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DEPARTMENT OF LABOR

MINE SAFETY AND HEALTH ADMINISTRATION

30 CFR Part 75

[Docket No. MSHA-2014-0019]

RIN 1219-AB78

**Proximity Detection Systems for Mobile Machines in
Underground Mines**

AGENCY: Mine Safety and Health Administration, Labor.

ACTION: Proposed rule; reopening the comment period.

SUMMARY: The Mine Safety and Health Administration (MSHA) is reopening the rulemaking record and requesting additional comments on the Agency's proposed rule on Proximity Detection Systems for Mobile Machines in Underground Mines which was published in the Federal Register on September 2, 2015. The proposed rule would require underground coal mine operators to equip coal hauling machines and scoops with proximity detection systems. Miners working near these machines face pinning, crushing, and striking hazards that result in accidents involving life-threatening injuries and death.

DATES: The comment period for the proposed rule published September 2, 2015 (80 FR 53070) is reopened. Comments must be received by midnight Daylight Saving Time on [INSERT

DATE 30 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER].

ADDRESSES: Submit comments and informational materials, identified by RIN 1219-AB78 or Docket No. MSHA-2014-0019 by one of the following methods:

- *Federal E-Rulemaking Portal:*
<http://www.regulations.gov>. Follow the on-line instructions for submitting comments.
- *E-Mail:* zzMSHA-comments@dol.gov.
- *Mail:* MSHA, Office of Standards, Regulations, and Variances, 201 12th Street South, Suite 4E401, Arlington, Virginia 22202-5452.
- *Hand Delivery or Courier:* 201 12th Street South, Suite 4E401, Arlington, Virginia, between 9:00 a.m. and 5:00 p.m. Monday through Friday, except Federal holidays. Sign in at the receptionist's desk on the 4th floor East, Suite 4E401.
- *Fax:* 202-693-9441.

Instructions: All submissions must include RIN 1219-AB78 or Docket No. MSHA-2014-0019. Do not include personal information that you do not want publicly disclosed; MSHA will post all comments without change, including any personal information provided.

Docket: For access to the docket to read comments received, go to <http://www.regulations.gov> or <http://www.msha.gov/currentcomments.asp>. To read background documents, go to <http://www.regulations.gov>. Review the docket in person at MSHA, Office of Standards, Regulations, and Variances, 201 12th Street South, Arlington, Virginia, between 9:00 a.m. and 5:00 p.m., Monday through Friday, except Federal holidays. Sign in at the receptionist's desk on the 4th floor East, Suite 4E401.

E-mail notification: To subscribe to receive email notification when the Agency publishes rulemaking documents in the Federal Register, go to <http://www.msha.gov/subscriptions>.

FOR FURTHER INFORMATION, CONTACT: Sheila McConnell, Director, Office of Standards, Regulations, and Variances, MSHA, at mcconnell.sheila.a@dol.gov (e-mail), 202-693-9440 (voice), or 202-693-9441 (facsimile).

SUPPLEMENTARY INFORMATION:

I. Introduction

On September 2, 2015, MSHA published a proposed rule, Proximity Detection Systems for Mobile Machines in Underground mines (80 FR 53070). MSHA is reopening the rulemaking record and requesting comments on issues that

were raised by commenters during the comment period and on issues that developed after the record closed.

MSHA also observed the operation of proximity detection systems on both continuous mining machines and mobile machines (shuttle cars, ram cars and scoops) on working sections in the United States and South Africa after the record closed. There are 106 mobile machines operating on working sections equipped with proximity detection systems in the United States. MSHA visited six mines that operated 79 of these machines. These mines varied by physical, geological, and environmental conditions. MSHA is also including in the rulemaking record MSHA's field-trip report on the use of proximity detection in South Africa's underground coal mines and materials presented at the National Institute for Occupational Safety and Health (NIOSH) Proximity Detection Partnership Meeting held on June 22, 2016.

