

UNITED STATES
DEPARTMENT OF LABOR
MINE SAFETY AND HEALTH ADMINISTRATION

REPORT OF INVESTIGATION

Underground Coal Mine

Fatal Machinery Accident
January 05, 2019

Mine No. 1
Hamilton County Coal, LLC
Dahlgren, Hamilton County, Illinois
I.D. No. 11-03203

Accident Investigators

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OVERVIEW

On Saturday, January 5, 2019, at approximately 3:20 a.m., John D. Ditterline, a 55 year-old contract laborer, died when he was pinned between a pneumatic airlock door and a concrete barrier. The victim was tracing a power cable through the area of the airlock doors and he had passed through an inby set of airlock doors. When he tried to open the outby set of airlock doors, they failed to open. Evidence indicates that he then opened a small sliding access door at the bottom of one of the outby airlock doors. The opening of the sliding door lowered the air pressure and caused the outby airlock doors to suddenly spring open, pinning the victim between one of the outby airlock doors and a concrete barrier.

The accident occurred because the mine operator did not design and maintain the pneumatic airlock doors to operate safely in the high air pressure environment where they were located, and did not establish safe work procedures for when the doors did not operate properly. A damaged, permanent ventilation stopping, isolating the area between the airlock doors from the intake air course, created additional pressure causing the doors to not open properly.

GENERAL INFORMATION

The Mine No. 1 is located approximately 7 miles east of Dahlgren, Hamilton County, Illinois, and is operated by Hamilton County Coal, LLC. Coal is mined from the Herrin No. 6 coal seam, which averages 7 feet in height and has a depth-of-cover of approximately 950 feet. At the time of the accident, the mine employed 278 personnel. The mine operates the longwall section and the gate entry sections on different shift schedules. The longwall section operates 3 production shifts per day and maintenance is performed as needed. The gate entry sections operate 2 production shifts and 1 maintenance shift each day, 6 days per week. The mine produces an average of 55,000 tons of raw coal per day.

The mine has a dual-purpose slope. The upper compartment of the slope is a conveyor belt system used to transport coal to the surface, and the lower compartment of the slope is used to transport material into and out of the mine. The main portal is a triple compartment shaft which is near the scene of the accident. Two of the compartments are used for ventilation; one has dual blowing fans where air enters the mine and the second compartment is where air exits the mine. The third is a hoist compartment used to transport personnel and supplies in and out of the mine. The mine also has one operating exhausting main mine fan, which is connected to the mine via a different vertical shaft opening from the coal seam to the surface. The mine operates two advancing mining sections, and one retreating mining section.

The mine liberates over 2.2 million cubic feet of methane in a 24-hour period and is on a five-day spot inspection schedule in accordance with Section 103(i) of the Mine Act.

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

Gary Thweatt.....	General Manager
Ezra French.....	Assistant General Manager
Chad Woodland.....	Superintendent
Michael Hathaway	Safety Director

At the time of the accident, a regular (E01) safety and health inspection was in progress, although an inspector was not on site. The previous E01 inspection was completed on December 26, 2018. The non-fatal days lost (NFDL) incidence rate for the Mine No. 1 for 2018 was 0.77, compared to the national average of 3.10 for mines of this type.

DESCRIPTION OF ACCIDENT

On Friday, January 4, 2019, John D. Ditterline, Contract Laborer, reported to work on the 3rd shift which began at 11:00 p.m. Harvey Niehaus, Assistant Mine Manager, was traveling through the main shaft bottom area and heard a “whistling” sound near the stopping in the No. 4 entry between footage markers 200 and 300. Niehaus continued traveling to check on a belt and electrical power move, and then returned and found the stopping was bowing in the center and leaking across the top. Niehaus told Jim Payne, Supply Man, to remove the supply trailers from the crosscut and bring one pallet of concrete blocks to the damaged stopping location.

Niehaus next traveled to the 4 Left head drive area and told Matthew Wright, Johnny Hettercheidt, and Jason Wilson, Contract Laborers, to travel to the bottom area and start working on building a stopping in by the damaged stopping. Niehaus stopped at the West Main head drive where Ditterline and John Holland, General Laborer, were working. He told them to travel to the bottom area and help the other miners build a new stopping. Niehaus proceeded on to the 9 Left mining section.

Holland and Ditterline arrived at the bottom area and met with Wright, Hettercheidt, and Wilson to build the stopping. The area where they were building the new stopping had two 110 volt shop lights that needed to be removed. To determine the location of the power cable that provided power to the lights, Ditterline traveled outby towards the pneumatic airlock doors located in the crosscut between entry 4 and entry 5 at footage markers 100 and 200 (see Appendix A). He walked through the inby set of doors and closed them behind him, following the power cable for the lights. Surveillance video shows that after Ditterline activated the outby set of pneumatic airlock doors, at 3:18 a.m., the indicator lights for the doors began flashing, which means the doors went into fault condition. There were no witnesses to what followed, but evidence indicated that Ditterline walked up to the doors, opened the slide access door and the airlock doors opened suddenly, hitting him and pinning him between one of the doors and the concrete barrier. When the doors opened, Holland, Hettercheidt, Wright and Wilson could hear and feel the air velocity increase at the damaged stopping.

