CAI-2018-06

UNITED STATES
DEPARTMENT OF LABOR
MINE SAFETY AND HEALTH ADMINISTRATION

COAL MINE SAFETY AND HEALTH

REPORT OF INVESTIGATION

Underground Coal Mine

Fatal Powered Haulage Accident
September 11, 2018

Kocjancic
Rosebud Mining Company
Brockway, Jefferson County, Pennsylvania
ID No. 36-09436

Accident Investigators

James Miller
Coal Mine Safety and Health Inspector

Jason Boring
Coal Mine Safety and Health Inspector

Richard Feigh
Coal Mine Safety and Health Specialist, Electrical

Originating Office
Mine Safety and Health Administration
District 2
Paladin Professional Center
631 Excel Drive, Suite 100
Mount Pleasant, Pennsylvania 15666
Russell J. Riley, District Manager

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No. 1 mobile bridge carrier

OVERVIEW

On Tuesday, September 11, 2018, at approximately 4:10 p.m., Kameron Rankin, a 27-year-old mobile bridge carrier operator with 7 weeks of mining experience was fatally injured. The accident occurred when the continuous mining machine was being re-positioned. Because the victim's mobile bridge carrier was connected to the mining machine, the carrier moved and the victim was crushed between the carrier and coal rib.

The accident occurred because the administrative and engineering controls in place at the mine were not adequate to protect the victim from crushing injuries.

GENERAL INFORMATION

The Kocjancic mine is an underground mine owned and operated by the Rosebud Mining Company, located in Jefferson County, Pennsylvania. Miners enter the mine, which is in the Lower Kittanning (bituminous) coal seam, via 3 slopes. The mine is ventilated with two intake slopes and one exhaust fan. Laboratory analysis of air samples indicated no measurable amount of methane liberation in a 24-hour

period. The mine employs 30 miners, which includes 27 underground miners working two production shifts, five days a week. The mine produces an average of 1,900 tons of raw coal per day from one mechanized mining unit (MMU). The MMU utilizes the continuous haulage mining system (see Appendix A). Coal is extracted by a continuous mining machine (CMM) and then transported by mobile bridge carriers (MBC) and bridge conveyors, which are attached to the rear of the mining machine. Coal is then transported over a system of conveyor belts to the surface. Rubber-tired diesel and battery-powered scoops and rubber-tired battery-powered personnel carriers are used to transport materials, supplies, and miners.

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

Clifford Forrest……President
David Doney……General Manager
Brian Burkett……..Mine Superintendent
Don Ishman……Mine Foreman
Jake Wells…….Safety Manager

At the time of the accident, a regular (E01) safety and health inspection was in progress. The previous E01 safety and health inspection was completed on June 26, 2018. The non-fatal days lost (NFDL) incidence rate for the mine for 2017 was 0 compared to a national average of 3.51 for mines of this type.

DESCRIPTION OF ACCIDENT

On Tuesday, September 11, 2018, at 3:00 p.m., the C-8 Butt Rooms Section (MMU 001-0) crew, including Kameron Rankin, No. 1 MBC operator, began their shift. The miners travelled underground to the section, arriving at approximately 3:10 p.m. Crew member Joe Guzzo, CMM Operator, had arrived on the section earlier.

Jason Baumgartner, Section Foreman, conducted an examination of the workplaces. Jeremy Cary, No. 2 MBC Operator; Dylan Filler, Roof Bolter (single boom); Austin Roy, Roof Bolter (twin boom); Jeff Fike, Roof Bolter helper (twin boom); Guzzo; and Rankin, performed their pre-operational equipment checks. Brandon Keener, Scoop Operator, retrieved the battery-powered scoop from the outby charging station while Kaven Hornberger, Utility-man, waited on Keener.

