

# How can the CPDM Affect Miners' Knowledge and Control of Respirable Dust Exposure?



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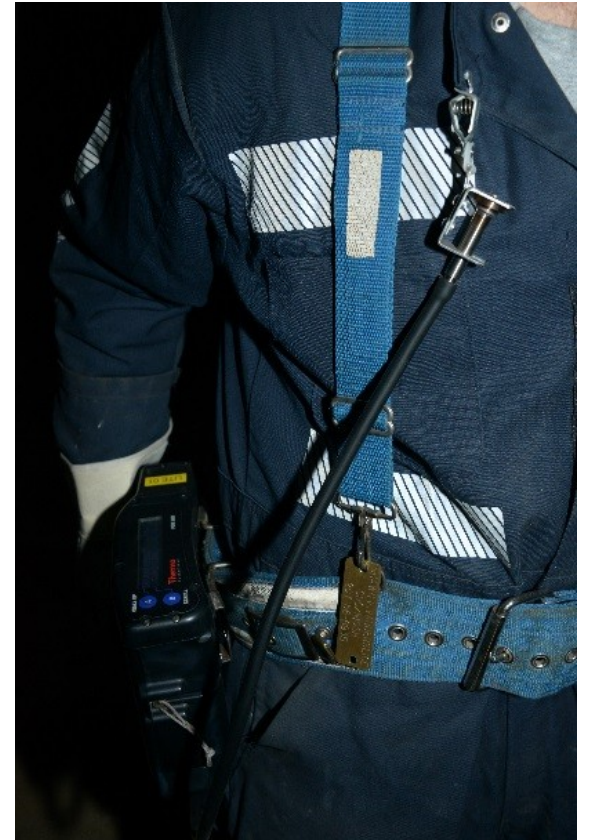
NIOSH Mining Program



# Overview of MSHA Final Rule on CPDMs

## Sampling of **Designated Occupations** (DOs)

- CPDMs must be used to monitor exposure of underground coal mine occupations with highest exposures AND Part 90 miners
- For high exposure occupations, must sample consecutive normal production shifts until 15 valid samples are obtained
- Sample results must be posted within 12 hours
- Results given to Part 90 miners within the first hour of next shift
- Beginning August 1, 2016, concentration limits for designated occupations at the working face are reduced from 2.0 to 1.5 mg/m<sup>3</sup> (lower if excessive quartz is present)



# Overview of MSHA Final Rule on CPDMs

## Required responses to citations

- Make respirators available
- Take corrective actions to lower dust
- Keep a record of the corrective actions taken
- Begin sampling within 8 days until 5 valid samples are taken
- Violations will be terminated once:
  - all 5 samples are at or below the standard AND
  - revised dust control parameters are submitted and approved by MSHA District manager



# Current fear of compliance with regulation makes it difficult to avoid “controlled” efforts.



## Layers of resources to comply

- CPDM set up
- Completing enough samples
- Reporting them on time
- Being in compliance
- Executing corrective actions if needed

## Manager observation

- *“The guys are so nervous about compliance that they usually babysit the pump.”*

## Worker feedback

- *“I am constantly swinging my belt to look at the thing and make sure I’m okay. If there was some type of warning it would put me more at ease in terms of compliance...”*

Mines have an increasing need for CPDM-focused communication that promotes autonomy.

