

CA1-2001-19

UNITED STATES
DEPARTMENT OF LABOR
MINE SAFETY AND HEALTH ADMINISTRATION

COAL MINE SAFETY AND HEALTH

REPORT OF INVESTIGATION

Underground Coal Mine

Fatal Powered Haulage
September 17, 2001

Cardinal
Warrior Coal, LLC
Madisonville, Hopkins County, Kentucky
ID No. 15-17216

Accident Investigator

Curtis W. Haile
Coal Mine Safety and Health Specialist

Originating Office
Mine Safety and Health Administration
District 10
100 YMCA Drive, Madisonville, Kentucky 42431-9019
Carl E. Boone II, District Manager

Release Date: October 31, 2001

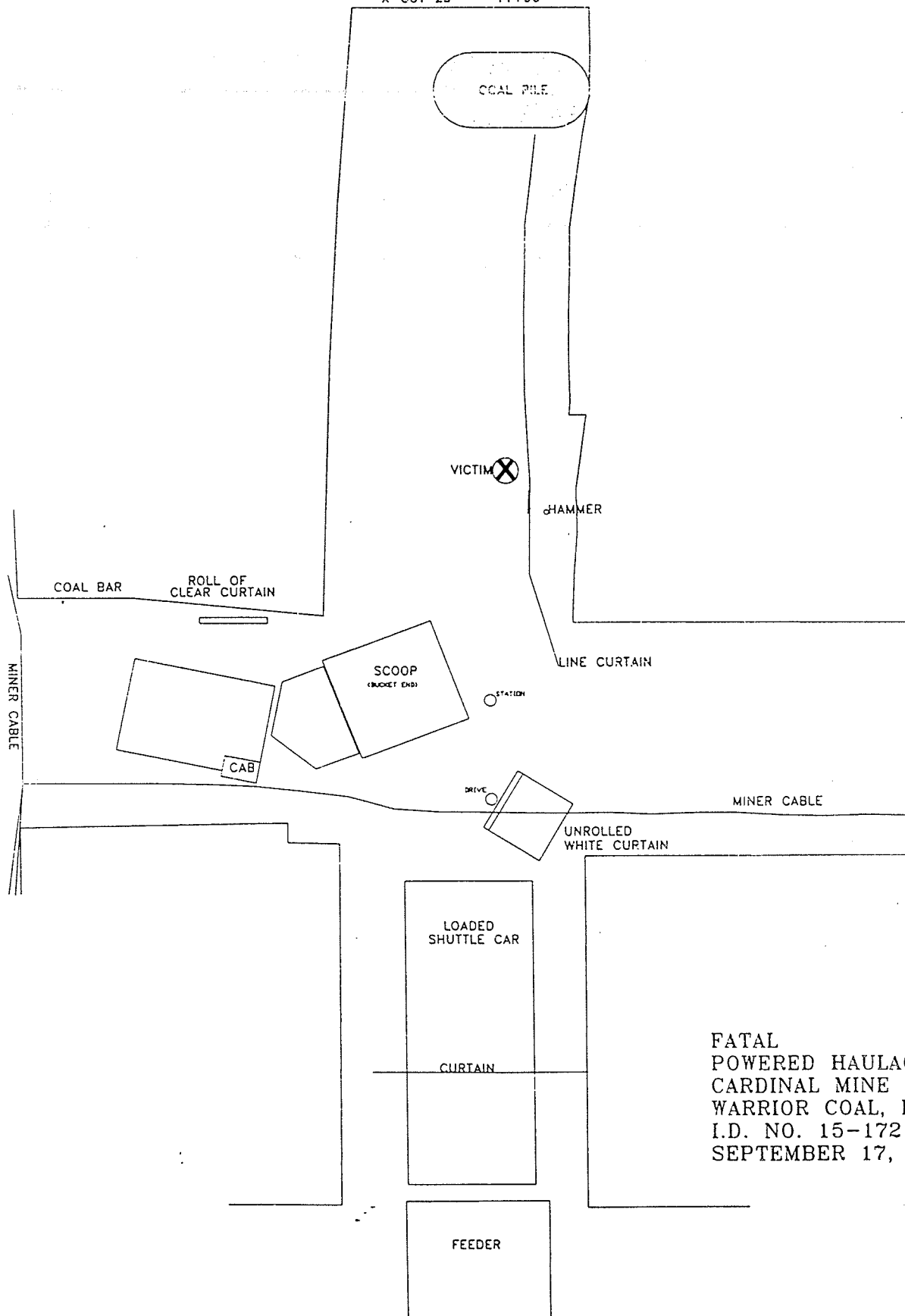
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#4 ROOM

