

“12 To Remember”

Adapted From MSHA’s “Rules to Live By” Program

**Includes Serious Injury and Fatality Statistics From Virginia
2000 – 2009**

**Presented by Virginia DMME
Division of Mineral Mining
Created July 2010**

MSHA's "Rules to Live By"

- MSHA has analyzed its fatality data from 2000 through 2008. As a result, MSHA has identified the following:
 - 9 accident categories most prevalent.
 - Of these, 3 are specifically underground and 6 apply equally to surface and underground.
 - 13 standards most often violated in M/NM.
 - 12 of these standards are from Part 56, which governs surface M/NM mines, and 1 is from Part 57, governing underground M/NM mines.

Our Focus Today

- In Virginia, at present, the vast majority of mineral mines are surface operations.

Therefore:

- We will discuss the 6 accident categories that apply to surface operations.
- We will discuss, in depth, the 12 MSHA standards from Part 56 along with the corresponding Virginia regulations. These are the “12 To Remember”.

The Accident Categories

1. Falls From Elevation

- Nationally (MSHA), 42 fatalities
- Virginia; 16 serious injuries, 1 fatality

2. Operating Mobile Equipment

- Nationally, 40 fatalities
- Virginia, 2 serious injuries

3. Lock and Tag Out

- Nationally, 22 fatalities
- Virginia, 2 serious injuries

4. Maintenance

- Nationally, 21 fatalities
- Virginia; 10 serious injuries, 5 fatalities

5. Struck by Mobile Equipment

- Nationally, 15 fatalities
- Virginia; 7 serious injuries, 1 fatality

6. Blocking Against Motion

- Nationally, 11 fatalities
- Virginia, 1 serious injury

- This represents 52% of all M/NM fatalities, nationally.
- For Virginia, this represents 83% of all serious injuries and 88% of fatalities!

The Ugly Numbers

- Between January 1, 2000, and December 31, 2008, there were 289 fatalities in M/NM mines in the United States. Of these fatalities, 119, or 41%, are cited under the 12 standards we will discuss.
- In Virginia during the same time period, and including 2009, there were 46 serious injuries and 8 fatalities in mineral mining. Of these serious injuries and fatalities, 23 serious injuries, or 50%, and 7 fatalities, or 88%, fell under the 12 MSHA standards and our corresponding regulations.

The Twelve Standards

- 56.14105 – Procedures during repairs or maintenance
- 56.15005 – Safety belts and lines
- 56.9101 – Operating speeds and control of equipment
- 56.14101(a) – Service brake performance
- 56.14205 – Machinery, equipment and tools used beyond design
- 56.20011 – Barricades and warning signs
- 56.16009 – Persons shall stay clear of suspended loads
- 56.14131(a) – Seat belts provided and worn in haul trucks
- 56.14130(g) – Wearing seat belts
- 56.12017 – Working on power circuits
- 56.16002 – Bins, hoppers, silos, tanks, and surge piles
- 56.14207 – Parking procedures for unattended equipment

1. Procedures During Repairs or Maintenance

■ 56.14105

- Repairs or maintenance of machinery or equipment shall be performed only after the power is off, and the machinery or equipment blocked against hazardous motion. Machinery or equipment motion or activation is permitted to the extent that adjustments or testing cannot be performed without motion or activation, provided that persons are effectively protected from hazardous motion.

■ 4 VAC 25-40-350. Repairing machinery

- Similar language as above except it goes on to require locks and tags placed by those performing the work and only removed by those same people.

Statistics

- Failure to prevent hazardous motion of machinery or equipment during maintenance or repairs accounted for the highest number of fatalities nationally (25 or 8.7%).
- The same was true in Virginia with 3 fatalities taking place during the period (38%). 4 serious injury accidents took place as well (9%).
- From 2000 through 2008, MSHA cited this standard 605 times.

Hazards to Avoid

- Machinery/equipment not blocked against motion during maintenance/repairs.
 - All 3 of Virginia's fatalities and 1 serious injury were due to this.
- Equipment not effectively de-energized.
 - 2 serious injuries in Virginia resulted from this.
- Persons not protected against hazardous motion during testing and adjustment.
 - 1 serious injury in Virginia was a result of this.

Before Starting Work...