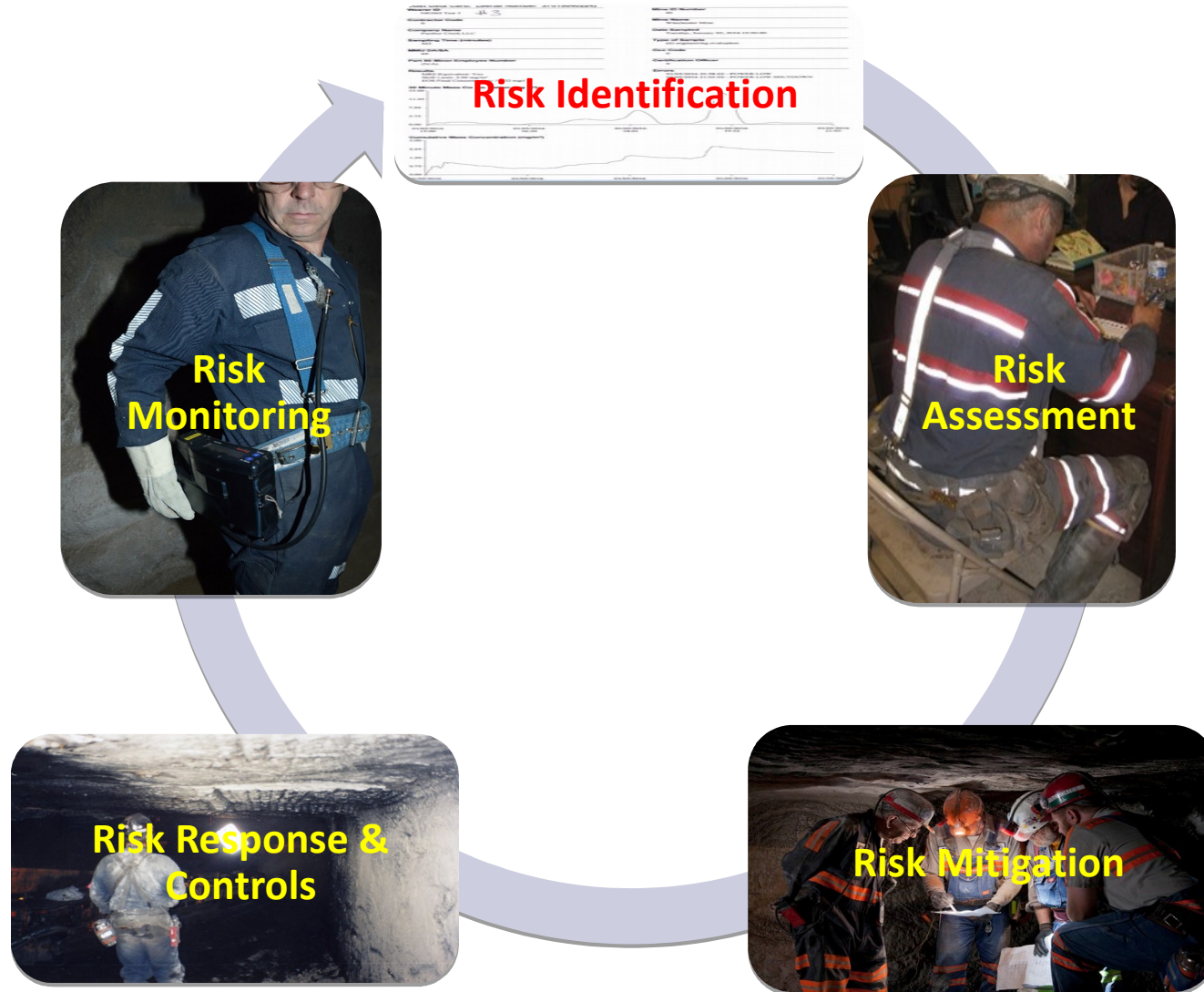
An increase in the prevalence of Black Lung Disease as well as several updates in CPDM technology to assess dust exposure, but few efforts with the workers.

## Objectives:

- Miners' knowledge, attitude, skills, and behaviors (***corrective actions***) toward using and responding to the information displayed on their CPDM.
- Miners' communication about their dust exposure output on the CPDM.



# Discussions about use and behavioral response to CPDM data



Perceptions, uses, other KSAs (risk decisions, satisfaction, barriers, etc.)

Job tasks/equipment interference (roof bolter machines, shuttle cars)

External influences and feedback (environment, work crew, etc.)



# 9 CPDM visits, data collected from over 50 miners



- Technology adoption surveys
- Pre/post interviews/focus groups
- Dust exposure with technology
- 3 CPDM interventions with 35 workers (completed January 2016 – March 2017)
- 3 additional one-time visits (January 2017 – March 2017)

# Miners are usually concerned about past and current exposure to respirable dust



- Know someone who has/had Black Lung.
- Some are more concerned with silicosis.
- Not much within their control.

