

UNITED STATES
DEPARTMENT OF LABOR
MINE SAFETY AND HEALTH ADMINISTRATION

COAL MINE SAFETY AND HEALTH

REPORT OF INVESTIGATION

Underground Coal Mine

Fatal Fall of Roof Accident
December 12, 2005

at

Logansport Mine
Rosebud Mining Company

Ford City, Armstrong County, Pennsylvania
ID No. 36-08841

Accident Investigators
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Coal Mine Safety and Health Inspector

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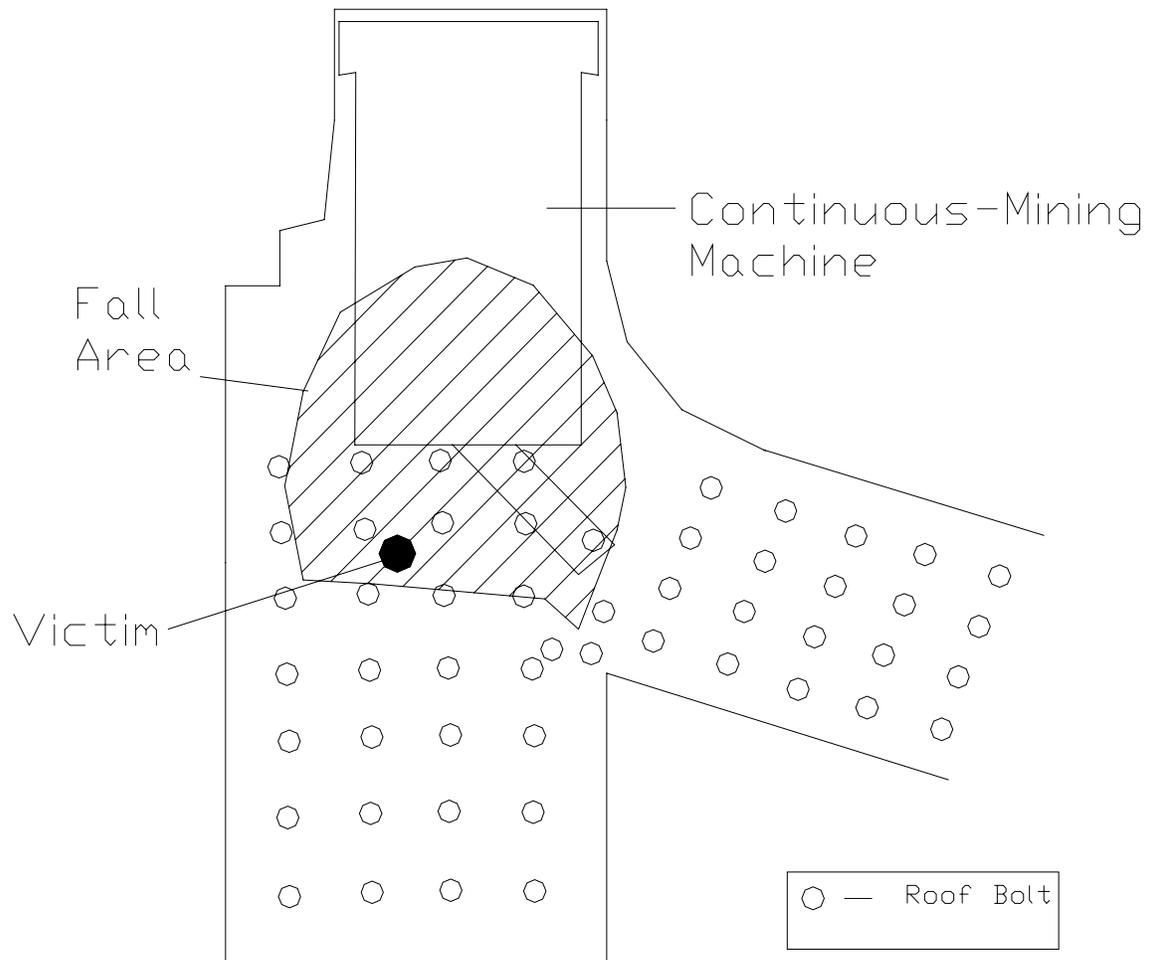
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ACCIDENT SITE

