The Changing Landscape of Mining Safety and Health Following the Mine Disasters of 2006

Queensland Mining Industry Health and Safety Conference

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CDC Workplace Safety and Health

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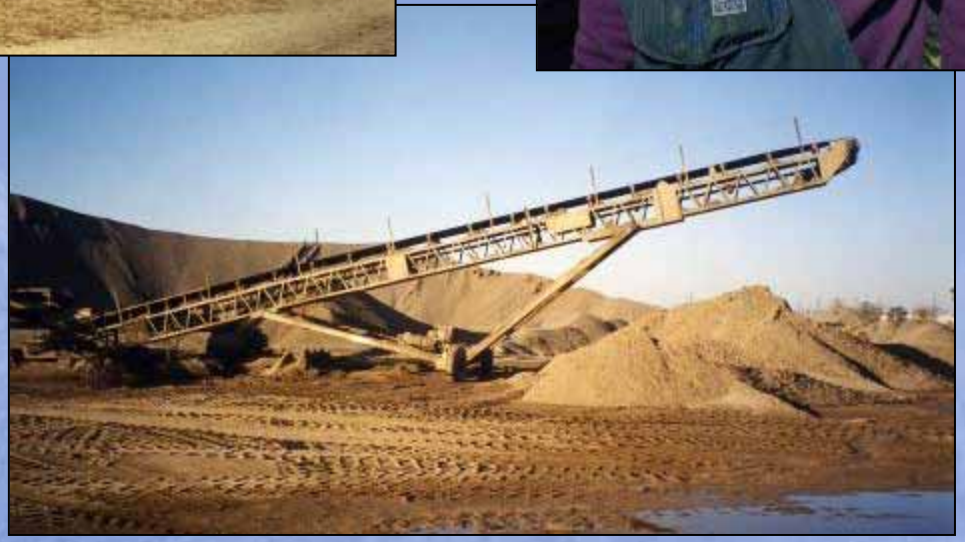
Improving Mineworker Health & Safety Through Research & Prevention



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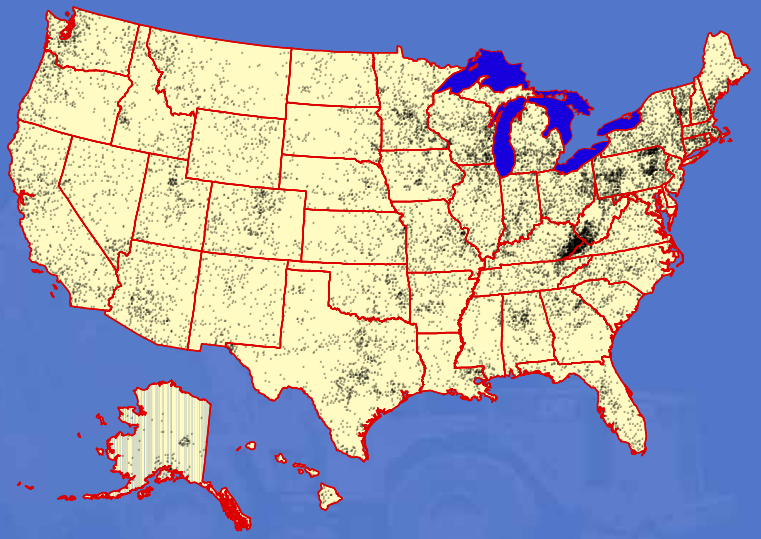
NIOSH - Focusing on High Risk Sectors

- Mining
- Agriculture
- Construction
- Health Care

Office of Mine Safety and Health Research

NIOSH Mining research is conducted primarily at laboratories in Pittsburgh, Lake Lynn, and Spokane as well as field sites across the US.



Today's Presentation

- Historical Perspective on Mining Safety & Health (U.S.)
- 2006 Coal Mine Disasters and Their Impact
  - Legislative
  - ***Research***
- Direction Forward

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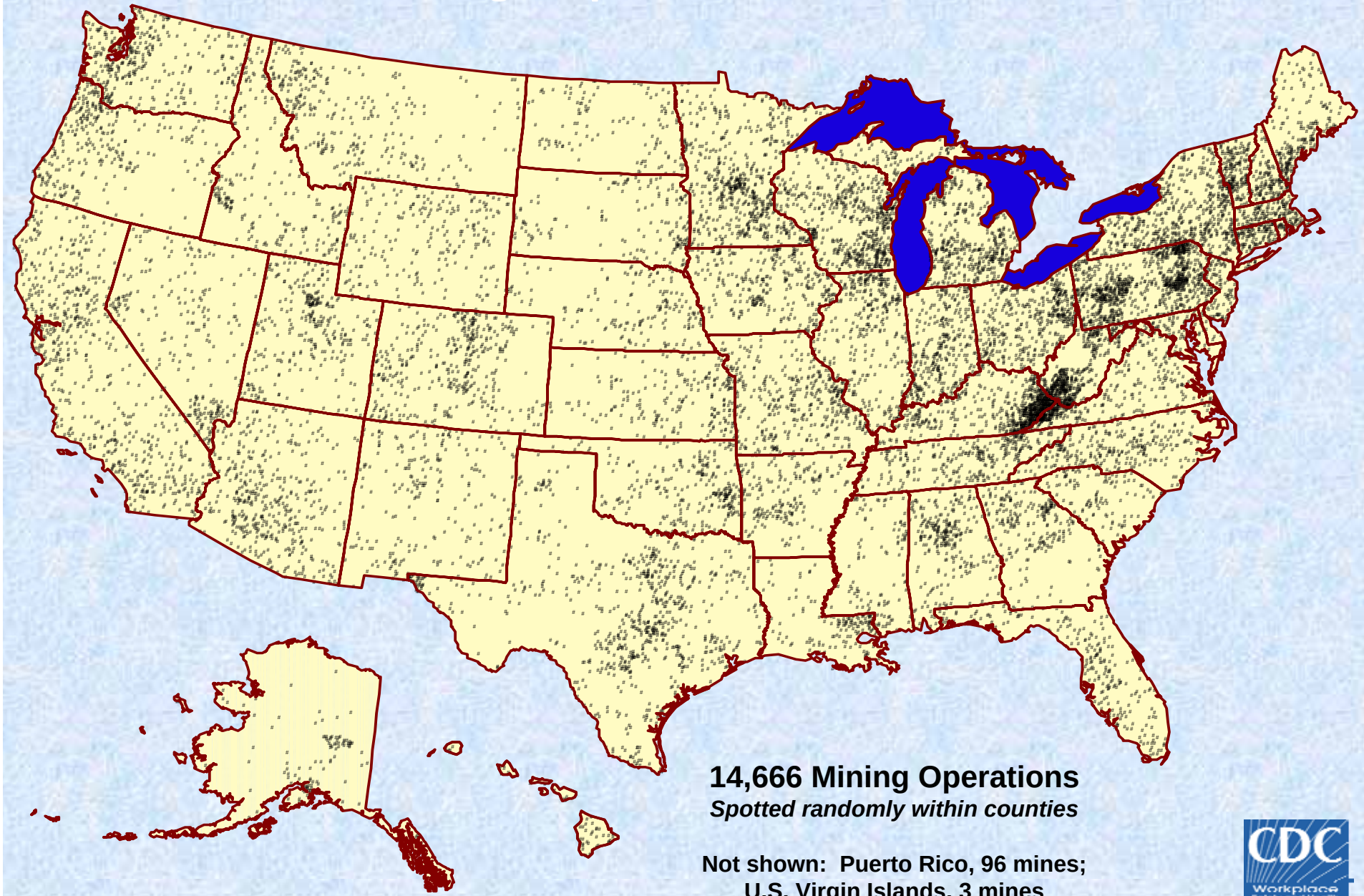
Mining in the U.S.

