

Evaluation of New Technologies for Mine Rescue Training

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Presentation Outline

- Project team
- Partnerships
- U. S. rescue teams
- Rescue team exercises
- Evaluating technologies

Project Team

- Dan Alexander, Ph.D., PE
- Mike Brnich, CMSP
- Linda Chasko
- Jacquie Jansky
- Chuck Lazzara, Ph.D. (ret.)
- Kathleen Trakofler, Ph.D.
- Cindy Mytrysak

Our courteous and knowledgeable staff

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A few of our partners

UK

CAB
Welcome to the CAB Products Web Site. Click here to enter!

NPPTL

United States Department of Labor
MSHA
Mine Safety and Health Administration

Peabody

BCOA

UNITED MINE WORKERS OF AMERICA
UMWA

CONSOL ENERGY

Department of Environmental Protection
Bureau of Mine Safety

NMA
THE AMERICAN RESOURCE

West Virginia University

HILTI

- Industry
- Labor
- Manufacturers
- Enforcement
- Academia

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Rescue Team Data

- 670 underground coal mines*
- 247 underground metal/nonmetal/stone mines*
- 265 state and company u/g mine rescue teams~
- 138 coal teams
  - 1005 members
- 127 m/nm/stone teams
  - 951 members

***Source: MSHA 2005**

~Source: MSHA 2007

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Rescue Team Exercises and Technology Evaluation

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Mine Rescue Team Exercises

From 2004 to date, 31 mine rescue teams underwent training simulations at Lake Lynn Laboratory, some several times a year.

