

Summary of 2012 Fatal Accidents at Coal Mines and Preventative Recommendations

During 2012, nineteen miners were killed in accidents in the coal mining industry.

Four miners were killed in **Powered Haulage** accidents. Three died from **Slip or Fall** accidents. Three miners were killed as a result of **Machinery** accidents. Two miners were fatally injured as a result of **Rib Fall** accidents, and two miners were killed in **Roof Fall** accidents. Three miners were killed in the following accident classifications: **Exploding Vessels Under Pressure, Handling Materials, and Electrical**. Lastly, two fatalities were classified as **Other**. Both of those miners drowned – one in a river and the other in an impoundment.

Of the nineteen fatalities, five occurred on five consecutive weekends. Two (11%) of the nineteen fatalities involved contractors; five (26%) were supervisory personnel.

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

Here are brief summaries of these accidents:

Four miners died in Powered Haulage accidents

A 25-year-old water truck driver with 31 weeks of experience was killed at a surface mine. The victim was driving a water truck down a grade in an active work area of the mine when he lost control of the truck. The truck struck a berm on the right side of the roadway, traveled across the roadway, struck an embankment on the left side of the roadway and overturned, facing opposite the original direction of travel. The victim was found ejected from the truck.

A 43-year-old scoop operator received fatal crushing injuries when he was caught between a battery powered scoop and the coal rib while attempting to change the scoop's batteries. The scoop was parked at a battery charging station located four crosscuts from the working section when it was impacted by another scoop which was traveling outby adjacent to the charging station.

A 28-year-old miner was killed moving longwall equipment when he was crushed between the coal rib and a large power center, weighing approximately 30 tons.

A 27-year-old electrician was killed when he was caught between a battery-powered maintenance scoop and the cutting head of a continuous mining machine. The accident occurred on a working section while the electrician was performing maintenance work on the cutting head of the continuous mining machine, which was parked in an entry.

Three miners died in Machinery accidents

A 55-year-old surface foreman with 19 years of mining experience was killed when he was caught between the frame of a highwall transportation dolly and a front-end loader with a forklift attachment.

A 35-year-old-move crew member with 5 years of mining experience received fatal crushing injuries when he was pinned between the conveyor boom of a remote controlled continuous mining machine and the outby rib of the No. 4 Right Crosscut. The continuous mining machine was moving to an adjacent entry in preparation for the oncoming day shift when the accident occurred.

A 30-year-old continuous mining machine operator was killed when he was pinned between the head of the remote controlled continuous mining machine and the coal rib. The victim had 3 years of mining experience, with 20 weeks of experience as a continuous mining machine operator. The victim had mined the left side of an entry and was repositioning the continuous mining machine to mine the right side when the accident occurred.

Three miners died in Slip or Fall of Person accidents

A 61-year-old demolition contractor with approximately 20 years of experience was killed from injuries received while dismantling a conveyor stacker belt from the surface area of an inactive underground coal mine. The victim had completed the final torch cut on an elevated, inclined stacker frame support beam containing the counter-weight, when the structure fell. The structure contacted the walkway (catwalk) where the victim was located. This section of the walkway, approximately 25 feet long, broke loose from the main structure, causing the victim to fall approximately 27 feet.

A 57-year-old mechanic was killed at a coal preparation plant. The victim was standing on a 14-foot fiberglass extension ladder when it became unstable and slid across an I-beam. He fell down an adjacent hoist well opening 39 feet to the concrete floor below. He was attempting to cut and remove a 12-inch hoist beam located above the third floor in the plant.

A 43-year-old shaft worker with 39 weeks of mining experience died from injuries he received when helping pour concrete in a 30-foot diameter shaft that was under construction. The victim and his coworkers were using a hose to direct concrete into forms that lined the shaft wall. The hose was overloaded as concrete came out of the hopper too fast, which caused the hose to surge. This sudden movement of the hose knocked the victim and his coworkers off their feet, resulting in a fracture to the left leg of the victim. The victim was treated at a local hospital and released. He passed away at his residence as a result of complications of this injury.