X-CUT 23 11+96

#9 ENTRY



FATAL
POWERED HAULAGE ACCIDENT
CARDINAL MINE
WARRIOR COAL, LLC
I.D. NO. 15-17216
SEPTEMBER 17, 2001

OVERVIEW

On September 17, Mary C. Sigers, timber person, was working as a continuous mining machine helper on the No. 1 Unit located in the Second West entries off the First Main South entries. Sigers carried a roll of curtain material into the mouth of the No. 4 entry and cut off enough to extend the line curtain up to the pile of coal the scoop had left at the face. The diesel scoop returned approximately ten minutes later with another bucket of coal to place in the face of the No. 4 entry. The scoop entered bucket first into the entry and was approximately 12 feet in by the last open crosscut when the operator stopped and steered to the left to line the machine parallel with the entry before advancing. The operator saw the victim's cap light shining on the mine roof and was backing out of the entry to investigate when he heard another miner call out the victim's name. Sigers was apparently struck by the scoop bucket and received fatal crushing injuries.

GENERAL INFORMATION

The Warrior Coal, LLC Cardinal mine (ID 15-17216) is located three and one tenth miles southwest of Manitou, Kentucky off U.S. Highway 41. This underground coal mine began operating as Cardinal #2 under the ownership of Robert Bros. Coal Co. Inc. on March 9, 1993. On January 27, 2001, Hopkins County Coal, LLC became the official operator of the mine and changed the name to Cardinal.

Cardinal mine currently employs 130 persons. Coal is extracted on two mechanized mining units by the room and pillar method during two nine-hour production shifts daily with one maintenance shift. Continuous mining machines extract coal on the No. 1 Unit (MMU 001-0) from the Kentucky No. 9 coal seam. The No. 2 Unit (MMU 002-0) produces coal with the use of continuous mining machines from the Kentucky No. 11 coal seam. Shuttle cars are used to transport coal from the working face to a conveyor belt which transfers it to the surface overland belt for conveyance to a surface preparation facility. The processed coal is shipped by rail to Louisville Gas and Electric (LG&E) and the Paradise TVA power generating facilities located in western Kentucky.

The Cardinal mine produces 8652 tons of coal daily on the two units with a total liberation of 574,802 cubic feet of methane every 24 hours.

A regular Safety and Health Inspection (AAA) was started at Cardinal mine July 3, 2001 and was ongoing at the time of the accident.

DESCRIPTION OF ACCIDENT

The following information was obtained through testimony and the investigation of the accident scene:

The No. 1 Unit was mining panel entries toward the east in the Second West off the First Main South entries. On Sunday, September 16, the unit was moved approximately 18 crosscuts west because of a roof fall that occurred on the unit conveyor belt during the previous third shift. At 6:00 a.m., Monday, September 17, five miners entered the underground portal and traveled to the No. 1 Unit to begin the production cycle. The rest of the No. 1 Unit production crew, supervised by Foreman Steve Hight, entered the mine around 7:00 a.m. and arrived on the unit around 7:35 a.m..

Jeff Hibbs, acting foreman, and James Vaughn, diesel scoop operator, arrived on the No. 1 Unit around 9:10 a.m. after servicing and washing the diesel scoop. Following a supplemental inspection of the area where the No. 1 Unit had previously moved from, Hibbs instructed Vaughn to clean the loose coal from the left side of the old working section and deposit it in one of the right side entries closest to the unit.

After the old working section was cleaned, Vaughn began transporting the loose coal to the face of the No. 1 entry at the new location where it would be reloaded on cycle by the unit's continuous mining machine. It took Vaughn approximately ten minutes to make the round trip between the old working section and the No. 1 Unit.