- About 300,000 people work directly in mining throughout the United States.
- Mining provides nearly a half-trillion dollars annually in direct and indirect economic impact.
- Every American uses an average 47,000 pounds of newly mined materials each year.

Data source: NMA

Mining Operations, 2005



14,666 Mining Operations

Spotted randomly within counties

Not shown: Puerto Rico, 96 mines;
U.S. Virgin Islands, 3 mines

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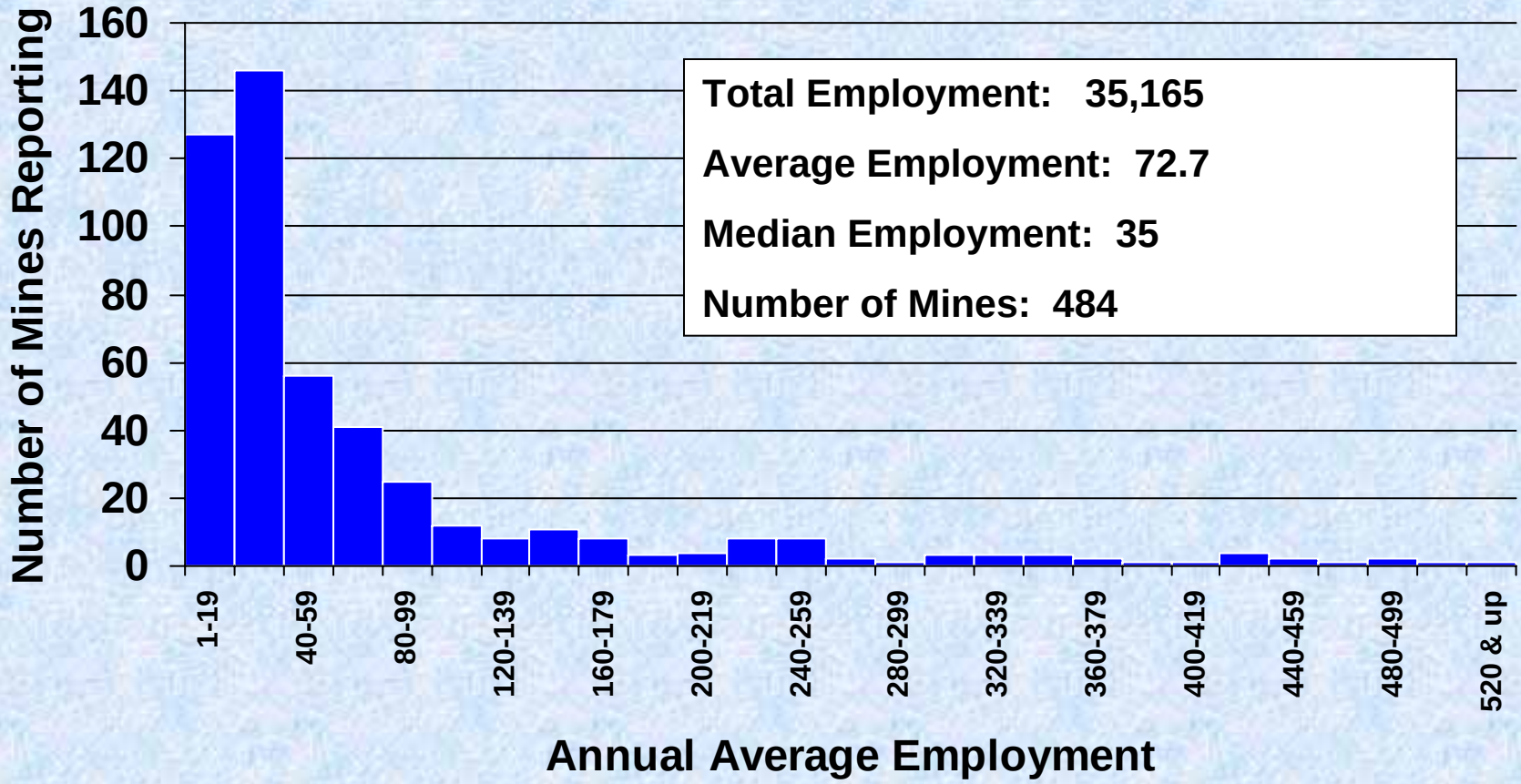
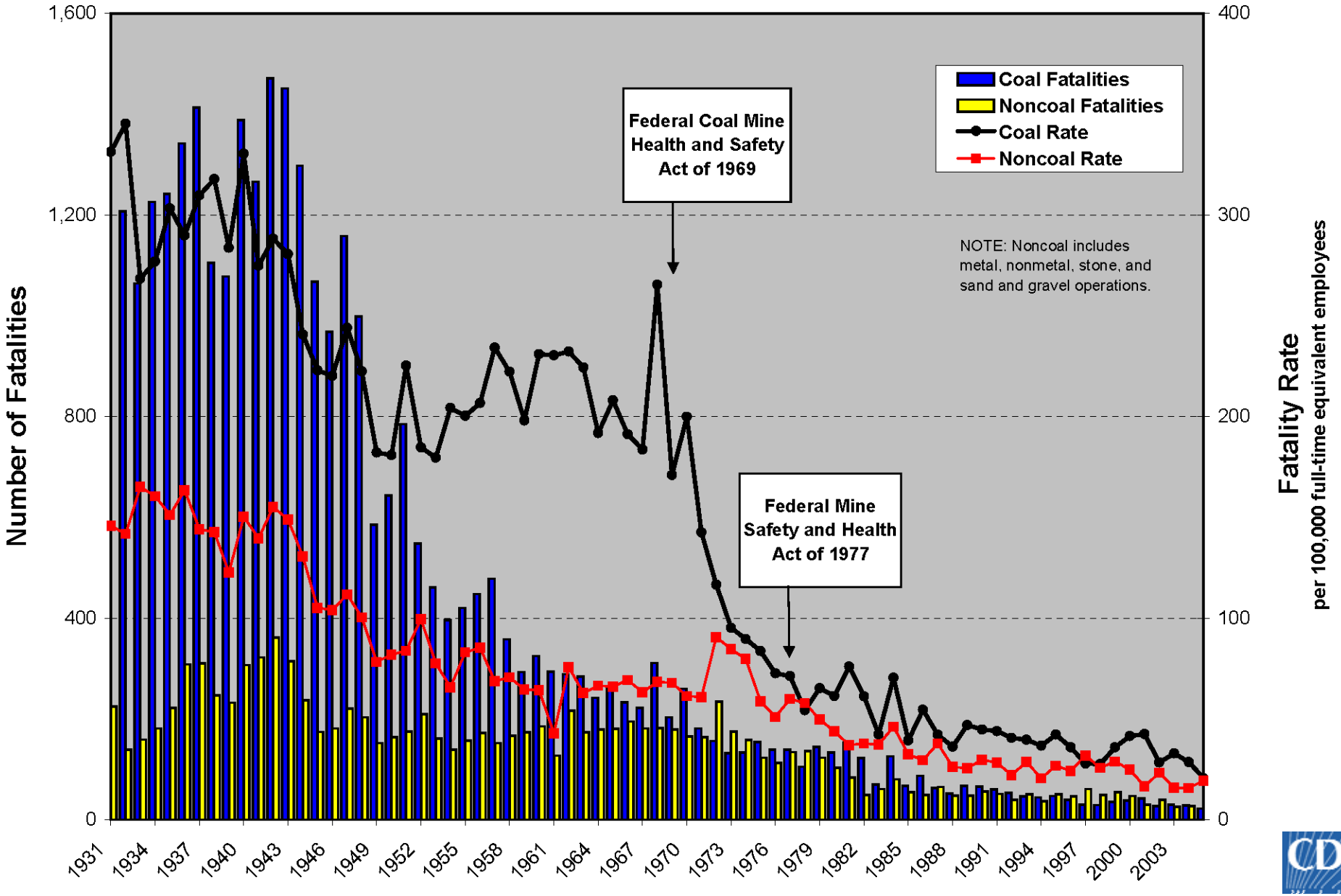
U.S. Underground Coal Mines Employment Distribution, 2006 Active Mines, Underground Subunit Employment Only



