

Return Roller Guarding

MSHA/DMM Requirements

DMME

Division of Mineral Mining

AR Training 2012

MSHA Standard/Va. Regulation

- **56.14107** Moving machine parts.
- **4 VAC 25-40-2680.** Accessible moving parts.
 - Both have language requiring guarding for moving machine parts within seven feet of “reach” (Va.) or “walking or working surfaces” (MSHA). MSHA requires the guard to prevent “contact”, DMM “accidental contact”.
 - The big difference is that MSHA includes conveyor components and DMM does not since conveyors are covered in **4 VAC 25-40-2700**. This regulation describes the two levels of conveyor guarding required in Virginia (deliberate/accidental).

MSHA Standard/Va. Regulation

- **56.14112** Construction and maintenance of guards.
- **4 VAC 25-40-2750.** Maintenance of guards.
- **4 VAC 25-40-2740.** When guards to be in place.
 - Similar language requiring guards to be of adequate strength and in place when machinery is in operation except during testing or adjustment.
 - MSHA specifies that guards not create hazards by their use.

MSHA Standard/Va. Regulation

- **56.14110** Flying or falling materials.
- **4 VAC 25-40-2760.** Flying or falling material protection.
 - Both have language requiring guards or shields in areas where flying or falling material presents a hazard to persons.
 - The key difference is that MSHA specifies flying or falling material from the operation of “screens, crushers, or conveyors”.
 - Based on this language, and the recommendations in their “Guide to Equipment Guarding” (2004), some MSHA personnel have required conveyor return idlers to be completely enclosed.
 - Other sources, such as an April 2010 “Pit & Quarry” article have indicated that complete enclosure is required.
 - New MSHA guidelines released in June 2010 indicate this is not the case.

MSHA's Guide to Equipment Guarding

2004 edition

- As the guide indicates, the illustration shows the primary reason for guarding return idlers. The pinch point created by the belt and roller must be guarded.
- The guide goes on to say, "Guarding return idlers may be required where miners work or travel beneath the belt."



Figure 4

MSHA's Guide to Equipment Guarding

- The guide states, “The guard may have openings large enough for fines to fall through, but not large enough for a miner to reach the moving parts”.
- As the illustrations show, miners working or traveling below will be protected from material (or the roller itself should it work loose) falling on them*.

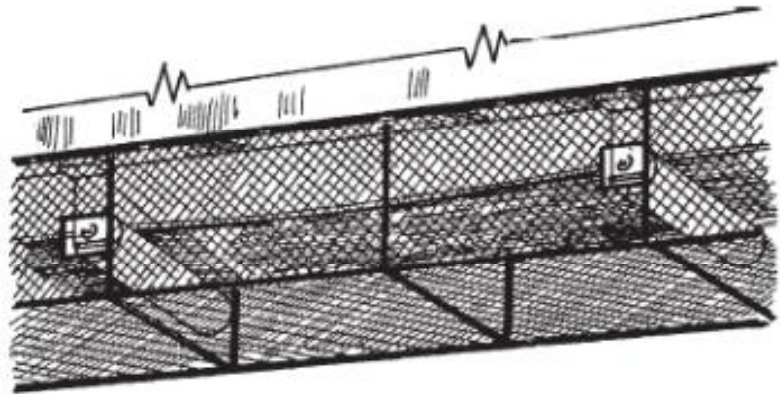


Figure 5

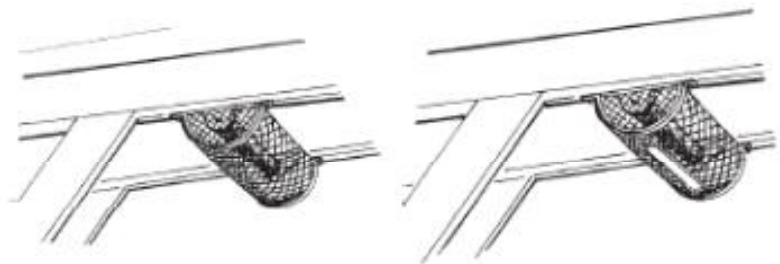


Figure 6

Figure 7

*** MSHA does not state this as a hazard to be addressed by idler guards!!**

MSHA's Latest Guidance Material

June 2010



This guide provides compliance information to help the metal and nonmetal mining industry meet current requirements of the Mine Safety and Health Administration's (MSHA's) guarding standards addressing conveyor belts. This document is also intended to enhance awareness of guarding compliance for miners' representatives, miners, independent contractors, and MSHA's Metal and Nonmetal enforcement personnel with compliance issues related to guarding conveyor belts. This guide should be used to supplement existing guarding guidance contained in "MSHA's Guide to Equipment Guarding" issued in 2004, and in MSHA's existing Program Policy Manual.

