

Training Techniques for Emergency Response Preparedness

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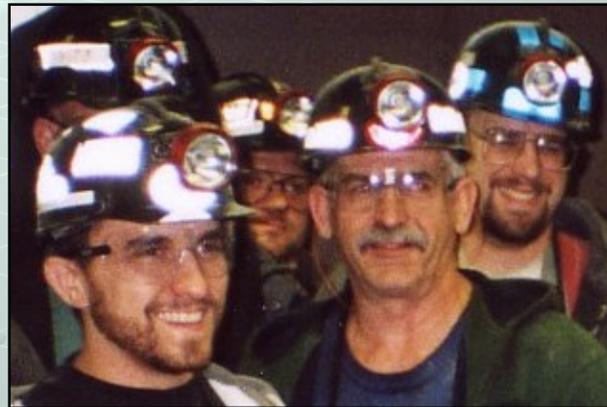
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Underground Coal Mining

Learning from the Past

- March 7, 1988, a fire occurred at Marianna Mine.
- “At 10:32 p.m., the CO monitoring system alerted *the dispatcher* of a low alarm. ... This station went to into high alarm” *2 minutes later*.
- “*A mechanic* was sent to investigate the reason for the alarm.”
- “*The sections* were notified to evacuate 16, 17, and 21 minutes after the system indicated a high alarm...”
- “Twenty-seven miners were exposed to heat and smoke and escaped with the aid of self-contained self-rescuers.”
- “Five of the 27 miners were transported to the hospital and treated for smoke inhalation and then released.”

30 CFR § 75.351



(q) *Training.* All AMS operators must be trained annually in the proper operation of the AMS. A record of the content of training, the person conducting the training, and the date the training was conducted, must be maintained at the mine for at least one year by the mine operator.

Training at Marianna

Formal Training

- The people who put in the computer showed me all of that and – they left me the book to read for myself. They left the computer on the other side, what you call animated...go play with it if you have a few more minutes.
- ...they showed me how to read the sensor. ... They said that's all I really need to know—how to read a sensor.

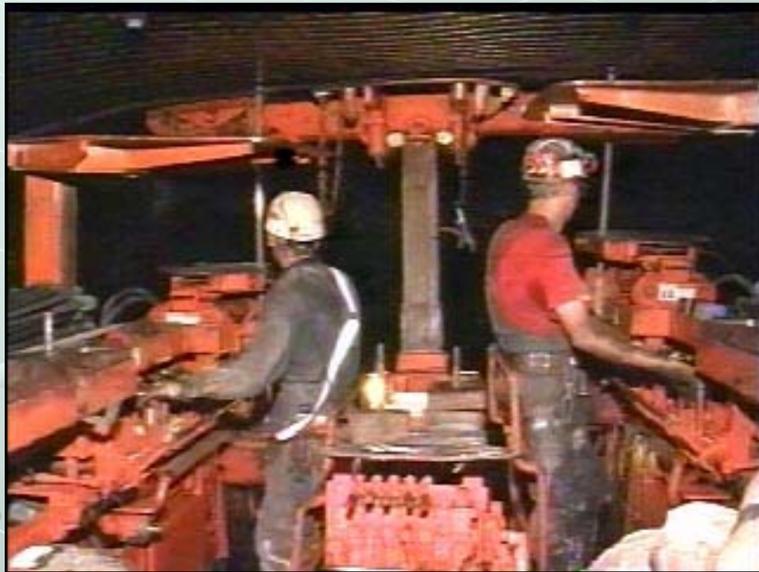
Job-Aids

- *We have procedures posted and we also got a drill book.*

Informal Mentoring

- ...there was a fellow...he gave me a little instructions a couple hours after I wasn't on duty...

Designing Effective Training



Develop of Curriculum

- Clear goals
- Content
- Appropriate Delivery Mechanism
- Assessment
- Remediation

30 CFR § 75.352

Actions in response to AMS malfunction, alert, or alarm signals.