After completing the required checks, Guzzo trammed the CMM to the face of the No. 3 entry. Rankin and Cary trammed their MBCs behind the CMM. The CMM and MBCs were linked to move together as a train. Mining began at approximately 3:25 p.m. After completing the mining sequence in the No. 3 entry, the train was trammed backward and moved from the No. 3 entry, through the last open cross-cut intersections. The train then moved so the CMM entered the working place of the

No. 1 entry, and the CMM was then used to remove a small (wedge) cut of coal from the No. 1 working face.

After completing the cut in the No. 1 entry, the train was trammed backward, allowing Filler to tram the single-boom roof bolting machine into the No. 1 entry to install roof bolts. This placed the No. 1 MBC just outby the intersection of No. 3 entry, between the conveyor belt and the right rib line.

Guzzo and Baumgartner were on the outby end of the intersection, in the No. 2 entry, on the left side of the CMM. Guzzo signaled to Rankin using his cap-light that he was ready to move the CMM into the No. 2 entry. Because of the elevation difference between No. 2 and No. 3 entries, Rankin may not have seen the signal.

At approximately 4:08 p.m., Guzzo began using the remote control transmitter to tram the CMM into the No. 2 entry. Both Guzzo and Baumgartner detected that the No. 1 MBC was causing unusual resistance as the CMM moved forward. Guzzo stopped the CMM and Baumgartner said that he was going to the No. 1 MBC to determine the cause of the resistance. Baumgartner crossed over the bridge conveyor and approached the No. 1 MBC. He observed Rankin on the MBC with his back against the controls and his legs in an awkward position. At this time, Rankin's MBC was positioned in the intersection of the No. 3 entry with the rear (outby side) of the machine against the right rib (see Appendix B). The front of the MBC had pushed the belt conveyor tailpiece out of alignment. Guzzo decided to go to the No. 1 MBC and came to the victim's location. Baumgartner told Guzzo that the situation was bad and that he was going to call outside. He then signaled Cary, with his cap-light, to come up to the No. 1 MBC.

At approximately 4:12 p.m., Baumgartner went to the No. 4 entry where hand-held radio reception was better, and called Ben Bowser, Surface Attendant. Bowser was instructed to call for an ambulance. Jack Ishman, Beltman and Emergency Medical Technician (EMT), was travelling the No. 3 beltline and overheard the radio conversation and immediately came to the accident scene. As soon as J. Ishman viewed Rankin, he left to retrieve medical supplies and a backboard from the section first aid supply station. Guzzo brought the battery-powered scoop to the accident scene. J. Ishman, Cary, and Guzzo secured Rankin to the backboard and placed him in the scoop bucket for transport. Guzzo operated the battery-powered scoop. J. Ishman and Cary began performing cardiopulmonary resuscitation (CPR) and continued during the ride to the mine's slope. While traveling, they were met by Don Ishman, Mine Foreman, who assisted in administering CPR. When they reached the bottom of the slope, Rankin was transferred from the battery-powered scoop to a diesel-powered scoop bucket which was more capable of ascending the steep grade to the surface. Guzzo operated the diesel scoop and CPR was

continued. Attendants from Brockway Area Ambulance Service, Brockway, Pa., were waiting on the surface, and at 4:47 p.m., took over treatment of Rankin.

At 6:01 p.m., Brenda Shumaker, Jefferson County Coroner, pronounced Rankin dead at the mine. The victim was transported to the Coroner's Morgue in Punxsutawney, Pa.

INVESTIGATION OF THE ACCIDENT

At 4:13 p.m. on September 11, 2018, Bowser notified the Department of Labor National Contact Center of the accident. The contact center notified Randall Caramellino, Staff Assistant, at 4:30 p.m. Caramellino contacted D. Ishman at the mine and learned that the accident was very serious. Caramellino contacted Jason Boring and James Miller, Coal Mine Safety and Health Inspectors (CMI) and Accident Investigators, who were dispatched to the mine. Richard Feigh, Coal Mine Safety and Health Specialist (Electrical), from the Clearfield Field Office was dispatched to the mine. Feigh arrived at the mine at approximately 6:10 p.m., and issued a 103(k) order to ensure the safety of all persons in the mine. Robert Roland, Clearfield Field Office Supervisor, also traveled to the mine to provide assistance.

