CAI-2018-08

UNITED STATES
DEPARTMENT OF LABOR
MINE SAFETY AND HEALTH ADMINISTRATION

COAL MINE SAFETY AND HEALTH

REPORT OF INVESTIGATION

Surface Coal Mine

Fatal Machinery Accident
October 17, 2018

No. 1 Surface Mine
Princess Polly Anna Coal, Inc.
Rupert, Greenbrier County, West Virginia
ID No. 46-09473

Accident Investigators

Russell Richardson
Mine Safety and Health Inspector

Andrew Sedlock
Mine Safety and Health Inspector

John Stone
Mine Safety and Health Inspector

Originating Office
Mine Safety and Health Administration
District 4
100 Bluestone Road
Mount Hope, West Virginia 25880
David S. Mandeville, District Manager

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Photograph of Accident Scene

OVERVIEW

On Wednesday, October 17, 2018, at approximately 10:25 a.m., Roger W. Herndon, a 33-year-old auger mining machine helper (in training) with approximately 3 days of surface mining experience, received fatal injuries when he was struck in the chest while moving a piece of auger drill steel (auger steel). When he was struck, Herndon was using the onboard crane in an attempt to move a piece of auger steel onto the deck of the auger machine. The accident occurred because the victim was not adequately trained and was standing in an unsafe location. Also, the mine operator did not properly maintain the auger's hydraulic system which compromised the safety of miners operating the machine.

GENERAL INFORMATION

The coal auger mining machine is owned and operated by Princess Polly Anna Coal, Inc. At the time of the accident, the auger mining machine was operating at the No. 1 Surface Mine property (MSHA ID No. 46-09473) in the Sewell Coal Seam, located near Rupert, Greenbrier County, West Virginia. The mine operates on a rotating schedule of five days one week and six days the following week. The auger mining machine is operated on one 10-hour shift each producing day. Maintenance is performed as needed during the shift. The mined coal is transported by truck to the preparation plant for processing.

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

Frederick Taylor .....Owner/Operator
Cary Dameron .....Mine Foreman
Kermit Holliday ..... Assistant Mine Foreman

The Mine Safety and Health Administration (MSHA) completed a regular safety and health inspection (E01) on September 19, 2018. The non-fatal days lost (NFDL) incidence rate for the mine for 2017 was 0 compared to a national average rate of 0.78 for mines of this type.

DESCRIPTION OF THE ACCIDENT

On October 17, 2018, Roger Herndon, Auger Mining Machine Helper (in training), and William Herndon, Auger Mining Machine Operator, arrived at the mine at approximately 6:30 a.m. They met Cary Dameron, Mine Foreman; Kermit Holliday, Assistant Mine Foreman; Roger Woods, Auger Helper and Articulating Truck Operator, and G. Evert Heimberger, Equipment Operator, at the mine office to receive their work assignments. R. Herndon and his father W. Herndon were assigned to operate the auger.

W. Herndon and R. Herndon conducted a pre-operational inspection of the articulating truck they would be driving to the pit. They drove to the pit where R. Herndon checked and added oil to the auger machine while W. Herndon inspected the rest of the machine. The two began production with the auger machine and mined the first hole to a depth of 220 feet. They then moved the auger machine and started mining the second hole. W. Herndon and R. Herndon fully advanced the seventh piece of auger steel and R. Herndon began setting the eighth piece of auger steel into the pan. According to W. Herndon, R. Herndon noticed that the auger steel was not properly positioned in the pan and that it needed to be adjusted so it would connect to the machine. R. Herndon used the onboard crane to reposition the auger steel and, while standing in an unsafe location, unintentionally pulled it from the auger pan and struck himself in the chest. R. Herndon was knocked onto the auger steel that was stacked on the ground adjacent to the auger machine.

W. Herndon saw R. Herndon laying on the ground and ran to him. W. Herndon calmed him down and laid him at the end of the auger machine. W. Herndon went to a coal truck and called for Holliday to come to the pit. At approximately 10:30 a.m., Roger Woods, who was operating an articulating truck, told Holliday that W. Herndon wanted him to come to the pit. Holliday arrived at the auger machine and began evaluating R. Herndon. W. Herndon traveled to the mine office to get first aid supplies and to call 911. W. Herndon returned to the pit. Taylor, Woods and Heimberger had all arrived at the auger machine and were assisting Holliday administer first aid.

Quinwood Emergency Ambulance arrived on scene at 10:59 a.m. and stopped at the top of the roadway leading down into the pit. R. Herndon was placed on a backboard and transported in a pickup truck out of the pit area to the ambulance. While R. Herndon was being transported out of the pit, Holliday started to administer cardio pulmonary resuscitation.

