

# EFFECTIVELY RECOGNIZING HAZARDS

Which competencies are most critical for a 'competent person' to adequately perform a workplace examination?

BY JONATHAN K. HRICA, BRIANNA M. EITER AND DANA R. WILLMER

**R**esearchers at the National Institute for Occupational Safety & Health (NIOSH) are conducting studies to help the crushed stone, sand and gravel industry prepare its workers to perform more effective workplace examinations.

In one study conducted at NIOSH's Virtual Immersion and Simulation Laboratory (VISLab), researchers created a search task within a virtual surface stone mine to study how workers with varying years of work experience identify hazards.

They instructed participants, including safety professionals,



A workplace examiner inspects the highwall at a surface limestone mine.

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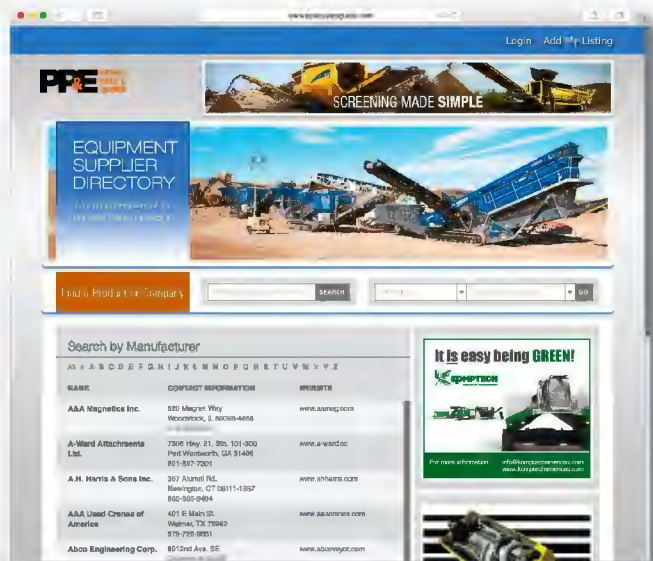
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# SAFETY: WORKPLACE EXAMS

mineworkers and student volunteers, to search the environment for hazards as if they were performing a real workplace examination. Safety professionals outperformed the other participant groups by finding 61 percent of the hazards. While this was more than the other participant groups, there is still room to improve hazard recognition skills for all levels of experience.

To further explore hazard recognition and how mineworkers can improve their ability to find hazards at their work location,

Most safety professionals did not have a formal evaluation strategy in place when asked if examiners are evaluated on how effective they are at performing workplace exams.

NIOSH researchers are beginning to characterize which competencies (knowledge, skills and abilities) are considered critical when performing workplace exams. Each day, mineworkers conduct these examinations at worksites with the goal of finding and mitigating hazards before they cause injury or death. Previous research indicates that several different competencies may influence a worker's ability to successfully identify and mitigate hazards.

For example, having knowledge of potential hazards in the work environment gives workers a leg up in their ability to recognize hazards when they are present. Additionally, having accurate risk perception plays an important role in the ability to correctly interpret cues that signal a hazardous event or activity.

These findings indicate that there are several critical competencies mineworkers need to recognize hazards effectively. However, it is unclear which competencies are most critical for the "competent person" (based on the Mine Safety & Health Administration (MSHA) designation) to have to adequately perform a workplace examination.

As a first step in the characterization process, NIOSH researchers spoke with mine safety professionals and asked how mineworkers are currently prepared for this task.

## GAINING INDUSTRY INSIGHT

From December 2016 to May 2017, NIOSH reached out to nine safety professionals from the surface stone, sand and gravel sector and asked them to participate in semi-structured interviews as part of a study approved by the NIOSH Institutional Review Board. Interviews took place over the phone, at participant workplaces or at the NIOSH Pittsburgh Laboratory. Interviews were designed to explore how mineworkers are currently being selected to conduct workplace examinations.

During the interviews, researchers provided language from MSHA and the Code of Federal Regulations about workplace examinations and the role of the competent person. Specifically, in a program policy letter, MSHA emphasized that the person performing workplace examinations should be a "competent person" and, according to 30 CFR 56/57.18002, the competent person designated by the operator must examine each working place at least once each shift for conditions that may adversely affect safety and health.