(a) When a malfunction, alert, or alarm signal is received at the designated surface location, the sensor(s) that are activated must be identified and the AMS operator must promptly notify appropriate personnel.

In the event of system malfunction, (e)(4) and (5) require the AMS operator to communicate with a trained person who is monitoring the sensor or area.

Training for Non-Routine Tasks



AMS Operator at Marianna Mine

How does the CO monitoring system work?

- Well, you got a low alarm and a high alarm. It goes off and we are supposed to notify wherever it's at and...the dumper. ...they got a hand monitor...they usually go check it out.

If they confirm the alarm?

- I was suppose to tell them to...leave the section if I found an alarm and then notify the boss.

Emergency Decision-Making

- Detection of problem
- Definition/diagnosis
- Considering options
- Choose from options
- Execute decision

Process impacted by:

- Skills, knowledge, and attitude
- Uncertainty
- Stress
- Complexity of situation



Decision-Making at Marianna

- Past false alarms led to delay in diagnosis
- After confirming fire, task of warning inby sections split between dispatcher and dumper
- 3 inby crews were told to evacuate the mine because of fire on belt
- No information about location or severity of fire was given to or requested by crews

AMS Operator Tasks

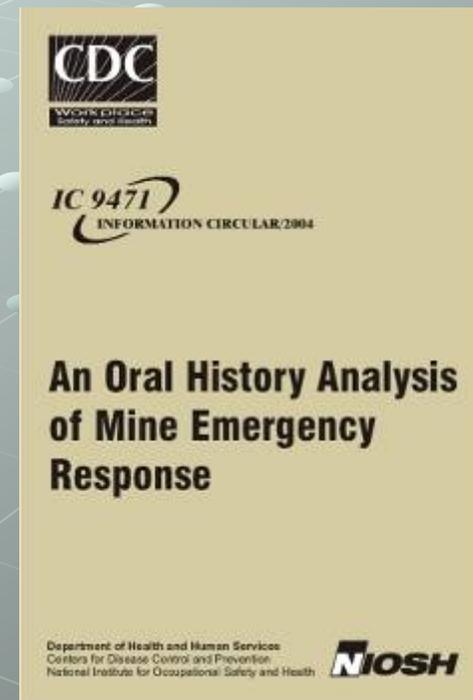
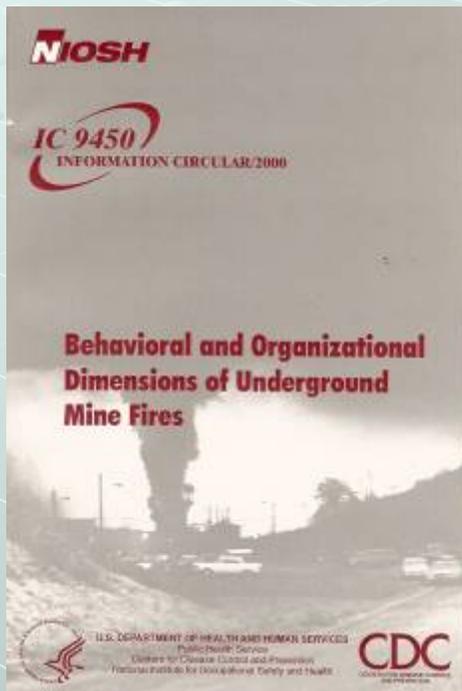
Routine Situations	Routine Tasks	Minimal interaction with AMS	
Non-routine Situations	AMS Alarm – determine if real		
	Seek more information	Alarm explained as routine	No Action
		Alarm confirmed	Call for evacuation

Potential Content for Emergency Response Training

- Routine functioning of system
- Diagnosing non-routine situations
- Giving and receiving emergency warning
- Impact of stress during and after emergencies



Discussion



The findings and conclusions in this presentation are those of the author and do not necessarily represent the views of the National Institute for Occupational Safety and Health.