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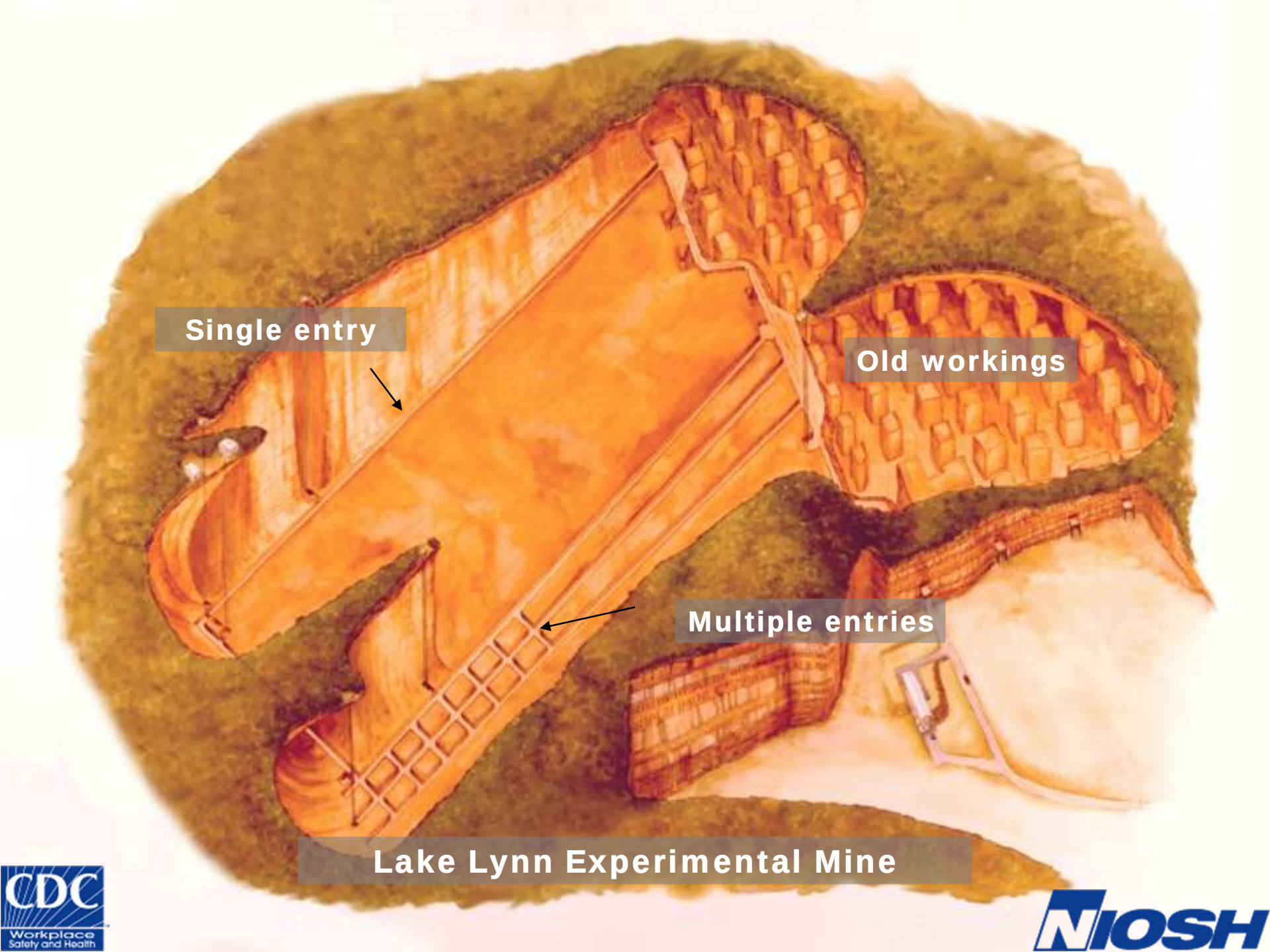
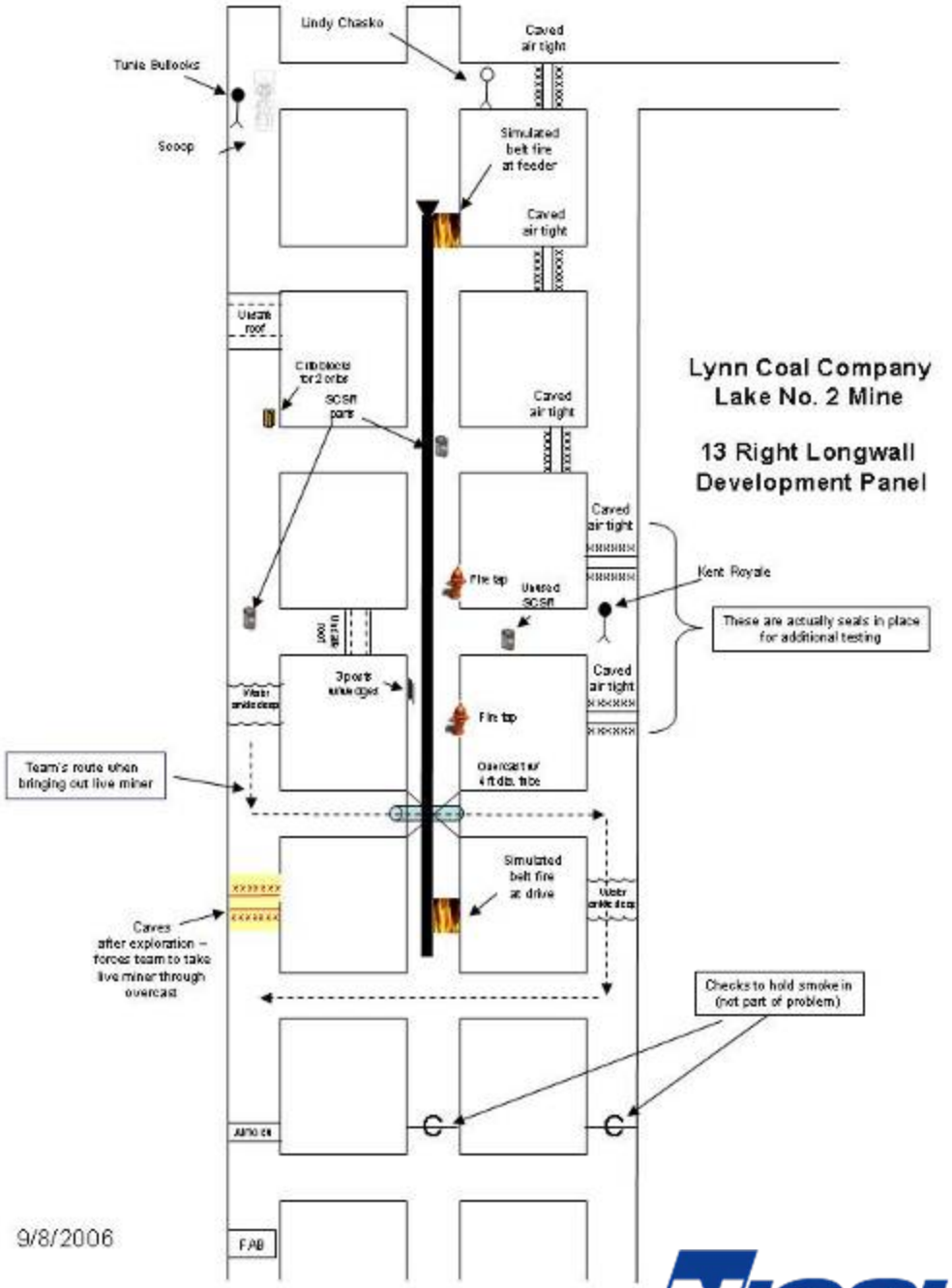