- Certified foremen and miners should answer these questions:
 - Are adequate blocking materials available and being used?
 - Is the piece blocked against all possible motion?
 - Is it effectively de-energized?
 - Is there a hazard from any stored energy?
 - Is motion necessary for testing or adjustment?
 - Are people protected from motion during testing or adjusting?



11/20/2009

2. Safety Belts (Harnesses) and Lines

- 56.15005
 - Safety belts and lines shall be worn when persons work where there is a danger of falling....
- 4 VAC 25-40-1740. Safety harnesses
 - A safety ***harness*** with a line.... Safety belts are not allowed in Virginia.
- ***Remember – Safety harnesses and lines are not a replacement for providing safe access to areas where miners must travel as a normal part of their work day.***

Statistics

- Every year at least 1 miner dies from a fall somewhere in the country (17 overall, 5.9%).
- In Virginia there was 1 fatality and 6 serious injuries during the study period.
- MSHA cited this standard 3,887 times.



Hazards to Avoid

- Miners not wearing harnesses and lines when exposed to fall hazards.
 - The 6 miners seriously injured in Virginia were not wearing fall protection.
- Miners not tied off to adequate anchor points.
 - The fatality in Virginia was due to this.
- Miners wearing harnesses not properly adjusted.

Before Starting Work...

- Certified foremen and miners should ask...
 - Are there fall hazards associated with this job?
 - Is proper fall protection equipment available?
 - Has the equipment been inspected for good condition?
 - Is the equipment being worn/used properly?
 - Are lanyards of proper length and attached?
 - Do training and procedures adequately address what to do after a fall? This includes getting a fall victim down and dealing with the possibility of ***suspension trauma***.



3. Operating Speeds and Control of Equipment

■ 56.9101

- Operators of self propelled mobile equipment shall maintain control of the equipment while it is in motion. Operating speeds shall be consistent with conditions of roadways, tracks, grades, clearance, visibility, and traffic, and the equipment used.

■ 4 VAC 25-40-1430

- Operators shall have full control of the equipment while it is in motion.

■ 4 VAC 25-40-1390

- Speeds shall be consistent with conditions....

Statistics

- This standard was cited in the deaths of 15 miners. In a number of cases seat belt use was also a factor.
- There were 2 serious injuries in Virginia.
- MSHA cited this rule 210 times.

Hazards to Avoid

- Operators not fully in control of their equipment at all times.
- Operating speeds not consistent with conditions.



Before Starting Work...

- The certified foreman and equipment operators should consider:
 - Road conditions
 - Weather conditions
 - Is the terrain too rough?
 - Is the slope/grade too great?
- These issues should be monitored for changes throughout the shift.

From MSHA Fatal-grams



4. Brakes (minimum requirements)

■ 56.14101(a)

1. Self propelled mobile equipment shall be equipped with a service brake system capable of stopping and holding the equipment with it's typical load on the maximum grade it travels.
2. If equipped..., parking brakes shall be capable of holding the equipment with it's typical load on the maximum grade it travels.
3. All braking systems installed on the equipment shall be maintained in functional condition.

Virginia Regulations

- 4 VAC 25-40-1320. Brakes on mobile equipment.
 - ...equipment shall be provided with adequate service brakes capable of stopping and holding the equipment with it's typical load on the maximum grade it travels.
- 4 VAC 25-40-1330. Emergency brakes.
 - Mobile equipment shall be equipped with emergency brakes separate and independent of the regular braking system
- 4 VAC 25-40-360. Maintaining machinery.
 - Machinery and equipment shall be maintained in accordance with manufacturer's specifications; defective machinery or equipment shall be removed from service immediately.

Statistics

- Brakes were a key factor in 14 fatalities nation wide.
- MSHA cited the various parts of this standard 18,073 times.
- There were no serious injuries or fatalities that involved inadequate brakes in Virginia!!

Hazards to Avoid

- Service brakes that will not hold adequately.
- Parking brakes that will not hold adequately.
- Brake systems/parts not maintained to manufacturer's specifications.

Before Starting Work...

- The certified foreman must be certain that equipment operators are trained to properly carry out a pre-operational inspection of their equipment including brake system components and functionality.
- Operators must visually check brake components before moving the equipment, then check function when the equipment is first moved and, once loaded, check for adequate function of the service/foot brake and parking brake on the maximum grade.
- * Operators must be alert to changes in performance during the shift.



