

UNITED STATES  
DEPARTMENT OF LABOR  
MINE SAFETY AND HEALTH ADMINISTRATION

REPORT OF INVESTIGATION

Surface Coal Facility

Electrocution  
August 7, 2019

Kanawha Eagle Mining, LLC  
South Hollow Prep Plant and Loadout  
Winifrede, Kanawha County, West Virginia  
ID No. 46-03085

Accident Investigators

John Stone, Jr.  
Electrical Specialist

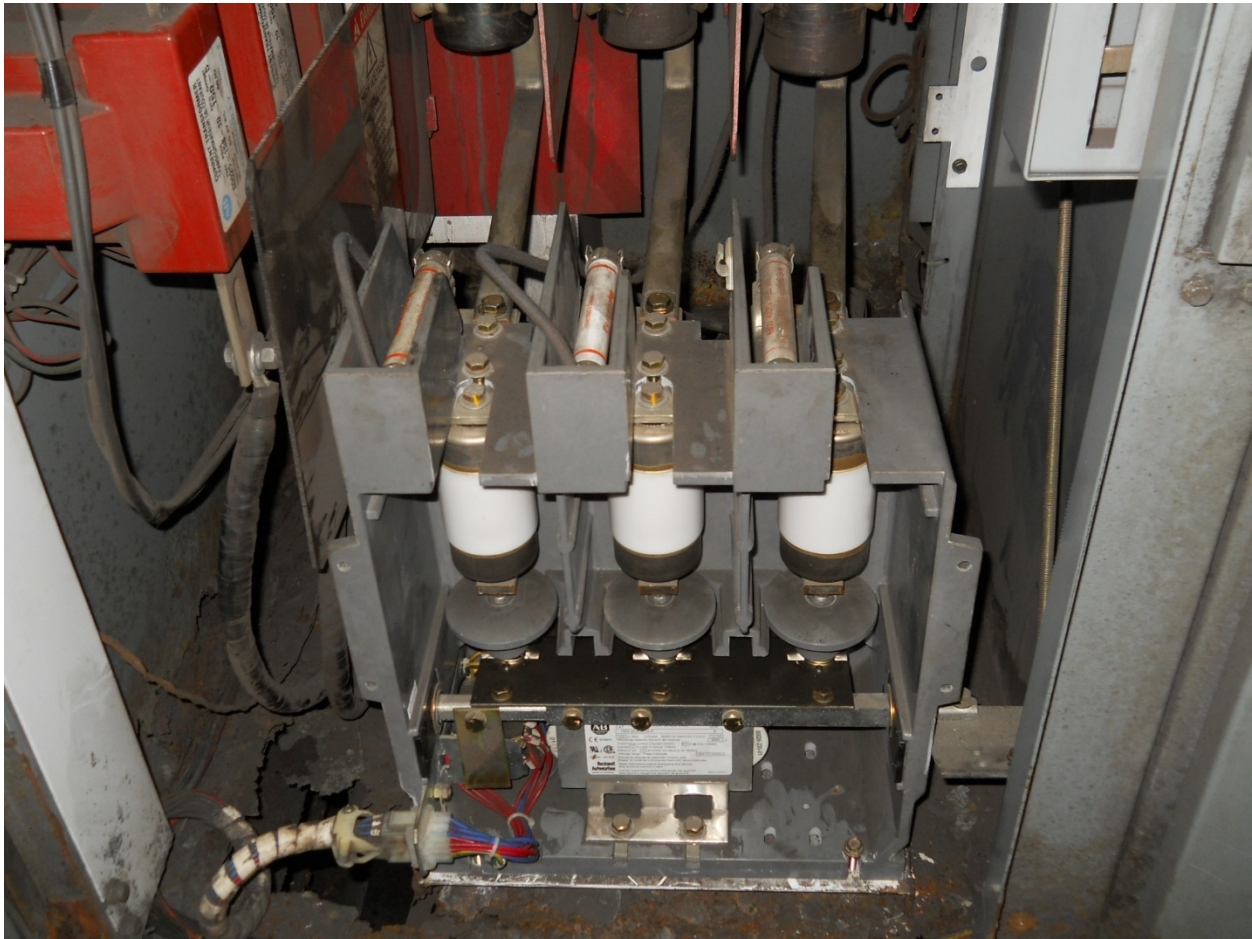
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## OVERVIEW

On Wednesday, August 7, 2019, at approximately 8:05 a.m., Michael S. Davis, a 42-year-old electrician with 15 years of mining experience died when he contacted a 4,160 VAC energized circuit. When the accident occurred, the victim was attempting to replace a vacuum contactor located in the 8<sup>th</sup> floor motor control center (MCC) room in a coal preparation plant.

