

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  
February 16, 2006

HZ4-1  
Perry County Coal Corporation  
Hazard, Perry, Kentucky  
ID No. 15-02085

Accident Investigators

Marvin Hoskins  
Coal Mine Safety and Health Inspector

Dennis Cotton  
Coal Mine Safety and Health Inspector (Roof Control Specialist)

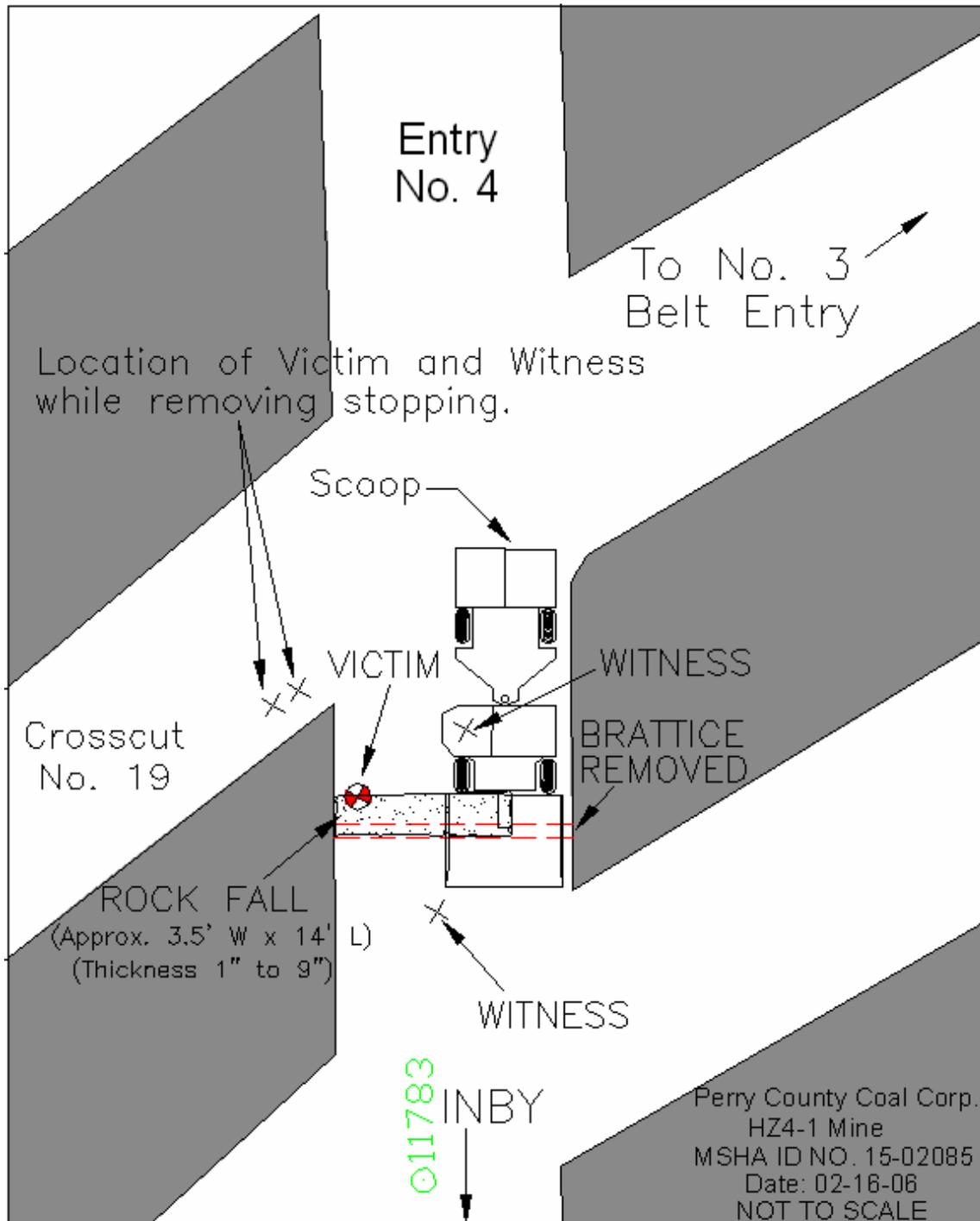
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**ACCIDENT SITE**



## OVERVIEW

At 8:30 a.m. on Thursday, February 16, 2006, Timothy W. Caudill, a 33-year old roof bolting machine operator with 7 years of mining experience was fatally injured at Perry County Coal Corporation's HZ4-1 mine. The accident occurred while Caudill was assisting in the removal of a permanent stopping during a move of the working section to another panel. The accident occurred as a result of an area of inadequately supported roof, which fell, causing fatal crushing injuries. No effective procedure was in place to ensure that roof irregularities caused by mining operations would be adequately supported, especially where additional roof support in the form of a permanent stopping was removed immediately prior to miners traveling under this inadequately supported area.