PRE-SHIFT SAFETY CHECK LIST

Note: (fill out this sheet before starting shift)

JOB _____ DATE _____

EQUIPMENT TYPE _____

EQUIPMENT NUMBER _____ SHIFT NO. _____

CODES: O-K ☒ REPAIRS MADE ☐ REPAIRS REQUIRED ☒

	Safe	Unsafe
Safe to Operate?		
Back-up Alarm		
Brakes: Foot		
Brakes: Parking		
Fire Extinguisher		
Lights		
Horn		
Windshield Wipers		
Glass		
Grab-rails		
Steps		
Safety Guards		
Mirrors		
Seat Belts		
Tires-Wheels		
Steering		
Oil Level		
Water Level		
Was Machine Inspected?		
Hour Meter Reading		
Battery		
Check for oil hydraulic leaks		

Remarks: _____

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5. Machinery, Equipment and Tools

■ 56.14205

- Machinery, equipment, and tools shall not be used beyond the design capacity intended by the manufacturer where such use may create a hazard to persons.

■ 4 VAC 25-40-330. Proper use of machinery.

- Machinery and equipment shall be used for the purpose and within the capacity for which intended and designed.



Statistics

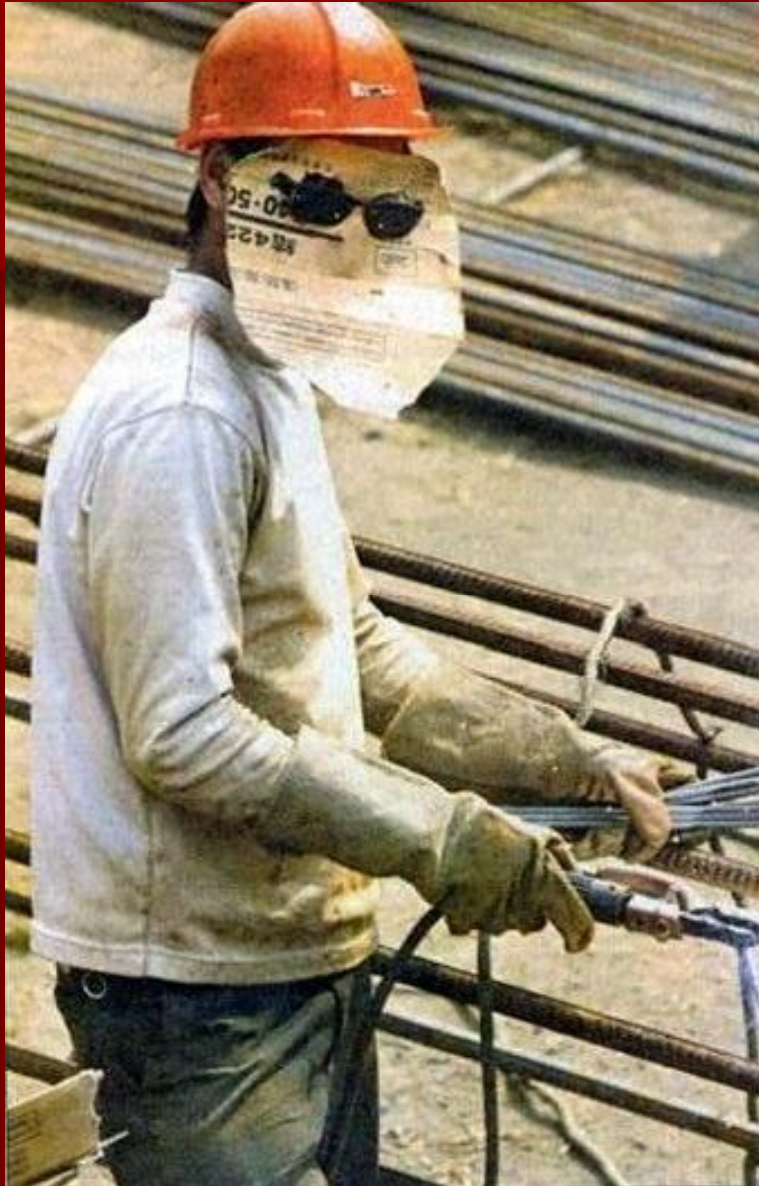
- Misuse of machinery, equipment and tools contributed to 14 fatalities nationally, 4.8% of the total.
- Improper use of tools and equipment was a factor in 6 serious injuries (26%) and 1 fatality in Virginia.
- During the period analyzed, MSHA wrote 1,412 citations.
- * *5 of the 6 serious injuries in Virginia involved the misuse of ladders.*

Hazards to Avoid

- Pieces modified in the field from their original design.
- Objects obviously not intended for the use observed; a cinderblock used for support, bucket teeth used to clear crushers.
- Not knowing the capacities/limits of the tools, etc., before use.
- Not knowing, or having on hand, the proper materials/equipment for a job.
- *Ladders improperly set up and/or used when man-lifts or scaffolding are required.*

Before Starting Work...