Mine Safety and Health Administration (MSHA) personnel conducted the accident investigation in conjunction with the Pennsylvania Bureau of Mine Safety (PA BMS) and mine management. The investigation team conducted interviews with miners, travelled underground, and took pictures and measurements of the scene. See Appendix C for a list of persons interviewed and those participating in the accident investigation.

On September 12, 2018, Miller and Michael Kelley, Assistant District Manager for Enforcement, travelled underground to the accident scene. Later that same day, Feigh, Boring, and the PA BMS electrical specialists examined the CMM and MBCs to see if there were any electrical or mechanical deficiencies. They attempted to recreate the movement of the machinery that may have caused the accident, but without a witness to the accident, the recreation could not be done.

On September 17, 2018, Feigh accompanied MSHA Technical Support personnel Patrick Retzer and Justin Daniels, Electrical Engineers, and Matt Wharry, Industrial Engineer to the mine. They travelled underground to examine the proximity detection system on the CMM.

DISCUSSION

Accident Scene

The accident occurred in the No. 3 entry intersection of the C-8 Butt Rooms Section. The CMM backed up across the No. 2 entry intersection to allow the single-boom roof bolter to pass by into the No. 1 entry. This action placed the No. 1 MBC (victim's MBC) just outby the intersection of the No. 3 entry, alongside the stationary conveyor belt. The No. 1 MBC was idle indicating that the victim was not tramming it at the time of the accident. The CMM, while it was trammed backward, then forward, pinched the victim between the MBC and the coal rib (see Appendix B). The victim was moved along the rib line for approximately 8 feet until the MBC

reached the right outby corner of the intersection in No. 3 entry. The mined height at the victim's location is 46 inches. The mine floor was dry.

Continuous Haulage Mining System

The continuous haulage mining system involved in the accident is an "attached system," meaning that the MBCs and bridge conveyors are physically attached to the CMM, forming a train (see Appendix A). The train consists of one CMM, two MBCs, and three bridge conveyors. The MBCs are controlled by equipment operators who start and stop the bridge conveyors as needed.

An Eimco continuous mining machine (CMM), model number 25M-0, was connected to the first bridge conveyor, which was connected to the No. 1 Long Airdox MBC, model number MBC-27CL.

Next, the No. 1 MBC, operated by Rankin, was connected to the second bridge conveyor, which was connected to the (outby) No. 2 Long Airdox MBC, model No. 27CL, which was operated by Cary. The No. 2 MBC, in turn, was connected to the final bridge conveyor. As previously explained, mined coal was transported from the CMM, across the MBCs and bridge conveyors and dumped onto the section conveyor belt, which was connected to the main belt conveyor system, which carried the mined material to the surface.

Mobile Bridge Carrier Operation

Operator controls

The MBCs are operated manually, with the controls being on the side of the machine. Due to the low mining height, the operator typically crawls beside the machine as it moves forward and backward. The No. 1 MBC involved in the accident was equipped with a piece of conveyor belt material that was attached to the MBC so Rankin could ride on it as the unit moved across the mine floor. This piece of conveyor belt is commonly referred to as the "magic carpet." The magic carpet is typically used when there is no operator's deck attached to the machine. The deck is a solid platform for the machine operator to sit on and ride as the controls are operated. The deck provides lateral protection against crushing hazards because the metal deck frame extends beyond the MBC operator's body. The No 1 MBC was manufactured in 1988 with an operator's deck, but when it began to be used at the Kocjancic mine in 2013, it did not have an operator's deck. Investigators were not able to determine when the deck was removed or who removed it.

Communication

Investigators learned that the CMM operator commonly flashed his cap-light to the No. 1 MBC operator in order to signal his intentions to move forward or backward. This method of communication is unreliable because it is difficult for others to see the signals when the coal seam is changing in elevation and/or the mining

equipment is blocking the view of the equipment operators. Also, signaling does not provide confirmation that the MBC operator understood the signal. A positive means of verbal communication by radio or pager would help to prevent miscommunication.