The accident occurred because the mine operator engaged in, and assisted miners in the performance of, electrical work while knowing the energized electrical circuit on which electrical work was performed was not locked and tagged out.

## GENERAL INFORMATION

The South Hollow Plant and Loadout processes bituminous coal mined from the Peerless and Eagle coal seams. The plant is located at Winifrede, which is in Kanawha County, West Virginia. The plant operates two, 12-hour shifts five to six days a week,

and employs a total of 40 people. The day shift starts at 7:00 a.m., and the evening shift starts at 7:00 p.m. Coal from the Peerless Rachel Mine is transported by overland conveyor belt to the South Hollow Plant storage area. Coal from the North Eagle Mine is transported by a slope belt directly into the South Hollow Plant and then is transferred by belt conveyor to the storage area. The plant processes an average of 6,000 tons of raw coal each day.

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

Doug Fala ..... Vice President of Operations  
Robbie Dehart ..... Director of Preparations  
Dave Kimbrell ..... Superintendent  
Chris Williams ..... Safety Manager

On July 10, 2019, a regular (E01) safety and health inspection was started and was still in progress at the time of the accident. The previous regular inspection was completed on March 26, 2019. The non-fatal days lost (NFDL) injury rate for the South Hollow Plant and Loadout for 2018 was 4.78 compared to the national NFDL rate of 1.37 for operations of this type.

#### DESCRIPTION OF ACCIDENT

On August 7, 2019, Joshua Farley, Plant Operator, attempted to start the slope belt coming from North Eagle Mine at approximately 12:00 a.m. The belt would not start. Farley notified Darrell J. Atkins, Sr., Plant Electrician, that there was a problem with the slope belt. Atkins traveled to the 8<sup>th</sup> floor MCC room and opened the top Unit 171 cabinet to do a visual check of the control relays. Atkins then asked Farley to try to start the slope belt while he watched the operation of the control relays. Farley made several attempts to start the belt at Atkins' request so Atkins could observe the function of the vacuum contactor circuit. After several attempts, the belt did not start. Richard Muncy, Plant Foreman and certified electrician, travelled to the 8<sup>th</sup> floor MCC room at approximately 1:30 a.m. to assist Atkins.

Muncy and Atkins began troubleshooting the slope belt starting circuit. The disconnect handle was pulled down to deenergize power. At approximately 4:00 a.m., Muncy left Atkins in the 8<sup>th</sup> floor MCC room as he went to place a call to Richard Cyfers, Programmable Logic Controller (PLC) Engineer, for help troubleshooting the slope belt problem. Cyfers informed Muncy during the call that they should replace the vacuum contactor. Cyfers informed Muncy there may be a vacuum contactor no longer being used that would work as a replacement and it was located in the old pump station a short drive from the plant. Muncy told Atkins to gather some tools and meet him outside the plant. Atkins closed the slope belt starter door, gathered his tools, and met Muncy outside the plant. Muncy and Atkins traveled to the old pump station in a separate building away from the plant. They arrived at the old pump station and

Muncy verified that the power disconnect at the old pump station was pulled. A company lock was already in place on this power disconnect. After removing the replacement vacuum contactor from the old pump station, they travelled back to the 8<sup>th</sup> floor MCC room at the plant.

Muncy pulled the Unit 171 visual disconnect handle down to the open position (see Appendix A) which opened the three visual disconnect blades. Muncy then put on his high voltage gloves and removed the 4,160 VAC fuses from the circuit that supplies electrical power to the Unit 171 cabinet. Atkins, assisting Muncy, removed the de-energized 4,160 VAC phase conductors along with the control transformer connections and began removing the vacuum contactor. Atkins had not completed the removal of the vacuum contactor when his shift ended at 7:00 a.m. Muncy told Atkins to inform Davis and Travis Myers, Plant Electrician, who were both about to begin work for the day shift, of their progress in replacing the vacuum contactor. Muncy remained in the 8<sup>th</sup> floor MCC room by himself to continue replacing the vacuum contactor. Atkins met Davis and Travis Myers on the 3<sup>rd</sup> floor and advised them of the progress on the vacuum contactor removal. Davis and Travis Myers traveled to the 8<sup>th</sup> floor MCC room and discussed the job with Muncy. Davis completed the removal of the vacuum contactor and began installing the replacement vacuum contactor.