II. Request for Comments

1. Requirements for proximity detection systems.

Proposed § 75.1733(b)(1) would require that a proximity detection system cause a machine to stop before contacting a miner except for a miner who is in the on-board operator's compartment. MSHA requested comments on the types of machine movement the proximity detection

system should stop. Commenters did not support the total de-energization of all functions of the equipment. One commenter noted that a "stop all machine movement" requirement cannot be applied universally to all mobile equipment covered by this proposed rule. The commenter noted that mine operators need the flexibility to configure proximity detection systems and machine responses based on the individual applications needed underground. In support of this comment, the commenter stated that machines that interact with other equipment, machines that require a ground-standing operator to be in contact with the machine, and machines that lack specific capabilities for motion control may need allowances outside of prescriptive requirements. As an example, the commenter stated that shuttle cars and ram cars do not require a miner to stand on the ground nearby to perform required tasks; however, scoops require a miner to touch or be near the machine to do certain work.

One commenter also noted that proximity detection systems present significant problems for performing trouble-shooting and maintenance activities. The commenter provided an example of a mechanic trying to identify a leaking hydraulic hose; the mechanic must remove the miner-wearable component for the machine to be started because

the mechanic has to be inside a red zone to diagnose the source of the leak.

The National Institute for Occupational Safety and Health (NIOSH) also commented that requiring all machine movement to stop would potentially limit the development and application of advanced technology for selective shutdown features. NIOSH stated that currently available systems are not capable of providing the level of protection required in the industry while maintaining the operator's freedom to efficiently perform the job. NIOSH further stated that to be acceptable to the miners and to avoid false alarms, a proximity detection system must provide the necessary protection while still allowing normal operation of the machine.

MSHA observed mobile machines with proximity detection systems operating during coal production on working sections. These proximity detection systems functioned as designed to prevent pinning, crushing, and striking accidents. Four of the six mines that MSHA visited in the United States, after the record closed, had proximity detection systems on mobile machines and continuous mining machines on the working section except for full-face mining machines. The mobile machines included shuttle cars, ram

cars, and scoops. These mine operators provided all miners on these working sections with miner-wearable components.

MSHA solicits additional comments on whether currently available proximity detection systems are capable of preventing coal hauling machines and scoops from pinning, crushing, and striking miners while maintaining the machine operator's freedom to efficiently perform the job.

Under proposed § 75.1733(b)(1), MSHA would consider stopping a coal hauling machine or scoop to consist of causing it to cease tramming or articulating any part of a machine that could cause the machine to contact a miner. Tramming means to move the machine in a forward or reverse direction. Articulating includes an act of moving or pivoting at a joint, such as when a mobile machine may pivot towards a rib such that the movement could result in pinning, striking, or crushing a miner. Under the proposal, the machine would remain stopped while any miner is within a programmed stop zone. Unexpected tramming and articulation in the direction of a miner may be hazardous. However, MSHA is considering whether it is necessary to stop the movement of all parts of the machine, such as auxiliary movements, as long as the tramming and articulating machine motion that can pin, crush, or strike a miner is stopped. In MSHA's experience, striking,

pinning, or crushing hazards are not caused by auxiliary functions such as operation of a pump motor or diesel engine, ram extension, winch movement, vertical bucket movement, or battery lift.

MSHA is also aware of proximity detection system features that only allow authorized miners to perform maintenance. For example, an authorized miner may swipe an identification card over a card reader mounted on the machine or have a separate miner-wearable component that is programmed to allow a miner to perform maintenance. The proximity detection system records each time maintenance is performed. Miners authorized to perform maintenance on machines equipped with proximity detection systems would continue to observe standard safety procedures, such as removing stored energy and blocking the machine to prevent motion, while maintaining and repairing the machine.

MSHA is considering a revision to proposed § 75.1733(b) (1) that would require a proximity detection system to stop a machine from tramming or articulating before contacting a miner except for a miner who (i) is in the on-board operator's compartment, or (ii) performing maintenance with the proximity detection system in maintenance mode.

MSHA observed a miner and a scoop operator perform maintenance by changing the battery on a scoop equipped with a proximity detection system. The miner stayed near the scoop, directed the scoop operator's movement of the machine, and maintained a safe position outside of the proximity detection system's warning zone. MSHA also observed a ram car equipped with a proximity detection system that was installed and programmed to modify its warning and shutdown zone dimensions to allow miners to safely approach the machine to perform maintenance and repairs without causing it to shut down. The warning and shutdown zones extended around the entire machine perimeter during normal operation; however, activating the parking brake reduced these zones to encompass only the pinch point areas around the articulation joint.