- Certified foremen and miners should be certain:
 - The proper machinery, equipment and tools are available to do the job.
 - The capacities of the machinery, equipment and tools are known.
 - The capacities required by the job are known.
 - Proper procedures, as specified by manufacturers or others, are being followed.
 - Federal, state and company rules and regulations are being followed.



6. Barricades and Warning Signs

■ 56.20011

- Areas where health or safety hazards exist that are not immediately obvious to employees shall be barricaded, or warning signs shall be posted at all approaches. Warning signs shall be readily visible, legible, and display the nature of the hazard and any protective action required.

■ 4 VAC 25-40-260. Posting hazards.

- Areas containing safety or health hazards that are not immediately obvious to personnel shall be barricaded or posted with warning signs specifying the hazard and proper safety procedures.

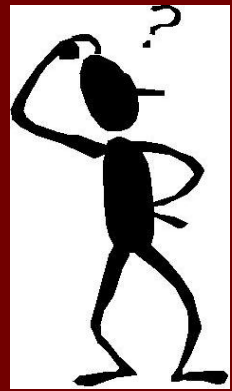
Statistics

- There were 13 fatalities nation wide involving violation of this standard. Most of these occurred when miners stepped on unsecured coverings or grating and opening covers not designed to support the miner's weight.
- There were 2 serious injuries in Virginia. 1 involved the use of boards not capable of supporting the miner.
- MSHA cited this standard 1,808 times.

Hazards to Avoid

- Barricades not provided or warning signs not posted where safety and health hazards are not obvious.
- Intermittent hazards including dust, noise, gases/fumes, and heat.
- These types of hazards can come and go during a shift. They are often of a short duration during maintenance or construction activities. This makes constant re-inspection of the work area all the more important.

Before Starting Work...



- Certified foremen and miners must:
 - Identify those areas needing barricading or posting.
 - Be alert to these areas being created during the shift by the work being done.
 - Be certain that materials being used to support miners, especially temporarily, are capable of doing so.
 - Consider hazards to miners entering an area they are not familiar with.





7. Suspended Loads

■ 56.16009

– Persons shall stay clear of suspended loads.

■ 4 VAC 25-40-2600. Suspended loads.

– Persons shall stay clear of suspended loads.



Statistics

- Nationally, 9 miners were killed when suspended loads fell and struck them.
- From 2000 through 2009 there was 1 serious injury and 1 fatality in Virginia.
- MSHA cited this standard 393 times.

Hazards to Avoid

- Persons failing to stay clear of suspended loads.
- Persons not being aware of the path loads will travel while suspended.
- Too many people in the lift area.
- Inadequate lifting materials/tools.

Before Starting Work...

- Certified foremen and miners should be certain:
 - Materials/equipment to be used in lifting are in good condition and properly rated for the job.
 - Everyone in the area knows the path the lift will take.
 - Everyone is trained to stay clear of loads and procedures are followed so no one is in a dangerous position.



8. Seat Belts in Haulage Trucks

- 56.14131 (a)
 - Seat belts shall be provided and worn in haulage trucks.
- 4 VAC 25-40-1370. Safety equipment.
 - Heavy duty mobile equipment manufactured after June 30, 1969 shall be equipped with acceptable roll-over protection structures and seat belts. Equipment operators shall use the seat belts provided.

Statistics

- MSHA 's records show there were 8 fatalities due to failure to wear seat belts in haulage trucks.
- There were no serious injuries or deaths in Virginia due to not wearing seat belts in haul trucks!!
- 963 citations were issued by MSHA during the period.
- * MSHA reported 2 other fatalities related to operators jumping from the equipment cab.

Hazards to Avoid

- Improper training resulting in seat belts not being worn, or worn incorrectly.
- Seat belts not being checked during pre-operational inspections and reported if damaged.

