BILLING CODE 4163-19-P

DEPARTMENT OF HEALTH AND HUMAN SERVICES

Centers for Disease Control and Prevention

[Docket Number CDC-2019-0016, NIOSH-325]

Mining Automation and Safety Research Prioritization

AGENCY: National Institute for Occupational Safety and
Health (NIOSH) of the Centers for Disease Control and
Prevention (CDC), Department of Health and Human Services
(HHS).

ACTION: Request for information and comment.

SUMMARY: The National Institute for Occupational Safety and
Health (NIOSH) of the Centers for Disease Control and
Prevention (CDC) has recently established a research
program to address the rapidly expanding area of automation
and associated technologies in mining. NIOSH is requesting
information to inform the prioritization of research to be
undertaken by The Institute's Mining Program. NIOSH is
seeking input on priority gaps in knowledge regarding the
safety and health implications of humans working with
automated equipment and associated technologies in mining,
with an emphasis on worker safety and health research in
which NIOSH has the comparative advantage, and is unlikely

to be undertaken by other federal agencies, academia, or the private sector.

DATES: Electronic or written comments must be received by [**INSERT DATE 60 DAYS AFTER PUBLICATION DATE IN THE FEDERAL REGISTER**].

ADDRESSES: You may submit comments, identified by CDC-2019-0016 and NIOSH-325, by any of the following methods:

- Federal eRulemaking Portal http://www.regulations.gov. Follow the instructions for submitting comments.
- *Mail*: National Institute for Occupational Safety and Health, NIOSH Docket Office, 1090 Tusculum Avenue, MS C-34, Cincinnati, Ohio 45226-1998.

Instructions: All information received in response to this notice must include the agency name and docket number [CDC-2019-0016; NIOSH-325]. All relevant comments received will be posted without change to https://www.regulations.gov, including any personal information provided. For access to the docket to read background documents or comments received, go to https://www.regulations.gov. All information received in response to this notice will also be available for public examination and copying at the NIOSH Docket Office, 1150 Tusculum Avenue, Room 155, Cincinnati, OH 45226-1998.

FOR FURTHER INFORMATION CONTACT: Jeffrey H. Welsh, NIOSH Office of Mine Safety and Health Research, 315 E. Montgomery Ave., Spokane, WA 99207. Phone: 412-386-4040 (not a toll-free number).

SUPPLEMENTARY INFORMATION:

Background: The mining industry has been undergoing significant changes as companies look to adopt automation technologies to decrease costs and increase efficiency and, according to some companies, improve safety. These new technologies include automated mobile equipment, robotics, teleoperation, wireless communications and sensing systems, wearable sensors and computers, virtual and augmented reality, and data analytics. Surface iron ore mines in Western Australia are moving rapidly to adopt automation technologies, and they appear to be the closest in achieving completely autonomous mining. In U.S. mines, the adoption of automation technology is gaining momentum, with some of the first automation having been applied to processing facilities, drilling equipment, underground coal mine longwalls, and now pilot projects with automated haulage trucks and loaders.

Information Needs: To prepare for expanded use of automation technologies, NIOSH seeks to both proactively address worker health and safety challenges that may be associated with automation, as well as leverage new technologies to improve miner health and safety. To understand the state of automation technologies, their implementation in the United States, and the health and safety concerns associated with the technology, NIOSH seeks public input on the following questions:

1. To what extent will automation and associated technologies be implemented in mining and in what timeframe?
2. What are the related health and safety concerns with automation and associated technologies in mining?

3. What gaps exist in occupational health and safety research related to automation and associated technologies?

While the above questions have priority, NIOSH also seeks public comment on the state of the technology and the health and safety concerns associated with the following specific topics related to automation:

4. What are the major safety concerns associated with humans working near or interacting with automated mining equipment? Have other organizations addressed the safety concerns associated with humans working near or interacting with automated mining equipment? If yes, please provide a description.

5. What research has been conducted, or approaches taken, to address the potential for human cognitive processing confusion, misunderstanding, and task or information overload associated with monitoring or controlling automated mining equipment or other monitoring systems (e.g., fleet management, environmental monitoring, safety systems, health care systems)?

6. What is the state of the art for display methodologies and technologies to provide mine personnel and equipment operators with information on operational status, location, and sensory and environmental feedback from automated mining equipment or systems?

7. What sensor technology improvements are needed to ensure the safety of humans working on or near automated equipment?

8. How are existing methods of big data analytics applied to automated mining equipment or systems? Are there health and safety benefits to these applications? If yes, please describe.

9. Are there any needed improvements to guidelines or industry standards for automated mining system safe design and operation practices? If yes, please describe.

10. Are there any needed improvements to training materials, training protocols, and operating procedures for system safety design principles related to automated mining systems? If yes, please describe.

NIOSH is seeking feedback on the research areas identified above and on any additional knowledge gaps, ideas, innovations, or practice improvements not addressed by these research areas, as well as feedback on how the research areas should be prioritized. NIOSH is especially interested in any creative and new ideas as they relate to protecting the health and safety of miners today and in the future. When possible, NIOSH asks that commenters provide data and citations of relevant research to justify their comments. NIOSH is also seeking key scientific articles addressing worker safety and health related to mining automation that could inform our research activities.

References:

DoD [2000]. Standard practice for system safety. U.S. Department of Defense, MIL-STD-882D.

Endsley MR [1995]. Toward a theory of situational awareness in dynamic systems. Hum Factors *37*(1):32-64.

USBM [1988]. Human factors in mining. By Sanders MS, Peay JM. Pittsburgh, PA: U.S. Department of the Interior, Bureau of Mines, IC 9182.

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