

UNITED STATES
DEPARTMENT OF LABOR
MINE SAFETY AND HEALTH ADMINISTRATION
COAL MINE SAFETY AND HEALTH

REPORT OF INVESTIGATION

Fatal Electrical Accident
June 13, 2003

#1 Mine
Mountain Spring Coal Company
Shippingport, Beaver County, Pennsylvania
ID No. 36-08725

Accident Investigators

Carl Kubincanek
Coal Mine Safety and Health Inspector

Eugene Kelly
Coal Mine Safety and Health Inspector (Electrical)

Originating Office
Mine Safety and Health Administration
District 2
319 Paintersville Road, Hunker, PA 15639
Cheryl McGill, District Manager

Amended: December 16, 2005

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Note: Page 9 was amended to remove Tom Stitt.



Mountain Spring Coal Company
#1 Mine, I.D. No.36-08725
Beaver County, Pennsylvania
Enclosed Unit with Capacitor Bank

OVERVIEW

On Friday, June 13, 2003, at approximately 1:15 p.m., Christopher St. Clair, a 41-year old maintenance foreman, with 15 years experience, was fatally injured while working on the surface of an underground coal mine. The victim and two other maintenance foremen were working at the substation to resolve a mine power problem. The victim had pulled the three disconnects feeding power to a bank of capacitors located on top of the enclosed unit in the substation and had removed a fuse from the center disconnect. While kneeling on top of the enclosed unit, closing the fused disconnects, the victim came into contact with an energized 12,470 volt circuit.

The cause of the accident was failure to de-energize the high voltage circuit prior to performing electrical work. The root cause was management's failure to establish and enforce safe work procedures. Contributing causes included the location of the main disconnects and the installation of the capacitor bank and capacitor bank disconnects.

GENERAL INFORMATION

The #1 mine is an underground bituminous coal mine, operated by the Mountain Spring Coal Company, which is a subsidiary of the Forest Coal Corporation. The mine is located in Hanover Township, approximately 4 miles south of Shippingport, Beaver County, Pennsylvania. The mine is opened through four drifts into the Upper Freeport coal seam which averages 40 inches in height. The mine is ventilated using a blowing ventilation system and liberates approximately 9,000 cubic feet of methane in a 24 hour period. The mine employed 26 underground and 6 surface miners.

The #1 mine was placed in active producing status (AA) on December 7, 1998. The mining method was room and pillar utilizing a continuous-mining machine, continuous haulage and belt conveyors. The mine operated one maintenance and two production shifts, five days a week with an average daily production of 1,400 tons. On June 11, 2003, the mine was idled and placed in BA status (non-producing, persons working). At the time of the accident, supervisory personnel were working at the mine performing examinations and maintaining the underground and surface portions of the mine. The only other person on the property at the time of the accident was an employee of Tesone Transport, an independent contractor. He was operating a front-end loader, loading stockpiled coal into trucks.

The Mine Safety and Health Administration (MSHA) completed the last regular safety and health inspection at the mine prior to the accident on June 12, 2003. The Non-Fatal Days Lost (NFDL) injury incidence rate for the mine in 2002 was 26.03 compared to a National NFDL rate of 6.54.

The principle officers for Mountain Spring Coal Company are:

Terry L. Gooding	President
Dwight A. Miller	Vice President/Secretary
Gregory D. Patterson	Vice President
David W. Chambers	Superintendent/Mine Foreman

DESCRIPTION OF THE ACCIDENT

On Friday, June 13, 2003, Numan Lambert, mine maintenance foreman, and Christopher L. St. Clair, shift maintenance foreman, started their shift at 6:00 a.m. Also scheduled to work on the dayshift were Mike Smith, preshift examiner; Jim White, laborer; and Gary Eisel, front-end loader operator. St. Clair and White were assigned to perform maintenance work on the Fairchild continuous mining machine on the (MMU-001) section. They entered the mine and reached the section at approximately 6:30 a.m. While performing the work, St. Clair identified a potential voltage imbalance problem on the miner. St. Clair contacted Lambert on the surface and reported the problem. Lambert said he would be in to help them locate the source of the problem. Before entering the mine, Lambert placed a call to Thomas Hensley, electrical maintenance foreman, who was working at a sister mine in Ohio. Lambert described the problem to Hensley who said he would assist in troubleshooting the problem.

