
Where could I be exposed?

**Frack**
- Proppant Handling and Storage

**Seismic**
- Air-hammer Drilling

**Drilling**
- Drilling Mud Additives

Photos courtesy of an Industry company, NIOSH and OSHA
Fracking - Exposure Sources

• Proppant (sand: 30-99% quartz)
  – The high percentage of quartz and amount of energy imparted into the sand makes this hazard unique
  – Any transfer points
    • Rail to truck
    • Truck to sand tent or site sand storage (vertical or horizontal)
    • Site sand storage to hopper
    • Pneumatic in-loading on site
  – Working in visible frack dust?
Drilling - Exposure Sources

• Handling and adding drilling mud dry-product additives
  – Barites, Graphite, etc…
  – If it’s naturally sourced, be suspicious

• Cement In-loading
  – Portland cement verses additives

• Cuttings Dryers
  – Most of cuttings are rock = silica

• Shaker Mist
  – Rock dust and fluid additives
Seismic - Exposure Sources

- Main source is hard rock such as sandstone, granite and shale
  - Depends on shot hole parameters
    - Depth and diameter of hole
  - Wet or Dry Environment
    - Up on hill or next to river
Other Sources

- Refractory brick removal - furnaces*
- Construction - road and lease
- Abrasive blasting - sand substitutes*
- Cement handling
- Cutting, grinding, and drilling concrete
Controls - Engineering

• The answer to many silica exposures is engineering and administrative controls
  – This does not have to be expensive/difficult
    • Wet materials
    • Distance/time etc.

• Look for opportunities to make a difference!
  – Take some action (action = caring)
Different dust levels = different protection levels

- Respirator protection factors
  - Half-face - 10
  - Full-face - 50 and 100
  - PAPR or Supply Air - 1,000

- Why? Leakage, where the respirator meets the face
- Coveralls
So what do I need to do?

- Fracking
  - Depends on the presence of engineering controls and where you are working
  - What is needed?
    - Consistently applied engineering controls
So what do I need to do?

- Fracking
  - Some workers need a ½ mask
    - Not in dust on an on-going basis
    - At least 3 meters from source
  - Some workers need full-face or better
    - On-going and close to source
    - Handling frack dust (powders)
  - Adjacent workers may be at risk
    - If you are breathing visible frack dust you need a respirator (micro-seismic, flow back, medics etc.)
So what do I need to do?

- **Drilling - Dry-Product Additive Handling**
  - Use engineering ventilation controls
    - Direct exhaust ventilation into mud tanks
  - Add product slowly - one bag per minute
    - Reduces dust generation (energy)
    - Ensures complete incorporation into drilling fluid
  - Wear a respirator (minimum half mask)
  - Keep your distance from cement in-loading and use a dust capture bag on exhaust
  - Follow Invert exposure control plan
So what do I need to do?

- **Air-hammer Drilling**
  - Engineering controls
    - Venturi
    - Vacuum
    - Water injection
    - Blower fan
  - Stay upwind of dust when ever possible
  - Use respirator
    - No engineering controls? You may need a full-face respirator

Photo: Sun Machinery Corp.
Enform’s Approach

- Silica ECP template
  - Modular approach
- Guidance Sheets
  - Sources
  - Controls
  - Hazard Assessment
What Now?

- Silica ECP and Guidance sheets (frack) available at enform.ca
- Worker tools and resources are being completed
- The CCH Guideline update for release later this year
- Pick up the Fall issue of *Frontline*
Summary

• Silica is not nuisance dust!
• Silica is everywhere
• What you don’t know will still hurt you
• Enform’s Controlling Chemical Hazards Guideline has the answers you need
• Solutions by industry - for industry
Is your worker’s future clear?

Healthy Lung

Silicosis Lung

Questions

Contact: Robert Waterhouse
Email: robert.waterhouse@enform.ca