Bill Clendenen, Plant Foreman and certified electrician, arrived at the 8<sup>th</sup> floor MCC room to check the progress of the job. Davis completed installation of the vacuum contactor and closed the cabinet door. Travis Myers replaced the three high voltage fuses in the back of the cabinet which energized the cabinet with 4,160 VAC. Davis then attempted to close the disconnect handle but the disconnect handle would not move. The handle was stuck in the open position and he could not close it. Scott Williams, Plant Foreman and certified electrician, arrived at the 8<sup>th</sup> floor MCC room and discussed the ongoing repairs with Clendenen. Meanwhile, Davis opened the cabinet door and began adjusting the contactor interlock rod (see Appendix B).

While Davis was adjusting the contactor interlock rod, Muncy noticed the disconnect handle had moved slightly upward from the fully open position (see Appendix B). Muncy looked towards the visible disconnect and he noticed the disconnect blades had moved towards the 4,160 volt buss. Muncy stated to Davis that it looks like the fingers are partially closed, something does not look right. At that moment, Davis came in contact with part of the energized circuit within the slope belt breaker cabinet. Clendenen, Scott Williams, Travis Myers and Muncy heard an electrical arc and all of them turned to see Davis lying on the floor. Clendenen threw Muncy a pair of high voltage gloves which he used to pull Davis clear of the breaker cabinet.

Zachary Bailey, Sales Vendor, arrived at the accident scene to assist with attempts to resuscitate Davis. Dallas Henderson, Control Room Operator, called 911. Cyfers and Scott Williams who had traveled to the bottom floor of the plant rushed to the main

substation to deenergize power. Scott Williams deenergized the electrical power to the plant. Clendenen was on the elevator at the time electrical power was deenergized so he radioed Scott Williams to reset the power so they would be able to use the elevator. Henderson along with Clifton White, Operations Manager, advised 911 Dispatch that a miner had been shocked.

Chesapeake Fire and Rescue along with a Paramedic and Emergency Medical Technician from Kanawha County Emergency Ambulance Authority arrived and began treatment. Davis was transported to Charleston Area Medical Center and arrived at the Emergency Room at 9:03 a.m. Medical examiner Allen Mock pronounced Davis dead at 9:34 a.m.

## INVESTIGATION OF ACCIDENT

On Wednesday August 7, 2019, at 8:21 a.m., Chris Williams called the Department of Labor National Contact Center (DOLNCC) to report the accident. The DOLNCC contacted Pam Wilson, the District Manager's secretary. Wilson informed David S. Mandeville, District Manager, and Mandeville dispatched Joshua McNeely, Electrical Specialist, and John Stone, Jr., Electrical Specialist, to the South Hollow Plant. Warren E. Stover, Coal Mine Safety and Health Inspector, was present at the mine at the time of the accident. He had arrived on the day shift to begin collecting respirable dust samples. Stover issued a 103(k) order at approximately 8:15 a.m. to the operator to ensure the safety of miners and preserve the accident scene for investigation. Stover traveled to the 8<sup>th</sup> floor MCC room after the victim was removed and secured the accident scene by closing both doors to the MCC room. MSHA conducted the investigation in conjunction with the West Virginia Office of Miners Health, Safety and Training (WVOMHST), mine management, and employees at the plant. Investigators obtained statements from persons who had knowledge of the facts and circumstances concerning the accident. Photographs and sketches were made of the accident scene.

On August 9, 2019, MSHA and WVOMHST jointly conducted interviews at the office of the WVOMHST in Danville, West Virginia. See Appendix C for a list of persons interviewed and those participating in the accident investigation.

## DISCUSSION

### South Hollow Plant Electrical System

An electrical substation located on the hill behind the plant supplies 4,160 VAC electrical power to the plant. The plant has three MCC rooms located on the 1<sup>st</sup>, 3<sup>rd</sup> and 8<sup>th</sup> floors. The MCC rooms are the electrical control and distribution centers that contain the circuit breakers and control circuits for the operation of the electrical

equipment in the plant. The 1<sup>st</sup> and 8<sup>th</sup> floor MCCs did not have a main 4,160 VAC power disconnect. The 3<sup>rd</sup> floor MCC had a main 4,160 VAC power disconnect.