#21
Room



Drawing Not To Scale

OVERVIEW

At approximately 2:00 p.m. on Monday, December 12, 2005, Eric B. Hill, a 29-year old continuous miner operator, with 11 years of mining experience, was fatally injured when a roof fall occurred in the No. 21 room intersection of 6 North Butt Section. The accident occurred while the victim was mining coal in the No. 21 Return Room and was positioned on the left side of the continuous mining machine just outby the second row of roof bolts. In the intersection, the mine roof was supported with 36- and 42-inch resin grouted roof bolts.

The accident occurred as a result of management's failure to ensure that proper length roof bolts were being installed to adequately support the roof and extended cuts were not mined where adverse roof conditions existed in the 6th North Butt Section.

GENERAL INFORMATION

The Logansport Mine, operated by Rosebud Mining Company, is located along Kelly Station Road, in Ford City, Armstrong County, Pennsylvania. The mine is opened by three drifts into the Lower Kittanning coal seam. The immediate roof is typically black shale and the floor is gray, silty claystone. The coal seam has a maximum 650 feet of cover and ranges in thickness from 38 to 48 inches. The overburden at the accident site is 400 feet. Employment is provided for 45 persons underground and 13 persons on the surface. The mine works two production shifts and one maintenance shift, five to six days per week. Two continuous mining machine sections produce an average of 2500 tons of coal a day. Coal is transported from the face by continuous haulage and discharged onto a belt conveyor. The belt conveyor transports the coal to the surface.

The principal officers for the mine at the time of the accident were:

Jerry Hefferan	Manager of Mines
Robert Penigar	Manager of Safety
Michael Roudybush	Superintendent/Mine Foreman
Dave Sharkins	Manager of Maintenance

Prior to the accident, the Mine Safety and Health Administration (MSHA) completed the last regular safety and health inspection on September 29, 2005. The Non-Fatal Days Lost (NFDL) injury incidence rate for the mine in 2004 was 16.66, compared to the National NFDL rate of 5.45.

DESCRIPTION OF ACCIDENT

On December 12, 2005, the daylight shift crew, for 6th North Butt section, consisting of nine persons entered the mine at their regularly scheduled starting time of 6:00 a.m. The crew traveled from the surface to the working section via battery-powered rubber-tired personnel carriers. They arrived on the section at approximately 6:30 a.m. Michael Kunselman (General Assistant) was already at the section. He had conducted the preshift examination and remained on the section due to adverse roof conditions.

The continuous-mining machine operator, Eric Hill (victim) mined a total of six cuts in the Nos. 21, 22, and 23 rooms during the shift. At approximately 1:30 p.m., Hill moved the continuous-mining machine with attached mobile bridge conveyor through the last open crosscut from No. 22 to No. 21 room to complete an intersection and advance the No. 21 room. Hill was positioned in the crosscut on the right side of the continuous-mining machine while mining the intersection. He then moved to the left side of the continuous mining machine just outby the second row of permanent roof supports, in the intersection, to advance the face. The curtain-side lift was mined approximately 30 feet inby the last row of permanent roof supports when the roof fall occurred.

Corey Mumford (Mobile Bridge Operator) turned his head to check the conveyor belt operation. He turned his head back towards the face and saw the roof fall on the continuous-mining machine. Mumford immediately hit the panic bar shutting down the mobile bridge and continuous-mining machine. James Waltenbaugh (Section Foreman), Michael Roudybush (Mine Foreman) and Kunselman were on the section evaluating the roof conditions when they heard the roof fall. They immediately proceeded to the continuous-mining machine and called for Hill but received no response. Waltenbaugh and Kunselman climbed over the mobile bridge conveyor while Roudybush went to call outside for help. Kunselman saw Hill but could not free him. Waltenbaugh yelled to Jason Rankin (Scoop Operator) to bring up cribs and posts to aid in the rescue effort. A hydraulic jack and cribs were used to lift the rock from Hill. Hill was transported to the surface, where he was pronounced dead at 4:45 p.m. by Robert Bowers, Armstrong County Coroner.