Payne was working nearby and walked through the boot wash area to the shaft bottom. Once at the hoist, Payne noticed the opened airlock doors and a leg extending through the slide access door. He ran toward the airlock doors and found Ditterline at 3:22 a.m., pinned behind the left airlock door. Ditterline was unresponsive. Payne immediately called on the radio for Holland to come to the shaft bottom. Holland, Wright, Hettercheidt, and Wilson traveled to the shaft bottom to help. Holland tried to clear the fault condition at both sets of electronic sensors for the doors. Once the doors started to close, Wilson and Hettercheidt pulled Ditterline out and laid him on his back. Ditterline was still unresponsive. Wilson, who is an Emergency Medical Technician

(EMT), and Holland started cardiopulmonary resuscitation (CPR). Hettercheidt assisted with CPR while Wright went to get an automated external defibrillator (AED) from the shop.

Niehaus heard Payne call on the radio and traveled from the 9 Left mining section outby towards the bottom area. Niehaus picked up Michael Welch, Contract Laborer/EMT and they proceeded to the accident scene. When Niehaus and Welch arrived, Wilson and Holland were still performing CPR. An AED was applied to Ditterline, but the diagnostic function of the AED indicated that no shock be administered. They placed Ditterline on a backboard and carried him to the hoist for transport to the surface. Upon arrival on the surface, Harre Ambulance service took over care of Ditterline and transported him to Hamilton Memorial Hospital.

James Steven Bowling, Hamilton County Coroner, pronounced Ditterline dead at 4:45 a.m. Dr. James Jacoby, Forensic Pathologist, performed an autopsy and stated that Ditterline's death was due to a cardiomyopathy. Coroner Bowling listed cardiomyopathy as the cause of death on the State of Illinois Certificate of Death Worksheet. The worksheet also states that the manner of death was "natural."

When a miner's death is not conclusively determined to be chargeable to the mining industry, MSHA submits the case, including facts and supporting information, to the MSHA Chargeability Review Committee (Review Committee) for a decision. The review committee has been in existence since 2008 and has reviewed over 500 cases. The Review Committee is currently comprised of the following persons:

1. Reviewing Medical Official, Federal Occupational Health
2. Associate Solicitor for Mine Safety and Health
3. Director of the MSHA Office of Assessments
4. Director of the MSHA Office of Program Evaluation and Information Resources
5. Director of the MSHA Office of Educational Policy and Development (Chair)

After a thorough review of the facts and medical information, the Review Committee found that, "acute stress cardiomyopathy can occur when an individual is exposed to sudden, intense physical or emotional (grief, fear) stress which causes rapid and severe heart muscle weakness. Acute stress cardiomyopathy can mimic a myocardial infarction (a heart attack) even in the absence of obstructive coronary artery disease." "Because 1) Mr. Ditterline was seen on video moments before the door accident in no apparent distress, 2) the door slam was a significantly traumatic event, and 3) the death occurred at the time of the door slam, the Review Committee members [concluded] it is probable that the trauma of the accident triggered acute stress cardiomyopathy." Therefore, the Review Committee stated, "Mr. Ditterline's death should be charged to the mining industry."

INVESTIGATION OF THE ACCIDENT

On January 5, 2019, at 3:53 a.m., Gary Quertermous, Mine Control, notified the Department of Labor National Contact Center of the accident. At 4:08 a.m., the Contact Center notified Robert Bretzman, Supervisory Mine Safety and Health (CMS&H) Inspector. Bretzman notified Mary Jo Bishop, Assistant District Manager for Enforcement, of the accident. He then directed Brandon Naas, CMS&H Inspector/Accident Investigator, to investigate the accident. Bretzman and Naas traveled to the mine where they met Bishop. Naas issued a 103(k) order to protect the safety of persons at the mine.

Investigators obtained preliminary interview statements from persons having knowledge of the facts and circumstances surrounding the accident. The accident investigation team then traveled underground and arrived at the accident scene at approximately 11:20 a.m. They took photographs and measurements of the accident scene.

MSHA conducted the investigation in cooperation with the Illinois Department of Natural Resources, Office of Mines and Minerals (IDNR), and Hamilton County Coal, LLC personnel. See Appendix B for a list of those participating in the investigation.

On January 7, 2019, David Brown, Training Specialist with MSHA's Educational Field & Small Mine Services (EFSMS), reviewed training records. Bretzman and Naas conducted further testing on the pneumatic airlock doors after the stopping had been replaced.

On January 8, 2019, Gary Rethage and Mark Kvitkovich, Mechanical Engineers with MSHA Technical Support, traveled to the mine with other investigators to mechanically evaluate the pneumatic airlock doors involved in the accident.

On January 17, 2019, the accident investigation team conducted interviews at the IDNR building located in Benton, Illinois (see Appendix B).