Stopping and starting the CMM and MBCs

Investigators determined that the CMM moved the No. 1 MBC while it was idle. Because of this, investigators determined the scenarios in which the CMM could move the MBCs without the MBCs being trammed with the CMM. First, when the CMM was turned off manually or with the emergency stop button, the MBCs were de-energized. The CMM was then re-started and trammed prior to the MBCs being re-started. Therefore, the CMM was able to move the MBCs while they were de-energized.

Secondly, the Eimco 25M-0 continuous mining machine is equipped with a model MDG MX3 IntellliZone proximity detection system (PDS), manufactured by Matrix Design Group. The PDS utilizes an electromagnetic field and line-of-sight radio signal which allows the machine mounted components (electromagnetic field generators), and miner wearable components (MWC), to communicate with one another. When a miner wearing a MWC approaches a set distance from the continuous mining machine, an electromagnetic field is generated. This action triggers a warning (flashing yellow light and audible alert) on the continuous mining machine and the miner's MWC. If the miner continues toward the CMM, a "shutdown zone" is triggered, indicated by a flashing red light and continuous audible alarm, on both the CMM and the MWC.

Investigators determined that entering the shutdown zone disabled the tram and conveyor boom functions of the CMM and shut down the MBCs. However, when a MWC was moved away from the shutdown zone, the tram and conveyor boom functions of the CMM were restored so that it could move the MBCs while they were de-energized.

Training and Experience

Rankin had 7 weeks of underground mining experience, of which 2 weeks were as an MBC operator. He gained all of his experience at the Kocjancic mine. Rankin received 40 hours of new miner training from July 16, 2018 through July 20, 2018. This training was a combination of classroom training and a mine tour provided by the mine operator. The victim's underground experience from July 20, 2018, until August 16, 2018, involved general labor duties as he became familiar with the mine and working section.

On August 16, 2018, Baumgartner task trained the victim to be a MBC operator. The task training covered instruction in the health and safety aspects and safe operating procedures related to operating a MBC. This involved instruction on pre-

operational checks, examining the MBC for loose covers or broken parts, removing combustible material from the MBC, inspecting the fire suppression system, examining tram roads, operational checks and controls, exercising caution near cables and workers, post-operational checks, and de-energizing at the end of the shift. This task training also instructed Rankin to keep his extremities in a safe location at all times.

Supervised practice was provided prior to the beginning of production and supervised operation during production. On August 17, 2018, Rankin was assigned to operate the No. 1 (inby) MBC, which he did for the two weeks and three days leading up to the accident.

The operator submitted an addendum to the approved training plan which addresses the task training provided to new MBC operators. The addendum prohibits new miners from operating MBCs within their first thirty days. After thirty days, the new miner must receive supervised practice during nonproduction, supervised operation during production, and training in all safety devices and policies. The training plan addendum was approved by MSHA on October 30, 2018.

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. Root causes were identified 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 of this type of accident.

1. Root Cause: The mine operator did not provide a means of protection against crushing injuries to the MBC operator.

   Corrective Action: The mine operator installed a substantially constructed equipment operator's deck for lateral protection against crushing injuries to the MBC operator. The construction of the deck is consistent with the original equipment manufacturer's design. Additionally, the mine operator installed "man-in-position" safety devices on the MBCs to deactivate the tram motors of the CMM and both MBCs when an MBC operator exits the operator's deck. The devices prevent restarting the CMM or any MBC until the operator returns to position. The mine operator also instituted preoperational examinations of the man-in-position safety device. The examination and results must be recorded and signed by a foreman, and defects affecting safety must be fixed before any MBC is used.

2. Root Cause: The mine operator did not provide a means for the MBC operators and the CMM operator to communicate verbally before the CMM is trammed.