* Significant & Substantial (S&S), high negligence violations result from mine operators not providing seat belts and equipment operators not using them.



Before Starting Work...

- Certified foremen should ensure:
 - Equipment is provided with adequate seat belts.
 - Operators are trained to use seat belts.
 - Operators are inspecting seat belts during pre-op inspections.
 - They observe operators to ensure compliance.
- Miners should ensure:
 - They are complying with seat belt regulations.
 - They report damaged or missing seat belts.
 - If there is an auxiliary seat in the equipment, that a seat belt is present and in good condition and anyone riding in the equipment uses the seat belt provided.
 - If there is no seat/seat belt, NO RIDERS!!



9. Wearing Seat Belts

■ 56.14130 (g)

- Seat belts shall be worn by the equipment operator except when operating graders from a standing position, the grader operator shall wear safety lines and a harness in place of a seat belt.
- * Other subsections list equipment types covered and exemptions and seat belt maintenance.

■ 4 VAC 25-40-1370

- As stated previously, refers to “heavy duty mobile equipment” and does not exempt any equipment except that made prior to June 30, 1969. There is no reference to grader operators.

Statistics

- There were 7 miners killed nationally in accidents where failure to wear a seat belt was a factor (other than haulage trucks).
- In Virginia, there was 1 serious injury due to failure to wear a seat belt. A supervisor was moving a small dozer.
- MSHA issued 3,066 citations involving violation of this standard.

Hazards to Avoid

- The same as with haulage trucks:
 - Operator training that does not include proper seat belt use.
 - Equipment operators not inspecting condition of belts as part of pre-operational inspections.
 - Not following manufacturer's recommendations concerning maintenance and replacement of seat belts.

Before Starting Work...

- Mine operators and certified foremen:
 - Carry out and document mobile equipment operator training that includes the proper use of seat belts.
 - Corrective/disciplinary action plans documented and communicated to personnel for failure to wear seat belts.
 - Regularly observe personnel to ensure compliance.
- Miners must comply with federal, state and company rules regarding the use, inspection and maintenance of seat belts.

* High negligence is usually cited!



10. Work on Power Circuits

■ 56.12017

- Power circuits shall be de-energized before work is done on such circuits unless hot-line tools are used. Suitable warning signs shall be posted by the individuals who are to do the work. Switches shall be locked out or other measures taken which shall prevent the power circuits from being energized without the knowledge of the individuals working on them. Such locks, signs, or preventative devices shall be removed only by the person who installed them or by authorized personnel.

■ 4 VAC 25-40-2150. De-energizing power circuits.

- Language is identical to the MSHA standard.

Statistics

- MSHA's records show 6 deaths involving failure to de-energize power circuits.
- In Virginia, there were no serious injuries or fatalities involving energized power circuits during the period. However, 1 incident was investigated because of the potential for serious injury.
- There were 263 citations issued by MSHA.

Hazards to Avoid

- Maintenance/repair work carried out by personnel without proper training (certified/licensed electrician or other competent person).
- Power circuits not being de-energized prior to work being done (AND TESTED).
- Adequate measures not taken to prevent re-energizing of circuits without the knowledge of the people doing the work.
- Not having adequate locks, tags or other proper materials/tools available.
- Getting in too big of a hurry to follow proper procedures.



Before Starting Work...

- Certified foremen and miners should ask themselves:
 - Have all exposed circuits been de-energized? Tested?
 - Have “suitable” warning signs been posted?
 - Do the signs identify all personnel working on the circuit?
 - Are switches locked out or other suitable measures taken to prevent energizing of the circuits?
 - Have all personnel received proper training/certification?



Arc Flash Victim



11. Bins, Hoppers, Silos, Tanks, and Surge Piles

■ 56.16002 (c)

- Where persons are required to enter any facility listed in this standard for maintenance or inspection purposes, ladders, platforms, or staging shall be provided. No person shall enter the facility until the supply and discharge equipment is locked out. Persons entering the facility shall wear a safety belt or harness equipped with a lifeline suitably fastened. A second person, similarly equipped, shall be stationed near where the lifeline is fastened and shall constantly adjust it or keep it tight as needed, with minimum slack.