DISCUSSION

Accident Scene

The accident occurred at the set of outby pneumatic airlock doors located on the East Main, Entry 4, between footage markers 0-100, just east of the Main Shaft bottom area (see Appendix A). When investigators arrived, the pneumatic doors involved in the accident were in the open position and the slide access door was open. Electrical power had been disconnected, locked, and tagged out.

Pneumatic Airlock Doors

The airlock consisted of a set of pneumatic-operated equipment doors (an outby set and an inby set) that allow equipment and personnel access between the mine and the shaft. The outby airlock doors involved in the accident are located near the bottom of the shaft. The inby set of doors are one crosscut inby through an angled crosscut (see Appendix A). The doors were manufactured by Alliance Central Shop. The doors are made of metal and each door is approximately 7 feet wide by 7.3 feet high and weighs approximately 550 pounds. Both doors opened in the inby direction. One door of each set has a small slide access door which measured 29" X 18.5".

Pneumatic Door Overview

There are two pneumatic systems at this airlock, one for the inby airlock doors, and the other for the outby airlock doors. Each pneumatic system is comprised of a compressor, air tank (accumulator), two pneumatic hoses with flow restriction valves in-line, and a pneumatic cylinder. The cylinder rod connects via a bolted connection to the slide mechanism. The slide mechanism, which rolls on a steel beam mounted to the roof of the entry, connects to the linkage bars via a pinned connection. The linkage bars then connect to the doors with a pinned connection (see Appendix C).

The pneumatic cylinder is a double acting cylinder; it has a port on both sides of the cylinder to control motion for extension or retraction. When the doors are closed, the cylinder rod is in the extended position. The pneumatic air pressure is located on the piston side of the cylinder to keep the cylinder rod extended and the doors closed, while the air in the other side vents to the atmosphere. The air venting to atmosphere works as a dampener to slow the pressurized side. This allows the doors to open or close in a controlled manner. The solenoids reverse when the doors go into the open status, pressurizing the rod side of the cylinder to retract the cylinder rod and venting the air on the piston side of the cylinder rod.

An electronic system controls the pneumatic components. This system utilizes an Allen Bradley MicroLogix 1400 Model, programmable logic controller (PLC), which controls the solenoid valves, lights, and audible alarms. There are limit switches above the slider mechanism that sense the position of the cylinder rod. The limit switches send a signal to the logic controller. An electronic signal opens a solenoid and closes the other solenoid when the beam of the photo sensors is broken. This also triggers the lights and audible alarms for the direction of travel.

The photo sensor has two sides: open or close. The open sensor is marked with green and the close sensor is marked with red. The beam generator generates a beam; the beam reflects back to a sensor in the beam generator. When the beam is broken, the PLC opens or closes the doors. The PLC also activates the lights and audible alarms. Miners operate the doors by placing their hand into the appropriate side of the photo sensor mount located near the doors (see Appendix D).

The doors have three statuses: closed, open and fault. The fault condition activates when the doors do not reach the limit switch in the desired direction of travel within 35 seconds. The pneumatics stay pressurized in the desired direction of travel while the air in the other side of the cylinder has had time to completely vent to the atmosphere. The fault clears by interrupting the beam on both the open and close sides of the photo sensor mount. The lights continue to flash in the fault condition, but the alarm stops after 35 seconds.

Mechanical Engineers from MSHA Technical Support observed the outby doors and its components on January 8, 2019. They evaluated the components of the pneumatic system for damage. The investigators did not observe damage on any component of the system, including the pneumatic cylinder, cylinder rod, linkages, hoses, valves, air tank (accumulator), or door. The electronic controls appeared to be functioning properly as the door functioned as designed when tested. Investigators did not observe damaged components in the pneumatic system or mechanical components. The pneumatic system and all mechanical components operated as designed.

Effects of Ventilation Pressures on the Pneumatic Doors

The mine repaired the damaged stopping prior to the January 8 investigation to correct the ventilation. The investigators observed that the outby doors opened normally with the corrected ventilation. However, the inby doors would not open without assistance due to the ventilation change caused by the damaged stopping. When mine personnel pushed on the inby doors, they opened in an uncontrolled rapid manner in the same way the outby doors opened, which caused the fatal injury.

Reenactment

In an attempt to recreate a fault condition on the outby doors, the investigators opened the sliding door on one of the inby doors to increase pressure and ventilation in the airlock. The investigators measured the velocity of the air in the airlock with an anemometer. The air quantity was approximately 13,000 cubic feet per minute (cfm). Before repairs were made to the damaged stopping, the quantity of the air in the airlock had been measured at approximately 36,000 cfm. Despite the reduced ventilation pressure, the outby doors went into the fault condition and did not open without assistance.

The system was set to the fault condition again to evaluate what would happen when the sliding door in one of the outby doors was opened. After a few seconds, the outby doors opened in an uncontrolled rapid manner. This test demonstrated the scenario that evidence indicates occurred at the time of the accident.