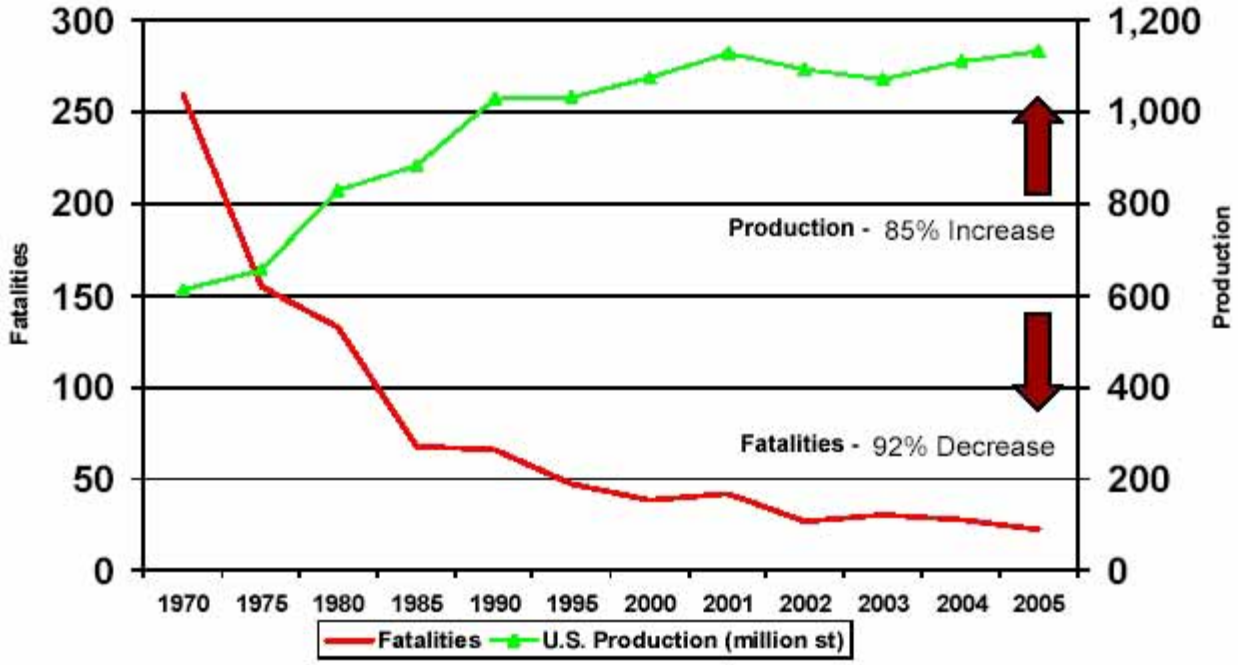
Source: MSHA

Number of Fatalities and Fatality Rates in the Mining Industry by Commodity, 1931-2005

(Excludes office employees; Data source: MSHA)



U.S. Coal Mine Safety and Production Trends



Source: Mine Safety & Health Administration (MSHA)

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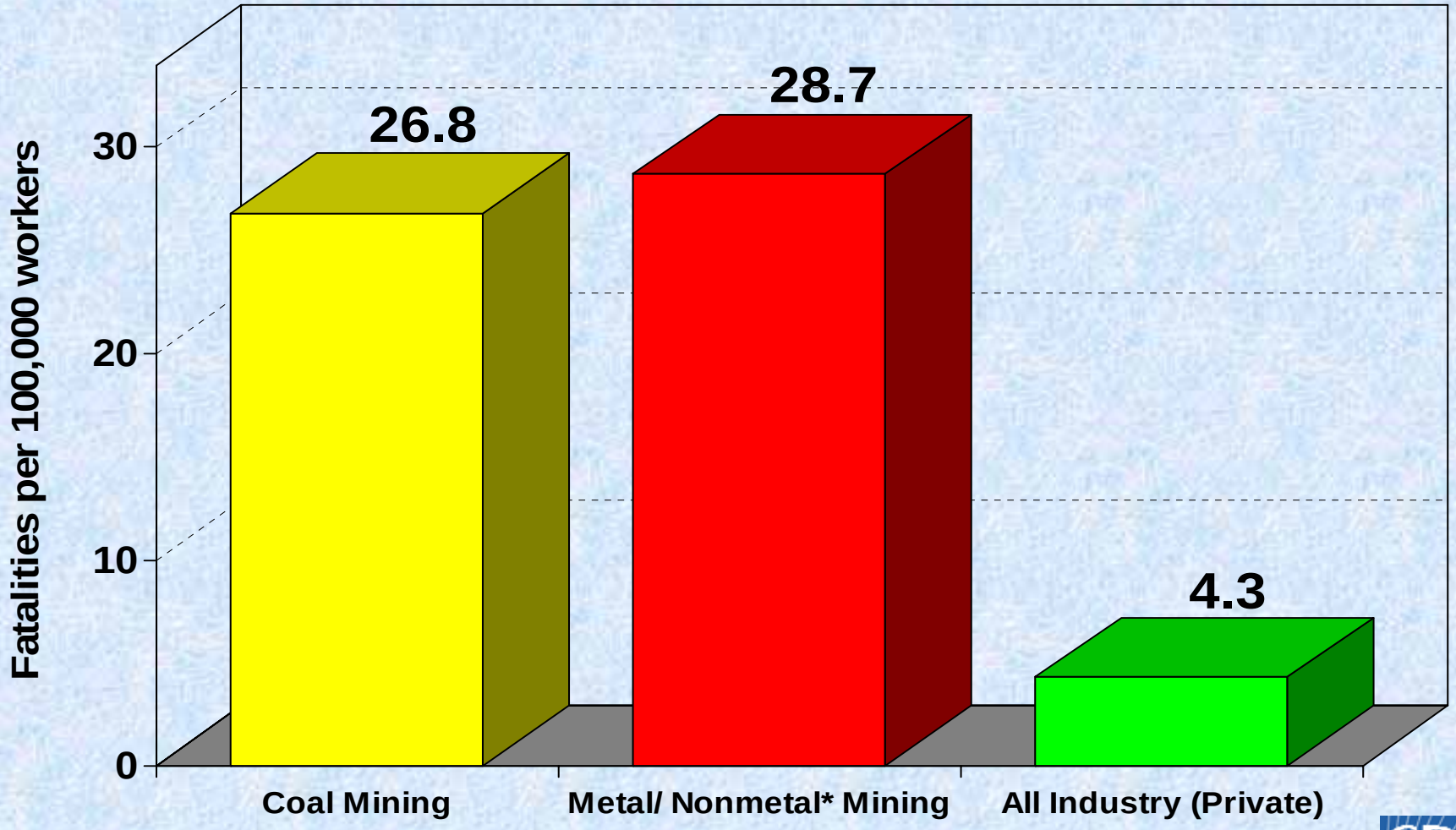
Fatality Rate in Coal Mining, Metal/Nonmetal Mining, and All Industry (Private), 2005