June 2010 Guarding Guide

- Quote is referencing 56.14107.
- Slide note* says idlers must be guarded when miners work or travel under the belt.
- Guards must prevent any part of a person from accidentally getting behind the guard and getting caught.

Return Rollers

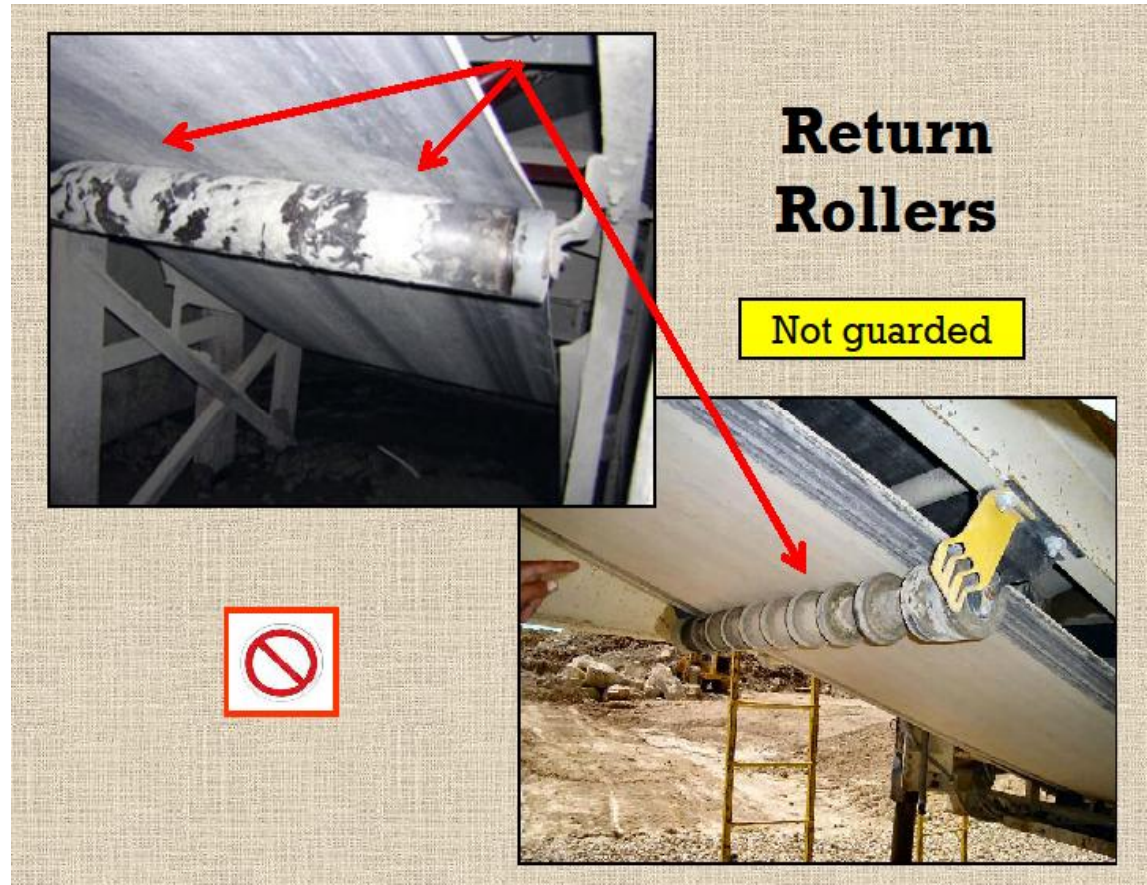
- Considered to be “similar moving parts” and are to be guarded when miners are exposed to injury during work or travel activities.
 - For instance, when cleaning or working under, or crossing under an operating belt conveyor that is not guarded by location.