Mine personnel placed pressure gauges on both ports of the outby door cylinder to monitor pressures while the door was being tested. The air tank maintained a pressure of 140 pounds per square inch (psi). Testing was then performed on the cylinder while the door was in a fault condition. The rod side of the cylinder remained within its designed operating pressures of 105 to 120 psi. The piston side of the cylinder went to zero which means that there was no dampening effect to allow the doors to open in a controlled manner after the slide access door was open. Testing showed investigators that the pneumatic system operated as designed, that there were no overpressures or other problems solely with the pneumatic system, and that the problem with the doors was created by the high air pressure environment.

Conclusions from Testing

The increased ventilation pressure due to the damaged stopping was outside the designed operating parameters for this system. At the time of the accident, the airlock door system operated within its designed logic parameters and entered a fault condition when the door would not open. When the victim opened the sliding door on the outby door, the ventilation pressure moved toward equilibrium. The pneumatic air pressure on the rod side of the cylinder (pushing open the door) was now greater than the force provided by the ventilation pressure (holding the door closed). The residual air pressure on the piston side of the cylinder that normally dampens this movement had completely vented to the atmosphere; this allowed the outby door to open in an uncontrolled rapid manner.

Rethage and Technical Support's Mechanical Engineering Division calculated the kinetic energy and the energy equivalency of the pneumatic airlock door when it impacted Ditterline. They determined that the door hit Ditterline with the equivalent energy of a 550 pound mass moving at approximately 4.5 miles per hour. Ditterline was pinned between the door and the concrete barrier, with the door continually applying a force of 550 pounds until the door was moved away from him and closed. Video surveillance established that the outby airlock doors went into fault mode at 3:18 a.m., and the door was removed from Ditterline at 3:22 a.m.

Problems with the Pneumatic Airlock Doors

Investigators discovered through interviews and discussions with miners that the operation of the airlock doors was problematic and known to miners. Investigators also learned through the discussions with miners that the mine operator attempted to overcome the high mine ventilation pressure by installing an air compressor near the shaft bottom, in line with the air supply from the surface, to ensure air was always available for the airlock doors. This did not correct the problem. After installing the compressor, the airlock doors would open easier. However, the slide access door still had to be opened for the airlock doors to operate, and the airlock doors would open more violently. Investigators also discovered that on the shift prior to the accident, a

miner was nearly struck by the same set of airlock doors as the victim. However, mine management was not made aware of this incident.

Investigators reviewed the mine surveillance video from earlier in the shift prior to the accident. This video shows Payne, who normally works in this area of the mine and is very familiar with these airlock doors, open the inby set of airlock doors and drive his megatrack pushing a supply trailer into the airlock. After closing the inby set, the video shows he activated the photo sensor to open the outby airlock doors involved in the accident. Although Payne cannot be seen on the video inside the airlock, the lights on the travelway indicate the airlock doors went into fault condition twice and did not open. Payne can be seen walking back through the inby set of airlock doors and around to the shaft bottom side of the outby set of doors. By approaching the outby set of airlock doors from this side, he could open them standing out of the swing path while avoiding the sudden movement.

Examinations

Investigators determined through interviews that the mine operator did not regularly conduct pre-shift examinations for supply travelways between the airlock doors. An adequate preshift examination may have identified the operational issues associated with the doors.

Training and Experience

Ditterline had 28 years of total underground mining experience, with 5 weeks and 5 days as a contract laborer for Madisonville Mining, LLC at Hamilton County Coal. He had mine manager and mine examiner certifications from the State of Illinois. He received experienced miner training on November 26, 2018. He had not received task training with regard to the hazards associated with the pneumatic airlock doors in fault condition.

ROOT CAUSE ANALYSIS

MSHA conducted an analysis to identify the most basic cause or causes of the accident that were correctable through reasonable management controls. The accident investigation team identified root causes that, if eliminated, would have either prevented the accident or mitigated its consequences.

Listed below are the root causes identified during the analysis and the corresponding corrective actions that were implemented to prevent a recurrence.

1. Root Cause: The pneumatic airlock doors were not designed and maintained to operate safely in the high mine ventilation pressure area near the shaft bottom. A damaged permanent ventilation stopping, which isolated the area between the airlock doors from the intake air course, caused the high mine ventilation pressure on the outby airlock doors.

Corrective Action: The mine operator replaced the pneumatic system with a hydraulic system on the airlock doors that is capable of safely operating the doors in the high mine ventilation pressure area near the shaft bottom.

2. Root Cause: The mine operator had not established safe work procedures when miners encountered fault conditions on the pneumatic airlock doors.

Corrective Action: The mine operator developed and implemented safe work procedures to be followed in the event of fault conditions on pneumatic and hydraulic airlock doors. All miners were trained in these work procedures.

3. Root Cause: The mine operator did not task train the victim with regard to the hazards associated with the pneumatic airlock doors in fault condition.

Corrective Action: Miners have received task training on the safe operating procedures for the hydraulic equipment doors. Also, the hydraulic equipment door operation instructions have become part of the mine operator's Standardized Traffic Rules.