## GENERAL INFORMATION

Perry County Coal Corporation's HZ4-1 mine is located near Hazard, Perry County, Kentucky. Coal is produced on the first and second shift. The mine produces approximately 1600 tons of raw coal daily using the room and pillar method. The mine provides employment for 37 underground workers and three surface workers.

Coal is extracted with remote-controlled continuous mining machines equipped with flooded bed scrubbers, utilizing a 44-foot extended cut plan. Continuous haulage is used to transport the coal to the belt conveyor. The coal is then transported by a series of belt conveyors to the diesel rail haulage. The diesel rail haulage transports the coal to the surface, a distance of approximately 4.3 miles.

The mine is ventilated with two fans, one blowing and one exhausting. The mine liberated 67,613 cubic feet of methane in a 24 hour period when it was last sampled.

The mine opened into the 32 to 73-inch thick Hazard Number 4 seam by three drift openings in 1914. As the mine was developed, there were additional portals, shafts, and a box cut developed. At the time of the accident, coal was only being mined on the 012 working section. The life of the mine was estimated to be six to eight months.

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

J. J. Shackelford .....	President
Robert J. Zik.....	Vice President
Clark Taylor .....	Vice President
Gary Osborne .....	Superintendent
Michael L. Joseph .....	Mgr. Safety & Env. Affairs

Prior to the accident, the Mine Safety and Health Administration (MSHA) completed the last regular safety and health inspection on December 22, 2005. There was an on-going regular inspection being conducted at the time of the accident. The Non-Fatal Days Lost (NFDL) injury incidence rate for the mine in 2005 was 5.46 compared to a National NFDL rate of 5.20 for underground coal mines.

## **DESCRIPTION OF ACCIDENT**

On February 16, 2006, at approximately 6:00 a.m., the first shift crew entered the mine and traveled to the 012 working section. The working section was being moved to a new panel. Stanley Gilbert, first shift 012 section foreman, directed some of the miners to remove the “run-through” air-lock ventilation device and to begin moving the head drive and conveyor belt structure.

Gilbert directed Marshall Wells, first shift scoop operator, Lonnie Adams and Timothy W. Caudill, first shift roof bolting machine operators, to move the water pump and the scoop charger. Gilbert assisted Wells, Adams and Caudill in loading the water pump and scoop charger into the scoop bucket. Wells, Adams and Caudill moved the charger and water pump and removed a permanent stopping at the new panel using the scoop to push through the permanent stopping blocks. Wells pushed the concrete blocks out to a location where they could be reused.

Wells returned to the air lock area and was directed by Gilbert to remove the permanent stoppings that were part of the air lock. Gilbert then instructed Adams and Caudill to help Wells remove the permanent stoppings by picking up the concrete blocks that did not fall into the scoop bucket. Adams and Caudill walked to the first permanent stopping. Wells had already pushed through the right side of the permanent stopping using the scoop. Wells then proceeded to push through the left side which caused, part of the concrete blocks making up the left side of the permanent stopping to fall into the scoop bucket. Approximately 75 to 80 percent of the concrete blocks fell into the bucket.

Just as Wells finished pushing through the left side of the permanent stopping, Adams walked towards the permanent stopping, followed by Caudill. Adams began to pick up a concrete block when he heard a noise. Adams turned and saw that rocks (measuring in combination 14 feet x 3.5 feet x 1-9 inches thick) had fallen onto Caudill, pinning him against the coal rib and mine floor.

Adams began to remove the rocks and called for Wells to help. Wells and Adams removed one of the rocks. Wells then went to get assistance. Joda Cornett, a Mine Emergency Technician, and Gary Turner an Emergency Medical Technician, immediately began to administer cardiopulmonary resuscitation (CPR) and other medical assistance. Caudill was then transported by four wheel buggy and rail motor, arriving on the surface at 9:10 a.m. and then transported to Appalachian Regional Healthcare Hospital, in Hazard, Ky., by ambulance. He was pronounced dead by Deputy Coroner Clayton Brown at 10:00 a.m.

## **INVESTIGATION OF THE ACCIDENT**

The investigation began on February 16, 2006, and was conducted in cooperation with the Kentucky Office of Mine Safety and Licensing (OMSL). A list of those persons who participated in the investigation is shown in Appendix A of this report. Investigation

team members traveled underground where measurements, photographs, and other information was gathered. Documents and relevant information were collected on the surface by the team. A regular inspection was conducted concurrently with the investigation to address issues that did not contribute to the accident. The training program and records were reviewed. Persons having knowledge of the facts regarding the accident were interviewed by MSHA and OMSL on February 17, 2006. None of the six persons interviewed stated that they desired that their statements be made confidentially.