### Slope Belt

The slope belt drive has two 4,160 VAC 600 horsepower (HP) motors and one smaller 75 HP 480 VAC pony drive motor which is used for maintenance. The slope belt is approximately 1,700 feet in length and runs approximately 600 feet per minute. In the 8<sup>th</sup> floor MCC room, the electrical cabinet for the slope belt, cabinet Unit 171, contains components that function as a circuit breaker. The upper cabinet contains low voltage circuits. The lower cabinet contains the high voltage power circuit which included a vacuum contactor and an isolation switch that serves as a visible disconnect. The application of 110 VAC to the vacuum contactor's closing coil circuit causes the vacuum contactor to close and start the slope belt. A PLC located in the plant control room controls the vacuum contactor. A jog switch located near the 8<sup>th</sup> floor MCC can also be used to close the vacuum contactor.

### Vacuum Contactor

The vacuum contactor being replaced was an Allen Bradley Model Number 1502-V4DBDA-1. The contactor is rated for 7,200 VAC and a continuous rating of 400 amperes. The vacuum contactor has a closing coil that closes and opens contact tips in vacuum bottles to start and stop an electric motor. The vacuum contactor also has a Contactor Interlock Lever that moves when the contact tips close and open. The Contactor Interlock Lever is connected to a Contactor Interlock Rod. The Contactor Interlock Rod connects the Contactor Interlock Lever and the disconnect handle to prevent opening of the disconnect switch while the motor is running (see Appendix B). Above the vacuum contactor in the same cabinet is a visible power disconnect switch referred to as an "isolation switch" by the manufacturer. This type of disconnect switch does not contain an arc suppression feature and is not designed to be opened when current is passing through the disconnect blades.

When investigators arrived they found the visible disconnect was in the closed position. The 8<sup>th</sup> floor MCC room was de-energized, however, because the electrical power had been turned off at the substation. Investigators determined that when the victim installed the vacuum contactor, the original mounting plate was re-used to mount the replacement vacuum contactor. However, the replacement vacuum contactor and mounting plate were misaligned. When Davis attached the contactor interlock rod from the vacuum contactor to the disconnect handle mechanism, it would not allow the visible disconnect to close. The contactor interlock rod has a connection point that allows adjustments to be made to the effective length of the contactor interlock rod.

When the accident occurred, the visible disconnect was closed (disconnect handle in the up position) during the adjustment process and the input side of the vacuum contactor became energized. Further testing revealed that adjustment of the contactor interlock rod requires a miner to open and close the visual disconnect to check the adjustments. To perform these adjustments safely and comply with the appropriate standards, the electricians performing the work would need to first travel to the substation, open the circuit breaker, open the visual disconnect to ensure that electrical power was deenergized in the cabinet, and lock and tag the visual disconnect (separate lock and tag for each electrician). The electricians would then have to ground the de-energized power conductors prior to performing adjustments.

### Vacuum Contactor Testing

Robert Bates and Jordan Rose, electrical engineers at MSHA Technical Support , tested the vacuum contactor that was removed for proper operation, vacuum bottle integrity, and insulation resistance. Testing verified the vacuum contactor holding coil was defective. Testing indicated leakage of the vacuum bottles was within manufacturer's specifications, and there was no breakdown of the insulation for the vacuum contactor.

### Lock Out and Tag Out Procedure

At the time of the accident, the company had a policy for locking and tagging out electrical circuits. The policy had been in place since the mine operator took ownership on October 26, 2015, and had the following steps:

1. Notify those in the area of your intentions;
2. Make certain control buttons or control switches for the equipment is in the "off" position;
3. All electricians are required to have a voltage tic tracer;
4. Trace the trailing cable from the equipment back to the power source;
5. Determine the circuit breaker protecting the circuit to be de-energized and switch it to the "off" position;
6. Disconnect coupler at the power source and put dust cover, if one is provided, on the gear mounted portion of coupler. Lock and tag out the coupler with the proper lock.

### Green Lock

Personal lock with only one key.

Used when work is being performed.

Work under this lock can only be performed by the individual that installed it.

Only acceptable lock to use while performing any maintenance.



### Red Lock

Community lock with multiple persons having a key, (keyed alike).

