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Safety Improvement Technologies for Mobile Equipment at Surface Mines, and for Belt Conveyors at Surface and Underground Mines.

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Comment from Charles Franklin, NA

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General Comment

The Portland Cement Association (PCA) and its members appreciate the opportunity to respond to MSHAs Request for Information on Safety Improvement Technologies for Mobile Equipment at Surface Mines, and for Belt Conveyors at Surface and Underground Mines, 83 Fed. Reg. 29716 (June 26, 2018).. PCA's comments are attached.

Attachments

PCA Comment Powered Haulage RFI (Filed12-24-2018)

AB91-COMM-15



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December 24, 2018

Re: PCA Response to MSHA Request for Information: *Safety Improvement Technologies for Mobile Equipment at Surface Mines, and for Belt Conveyors at Surface and Underground Mines*
RIN 1219-AB91

Dear Ms. McConnell:

The Portland Cement Association (“PCA”) and its members appreciate the opportunity to respond to MSHA’s Request for Information on Safety Improvement Technologies for Mobile Equipment at Surface Mines, and for Belt Conveyors at Surface and Underground Mines, 83 Fed. Reg. 29716 (June 26, 2018) (the “RFI”).

PCA, founded in 1916, is the premier policy, research, education, and market intelligence organization serving America’s cement manufacturers. PCA’s members represent 93 percent of U.S. cement production capacity, with facilities in all 50 states. Cement and concrete product manufacturing, directly and indirectly, employs approximately 600,000 people in our country, contributing over \$100 billion to the economy. Portland cement is the fundamental ingredient in concrete. The Association promotes safety, sustainability, and innovation in all aspects of construction. It fosters continued improvement in cement manufacturing and distribution and promotes economic growth and sound infrastructure investment. PCA is also a proud MSHA Alliance Partner, having recently updated its Alliance in November 2018.

Like many leading companies in the mining industry, our members place a premium on the health and safety of their workers and staff. Our members commit and invest significant resources in promoting worker safety through training; safety management practices; facility and equipment design, operation and maintenance; and use of effective safety technologies. These efforts have delivered results. Like the mining industry as a whole, cement operations have made great strides in improving worker safety over the years, owing to a successful partnership and mutual commitment between MSHA and industry. PCA and its members share MSHA’s desire to ensure a safe workplace with respect to powered haulage and conveyers.

The following comments reflect our members’ significant experience managing safe operations, developing leading safety programs, and protecting against the hazards addressed in the RFI. We hope they help MSHA in considering these issues, and we welcome the opportunity to have an ongoing dialogue.

❖ **Because of a wide variety of facilities and operations, the cement industry employs many different kinds of “powered haulage.”**

We note that cement industry is unique in nature and scope, encompassing both surface and underground non-metal mining and facility operations. A typical cement facility will operate a limestone quarry of varying sizes, including large and small haul trucks, loaders, water trucks, drilling machines, and associated conveyer systems, all of which are used to mine, grind, and transport limestone from the quarry to adjacent or nearby cement manufacturing facilities.

The cement facilities themselves are complex and highly-regulated. They use a variety of fuels (coal, natural gas, coke, and others) to heat limestone and other ingredients in a kiln to temperatures in excess of 3,000 degrees to create cement clinker – a core component of finished cement. The clinker resulting from the kiln undergoes further grinding, processing, storage, and distribution. At each step, the facility may rely on a variety of powered haulage vehicles and conveyors to move fuel and ingredients from one processing area to another. As a result, most of the questions in the RFI touch upon our members’ operations.

❖ **Fostering safe behavior and a culture of compliance through training and enforcement remains the top strategy for improving mine safety.**

For all PCA members and facilities, worker health and safety is a daily focus, from the CEO to the workers in our quarries and plants. Safety begins with robust safety and training programs. Even with the most advanced safety technologies, if strong policies and training are not also in place, the most promising technology is useless at best, and an impediment to safety at worst. As a result, our members tailor training programs to their operations and staff, often sharing ideas through PCA’s Occupational Health and Safety Committee. Companies also continuously look for ways to improve work practices and technology.