When the group arrived at the ambulance, Quinwood Emergency Ambulance personnel took control of the victim. R. Herndon was transported to the Greenbrier Valley Medical Center in Ronceverte, WV and was pronounced dead at 11:55 a.m. by Medical Examiner Andrea Orvik.

INVESTIGATION OF THE ACCIDENT

On October 17, 2018, at 10:55 a.m., Dameron notified Kelly Acord, MSHA Supervisory Special Investigator, of the accident. At 11:00 a.m., Acord notified David S. Mandeville, MSHA District Manager, that there had been a serious accident at the No. 1 Surface Mine. At 11:15 a.m., Acord notified Russell Richardson, Accident Investigator; Andrew Sedlock, Surface Inspector; Joseph Presley, Staff Assistant; and Donald Phillips, Conference Litigation Representative Supervisor, of the accident.

At 1:55 p.m., Richardson, Presley, and Phillips arrived at the mine office and issued a 103(k) order to preserve the accident scene and to prevent the destruction of any evidence that would assist in determining the cause or causes of the accident. They also conducted informal interviews with the miners and obtained their written statements.

At 4:30 p.m., Sedlock arrived at the mine and performed initial function tests of the remote switch used to control the crane boom functions. Sedlock reviewed examination and training records before traveling to the accident scene with Dameron and investigators from the West Virginia Office of Miners Health Safety and Training (WVOMHST). The accident scene was secured, examined, and photographed.

On October 18, 2018, Sedlock and MSHA electrical specialist John Stone returned to the mine to perform additional function tests. Sedlock and Stone met with Dameron, Holliday, Woods, and Taylor. Also present were representatives from the WVOMHST.

On October 23, 2018, Richardson and Stone, MSHA Technical Support mechanical engineers Mark Kvitkovich and Ronald Medina, MSHA electrical supervisor Robert Hatfield, and Kendall Smith, WVOMHST Chief Electrical Inspector, returned to the mine site and met with Dameron. They tested the hydraulic system and determined the operating pressures.

On October 25, 2018, MSHA and WVOMHST jointly conducted formal interviews at the Office of Miners Health Safety and Training Office in Oak Hill, West Virginia. The persons who participated in the investigation and were interviewed are listed in Appendix A.

DISCUSSION

Accident Scene

The auger crane boom was found to be extended out away from the auger machine with a piece of auger steel suspended on the crane rope hook. The remote crane boom controls were found on the ground near the operator deck (Appendix B). The weather was clear and 57 degrees. The ground around the auger was muddy and a stack of auger steel was stored next to the auger machine.

Auger Steel

The piece of auger steel measures 18" in diameter, is 12' in length, and weighs 647 lbs. The steel is loaded onto the machine using an onboard, overhead, hydraulically powered crane. The auger helper adds or removes auger steel as needed. The auger operator stands in a different location and operates the conveyor loadout, thrusting jack, and auger rotation. The auger operator and auger helper have different and distinct tasks and do not supervise each other.

Auger Machine Controls and Hydraulic System

The auger mining machine was manufactured by Salem Auger in 1986 and was purchased by the mine operator in April 2016. The model number is S-1500-B and the serial number is 2-2 Job #K2313.

A crane winch hydraulic motor (crane winch motor) lifts or lowers the auger steel by extending or retracting a wire rope. A hook is permanently attached to the end of the wire rope for the purposes of lift or lowering. As designed, relief valves limit the maximum pressure available to the crane winch motor to 1,700 psi, to extend or retract the wire rope. Investigators performed testing and found hydraulic movements very erratic. When tested, the maximum pressure available at the crane winch motor was 2,350 psi. The hydraulic relief valve pressure of the crane winch motor (2,350 psi) was set 1.38 times higher than the manufacturer's recommended setting (1,700 psi). This caused the wire rope and hook to jerk upward when trying to lift a load. Investigators determined that adjustments were made to the operating hydraulic pressures that were not in accordance with the manufacturer's specified pressure settings, but they could not determine who made the adjustments.

A crane boom hydraulic cylinder (crane boom jack) rotates or swings the boom away from the auger machine or toward the auger machine. Investigators found that the hydraulic relief valve pressure for the crane boom jack was 960 psi, which was 2.74

times higher than the manufacturer's recommended setting of 350 psi. This caused the crane boom swing to operate suddenly with a jerking motion. Investigators also found that, without any operator input, the crane boom was always moving at idle speed, either toward the machine or away from the machine.