Researchers then asked a series of questions related to the concept of the competent person. Some of the questions asked were general in nature such as: "What is your definition of a competent person?" and "What makes someone good at workplace examinations?"

Researchers then followed up with more specific questions on who performs workplace examinations at their site, how the person is selected, what locations they work at, and whether or not they thought a workplace examiner should have a minimum

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A mineworker virtually searches for worksite hazards via the **Hazard Recognition Challenge**, which is available on the NIOSH Mining website.

level of experience and/or training to identify hazards.

Lastly, researchers asked if workplace examiners at their sites were evaluated on how effective they are at performing workplace examinations.

The analysis of the interview data focused on the competencies identified by safety professionals and who should be conducting workplace examinations. Researchers also reviewed the data to determine what practices were in place to evaluate mineworker workplace examination performance.

### KNOWLEDGE NECESSARY FOR HAZARD IDENTIFICATION

When reviewing the interview transcripts, researchers found a recurring theme that the workplace examiner should have knowledge of hazards in the mining environment. One safety professional identified this type of knowledge and what is expected of an examiner.

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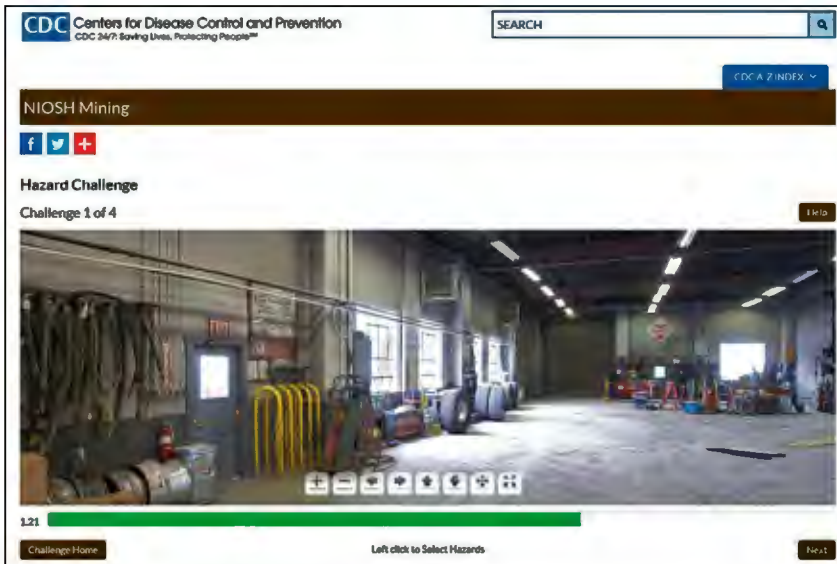
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# SAFETY: WORKPLACE EXAMS



A screenshot of the **Hazard Recognition Challenge** showing the first challenge: the shop. The Hazard Recognition Challenge gives mineworkers the opportunity to perform a workplace exam at four simulated locations at a surface stone operation.

“They have to understand what constitutes a hazard, what constitutes a violation. [They] have to understand – be trained on – what the expectation is for those things that are maybe not black and white.”

In addition to general knowledge, safety professionals talked about the need for specialized knowledge and people with the right knowledge of hazards in a given area. As an example, one safety professional recalled an incident where there was a structural failure and collapse of a bin that resulted in a fatality. This participant indicated that the examiner would need specialized knowledge of structural components to have identified this hazard.

“How many people realize that you’re not going to take a grade 3 or grade 5 bolt and expect it to hold a 100-ton bin over time?” says the participant. “There [are]





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special bolts that go in those things.”

Another skill identified by safety professionals was the ability to anticipate or predict what could happen. A safety professional gave an example of this skill when describing the practice of inspecting the highwall for unsafe conditions.

Says the safety professional: “If someone actually got up there and looked, well, you can see cracks filling up with water and a week later it falls off.”

### SKILLS ACROSS THE WORKFORCE

One safety professional emphasized that the workplace examiner should be the person who is most competent in that area, and that person may not necessarily be a supervisor.

“If I had a drill crew working ... I’d say I want this workplace exam done [by] the start of the shift,” says the safety professional. “Even though I’ve got experience. Even though the supervisor should have a lot of experience. He should put that in the hands of an individual that is more qualified. More competent to do that.”

Although specialized knowledge may be required for certain areas, another safety professional indicated that this should not take away from getting everyone involved.

