

IDEAS SUBMITTED BY STAKEHOLDERS TO IMPROVE SAFETY IN POWERED HAULAGE IN ADVANCE OF APRIL 30, 2018 CALL

(MSHA does not endorse any products mentioned below, the suggestions are presented in the interest of fostering discussion regarding safety.)

Comprehensive strategies

Charles Poole, Iluka Resources (Australian-based resources company specializing in mineral sands exploration, project development, and operations)

Iluka has successfully implemented systems for minimizing hazards involving the interaction of heavy equipment and smaller vehicles. Some components of successful systems I have observed are as follows:

- o Required Caterpillar Level 2 or equivalent competency training for the operators of all heavy equipment (wheel loaders, excavators, dozers, articulated haul trucks, telescopic forklifts, skid steer loaders)
- o Forward and rearward facing cameras and proximity detection systems
- o Amber flashing lights, headlights on, and hi-visibility flags for smaller vehicles operating in the vicinity of heavy equipment to assist with blind spots
- o Traffic management plans that delineate small vehicle roadways from heavy equipment travel ways and specify haul route requirements (safety berms, intersections at 90 degrees, two-way traffic roads designed at 3 times the width of the largest vehicle using the road, 2 times the width for one way roads)
- o Designated and separated personal vehicle, work vehicle, and heavy equipment parking areas
- o Signed call up points when entering heavy equipment areas – one equipment operator is in charge of the work area and is informed every time a small vehicle or heavy equipment enters their work space (we also use this for haul truck routes with blind corners so truck drivers know where each other are at all times), smaller vehicles and pedestrians not allowed within 150' of heavy equipment without making positive radio contact and notifying the operators when you leave the area
- o Distractions such as mobile phones and electronic devices are not allowed to be used within equipment and vehicles in motion
- o Recommended reverse parking or drive through parking for all vehicles and equipment to enhance lines of sight while taking off
- o Risk assessments signed off by work teams to determine hazards and controls involving speed limits, volume of traffic, lines of sight, road conditions, operator fatigue, and inclement weather protocols
- o Random drug and alcohol testing, including pre-employment and post-incident/near miss
- o Induction training for all new employees that cover these requirements and administering tests to verify comprehension

o Traffic management plans including maps, relevant procedures, and safe work instructions are provided to all operators of equipment and vehicles

Also the usual controls shall be followed at all times. These include zero tolerance policy for not wearing seat belts, working reverse alarms, pre-operational inspections of all vehicles and equipment, and workplace examinations.

Sheryl Newsome, Thiele Kaolin Minerals Co in Georgia

- 1) Have a designated parking area for smaller vehicles that haulage equipment can report to, if needed. This may not always be convenient but nevertheless, more safe for all.
- 2) Make sure the operator of the Loader, Off Road Truck, etc. sees and gives you the "okay" to approach his/her equipment or work area.
- 3) Use CB radio to communicate with Crude Shed Loaders or other heavy equipment and try to lessen the need to drive under crude shed or in heavy equipment area. The channel should be posted, but if not and you don't know the CB channel ask someone on site, safely of course.
- 4) Make sure signage is in place where it is needed at heavy equipment areas and crude shed.
- 5) Make sure anyone working or traveling near heavy equipment area knows the hazards and what is expected of them in the way of communication and safety. (Site Awareness)
- 6) If you are the heavy equipment operator and someone does have a need to communicate with you in person, park the loader or heavy other equipment, using safety parking procedures, and meet with them on the ground, if possible.

Training improvements

Toni Conforth, Safety Director, Gilbert Development Corp.

My experience in teaching a MSHA new miner or an MSHA refresher, the more detail that can be reviewed about a serious accident or fatality the more miners interact. If there was an MSHA reenactment opportunity so that new videos could be produced and shared during training. The impact of the outcome become more real to the everyday miners involved with the daily operation.

Steve McCall, MSHA instructor and former emergency response coordinator Golden Sunlight mine, Barrick Gold.

I believe people are getting way too routine, i.e. Fatalities # 11, 12 and 13 for an example. an employee does tasks day in and day out so that it becomes "just going through the motions" and a person may even be thinking of something else at the time. We expound on this heavily in our refreshers and new miner trainings. We have to keep our mind on the tasks at hand.

Steve Kidwell, Safety instructor and former MSHA inspector

I believe a contributing factor in most accidents is (ineffective) training. Training may not be as effective when taught by computer or in large groups. Also there must be individual miner accountability...Compliance with regulations and safety must work hand in hand.

Patricia Boer, MSHA employee, WE District

I was a miner and safety manager for a mine for almost 30 years before I came to work for MSHA. When I worked at the mine in Napa CA, I drove a Peterbuilt truck. The company had someone get in the blind spot and walk out with the operator looking in the mirror and then measured the distance it took them to see the person. It was shocking. In my truck, it was over 100' before I saw someone in my mirror. I never forgot this and thought of it every day when I operated that truck. Most people learn by seeing.

Clear communications with operators of large equipment

ChiChi Dor, Safety Trainer

#1 Ensure energy control systems are in place and proactively monitored.

#2 Ensure workers are not being told directly or indirectly to “cut corners” to get the job done quickly.

John Dupnock, NJ Dept of Labor and Workforce, Mine Safety Trainer

When approaching any vehicle it is important to establish "eye contact with operators via hand signals" and communicate directly via radio. I cover the importance of establishing contact/verifying via hand signals in ALL of my classes - more emphasis is needed on this important topic during future stakeholder calls.

Frank Blizzard, Safety Trainer

I have implemented a procedure that is MANDATORY, for my crew while operating large equipment. When backing up, they are to let the backup alarm sound for a count of 5, then sound the horn 3 long bursts, then proceed to back up. Before moving forward, 4 long bursts.

Safety flags

Jesse Martinez, Safety Trainer

Install 15ft. Flexible fiberglass flag pole with flag and strobe beacon in/on smaller mine vehicles. Like what's used on dune buggies

Irwin Jimenez, Safety Trainer

I would like to see the longer 12'ft flag whips instead of the 6 inch fiberglass ones. Even the ones that light up at the top or along the length are worth the investment to save a life.

Steve Dittoe, Safety Trainer

Something that we have implemented at Pioneer Sands to help operators of large equipment identify smaller vehicle is the use of safety flags on small vehicles that travel on the same roadways as large mobile equipment.

Berms and Dump Points

Jo Dee Coy, JoSAFETY

From 2016-2018 seat belt usage and powered haulage were main topics presented in our refresher classes. What we found out when reading through the investigation results in the seat belt related fatals is that the seat belt is just the final straw or factor in the accident, it is not the root cause. Most of the powered haulage fatals involving trucks was due to berms or lack of/inadequate berms; driver lost control or backed too close to the edge and the berm failed to impede. According to the definition of a berm in the 30 CFR: a “berm” is defined as a pile or mound of material along an elevated roadway capable of moderating or limiting the force of a vehicle in order to impede the vehicle’s passage over the bank of the roadway. Just in the last MNM Close Call Accident Alert sent out, it was stated the loader backed over the top of a roadway berm. It was fortunate that he had his seat belt on – but again, to me, not the root cause.

I think if you want to focus on a reason you should look at the regulation(s) and education on roadway berms and dump-point areas. The minimum mid-axle requirement is definitely not adequate for roadways.

Proximity detection, seat belt interlock, other technological fixes

Neal Guenther, Juneau AK, Hecla Greens Creek Mining (underground coal)

We have gone to a “proximity” detection system on equipment and cap lamps. It helps, but is not a “cure all”. We also utilize back-up cameras on larger equipment, reflective tape, and strobe lights. Human error is a big factor in accidents. We all need to make the right choices. Thank you.

Buddy Hudson, TxDOT, MNT Div.

With all of the technology that is out there why couldn't all of the haul trucks and the mine, pit or quarry employees vehicles have a proximity warning device installed. With this device installed on all of the working vehicles, bells, whistles, warning lights, shutting down of engines and applying of brakes could happen to prevent this from happening. Maybe this could be made into a standard system that all mines, quarries and pits have to comply with according to your safety standards.