Investigators determined there was a defect in the crane boom swing toggle switch on the crane control handset. See "boom out" and "in" in Appendix C. When tested, in several instances this switch was placed in the swing out position, but the crane boom did not swing. For it to work, the switch had to be moved back and forth a few times.

Investigators found a brass alloy water-oil-gas gate valve, not a part of the original design, on the crane boom jack that was not rated for the operating pressure of the machine. Also, an extra, unused switch marked "Trolley" was installed on the crane control (see Appendix C). This "Trolley" control served no purpose since this machine did not have an extendable boom.

Investigators determined that the remote was equipped with a crane boom in-out "Trolley" switch that was not connected because the boom did not have this capability to extend and retract the length of the boom. The investigation team inspected the controls of the auger machine and conducted tests on the auger's crane boom hydraulic functions. Investigators determined that the on/off switch on the remote control was reversed (see Appendix D). When the switch was in the "off" position, the system was actually on. Also, the crane boom would slowly swing outward without operator input. Testing showed that when the crane boom toggle switch was placed in the neutral (stopped) position, the crane boom would swing out slowly away from the machine instead of staying still. The drift rate was 70 degrees per minute when there was no load on the crane boom and 45 degrees per minute when the crane boom was carrying an auger steel.

Investigators found several hydraulic oil leaks, including some that were mixed with coal dust, and there were oil accumulations on the machine in various locations. Hydraulic oil was added as needed at a rate of approximately 1-2 gallons a day and there was nothing noted in the maintenance record book about the oil leaks. MSHA inspectors had previously issued two citations for oil leaks, and one citation for missing guarding, during the 24 months prior to the fatal accident.

Investigators also determined the following:

1. The hook permanently attached to the wire rope had been modified to the point that it could not be safely used to hoist the auger steel.

2. A tagline was not being used to steady or guide the auger steel during installation and removal.

3. Persons were not kept clear of auger sections being swung into position. All miners must be outside the swing radius of the auger steel.

After the fatal accident, the mine operator replaced the auger crane boom system with a hydraulic arm and claw system similar to an excavator with a claw. This eliminated the need for miners to be near the side of the auger while auger steel is being installed or removed.

Testing and Examination

The mine operator's records indicate that a pre-shift examination and two on-shift examinations were conducted during each shift. The pre-shift and the on-shift examination records did not show any hazards for the day of the accident.

Training

R. Herndon began working for the mine operator on October 15, 2018. When he began his employment he had 12 years of underground mining experience, had completed new miner surface training, but had no surface mining experience. The mine operator gave him experienced miner training on October 15, 2018.

R. Herndon was hired to be an auger mining machine helper, a job he had never performed before. The mine operator was required to provide task training which would include adequate training in the health and safety aspects and safe operating procedures for this task, equipment and machinery.

The mine operator did not provide adequate task training because he did not provide adequate training in the health and safety aspects and safe operating procedures for this task, equipment and machinery. Roger Woods, Auger Helper/Articulating Truck Operator, provided supervised operation training during production for a portion of the shift on October 15, 2018. Woods then provided additional supervised operation training during production during the morning of October 16, 2018. The October 16 training was performed for a portion of the shift until Woods left the job site to go to an appointment. On Wednesday, October 17, 2018, R. Herndon was assigned to operate the auger crane while not being supervised. As previously discussed, he positioned himself in a hazardous location while operating the auger crane with a suspended piece of auger steel attached which struck him in the chest resulting in fatal injuries.

ROOT CAUSE ANALYSIS

MSHA conducted an analysis to identify the most basic causes of the accident that were correctable through reasonable management control. 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 operator's implemented corrective actions to prevent a recurrence of this type of accident.

1. Root Cause: Improper adjustments were made to the operating hydraulic pressures by persons not familiar with the manufacturer's pressure settings.

   Corrective Action: The operating pressures in the hydraulic system were set properly. The operator developed a written policy that permits only qualified employees to perform maintenance and adjustments on the auger mining machine. All employees were trained in the new policy.

2. Root Cause: The task training provided by the operator was not adequate because the training did not include the health and safety aspects and safe operating procedures for the task, equipment and machinery, and supervised practice during nonproduction.

   Corrective Action: The operator revised its task training program to include the health and safety aspects and safe operating procedures for the task, equipment and machinery, and supervised practice during nonproduction.

CONCLUSION

On Wednesday, October 17, 2018, at approximately 10:25 a.m., Roger W. Herndon, a 33-year-old auger mining machine helper (in training) with approximately 3 days of surface mining experience, received fatal injuries when he was struck in the chest while moving a piece of auger drill steel (auger steel). When he was struck, Herndon was using the onboard crane in an attempt to move a piece of auger steel onto the deck of the auger machine. The accident occurred because the victim was not adequately trained and was standing in an unsafe location. Also, the mine operator did not properly maintain the auger's hydraulic system which compromised the safety of miners operating the machine.