   Corrective Action: The mine operator provided all MBC operators and the CMM operator with a stand-alone, permissible, two-way voice communication system. The mine operator instituted a company policy that requires the CMM operator to receive verbal confirmation from the MBC operators prior to starting to tram. All CMM and MBC operators have been trained in this policy.

3. Root Cause: There was no electronic means provided to prevent the CMM from tramming and dragging the MBC while the MBC was de-energized.

   Corrective Action: The mine operator installed a system that causes all the tram functions of all electrical components (CMM and MBCs) to be de-energized when one component shuts off, either intentionally or by proximity detection. Additionally, the system requires a physical start-up function that must be performed on each component before any of the components have the ability to tram.

CONCLUSION

On Tuesday, September 11, 2018, at approximately 4:10 p.m., Kameron Rankin, a 27-year-old mobile bridge carrier operator with 7 weeks of mining experience was fatally injured. The accident occurred when the continuous mining machine was being re-positioned. Because the victim's mobile bridge carrier was connected to the mining machine, the carrier moved and the victim was crushed between the carrier and coal rib.

The accident occurred because the administrative and engineering controls in place at the mine were not adequate to protect the victim from crushing injuries.

Approved By:

_____ _____

Russell J. Riley Date
District Manager

ENFORCEMENT ACTIONS

1. A Section 103(k) Order No. 8013255 was issued to Rosebud Mining Company, Kocjancic. ID No. 36-09436.

   A fatal accident occurred in the C-8 Butt rooms #1-#5 working section on September 11, 2018. This order is being issued under Section 103(k) of the Federal Mine Safety and Health Act of 1977 to prevent destruction of any evidence which would assist in investigating the cause of the accident. This order prohibits all activity in the underground workings of the entire mine.

2. A 314(b) safeguard notice was issued to the Rosebud Mining Company, Kocjancic, pursuant to 30 CFR § 75.1403.

   On September 11, 2018, at approximately 4:10 p.m., the operator of the No. 1 Mobile Bridge Carrier (MBC) being operated in the C-8 Butt Rooms Section, MMU 001-0, was fatally crushed between the MBC and rib as the continuous mining machine (CMM) was being repositioned. At the time of the accident, the No. 1 MBC was moved because it was physically linked to the CMM. The administrative and engineering controls in place at the time of the accident were not adequate to prevent the accident. Additional controls are necessary to prevent this type of accident and to provide additional layers of protection: (1) A means for effective verbal communication between the CMM operator and MBC operator, (2) an operator's deck that provides protection against crushing injuries, (3) interlocked shut down and start up electrical controls, and (4) a man-in-position device and associated preoperational examinations to ensure functionality.

   This is a notice to provide safeguard requiring:

   - All MBCs shall have a written pre-operational check performed, which includes checking each man-in-position switch and panic bar, prior to putting the equipment into service each shift. All deficiencies found that affect safety must be corrected before any MBC is put into service. The pre-operational checks, deficiencies found, and corrective actions, shall be documented in the foreman's note pad made available to MSHA upon request and recorded in a book. The record book of the pre-operational checks shall be promptly dated and signed or countersigned by a foreman. The book of pre-operational checks will be retained at a surface location at the mine for at least one year and shall be made available for inspection by authorized representatives of the Secretary and the representative of miners.

   - All MBC operators, and the CMM operator, shall be provided with a stand-alone permissible two-way voice communications system. Such