** Safety belts are illegal in Virginia!*

Virginia Regulation

- 4 VAC 25-40-2550. Confined space hazard.
 - A safety harness attached to an attended lifeline shall be worn by persons before they enter bins, hoppers, silos, tanks, surge, or storage piles. Persons shall not enter the above areas until the supply and discharge of materials has ceased and the supply and discharge equipment is locked out. No person shall enter an area where they are exposed to entrapment by the caving or sliding of loose unconsolidated material.

Statistics

- 6 miners lost their lives in confined spaces from 2000 through 2008, nationally.
- There were no serious injuries or deaths in Virginia from 2000 through 2009.
- * There were fatalities prior to 2000 and 1 during the period that was not considered mine related.
- MSHA inspectors issued 70 citations related to this standard during the analysis period.

Hazards to Avoid

- Persons entering confined spaces without wearing a safety harness and attended lifeline.
- Second person not attending the lifeline.
- Supply and discharge equipment not stopped and locked out. Other similar hazards not addressed.
- Safe access in and around the work area not provided.

Before Starting Work...

- Certified foremen and miners should answer these questions:
 - Has proper confined space training taken place?
 - Are harnesses and lines available?
 - Is air quality an issue before or during work?
 - Has all equipment/machinery presenting a hazard been locked out (supply, discharge)?
 - Has all material presenting an entrapment hazard been removed?
 - Are people available to attend the lifeline and offer adequate assistance if needed?



12. Parking Procedures for Unattended Equipment

■ 56.14207

- Mobile equipment shall not be left unattended unless the controls are placed in the park position and the parking brake, if provided, is set. When parked on a grade*, the wheels or tracks of mobile equipment shall be either chocked or turned into a bank.

■ 4 VAC 25-40-1510. Setting brakes.

- Mobile equipment shall not be left unattended unless the brakes are set. Mobile equipment with wheels or tracks, when parked on a grade, shall be either blocked or turned into a bank or rib unless the bucket or blade lowered to the ground prevents movement.

* MSHA defines a grade as 1% or greater

Statistics

- Nationally, improper equipment parking contributed to 3 fatalities.
- There was 1 serious injury and 1 fatality in Virginia. The fatality was in 2009 and at a mine site not inspected by MSHA.
- 2,189 citations were issued by MSHA for violation of this standard.

Hazards to Avoid

- Mobile equipment left unattended and:
 - Controls not in the park position,
 - Buckets/blades not lowered to the ground,
 - Brakes not set,
 - On a grade (1% or greater) with no chocks or wheels/tracks not turned into a bank.
- Equipment operators not trained in proper parking procedures.
- Failure to remember that light equipment and vehicles must comply (skid steers, fork lifts, pickup trucks and vans).

Before Starting Work...

- Certified foremen must ensure:
 - Equipment operators are trained in proper parking procedures.
 - Wheel chocks are available for all mobile equipment.
 - All personnel are aware that a part of the foreman's daily routine will be to check parking procedures.
- Equipment operators must remember that proper parking procedures are to be utilized every time they leave their equipment, no matter how briefly.



Summary

- Special emphasis is being placed on compliance with the 12 standards discussed here.
- In issuing citations, MSHA inspectors are carefully evaluating key factors:
 - Gravity
 - The likelihood of an occurrence of the injury the standard is intended to prevent.
 - The seriousness of the injury if it were to occur.
 - The number of people affected or subject to injury.
 - Negligence
 - Weight is given to the fact that the requirements within these standards are clearly stated, fundamental to safety, of long standing, and should be well understood. Also considered:
 - Degree of danger to miners.
 - Length of time condition has existed.
 - Obviousness or extensiveness of the condition.
 - Mine violation history.
 - Effort, or lack of effort, to abate the condition.



All Injuries In Virginia

- A look at all reported injuries (medical treatment, etc.) from 2000 through 2009:
 - There were a total of 1,029 reported injuries:
 - 177 involved hand tools.
 - 143 involved slips and falls.
 - 117 involved mobile equipment.
 - 79 involved materials handling.
 - 840 of the 1,029 injuries were assigned to 19 categories (189 shown as “other”). The 4 categories above account for 61% of those injuries categorized.



Final Thoughts

- As stated in the summary, the standards and regulations we have discussed cover fundamental safety issues/hazards. We have been discussing these issues for many years, and yet, we continue to see serious injuries and fatalities related to them.
- Training is a key preventive measure.
- Follow proper procedures at all times; shortcuts kill!!
- Mine operators and miners alike must understand and accept the responsibility for safety they share.



END