

## Summary of 2013 (Mid-year) Fatal Accidents at Coal Mines and Preventative Recommendations

During the first half of 2013, nine miners were killed in accidents in the coal mining industry. The first six fatal accidents - two-thirds of the fatalities in the first half of 2013 - occurred in 25 days, between January 26 and February 19. MSHA sent an alert to the mining industry on these fatalities and to encourage effective safety and health practices. Eight of the fatalities occurred in the first quarter of the year; one occurred in the second quarter.

Two miners died in **Machinery** accidents. Three miners were killed in **Powered Haulage** accidents, and two miners died as a result of **Roof Fall** accidents. One miner died as a result of an **Exploding Vessels Under Pressure** accident, and one miner was killed in a **Hoisting** accident. One of the fatalities was a **contractor**.

Eight of the fatalities occurred in underground mines; one was at a surface mine. The deaths were not isolated to certain occupations. Seven occupations were represented among the nine miners killed. Two of the powered haulage deaths may have been prevented through the use of proximity detection systems. There also are other best practices, as described in the fatality summary section on MSHA's website, which should be applied to prevent crushing injuries and fatalities from occurring.

When completed, a detailed investigation report of each fatality is posted on the MSHA website at: <http://www.msha.gov/fatals/fab.htm>

Here is a brief summary of these accidents:

### **Two miners were killed in Machinery accidents.**

A 52-year-old contract welder with 30 years of experience was killed while doing maintenance on a bulldozer. The victim was performing work to remove a damaged wear plate from the bulldozer's center portion of the blade. At the time of the accident, a hydraulic jack was being used to push the wear plate away from the bulldozer blade. The victim was using an air chisel between the wear plate and the blade. The hydraulic jack slipped while the victim was using the air chisel and he was crushed between the blade and the damaged wear plate.

A 28-year-old continuous mining machine operator was killed when he was pinned between the tail of the remote controlled continuous mining machine and the coal rib. The victim had mined the first two lifts of the cut sequence in the No. 1 entry. While repositioning the continuous mining machine to mine the final cut on left side, the victim was pinned between the tail of the machine and the coal rib on the right side. The victim had 4 years and 2 months of mining experience, with 6 months of experience as a continuous mining machine operator.

### **Three miners were killed in Powered Haulage accidents.**

A 51-year-old motorman with 31 years of mining experience was seriously injured while attempting to re-rail a shield carrier. The shield carrier was raised with an air bag. The victim was attempting to straighten the wheels and pry the wheel flange high enough to clear the rail. As the wheel flange cleared the rail, the shield carrier shifted, causing the slate bar to fly back and strike the victim in the face. The victim later died of the injury.

A 44-year-old shuttle car operator, with four years of experience, was killed when he was pinned underneath the battery end of a section scoop. The accident occurred on the No. 3 Section in the first connecting crosscut inby the feeder between the Number 5 and 6 entries. The victim was shoveling along the ribs of the crosscut when a battery-powered scoop backed into the crosscut, striking him.

A 36-year-old conveyor belt foreman with 4 years of mining experience was killed while checking a belt wiper at the belt conveyor discharge. He was positioned at the end of an elevated catwalk parallel to the belt drive to check the wiper. When the victim contacted the guardrail at the end of the catwalk, it gave way and he fell below onto the moving belt conveyor.

### **Two miners were killed in Roof Fall accidents**

A 63-year-old roof bolter with 40 years of mining experience was killed when he was struck by a large piece of roof rock while installing a rib bolt. The rock was approximately 6 feet long by 5.5 feet wide and about 5 inches thick.

A 29-year-old continuous mining machine operator, with 9 years of mining experience, was killed while operating a remote-controlled continuous mining machine during retreat mining. While mining a left hand lift, the victim was positioned near the right rear corner of the continuous mining machine and the right rib. A section of roof, approximately 8 feet long by 7 feet wide and 16 inches thick, fell and broke several roof bolts, striking the victim. The slab of rock that fell was a portion of a larger fall, approximately 20 feet wide by 25 feet long, that included the bolted roof between the rear of the continuous mining machine and the mobile roof support units located inby.

### **One miner was killed in an Exploding Vessels Under Pressure accident.**

A 34-year-old company engineer was killed at a coal preparation facility when he was struck by one of the hydraulic cylinders on a plate-type filter press. A hydraulic cylinder catastrophically failed while the press was in operation. The victim was positioned near the hydraulic cylinders, troubleshooting the operation of the filter press, when the accident occurred. The filter press de-watered the fine coal refuse material generated during the coal cleaning process.

### **One miner was killed in a Hoisting accident**

A 43-year-old utility man was killed when he was pinned underneath the scoop he was operating at the bottom of a service shaft. The victim and two other miners were unloading trash from a scoop bucket insert with the scoop bucket positioned on the hoist platform. The hoist unexpectedly started moving up the shaft. This raised the front end of the scoop, which slipped away from the hoist deck and fell suddenly. The victim was found underneath the operator's deck of the scoop.

