The NIOSH Mining Program
My Goals for Today’s Meeting

- Provide the rationale for our current mining research program
- Provide you with a broad overview of the mining program within NIOSH
Goal’s Continued

- Share with you the current focus areas within the mining program
- Share with you some future directions
- Have a discussion of these topics
Outline of Today’s Presentation

- An overview of the mining industry with emphasis on health and safety issues
- An overview of the NIOSH mining program
- Current focus areas of the mining program
- Future plans and directions
- Discussion
Vision: Delivering on the Nation’s promise: safety and health at work for all people through research and prevention.
Office of Mine Safety and Health

Mission: Provide national and world leadership to prevent mining work-related illness, injury, and death by gathering information, conducting scientific research and demonstrations, and translating the knowledge gained into products and services.
## Employees

<table>
<thead>
<tr>
<th></th>
<th>Coal</th>
<th>Metal and Nonmetal</th>
<th>Sand, Gravel and Stone</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Surface</strong></td>
<td>55,999</td>
<td>88,886</td>
<td>105,863</td>
</tr>
<tr>
<td><strong>Underground</strong></td>
<td>46,297</td>
<td>12,633</td>
<td>2,197</td>
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<tr>
<td><strong>Total</strong></td>
<td>102,296</td>
<td>101,519</td>
<td>108,060</td>
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What Is Unique About Mining

- One of the 6 extreme work environments (space, underwater, arctic, deserts, mountains and underground)

- Confined space
- Visibility is poor
- Surrounding structure is unpredictable
- Atmosphere is dusty and potentially toxic or explosive
The First International Design for Extreme Environments Assembly

University of Houston, November 12-15, 1991, Houston, Texas
Fatalities & Rates

Number of Fatalities (5-Year Aggregates)

- Farmington explosion (78 deaths)
  - Federal Coal Mine and Safety Act of 1969
  - Regulatory enforcement vastly increased

- Sunshine fire (91 deaths)
  - Federal Mine Safety and Health Act of 1977
  - Consolidated federal mine regulations for Coal and M/NM under DOL/MSHA

Coal M/NM Rate Coal Rate M/NM

Annual Average Fatality Rate

 Coal M/NM Rate Coal Rate M/NM
Still have a long way to go...

- 1999, U.S.
  - 90 fatalities
  - 16,127 injuries
    - 461,290 days lost
  - 882 new cases of occupational illnesses
Respirable Coal Dust

- 1100 deaths in 1999
- Annual cost of $1,600,000,000
- 8% of underground coal miners with more than 25 years have CWP
Coal Dust Problems Could Get Worse

- Productivity is increasing every year (and dust generation increases with productivity)
- As deeper coalbeds are exploited, ventilation will become more difficult
Noise-induced Hearing Loss

- 70 – 90 % of coal miners have a hearing disability

- In general, if you are over 45 years of age and have 20 years in the mines, you are hearing impaired
Fatalities

- Fatality rate is 6 times greater than the national average.
Causes of Underground Fatalities

Distribution of Fatalities by Accident Class
Underground Mining, 1995-1999
(Source: MSHA)

- Powered haulage: 23%
- Machinery: 7%
- Electrical: 7%
- Explosives and breaking agents: 2%
- Slip or fall of person: 11%
- All other: 2%
- Fall of ground (not in place): 50%

n = 145

Causes of Surface Fatalities

Distribution of Fatalities by Accident Class
Surface Operations, 1995-1999
(Source: MSHA)

- Powered haulage: 40%
- Machinery: 19%
- Electrical: 6%
- Slip or fall of person: 11%
- Falling, rolling, or sliding rock or material: 5%
- Explosives and breaking agents: 2%
- All other: 13%
- Fall of ground (not in place): 4%

n = 296
Diesel Particulates

- 30,000 underground workers are exposed to concentrations that are 20 times greater than 50 $\mu g/m^3$

- Primarily the metal and nonmetal miners
Silica Dust

GOLD AND STONE MINES
MOST FREQUENTLY SAMPLED OCCUPATIONS

Silica Dust Samples Exceeding PEL for Underground Coal Mining
Injuries

- Severity of injuries is greater than other industrial sectors

- Long-term effects of working in an underground setting are significant
Injury Rates by Severity (U.S.) 1998

- Coal Mining: 5.7 Lost Time, 1.9 No Lost Time
- Nonmetallic Mining: 2.9 Lost Time, 1.8 No Lost Time
- Metal Mining: 2.7 Lost Time, 2.1 No Lost Time
- All Industries: 2.9 Lost Time, 3.3 No Lost Time
Causes of Lost-time Injuries

Underground Operations

Distribution of Lost-time Injuries by Accident Class
Surface Operations, 1995-1999
(Source: MSHA)

n = 36,980

Distribution of Lost-time Injuries by Accident Class
Underground Mining, 1995-1999
(Source: MSHA)

n = 24,426
Toxic Substances

- Many metal mine workers are exposed to more than twice the PEL.
- For silver mining, almost half the workers are overexposed.
Technology and Knowledge Shortcomings

- Dust measurement
- Hearing loss prevention strategies
- Adequate structural designs methodologies
Significant Issues

- Equipment safety
- Aging workforce
- Disaster prevention and life support
High Priority Research Areas

- Dust monitoring and control
- Hearing loss prevention
- Fatality prevention
Dust Monitoring and Control

Real-Time Monitoring for Coal Dust Exposures

Strategies for Dust Control

Silica Exposures at Surface and Underground Operations
Hearing Loss Prevention

Survey of Noise Sources

Hearing Conservation Programs

Miner Exposures

Quiet-by-Design
Fatality Prevention

Ground Falls

Equipment Safety

Powered Haulage Systems
Research Program Overview
Funding

FY2000 Mining Laboratory Budgets
(In Millions)

- PRL: $24.0
- SRL: $8.2
- Extramural: $2.7
Spokane Research Lab

- Spokane, Washington
- 100 Employees
- Mining Injury and Disease Prevention
- Catastrophic Failure Detection and Prevention
- Mining Surveillance and Statistical Support
- Extramural Coordination and Information Dissemination
ZEUS
Hydrogen Powered “Zero Emission Utility Solution”
Mark II Free-fall Shock Testing Machine - Spokane
Ore Pass and Hoisting Research Facility – Spokane
Pittsburgh Research Lab

- Pittsburgh, Pa
- 300 Employees
- Disaster Prevention and Response
- Health
- Mining Injury Prevention
- Surveillance, Statistics and Research Support
Lake Lynn Laboratory

- Conveyor Belt Fire
- Explosives Testing
- Grain Explosion
- DOT Testing
Mine Roof Simulator
Extramural Research

- Colorado School of Mines
- University of Kentucky
- Penn State University
- Virginia Polytechnic Institute
- West Virginia University
- Harvard Medical Center
- Michigan Tech University
Extramural Research Areas

Noise-induced hearing loss prevention
Mine ventilation
Ground control
Surveillance
Training
Rock Mechanics
Future Plans and Vision

- Never forget that it is about the safety and health of the mine worker.
- Work with, listen to, and be guided by our stakeholders.
- Increase the use of partnership to bring more resources ($ and expertise) to bear on the problems.
Future Plans and Vision

- Better serve the mine worker by improving how we get the results of our work into the mines.
- Increase the size of the extramural research component in direct support of on-going intramural efforts.
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Questions and Discussions