Two miners died in Rib Fall accidents

A 34-year-old section foreman with 11 years of experience was killed while operating a continuous mining machine in the No. 2 entry. He was struck by a section of rock that fell from the right-hand rib. The rock was approximately 10 feet and 6 inches long, 3 feet and 4 inches high, and 10 inches thick.

A 33-year-old outby foreman with 7 years of experience was killed while installing additional rib/roof support in the No. 5 belt/track entry. The victim was wedging a timber against the mine roof to support the rib when a section of the left hand rib rolled on top of him. The rock was approximately 14 feet long, 4 feet high, and 17 inches thick.

Two miners died in Roof Fall accidents

A 61-year-old general inside laborer with 38 years of mining experience was killed when he was struck by a section of mine roof. The victim was removing a roof bolt from an older area of the mine which was no longer in contact with the mine roof. A section of mine roof fell, striking the victim.

A 32-year-old section foreman with 12 years of experience was killed when a section of unsupported roof approximately 6 ½ feet long, by 6 feet wide, by up to 8 inches thick fell, pinning him to the mine floor. He was operating the continuous mining machine in preparation for the installation of a belt conveyor drive and was positioned approximately 8 feet in by the last row of permanent support.

One miner died in an Exploding Vessels Under Pressure accident

A 44-year-old utility/diesel tram operator with 1 year and 8 months mining experience, died from injuries he received when repairing a damaged water outlet (fire valve manifold). During the repair work, a 1.5 inch bronze ball valve (quarter turn valve) failed catastrophically, propelling the steel manifold into the miner's face/head. This fire valve manifold was originally damaged when an oversized load being transported on the adjacent mine track haulage system contacted the outlet, causing it to separate from the 6" mine water supply. The internal threaded body of the valve separated from the external threaded portion of the valve, causing the catastrophic failure.

One miner died in a Handling Materials accident

A 32-year-old foreman was killed while attempting to install a canopy on a Joy 21 SC Shuttle Car. The canopy was suspended from the mine roof by a cable and chain. The foreman was seated in the operator's compartment of the shuttle car beneath the suspended canopy. The canopy shifted and fell, striking the foreman in the head, causing fatal injuries. The victim had 11 years of mining experience, 2 years and 6 weeks experience at this mine, and 32 weeks of experience as a foreman.

One miner died in an Electrical accident

A 37-year-old electrician, with approximately 3½ years experience (approximately 1½ years as an electrician), was killed when he contacted the energized conductors of a shuttle car trailing cable. He was making the final electrical connections for a replacement cable reel when he was electrocuted.

Two Miners Drowned in accidents classified as "Other"

A 52-year-old deckhand with 4 years of mining experience drowned when measuring the distance from the water surface to the bottom of a set of empty barges that were to be loaded. He had to cross from the dock to the first empty barge. He apparently fell

from the barge into the water. The miner was wearing a flotation device, but the flotation device was not designed to keep an unconscious miner's face above water.

A 58-year-old bulldozer operator with 37 years of experience was killed when an upstream slope failure occurred at a coal slurry impoundment. The victim was grading the upstream slope at the time of the accident. The bulldozer was carried into the pool area during the slide and sank with the victim on board.

Best Practices

Deaths continue to occur needlessly in coal mining, but these fatalities can be prevented. They are not inevitable in mining. Effective safety and health management programs save lives. Workplace examinations for hazards can identify and eliminate hazards that kill and injure miners. Effective and appropriate training will 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 best practices that we can identify at this time to prevent accidents like these in the future:

Powered Haulage Accidents

These types of deaths can be prevented by following well-known and accepted safety practices:

- Train all employees thoroughly on proper work procedures, hazard recognition and avoidance, and proper use of roadway berms.
- Conduct pre-operational checks of equipment to identify defects that may affect the safe operation of equipment before placing it into service.
- Never operate a truck or other mobile equipment without using a seat belt.
- Know the truck's capabilities, operating ranges, load-limits, and maintain the brakes and other safety features properly.
- Construct roadway berms to appropriate strengths and geometries. Ensure all grades and haulage roads are appropriate for the haulage equipment being used.
- Maintain control of equipment at all times, making allowances for the prevailing conditions (low visibility, inclement weather, etc).
- Observe all speed limits and traffic rules.
- Always select the proper gear and downshift well in advance of descending the grade.
- Maintain equipment braking and steering systems in good repair and adjustment. Never rely on engine brakes and transmission retarders as substitutes for keeping brakes properly maintained.
- Monitor work habits routinely and examine work areas to ensure that safe work procedures are followed.
- Do not attempt to exit or jump from a moving vehicle.