Heidi Yriba, Hexagon Mining

In June of 2017, Hexagon launched HxGN Mine Vehicle Intervention System (VIS), which detects and prevents collisions by automatically slowing down or even stopping a haul truck if an imminent collision is detected. VIS is an extra layer of safety to our Collision Avoidance System, taking control of a vehicle when its operator cannot.

John Metzger, Colo.

Proximity detection in light vehicles, no approaching within 200 feet without visual contact and Haul Truck DRIVER OUT OF Cab.

Have a ignition lockout on the seatbelt sensor. No belt connected into receptacle – no power for ignition.

Jesse Martinez, Safety Trainer

Install a device that would not allow an operator to start and move truck without seat belts fastened.

Julia Larrabee, Knight Piesold and Co. (Engineering and Environmental Consultants, est. South Africa))

Would like to see discussion/thoughts on Autonomous Powered Haulage.

<https://roboticsandautomationnews.com/2018/03/06/komatsu-reaches-ten-year-milestone-in-autonomous-haulage/16307/>

“Komatsu is celebrating the tenth anniversary of the commercial deployment of its Autonomous Haulage System (AHS). More than 100 AHS trucks operate in Australia, North and South America and Komatsu plans to accelerate the pace of AHS deployment. In 2005, Komatsu began the AHS trial at Codelco’s copper mine in Chile and succeeded in achieving the world’s first commercial AHS deployment with Codelco in January 2008. A second successful deployment followed in late 2008 at Rio Tinto’s iron ore mine in Australia and Rio Tinto currently operates AHS trucks in four mines in the Pilbara region of Western Australia. The entire AHS operation is controlled remotely and efficiently from Rio Tinto’s operations center in Perth, roughly 1,500 km from the mines.”

Drone technology

Adam Yoxtheimer, Airware

My background is in mining and energy, and I worked for US Silica (US-based industrial minerals company) as its CAO prior joining Airware to help develop solutions in the mining space that leverage drone technology.

We have developed safety-specific mining analytics that help safety managers, site managers, and mining engineers monitor and improve safety conditions on site. Drone-captured imagery is then transformed into high fidelity 3D models of quarries and mines, allowing safety analyses to run against the models. I've included some screenshots as well as a link to learn about the module on our website: <https://www.airware.com/en/industries/mining-quarrying/safety-module/>

Belt conveyors

Brandon McArdle, Safety, Castle Valley Mines

At the Castle Valley Mining Complex, we have taken a pro-active stance on guarding and crossing on our surface and underground belt conveyors.

On the surface belts, we have installed emergency pull-cord style stop devices along the length of our overland conveyors. We have also been working closely with the local field office to insure proper installation of these devices. Additional guarding has also been installed to protect miners from contacting moving belt idlers on our tipple and stockpile area.

In the underground portion of the Castle Valley Mining Complex, we are in the process of upgrading and/or replacing the guarding around many of our main line belt drives. The guard panels are designed to be installed 12" to 18" off the mine floor to allow the drive area to be cleaned without removing any guarding. The top of the guarding is between 5' and 7' from the mine floor at a distance of approximately 2' from the moving belt conveyor and drive components. The material that makes up the "field area" of the panels is 2" x 2" steel mesh or expanded metal, which adequately protects the area from contact, but also allows for a proper visual examination of belt and drive components. We are also upgrading the guarding around any remote tail- pieces that are not guarded with the drive. This guarding is also installed 12" to 18" off the mine floor and 2' from the tail pulley, so that the area can be properly cleaned and examined. All of the guarding is custom fabricated for each location, and is painted bright yellow or has reflective material added for high visibility.

In addition to guarding at the drive and tail areas, we are enhancing existing belt crossings to become more substantial and visible, as well as installing new crossings at strategic locations throughout the mine. We are also constructing our new belt cross-over locations wider than we have in the past to make them easier to utilize. In lower areas of the mine, we are making some of these crossings up to 6' in width so it easy to turn around on them, thus reducing the risk of falling while climbing on or off. This enhanced construction design will encourage proper belt crossing procedures by our employees. In an effort to reduce the exposure of our employees to moving conveyors, we will continually strive to improve this process on any new belt installations in the future.