Through these safety and training programs, company standards, and federal regulations, our members regularly promote powered haulage safety principles, including, but not limited to: using seatbelts, emergency brakes, and chocks on vehicles; designing and implementing powered haulage traffic pathways, signage, berthing, traffic control systems, and access control; using lockout/tagout procedures; and adopting hazard communication protocols. These and other practices constitute core elements of our members’ training programs and operating procedures, both for regulatory compliance and protection of our workforce.

In our experience, accidents happen due to a variety of causes and circumstances. At times, additional technology may prevent an accident or mitigate its harm. Far too often, however, human behavior causes or exacerbates an accident. The failure of individuals to comply with existing regulations and safety protocols continues to be an important concern. Most miners are serious about safety. But, there are a few who violate policies or take unacceptable risks. For one reason or another, some individuals are even particularly committed to unsafe conduct, such as refusing to wear seat belts at the risk of their own lives.

As a result, PCA and its members welcome partnership with MSHA on enhancing and equalizing training resources available across the industry. MSHA can emphasize – and encourage operators to emphasize – key issues such as seat belt usage, and providing incentives for workers to comply with existing regulations. Large and small operators do not have the same resources. While large companies can develop sophisticated safety programs, smaller firms may struggle to do so. MSHA is particularly well-suited to spread the expertise developed by leading companies to help smaller and mid-sized operators

implement top quality safety programs. PCA and its members would appreciate MSHA's assistance with enhanced guidance, robust training resources, and incentivizing effective enforcement mechanisms.

MSHA can also prevent accidents by encouraging and supporting appropriate discipline.

Just as traffic laws and penalties increase seat belt usage on public highways, compliance with mine safety rules and regulations increases when people are held accountable. Policies and education are a helpful first step, but they are not enough. Effective safety programs work because they create incentives for compliance and disincentives for violation. When accidents happen, MSHA cites mine operators for not sufficiently managing employees. To prevent accidents, MSHA can also support good operators working to enforce their safety policies and MSHA rules. For instance, MSHA could develop resources that encourage robust safety programs on the front end while also emphasizing fairly administered discipline for violations. Some smaller and medium-sized operators might benefit from best practice information on how to do discipline right. MSHA could also continue to review employee hazard complaints carefully, to ensure that operators fairly enforcing safety rules are not subject to unjustified penalties.

Even new technologies can only reach their full potential within a culture of safety and with proper attention to human elements. Many of the technologies highlighted in MSHA's RFI are promising. But, many can be ineffective, or even harmful, without proper training in place within a culture of compliance. For instance, seat belts, whether interlocking or not, will only save lives to the degree that an operator creates a culture that emphasizes their importance and does not tolerate non-use. Otherwise, even with interlocks in place, some individuals may evade the devices.

Similarly, in a culture where safety is not heavily emphasized, collision warnings and alarms may make some individuals complacent, leading them to ignore basic checks and overly rely on the technology, which is never foolproof. Others may ignore warnings and alerts without sufficient training on the hazards at stake or sufficient accountability for safety violations. Recognizing that the human element will always be present, any new technology rollout should be accompanied by sufficient educational resources, training, and disciplinary policies. PCA encourages MSHA to first explore training and compliance improvement before implementing additional technology requirements because such education is necessary to ensure the new technology achieves its desired ends.

❖ **As MSHA further considers the many issues in its broad RFI, it should narrow its focus to the mine types, areas, and equipment with greatest risk.**

Cement operations raise unique issues in terms of the types of equipment used, the worker-equipment interface, the layout of the work area, and the types of health and safety hazards to manage. Every quarry and plant is different, each with its own safety and compliance challenges based on geographical footprint, facility design, and operating characteristics. There is no one-size-fits-all approach to safety that can work across all of our members and their disparate operations, let alone the entire mining industry.

