Disclaimer

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Modern Problems: Occupational Safety and Health in the 21st Century

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Outline

- Current problems
- Emerging issues
- New control approaches
- Opportunities for impact
Current exposures

- Lead
- Asbestos
- Silica

Emerging exposures

- Infectious agents
  - SARS
  - Avian Flu
- Nano-materials
- Formaldehyde
- Noise
- Mold
Gauley River
Workplace Safety and Health
Stone Cutting - 1955
(with water spray dust control)
Jackhammer Drilling - 1936

Figure 12. Jackhammer drilling without dust control. (About 1936.)
Stone Cutting ~1996
(no dust control)

Photo Credits: Ken Linch
Drilling in 1990’s – 2000’s

Photo Credits: Ken Linch & Joe Cocalis
Workplace Safety and Health
“He shall examine the disease; if the disease is in the walls of the house with greenish or reddish spots, and if it appears to be deeper than the surface, the priest shall go outside to the door of the house and shut up the house seven days. The priest shall come again on the seventh day and make an inspection; if the disease has spread in the walls of the house, the priest shall command that the stones in which the disease appears be taken out and thrown into an unclean place outside the city.”

Circa 650 B.C.E.
Mold in office building
Anthrax at Hart Senate Office Building
Nanotechnology in today’s products

Nano clay composite

Easton CNT is Real Nanotechnology

Easton’s Tiny Innovation is Huge
Easton has an eighty-three year history of leading the market by innovating new materials and innovative products. Easton has been manufacturing our own products using carbon-fiber composites since 1939 and has been the leading brand of composite bats in baseball since then.

New Easton’s research and development team is proud to present a breakthrough in composite materials and manufacturing.

The Next Frontier
Nanotechnology is the next frontier in scientific research and manufacturing. Nanotechnology deals with the manipulation of matter on the atomic or molecular scale. In billions of a meter (nanometer), nanoscale materials are opening new frontiers in the fields of electronics, medicine, and structural reinforcement.

Enhanced Resin System

Nano silica composite

Nanofibers

Carbon nano-tube composite

Workplace Safety and Health
Nanotechnology

- Are workers exposed?
- At what concentrations?
- Are there potential adverse health effects?
- What controls are available?
- How effective are they?
Addressing Occupational Impact

Exposure routes → Exposure → Dose → Risk → Health Effects → Toxicity

Exposure → Characterization → Education

Risk → Control → Reduced risk/impact

Knowledge Level: Poor → Good

Workplace Safety and Health
Personal Dust Monitor

Workplace Safety and Health
Control Banding

Table 1. Control bands for exposures to chemicals by inhalation

<table>
<thead>
<tr>
<th>Band No.</th>
<th>Target Range of Exposure Concentration</th>
<th>Hazard group</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>&gt;1 to 10 mg/m³ dust &gt;50 to 500 ppm vapor</td>
<td>Skin and eye irritants</td>
<td>Use good industrial hygiene practice and general ventilation.</td>
</tr>
<tr>
<td>2</td>
<td>&gt;0.1 to 1 mg/m³ dust &gt;5 to 50 ppm vapor</td>
<td>Harmful on single exposure</td>
<td>Use local exhaust ventilation.</td>
</tr>
<tr>
<td>3</td>
<td>&gt;0.01 to 0.1 mg/m³ dust &gt;0.5 to 5 ppm vapor</td>
<td>Severely irritating and corrosive</td>
<td>Enclose the process.</td>
</tr>
<tr>
<td>4</td>
<td>&lt;0.01 mg/m³ dust &lt;0.5 ppm vapor</td>
<td>Very toxic on single exposure, reproductive hazard, sensitizer*</td>
<td>Seek expert advice.</td>
</tr>
</tbody>
</table>
Summary

- Monitoring technology
- Analysis methods
- Exposure limits and guidelines
- Risk management tools
- Translate research to practice
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