MSHA solicits comments on the types of machine movement a proximity detection system should allow for miners to perform necessary maintenance without exposing them to pinning, crushing, or striking hazards. MSHA also solicits comments on miners' and mine operators' experiences with proximity detection systems that allow a miner to conduct maintenance on a machine without activating the stop movement function.

Several commenters also noted that sudden stopping of equipment presents hazards for on-board machine operators. A commenter noted that sudden stops and equipment shut downs, like any other unexpected operations, could put the operator of the machine at risk of injury or death based on the size and speed of the machine, and other related factors. One commenter stated concerns that the requirement to stop the machine before contacting a miner could create a hazard for machine operators, especially diesel-powered machine operators since their ground speed is typically faster than electric-powered machines. However, another commenter stated that MSHA should not require that machines slow down before stopping because some machines, such as battery-powered direct current traction drives, do not have this capability; in some cases, it is more important to stop the machine as fast as possible to prevent contact with miners.

NIOSH commented that field tests of proximity detection systems on continuous mining machines and input from stakeholders found that detection range, environmental effects/limitations, detection accuracy, and system repeatability are considered critical parameters. MSHA observed mobile machines operating in mines in the United States with properly functioning proximity detection

systems of various manufacturers with appropriate zone dimensions. These mobile machines worked in a range of seam heights, in dry and wet conditions, on varying grades, with and without wire mesh, with various mine ventilation controls. In MSHA's experience, mine operators work with machine manufacturers and proximity detection system manufacturers to determine the appropriate warning and shutdown zones for the specific mining conditions and practices that the machine encounters. MSHA is aware that proximity detection system manufacturers provide site-specific testing during commissioning of proximity detection systems. MSHA also observed proximity detection system testing used to confirm appropriate zone dimensions for the equipment and the mining conditions at the time of commissioning. MSHA solicits additional comments on appropriate warning and stopping zones for each type of machine movement and various mining conditions including any differences in cost for differing conditions or machines.

Current NIOSH research is identifying critical parameters that impact the performance of proximity detection systems on mobile machines, such as stopping distances and deceleration rates. MSHA is aware that NIOSH research on proximity detection systems for underground

mobile equipment is scheduled to conclude in September, 2018. Several commenters expressed concern that the Agency will require proximity detection systems to be installed on coal haulage machines and scoops before the findings from NIOSH research on proximity detection systems on underground mobile machines are released. MSHA is also aware that some mine operators have installed and are operating proximity detection systems on mobile machines. MSHA observed variations in the installation, maintenance and performance of these systems. MSHA anticipates that a final rule would provide minimum standards for installation, performance, maintenance, and recordkeeping to assure that miners are adequately protected. MSHA observed several dynamic tests of mobile machines equipped with proximity detection systems in which the machine decelerated to a full stop without injury to the on-board operator. MSHA also observed warning and shutdown zone incursions on mobile machines equipped with proximity detection systems that are being used on working sections during normal mine production operations. These proximity detection systems appropriately slowed and/or stopped these mobile machines without injuring the on-board machine operator. MSHA is not aware of any on-board operator

injuries resulting from a proximity detection system decelerating and/or stopping a mobile machine.

MSHA will continue to work with original equipment manufacturers, proximity detection system manufacturers, NIOSH, States, and mine operators to consider the benefits and timing of requiring proximity detection systems on mobile machines in underground coal mines.

MSHA solicited and received several comments on how the use of proximity detection systems and the overlap of proximity detection system protection zones on multiple types of machines operating on the same working section might affect miners' work positions. One commenter stated that testing, which was conducted in a controlled environment, demonstrated that it was impossible to provide full coverage on the rear section of the coal hauler without creating a shutdown zone in the locations where the continuous mining machine operator was required to stand. A modification to the system allowed the shutdown zone to shrink as the coal hauler backed into the loading position. Due to the shape of the zone, however, the modification removed protective coverage of the rear corners of the coal hauler.

