Silica

Old, New and Emerging

Uses result in Worker Exposures
2013. Hydraulic Fracturing

- Energy extraction
  - Oil
  - Gas
- Drill
- Fracture
- Stabilize
NIOSH Sampling

- 11 sampling sites
- 5 states
  - Colorado, North Dakota
- 110 samples
  - Pennsylvania
  - Texas, Arkansas
- 15 jobs
Silica as a proppant

- Delivered by truck
- Driver/operator connects to sand mover
  - Compressed air
  - Belt delivery to blender truck
- Sand mover operator
  - Monitors operation
  - Transfer to blending station
    - Wet at end of blender
PEL exceeded 51% of samples

- Blender operator
- Chem truck driver
- Hydration unit op
- Sand coord
- Sand mover op
- Belt op

- 50% of 16 samples
- 67% of 3 samples
- 40% of 5 samples
- 10% of 10 samples
- 74% of 50 samples
- 83% of 6 samples
Maximum TWAs

• Blend • 0.49
• Chem truck driver • 0.32
• Hydration unit op • 0.75
• Sand coordinator • 0.33
• Sand mover op • 2.76
• Belt op • 2.57
• Growing industry
• Uncontrolled transfer points
• Site of work not a determinant
• Proppant is a determinant
2014. Stone Restoration Work

• Stone masons and stone cutters
  – Sandstone, limestone, lime mortar, granite
  – 35 workers employed by government
    • 740 national monument
  – Stone mason
    • On site cutting to fit
  – Stone cutter
    • Shop, first cuts

• Historic building
  – restoration
  – Maintenance
Range of TWAs

• Sandstone
  – Cut w angle grinder • 0.26  1.30
  – Cut water-cool saw • <lod  0.13
  – Grind w angle grind • <lod  6.00
  – Hand/pneum chisel • <lod  0.07
• **Limestone**
  – Cut, angle grind
  – Grind, angle grind
  – Hand/pneum chisel

• **Granite**
  – Water-cool saw
  – Grind, angle grind
Determinants

- Task (tool)
- Material

- Reduced by task in mixed effects models
  - Between site
  - Between worker
  - Within worker
2014. Microbeads replacement

• Microbead exfoliates in face/body scrubs
  – Polyethylene, polythene, polypropylene
  – Polyethylene terephthalate (PET)
  – 85% < 1mm diameter in US Great Lakes
  – Not filtered in waste water treatment

• Possible environment-friendly alternatives
  – Anise seed
  – Sand
  – Salt
  – Coconut
• No measurements
  – Possible exposure points where
    • Mined
    • Milled
    • Transported
    • Transferred
    • Compounded
If it is silica, it is not just dust

OSHA 1996
References