Single entry
Old workings
Multiple entries
Lake Lynn Experimental Mine

Problem solution map for an underground exercise allowing both the mine fire brigade and rescue team to work together



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Technologies to aid Mine Rescue Teams


Dawson, WV mine rescue team – c. 1940


USBM mine rescue team – c. 1920

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Lighted Team Link Line

- Luminescent wire
- 27 feet long
- Team can move along line
- Team can step off line using a retractor
- Patented - not in commercial production

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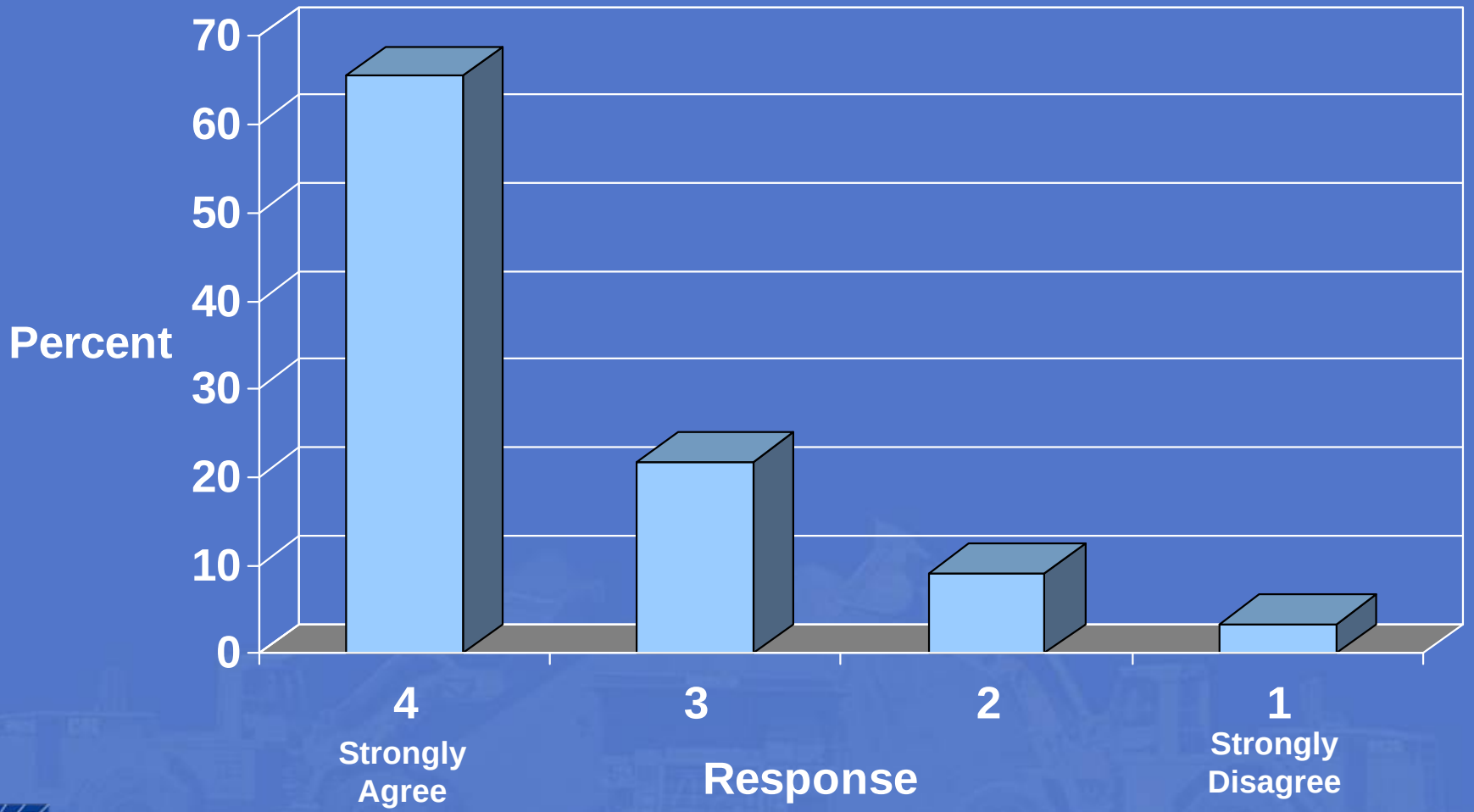
Trainees were asked the following question -