- Equipment operators should sound audible warnings when traveling around turns or blind spots, through ventilation curtains, and at any time the operator's visibility is obstructed.
- Always look in the direction of equipment movement and exercise caution in areas where clearance is tight and visibility is limited.
- Install warning signs to remind equipment operators of the hazards present in areas of limited visibility and clearance.
- Assure that the area where equipment is parked is conspicuously marked with reflective material and/or signs if there is a potential for other equipment to strike it.
- Install Proximity Detection Systems on continuous mining machines and haulage equipment to prevent pinning, crushing or striking injuries and fatalities.
<http://www.msha.gov/Accident%20Prevention/NewTechnologies/ProximityDetection/ProximitydetectionSingleSource.asp>
- Ensure that equipment operators establish good communications between themselves and other miners that may be working around or near their equipment.
- STAY OUT of areas where clearance is tight (pinch points) and visibility is limited when haulage equipment is being operated to move large equipment and/or components.
- While moving equipment, ensure that all persons are located safely out of the route of travel, especially with limited visibility.
- Ensure that all large equipment and/or components are secured adequately to prevent unintended motion when being moved.
- Inspect the mine floor properly in areas where large equipment and/or components will be transported to identify any irregularities that may cause unexpected movement of the equipment and/or components being moved, or with the machinery being operated to move the equipment.
- Mark the area where equipment is parked for maintenance with conspicuous reflective material, flashing lights, or other warning signs on both sides of the entry or crosscut to warn mobile equipment operators of a parked machine or the presence of other miners.
- Use approved translucent or transparent ventilation curtains for better visibility.
- Never put extraneous material or supplies on mobile equipment where it can obstruct the visibility of the machine operator.

Slip and Fall

These types of deaths can be prevented by following well-known and accepted safety practices:

- Clear the area of tripping and stumbling hazards before starting any work.
- Secure structures against unexpected movement when performing demolition work.
- Use fall protection when working in an elevated position and securely tie-off where the danger of falling exists.

- Ensure all workers are adequately trained in the use of fall protection and restraint devices.
- Examine fall protection equipment and personal protective equipment before each use. Ensure that defective equipment is replaced.
- Properly position ladders to ensure that footing is secure, that the ladder is resting in a manner that prevents movement, and that the ladder is protected from being struck by moving objects.
- Provide a means to control water, air, concrete, etc., lines when they are pressurized to prevent surges and other unintended movement.

Machinery

These types of deaths can be prevented by following well-known and accepted safety practices:

- Never position yourself between equipment in motion and a stationary object. Always be aware of your location in relation to machine parts that have the ability to move.
- Ensure mobile equipment operators are aware of miners' locations at all times.
- Maintain communication with mobile equipment operators when working in confined areas. Ensure that line of sight, background noise, or other conditions do not interfere with communication.
- Ensure miners are adequately trained for the task they are performing.
- Use a tow bar with adequate length and proper rating when towing heavy equipment.
- Wear brightly-colored clothing or clothing that is distinguishable from surroundings to become more visible.
- Know and follow established communication procedures.
- Maintain control of equipment at all times.
- Conduct a risk analysis before beginning work.
- Ensure that all persons, including the continuous mining machine operator, are positioned outside the machine's turning radius before starting or moving the machine.
- Maintain clear visibility and communications with all personnel in the vicinity of the equipment, and minimize the number of miners working around or near continuous mining machines.
- Frequently review, retrain, and discuss the importance of staying out of any "RED ZONE" area while operating or working near a continuous mining machine.
<http://www.msha.gov/webcasts/coal2004/REDZONE2.pdf> and
http://www.msha.gov/Safety_Targets/Continuous%20Miner%20Package/RCCM.asp
- Position the conveyor boom away from the operator or other miners working in the area when tramming or moving the machine.
- Install Proximity Detection Systems on continuous mining machines and mobile equipment to prevent pinning, crushing or striking injuries and fatalities.
<http://www.msha.gov/Accident%20Prevention/NewTechnologies/ProximityDetection/ProximitydetectionSingleSource.asp>