When there was no longer room to deposit the coal in the No. 1 entry, Vaughn began off-loading it into the unit ratio feeder. Around 2:30 p.m., a hydraulic hose on the ratio feeder ruptured and the feeder became inoperative. When Vaughn returned to the unit with another scoop of coal and realized the feeder had stopped, he parked the diesel scoop in the No. 2 entry and walked to the inby rib of the last open crosscut outby the face and asked Hibbs where to put the coal. During their conversation, Hibbs noticed the roof-bolting machine moving out from the face of the No. 4 entry and begin traveling toward the continuous mining machine that was located in the face of the No. 8 entry. Hibbs instructed Vaughn to put the coal in the face of the No. 4 entry which was one crosscut in front of the ratio feeder. The working face of the No. 4 entry was 20 feet wide and located 53 feet inby the last open crosscut. Vaughn traveled across the No. 3 entry through the last open crosscut and pushed the scoop bucket of coal out into the right side of the working face of No. 4 entry and returned to the old working section. No one was in the No. 4 entry during the time Vaughn placed the first bucket of coal in the face area.

Mary Sigers, victim and miner helper, and Bryant Page, unit scoop operator, had carried two rolls of ventilation curtain into the No. 5 entry and were sitting on the left rib inby the last open crosscut when Vaughn placed the first load of coal into No. 4 entry. Shortly after Vaughn left the face of the No. 4 entry, Page left the No. 5 entry to get some hydraulic oil for the feeder. Sigers carried a roll of curtain from the No. 5 entry into the mouth of the No. 4 entry where she cut off a section and extended it up to the face next to the pile of coal Vaughn had just left. Nathan Orten, miner operator, walked from the No. 8 entry through the second row of crosscuts outby the working faces to the No. 4 entry where the feeder was located. While Orten was at the feeder he saw Sigers installing the line curtain in the face of the No. 4 entry.

No equipment was operating on the working section when Vaughn returned with another scoop bucket of coal to put in the face of the No. 4 entry. Orten was still at the feeder when he heard the diesel scoop approaching and told Foreman Hight he hoped Sigers was still not in the face of the No. 4 entry. When Hight told Orten to check and see, Orten started walking toward the face of the entry. Orten walked through the curtain located in the pillar line just inby the feeder, and saw a red cloth beneath the scoop bucket similar to the color of the shirt he seen Sigers wearing earlier. The diesel scoop had momentarily stopped at an angle inby the entrance of the working place. When Vaughn steered the scoop to the left to align the bucket with the entry before advancing, he saw Siger's cap light shining on the mine roof on the operator's side of the scoop bucket (See Photo #3). At the same time Vaughn steered the scoop to the left, Orten saw the reflective material on Siger's hat and belt and began running toward the scoop and yelling for Vaughn to back up. Vaughn reversed the scoop and backed up 10 to 15 feet when he heard Orten yelling "it's Mary, it's Mary".

Foreman Hight, certified MET (mine emergency technician), and Jeff Hibbs, certified EMT (emergency medical technician), in addition to other miners on the unit heard Orten calling out for help and ran to the location of the accident. Hight immediately began assessments and performing CPR on Sigers. Bryan Branson, MET, and Charles Gamblin, EMT, assisted with the CPR efforts. Hibbs and Gamblin continued CPR efforts while Sigers was being transported to the surface where she was pronounced dead by John Walters, Hopkins County Coroner, at 4:05 p.m..

INVESTIGATION OF THE ACCIDENT

The accident occurred at 2:40 p.m., on September 17, 2001. The Ambulance Service Medical Center located in Madisonville, Kentucky was contacted immediately and arrived at the mine at 2:58 p.m. MSHA District 10 Staff Assistant Ted Smith, was notified at 3:30 p.m., of the accident by Paul Love, safety director at Cardinal mine. Joe Gill and Lewis Compton, accident investigators from the Kentucky Department of Mines and Minerals, arrived at the mine at 3:45 p.m. MSHA Electrical Inspector Michael Moore, accompanied by MSHA Field Office Supervisor Harold Gamblin, arrived at Cardinal mine at 3:55 p.m., and issued a 103-K Order to insure the safety of any person on the No. 1 Unit until a determination was made that the unit was safe. Hopkins County Coroner John Walters was at the mine when Mary Sigers was brought to the surface and pronounced her dead. Siger's body was transported to the Kentucky Medical Examiner's office in Madisonville for an autopsy.