Used for transferring responsibility to oncoming shifts.

Always replace red lock with green lock and re-trace cable to be sure correct.

### Blue Lock (Optional)

Only electricians are permitted to have keys to these locks.

Prohibits general workforce from accessing electrical installations such as transformers, breaker boxes, belt starters, etc.

Return to equipment and operate the starting controls to be sure the source of power is completely isolated, prior to beginning work on such equipment.

Based on interviews, all three plant foremen, who were also certified electricians, had first-hand knowledge that the energized electrical circuit, on which electrical work was being performed, was not locked and tagged out. They were physically present at the work location, knew about the ongoing electrical work, and knew that locks and tags were not installed while the work was being performed. All three plant foremen told investigators that the circuit was not locked and tagged because they were physically present and were guarding the work area.

### Training and Experience

Davis received his latest annual refresher training on September 15, 2018. He received his electrical certification on January 27, 2012, and was current until December of 2019. He had received task training on lock out/tag out on October 12, 2018, and attended a safety meeting conducted by Foreman Bill Clendenen and Foreman James Kish on lock out/tag out at the start of the shift on the morning of the accident. Seventeen persons on the day shift crew were present, as well as MSHA inspector Warren Stover. All miners at the mine had been previously trained on lock out/tag out utilizing the three lock system. Davis had a total of 15 years of mining experience, with 14 years at this mine. Investigators found no deficiencies in the training Davis received. The following foremen who were present became qualified MSHA electricians on the following dates: Bill Clendenen - November 10, 1976; Richard Muncy - November 2, 2000; Scott Williams - March 19, 2010.

## ROOT CAUSE ANALYSIS

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

Listed below is the root cause identified during the investigation and the operator's implemented corrective actions to prevent a reoccurrence of this type of accident.

Root Cause: The mine operator engaged in, and assisted miners in the performance of, electrical work while knowing the energized electrical circuit on which electrical work was performed was not locked and tagged out. The mine operator did not follow their own procedures to ensure that electrical work would be performed safely. The mine operator revised their procedures to specifically clarify steps required when performing electrical work.

Corrective Action: The mine operator installed new equipment related to locking out and tagging out, and revised the written lock out/tag out procedures.

1. New main disconnects were installed on the 1<sup>st</sup> and 8<sup>th</sup> floor MCC rooms with a "captured key" type system at the plant substation. This new system requires the main disconnect to be opened to gain access to the key to unlock single key locks installed on all 4,160 VAC circuit breaker cabinets inside the plant.
2. The revised written procedures contain more detailed instructions related to communication, job safety analysis, identifying and turning off energy sources, locking out and tagging out visual disconnects, testing and verification, and the three lock system.
3. All plant electricians and supervisors are now required to maintain a lock on their person while working in the plant.
4. All certified electricians attended an electrical safety course highlighting the hazards involved when working near energized sources.
5. The mine operator retrained all electricians and trainee electricians on these revised procedures.

## CONCLUSION

On Wednesday, August 7, 2019, at approximately 8:05 a.m., Michael S. Davis, a 42-year-old electrician with 15 years of mining experience died when he contacted a 4,160 VAC energized circuit. When the accident occurred, the victim was attempting to replace a vacuum contactor located in the 8<sup>th</sup> floor motor control center (MCC) room in a coal preparation plant.

The accident occurred because the mine operator engaged in, and assisted miners in the performance of, electrical work while knowing the energized electrical circuit on which electrical work was performed was not locked and tagged out.

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David S. Mandeville  
District Manager

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Date

## ENFORCEMENT ACTIONS

1. A 103k Order was issued at 8:15 a.m. on August 7, 2019, to Kanawha Eagle Mining, LLC, South Hollow Prep Plant and Loadout to protect miners and to prevent the destruction of any evidence which would assist in the investigation of the cause or causes of the accident. The mine operator shall obtain prior approval from an Authorized Representative of the Secretary for all actions to recover or restore operations in the affected area. It prohibits all activity in the affected area until MSHA has determined that it is safe to resume normal mining operations in this area. This order applies to all persons engaged in the rescue and recovery operation and any other persons on-site. Additionally, the mine operator is reminded of its obligations to prevent the destruction of evidence that would aid in investigating the cause or cause(s) of the accident.
2. 104(d)(2) Order, No. 9244829, 30 CFR 77.501 was issued to Kanawha Eagle Mining, LLC