Data source: BLS, CFOI

*Includes Metal, Nonmetal, Stone, and Sand and Gravel Mining

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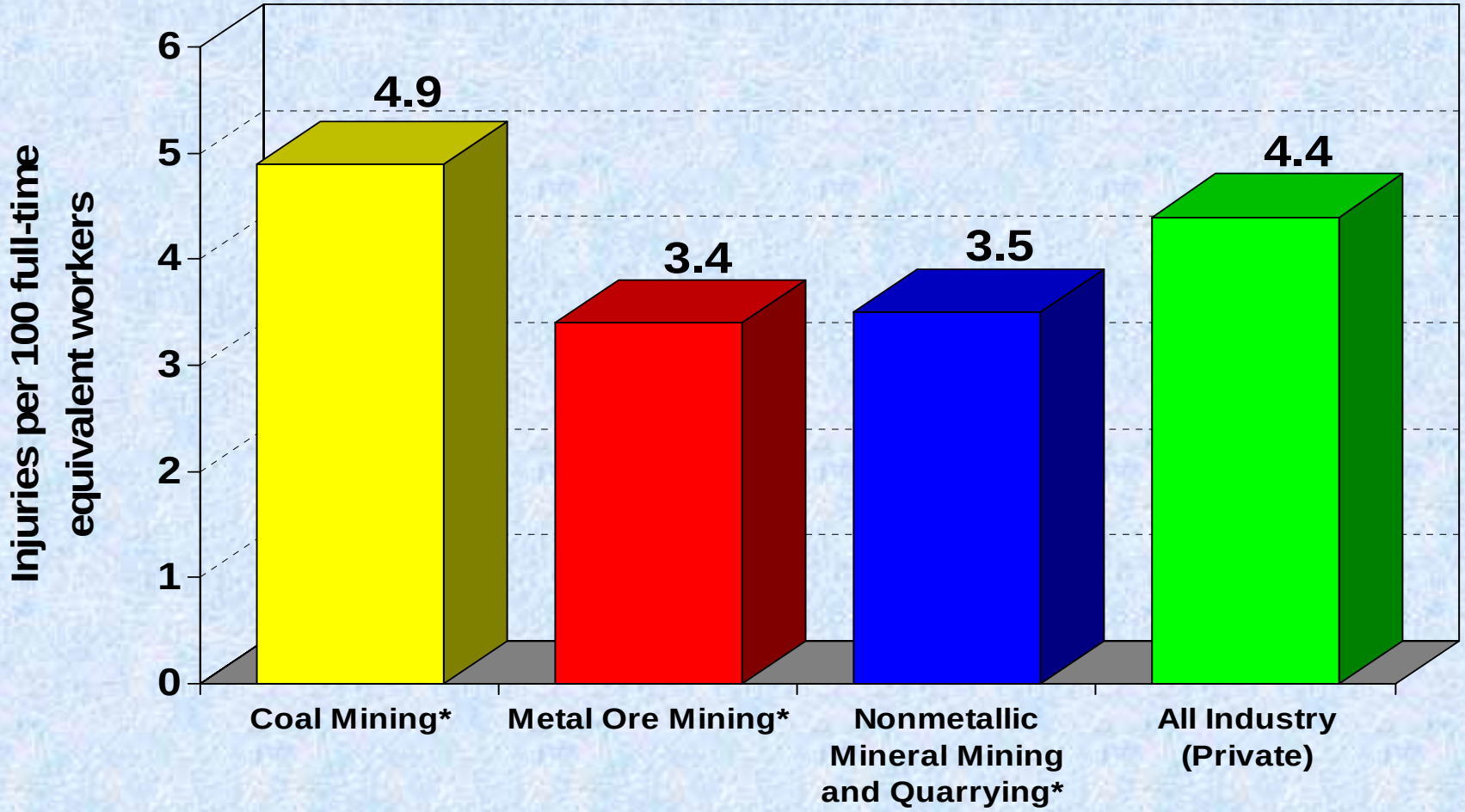
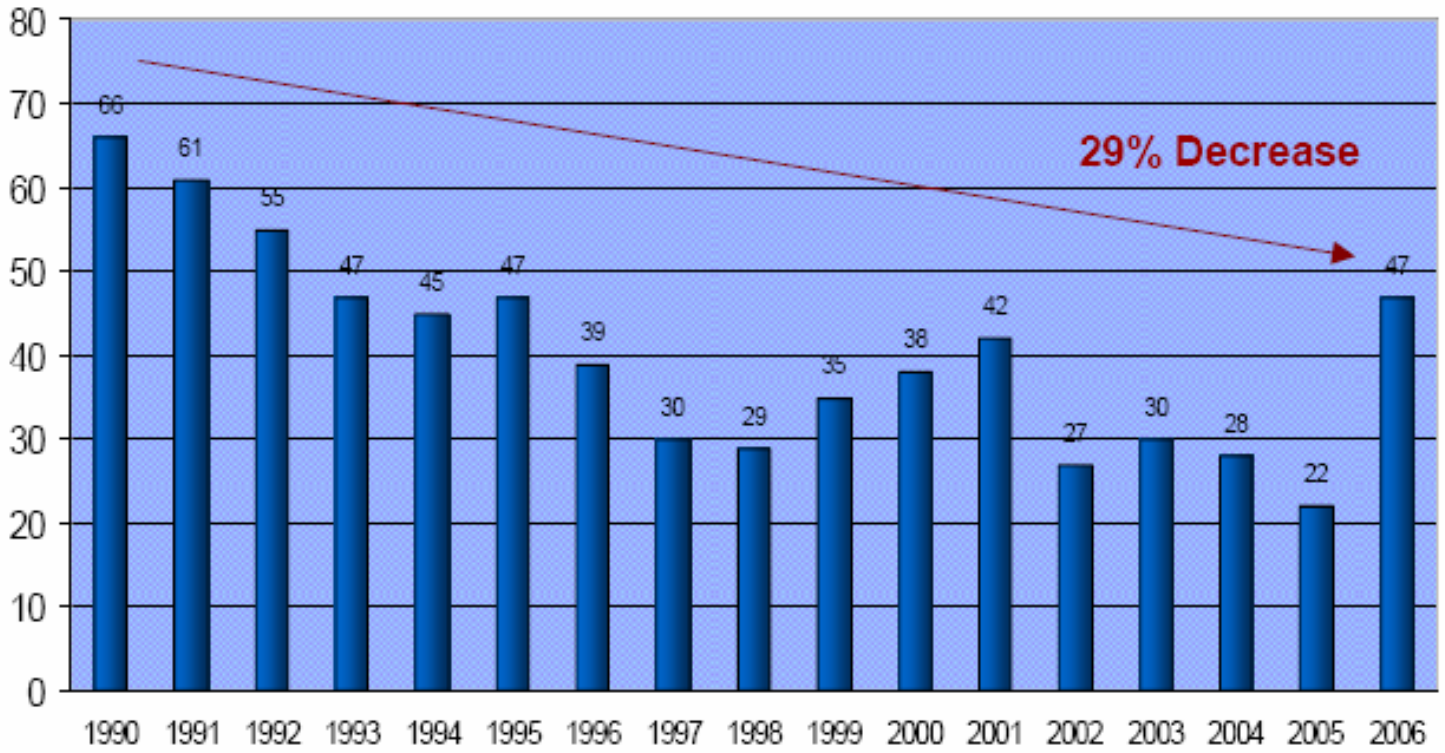
Nonfatal Injury Rate in Coal Mining, Metal Mineral Mining, Nonmetallic Mineral Mining and Quarrying, and All Industry (Private), 2005