Approved By:

_____ _____

David S. Mandeville Date
District Manager

ENFORCEMENT ACTIONS

1. 103(k) Order (8149188) issued October 17, 2018, at 13:55 to Princess Polly Anna Coal, Inc. A fatal accident occurred at this operation on 10-17-18. This Section 103(k) Order is intended to protect the safety of all persons on site, including those involved in rescue and 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 and prohibits all activities at the mine. Additionally, the mine operator is reminded of its obligation to prevent the destruction of evidence that would aid in investigating the cause or causes of the accident.

2. 104(a) citation no. 8149189 was issued for a violation of § 77.404(a).

   The Salem auger was not being maintained in safe operating condition. The following conditions were found to exist on the auger crane boom:

   1. The auger crane boom swings outward slowly without operator input;
   2. The hydraulic relief pressure for the auger crane boom jack was set 2.74 times higher than manufacturer's recommended settings. This caused the crane swing to operate suddenly with a jerking motion;
   3. The hydraulic relief pressure of the auger crane winch motor was set 1.38 times higher than the manufacturer's recommended setting. This caused the wire rope, hook, and load to jerk upward during lifting;
   4. The relief pressure settings and valve bypassing associated with the hydraulic system caused the movements of the auger crane boom to be unexpected and uncontrolled.

   On Wednesday, October 17, 2018, R. Herndon was assigned to operate the auger crane while not being supervised. He positioned himself in a hazardous location while operating the auger crane with a suspended piece of auger steel attached which struck him in the chest resulting in fatal injuries. Additionally, the following conditions were found on the auger.

   5. The on/off switch located on the operator's control is reversed. When the switch is in the off position it is actually on;
   6. A device located on the auger crane boom swing jack was not rated for the operating pressure of the machine;
   7. An extra, unused switch, marked "Trolley" was installed on the auger crane boom control which could confuse operators;
   8. A hook permanently attached to the crane wire rope had been modified to the point that it could not be safely used to hoist the auger steel.

3. 104(d)(1) citation no. 8149193 was issued for a violation of § 77.1504(b).

   Persons were not being kept clear of auger sections that were being swung into position. On Wednesday, October 17, 2018, R. Herndon was assigned to operate the auger crane boom while not being supervised. While operating the auger crane he was struck in the chest with a suspended piece of auger steel, resulting in fatal injuries.

4. 104(d)(1) order no. 8149190 was issued for a violation of § 48.27.

   The mine operator did not provide adequate task training to a miner for a task in which the miner had no previous experience. The mine operator directed the miner to operate an auger crane boom and did not provide adequate instruction in the health and safety aspects and safe operating procedures.

   Roger Herndon was hired by the mine operator on October 15, 2018, to be an auger mining machine helper, a task he had never performed. The operator provided supervised operation training during production for a portion of the shift on October 15, 2018. The operator provided additional supervised operation training during production the morning of October 16, 2018. The October 16 training was performed for a portion of the shift until the trainer left the job site to go to an appointment. On Wednesday, October 17, 2018, R. Herndon was assigned to operate the auger crane while not being supervised. While operating the auger crane he was struck in the chest with a suspended piece of auger steel, resulting in fatal injuries.

APPENDIX A

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

Princess Polly Anna Coal, Inc.

*Frederick Taylor .....Owner/Operator
*Cary Dameron .....Mine Foreman
*Kermit Holliday ..... Assistant Mine Foreman
*William Herndon .....Auger Mining Machine Operator
*Roger Woods ..... Auger Helper/Articulating Truck Operator
*G. Evert Heimberger .....Equipment Operator

West Virginia Office of Miners Health, Safety and Training

Greg Norman.....Director
Eugene White.....Deputy Director
McKennis Browning.....Inspector at Large
Kendall Smith ..... Chief Electrical Inspector
David Boggs.....Mine Safety Specialist (Surface)
Thomas Fitzwater .....Mine Safety Specialist (Surface)
Jack Riffe.....Attorney

Mine Safety and Health Administration

Donald Phillips ..... Conference Litigation Representative Supervisor
Joseph Presley .....Staff Assistant
Robert Hatfield .....Electrical Supervisor
John Stone .....Electrical Specialist
Russell Richardson ..... Lead Accident Investigator/Special Investigator
Andrew Sedlock .....Surface Inspector
Ronald Medina ..... Mechanical Engineer
Mark Kvitkovich ..... Mechanical Engineer