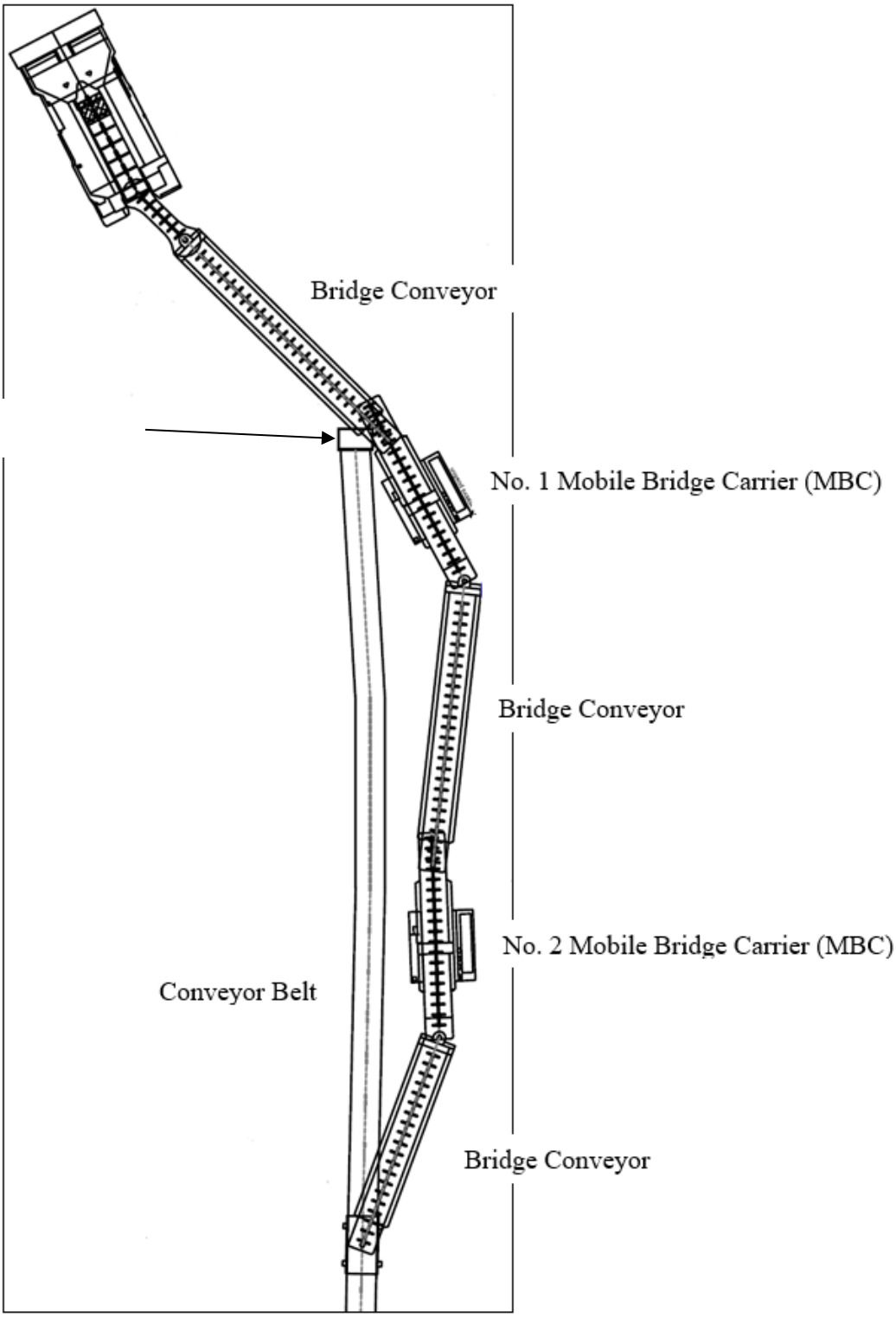
communication shall be either hardwired on the machine, or a wireless device, worn by the machine operators. If a wireless device is used, a separate radio frequency specified for such use only, shall be provided. CMM operators must receive a verbal confirmation from the MBC operators prior to tramming.

- All electrical components of the continuous haulage system shall be so designed that when one component shuts off, either intentionally or by proximity detection, the tram functions of all components will be de-energized. Additionally, a start-up procedure shall be utilized to assure that all component operators must perform a physical function related to re-starting before any of the components begin to tram.

- All MBCs shall be provided with a substantially constructed deck. Such decks shall be constructed for the lateral protection of, and other crushing injuries to, the operator. The construction of such operator deck components shall be as close as practical to the original equipment manufacturer's design criteria.