### **Best Practices**

Effective safety and health management programs save lives. Workplace examinations can identify and eliminate hazards that kill and injure miners. Effective and appropriate training help ensure that miners recognize and understand hazards and how to control or eliminate them.

While some of the specific circumstances of these accidents remain under investigation, here are some of the best practices that can prevent them:

### **Machinery Accidents**

**These deaths can be prevented by following well-known precautions:**

- Ensure the power is off and the equipment is blocked against motion prior to performing maintenance.
- Devise safe methods to complete tasks involving large objects, massive weights, or where the release of stored energy is a possibility.
- Never use a hydraulic jack as the only tool for supporting large objects, massive weights, or objects that have the potential for the release of stored energy.
- Avoid metal to metal contact because it slides much easier than wood or other materials against metal.
- Ensure that all contact areas where jacks or other blocking materials are to be installed are free from grease or other substances to decrease the likelihood of shifting and sliding.
- Ensure that there is sufficient space around equipment to enable work to be performed safely.
- Consult and follow the manufacturer's recommended safe work procedures for maintenance tasks and monitor work to ensure procedures are followed.
- Ensure that contractors have safe work procedures in place for the specific task and machine.
- Before performing any job, consider all hazards and implement formal procedures that address possible hazards.
- Install and maintain proximity detection systems. See the proximity detection single source page on the MSHA website.
- Develop programs, policies, and procedures for starting and tramming remote controlled continuous mining machines.

- Frequently review, retrain, and discuss avoiding the "RED ZONE" areas when operating or working near a remote controlled continuous mining machine.
- Train all production crews and management in the programs, policies, and procedures and ensure that they are followed.
- Ensure that mining machine operators are in a safe location while tramming the continuous mining machine from place to place or repositioning in the entry during cutting and loading.
- Ensure everyone is outside the machine turning radius before starting or moving the equipment.
- When moving continuous mining machines where the left and right traction drives are operated independently, low tram speed should be used.
- Assign another miner to assist the continuous mining machine operator when it is being moved or repositioned.
- Additional information on preventing these types of accidents can be found at: MSHA's Safety Targets Program Hit By Underground Equipment.

### **Powered Haulage Accidents**

**These deaths can be prevented by following well-known precautions:**

- Block or secure equipment being raised against motion so it cannot suddenly shift.
- Always be aware of the stored potential energy when raising or lowering items.
- Make sure the lifting device has a secure base before lifting an item.
- When lifting items and the desired height cannot be reached, block the item in position and lower the lifting device to establish a higher base.
- Ensure that personnel are trained to recognize hazardous work procedures where inadvertent movements could cause injury.
- Discuss work procedures and identify all hazards associated with the work to be performed, along with the methods to protect personnel.
- Ensure personnel are equipped with proper equipment and are knowledgeable of safe procedures for rerailling.
- Train miners to establish and use effective means of communication while operating and working around mobile equipment.
- Know your location relative to the movement of mobile equipment and never position yourself between any piece of equipment in motion and a stationary object. Assume the equipment operator has not seen you, unless eye contact is confirmed and signal your presence to equipment operators.

- Install and utilize proximity detection systems on continuous mining machines and haulage equipment.
- Use cameras mounted on section haulage equipment and utility equipment, such as scoops, to improve the visibility of machine operators.
- When operating equipment, sound audible warnings when traveling around turns or blind spots, through ventilation curtains, and any other time the equipment operator's visibility is limited or obstructed.
- Never position extraneous material or supplies on top of mobile equipment, or position the machine's batteries in a manner which can interfere with or obstruct the visibility of the machine operator.
- Check guards along belt conveyors for stability and good repair.
- Train all employees thoroughly on the dangers of working or traveling around moving conveyor belts.
- Install appropriately-designed railings, barriers, or covers at all required conveyor belt locations, and ensure it is maintained in structurally sound condition.
- Perform thorough workplace examinations. Inspect the work areas for all potential hazards including places that persons may fall from or through.
- Provide belt conveyor stop and start controls at areas where miners must access both sides of the conveyor. Provide these areas with adequate crossing facilities (e.g. cross-overs or cross-unders).
- Do not assume handrails or guards are strong enough to support you, and never lean against or support your weight on guarding.

### **Roof Fall Accidents**

**This death can be prevented by following well-known precautions:**

- Conduct frequent and adequate examinations of the roof, face, and ribs. Be alert for changing conditions at all times. When hazardous conditions are detected, danger off access to the area until it is made safe for work and travel.
- Develop and follow safe rib bolting procedures. Consult the manufacturer's recommendations.
- Adequately support, or scale down, any loose roof or rib material from a safe location before working or traveling in the area.
- Ensure that Automated Temporary Roof Support systems on all roof bolting machines are maintained in good working condition.
- Ensure that the approved Roof Control Plan is followed and is suitable for the geologic conditions encountered at the mine. If conditions change and cause the plan to no longer be suitable, the plan must be revised to provide adequate support for the control of the roof, face, and ribs.