* Each MSHA slide contains a “notes” icon that, when touched, displays notes in a text box. These are referenced throughout.

** Underlining added

June 2010 Guarding Guide

- Slide notes:
 - Rollers are 3.5 to 4 feet above ground/floor level.
 - The top photo was the scene of a fatality.
 - Rollers must be guarded if miners work or travel....



June 2010 Guarding Guide

- Slide notes:
 - Roller shown is compliant. It is 8 inches from the edge of the travelway and 1 foot above the walkway surface. Contact would not be inadvertent.
 - Must be guarded if miners work or travel....

Return Roller Location



June 2010 Guarding Guide

- Slide notes:
 - The conveyor is located between 2 travelways. The pinch point indicated is at about shoulder height.
 - The ends of the roller must be guarded and maybe the entire roller since the chains are inadequate as a guard against access under the conveyor.

Return Roller Location



The in-running nip point between the roller and the belt can be inadvertently contacted by miners on the walkway. It must be guarded on the sides, as shown on the next slide.

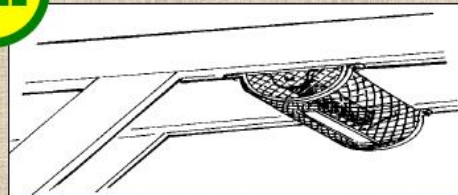
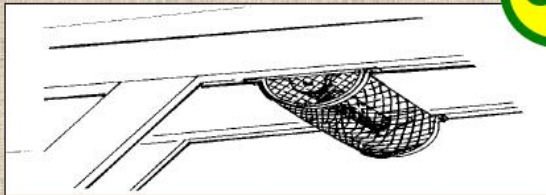
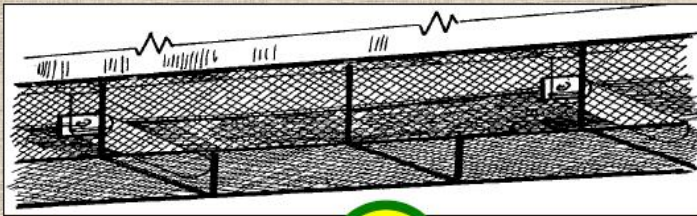
June 2010 Guarding Guide



- Slide notes:
 - Same conveyor, now with guards at the ends of the rollers and railings have been added to prevent miners from working or traveling under the belt.
 - This is compliant unless miners crawl through the railings and access the unguarded portion of the rollers.

June 2010 Guarding Guide

Alternative Methods for Guarding Return Rollers



Illustrations from *Guide to Equipment Guarding Handbook* - 2004

- Slide notes:
 - Drawings from the 2004 “Guide” showing compliant roller guards.
 - Other styles of guards that completely enclose rollers may be used, as well as guards that do not completely enclose the roller.*

* Underlining added

June 2010 Guarding Guide

- Slide notes:
 - The guard shown in the top picture has a hinged bottom to make cleaning easier.
 - The guard at bottom right is non-compliant because the mesh intended to fill the gap between the metal frame and the belting is not substantial and is collapsing. The raw edge of the mesh is a laceration hazard.

Alternative Return Roller Guarding Methods



June 2010 Guarding Guide

- Slide notes:
 - Return roller guards do not have to completely enclose the roller.
 - The guard is set close to the belt and protects the in-running nip point.
 - The guard extends past the ends of the roller to protect the nip points there.

Alternative Methods for Guarding Return Rollers



In-running nip point guarded full width of belt.

Note that guard extends past end of roller.

OK

June 2010 Guarding Guide

- Slide notes:
 - This guard is set close to the belt and protects the in-running nip point.
 - The ends of the roller are covered to protect against accidental contact with nip points.

Alternative Methods for Guarding Return Rollers



Belting location. Adjust guard to minimize gaps.