Data sources: BLS

*Independent mining contractors are excluded

U.S. Coal Mining Record of Reduction
Fatal Injuries, 1990-2006



Source: Mine Safety & Health Administration (MSHA)

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THE AMERICAN RESOURCE

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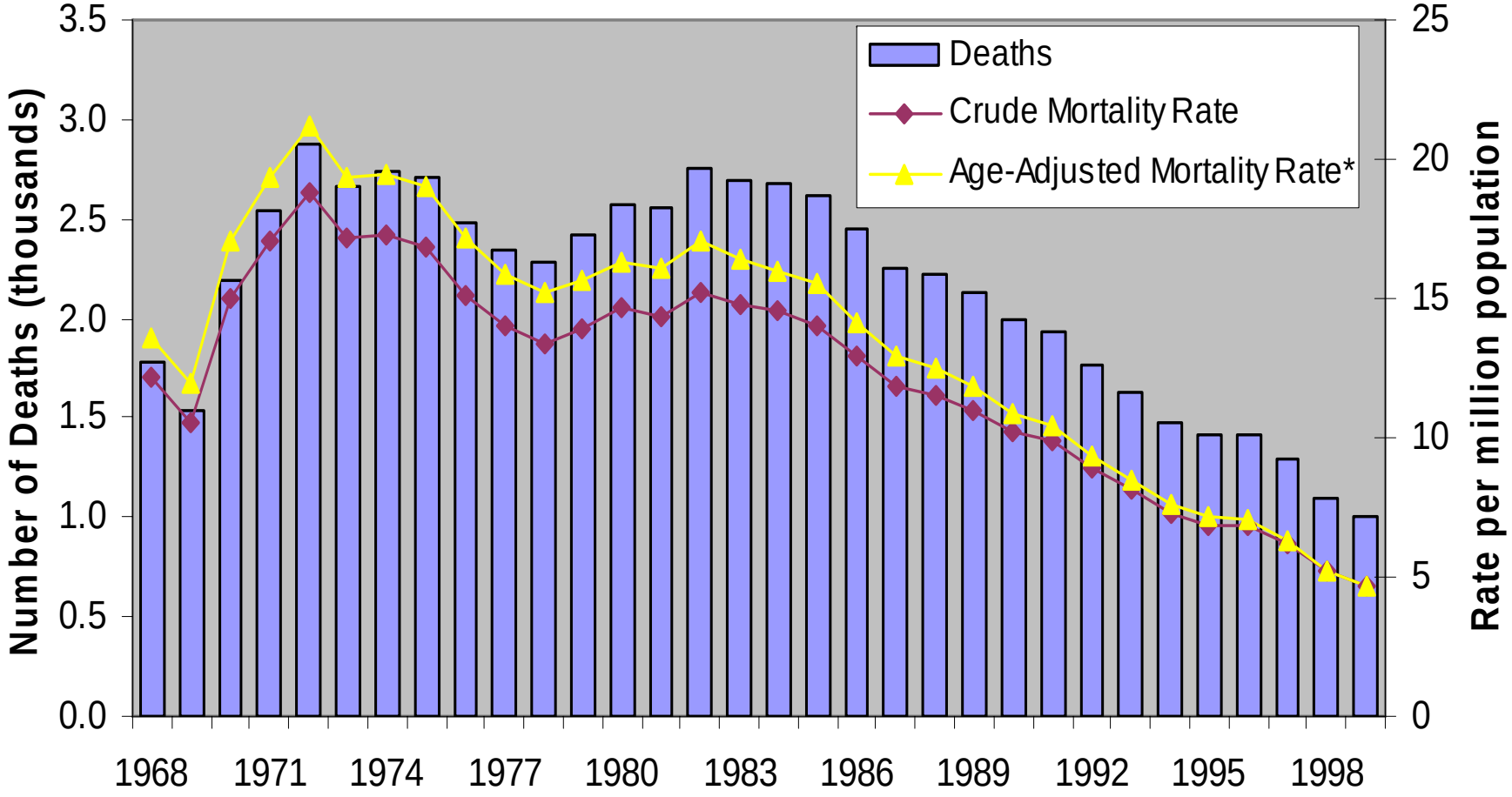
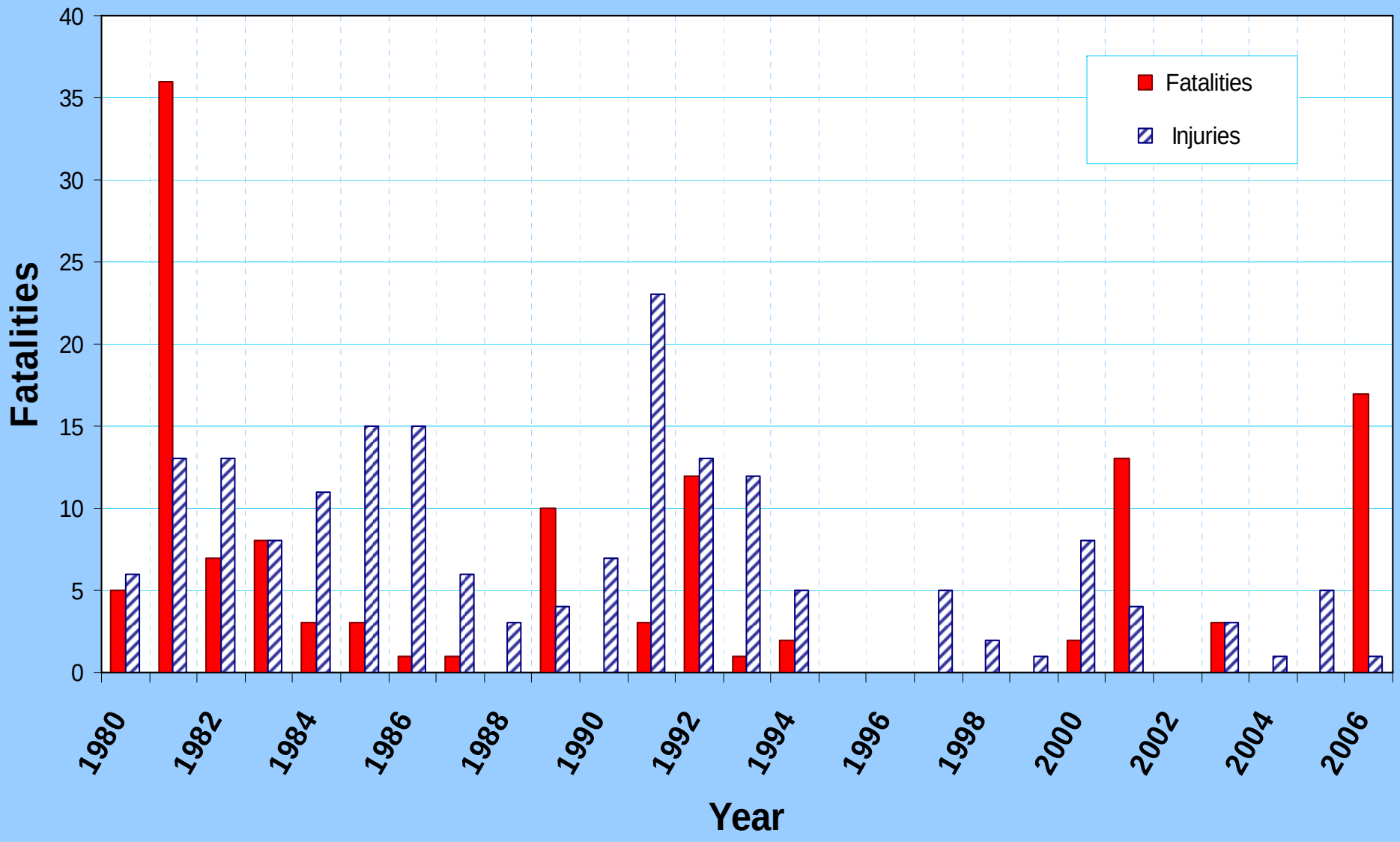
Coal Workers' Pneumoconiosis: Number of Deaths, Crude and Age-adjusted Mortality Rates, United States Residents Age 15 and over, 1968-1999