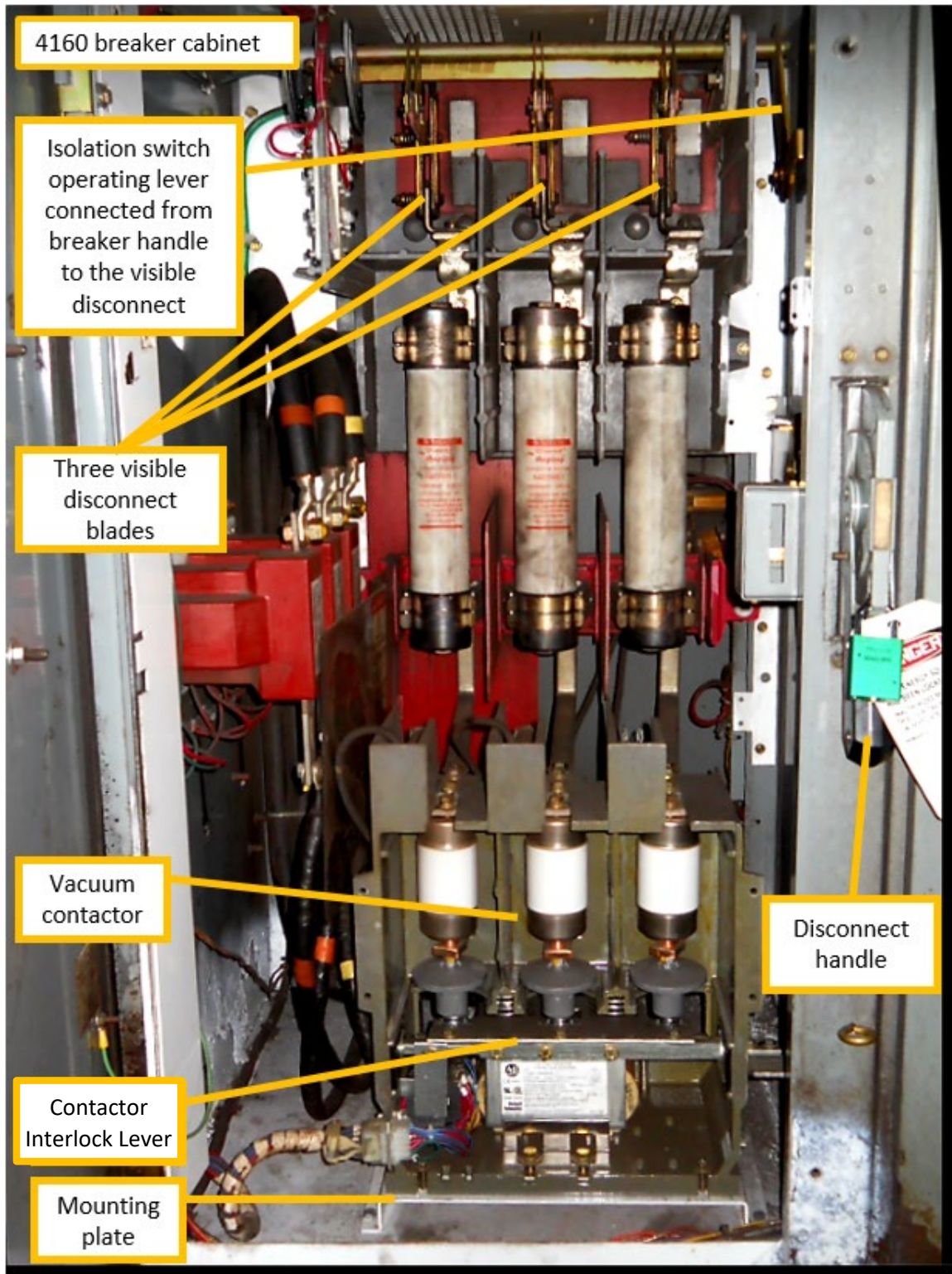
On August 7, 2019, an electrician was electrocuted when he performed electrical work on a 4,160 VAC energized circuit while the disconnecting device for the circuit was not locked and suitably tagged. The electrician was working to adjust the contactor interlock rod inside the 4,160 VAC circuit compartment associated with the Unit 171 slope belt drive motor "A" vacuum contactor. The work to adjust the contactor interlock rod was performed with the 4,160 VAC energized circuit in close proximity.