Despite the unique challenges presented by differing mine types and equipment, MSHA's RFI seems broad and far-reaching. Technology suitable for open areas might perform poorly in narrow areas. Some equipment could benefit from additional blind spot detection ability, whereas other equipment provides drivers with good visibility all around. Because of the wide variety of equipment and operations, MSHA was right to raise specific questions about particular technologies and equipment. As it considers these issues further, we hope it can tailor future ideas to narrowly target the highest risk areas, equipment, and activities.

This application variation also underscores the need to retain mine operator discretion in implementing safety policies and procedures to help achieve the best outcomes. A technology or work practice used at one site may not be practical for another site. It is the job of individual mine operators to develop a safety plan that will work for each facility's specific design, layout, size, staffing, and operations. Additionally, operators require discretion and authority to make adjustments where needed in the event technology is not working as intended or is creating unintended consequences.

Finally, due to the large variety of mine and equipment types, simpler solutions may more quickly and reliably achieve desired outcomes. Enhanced, better focused training and policy enforcement is one such solution. Another would be MSHA working with mobile equipment manufacturers to include new safety technology at the factory, rather than retrofitting it. Factory-installed technology is both more reliable and less costly. While field retrofits require systems to adapt to a wide variety of equipment, installation at the factory takes into account the design and functionality of each machine. Manufacturers simply understand the technology, its requirements, and limitations better than mine operators or after-market firms. This is especially important for equipment that is sensitive to precise placement, such as cameras and presence detection devices. Working with manufacturers may also help spread the technology as large operators turn over their fleets, and the technology passes down the chain to smaller firms.

❖ **While PCA supports reliable new technologies, a number of the items in the RFI may require more research, development, and testing.**

Certain technologies, properly implemented, could undoubtedly help remedy some of the issues MSHA has discussed in the RFI. However, PCA would like to briefly highlight some possible challenges with the technology as it currently exists based on input from our members.

Before adoption, new technologies must be suitable for mining and reliable. Cement facilities invest significant sums in vehicles, conveyors, and related equipment. Some equipment, like large haul trucks, costs millions of dollars to purchase, constituting major capital investments. This equipment's smooth operation is critical to meeting production goals and remaining profitable. The loss of even a day of operations due to maintenance, repair, or retrofitting can cost thousands of dollars. As such, it is critical to our members that the technologies they acquire and implement are proven to work in the field and suitable to the unique conditions facing individual cement quarries and plants and their workforces.

Operators are understandably concerned about lost time – not only as a result of taking units out of production in order to retrofit new technologies, but also if technologies become damaged, fail, or otherwise malfunction and thus cause the entire machine to be pulled from service for a period of time. Technologies that must be implemented facility-wide (as opposed to more targeted applications) also cost significant money, staff time, and downtime for retrofitting, optimization, and training. As expected, our small and mid-sized members would be hit hardest by these resource and workforce commitments.

Some of the new technologies in the RFI may not yet be ready for rollout. For instance, complex collision and edge avoidance technology appears to still be in the developmental stage. Some companies have experienced high rates of false alarms with these tools. Various sensors may need more testing in mining environments to ensure reliability and durability. Indeed, in mining, these technologies must contend with both pedestrian and vehicular traffic, a variety of vehicle types and speeds, dynamic road and weather conditions, and different landscapes. Dozens of pieces of equipment may be in play and on the move

at one site, requiring sophisticated solutions, especially if they need to communicate with each other. MSHA may also need to research how the human element responds to these tools to fight complacency.

In short, the cement industry supports MSHA's efforts to identify, evaluate, and share information on powered haulage safety technologies and best practices that are currently available or under development, and their potential application for metal/nonmetal mines, quarries, and cement facilities. This information, if made available for consideration and adoption on a voluntary basis, will help our members maximize the efficacy of their safety programs across their respective facilities and powered haulage fleets. However, we recommend that MSHA proceed with caution to avoid excessive costs and unintended consequences that do not address the root causes of accidents. In addition, new technologies could benefit from more testing, pilot programs, and development specific to mining environments before rolling out on a wide scale.

❖ To ensure greater seat belt usage, training and discipline are key since some who refuse seat belts may still circumvent interlocks.