The lighted lifeline is an improvement.



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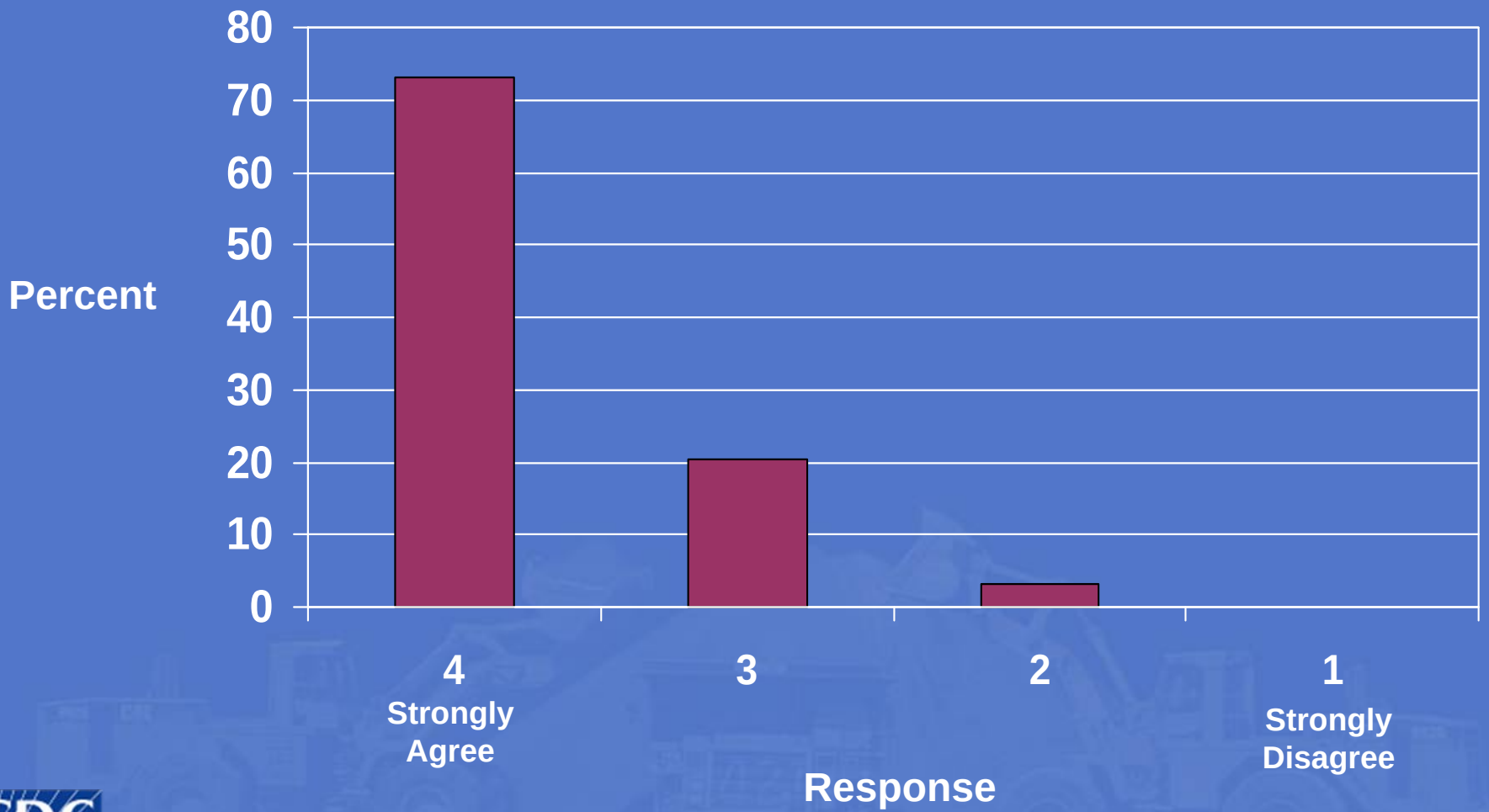
Wayfinding Technologies