Curtis Haile, MSHA accident investigator, accompanied by Troy Davis, MSHA mining engineer, arrived at the mine at 4:30 p.m., conducted a pre-investigation conference, obtained copies of the victim's training records and the weekly examination report of the Eimco diesel scoop that was involved in the accident.

The on-site investigation which included preliminary interviews with the witnesses was also initiated that same night. Photographs and detailed sketches were made underground of the accident site. An inspection was performed on the Eimco diesel scoop to verify the permissibility, lighting, braking system, and panic bars were working properly. The overall length of the scoop measured 29 feet and 9 inches with a 9 foot wide bucket. With the bucket loaded in a raised position there was 9 inches of clearance between the mine roof and the coal at the forward end of the bucket (See Photo #1). There was approximately twenty two inches of clearance between the mine floor and the underside of the forward end of the bucket with five inches of clearance between the mine floor and the end of the bucket next to the operator.

The working face of the No. 4 entry was 20 feet wide and located approximately 53 feet from the inby rib of the last open crosscut. The victim's body was located approximately twelve feet inby the right hand rib of the last open crosscut near the ventilation curtain that was installed along the right side of the entry. The height of the roof in the area where the accident occurred was 60 inches. A white ventilation line curtain approximately 2 feet and 9 inches from the right hand rib was installed from the last row of roof bolts in the intersection inby to the third roof bolt outby the face next to the pile of coal Vaughn had previously placed in the entry. (See Photo #4)

On September 18, representatives from the Mine Safety and Health Administration and the Kentucky Department of Mines and Minerals heard testimony from Steve Hight, No. 1 Unit foreman, Jeff Hibbs, acting foreman over the rock crew, James Vaughn, diesel scoop operator, Nathan Orten, miner operator, John Holmes, shuttle car driver, Bryan Branson, roof-bolting machine operator, and Bryant Page, battery scoop operator.

Leland Payne, MSHA Educational Field Services Training Specialist, checked the training records of the victim in addition to the other miners who worked on the No. 1 Unit on September 17. Jim Angel,

mechanical engineer with MSHA technical support division, with the assistance of Michael Moore, MSHA electrical inspector, conducted an additional inspection of the Eimco scoop on September 19.

DISCUSSION

Training

Cardinal's Training Plan was approved by the Mine Safety and Health Administration on September 12, 1996. Mary C. Sigers (victim) was certified as an underground miner by the Commonwealth of Kentucky Department of Mines and Minerals. The scoop operator and the victim had received all their required training. Testimonies and records indicate that Sigers had approximately three years of accumulative time working as a miner helper. Her most recent 8-hours of Annual Refresher Training was conducted on April 14, 2001. On December 1, 1999, Sigers received Hazard Training in addition to New Task Training as a continuous mining machine helper from Unit Foreman Kenneth L. Lee. Lee is certified by the Kentucky Department of Mines and Minerals as a Underground Mine Foreman, Certificate No. A-295-90.

Machine Information

The Eimco Model 935-2NL is a permissible diesel-powered scoop. The scoop was originally approved under Approval No. 31-110-1, but was modified to Approval No. 31-202 to meet the new diesel regulations. The scoop was 29 feet long and 9 inches long with a nine foot wide bucket and the distance from the mine floor to the top of the canopy was approximately 50 inches. The scoop has a tare weight of approximately 44,000 lbs. The scoop has four wheel drive and articulated steering. The articulation joint was located between the bucket end and the engine end of the machine. The scoop was powered by a Deutz-MWM, Model D916-6, diesel powered engine producing 94 horsepower at 2300 rpm, MSHA Engine Approval 7E-A-001-0 with Safety System Approval 31D108-0. The scoop utilized a 3 speed (forward and reverse) hydraulic torque converter transmission.

The operator's compartment was positioned perpendicular to the center line of the machine (See Photo #2). It was located on the right side of the machine (from the point of view of the operator using the bucket end of the machine as the front) just behind the articulation joint and on the engine half of the machine (opposite end from the bucket). A distance of 11 inches between the frame and the underside of the canopy provided the operator's vertical field of view. The canopy posts did not significantly obstruct the view from the operator's compartment. (See Photo #2)

Braking System

The operational status and the braking system of the Eimco scoop were not relative to the accident. The operational controls and braking system of this machine were examined and found to be in safe operational condition.