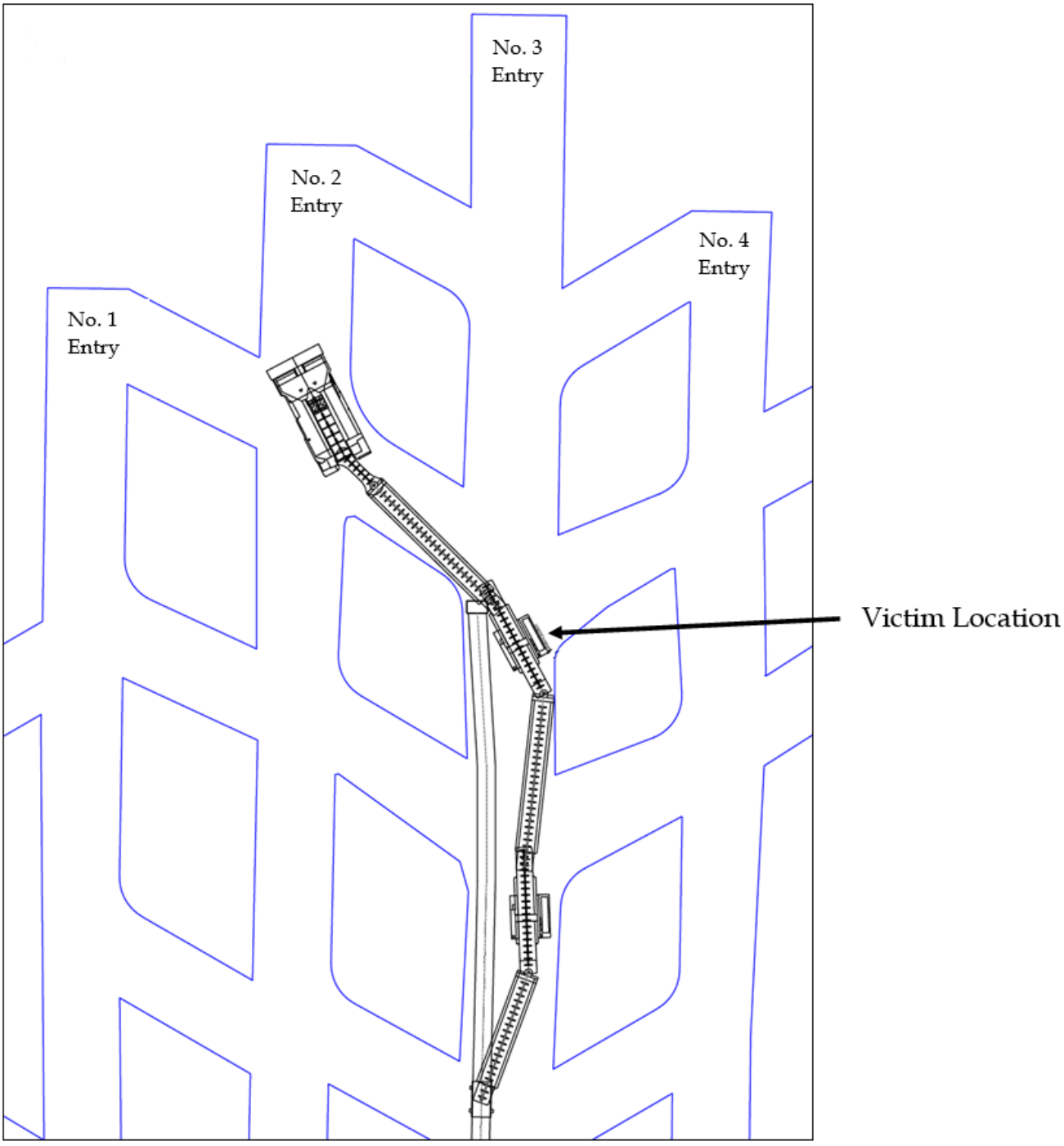
- All MBCs shall be provided with a man-in-position safety device. This device will be installed to deactivate the tram motors of the CMM and all MBCs when an MBC operator exits the operator's compartment. The switch shall automatically de-energize all tram motors and prevent restarting the motor of any MBC or the CMM until the operator returns in position. This safety device shall be functional when repositioning during the mining cycle or tramming equipment from one place to another as an attached system.