MSHA observed continuous mining machines and mobile machines equipped with proximity detection systems

successfully interact during production on working sections where all of the miners had miner-wearable components. MSHA solicits additional information regarding how coal hauling machines using proximity detection systems work with continuous mining machines equipped with proximity detection systems while allowing continuous mining machine operators to remain in a safe location. MSHA is interested in additional information describing the installation and programming of proximity detection systems and examples of related work practices established to assure that the continuous mining machine operator remains outside of the coal hauling machine warning and shutdown zones.

Another commenter observed, during tests of proximity detection systems on continuous mining machines and battery haulers, instances in which miners (primarily continuous mining machine operators) could not properly perform necessary tasks without getting closer to the continuous mining machine than the proximity detection system allowed. The commenter noted that without the capability to temporarily bypass proximity detection, these personnel would either be forced to operate equipment without a clear line of sight or they would need to stand in conditions that pose different hazards, such as roof or rib hazards, or in locations that are not permitted under other

regulations. The commenter recommended that the proximity detection system regulation for mobile equipment allow for personnel to temporarily bypass proximity detection when such conditions are encountered.

MSHA may consider such a feature and seeks comment on the availability, use, and appropriateness of a temporary bypass feature. MSHA solicits information regarding how this feature could work with existing proximity detection systems and specific benefits or hazards that could result.

One commenter noted that coal haulers and scoops would encounter sensors (miner-wearable components) much more frequently during operation than would continuous mining machines. Thus, there is an increased potential for nuisance tripping caused by inadvertent exposure into the detection zones of coal haulers, scoops, and other equipment. The commenter further noted the operation of equipment during the mining process requires multiple machines to operate, often in close proximity and can result in cross zone interference and nuisance tripping. As an example, the commenter noted a mine had to install additional equipment to help alleviate the cross zone interference issue. MSHA is aware that proximity detection system manufacturers must consider the interaction of machines with on-board operators to prevent unnecessary

shut downs. MSHA observed a loading machine on which proximity detection equipment was installed to provide a silent zone for the on-board loading machine operator. This silent zone allowed the shuttle car to approach the loading machine without the loading machine operator causing the shuttle car to stop. MSHA is also aware that proximity detection system manufacturers have addressed this situation through programming miner-wearable components with specific permissions.

In addition, MSHA received a comment from a machine manufacturer stating that its field testing experience with coal customers within the United States demonstrates measurable section production tonnage drops, within five to ten percent of normal production levels, when proximity detection is active on haulage equipment.

MSHA is aware of mine operators that installed proximity detection systems on all mobile machines on the working section and experienced production decreases. Two of these mine operators reported that production later returned to pre-installation levels. MSHA observed that miners with experience working with mobile machines equipped with proximity detection systems are aware of the warning and shutdown zone locations and position themselves to minimize machine shutdowns. MSHA did observe a proximity

detection system provide both a warning and then shut down the machine while the miner-wearable component was physically located outside the established warning and shutdown zones. This mine operator reported working with the proximity detection system manufacturer to resolve this type of occurrence. MSHA is aware of proximity detection system manufacturers that have mitigated nuisance alarms and other issues through engineering solutions. MSHA is also aware that proximity detection system manufacturers continue to improve their technology and develop solutions to minimize unwarranted warnings and shutdowns.

MSHA solicits definitive data, including cost and time estimates, on delays in production caused by proximity detection system alarms due to cross zone interference and nuisance tripping as well as data on the length of time to return to pre-installation production levels. MSHA also seeks information on how to reduce or eliminate production delays when working with mobile machines equipped with proximity detection systems.

MSHA solicits comments on how miners can place themselves in a safe work position to avoid causing nuisance alarms when one or more machines with proximity detection systems are on the working section. MSHA also solicits comments on miners' and mine operators'

experiences when more than one miner may be in close proximity to one or more machines with proximity detection systems.