CONCLUSION

On Saturday, January 5, 2019, at approximately 3:20 a.m., John D. Ditterline, a 55 year-old contract laborer, died when he was pinned between a pneumatic airlock door and a concrete barrier. The victim was tracing a power cable through the area of the airlock doors and he had passed through an inby set of airlock doors. When he tried to open the outby set of airlock doors, they failed to open. Evidence indicates that he then opened a small sliding access door at the bottom of one of the outby airlock doors. The opening of the sliding door lowered the air pressure and caused the outby airlock doors to suddenly spring open, pinning the victim between one of the outby airlock doors and a concrete barrier.

The accident occurred because the mine operator did not design and maintain the pneumatic airlock doors to operate safely in the high air pressure environment where they were located, and did not establish safe work procedures for when the doors did not operate properly. A damaged, permanent ventilation stopping, isolating the area between the airlock doors from the intake air course, created additional pressure causing the doors to not open properly.

Approved By:

Ronald W. Burns
District Manager

Date

ENFORCEMENT ACTIONS

1. A Section 103(k) Order No. 9108283, was issued to Hamilton County Coal, LLC on January 5, 2019.

A fatal accident occurred at this operation on 01/05/2019 at approximately 03:20. This order is being issued under the Section 103(k) of the Federal Mine Safety and Health Act of 1977. This Section 103(k) Order is intended to protect the safety of all persons on site, including those involved in rescue and recovery operations or investigation of the accident. The mine operator shall obtain prior approval from an Authorized Representative of the Secretary for all actions to recover and/or restore operations in the affected area. Additionally, the mine operator is reminded of its obligations to prevent the destruction of evidence that would aid in investigating the cause or causes of the accident.

2. A 104(a) Citation No. 9108284, was issued to Hamilton County Coal, LLC for a violation of 30 CFR § 75.1725(a).

On January 5, 2019 at approximately 3:20 a.m., a miner was killed when he was attempting to travel through a pneumatic airlock door. The victim was killed when he opened a slide access door which relieved the pressure on the pneumatic doors. This allowed the doors to open suddenly pinning the victim between the door and the concrete barrier. The pneumatic airlock doors were not being maintained in safe operating condition. The pneumatic airlock doors could not open under their own system design due to the mine ventilation pressure against the doors and would go into a fault condition.

3. A 104(a) Citation No. 9108287 was issued to Hamilton County Coal, LLC for a violation of 30 CFR § 75.360(a)(1).

On January 5, 2019 at approximately 3:20 a.m., a miner was killed when he was attempting to travel through a pneumatic airlock door. The victim was killed when he opened a slide access door which relieved the pressure on the pneumatic doors. This allowed the doors to open suddenly pinning the victim between the door and the concrete barrier. An adequate preshift examination had not been conducted between the airlock doors (supply travelway) located on the shaft bottom where persons were scheduled to work and travel. An adequate preshift examination may have identified the operational issues associated with the doors.