- Reflective materials
- High intensity LEDs
- Chemical lightsticks
- Strobe lights
- Handheld lasers
- Turbo flares

Trainees were asked the following question -

The items in the team bag; e.g. light sticks, strobes, etc. are useful for mine rescue teams



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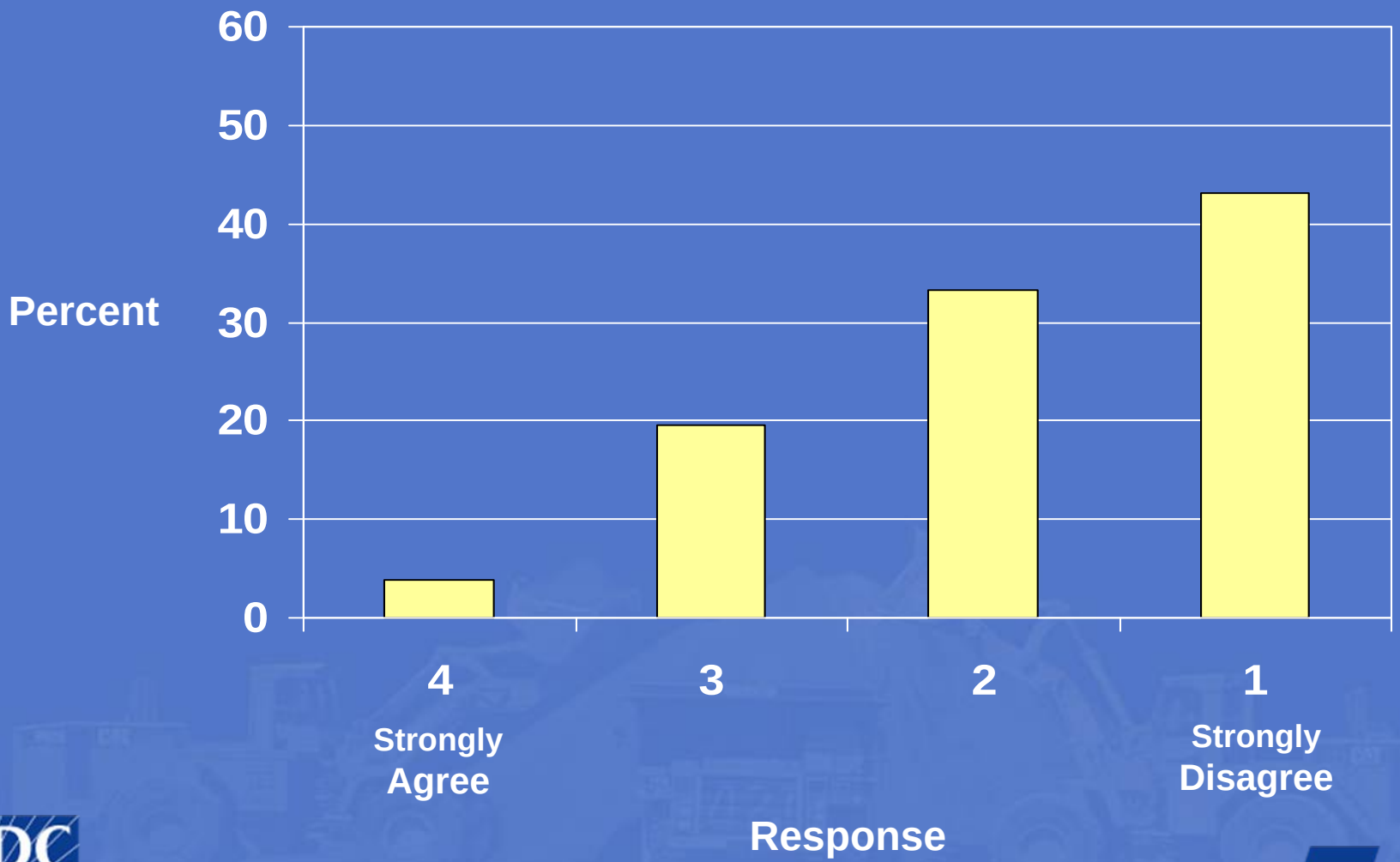
Commercial Laser Pointers

- Compact, lightweight, affordable
- Laser Diode Technology
- Class IIIa (**Green**, **Red**, **Blue**)
- Wavelength - 532 nm & 645 nm
- Output Power - 3-5 mW
- Beam Diameter - 1 mm
- Range - up to 2,400 ft
- Hilti looking at a permissible version of a green hand-held laser

Mine rescue team captains wearing lasers

Trainees were asked the following question -

The blue laser worked better than the green in the smoke.