INVESTIGATION OF THE ACCIDENT

MSHA was notified of the accident at approximately 2:30 p.m. on December 12, 2005, by a telephone call from Robert Penigar, Manager of Safety, to Thomas McCort, Supervisory Coal Mine Safety and Health Inspector, Kittanning Field Office. An investigation was started the same day. An order was issued pursuant to Section 103(k) of the Mine Act to ensure the safety of the miners.

MSHA's accident investigation team conducted a physical inspection of the accident site, interviewed employees, and reviewed documents and work procedures relevant to the accident. MSHA conducted the investigation with the assistance of the mine employees, Pennsylvania Bureau of Deep Mine Safety, MSHA Technical Support, MSHA Education and Field Services, and the Armstrong County Coroner's office. Fourteen persons were interviewed during the course of the investigation.

DISCUSSION

METHOD OF MINING

Panels developed off the 6th North Butt typically were started with a 3-room neck (for a distance of one to two crosscuts) and then increased to five rooms wide. Previous panels had been developed on the return (west) side of 6th North Butt. This was the first panel on the intake (east) side. At the time of the accident, the panel comprised three entries (rooms 21, 22, and 23) and had advanced one crosscut from the 6th North Butt. The day of the accident was the 3rd production shift in this set of rooms. An Eimco Dash-Zero continuous-mining machine, and a single mobile bridge unit with two bridge carriers, were being used during panel development. Rooms and crosscuts were driven a maximum of 20 feet wide with room centers of 52 feet and crosscut centers of 55 feet (on 60° angles).

The approved roof control plan permits cuts to a maximum depth of 40 feet in normal roof conditions. When subnormal or adverse roof conditions are encountered, the depth of the cut will be limited to 20 feet or less. A cut of approximately 30 feet was mined in the No. 21 return entry.

GEOLOGIC CONDITIONS

In the general vicinity of the accident site, several prominent geologic features were observed in the roof and ribs. Rock wedges, typically referred to as “horsebacks” or “drag folds” had fallen in all three rooms. Slickensided fault surfaces that bound these wedges were apparent in the fall cavities. Slickensided planes commonly referred to as “slips” were also present. These features are characterized as single planes that are inclined into the roof without forming wedges. A thin calcite layer was observed on many of the exposed slickensided surfaces; this layer appeared as a thin white line in some areas where it intersected the immediate roof surface. A horseback (drag fold) had previously fallen out of the mine roof in the return entry approximately 12 feet outby the edge of the intersection roof fall area.

The majority of the slickensided faults on the section are oriented along a trend of approximately N30°E, while a second set is oriented nearly perpendicularly to the first, along a trend of approximately N50°W. The N30°E faults are arranged to define two nearly parallel zones, separated by a distance of approximately 30 feet, that trend N30°E across the 6th North Butt. The outby fault zone projects directly into the intersection where the fatal roof fall occurred.

The roof fall material fell out along a slickensided fault surface that strikes N50°W. The triangular-shaped wedge, bounded by the slickensides, was estimated to be 25 feet in length and 16 feet wide at the base (outby end). The wedge measured about 4 feet at the thickest point and tapered toward each side and the inby end. Patchy remnants of a thin calcite vein were observed on the exposed fault surface in the fall cavity. The fallen material remained largely intact and was estimated to weigh 20 tons.

