Summary of 2012 Fatal Accidents at Metal/Nonmetal Mines and Preventative Recommendations.

In 2012, 17 miners were killed in accidents in the metal and nonmetal mining industry.

Six miners died as a result of **powered haulage** accidents. Three miners died in **machinery** accidents, three died in **fall of person** accidents, and two died as a result of **falling material.** One miner died from a **fall of highwall,** another from a **fall of rib,** and one from **other** types of accidents. Four (24%) of the seventeen fatalities were **contractors**; four (24%) were supervisors.

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:

Six miners died when they were involved in powered haulage accidents.
A 69-year-old mobile equipment operator with 48 years of experience was killed at a cement operation. The victim was cleaning a tailpiece with a skid steer loader. He backed the loader in a drainage ditch, traveled in reverse about 150 feet, and went into a 5½-foot deep water hole.

A 37-year-old haul truck driver with approximately 2½ years of experience was killed at an underground crushed stone operation. She was operating a loaded articulated haul truck down a slope when the truck went out of control and struck a rib. The tractor of the truck (cab) overturned. The victim was found outside of the cab and had been run over by the truck.

A 51-year-old shift operator with 13 years of experience was killed at a cement operation. He was walking from the lunchroom toward the locker area when he was struck by a front-end loader. He was found near the plant's crane bay building.

A 49-year-old customer truck driver with no mining experience was killed at a surface stone mine. He was driving a loaded dump truck, traveling down a grade, when the truck lost its brakes and went out of control. The victim jumped out and the truck ran over him. A passenger in the truck also jumped out and was treated at a hospital and released.

A 49-year-old equipment operator with 18 weeks of mining experience was killed at a portable crushing operation. He was standing on the discharge end of a 150-foot stacker belt conveyor, greasing the head pulley, when a coworker started the conveyor. The victim fell off the conveyor approximately 50 feet to the ground below.

A 52-year-old utility miner with 19 years of experience was killed on the surface of an underground limestone mine. He was operating a forklift on a decline toward the mine

entrance when the forklift went out of control, struck a concrete support for the belt conveyor, overturned and killed the miner.

Three miners were killed working near or inside machinery.
A 36-year-old foreman with about 9½ years of experience was killed at a sand and gravel operation. He was operating an excavator on a dike separating two ponds when the ground beneath the excavator tracks failed, toppling the excavator into one of the ponds.

A 79-year-old foreman with 56 years of experience was killed when he was run over by the dozer he was operating. The victim exited the cab and was on the left track checking the engine throttle linkage when the dozer moved forward.

A 30-year-old contract driller with 6 years of experience was killed at a common shale operation. The victim apparently attempted to thread a new drill steel manually, using a strap while the drill head was rotating. The rotating steel entangled him.

Three miners died in fall of person accidents.
A 46 year-old-plant mechanic with 7 years of experience was injured at a crushed stone operation when he fell 16 feet from an elevated walkway of a conveyor to the ground below. The victim and a coworker had been bolting a snub pulley in position. The coworker was positioned on a walkway on the other side of the belt. The victim was hospitalized and died four days later.

A 49-year-old driller with 24 years of mining experience was killed at an underground gold mine. The victim was assigned to prepare the work area to set up a long-hole bench drill and was working near an open stope when he fell down the stope. He was inadvertently loaded out with the material and transported by a haul truck to the surface where he was later discovered.

A 34-year-old contract laborer with 6 days of experience was killed when he fell through a 6 ft. X 8 ft. hole that was partially covered with 2" X 4" boards and ¾ " thick plywood. He fell into a chute landing on a belt conveyor 30 feet below. The victim was assigned fire watch duties on a welding/cutting operation that was taking place on the floor above him.

Two miners were killed by falling material.
A 49 year-old-excavator operator with approximately 8½ years of experience was injured at a sand and gravel operation. The victim was removing bolts from a counterweight on the back of an excavator when the counterweight fell and struck him. He was hospitalized and died four days later as a result of his injuries.

A 58-year-old equipment operator with 19 years of experience was killed at a cement operation. The victim was working on the roof of a 189-foot tall silo when the roof collapsed.

One miner was killed in a fall of highwall accident
A 40 year-old-mine owner with 8 years of experience was killed at a shale operation. The victim was operating an excavator with a rock breaker attachment. He was breaking and mining material from a near vertical wall when the face fell onto the cab of the excavator, crushing him.

One miner was killed by a fall of rib.
A 54 year-old-mine owner with approximately 25 years of experience was killed at an underground gemstone mine. He was cleaning fine ore with a shovel and loading it in the bucket of a front-end loader when rock fell from the top left rib about 20 feet high. The victim was working alone.

One miner was killed in other types of accidents.
A 55-year-old contract painter with 35 years of experience was killed at a kaolin and ball clay operation. He was standing on the bottom of a 40-foot high, 50-foot diameter tank that was open to the atmosphere and covered with mesh cloth material. He was spraying coal tar on the inside walls of the tank and was found unconscious by coworkers. The victim was recovered by emergency personnel and pronounced dead at a hospital.