The brake system consisted of (1) a service brake pedal that supplied hydraulic pressure to apply internal wet disk brakes on each axle, (2) a park brake actuator that operated a spring applied, pressure

released multi-wet disk brake in the transmission, and (3) panic bars, one located to the left and one located to the right of the operator, for emergency application of the park brake. The park brake can also be applied by a valve in the operator's compartment and it applies automatically within five seconds of the engine shutdown. Eimco specifies that the service and park brakes will stop and hold the fully loaded machine on a 32% grade.

The service and park brakes were tested per the brake test procedure in Eimco's Vehicle Permissibility Checklist. The brake test specifies the brakes are operating properly if they hold the machine stationary with the transmission in the forward second gear and with the engine operating at 2000 rpm. The service brake held the machine stationary, but the maximum engine speed that could be achieved, per the tachometer in the operator's compartment, was 1900 rpm. From the general performance of the brakes, it is considered that the service brakes would meet Eimco's criteria if an engine speed of 2000 rpm's had been achieved. The park brake also held the machine under the test conditions. An engine speed of 2000 rpm was achieved during the park brake test.

Panic bar braking performance tests were performed using a Tapley Meter (this is a brake test meter that uses a pendulum device to indicate the vehicle's maximum grade holding ability). The empty machine was trammed in second gear at normal speed and the left and right panic bars were alternately activated. When the left side panic bar was activated it fully opened the emergency brake valve. The brake pressure that held the park brake released instantly and fell from 2000 psi to 0 psi with a grade holding ability of 30%.

Since the scoop operator was not aware he hit anything, he did not activate the panic bar system. A subsequent investigation of the accident disclosed that the panic bar on the right side of the operator's cab failed to operate properly. When activated, the grade holding ability of the brakes measured 20% of the maximum 32%. A citation was issued for this violation under a Regular Health and Safety Inspection (AAA) because it did not contribute to the accident.

Environmental Conditions

Except for the Eimco scoop, there was no other mining equipment operating on the No. 1 Unit to prevent miners from hearing the diesel scoop approaching the area. The floor of the No. 4 entry was clean from the last open crosscut inby to the working face. The scoop operator could not see past the end of his bucket in the elevated position with it loaded. With the full load of coal in the bucket at the time of the accident, visibility to the front of the machine would have been limited to along the right side of the bucket.

Illumination of Working Area

The Eimco diesel scoop was equipped with two working lights located on each end of the machine. The two lights on the bucket end of the scoop were on in the direction of travel as the machine entered the working place. At the time of the accident, the scoop operator and the victim were wearing permissible cap lamps on their mining hats. There was no way to determine if the victim attempted to use her cap light to warn the scoop operator of her presence in the entry.

Reflective Clothing

The victim was in compliance in regards to reflective material.

Communication

No one was working inby the last open crosscut of the No. 4 entry when the scoop operator entered the face area to push out the first scoop bucket of coal. He had no knowledge that the victim intended to install a wing curtain next to the face after he exited the entry.

CONCLUSION

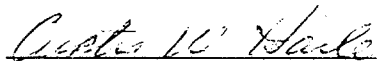
The consensus of the investigative team is that the accident occurred when Mary Sigers was accidentally struck by the Eimco diesel scoop as it was entering the mouth of the No. 4 entry. She received fatal blunt crushing to the chest area as a result of being trapped between the underside of the scoop bucket and the mine floor.

ENFORCEMENT ACTIONS

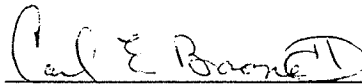
1. 103(k) Order No. 7647217 was issued to insure the safety of any persons on the No. 1 Unit, ID. 001-00 until an investigation was conducted.
2. There were no contributory violations observed or revealed during this investigation.

