The Power of Partnerships:
What NIOSH Can Do For You

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Outline

• UA – ARPA-AMA-State Mine Inspector partnerships
• What NIOSH brings to the partnership
IMR, ARPA, AMA, State Mine Inspector

- Student recruiting, mining engineering jobs and internships
- IMR Board of Directors
- Education Outreach
- Technical Advisory Committee (TAC) for Center for Environmentally Sustainable Mining (CESM)
  - Strategic directions for environmental research
  - Facilitate state-wide road mapping session for research and dissemination priorities
  - Letters of support for research proposals
  - Dust study – PM10
  - Wind and dust prediction models
- Health and Safety projects
  - Serious gaming software
  - Mining Institute for Supervisor Leadership (MISL)
  - Health and Safety TAC
  - Numerous health and safety research projects – letters of support, company participation
- Facilitating industry connections and Mining Day at Capitol
- Input to Global Mining Law Center curriculum and activities
- ABOR participation in hearings and meetings
- Collaboration contributed to ~$10M in mining research funding in 8 years
And Even More….

- Help with commercialized technology – TechLaunch Arizona
- Global Mining Law Center annual workshop – 2016 – Collaborative Solutions to Mined Land Reclamation
  - Led to National Academies workshop on same topic
  - Publication in Environmental Law Review
- 2017 – Building Capacity with Indigenous Communities: A two-way street October 20
  - ARPA partners should contact John Lacy at jlacy@dmyl.com to join the organizing committee, participate in workshop
- Advisory committees: environment, health/safety, mining, geology
- Consortium research projects
- Guest lectures, field trips, internships, K12 outreach, public outreach
The NIOSH Mining Program is a scientific (nonregulatory) office within NIOSH.

President of the United States

Department of Health and Human Services

Centers for Disease Control and Prevention

National Institute for Occupational Safety and Health

NIOSH

Mining Program

OMSRH
PMRD and SMRD

Research branches and teams

Department of Labor

U.S. Department of Labor
Mine Safety & Health Administration

OSHA

https://www.cdc.gov/niosh/mining
Mining Program Strategic Direction

To eliminate mining fatalities, injuries, and illnesses through relevant research and impactful solutions

1. Reduce mine workers' risk of occupational illness

2. Reduce mine workers' risk of traumatic injuries and fatalities

3. Reduce the risk of mine disasters and improve survivability of mine workers

Driven by: Burden-Need-Impact
How the NIOSH Mining Program is organized

NIOSH OD
Office of Mine Safety and Health Research

Pittsburgh
Mining Research Division
- Dust, Ventilation and Toxic Substances Branch
- Electrical and Mechanical Systems Safety Branch
- Fires and Explosions Branch
- Ground Control Branch
- Human Factors Branch
- Workplace Health Branch
- Health Comm., Surveillance, and Research Support Branch

Spokane
Mining Research Division
- Ground Control Team
- Mining-induced Seismicity and Stability Team
- Automation and Technology Team
- Health, Exposure, Assessment & Monitoring Team
Solutions Available Now for the Mining Industry

Dust control recommendations
Electrical safety
Helmet-CAM and EVADE 2.0 software
Diesel particulate matter monitor (DPM)
Cab filtration
Continuous personal dust monitor (CPDM)
Hearing loss simulator and noise training items
Ergonomics awareness
Intelligent lock out tag out
Heat stress fact sheets
Age awareness
Safety Pays web app delivers cost estimates for mining injuries
Hazard Recognition Challenge

https://www.cdc.gov/niosh/mining/works/coversheet2013.html

102 top hazards in mine, plant, shop, roads

Downloadable app

In future load your own pictures into the app
Dust control handbook

Dust Control Handbook for Industrial Minerals Mining and Processing

Department of Health and Human Services
Centers for Disease Control and Prevention
National Institute for Occupational Safety and Health