4. A 104(a) Citation No. 9108288 was issued to Hamilton County Coal, LLC for a violation of 30 CFR § 75.333(h).

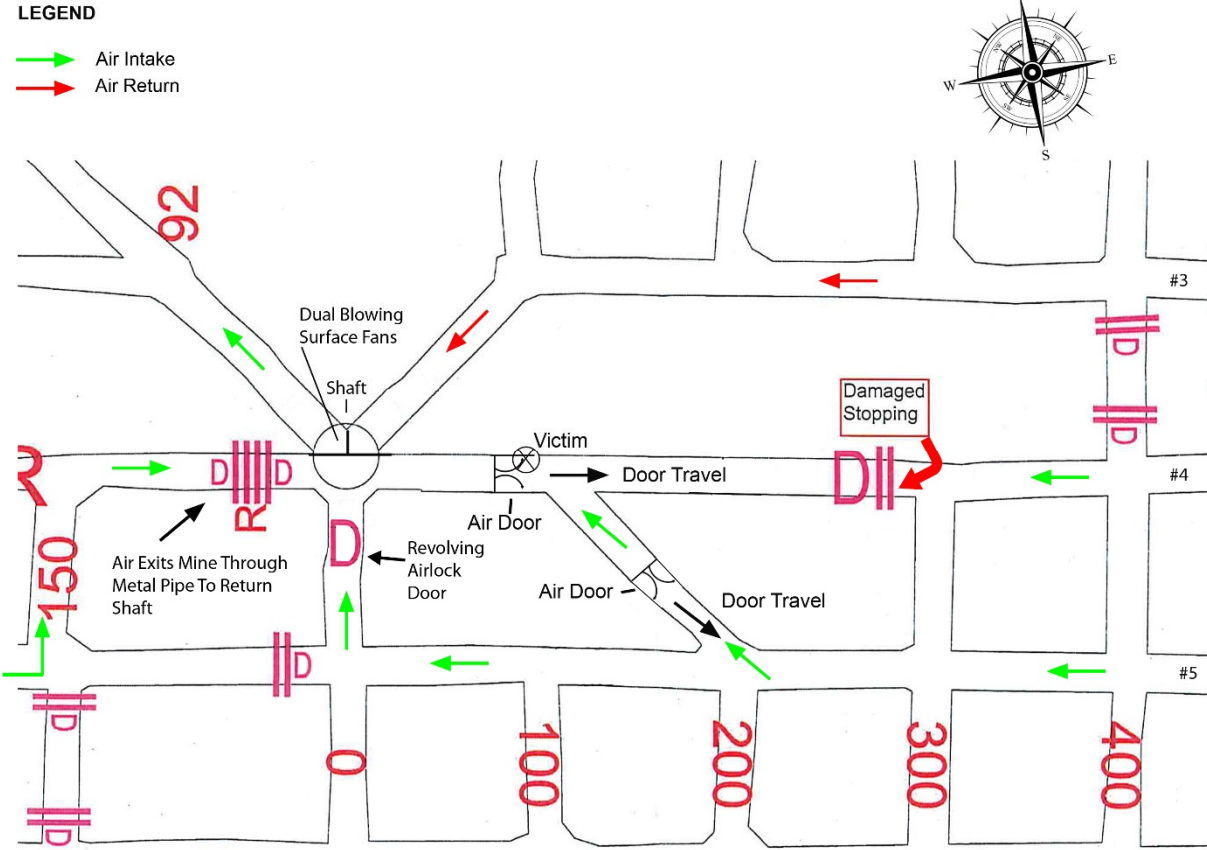
On January 5, 2019 at approximately 3:20 a.m., a miner was killed when he was attempting to travel through a pneumatic airlock door. The victim was killed when he opened a slide access door which relieved the pressure on the pneumatic doors. This allowed the doors to open suddenly pinning the victim between the door and the concrete barrier. The permanent ventilation stopping located in entry 4 at footage marker 200-300 was not being maintained to serve the purpose for which it was built. The stopping had bowed in the center creating a gap across the top allowing pressure to be put on the outby set of pneumatic airlock doors. With the added pressure the pneumatic airlock doors would not open without opening the slide access door to relieve pressure.

5. A 104(a) Citation No. 9108289 was issued to Hamilton County Coal, LLC for a violation of 30 CFR § 48.7(c).

On January 5, 2019 at approximately 3:20 a.m., a miner was killed when he was attempting to travel through a pneumatic airlock door. The victim was killed when he opened a slide access door which relieved the pressure on the pneumatic doors. This allowed the doors to open suddenly pinning the victim between the door and the concrete barrier. The victim did not receive task training on the safe operation of and safe work procedures related to door fault conditions associated with pneumatic airlock doors.