PCA and its members share the same underlying goal as MSHA – ensuring that every equipment operator wears a functioning seat belt every time.

With respect to interlocks, our members have found some success but have also noted some challenges. Members have noted that some new equipment comes with interlocking seat belts as a feature, which eliminates cost and reliability concerns associated with retrofitting. One member found that seatbelt interlocks worked well on skid steers and haul trucks but also noted that some individuals still refused to wear their seat belts and went so far as to circumvent the interlock system to avoid buckling up. Our members have also found that equipment manufacturers can be reluctant to allow outside vendors to program and install new technologies due to liability concerns. As after-market equipment, warning/interlock systems are technologically complex to install and maintain, and existing equipment may not be capable of the retrofit.

Because interlocking seat belts can still be circumvented, PCA's belief remains that focusing on human behavior is the single best way to achieve the highest levels of compliance. At the end of the day, an individual committed to not buckling up will not buckle up, regardless of technology or warnings. Heightened training, paired with fair but firm discipline tend to achieve the best results, regardless of technology. Our members that regularly audit seat belt use tend to have higher rates of compliance because employees know that their compliance will be checked regularly. The more MSHA can incentivize additional training and emphasis on seat belt usage, the better. It is vital to enforce seat belt use consistently, regardless of whether an incident occurs or not. Additional and more refined data from MSHA on injuries and fatalities directly attributable to lack of seat belt use (as opposed to simply a list of accidents in which a seat belt was not used) would also give operators yet another resource to drive home to workers the importance of buckling up.

❖ Many collision and edge avoidance technologies remain unproven in mining environments and would benefit from additional development.

As collision and edge detection technologies continue to progress, they will become less expensive and more effective and should certainly be considered to improve safety, but it remains uncertain how much impact the current generation will have on mine safety, despite its high cost. Automatic braking and collision/edge technologies remain far from perfected with respect to performance and effectiveness. Some of the technology is extremely sensitive and requires precise mounting and positioning, so the challenges of

the mine environment might not only impact function, but might also require significant upkeep and maintenance resources. One company reported that its mine environment impeded functionality through signal interruptions caused by geography, as well as dust and dirt.

Likewise, false alarms and the challenges of complacency or alarm fatigue remain major concerns. If the alarm systems activate too frequently when no hazard exists, individuals will understandably begin to ignore them. If individuals believe the technology is foolproof in eliminating hazards, they could begin to ignore basic safety checks that could otherwise prevent accidents. This situation occurred with one of our members, which reported that while sensor technology decreased damage to machines from impacting berms and other objects, the alarms went off too frequently, and workers became desensitized after a few months.

Due to the wide variations in mines and equipment, even within the cement industry, collision and edge detection technology might work well in one place but encounter significant problems in another. Performance and reliability may vary among narrow, rocky, or wide open spaces.

Autonomous mining equipment also remains a work in progress. Some is already in use on simple transport paths in Australia. However, while we anticipate more positive performance data in the future, the technology is in early stages of development. The removal of a human driver from the equipment would remove operator fluctuations (of course, it also displaces jobs for miners). Yet, unless and until there are no humans around whatsoever, autonomous equipment may pose equal or greater threats to humans in nearby equipment and on foot, especially absent significant new and enhanced policies and training.

At this stage, autonomous technology still has difficulty operating in certain areas, such as complicated haul road schemes. It will operate better in the future, when roads and dumps are designed with the technology in mind. Safety also demands that equipment allow for manual driving when conditions so require. Despite these challenges, we welcome MSHA continuing to study this technology as it improves and keeping operators informed of new developments.

Simple solutions seem to work best. PCA also notes that our members have had the best safety success with simple, easy-to-implement technologies. Easily added tools like flags, flashing beacons, and additional mirrors all improve visibility, install quickly, and increase safety. They require minimal resource diversion and upkeep, yet still reduce collisions and edge issues. Our members continue to find that additional training, re-emphasizing blind spots and edges, also improves safety. A culture where safety is top of mind tends to be the safest culture, regardless of the operation's size or ability to afford advanced technologies.