Approximately 12 feet outby the edge of the intersection fall cavity, a horseback (drag fold) had been encountered in a previous cut from the No. 21 room. This feature had formed a linear wedge-shaped cavity approximately two feet wide by 1 ½ feet high, and projected into the rib where the fall-bounding N50°W-striking fault cut into the coal pillar. This drag fold zone represents the expression in the roof of the normal fault that controlled the intersection fall.

There were numerous locations in the mine roof where horsebacks had fallen out during mining, leaving cavities up to 48 inches above the normal height of the mine roof. This should indicate to mine management that a roof bolt length greater than 42 inches would be needed to anchor in solid strata to adequately support the roof.

ROOF CONTROL PRACTICES

Two Long Airdox 15 LRB single head squirm-steer roof bolting machines are used to install roof supports on the section. The machines are designated as intake- and return-side bolters and they share responsibility for bolting the belt entry. The minimum approved primary roof support system in rooms 600 feet or less is 30-inch long, 5/8 inch diameter, fully grouted bolts installed with 6 by 6 inch bearing plates on no more than 4 feet spacing.

Near the 6th North Butt, the rooms were supported almost exclusively with 42-inch fully grouted resin bolts. The mine roof on the section in which the accident occurred was supported with several types and lengths of roof bolts. The primary support was a mixture of 36- or 42-inch, 5/8 inch diameter, and 72-inch, 3/4 inch diameter, notched, fully grouted resin bolts. Ten feet long, 0.6 inch diameter, resin anchored cable bolts were spotted as supplemental supports. However, the roof at the accident site where the fall occurred was bolted exclusively with 36-inch and 42-inch fully grouted roof bolts.

ROOT CAUSE ANALYSIS

An analysis was conducted to identify the most basic causes of the accident that were correctable through reasonable management controls. During the analysis, causal factors were identified that, if eliminated, would have either prevented the accident or mitigated its consequences.

Listed below are causal factors identified during the analysis and their corresponding corrective actions implemented to prevent a recurrence of the accident:

1. *Causal Factor:* The standards, policies, and administrative controls in use at the mine did not ensure that deep cuts were not taken where subnormal or adverse roof existed. A deep cut was taken in the No. 21 return room prior to mining two 20-foot cuts in normal roof where a subnormal roof condition existed.

Corrective Action: Changes have been implemented to clarify and improve the effectiveness of the roof control plan. The roof control plan was reviewed and

explained to all employees prior to mining being resumed. To verify roof conditions, a test hole 24 inches longer than the bolt or rod being used but at least 6 feet in length shall be drilled in the first row of bolts in each cut, the approximate center of intersections, and in visibly defective roof. If bed separation is detected a roof bolt that will anchor at least 18 inches above the separation will be used.

2. *Causal Factor:* The standards, policies, and administrative controls in use at the mine did not ensure that all areas of subnormal or adverse roof were adequately supported to protect persons from hazards related to falls of the roof.

Corrective Action: Changes have been implemented to clarify and improve the effectiveness of the roof control plan. A minimum length roof bolt of 6 feet will be used in areas of subnormal roof beginning 8 feet outby in good roof and extending 8 feet past into solid roof.

3. *Causal Factor:* The standards, policies, and administrative controls in use at the mine did not ensure that adequate length roof bolts were being installed by the roof bolting machine operators in the adverse roof conditions. The return-side roof bolting machine operator had 15 months total mining experience and approximately 3 months experience at this activity. The intake-side roof bolting machine operator had 24 months total mining experience and approximately 8 months experience at this activity.

Corrective Action: Additional training concerning the recognition of roof control hazards and safety issues has been provided for all Logansport Mine underground employees by MSHA Technical Support. Geologic mapping of subnormal roof areas will be done on a shift by shift basis in the active mining areas and the map will be maintained in the mine office.

CONCLUSION

The accident occurred as a result of management's failure to ensure that proper length roof bolts were being installed to adequately support the roof and extended cuts were not mined where adverse roof conditions existed in the 6th North Butt Section.