Best practices
Deaths continue to occur needlessly in metal and nonmetal 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 some best practices that can prevent these types of accidents in the future:

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

- Ensure that persons are task trained and understand the hazards associated with the work being performed.
- Equipment operators should be familiar with their working environment at all times.
- Ensure that safety precautions are taken based on different weather and lighting conditions.
- Keep mobile equipment a safe distance from the edge of water or embankments.
- Always wear a seat belt when operating self-propelled mobile equipment.
- Barricade or post warning signs at all approaches in areas where health or safety hazards exist that are not immediately obvious to all persons. Warning signs shall be readily visible, legible, and display the nature of the hazard and any protective action required.

- Provide and maintain berms or guardrails on the banks of roadways where a drop-off exists of sufficient grade or depth to cause a vehicle to overturn or endanger persons in equipment.
- Monitor work activities routinely to determine that safe work procedures are followed.
- Operate equipment in a manner that maximizes visibility. Use a spotter when visibility of the work or travel areas is limited.
- Maintain control of mobile equipment while in motion.
- Maintain safe operating speeds consistent with conditions of roadways, grades, clearance, visibility, traffic, and the type of equipment used.
- Place controls in the park position and set the parking brake when mobile equipment is left unattended.
- Inspect and maintain mobile equipment for operational reliability.
- Sound alarms and horns before starting or moving equipment.
- Stay clear of mobile equipment.
- Install proximity detection/protection systems.
- Provide and maintain a safe means of access to all working places.
- Establish policies and procedures for conducting specific tasks on belt conveyors.
- Deenergize and Lock-out/Tag-out all power sources before working on belt conveyors.
- Block belt conveyors against motion before working near a drive, head, tail, and take-up pulleys.
- Maintain communications with all persons performing the task. Before starting belt conveyors, ensure that all persons are clear.
- Sound an audible alarm prior to start up, if the entire length of the belt conveyor is not visible from the starting switch.
- Clearly label all switches on equipment and provide training to persons who operate and work in the vicinity of equipment.

Machinery Accidents

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

- Examine work areas to identify all hazards and remediate before starting any work.
- Evaluate the stability of the ground (slopes and berms) prior to operating equipment near any drop off or edge.
- Always be attentive to changes in ground conditions and visibility when operating machinery.
- Perform the work at a safe distance away from the edge of a pond or where the stability of the ground may be unknown.
- If a potential hazard is present, use long reach equipment to limit exposure and maintain a safe distance.
- Consider areas that have experienced previous slope failures to be unstable and do not approach until the area is evaluated for stability.

- Wear flotation devices where there is a danger of falling into water.
- Inspect equipment before placing it in operation for the shift.
- Correct safety and operational defects on equipment in a timely manner to prevent the creation of a hazard to persons.
- Establish and discuss safe work procedures. Identify and control all hazards. Train all persons to recognize all potential hazards and understand safe job procedures to eliminate all hazards before beginning work. Monitor personnel routinely to determine that safe work procedures are followed.
- Block dozer against motion by lowering the blade and ripper to the ground and setting the parking brake. Set the transmission lock lever to ensure the transmission is in neutral.
- Never place yourself in a position that will expose you to hazards while performing a task.
- Ensure that the manufacturer's procedures are followed when adding drill steels.
- Ensure that emergency stop/shut-off switches, panic bars, dead man devices, tethers, slap bars, rope switches, two handed controls, spring loaded controls, are functional and in easily accessible locations.
- Never manually thread drill steels when the drill head is rotating.
- Drills should be fitted with automated systems for changing rods, or two persons should be present when rods are changed manually.
- Do not wear loose fitting clothing when working around drilling machinery. Avoid using a strap or other objects that could become entangled with or thrown from moving or rotating parts.

Fall of Person

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

- Establish and discuss safe work procedures. Identify and control all hazards. Train all persons to recognize and understand safe job procedures before beginning work.
- Wear a safety harness and attach it to a securely-anchored lanyard where there is a danger of falling.
- Protect openings near travelways through which persons may fall by installing railings, barriers, or covers.
- Keep temporary access opening covers secured in place at all times when the opening is not being used.
- Ensure that areas are barricaded or have warning signs posted at all approaches if hazards exist that are not immediately obvious.
- In applications where the danger is not limited to a free-fall, do not use lanyards that depend on free-fall speed to lock. Follow the manufacturer's recommendations.
- Ensure that persons working on material in bins, silos, hoppers, tanks, and surge piles are properly tied-off, with one line tender per person. No persons should enter the facility until the supply and discharge equipment are locked out.

- Establish policies and procedures for safely clearing muck in a bin excavation and ensure that persons follow these safe procedures.