- Ensure that the approved Roof Control Plan support provisions are suitable for the geological conditions at the mine and that the plan is followed.
- Develop a map of geologic features, so additional support can focus on those areas.
- Maintain proper entry widths and pillar dimensions.
- Develop a safe procedure to align Mobile Roof Supports with the lift being mined.
- Install and examine test holes regularly for changes in roof strata.
- Take additional measures when hazards associated with draw rock are encountered, such as mining shorter cuts and decreasing roof bolt spacing.
- When joints are encountered, install adequate supplemental support.

### **Exploding Vessels Under Pressure Accident**

**This death can be prevented by following well-known precautions:**

- When troubleshooting or testing pressurized systems, position yourself in a safe location, away from any potential sources of failure.
- When possible, block access to areas where pressurized cylinders, tanks, or other vessels are located while the equipment is in operation and under pressure.
- Train miners in the proper maintenance of and the dangers associated with working around pressurized cylinders, tanks, and other vessels that have the potential to explode or rupture.
- Ensure the ratings of hydraulic components are compatible with their intended use.
- Use the proper tools and equipment for the job.
- Inspect, examine, and evaluate all materials that are being used in the installation, replacement, or repair of pressurized systems to ensure they are suitable and meet minimum manufacturer's specifications.
- Examine and inspect hydraulic components for defects periodically.

### **Hoisting Accident**

**This death can be prevented by following well-known precautions:**

- Ensure that an adequate delay time is provided between the activation of visual and/or audible alarms and the movement of the hoist, so that workers can react and move clear of dangerous areas.
- Conduct thorough examinations of all hoisting equipment and safety mechanisms on a daily basis. Ensure that persons

conducting these examinations are trained adequately and any deficiencies identified are corrected immediately.

- Discuss work procedures and identify all hazards associated with the work to be performed along with the methods to properly protect persons.
- Communicate work activities prior to beginning the work and maintain communications during the work activity.
- Develop and implement a standard operating procedure for the safe operation of service hoists and man hoists, train all of the miners involved in hoisting operations, and post these procedures near the hoist control panels in a conspicuous location.
- Provide redundant safety mechanisms that provide a more fail proof check of the system before the hoist can be operated.
- When possible, secure the cage mechanically to prevent cage motion due to suspension rope stretch during loading or other unintended motion.
- Design electrical safety circuits so that an open circuit does not represent an unsafe condition and the functioning of the safety circuit should not be solely dependent on a single programmable electronic system.
- Ensure that the hoist is inoperable during loading and unloading operations.

Violations of the priority standards identified as **Rules to Live By** continue to play key roles in mine fatalities. While the fatality investigations have not been completed, not all of the violations have been identified, and not all of the associated citations and orders have been issued, violations of the Rules to Live By standards were still involved in several fatalities. MSHA's inspectors will be especially mindful of these issues while performing inspections. They will be talking to miners and mine supervisors in mines throughout the country to discuss these kinds of fatalities, and the ways to prevent them.

One **contractor** was killed at mining operations in the first half of 2013. Contractors and mine operators should ensure that contractor employees are properly trained and follow the mine's safety policies and procedures. Contractors and mine operators should coordinate operations at the mine to ensure that safety and health management programs are in place and are effective, all workplace examinations are performed, and safe work procedures are followed.

The importance and value of effective **safety and health management programs** cannot be overstated. A thorough, systematic review of all tasks and equipment to identify hazards is the foundation of a well-designed safety and health management program. Modify equipment, processes, work procedures and management systems to eliminate or control identified hazards. Operators

and contractors should create effective safety and health management programs, ensure that they are implemented, and periodically review, evaluate, and update them.

If an accident or near miss does occur, find out why and act to prevent recurrence. If changes to equipment, materials or work processes introduce new risks into the mine environment, address them immediately.

Conducting **workplace examinations** before beginning a shift and during a shift – every shift – can prevent deaths by finding and fixing hazards. All required workplace examinations must be performed and identified hazards eliminated to protect miners.

Providing effective and appropriate **training** to miners is a key element in ensuring their safety and health. Mine operators and Part 48 trainers need to train all miners to recognize the conditions that lead to deaths or injuries and ensure that measures are taken and followed to eliminate hazardous conditions. Training all miners to follow safe work procedures and stay focused on the task they are performing cannot be stressed enough.

Take action to prevent additional injuries and deaths. Printable posters regarding the causes of some of these accidents can be found on the Alerts/Hazards section of MSHA's website, [www.msha.gov](http://www.msha.gov). Fatalgrams describing each fatality and Best Practices to prevent a recurrence can also be found on the agency's website.

Miners deserve a safe and healthy workplace and the right to go home safe and healthy at the end of every shift, every day. Working together makes that happen.