* standardized to the year 2000 standard population

Data source: NCHS

Underground Coal Mine Explosion Fatalities & Injuries, 1980 - present



Mine Disasters of 2006

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Tragic Events of 2006 Exposed Several Shortcomings

- Gaps, deficiencies, weaknesses…
  - Research, development, and deployment
  - Regulation and enforcement
  - Design and operational practices

- Plenty of room of improvement by all involved!

Response

- Federal Legislation
  - MINER Act of 2006
  - Proposed S-MINER Act of 2007
- State Legislation
  - West Virginia (led the way)
  - Kentucky, Illinois
- Federal Agencies
  - MSHA: ETS and other…
  - NIOSH: Revised Research Agenda and other…

MINER Act of 2006

- Primarily focuses on improving performance after a catastrophic event
- Addressed many of the shortcomings:
  - Emergency response plans
  - Rescue teams
  - Communications & tracking
  - Oxygen supply and refuge
  - R&D infrastructure
  - others

What's been happening?

- Changes to operational practices – MSHA ETS, changes mandated under the Act
- New technology initiatives
- Emerging change in safety culture

Technology Initiatives

- Development of communication and tracking systems
- Development of improved oxygen supplies for underground coal miners
- Development of refuge strategies for underground coal mines
- Science and engineering basis for mine seals

Rapid Implementation
$10 million Supplemental Appropriation

- Identify most promising technologies to support
- Seek extensive input from labor, industry, manufacturers, military, and international community
  - Conduct In-mine tests
  - Look for evidence of successful deployment in a commercial or military application
  - Look for evidence of general manufacturing or deployment barriers
- Balance the need to vet promising alternatives with the need to provide solutions as quickly as possible

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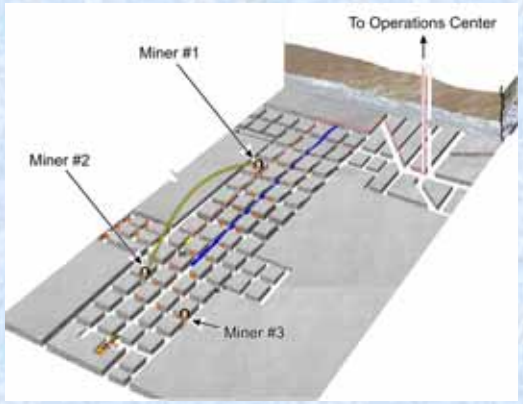
Communication and Tracking Systems

- “Survivable” leaky-feeder systems
- Mesh systems
- Hybrid UHF/MF system
- Tracking alternatives
- Development of engineering communication standards

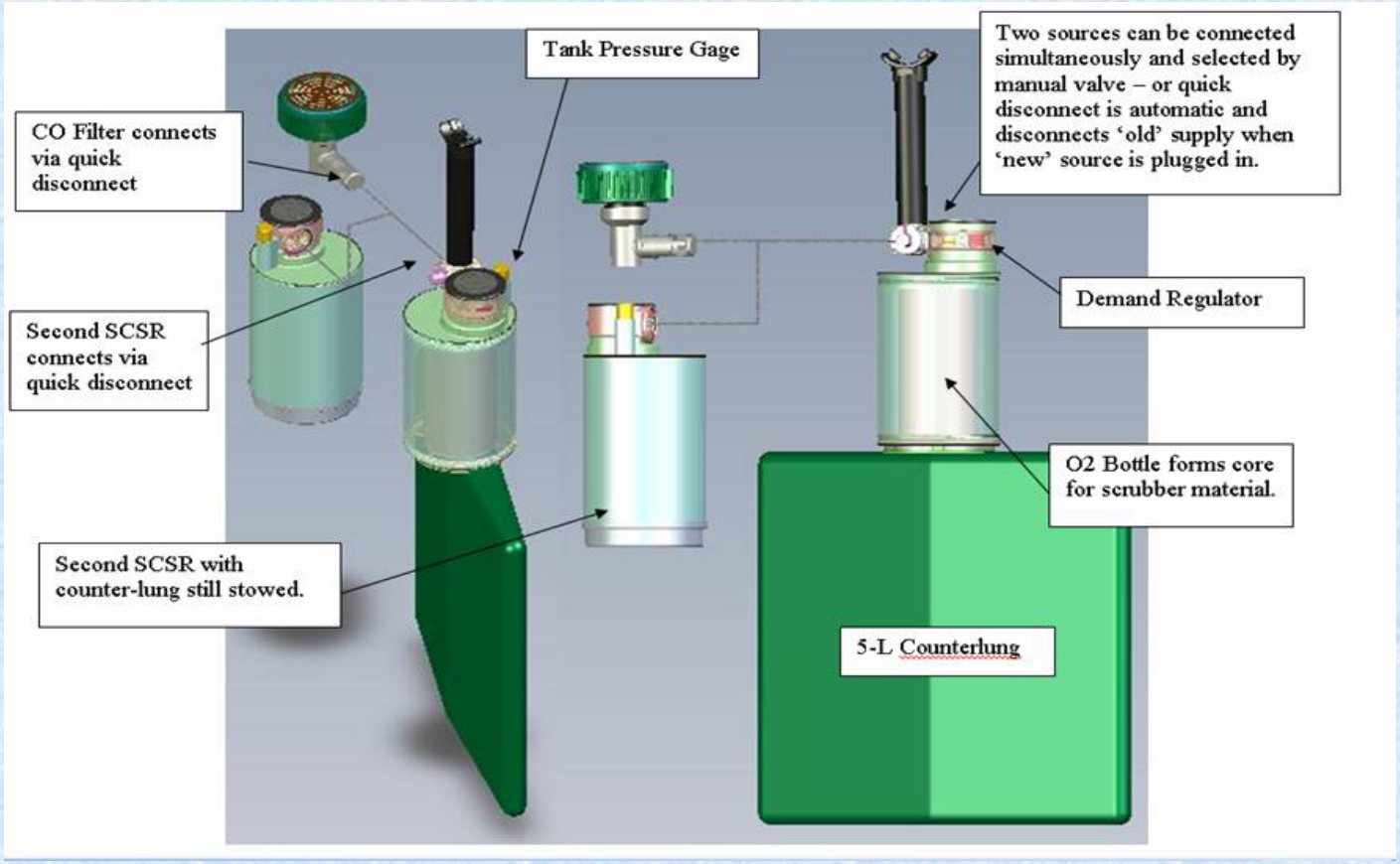


Communications System "Roadmap"