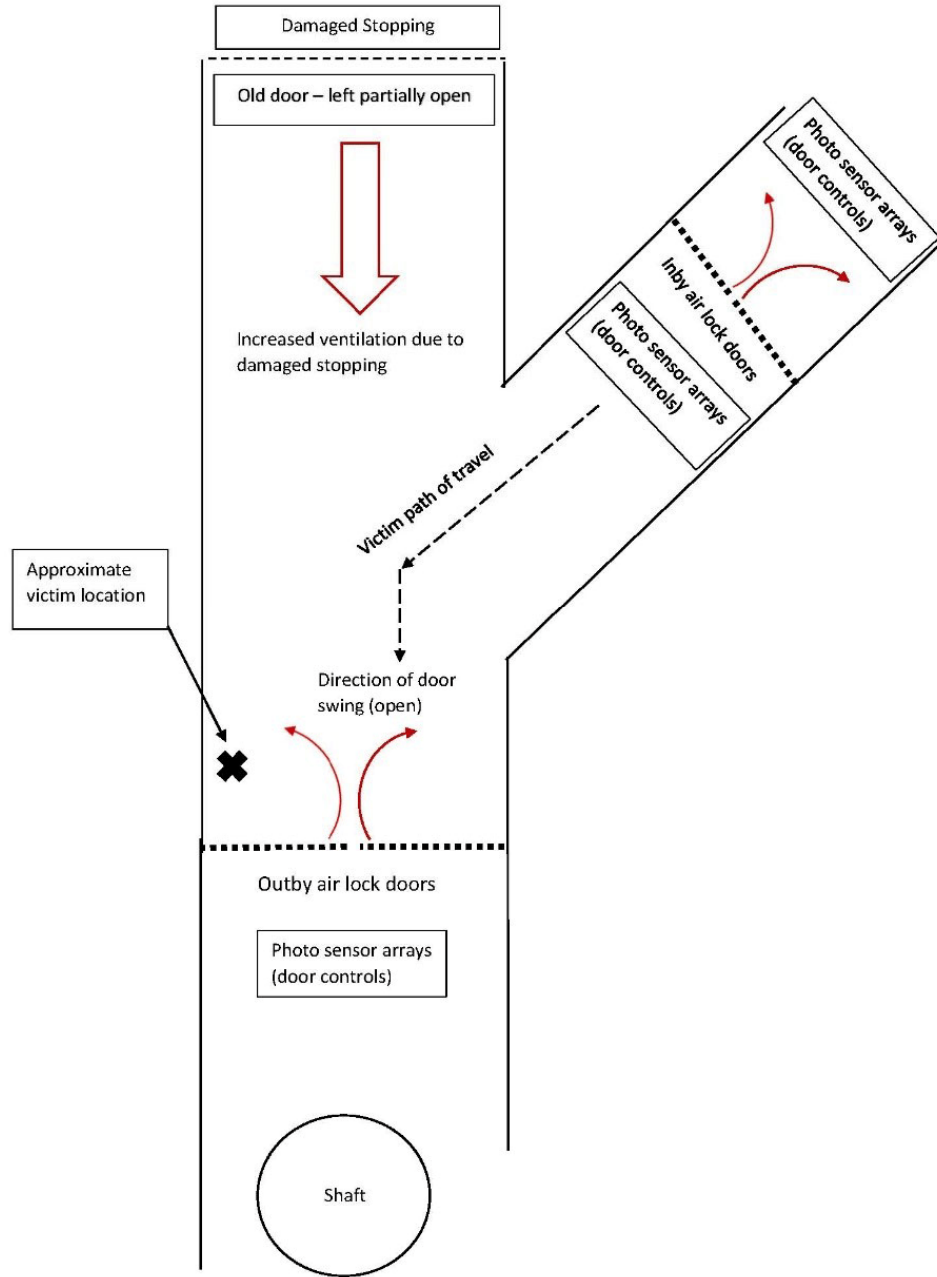
APPENDIX A

Drawing of Bottom Area



NOT TO SCALE

APPENDIX A cont' d.



NOT TO SCALE

APPENDIX B

Persons Participating in the Investigation
(Persons interviewed are indicated by a * next to their name)

Hamilton County Coal, LLC

Gary Thweatt General Manager
Ezra French Assistant General Manager
Michael Hathaway Safety Director
*Jonathan Hopper Maintenance Chief
Andy Sutton Electrical Engineer
*Harvey Niehaus Assistant Mine Manager
Jay Kittinger Safety
Andrew Ditch Safety
Kyle Hicks Maintenance
*Jim Payne Supply Man
*John Holland General Laborer

State of Illinois Department of Natural Resources, Office of Mines and Minerals

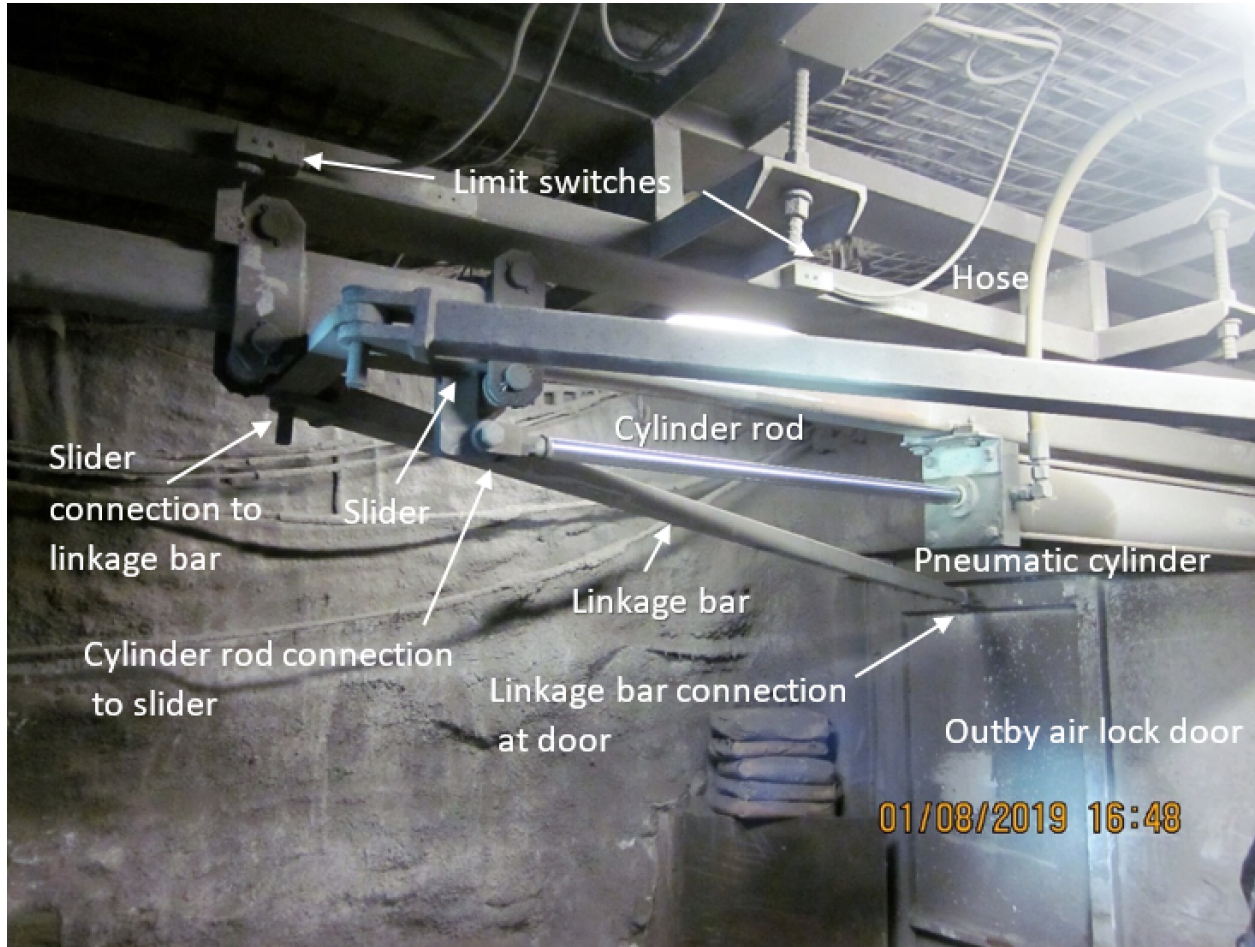
Bill Patterson Inspector at Large
Larry Jenkel Inspector