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Communication systems

Photo: CON-SPACE Communications

Con-Space

Rescom

Photo: Rescom Sales Inc.

Con-Space Communication System

Foundation Coal has bought sets

Consol Energy bought 12 sets

PA BMS buying 4 sets

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Con-Space System

- Modes of communication
  - Team members among themselves
  - Team to fresh air base
- Features
  - All members hear
  - All can speak (if desired)
  - Constant communication – not voice activated
- MSHA Approved
- Teams seem to prefer one person with mic and headset

Rescom Communication System

Photo: Rescom Sales Inc.

Cable reel

Head set and mic @ FAB

Team connections

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Rescom Communication System

- Modes of communication
  - Team members among themselves
  - Team to fresh air base
- Features
  - All members can hear
  - All can speak (if desired)
  - Constant communication – not voice activated
- Not MSHA approved

Rescom System in use

Ear piece w/throat mic and control

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Rescom Communication System

- Improvements made based on mine rescue teams used and evaluation (06)
- Additional evaluation conducted in April 2007
- More rescue team friendly, teams liked new design
- Teams still want ability to slide along link line which the present configuration prevents
- Pursuing MSHA permissibility testing
- Will be testing wireless version next

6-man junction box

Thermal Imaging Cameras

Cairns IRIS – c. 1996

MSA Evolution® 5200

Belt fire viewed through MSA Evolution® 5200

- PA BMS buying multiple units
- Various companies looking at this technology

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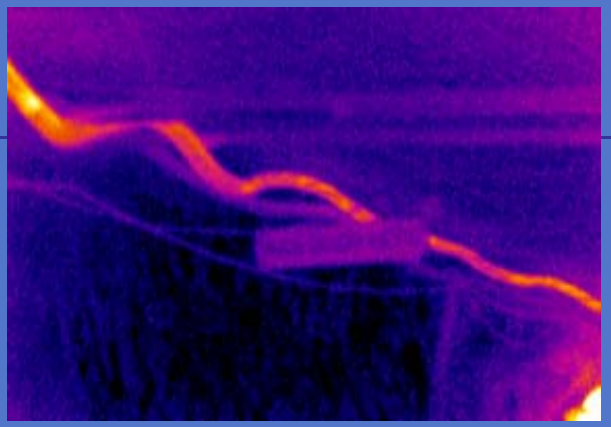
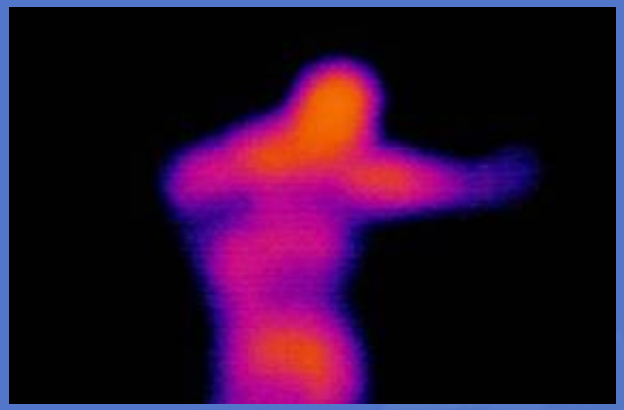
Camera Images

Mine rescue team exploring



Power cable w/splice



Miner behind barricade

Underground belt line

- Everyday mine maintenance
- Hot rollers
- Rubbing belt

Other technologies

Retractors for gas meters

Lifeline pulleys

Retractable stretcher

Lightsticks

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Summary

- Technologies, such as lifeline pulleys, chemical lightsticks, handheld lasers, lighted link lines, and thermal imaging cameras enhance the safety and operational effectiveness of emergency responders.
- Not all devices have been submitted for MSHA approval
  - Will not be available in the “near term”
- Hilti does have permissible LED lighting and is pursuing permissible green hand-held laser.

For more information …

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