- **Provide a systems architecture that provides maximum survivability.**

- **Provide a path to improve emergency communications capabilities in the short term, while enabling significant functionality advances in the coming years**

Dockable/Hybird SCSR



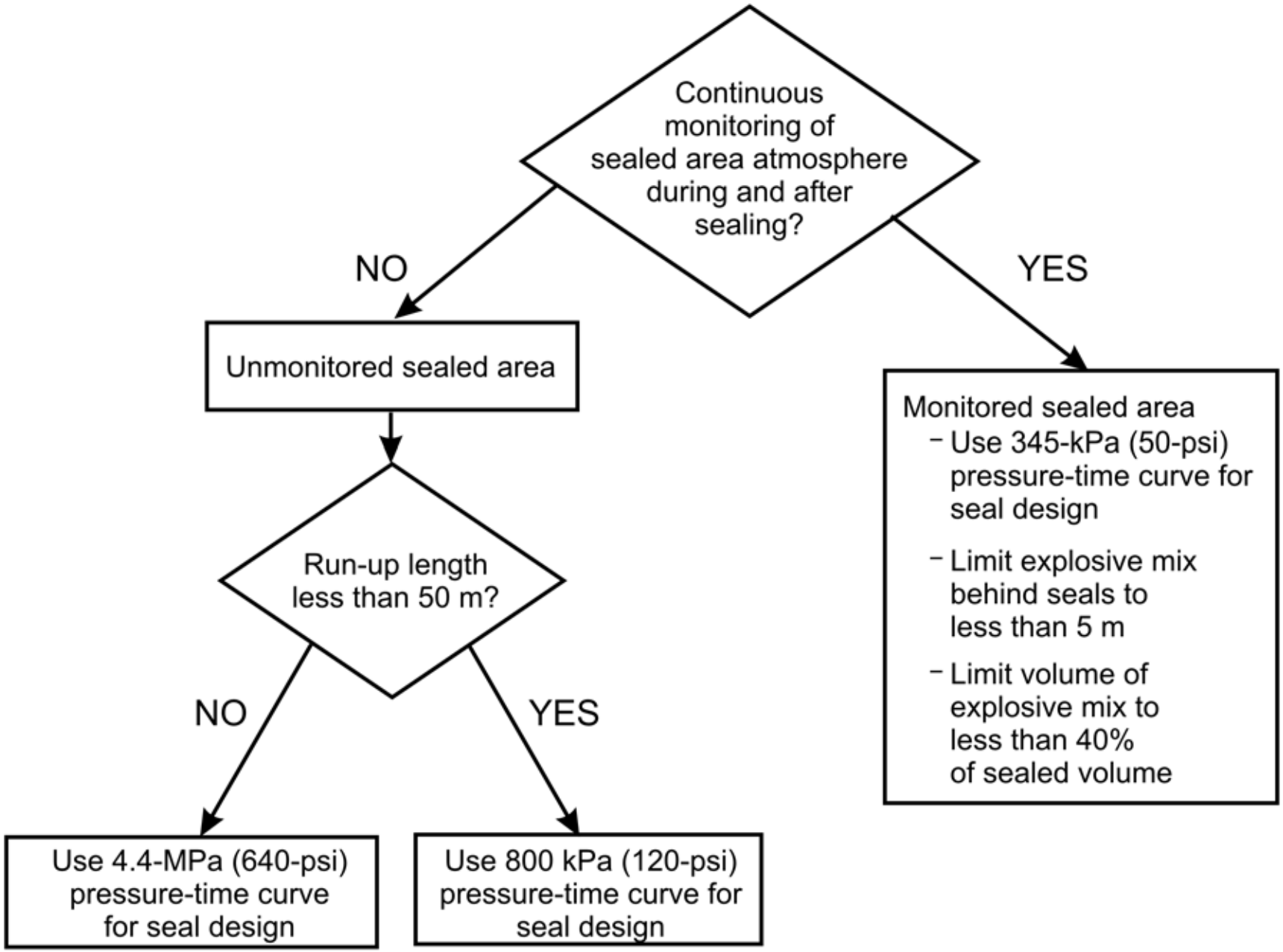
Refuge Alternatives

- Post 1969 Act activities on refuge
- MINER Act Mandate
- Develop an integrated escape-refuge strategy
  - Portable and temporary refuge shelters
  - Stationary refuge rooms/ safe havens
  - Training for escape and refuge
- Conduct research in support of recommendations to Congress

Seals Research

- **Pre-2006 – "build and test" approach at LLEM**
- **Post-2006 – "engineering design" approach**

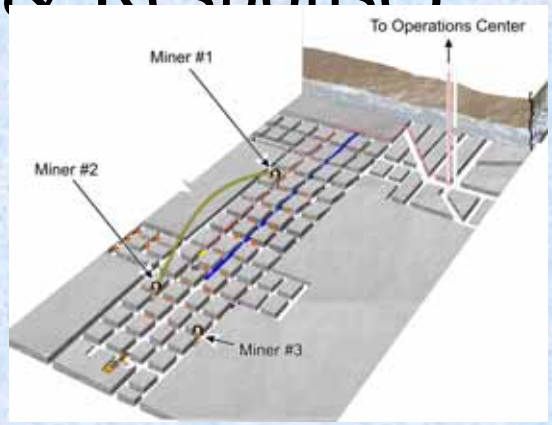
FLOWCHART FOR SELECTING DESIGN OF NEW SEALS



Additional Examples of Extramural Research

(Disaster Prevention & Response)

- Through-the-Earth Technologies
- Spray-on liners to reinforce mine seals
- Advanced firefighting agents



Additional Examples of Intramural Research

(Disaster Prevention & Response)

- Coal dust explosibility meter
- Explosion fundamentals, mitigations, and design of sealed areas
- Training