Due to the design of the contactor interlock rod and associated 4,160 VAC components in the compartment, the disconnecting device at the substation had to be disconnected, locked, and tagged while this work was being performed to comply with this standard. This is also a violation of 30 CFR § 77.500 because the power circuits and electrical equipment were not deenergized while work was being performed.

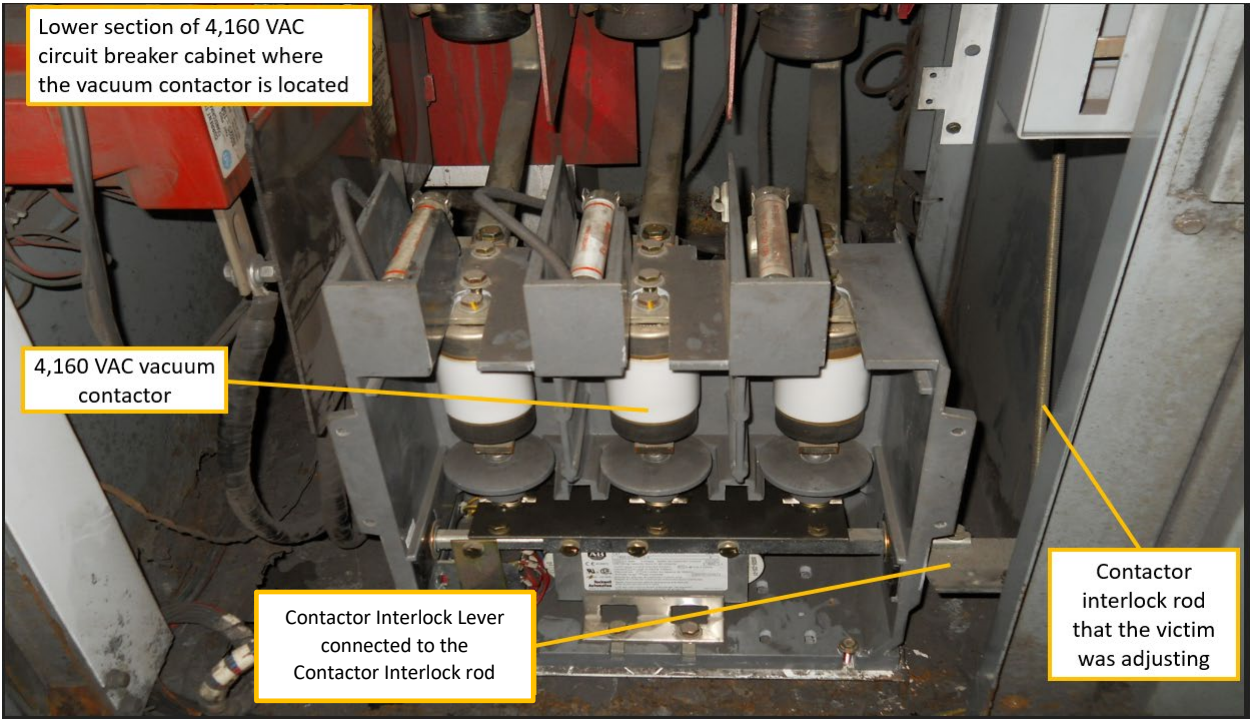
The mine operator engaged in aggravated conduct, constituting more than ordinary negligence, because a foreman, who was a qualified electrician, was actively engaged in the work performed by the electrician. Also, two other foremen, who were also certified electricians, came to the work area before the electrocution and were fully aware of the work being performed. The three foremen knew the work being performed was in close proximity to the energized 4,160 VAC circuit.