## **DISCUSSION**

### **Roof Control Practices**

The approved Roof Control plan dated February 26, 2004, permitted a maximum roof bolt spacing of 48 inches. The maximum entry width was 20 feet, except for the belt/track entry, which could be a maximum of 22 feet wide.

The area of the mine where the accident occurred was developed January 9, 2006. The width of the entry was measured at 19 feet and the mining height was measured at 85 inches. The roof bolt spacing was found to be 48 inches x 48 inches or less. The roof was supported with 48-inch fully grouted resin 5/8 inch diameter, grade 60, roof bolts.

The immediate roof on the 012 working section was composed of sandy shale, measuring approximately one inch to nine inches in thickness. The section of mine roof that fell had a brow present. This brow was created by the continuous mining machine cutting up into the mine roof and then over correcting, leaving a protruding segment of rock projecting between the roof bolts.

### **Training**

The training program and records were reviewed and no deficiencies were identified that would have contributed to the accident.

### **Permanent Stoppings**

Permanent stoppings were used to control and direct ventilation through the mine. The subject permanent stopping was constructed of six-inch, hollow-core concrete blocks stacked in staggered layers. Wedges are typically driven between the mine roof and the top of the stopping to tighten it and provide strength. Permanent stoppings were routinely removed at the mine to redirect air flow or to open the entries for use as roadways. Also, the concrete blocks comprising the stoppings were routinely re-used. The subject permanent stopping was directly under the draw rock which fell on the victim. This permanent stopping functioned as additional roof support for the draw rock that fell.

## 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, root causes were identified that, if eliminated, would have either prevented the accident or mitigated its consequences. Listed below are root causes identified during the analysis and the corresponding corrective actions implemented to prevent a recurrence of the accident:

*Root Cause:* An effective procedure or Roof Control plan requirement was not in place and followed to ensure that roof irregularities would be adequately supported. The roof rock that fell was not adequately supported. The rock that fell had a brow present that resulted from the continuous mining machine cutting up into the mine roof and then over-correcting, leaving a protruding segment of rock projecting between the installed roof supports. The permanent stopping was constructed directly under the protruding segment of mine roof and held it in place. After this permanent stopping was removed, the roof fall occurred that caused the death of Mr. Caudill.

*Corrective Action:* The operator's approved Roof Control plan was changed to address inadequately supported roof and brows. Task training was added to the training plan to require safe procedures to be followed when permanent stoppings are removed.

## CONCLUSION

The accident occurred as a result of an area of inadequately supported roof which fell, causing fatal crushing injuries. Contributing to this accident was an unsafe procedure whereby miners entered an area following the removal of a permanent stopping without an adequate inspection or without allowing sufficient time to ensure that the removal of the permanent stopping did not allow the mine roof to sag or fall. An effective procedure or Roof Control plan requirement was not in place and followed to ensure that roof irregularities would be adequately supported.

Approved By:

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Norman G. Page  
District Manager

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Date

## **ENFORCEMENT ACTIONS**

1. A 103 (K) Order, No. 7472920 was issued to Perry County Coal Corporation to ensure the safety of all persons until an investigation was completed and the area deemed safe.
  
2. A 104(a) Citation, S&S, Moderate negligence, No.7525604 was issued to Perry County Coal Corporation for a violation of 75.202(a): An investigation of the fatal fall of roof accident which occurred on February 16, 2006, revealed that an area of inadequately supported roof (drawrock) was present between crosscuts 19 and 20 of the number four entry of the 012 working section sub-mains. The drawrock fell from the mine roof causing crushing fatal injuries. The rock that fell had a brow present which resulted from the continuous mining machine cutting up into the mine roof and then over correcting, leaving a protruding segment of rock projecting down between the installed roof supports. Contributing to this accident was an unsafe procedure whereby miners entered an area following the removal of a permanent stopping without an adequate inspection or without allowing sufficient time to ensure that the removal of the permanent stopping did not allow the mine roof to sag or fall.

Information was obtained by an on-site investigation and interviews conducted during the investigation of a fatal accident.

**Appendix A  
Persons Participating in the Investigation**

**Office of Mine Safety and Licensing**

<u><b>Name</b></u>	<u><b>Title</b></u>
Tracy Stumbo .....	Chief Accident Investigator
Ron H. Hughes .....	Director of Investigations
Bob Banks.....	Roof Control Inspector
Tim Fugate .....	Safety Analyst
Mike Eldridge.....	Inspector

**Mine Safety and Health Administration**

<u><b>Name</b></u>	<u><b>Title</b></u>
Debbie Combs.....	Training Specialist (EFS)
Dennis Cotton.....	CMS&H Inspector/ Roof Control Specialist
Thomas A. Grooms.....	Attorney, Office of the Solicitor
Marvin Hoskins.....	CMS&H Inspector/ Accident Investigator
Jim W. Langley.....	CMS&H Inspector/Supervisor

Appendix B  
Enlarged view of accident site