APPENDIX B

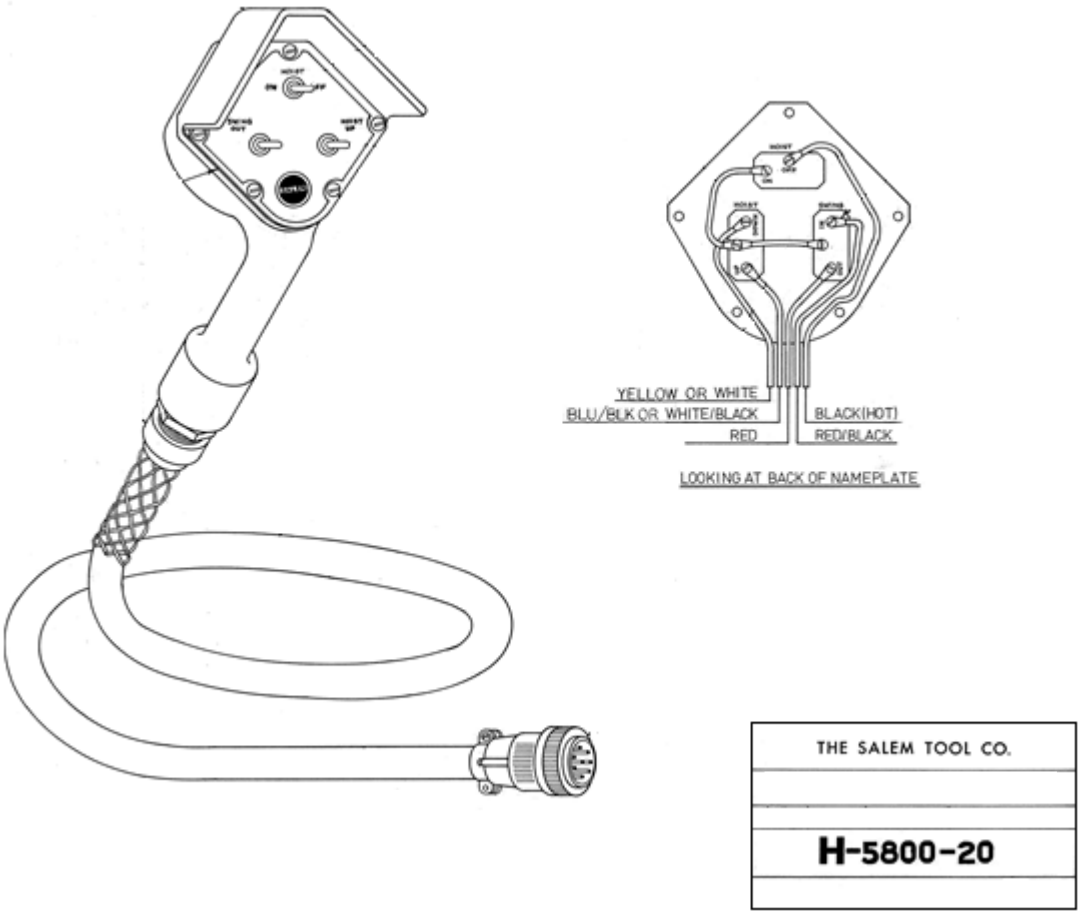
Photos of the accident scene

APPENDIX C

Crane Boom Hand Held Control Picture

APPENDIX D

Crane Boom Hand Held Control Drawing



APPENDIX E

Victim Information Form

Accident Investigation Data - Victim Information
Event Number: 4 6 0 9 4 7 3

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:
Roger W. Herndon	*M*	*33*	*01 Fatal*

5. Date(MM/DD/YY) and Time(24 Hr.) Of Death:	6. Date and Time Started:
a. Date: 10/17/2018 b.Time: 11:55	*a. Date: 10/17/2018 b.Time: 7:00*

7. Regular Job Title:	8. Work Activity when Injured:	9. Was this work activity part of regular job?
071 Auger helper	*028 Loading auger steel*	Yes X No

10. Experience	Years	Weeks	Days
a. This Work Activity:	*0*	*0*	*3*
b. Regular Job Title:	*0*	*0*	*3*
c: This Mine:	*0*	*0*	*3*
d. Total Mining:	*12*	*0*	*0*

11. What Directly Inflicted Injury or Illness?	12. Nature of Injury or Illness:
082 Struck in chest by auger steel	*170 Internal injuries*

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

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

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

16. Part 50 Document Control Number: (form 7000-1)
17. Union Affiliation of Victim: *9999* *None (No Union Affiliation)*