Rib Fall

These types of deaths can be prevented by following well-known and accepted safety practices:

- Conduct thorough pre-shift and on-shift examinations of the roof, face, and ribs. A thorough exam must be conducted before any work or travel is started in an area and thereafter as conditions warrant.
- Support any loose roof or rib material adequately or scale loose material before working or traveling in an area.
- Danger-off areas where hazardous roof or rib conditions are detected until they are made safe.
- Install rib bolts on cycle and in a consistent pattern to provide the best protection from rib falls.
- Ensure that the Approved Roof Control Plan is followed and is suitable for the geologic conditions encountered. If adverse conditions are encountered, the plan must be revised to provide adequate support for control of the roof, face, and ribs.

Roof Falls

These types of deaths can be prevented by following well-known and accepted safety practices:

- Perform thorough pre-shift and onshift examinations.
- Post the end of permanent roof support with a readily visible warning or physical barrier to impede travel beyond permanent roof support. This serves to alert all miners of an approaching potential danger zone.
- Never travel beyond permanent roof support.
- Persons should never expose any portion of their body in by the last row of undisturbed permanent roof supports.
- Make frequent, thorough roof examinations and be keenly aware of changing roof conditions at all times. Give extra attention to the roof after activities occur that could cause roof disturbance.
- Do not mine extended cuts when adverse roof conditions are present. The cut depth should be limited to 20 feet or less. Before performing work in any area of the mine, observe the roof and ribs for hazardous conditions and correct hazards immediately.
- Install additional roof supports prior to removing old supports.
- Perform sound and vibration testing before installing or removing permanent roof supports.
- Only remove roof supports under the direction of a manager or foreman.
- Use roof screen (wire mesh) to control loose roof in long-term travel roads.
- Take extra precautions when working or traveling in older areas of the mine, paying particular attention to deteriorating roof conditions.

Exploding Vessels Under Pressure

These types of deaths can be prevented by following well-known and accepted safety practices:

- When performing work on pressurized water supply piping systems, STOP ALL water flow into the pipe being worked on; BLEED ALL residual pressure from the pipeline, and when possible, OPEN A VALVE at an alternate location to ensure constant pressure relief. LOCK OUT and TAG OUT these valves to ensure safety while repairs are made.
- NEVER REUSE components in a pressurized line that may have been damaged or compromised.
- Ensure that components, such as valves, couplings etc. used in a pressurized water system are compatible with the highest measured or expected STATIC pressure in the system.
- Implement a Standard Operating Procedure for the design, installation, testing, and maintenance of pressurized fluid systems that is consistent with National Fire Protection Association standards.
- Install slow closing indicating valves. When opening a valve to put water flow into a pressurized system, do it slowly and minimize exposure to pressurized components. See slow closing indicating valves on MSHA's Belt Fire Suppression Simulator at the National Mine Health and Safety Academy. <http://www.msha.gov/alerts/SafetyFlyers/ScoreaTDMineFire2009.pdf>
- Inspect, examine, and evaluate all materials used during installation, replacement, or repair of pressurized water systems to ensure suitability.
- Properly train all miners on the hazards associated with working on or around pressurized fluid piping systems.
- Maintain safe and adequate clearance to prevent mobile equipment and machinery from contacting pressurized lines, valves, etc.
- Install barriers to prevent equipment from damaging piping and valves.
- Ensure adequate supervision when moving oversized equipment in haulage entries