MSHA solicited and received several comments on proposed training for miners who operate or work near machines equipped with proximity detection systems. NIOSH commented that gaining an in-depth view of miners' perspectives and how their job tasks and environment could be or are affected and then incorporating that information into training may help to prevent accidents and injuries that have been labeled as human error in the workplace. NIOSH further commented that studies of continuous mining machine operators have found that unintended consequences, such as a disruption in situational awareness, risks, hazards, and decision-making capabilities, can be avoided if human factors considerations are integrated into each stage of the technology design and implementation process. In addition, NIOSH stated that each piece of equipment needs to have a uniquely prescribed proximity system and the methods and amounts of training for each system should be designed specifically for each system and common platforms established where possible.

One commenter stated that it has been evaluating and testing proximity detection system technologies since 2011.

The commenter further stated that inadequate situational awareness is one of the primary factors in incidents attributed to human error and that the primary purpose of any proximity detection system/collision avoidance technology is to enhance situational awareness.

Another commenter stated that proximity detection system technology has the potential to dangerously change how miners interact with mobile equipment in underground mines. The commenter further stated that it has witnessed multiple instances where miners have taken higher risks because of a false sense of security and that implementation of proximity detection systems on all mobile machines will lead miners to unsafely rely on the devices and act contrary to their intuition and training. In addition, the commenter stated that the first priority [of the final rule] should be a safe working position for a miner or machine operator, and second a noncontact rule.

MSHA has observed miners relocate themselves to safer locations because of proximity detection system visible and audible warnings. These warnings increased the miner's situational awareness regarding their location with respect to hazardous areas around the mobile machines.

MSHA is interested in receiving additional information on miners' and mine operators' experiences with the effect

that proximity detection systems have on miners' and machine operators' situational awareness and any examples where reliance on proximity detection technology may cause the miner to develop work practices that introduce additional hazards.

MSHA observed representatives of mine operators and proximity detection system manufacturers provide instruction and task training to miners on the working section where proximity detection systems have been installed on mobile machines. Miners have demonstrated their knowledge of the installation, maintenance, and use of proximity detection systems to MSHA personnel. For example, MSHA observed one mine operator instruct miners to move into a crosscut adjacent to a coal haulage travelway. This increased their distance from the coal haulage travelway, averted unwanted proximity zone incursions, and ultimately placed the workers in a safer location. MSHA also observed a South African mine operator utilize data reports from the proximity detection systems to reinforce safe work practices specified in company policy. These data reports logged the instances when miner-wearable components entered the established warning and shutdown zones.

MSHA is also interested in miners', mine operators' and proximity detection system manufacturers' experiences with training that could be done to increase miners' and machine operators' situational awareness around machines with proximity detection systems.

2. Electromagnetic Interference.

Electrical systems used in the mine, including proximity detection systems, can adversely affect the function of other electrical systems through the generation of electromagnetic interference. Several commenters noted that electromagnetic interference generated from a variety of external sources can adversely affect the performance of proximity detection systems. Several commenters stated that electromagnetic interference prevents proximity detection systems from functioning as designed. Another commenter stated that, because of electromagnetic interference, the proximity detection system failed to locate the miner-wearable component with any level of accuracy or consistency. The commenter further stated that, as a result, it was nearly impossible for the coal hauler to work in close proximity to the continuous miner or operator.

In addition, on April 6, 2016, MSHA was made aware of concerns from mine operators regarding electromagnetic

interferences with proximity detection systems from respirable coal mine dust sampling devices. On April 15 and May 2, 2016, MSHA notified underground coal mine operators who have a proximity detection system installed on any equipment that they should identify sources of any electromagnetic interference that adversely affect the performance of the proximity detection system. The above-referenced notices are included in the rulemaking record.

Proposed § 75.1733(b) (5) would require a mine operator to install a proximity detection system to prevent interference that adversely affects performance of any electrical system. MSHA clarifies that proposed § 75.1733(b) (5) would require mine operators to prevent electromagnetic interference from affecting the operation of the proximity detection system or any other electrical system. MSHA intends that the system would be installed, maintained and operated in such a way that no electrical systems would be adversely affected due to interference. This would require periodic post-installation evaluation of all new potential sources of electromagnetic interference.