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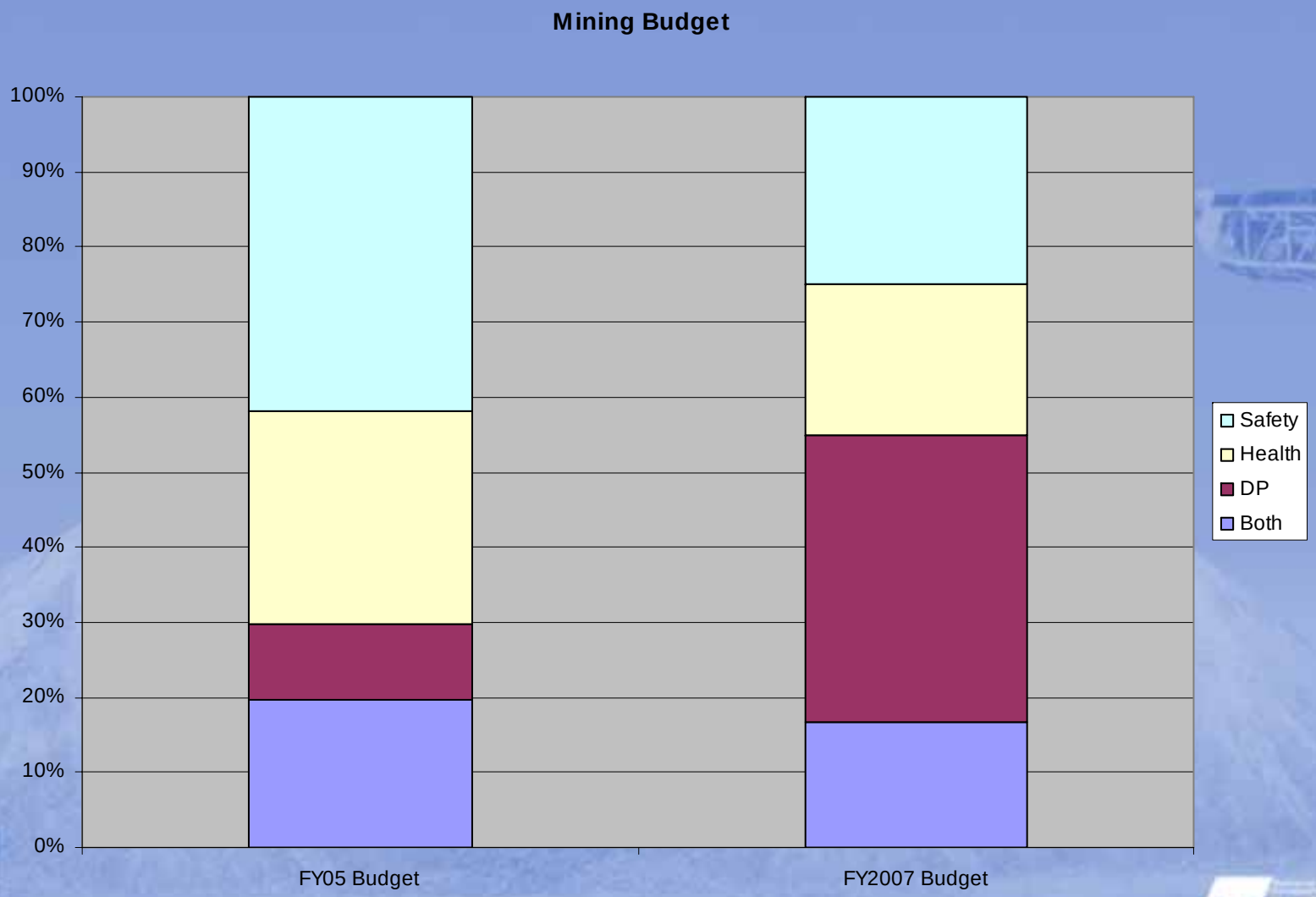
Mining Research Program



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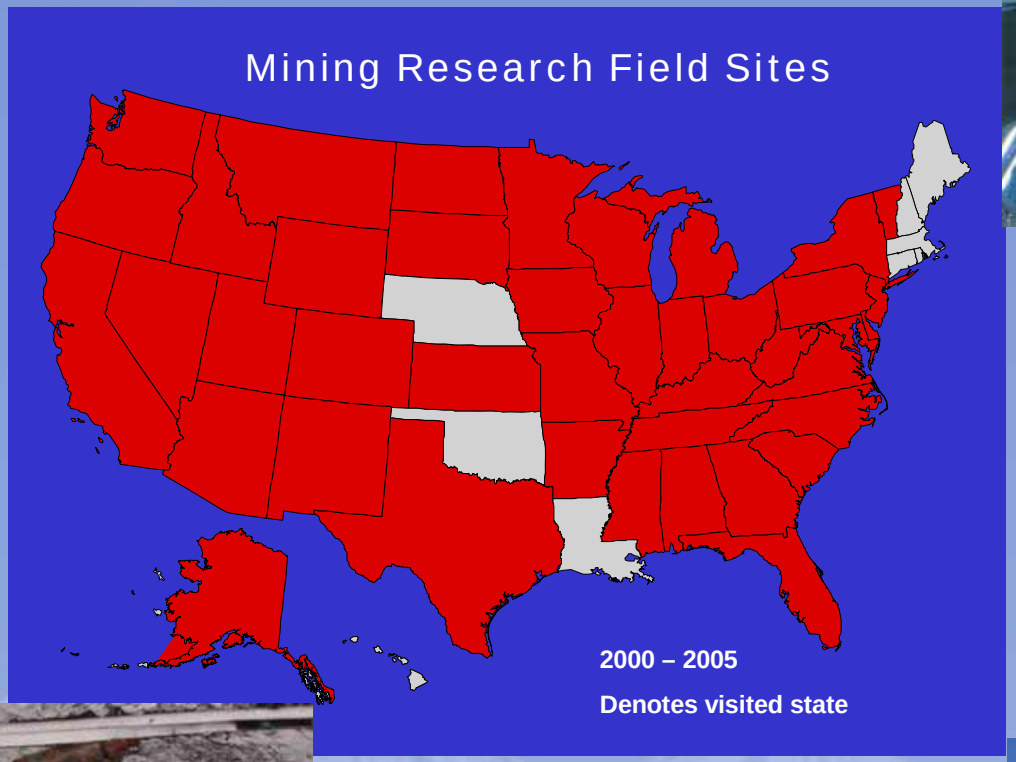
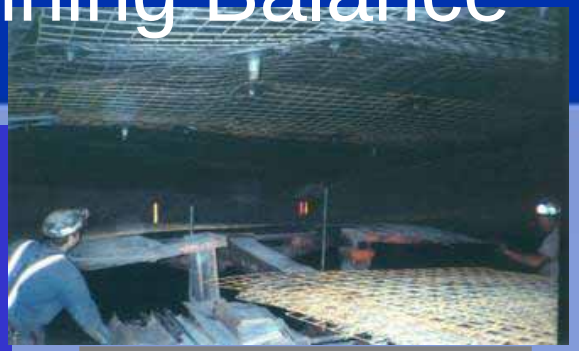
Challenge of Maintaining Balance





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Looking back, five years from now…will we see?

- New technologies, in the mine, to address the gap areas exposed by the tragedies in 2006
- Improved design and operational practices
- New legislation in place
- An improved safety culture practiced by all mines

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Zero Harm Mining Environment

- Society Risk Acceptance Paradigm Shift
  - Beliefs
    - Companies Responsible for Long Term Safety & Health
    - Society Wants (demands) “Zero Harm” Environment
  - Reality
    - One Incident Can Impact the Whole Industry Sector (i.e. Sago)
- Company Vision to Eliminate Fatalities and Injuries?
  - If Yes → go above & beyond regulatory compliance, i.e. compliance with regulations is essential but may not be sufficient to achieve zero harm
  - If No → please get out of this business

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Achieving “Zero Harm”

- Developing a “safety culture” throughout the industry
- Recognizing that compliance with regulations alone is not necessarily sufficient to achieve the goal
- Employing additional tools such as risk analysis and risk management to supplement the regulatory structure
- Partnering to solve safety and health problems

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NIOSH Project to Examine Application of Major Hazard Risk Analysis and Management in the U.S.

- NIOSH View
  - Not to replace regulations, but rather to be used on top of regulations to address gap areas
  - Mines will be able to better protect their workers to the extent that they address the identified risks
  - Some U.S. mines already do this… all mines should do it.
- NIOSH Experience
  - "Pilot Projects" completed
  - Training workshops were valuable
  - Mixed experience overall, consistent with having begun the "journey" recently
  - Final report in process

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Possible S-MINER Act

- Supplement the MINER Act of 2006
  - Expand application to include metal/nonmetal mines
  - Add a “prevention” focus
  - Address improvement of mineworker *health* in addition to safety
- Bill is “in-process” within the House of Representatives and the Senate

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If it were to happen again today, would the outcome be any different?

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Improving Mineworker Health & Safety Through Research & Prevention

Never forgetting it's about the health & safety of the mineworker!

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