Mine Safety and Health Administration

Mary Jo Bishop Assistant District Manager-Enforcement
Robert Bretzman Supervisory Mine Safety and Health Inspector
Brandon Naas MS&H Inspector/ Accident Investigator
Gary Rethage Mechanical Engineer, Technical Support
Mark Kvitkovich Mechanical Engineer, Technical Support
David Brown Training Specialist, EFSMS

APPENDIX C

Parts of Airlock Doors Pneumatic System



APPENDIX D

Photo Sensors - Pneumatic Airlock Doors

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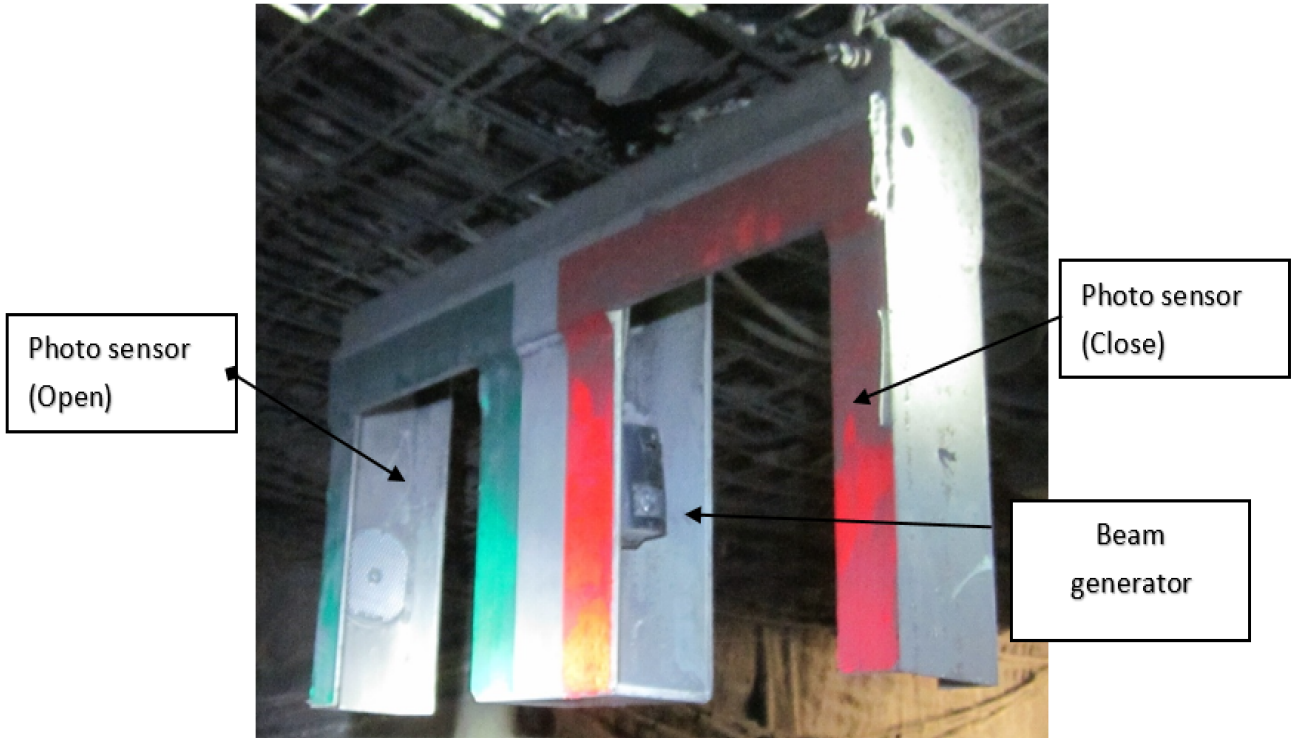


Photo sensors to open or close air lock doors