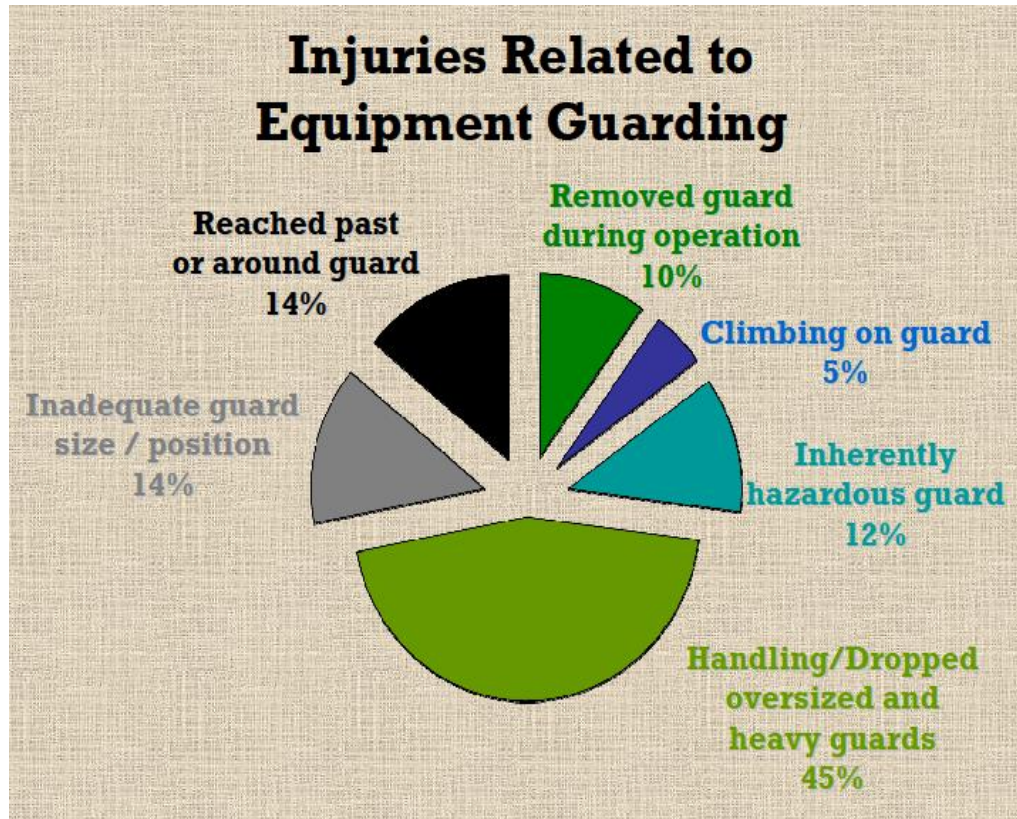
Evaluate



Other Conveyor Guarding Notes

From the June 2010 MSHA guide

Guard Related Injuries



- Graphic shows the distribution of injuries related to behaviors/actions as opposed to conditions.
- 1/3 of all guarding related injuries are caused by at-risk work practices.
- 2/3 of injuries are caused by inadequate guard design, construction, and maintenance.
- Note that 12% are due to the guard itself being a hazard.

Guarding Citations

- This covers all citations issued, not just those associated with conveyor belt guarding.

30 CFR § 56/57.14107 Moving Machine Parts

MNM's most-cited standard

Citations Issued	S&S
11,687	Y
23,966	N
35,653	

*Data is from 2005-May 20, 2010

Accidental or Deliberate Contact

Preamble: § 56/57.14107
[FR, Page 32509]

Guards are meant to protect persons from:

- “inadvertent, careless, or accidental contact” or
- “deliberate or purposeful *work-related* actions...” (inspection, testing, cleaning, maintenance, troubleshooting, lubrication, adjustment, servicing, etc...)
- Standard does not address deliberate or purposeful, NON-work-related actions

* The slide note states that a majority of machinery accidents result from deliberate work related actions.

Work Related (Deliberate) Contact

Inadvertent or Work-Related Contact



Tail pulley must be guarded underneath to prevent inadvertent contact.

- The slide note explains that the tail pulley is high enough that miners could get under it, inadvertently, or for work related purposes such as clean up.

Work Related Contact

- Slide Notes:
 - It is not always necessary to put a guard below a tail pulley, it depends on:
 - The height of the pulley from the ground.
 - The angle of the conveyor, if inclined.
 - What work is performed in the area.
 - The potential for contact.

Inadvertent or Work-Related Contact



Tail pulley guards must extend closer to the ground along sides and in front.

Work Related Contact

- Slide notes:
 - In this case the guard needs to protect the open front since the pulley is well above the ground. The guards on the back and sides are compliant.

Inadvertent or Work-Related Contact



The tail pulley can be accessed by the unguarded opening.



*** Would DMM approve the use of belting?**

Non-Work Related Contact

- Slide notes:
 - Compliant since the wing-shaped metal guard beneath the pulley protects against inadvertent and work related actions.
 - There is no work related reason a miner would purposely reach around or through the guard.
 - The pulley is close to a concrete surface and a water hose is used for clean up.

Purposeful Non-Work-Related Actions



* What would DMM say?

Non-Work Related Contact

Purposeful Non-Work-Related Actions



- Slide notes:
 - Compliant even though the pulley is well above the ground and miners access the area below the pulley for clean up.
 - The wing shaped metal pieces guard against inadvertent and work related actions. The metal straps spanning between the “wings” do the same.
 - Although some of the openings may be big enough for a miner to put a hand through, there is no work related reason a miner would do this.

A “Best Practice”

- Slide notes:
 - Guarding is compliant and could be considered a best practice.
 - Note the triangular guards on the sides of the truss protecting the ends of the return rollers from inadvertent contact.
 - The largest grid size used is 2 ¾ inches, small enough to prohibit contacting moving parts.

Tail Pulley Guards

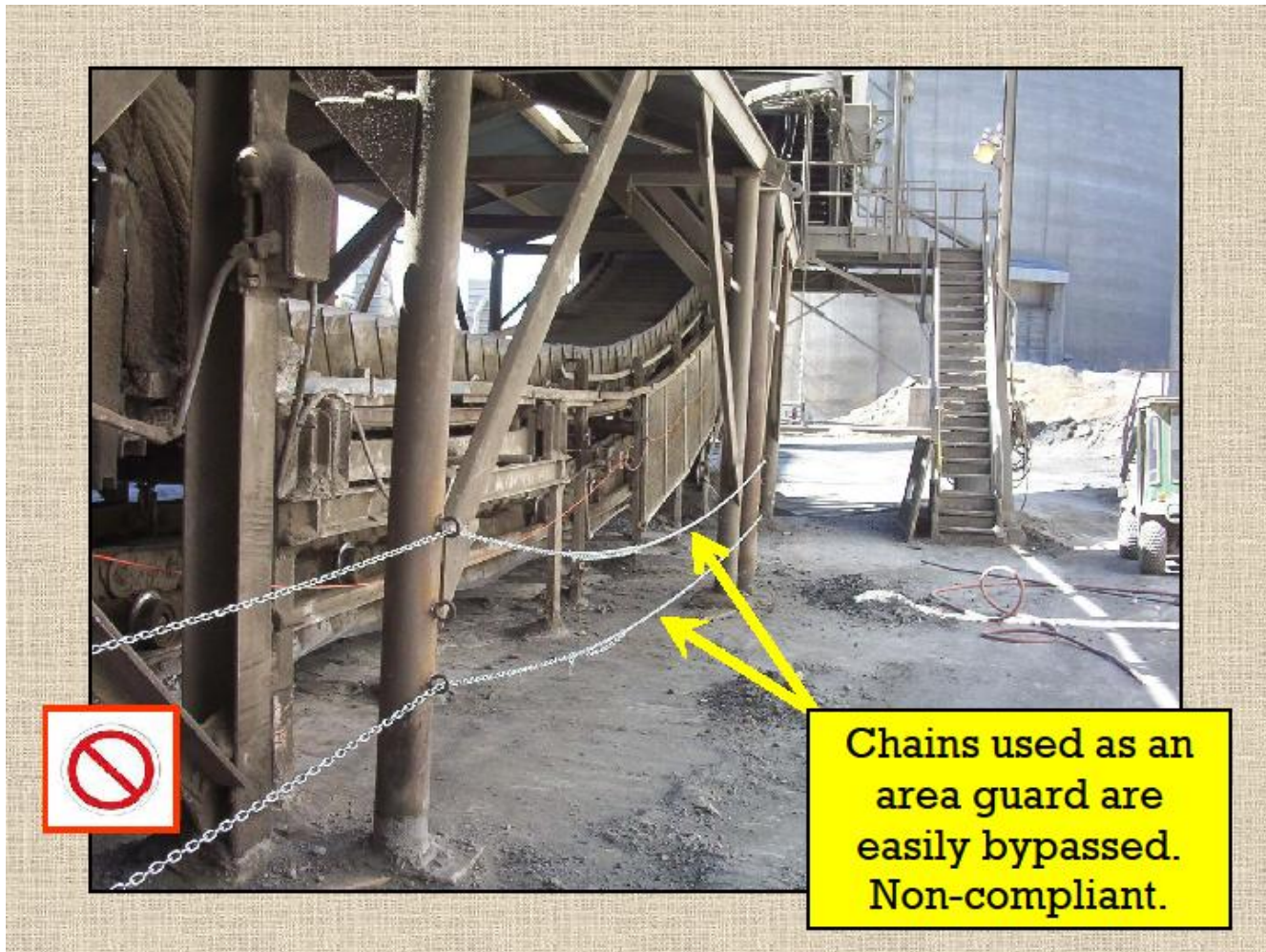


Area Guards

From the 2004 & 2010 Guides

- Effective area guards may require additional practices and provisions in addition to the physical barrier. Key issues to address:
 - The guard must be difficult to defeat and truly prevent entry.
 - Secured with multiple bolts or locked.
 - Machinery shutdown:
 - How many individual pieces to be stopped?
 - What procedures? Lockouts?
 - The guard must be easily recognized:
 - Warning and restricted entry signs used.
 - Color coding the guard itself.
 - Area must not be frequently accessed or accessed by a large number of people.
 - Area guard procedures must be documented and personnel trained; who, when, and how?

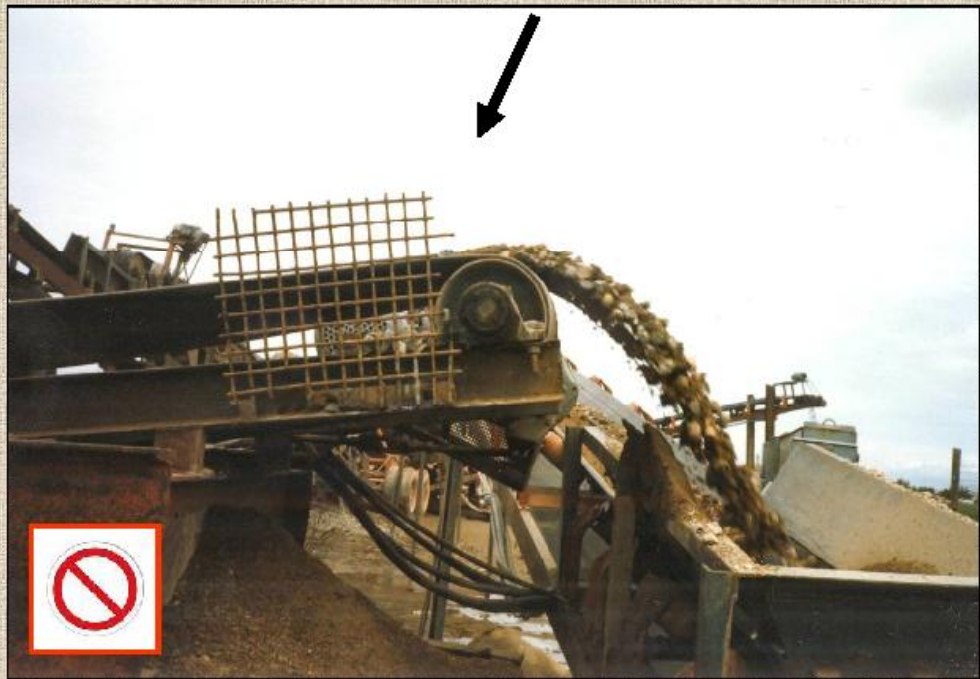
Area Guards



Guards As Hazards

- The guard is a laceration and puncture wound hazard.
- Since it does not adequately guard the moving parts, even if properly constructed, it would not be compliant.

Guard a Hazard in Itself



Guards As Hazards

- Slide notes:
 - This bend pulley guard obstruct 40% of the walkway with a 3 inch high tripping hazard.
 - Guards must be designed and constructed so that safe access is provided for miners carrying out their duties.

Tripping Hazard