Handling Materials

These types of deaths can be prevented by following well-known and accepted safety practices:

- Consider all hazards and implement formal procedures that address possible hazards before performing a materials handling job.
- Devise safe methods to complete tasks involving large objects, massive weights, or the release of stored energy.
- Always de-energize equipment and block against motion.
- Never use permanent roof support as a mechanism for lifting heavy objects. Install lifting points that are designed and manufactured to support the intended load.
- Use only devices designed and rated for the suspension of heavy loads and do not exceed the rated capacity of hoisting, towing, or rigging tools.
- Use a positive means to prevent objects/materials from falling, or moving when working with or near extremely heavy objects/materials suspended overhead.
- Never work in the fall path of objects/materials or massive weights that can become off-balance while suspended.

- Train personnel to recognize hazardous work procedures, including working in pinch points where inadvertent movement could cause injury.

Electrical

These types of deaths can be prevented by following well-known and accepted safety practices:

- Develop a hazard analysis work plan before conducting repairs.
- Always lock and tag-out electrical equipment prior to electrical work.
- Perform your own lock and tag-out procedure. Never rely on others to de-energize or disconnect a circuit for you.
- Use proper Personal Protective Equipment (PPE) for all electrical work.
- Ensure that all electrical circuits and circuit breakers are identified properly before troubleshooting or performing electrical work.
- Use properly rated non-contact voltage testers to ensure that circuits are de-energized.
- Eliminate personal distractions when working on equipment.
- For more information related to Lock and Tag safety, click on the following link on the MSHA Web site: [Lock and Tag Safety](#)

Drowning

These types of deaths can be prevented by following well-known and accepted safety practices:

- Use electronic devices to determine the draft in barges.
- Install and use lifeline tie-off systems to provide fall protection over water.
- Use and maintain sufficient area lighting and personal lighting. Set up a look out and communications protocol. Do not work alone.
- Ensure safe access is provided where persons are required to work or travel. Watch footing and stay clear of ropes, cables, and other obstacles. Use de-icing material to clear ice from walkways. Maintain three points of contact where practicable.
- Wear properly fitted personal flotation devices that are designed to keep an unconscious miner's face above water.
- Utilize wearable electronic emergency warning systems to immediately notify others of a fall into water. These devices can be equipped with water activated strobe lights and global positioning system tracking.
- Provide hazard training to all personnel working on or near an impoundment for recognition of hazards associated with the impoundment and pushout work, such as surface cracks or bubbling in water/slurry.
- Review safety precautions for upstream construction with equipment operators, along with material handling safety policies and designated storage areas for safety equipment.
- Provide oversight by knowledgeable personnel at the work site. Assure that a person is present who is familiar with the mechanics of upstream construction and can recognize and have unsafe work practices and conditions corrected immediately.

- Remove all personnel to a safe location when unsafe impoundment conditions are present.
- Prior to initiating push-outs, expose the slurry delta by pumping excess surface water down to the maximum extent possible, and for as long as possible.
- Use two-way radios or similar devices on all equipment during impoundment related construction, so that potential hazards can be communicated quickly to equipment operators and personnel.
- Maintain a work skiff with oars and life jackets near the pushout area.

Violations of the priority standards identified as **Rules to Live By** continue to play key roles in mine fatalities. While not all of the fatality investigations have been completed, not all of the violations have been identified, and not all of the associated citations and orders have been issued, Rules to Live By standards have been and continue to be associated with 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 fatalities, and the ways to prevent them.

Contractors

Two contractors were killed in the coal mining sector in 2012. 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.

Supervisors

In 2012, five supervisors were killed in accidents in coal mines, representing 26% of the fatalities in the coal mining sector. This percentage is much higher than in previous years. Mine operators must ensure that supervisors have adequate and effective training in the tasks they perform.

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. As necessary, 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" occurs, determine the root causes and take necessary actions to prevent a recurrence. If changes to equipment, materials, or work processes introduce new risks into the mine environment, they must be addressed immediately.

Conducting **workplace examinations** before and during each 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 46 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.

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, we can make that happen.