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SUBJECT:

Protecting Miners from Hazards Related to Rib Falls

### **Scope**

This Program Information Bulletin (PIB) applies to operators of underground bituminous coal mines, miners' representatives, Mine Safety and Health Administration (MSHA) enforcement personnel, and other interested parties.

### **Purpose**

The purpose of this PIB is to provide information on the conditions that contribute to rib fall hazards and the available methods for protecting miners from rib falls.

### **Information**

Existing MSHA standards require that the roof, face, and ribs of areas where persons work or travel shall be supported or otherwise controlled to protect persons from hazards related to falls of ribs (30 C.F.R. § 75.202 (a)). The roof control plan, which is developed by the mine operator and approved by the District Manager, must also be suitable to the prevailing geological conditions and the mining system at the mine (30 C.F.R. § 75.220 (a)(1)). The mine operator is required to propose revisions to the roof control plan when conditions indicate that the plan is not suitable for controlling the ribs (30 C.F.R. § 75.223(a)(1)).

The two most significant geologic conditions that contribute to hazards related to falls of ribs are the *seam height* and the *depth of cover*. Analysis of the fatal accident reports from the 23 rib fall fatalities that have occurred since 1995 indicates that 22 (96%) occurred where the mining height was at least 7 ft and 18 (78%) occurred where the

depth of cover was at least 700 ft. The reports indicate that rock partings (rock layers contained within the coal seam) or rock brows (rock layers above the coal seam) were present in nearly every instance.

Other conditions that have contributed to rib fall fatalities include:

- additional rib stress due to multiple seam interactions or retreat mining,
- large slickensides in the coal,
- unusually high places prepared for overcasts or belt drives, and
- unstable pillar corners.

Another significant factor associated with almost every fatal rib fall since 1995 is that no rib support had been installed at the accident location.

Rib bolts provide the best protection against rib falls. Since most rib fall incidents occur on the working section, rib bolts are most effective when they are installed in a consistent pattern while the roof is being bolted. Where the ribs are highly stressed, the rib bolts can be more closely spaced and supplemented by additional surface coverage such as straps or mesh. Control of taller ribs (e.g. 9 feet or higher) may be best achieved if two or more rows of rib bolts are installed. Rib bolts should always be long enough to anchor securely beyond the disturbed portion of the rib.

Outside-control, non walk-through roof bolting machines place the machine operators between the machine and the rib where they may be exposed to rib hazards. Every one of the roof bolt operators killed by rib falls since 1995 was operating an outside-control machine. Inside-control, walk-through roof bolting machines significantly reduce the worker's exposure to hazardous ribs. These machines also are commonly configured to provide horizontal rib bolt hole drilling capability. Operators of mines where conditions create rib fall hazards are strongly encouraged to use inside-control, walk-through roof bolting machines with horizontal rib bolting capability.

Where rib bolting is not feasible, the rib fall hazard can be mitigated by other techniques including roof channels fabricated with angled extensions that buttress the pillar rib, straps or cables for wrapping the pillar rib, or standing supports. When standing supports are used for rib control, it is essential that they be secured in such a manner that a hazard is not created should a support be dislodged.

Mine safety programs and procedures should include methods for preventing, detecting, reporting, and correcting hazardous conditions related to falls of the roof, face, and ribs. These conditions can be detected during applicable preshift, supplemental, or on-shift examinations (refer to Sections 30 C.F.R. §§ 75.360, 75.361 and § 75.362). Hazardous conditions found during such examinations must be corrected immediately or remain posted with a conspicuous danger sign until corrected, pursuant to 30 C.F.R. § 75.363(a).

**Background**

During 2010, three miners were killed in rib falls, and approximately 80 more were injured. While the number of fatalities caused by roof falls has been reduced substantially during the past 15 years, the number of rib fall fatalities has remained relatively constant averaging approximately three every two years.

**Authority**

The Federal Mine Safety and Health Act of 1977, as amended, 30 U.S.C. § 801 et seq.; and 30 C.F.R. §§ 75.202, 75.220, and 75.223.

**Internet Availability**

This PIB may be viewed on the Internet by accessing the MSHA home page ([www.msha.gov](http://www.msha.gov)) then choosing "Compliance Info" and "Program Information Bulletins."

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**Distribution**

MSHA Program Policy Manual Holders  
Underground Coal Mine Operators  
Coal Special Interest Groups  
Miners' Representatives