Appendix A

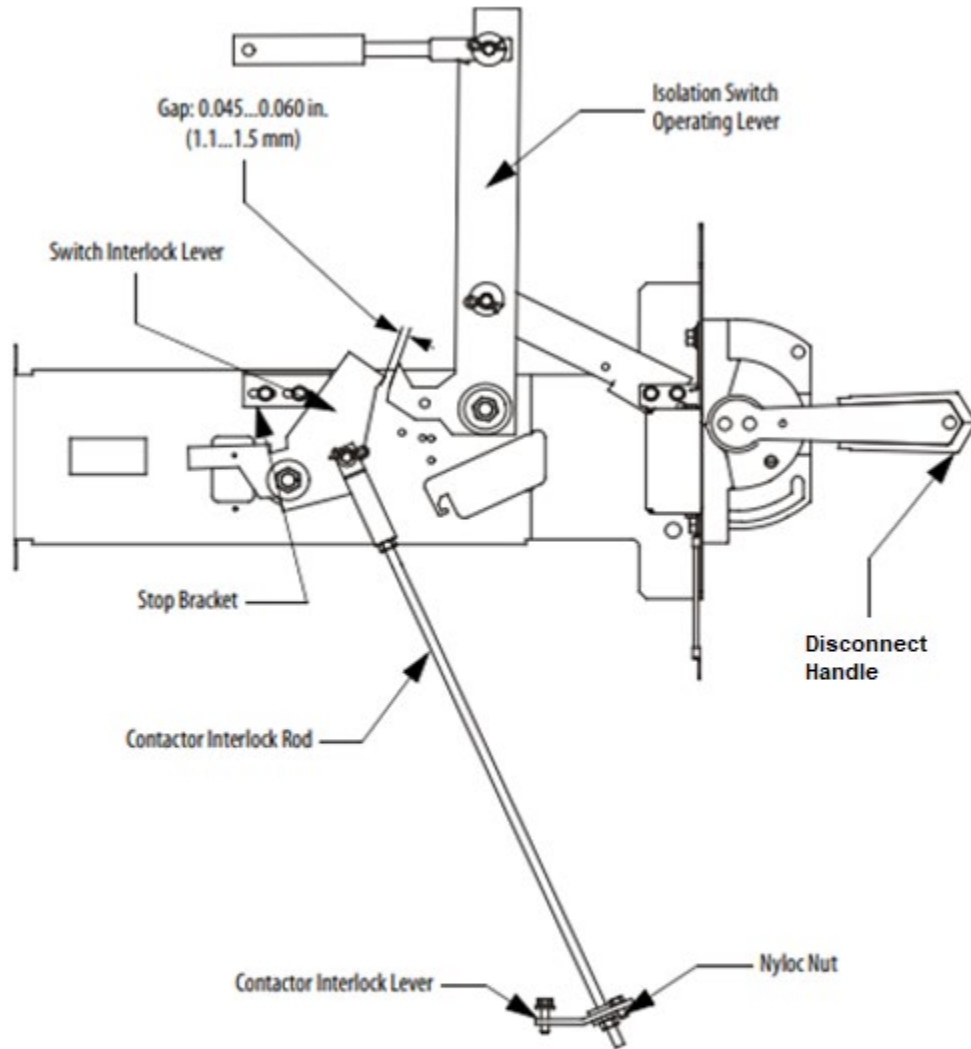
Photos of the Unit 171 4,160 VAC Cabinet



Appendix A  
(Continued)



## Appendix B Disconnect Handle Schematic



### Contactor Interlock Rod Adjustment



**ATTENTION:** To avoid shock hazards, lock out incoming power (refer to [Power Lock-out Procedure on page 51](#)) before working on the equipment. Verify with a hot stick or appropriate voltage measuring device that all circuits are voltage free. Failure to do so may result in severe burns, injury or death.

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

Kanawha Eagle Mining LLC

Doug Fala ..... Vice President of Operations  
JJ Meadows ..... Vice President of Safety  
\*Scott Williams ..... Plant Foreman  
\*Richard Muncy ..... Plant Foreman  
\*Bill Clendenen ..... Plant Foreman  
\*Bruce Workman ..... Surface Foreman  
\*Joshua Farley ..... Plant Operator  
\*Darrell J. Atkins, Sr ..... Plant Electrician  
\*Travis Myers ..... Plant Electrician

Kanawha Scales

\*Zachary Bailey ..... Sales Vendor  
John Steele ..... Sales Vendor

West Virginia Office of Miners Health, Safety and Training

Eugene White ..... Director  
John Kinder ..... Deputy Director  
Wayne Pauley ..... Inspector at Large  
Mike Pack ..... Assistant Inspector at Large  
Barry Koerber ..... Attorney  
Randy Carter ..... District Inspector  
Mark Keyser ..... Electrical Inspector

Mine Safety and Health Administration

John Stone, Jr ..... Electrical Specialist  
Joseph Presley ..... Staff Assistant  
Joshua McNeely ..... Electrical Specialist  
Robert Hatfield ..... Electrical Supervisor

Davis Family

Neil Davis ..... Family Representative