“Safety 101 is to get as many people involved as possible,” says the safety professional. “Have people engaged taking ownership. Creating a culture where now you give somebody the opportunity to simply wash their hands of it and say no it’s not my job, it’s someone else’s job – is a significant step in the wrong direction.”

Lastly, safety professionals indicated that the confidence or ability to take action once a hazard is identified is a critical skill to have to prevent incidents from occurring.

“Someone who will be ‘mature enough’ to say, ‘OK, this could be a problem. I’m going to do something about it right now.’”

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## SAFETY: WORKPLACE EXAMS

### EVALUATING ABILITIES VIA WORKPLACE EXAMS

In addition to identifying competencies, researchers wanted to determine how workplace examiners were being evaluated.

When asked if examiners are evaluated on how effective they are at performing workplace exams, most safety professionals reported that they did not have a formal evaluation strategy in place. However, one safety professional indicated that missed hazards can be used as teachable moments.

"No, I would say it's not something that we do," says the safety professional. "I will say that if the safety manager walks through an area and sees something that should have been seen by others, they'll use that as a learning [tool]. Again, it's more of a toolbox approach where you'll say, 'Hey, this is something you guys should be able to catch.'"

Other safety professionals reported similar strategies, such as visual follow-up inspections and informal conversations to talk about hazards. One strategy reported by safety professionals was to place small magnets labeled with "if found, return to supervisor" in locations where workers should be inspecting. A safety professional used this strategy to reward workers who do thorough exams.

"Those are kind of cool, too, because you usually give them some kind of reward," says the safety professional. "You know something small that says good job. I like doing those types of things."

### CHANGES YOU CAN MAKE NOW

Based on the initial results, we suggest the following considerations when identifying or developing competent persons to perform workplace examinations.

- **Specialized knowledge.** Recognize that in addition to general knowledge of hazards in the work environment, an examiner may require additional specialized knowledge of the work area that he or she is examining. Each work location has its own specific hazards.

For example, when examining the plant area, the examiner may need the specific knowledge of structural components to identify the potential for failures. An examiner in the pit area needs to be knowledgeable of ground conditions that can lead to highwall failures or rock slides. Assigning the person with the right knowledge of a specific area may help them recognize hazards or potentially hazardous conditions.

- **Training.** Consider developing skills and specialized knowledge through training and interaction among those who have specialized knowledge in different areas. Encourage mineworkers to discuss both typical and atypical hazards found at their work locations.

- **Evaluation strategies.** Consider implementing evaluation strategies for mine examiner performance. Reviewing missed hazards with mineworkers during safety meetings



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or toolbox talks may help workers identify and correct issues in the future.

### NIOSH TOOLS YOU CAN USE

Previous U.S. Bureau of Mines research shows that mineworkers who participate in simulation training exercises – for instance using latent-image 3-D slides – are better able to recognize hazards in an underground mining environment than mineworkers who did not receive training.

To build on this research and address hazard recognition competencies, NIOSH has developed a web application that invites mineworkers to test their knowledge of hazards in a simulated work environment.

The application, called the Hazard Recognition Challenge, uses panoramic images developed in a NIOSH laboratory

study and gives mineworkers the opportunity to perform a workplace exam at four simulated locations at a surface stone operation.

After completing a challenge, mineworkers receive feedback on their performance along with supplemental information they can use to increase their knowledge of worksite hazards.

The user-specific results page produced by the application shows where users clicked, which hazards they identified successfully, and which hazards they missed. This page also gives a brief explanation of each hazard along with supplemental information, such as relevant accident and injury narratives, links to “tools you can use” during training, and links to relevant MSHA standards. The supplemental information can be used to learn more

about each hazard.

Taking the challenge in a group setting is one way to use the supplemental information to start a discussion about a specific hazard or a type of hazard.

For example, a group reviewing hazard results may prompt discussion among workers about similar hazards found at their own mine site, and reveal ways workers can better protect themselves.

The Hazard Recognition Challenge is available on the NIOSH Mining website: [www.cdc.gov/niosh-mining/hazrec](http://www.cdc.gov/niosh-mining/hazrec). **P&Q**

Jonathan K. Hrica, Brianna M. Eiter and Dana R. Willmer are researchers at NIOSH. The findings and conclusions in this article are those of the authors and do not necessarily represent the views of NIOSH.

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