MSHA could help mine operators understand and sift through new technologies. Finally, a significant first step toward evaluating the benefits and limitations of these technologies would be for MSHA to provide resources for operators that educate about the benefits of the technologies, their reliability, their typical cost, and their demonstrated impact on safety. Additionally, we encourage MSHA to work with equipment manufacturers on implementation of this technology, since they are typically better-suited than mine operators to evaluate and implement these solutions.

- ❖ **Belt conveyors, which should be separate from “powered haulage,” work safely with emergency stop cords, paint, and enforcing safety rules.**

Notably, conveyor belt safety does not appear to fit neatly with the rest of the RFI. While conveyor safety is extremely important, it is different in character, scope, and application from mobile equipment. It merits its own unique treatment in a category of its own. Treating conveyors and mobile equipment separately for purposes of research, data, and regulation will yield better results.

Nonetheless, there is one key similarity with all of this equipment: reinforcing key procedures, heightening training, and providing simple easy-to-implement solutions will achieve the best safety outcomes. MSHA already provides a number of key regulations that target conveyor hazards, and we believe safety can best be achieved by reinforcing the importance of complying with existing regulations for crossovers, lockout/tagout, and guarding. As with seat belts, creating a culture of compliance will go a long way to improve results. These back-to-basics approaches will much more quickly and easily deliver than potentially retrofitting miles of conveyor belts with uncertain technology.

Emergency stop cords and paint work. One of the best solutions for conveyor safety is focusing on the use of emergency stop cords along the length of conveyors. Stop cords are both easier to implement and more reliable in mining environments than many new sensor technologies. While MSHA regulations also provide for railings as a solution to protect workers from moving conveyors, we welcome efforts by MSHA to further increase usage of e-stop cords in addition to or in lieu of railing, which is both less effective and more difficult to install and maintain. Other operators have painted guards and the metal underneath different colors, another simple solution which helps passersby quickly recognize missing guards.

By contrast, presence-sensing technology can be impaired by environmental conditions, such as dirt and dust, as well as narrow paths that bring traffic close to the belt line. Again, frequent alarms or reliance on the system can lead to complacency, sloppiness, or ignoring the signals. Some of our members have expressed concerns that the sensitivity of the technology could incorrectly shut belts down in the event of vibrations or spills. One member also had guard sensors along an entire belt system that, if removed, would shut down the belt. That operator found that while the system prevented miners from entering the belt area while the belt was operating, the sensors were unreliable, allowing spills that did not require immediate clean up to shut down the belt entirely.

Any additional technologies should be targeted on particular risks. Not all conveyor points present equal risk, and many of the RFI's cited technologies could not be implemented along the entire lengths of conveyors. Guard interlock mechanisms would be prohibitively difficult to install throughout, but MSHA could explore implementation at key locations. Limiting the number of interlocks to key hazard points may increase the likelihood that those interlocks will remain properly inspected and maintained. By contrast, retrofitting miles of conveyor, and then maintaining the new systems, would require a significant resource commitment from operators, likely at the expense of other more targeted and effective safety solutions.

We again commend MSHA for exploring how to further reduce serious accidents. The RFI is ambitious, covering a great amount of territory. We hope MSHA will have the space and time, as well as constructive input from all its stakeholders, to thoughtfully consider these issues. It is an exciting time, when new technologies are on the horizon that may one day take safety to even greater heights. There are, in fact,

PCA Comments on Powered Haulage, RIN 1219-AB91
December 24, 2018

some solutions that can be implemented already today. But, ultimately, our members have learned that there is no substitute for strong safety programs, hazard awareness, training, maintenance, and discipline, which all come together to create a culture of compliance. MSHA can and should play a role in supporting these critical, foundational efforts. Miners, mine operators, and MSHA alike will be proud of the results.

We thank you again for the opportunity to comment and look forward to further conversation. Please do not hesitate to contact me at 202-719-1977 or cfranklin@cement.org if you would like to discuss these comments further.

Sincerely,

**Charles L.
Franklin**

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