Respectfully Submitted:

Approved by:



Curtis W. Haile
Accident Investigator



Carl E. Boone II
District Manager

APPENDIX A

Listed below are the persons who furnished information and/or participated in the recovery and subsequent investigation:

CARDINAL MINE

William Adleman	General Manager
Tommy Kissinger	Superintendent
Paul Love	Safety Director
Steve Hight	Unit Foreman

LIST OF PERSONS INTERVIEWED

Steve Hight	Unit Foreman
Jeff Hibbs	Acting Foreman
James Vaughn	Scoop Operator
Nathan Orten	Miner Operator
John Holmes	Shuttle Car Operator
Bryan Branson	Roofbolting Machine Operator
Bryant Page	Scoop Operator

911 EMERGENCY RESPONSE TEAMS

Ambulance Service Medical Center

HOPKINS COUNTY CORONER

John Walters	Coroner
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MINE SAFETY AND HEALTH ADMINISTRATION

Curtis W. Haile	Accident Investigator
Michael Moore	Coal Mine Safety and Health Inspector (Electrical)
Troy K. Davis	Mining Engineer
Ann Knauff	MSHA Solicitor
Jim Angel	Mechanical Engineer with MSHA Technical Support Division
Ted Smith	Coal Mine Safety and Health Supervisor/Specialist
Harold Gamblin	MSHA Dam Field Office Supervisor
Leland Payne	MSHA Training Specialist

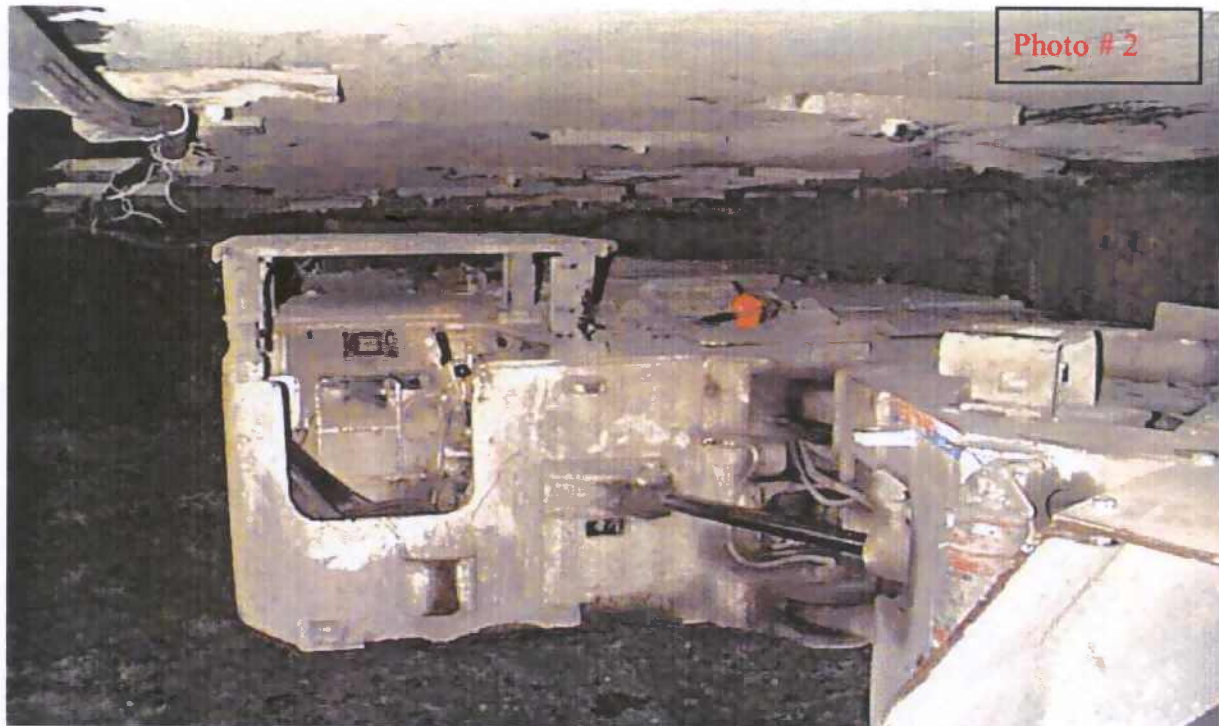
KENTUCKY DEPARTMENT OF MINES AND MINERALS

Joe Gill	Accident Investigator
Lewis Compton	Accident Investigator

View from the operator's cab



View of the operator's cab



Face of #4 room