NIOSH
Cab filtration to reduce dust exposure
Continuous personal dust monitor (CPDM)
End-of-shift silica monitoring system has reached beta test stage
End-of-shift silica monitoring was effective in mini-baghouse case study
Helmet-CAM and EVADE for use with samplers for dust, noise, and other hazards (Enhanced Video Analysis for Dust Exposure)

Developed with Unimin as partner
Preventing heat illness

- Heat stress fact sheets available from NIOSH
- Heat illness prevention training
Internet-enabled maintenance monitoring and reporting

- Effective for monitoring personnel access, machine guarding, and status of maintenance activities
- Digital LOTO next step
- Leverages IoT, RFID, and sensor technology to improve hazard recognition

Developed with OldCastle Materials as partner
Arc Flash Awareness Video: Information and Discussion Topics for Electrical Workers
Hearing loss training and communication solutions

NIOSH Hearing Loss Simulator

Roll-pull-hold earplug technique

1. Roll
2. Pull
3. Hold
Ergonomics Education
customizable training modules, demonstrations and process implementation

Proactively target risk factors to reduce or eliminate MSDs and unsafe worksite design
ErgoMine mobile ergonomics audit tool
Age awareness education

Designing work to slow down the aging process
Slip, trip, and fall prevention app under development
## NIOSH Mining Partnerships

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How to Get More Power Out of NIOSH For Your Company

National Occupational Research Agenda (NORA) Mining Council

NIOSH has 10 industry sector councils
Mining is most active
Meets Wednesday afternoon at SME annual meeting (Denver 2018)
Teleconferences
Document that describes H&S needs of the mining industry
Helps drive the work that gets done

Contact David Snyder: fwx4@cdc.gov
What’s Coming

• Personalized/continuous safety training
  • Adult education/active learning focused (UA/NIOSH)
  • Based on personality/learning style/experience (Predictive Index)
  • Competency/Capability framework (UA/Custos Fratris)
  • Serious games (Desert Saber)
  • Learning Management Systems (Marine Learning Systems/Mining Learning Systems)
  • Track outcomes of interventions in real-time (NIOSH/Industry partners)

• Wearable Sensors
  • Total worker health – correlate home and work (UA)
  • Ergonomics (Human Condition Safety)
  • Heat stress/sweat sensors (UA, GuiaCorp, and others)
  • Location (ubiquitous GPS)
  • Fitness/Activity (Fitbit and others)
  • Fatigue (SmartCap and others)
What’s Coming

• 4D Autonomous Monitoring of Site Environment
  • Measure, Assess, Predict, Act
  • Water quality, quantity
  • Structure stability
  • Air emissions/quality
  • Real-time, streamed to protected website, machine learning to predict outcomes and recommend actions (Sub Rosa LLC, NOAH LLC and others)

• Mobile Monitoring of Site Environment
  • Drones for site assessment and volumetrics (many companies)
  • Multi-spectral imaging (near – thermal infrared)
  • Augmented reality for hazard recognition, record access (GuiaCorp, Desert Saber, Red Hammer)
  • IoT – smart lock out/tag out/ guarding etc (NIOSH)
  • Machine learning to assess patterns and make predictions/recommendations
What’s Coming

• Autonomous Vehicles
  • Operator assist is more likely
  • Collision avoidance
  • Fatigue avoidance

• Robots
  • Exoskeletons for lifting more likely
  • Augmented reality for assisting with technical details
  • Ubiquitous speech recognition

• Smart Systems, AI, Machine Learning
  • Will be built into everything
  • Cyber security will always be an issue but will get better
  • Interoperability of data systems – must have some standards for systems to talk to each other – Global Mining Standards group in SME
  • Business advantage will be intelligence not communications and database protocols
Conclusions

• Innovation requires partnerships
• Approach innovation as a cube – must maneuver all faces and planes
• Have the range of people involved – starters and finishers
• Commit to systematic adaptation and adoption
• Balance societal push and financial pull
• What appears as rapid change and innovation has a generation of hard scientific research behind it
The New Face of Mining is Partnerships for Innovation

Thank You for being great partners!