To clarify this intent, MSHA is considering a revision to proposed § 75.1733(b) (5) that would require proximity detection systems to be both installed and operated in a manner that prevents interferences that adversely affect

the performance of any electrical system, including the proximity detection system. The operation of other electrical systems and equipment must not interfere with the performance of the proximity detection system, and the proximity detection system must not interfere with the performance of other electrical systems.

MSHA has found that one type of common interference can be identified when electrical devices are placed within several inches of the miner-wearable component of the proximity detection system. Electromagnetic interference between these two systems can be mitigated by maintaining a minimum distance between a miner-wearable component and electrical devices. MSHA's technical staff estimated that each mine would require an average of 20 hours for a mining engineer to identify sources of electromagnetic interference and the minimum distance needed to mitigate the interference. Mining engineers will test the compatibility between electrical devices and proximity detection system components. Tests will be based on equipment use and mining conditions. MSHA anticipates that mining engineers will conduct physical tests for compatibility, review equipment user manuals, and consult with the original equipment manufacturers and the proximity detection system manufacturer.

Based on MSHA's mine visits, the Agency estimated that mine operators are likely, on average, to introduce new electrical equipment twice per year. This would require a mining engineer two hours to identify and mitigate adverse interference from the new electrical equipment.

Holding all other variables of the preliminary regulatory economic analysis constant, MSHA estimated that, on average, it would cost each mine operator \$3,500 over ten years to comply with proposed §75.1733(b) (5). MSHA seeks comments on the cost drivers for compatibility testing and the Agency's cost estimate for proposed §75.1733(b) (5).

MSHA is aware of best practices that mine operators and proximity detection system manufacturers have established to minimize the effects of electromagnetic interference. MSHA is aware that proximity detection system manufacturers have stated that minimum separation distances need to be maintained between miner-wearable components and other electrical equipment. During mine visits, miners have demonstrated the ability to maintain sufficient separation between miner-wearable components and other equipment to ensure proper proximity detection system function. MSHA is also aware of mine operators that have added inline filters on variable frequency drive shuttle

cars to reduce electromagnetic emission interference. MSHA is aware of an electrical equipment manufacturer that added material designed to provide electromagnetic shielding to its gas detection equipment which reportedly reduced interference with proximity detection systems. MSHA solicits comments on the methods and practices mine operators have used or could use to identify sources of electromagnetic interference. MSHA is also interested in receiving information on the actions an operator has taken or could take to prevent such interference and how electromagnetic interference can be mitigated in instances where a miner needs to wear multiple miner-wearable components because different proximity detection system models are operating on a working section. Please also describe procedures that were successful and those that were not successful in identifying interferences, as well as solutions to prevent adverse interference.

MSHA has observed that wire mesh and metallic equipment can affect the proximity detection systems' warning and stopping zones. MSHA has also received reports of some pyrite deposits within coal seams affecting the use of the proximity detection system, but has not observed this effect first-hand. MSHA solicits information and data from mine operators and proximity detection system

manufacturers on best practices to minimize the effects of these non-electrical interferences.

Since the record closed, MSHA became aware of a proximity detection system design feature on a miner-wearable component that determines if the magnetic field sensing coils have been affected by electromagnetic interference and can no longer detect the magnetic field generated by the machine-mounted components. This feature provides a distinct audible and visible alarm on the miner-wearable component to alert miners when it is not functioning properly due to electromagnetic interference. MSHA is considering requiring this design feature for all miner-wearable components.

MSHA solicits comments on the cost and availability of, and experience with, any proximity detection system feature or other technology that automatically alerts the miner or machine operator when the miner-wearable component or proximity detection system is not functioning properly due to electromagnetic interference.