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

- Before working on or near equipment, establish safe work procedures consistent with the design of the machine. Train all persons to recognize and understand these procedures.
- Follow the equipment manufacturer's procedures for the work being performed to ensure that all hazards are addressed.
- Provide adequate task training to persons assigned to perform the work. Utilize assistance from the manufacturer when the equipment incorporates new technology and features.
- Install blocking materials before removing mounting bolts from machinery components which can fall during disassembly.
- Routinely inspect the entire silo including walls, top, hopper(s), feeders, conveying equipment, liner, roof vents, etc. Look for structural damage, exposed rebar, stress cracks, corrosion, concrete spalling/cracking, signs of overfilling, top lifts, dust spills from seams during loading, damage to climbing devices, etc. The structure should be inspected by a professional engineer knowledgeable in silo design and construction.
- Ensure a competent person conducts examinations to identify hazards.
- If damage is discovered, prohibit use of and access on the silo and in the surrounding area until repairs are complete and/or a registered professional engineer has declared it structurally safe to use.
- Modifications or equipment additions to a silo should be under the direction of a professional engineer.
- Ensure process controls and dust collector baghouses are in working order to prevent overpressure, overfilling, or excessive vacuum. Dust leaving a silo may indicate structural damage or equipment malfunction.
- Ensure aeration systems and other means of enhancing hopper flow are in working order so asymmetric flow patterns do not develop within the silo and damage the walls, hopper, and roof.
- Provide silo level probes/weight measuring technology for /equipment to monitor silo material filling and discharge in the silo and keep it in working order.

Fall of Highwall
This type of death can be prevented by following well-known and accepted safety practices:

- Operate excavators with the cab and tracks perpendicular to, and away from, the highwall.
- Bench or slope the material to maintain stability and to safely accommodate the type of equipment used. Do not undercut material on the face of a slope, bank, or highwall.

- Examine highwalls, slopes, and banks from as many perspectives as possible (bottom, sides, and top/crest) while maintaining the safety of the examiner(s). Look for signs of cracking, bulging, sliding, toppling or other signs of instability. Record the type and location of hazardous conditions.
- Use auxiliary lighting during non-daylight hours to conduct highwall examinations and to illuminate active work areas.
- Perform supplemental examinations of highwalls, banks, benches, and sloping terrain in the working area.
- Immediately remove all personnel exposed to hazardous ground conditions and promptly correct the unsafe conditions. When the conditions can not be corrected, barricade and post signs to prevent entry.
- Remove loose or overhanging material from the face. Correct hazardous conditions by working from a safe location.

Fall of Rib

This type of death can be prevented by following well-known and accepted safety practices:

- Establish safe work procedures and train all persons to recognize and understand these procedures.
- Examine work areas and identify and control all hazards before starting any work.
- Always examine, sound, and test for loose ground in areas before starting to work, after blasting, and as ground conditions warrant.
- Test for loose material frequently during work activities and where necessary, scale loose material safely.
- Install ground support in roof and ribs where conditions warrant.
- Do not perform work alone in any area where hazardous conditions exist that would endanger your safety.

Other

This type of death can be prevented by following well-known and accepted safety practices:

- Develop, implement, and maintain a written Hazard Communication (HazCom) program.
- Ensure that a Material Safety Data Sheet (MSDS) is accessible to persons for each hazardous chemical to which they may be exposed.
- Review and discuss MSDS control section recommendations with employees that may be exposed to hazardous chemicals. Establish and discuss safe work procedures before starting any work and identify and control all hazards.
- Train all persons to recognize and understand safe job procedures, including the physical and health hazards of chemicals that are being used and the proper use of respiratory protection, gloves, body suits, hearing, and eye & face protection.
- Ensure that adequate ventilation is provided to all work areas.
- Ensure that persons are not required to perform work alone in any area where hazardous conditions exist that would endanger their safety.

- Conduct air monitoring with calibrated instruments to ensure a safe working atmosphere. Air monitoring should be done prior to workers entering the confined work space and continuously until workers have exited the enclosed area. Atmospheric monitoring at minimum includes oxygen, LEL and all potential toxic gases in the work place.

Further analysis of 2012 fatalities in the metal and nonmetal mining sector reveals several issues to be aware of.

Contractors

In 2012, 24% of the fatalities in the metal and nonmetal mining sector were contractor employees. Contractors and mine operators should ensure that contractors are properly trained and following 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, 24% of the fatalities in the metal and nonmetal mining sector were supervisory personnel. 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.

Training

In 2012, 4 of the 17 (24%) miners killed had three years or less experience at the mine site and 3 of these miners (18%) had less than one year's experience at the mine. Additionally, 7 of those 17 persons (41%) had less than five years experience at that job or task, including five (29%) with less than one year at the job. 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 on the conditions that lead to deaths or injuries and measures to prevent them. **Ensure that all task training is provided as required.**

Lock Out and Tag Out (LOTO)

Failure to **Lock Out and Tag Out (LOTO)** equipment power sources continues to result in mine fatalities. These accidents that could have been prevented by electrically disconnecting power and assuring it is OFF, having each miner on the job lock the power source in the safe position, and attach his or her personal safety lock and tag to prevent reconnection and re-energization. In 2012, one such fatality occurred as a result of a powered haulage belt conveyor accident. **This accident would not have occurred had the power been disconnected and locked out.**

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, violations of the Rules to Live By standards were still

associated with several of those 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.

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 does occur, find out why and take necessary actions to prevent 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 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 problems resolved to protect workers.

Miners deserve a safe and healthy workplace and the right to return home injury free at the end of every shift. We must all continue to work together to make that happen.