Appendix A
Continuous Haulage Mining System



Appendix B
Victim Location

(Not to Scale)



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

Rosebud Mining Company

Jason Baumgartner * ..... Section Foreman
Ben Bowser * ..... Surface Attendant
Brian Burkett ..... Mine Superintendent
Jeremy Cary * ..... No. 2 Mobile Bridge Carrier Operator
David Doney ..... General Manager
Jeff Fike * ..... Roof Bolter helper (twin-boom)
Dylan Filler * ..... Roof Bolter (single-boom)
Mike Groff ..... Engineer
Joe Guzzo * ..... Continuous Mining Machine Operator
Kaven Hornberger * ..... Utility-man
Don Ishman ..... Mine Foreman
Jack Ishman * ..... Beltman/Emergency Medical Technician
Brandon Keener * ..... Scoop Operator
Tanner Lowmaster ..... Safety
Austin Roy * ..... Roof Bolter (twin-boom)
Joe Somogyi ..... Head of Maintenance
Ben Stock ..... Attorney

Pennsylvania Bureau of Mine Safety

Gary Barkley ..... Inspector/Electrical Specialist
Art Brower ..... Electrical Engineer
Brent Harmon ..... Inspector
Rick Murphy ..... Supervisor
James Ross ..... Electrical Engineer
Rich Wagner ..... Program Manager
Chas Washlak ..... Electrical Supervisor

Mine Safety and Health Administration

Jason Boring ..... Coal Mine Safety and Health Inspector
Justin Daniels ..... Electrical Engineer, Technical Support
Richard Feigh ..... Coal Mine Safety and Health Specialist, Electrical
Michael Kelley ..... Assistant District Manager for Enforcement
James Miller ..... Coal Mine Safety and Health Inspector
Patrick Retzer ..... Electrical Engineer, Technical Support
Robert Roland ..... Supervisory Coal Mine Safety and Health Inspector
Matt Wharry ..... Industrial Engineer, Technical Support

Appendix D

Victim Information

Accident Investigation Data - Victim Information
Event Number: 6 2 4 9 1 0 6

U.S. Department of Labor
Mine Safety and Health Administration

Victim Information: 1

1. Name of Injured/Ill Employee:	2. Sex:	3. Victim's Age:	4. Degree of Injury:
Kameron Rankin	M	27	01 Fatal

5. Date(MM/DD/YY) and Time(24 Hr.) Of Death:		6. Date and Time Started:	
a. Date: 09/11/2018	b. Time: 18:01	a. Date: 09/11/2018	b.Time: 15:00

7. Regular Job Title:	8. Work Activity when Injured:	9. Was this work activity part of regular job?
072 Mobile Bridge Operator	073 Operating Equipment	Yes X No

10. Experience:	Years	Weeks	Days		Years	Weeks	Days		Years	Weeks	Days		Years	Weeks	Days
a. This Work Activity:	0	2	3	b. Regular Job Title:	0	2	3	c: This Mine:	0	7	1	d. Total Mining:	0	7	1

11. What Directly Inflicted Injury or Illness?	12. Nature of Injury or Illness:
077 Underground Mining Machines	170 Crushing

13. Training Deficiencies:
Hazard: | New/Newly-Employed Experienced Miner: | Annual: | Task:

14. Company of Employment: (If different from production operator)
Independent Contractor ID: (if applicable)

15. On-site Emergency Medical Treatment:
Not Applicable: | First-Aid: X | CPR: X | EMT: X | Medical Professional: | None:

16. Part 50 Document Control Number: (form 7000-1)

17. Union Affiliation of Victim: