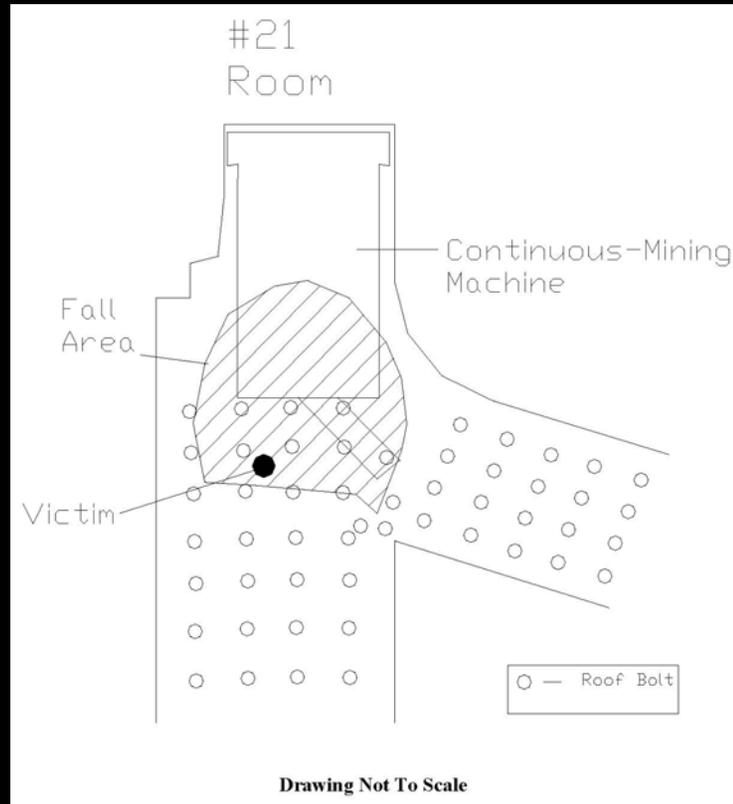


*This presentation is for illustrative and **general** educational purposes only and is not intended to substitute for the official MSHA Investigation Report analysis nor is it intended to provide the sole foundation, if any, for any related enforcement actions.*

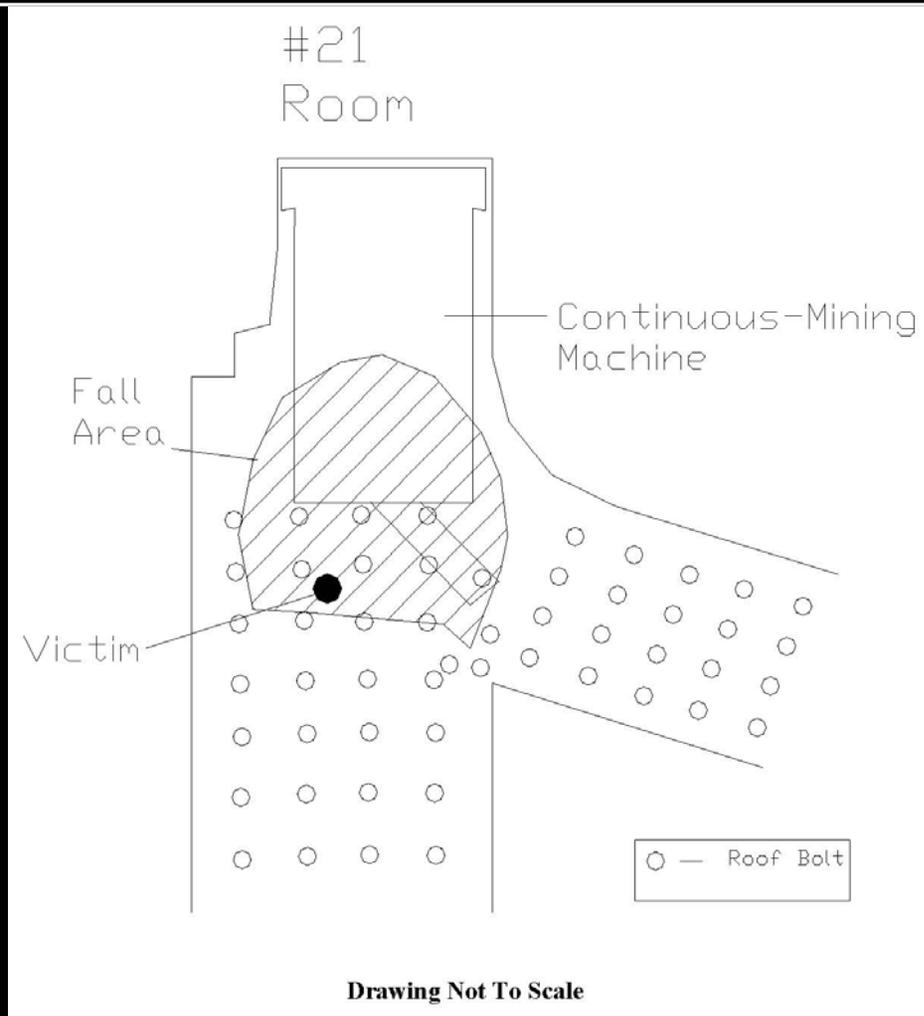
# GENERAL INFORMATION

## Coal Mine Fatal Accident 2005-19



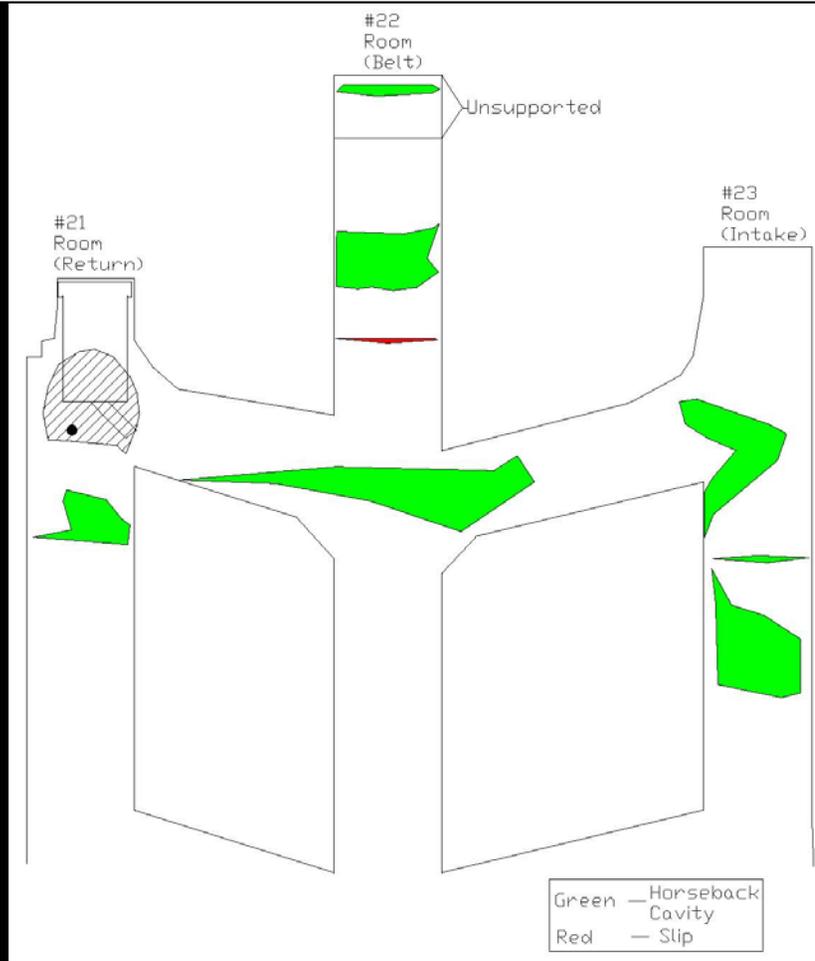
Operator:	Rosebud Mining Company
Mine:	Logansport Mine
Accident Date:	December 12, 2005
Classification:	Roof Fall
Location:	Dist. 2, Armstrong County, PA
Mine Type:	Underground Coal Mine
Production	2,500 tons/day

# ACCIDENT DESCRIPTION



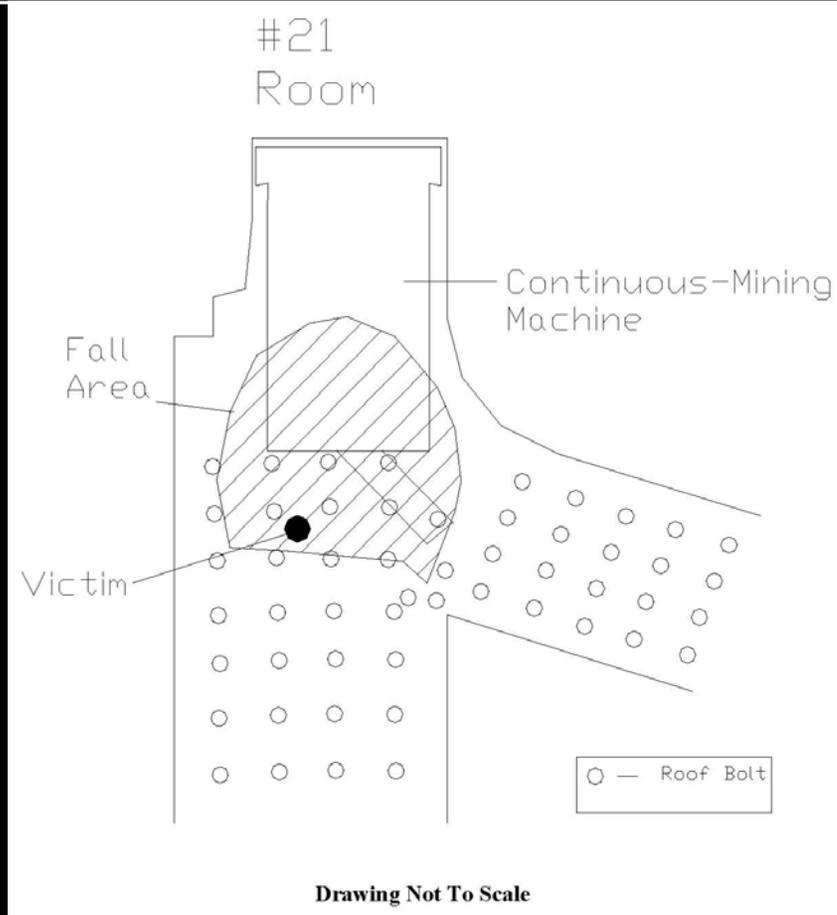
On December 12, 2005, the daylight shift crew, for 6th North Butt section traveled from the surface to the working section. The preshift examiner conducted the preshift examination and remained on the section due to adverse roof conditions.

# ACCIDENT DESCRIPTION



The victim was the continuous-mining machine (continuous miner) operator. He mined a total of six cuts in the Nos. 21, 22, and 23 rooms during the shift. At approximately 1:30 p.m., he moved the continuous miner 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.

# ACCIDENT DESCRIPTION

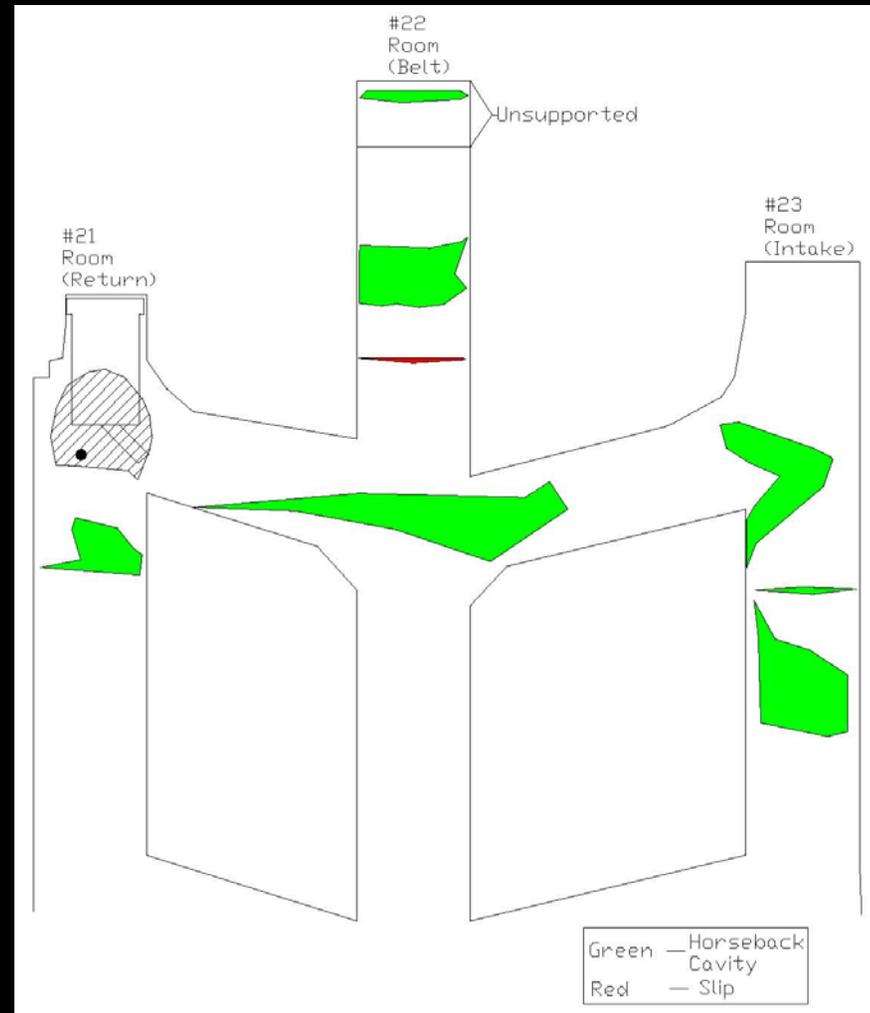


He was positioned in the crosscut on the right side of the continuous-mining machine while mining the intersection. He moved to the left side of the continuous miner, just outby the second row of permanent roof supports, in the intersection, to advance the face. The curtain-side lift was mined approximately 30 feet inby the last row of permanent roof supports when the roof fall occurred.

## METHOD OF MINING

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).

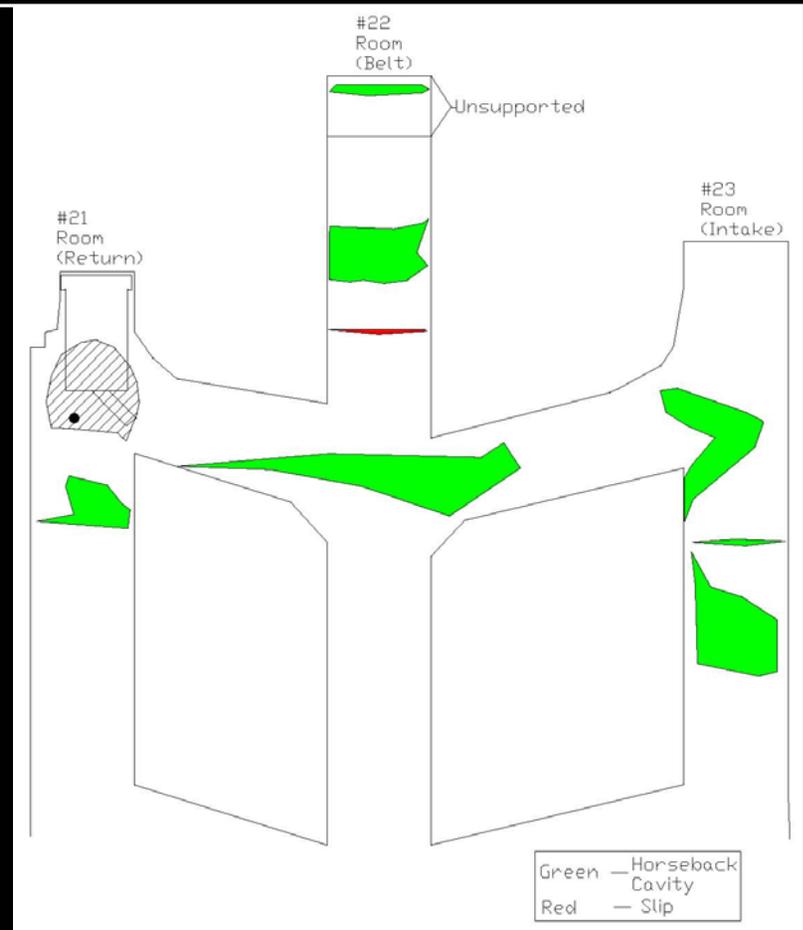
The approved roof control plan permits cuts to a maximum depth of 40 feet in normal roof conditions. When subnormal or adverse roof conditions are encountered, the depth of the cut will be limited to 20 feet or less. A cut of approximately 30 feet was mined in the No. 21 return entry.



# DISCUSSION

## GEOLOGIC CONDITIONS

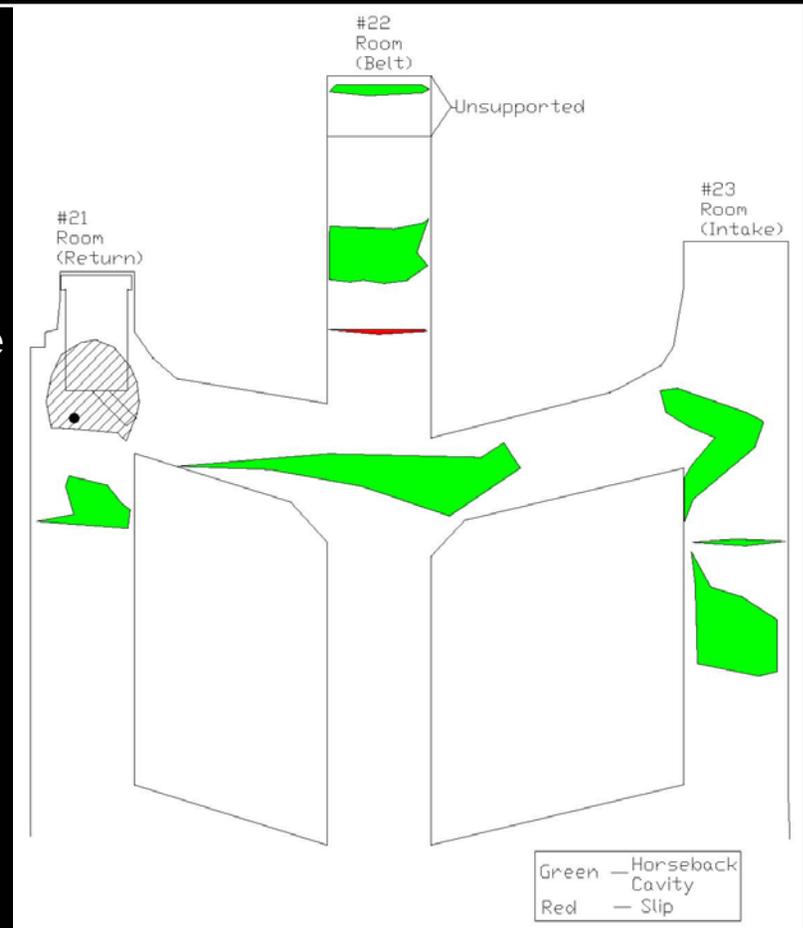
In the general vicinity of the accident site, several prominent geologic features were observed in the roof and ribs. Rock wedges, typically referred to as "horsebacks" or "drag folds" had fallen in all three rooms. Slickensided fault surfaces that bound these wedges were apparent in the fall cavities. 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.



## GEOLOGIC CONDITIONS

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.

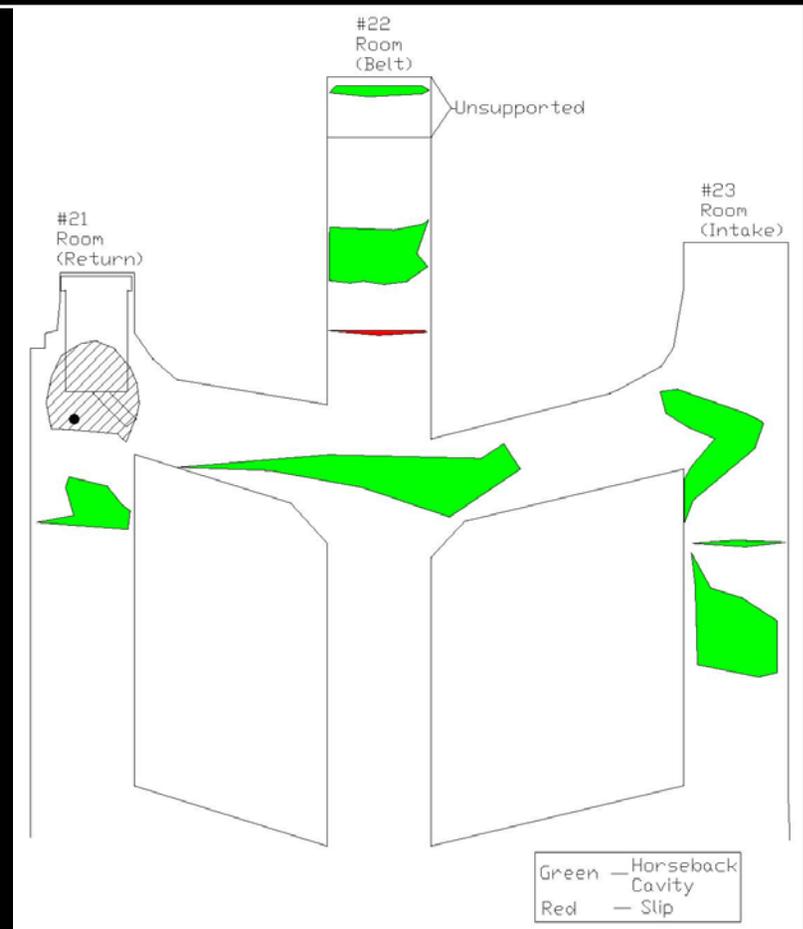
The fallen material remained largely intact and was estimated to weigh 20 tons.



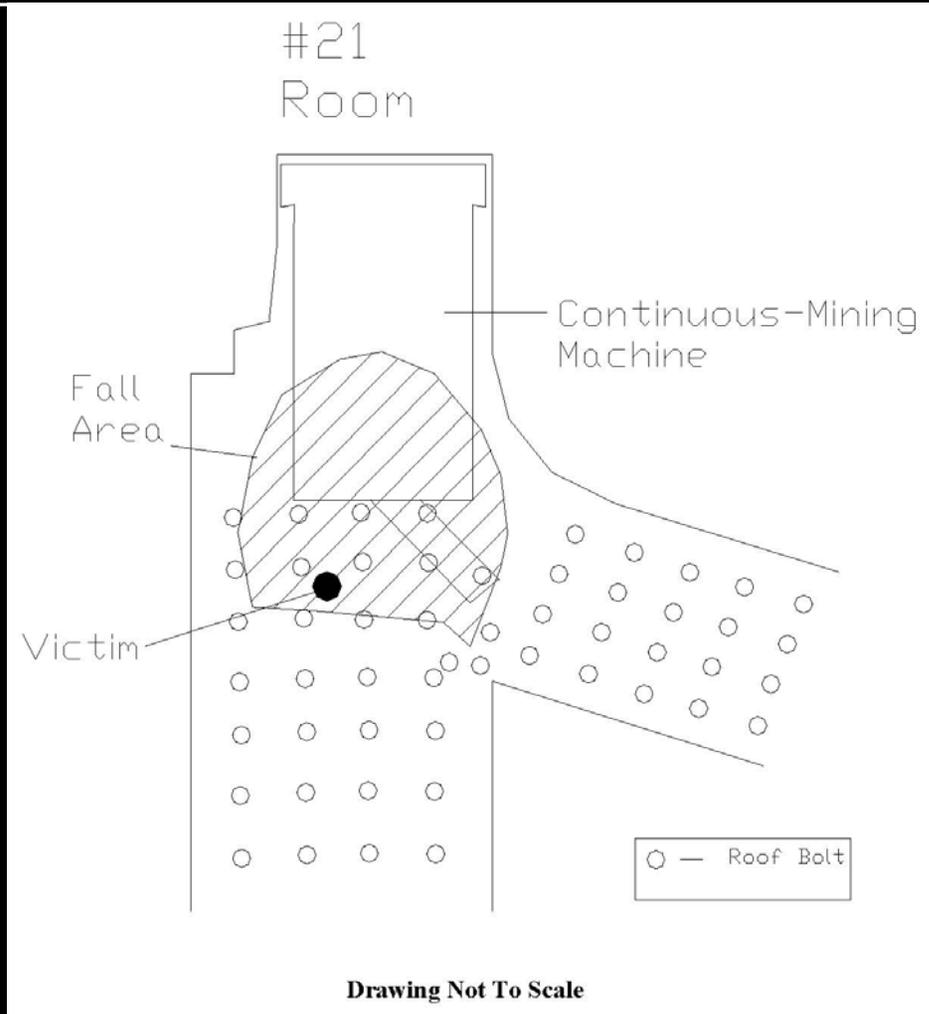
## GEOLOGIC CONDITIONS

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.



# DISCUSSION



## ROOF CONTROL PRACTICES

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

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.

# ROOT CAUSE ANALYSIS

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.

# ENFORCEMENT ACTIONS

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.

# ENFORCEMENT ACTIONS

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.

# BEST PRACTICES

- Make frequent roof examinations and be alert to changing roof conditions at all times. Slickensided shale may indicate the presence of roof hazards, such as horsebacks or kettle bottoms.
- Know and follow the approved roof control plan.
- Install and examine test holes frequently to detect changes in roof strata.
- Install adequate, additional roof support when adverse conditions are encountered or anticipated.
- Train all miners on the importance of roof examinations.