Approved By:

ORIGINAL SIGNED BY

Thomas E. Light
Acting District Manager

FEBRUARY 27, 2006

Date

ENFORCEMENT ACTIONS

1. A 103 (K) order was issued to ensure the safety of all persons in the mine until an investigation was completed and all areas and equipment were deemed safe.

2. A 104 (a) citation was issued for a violation of 30 CFR 75.202 (a). The mine roof was not adequately supported in the 6 North Butt (004-0) working section. A horseback measuring 25 feet in length, 16 feet wide and up to 4 feet thick fell out of the mine roof in the intersection of the No.21 room causing fatal injuries to the continuous miner operator. There were numerous visible defects in the form of slips and horsebacks in the mine roof on this section. Horsebacks had fallen out of the mine roof during the mining cycle in all three rooms leaving slickensided cavities in the roof up to 48 inches high. The mine roof was supported with a variety of 36-, 42- and 72-inch fully grouted roof bolts. The roof at the accident site was bolted with 36-inch and 42-inch fully grouted roof bolts. Based on the numerous quantity and size of slips and horsebacks being encountered in the very short distance the section had advanced (1 crosscut) and the depth of the cavities in the mine roof, a 36- or 42-inch roof bolt would not insure the roof was adequately support where miners work and travel on this section.

3. A 104 (a) citation was issued for a violation of 30 CFR 75.220 (a) (1). The approved roof control plan dated March 17, 2004, was not being followed in the 6 North Butt (004-0) working section. A 30-foot extended deep cut was mined in the No. 21 room where subnormal or adverse roof conditions were present. In the straight of this room a horseback had fallen out of the mine roof leaving a slickensided cavity approximately 20 feet outby this deep cut. Additionally, a horseback had fallen out of the roof in the intersection of the No. 22 room and extended into the crosscut towards the No. 21 room. Safety precaution No. 11 on page No. 19A of the approved roof control plan requires when subnormal and adverse roof conditions are encountered, the depth of the cut will be limited to 20-feet or less until roof conditions have improved to a point where extended cuts may be resumed. Two 20 foot cuts will be taken and permanently supported in good (normal) roof and the roof evaluated by the mine foreman or section foreman before extended cuts are resumed.

**Appendix A
Persons Participating in the Investigation
Rosebud Mining Co.**

<u>Name</u>	<u>Title</u>
Jerry Hefferan	Manager of Mines
Dave Sharkins.....	Manager of Maintenance
Michael Roudybush.....	Superintendent
Robert Penigar.....	Manager of Safety
Bernie Pavlick.....	Engineering
Joseph Yuhas.....	Attorney
Timothy M. Biddle.....	Attorney

County of Armstrong

Robert Bowers.....Coroner

Pennsylvania Department of Environmental Protection

<u>Name</u>	<u>Title</u>
Joseph Sbaffoni.....	Director, Bureau of Deep Mine Safety
Dennis Walker.....	Chief, Bituminous Deep Mine Safety
Bruce A. Pontani.....	Inspector Supervisor
Dennis Gramling.....	Mine Inspector