3. Proximity Detection System Checks.

Proposed § 75.1733(c)(1) would require that a mine operator designate a person to perform a check of machine-mounted components of the proximity detection system to verify that components are intact and the system is functioning

properly, and to take action to correct defects. MSHA clarifies that under proposed paragraph (c)(1), the check would include verification that the warning and shutdown zones are set for the established proximity detection field distances and to meet the performance requirements under proposed § 75.1733(b)(1) and (b)(2). Under proposed § 75.1733(c)(1), the person designated to perform the check would verify that the machine-mounted components are intact and correctly mounted and the system is operating properly to identify a miner-wearable component and stop the machine. The check assures that the warning and shutdown zones around the perimeter of the machine are set according to a mine operator's specifications. In MSHA's experience, proximity detection system manufacturers have determined the type of checks that should be conducted to assure that their system is functioning properly. Mine operators are expected to follow the check procedures suggested by the manufacturers. MSHA has observed that a check of the warning and shutdown zones can be made by a miner walking around the machine with a miner-wearable component to confirm proper zone range. MSHA has also observed checking the machine shutdown function of the proximity detection system. This check involves placing a miner wearable component inside the shutdown zone and then attempting to

initiate machine movements such as tramming. If the proximity detection system prevents machine movement, the system is functioning properly.

The check would also include an examination of the machine-mounted components to assure that the field generators, antennas, cabling, and other components are undamaged and correctly mounted. The check would also assure that appropriate audible and visual warning signals are working as required. MSHA solicits comments on how the warning and shutdown zones can be checked, or tested, without putting machine operators at risk.

With the clarification in this notice, MSHA estimates that the average time required for a check, which includes a verification that the warning and shutdown zones are set to meet the performance requirements under proposed § 75.1733(b) (1) and (b) (2), would increase from 20 seconds to 6 minutes. MSHA's revised estimate of 6 minutes reflects the time needed to: (1) verify that the machine-mounted components are intact and correctly mounted and the system is operating properly to identify a miner-wearable component and stop the machine, and (2) test and validate that the warning and stopping zones meet performance requirements. MSHA substituted the 6 minutes into the calculations of the proposed rule, held all other variables

constant, and calculated that the average 10-year cost per mine increase would be \$182,000. Many other assumptions and data values will be updated in a final regulatory analysis. MSHA seeks comments on the Agency's revisions to its proposed time estimate to comply with § 75.1733(c)(1).

4. South Africa Field-Trip Report and NIOSH Partnership Meeting.

The rulemaking record includes MSHA's Field-Trip Report on Proximity Detection Use in South Africa. On April 2 through April 13, 2016, MSHA and NIOSH representatives visited South Africa to investigate the progress of proximity detection system technology in South Africa. The group visited two proximity detection system manufacturing facilities and observed proximity detection system performance in three underground coal mines. In addition, the group met with a proximity detection system technology developer with experience in proximity detection system development in South Africa and other countries. Among other topics, they discussed the developer's experiences with proximity detection system interference in South Africa.

MSHA and NIOSH also met with representatives of South Africa's Department of Mineral Resources on the implementation of proximity detection systems on

electric-powered, trackless mobile machinery in South Africa's surface and underground mines. MSHA's report and presentation materials from the South Africa trip are included in the rulemaking record and available for comment.

MSHA has also included in the rulemaking record materials from the NIOSH Proximity Detection Partnership Meeting. On June 22, 2016, NIOSH held a partnership meeting that included representatives from MSHA, industry, labor, and proximity detection system manufacturers. Materials presented during the partnership meeting are included in the rulemaking record and available for comment.

III. Compliance Cost Revision

MSHA initially estimated that the proposed rule would cost mine operators, over ten years, approximately \$536,000 per mine. MSHA has revised estimates for two provisions to reflect the Agency's clarification on the proposed requirements. Table 1 summarizes the changes to estimated cost for these two provisions.

Table 1: Average 10-Year Total Cost Per Mine

	Average 10-Year Per Mine Cost
Total 10-Year Cost as Proposed on 09/02/2015	\$536,000

Changes		
Proximity Detection System Checks	\$182,000	
Electromagnetic Interference Evaluation	\$3,500	
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Total Change	\$185,500	
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Total Revised Cost		\$721,500
Percent increase in average cost per mine		35%

The rulemaking record and comment period for the proposed rule is reopened until [INSERT DATE 30 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER]. MSHA solicits comments on all aspects of the proposed rule. The Agency requests that comments be specific as possible and include any technological and economic feasibility data.

Joseph A. Main,
Assistant Secretary of Labor
for Mine Safety and Health

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