*“I just assume I’m exposed/overexposed. That’s what you sign up for. You know when you sign up.”*

*“I’ve been here 21 years so I’m sunk anyway – I probably have Black Lung.”*



# Results show that the CPDM can improve miners' motivation, engagement, and proactive health practices



- **Competence** – Miners can more effectively deal and adapt to their environment.
- **Relatedness** – Miners can establish supportive relationships with their coworkers.
- **Autonomy** – Miners have some control over their own exposures.

**Competence** – Miners can more effectively deal and adapt to their environment.

The CPDM can help improve miners' knowledge of dust sources and learn corrective actions to reduce exposure.

# Increased miner competence learned via CPDM



- Making or getting into a new cut of rock
- Hard rock, like sandstone, is dustier
- Turning a break
- Stay upwind— get a lot of spikes downwind
- Clogged steels when bolting – excess dust comes out of hole
- Outby roadway traffic and activity
- Maintenance jobs out of the ordinary (i.e. changing torque shaft)

## Mine efforts to increase knowledge

- Document and communication corrective actions determined by mineworkers.



# CM Operator competence learned via CPDM



- *"I have noticed that when I am more turned to the miner with the air at my back I have higher concentrations. If I turn my shoulder more and have the air my exposure is less. I have changed how I stand."*
- *"I don't walk through or stand in rock dust clouds anymore!"*
- *"The CPDM has helped created habits or make new habits. It changes where I usually stand when I'm not driving the car."*

## Mine efforts to increase knowledge

- Document and communication corrective actions determined by mineworkers.



# Roof bolter increased competence via the CPDM



- Changed where eating lunch to avoid being by the bolter when possible.
- Spacing the miner out from the bolter if bolting downwind so there is less dust exposure.

**Relatedness** – Miners can establish supportive relationships with their coworkers.

The CPDM can serve as a tool to communicate risks and facilitate work crew discussions to reduce exposure.

# Initial thoughts on crew communication



- *Assume people know...  
...maybe we shouldn't.*
- *Talk safety practices all the time, but we don't talk about health...  
...maybe we should.*



# Follow-up thoughts on crew communication



- *“We all look at each other’s cards or talk about our readings. Everyone in the mine is more aware of each other’s behaviors and how it can affect each other underground.”*
- *“We definitely communicate more. We (the roof bolter) all talk to each other before and after shifts – when we’re changing out – we’ll say what we were in the time before. We try to help each other.”*



**Autonomy** – Miners have some control over their own exposures.

The CPDM and dust data output can put miners in more control of monitoring and reducing exposure.

When it comes to using the CPDM, miners have high levels of motivation to reduce their exposure.

**Autonomy**  
**4.29/6.00**



**Regulated**  
**3.27/6.00**



# Increased miner autonomy in action



- *“I keep looking to see where I might be able to learn. We keep learning things. We [the guys] like to look at cards and ask questions.”*
- *“...I always like looking at my readout. It’s nice to see what the feedback was so you can prevent exposure later...if I know where or when I got a spike last time, and if that means I can stand in a different spot or something.”*

# Mine efforts to increase autonomy



Use dust cards to recreate the previous shift with miners to determine exposure sources and ways to reduce these sources.

*“We might move a curtain, stand behind the curtain if we think it will help. This has made me more aware. I mean you’re in the dust there’s no denying that. You can’t help it but this helps you deal with it...”*



# Minimizing complacency once autonomous behavior is established and compliance is consistently achieved.



## Management Challenge

- Care about the dust data cards at first but interest wanes.

## Worker Experiences

- “I’m not in it as much as I thought I was. I thought that the levels were gonna be a lot higher.”
- “...Before I sometimes wouldn’t do something because I was afraid of the levels. Now I can look at it, I have looked at it and I know it’s okay...”

# Thank You!

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