Mine Safety and Health Administration

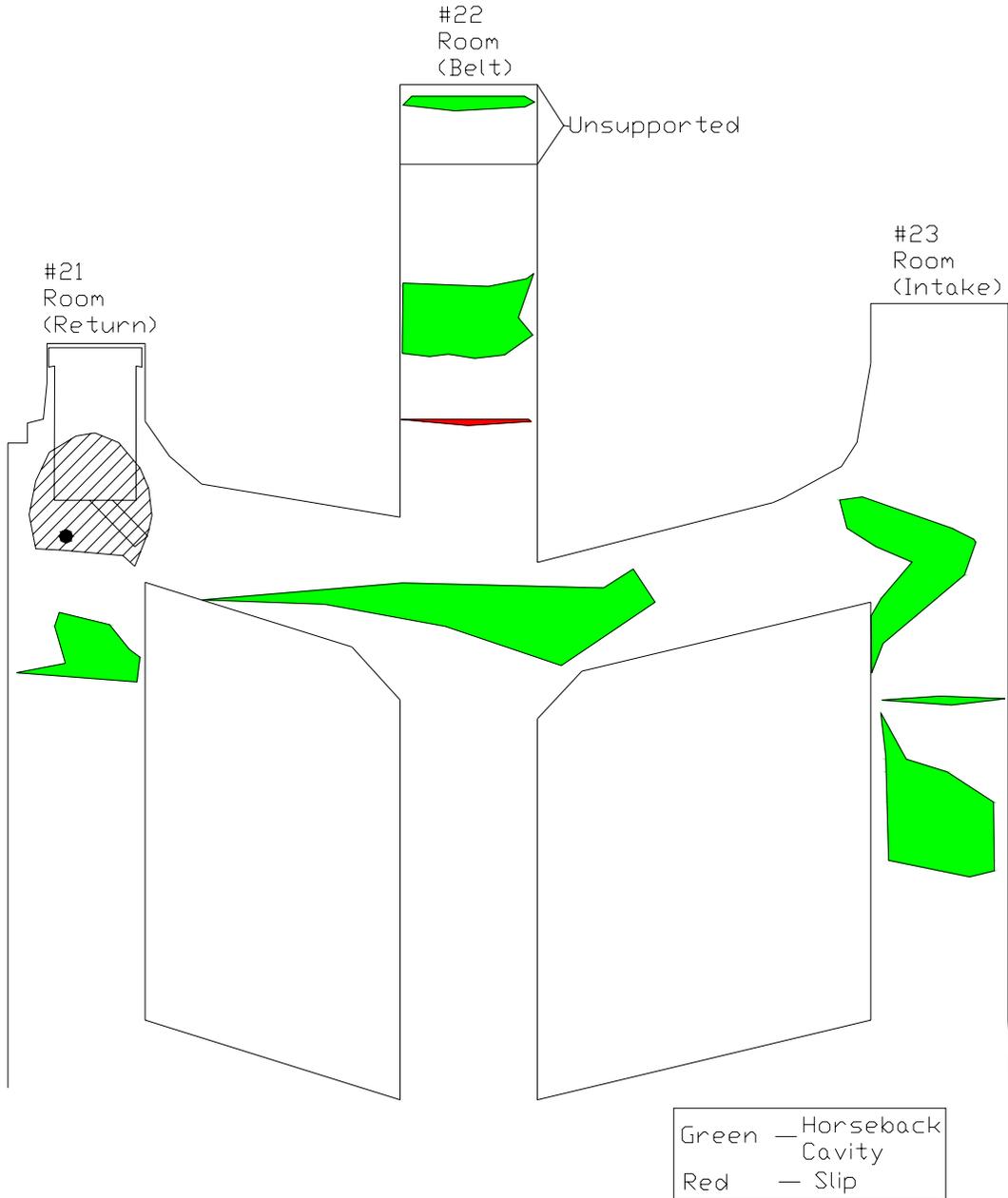
<u>Name</u>	<u>Title</u>
Thomas Todd.....	Staff Assistant
Thomas McCort.....	Supervisory Coal Mine Safety and Health Inspector
Ronald Hixson.....	Coal Mine Safety and Health Inspector
Thomas H. Whitehair II	Coal Mine Safety and Health Inspector
Donald Huntley.....	Coal Mine Safety and Health Inspector
William J. Gray.....	Mining Engineer, Roof Control
Sandin E. Phillipson PHD.....	Mining Geologist, Roof Control
Joseph C. Zelanko.....	Supervisory Mining Engineer, Roof Control
Don Conrad.....	Education and Training Specialist

PENNSYLVANIA STATE POLICE

Michael Kapustik.....Trooper, Crime Investigation Unit

Appendix B
Overview of 6th North Butt Section

Overview of 6th North Butt Section



Drawing Not To Scale