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Proximity Detection Systems for Mobile Machines in Underground Mines

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General Comment

See attached file(s)

Attachments

MSHA PDS proposal Rharris

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November 8, 2015

United States Department of Labor
Mine Safety and Health Administration

To Whom It May Concern:

I am an Environmental Health student at the University of West Chester. I initially became interested in mine safety and health after I had the opportunity to investigate cost effective engineering control methods for reducing employee exposure to diesel particulate matter in underground mine settings. In continuing these interests, I have examined the Mine Safety and Health Administrations proposal to require proximity detection technology to be equipped on all scoops and coal hauling machinery in underground coal mines. After considering the costs as well as benefits this proposal offers, I support this proposal and firmly believe that it will not only save lives, but also offer significant economic benefits to mine operators and taxpayers in this country.

My comment details the importance of implementing this proposal, providing evidence that proximity detection technology will reduce crushing, striking, and pinning accidents, thus, reducing worker injury and fatality rates, and leads to a net benefit for employers required to install and maintain systems.

Sincerely,

Ryan J. Harris

In response to the high frequency of striking, pinning, and crushing accidents in underground coal mines, the Mine Safety and Health Administration (MSHA) is proposing a rule that would require scoops and coal hauling machinery in underground coal mines throughout the country to be fitted with the current generation of proximity detection technology. While MSHA is a aware that there is limited evidence supporting the effectiveness of Proximity Detection Systems (PDS) because of how new this current technology is (only 79 coal hauling machines and 50 scoops in US underground coal mines equipped as of January 2015), the agency has observed the successful operation of these systems in foreign countries, and believes that the widespread use of this technology will significantly decrease worker fatality and injury rates in the US (MSHA, 2015).

The emerging evidence on current PDS clearly substantiates the capacity this technology has in improving underground coal mine safety conditions (MSHA, 2015). Thus, the required use of this technology should be extended to include all scoops and coal-hauling machinery, which are responsible for a majority of worker-vehicle accidents (Ruff, 2010). Approval and implementation of this rule requiring PDS in underground coal mining throughout the United States will 1) reduces human error in overcoming pinning, crushing and striking accidents; 2) reduces overall risk of injury to employees; 3) reduces employer incurred costs due to injury; and 4) reduces lifetimes costs due to injury.

On July 2nd, 2013 at the Wildcat Hills underground mine in Illinois, Nathanial Clarida was killed after being struck and pinned by a battery powered coal hauler. Due to poor visibility and Clarida's position, the coal haul operator could not detect the strobe light on Clarida's hard hat (Wilcox, Tite, Minor, & Miller, S, 2013). On October 27th, 2010 at the River View Mine in Kentucky, James Falk was struck and killed by a shuttle car hauling coal. Alterations to the

shuttle car hindered the operator's visibility, and the operator was unaware of Falk's presence in an entryway (Gardner & Ingold, 2010). Both victims had extensive mine experience, however, that experience could not eliminate human error that is often central to these types of worker-vehicle accidents commonly encountered with scoops and coal hauling machinery. These and many other fatality reports generated from striking, crushing, and pinning accidents often share common elements. Obstructed visibility/blind areas, limited space, and noisy machinery hindering communication, all of which are ubiquitous in the setting of an underground coal mine, combine to create the conditions for a disabling or fatal worker-vehicle accident (MSHA, 2015). Added to these conditions are the human errors that can impact safety on a daily basis. MSHA has determined that in at least 34 cases of equipment caused fatalities, and an even larger number of non-fatal injuries, could have been prevented through the proper application of current PDS (MSHA, 2015).

MSHA, in collaboration with the Office of Mine Safety and Health Research (OMSHR), has approved four different proximity detection systems. Each system has its own unique benefits, but all four operate in similar manner. Machinery is equipped with both a sensor which creates a very low frequency electromagnetic marker field, and an alert device. Employees are equipped with a personal, lightweight monitoring device. If the employee comes within a certain range of the marker field, an audible and visual alarm is set off alerting equipment operators and the employee wearing the monitoring device. When an employee is detected in an even closer range of the magnetic field known as the stopping zone, the machinery will slow down or shut off (Schiffbauer, 2012). Early designs of PDS were highly prone to damage and false alarms which complicated use.

However, the systems in use today are much more sophisticated and robust (NIOSH, 2012). The application of these new systems is becoming widely more accepted, and countries all over the world have begun trials investigating the lifesaving potential of current proximity detection technology. The most successful and extensive demonstration of one of MSHA's four permissible systems was with the HazardAvert system during a 2009 trial in South African Sasol Twistdraai Mine. The trial consisted of employee training, a carefully designed phase in schedule, and regular meetings to provide feedback on the effectiveness on the system. The trial found proximity detection technology to be very reliable, and drastically improved the overall safety conditions of the mine; proximity detection systems are now located in 65 different working sections in the mine (Kent & Schiffbauer, 2009). Australia is also beginning to take advantage of this new technology as it begins to run more trials with PDS. The Becker Mining Company in Cardiff Australia has begun to adopt and test these systems, reporting that the PDS technology "increases safety and minimizes the chances of accidents or near-misses resulting from insufficient reaction time due to an operator's lack of situational awareness" (Walker, 2014).

Currently in the United States, West Virginia already has a regulation which is requiring the installation and maintenance of current PDS on mobile equipment in underground coal mines. As one of the largest underground coal mining production states, West Virginia is on the forefront of using state-of-the-art PDS technology to minimize human error and decrease overall risk of injury (Tennant, 2014). Through various demonstrations and trails, it has been proven that PDS can benefit the worker by improving safety conditions, but the implementation of these systems will also prove to be beneficial to the employer.

The United States' coal industry annually contributes $83.1 billion to the national GDP (NMA, 2014). The annual cost to cover the installation, maintence, and training aspects of the PDS is projected to be $16.1 million, only .02% of the annual GDP contribution of the coal industry (MSHA, 2015). $16.1 million seems minimal in consideration of the expenses associated with worker injury and fatalities incurred by the coal industry. Workers compensation, weekly indemnity benefits, MSHA violation fines, and increases in insurance premiums quickly add up to cost an employer an estimated $910,000 for each worker fatality (MSHA, 2015) and $55,000 for each injury (OSHA, 2015). These are only the clear direct costs; indirect cost are much less obvious and include high worker turnover rates, training for replacement workers/heavy equipment operators, decreased worker satisfaction, decreased productivity due to fear of injury, damaged business reputation, and increased administration costs (Gange, 2011). Based on the numbers above, PDS technology will save the country's underground coal mining industry a significant amount. From 1984 to 2013, 238 injuries and 34 fatalities could have been prevented by PDS, the estimated cost of these incidences is a total of $43,690,000. MSHA estimates that the 10-year, total-cost of this final rule is actually $2 million less than what worker-vehicle accidents have cost the country's underground coal mining industry since 1984. MSHA further estimates the number of future fatal and non-fatal worker-vehicle accidents also indicates the potential benefits of this ruling. Currently, it is predicted that the next ten years will see 44 non-fatal injuries and 9 fatal injuries from worker-vehicle accidents if PDS is not utilized, with a projected cost of $10,520,000 (MSHA, 2015).

In West Virginia mines, alone, the estimated benefits added up to $6.5 million, while annualized costs added up to $4.7 million (Tennant, 2014). Extrapolating this same benefit/cost ratio to a national scale, it is estimated that the national underground coal mining industry would

reap $22.5 million in benefits from the $16.1 million in costs. This projected data clearly demonstrates the value of PDS technology to private industry. It will also demonstrate value to the lifetime costs of injury that can be exhibited long after an employee has retired and incurred by taxpayers who fund Medicare programs that address health care for individuals over 65.

According to the Government Accountability Offices report on retired coal miners' health benefit funds, retired miners, on average, incur greater costs 29% higher than typical retirees. At retirement, miners are entered into the general pool for Medicare, with supplemental benefits that address cost gaps covered by the union's medical support plans. As stated above, worker vehicle accidents do not always result in death or permanent disability. The cost of caring for those involved in accidents will eventually be borne by the general public which supports Medicare coverage, and the cost of care for injured workers are higher than the average person (GAO, 2002). Thus, implementing this rule will not only lower the costs of medical care for those who may be injured without the technology, but will also reduce the burden on taxpayers to care for those injured by these accidents who age into the Medicare system.

In writing this proposal, MSHA has considered a variety of factors: the conditions that may be responsible for crushing, pinning, and striking accidents; the vehicles that cause said accidents; and the types of mines in which these accidents are most likely. By requiring PDS technology on just scoops and coal hauling machinery in only underground coal mines, MSHA allows for implementation of this new technology in the setting that most requires it, but will open the opportunity to study its value to other mine settings. The use of this technology will enable employees to overcome the limitations of human error and limited visibility, and to maximize health and safety conditions. With the lives that will be saved from proper use of PDS, and the injuries that will be prevented, mine operators will find greater savings in health care and

related costs. Preventing these injuries will also relieve the additional strain put on the United States Medicare system from miners whose health care plans do not cover certain medical expenses. This proposed rule offers vast improvements in health and safety conditions in underground coal mining, which is historically considered one of the most hazardous occupations in the country (Cho & Lee, 1978), and offers economic benefits to mine operators, and deserves widespread support.

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