After Lambert reached the section, he and St. Clair checked voltages at various points along the power system, beginning in the section and working toward the outside. They reached the surface around noon, but they still had not located the problem. Lambert told St. Clair to get cleaned up after lunch and leave. St. Clair changed out of his coveralls and was preparing to leave the mine.

Hensley arrived at the mine site at 12:30 p.m., and was updated by Lambert on what they had done underground and that they had not been able to locate the source of the electrical problem underground. Hensley and Lambert walked from the office to the fenced substation area to further evaluate the problem. Although St. Clair was not instructed to assist, he followed them to the substation. At approximately 1:00 p.m., the three foremen entered the fenced area of the substation, which included the main transformer and enclosed transformer/switchgear unit. Lambert and Hensley walked around the enclosed unit to where the outgoing 480 volt circuits, supplying power to surface/underground loads, were located. They opened the 480 volt circuit breakers in order to test the circuits.

St. Clair noticed that the fuse in the center phase disconnect for the capacitor bank appeared to be blown. He pointed out to Hensley and Lambert that a length of fuse link material was hanging out of the fuse. The three fused disconnects were installed above the capacitor bank which was located on the roof of the enclosed unit. They discussed opening the main disconnects so that the capacitor disconnect fuse could be checked. Hensley and Lambert decided to wait until they completed checking the 480 volt circuits.

St. Clair left the substation and walked back to the shop where he picked up a pair of high voltage gloves and a hotstick. He then drove back to the substation using a battery powered mine cart. St. Clair re-entered the substation fenced area, put on the high voltage gloves and used the hotstick to pull fused disconnects that fed power to the enclosed unit. When the power was interrupted, Lambert and Hensley walked around the enclosed unit to determine what had occurred. Hensley asked St. Clair why he had pulled

the disconnects. St. Clair said he was not aware they wanted to check the voltage on the 480 circuits.

Lambert, Hensley and St. Clair again discussed opening the main disconnects. These disconnects were located approximately 40 feet above the ground on a pole outside the fenced substation. They decided that the work of removing the suspected blown fuse could be performed without opening the main disconnects. St. Clair retrieved a 3-foot stepladder located within the fenced area of the substation and used it to climb on top of the roof of the enclosed unit. Hensley and Lambert stayed on the ground in front of the enclosed unit and observed St Clair putting on the high voltage gloves. He was reminded by Lambert and Hensley to be careful because the high voltage capacitor bank circuit was still energized. Hensley instructed St. Clair to extend the hotstick, one section which would position him further back from the energized circuit. St. Clair opened the three disconnects feeding power to the capacitor bank. He tried to remove the suspected blown fuse from the center phase disconnect but could not because the capacitor bank was located below it and prevented the fuse from being rotated far enough to be lifted out. St. Clair pushed the capacitor bank forward 6 to 8 inches, removed the fuse from the center phase disconnect and handed it down to Lambert. Lambert examined the fuse and determined that the fuse was not blown. Lambert trimmed the excessive fuse link material from the fuse and then handed the fuse back to St. Clair to reinstall.

Hensley observed St. Clair kneeling in front of the capacitor bank as he closed the last of the three disconnects with his gloved hand. Hensley looked away for a moment and heard a “pop.” Looking back, Hensley saw St. Clair fall onto the capacitor bank and observed a flash around St Clair’s head. Lambert saw St Clair’s right hand jerk backwards and then suddenly come forward toward the capacitor bank.

Hensley and Lambert immediately exited the substation, went to the office and called the posted emergency numbers to request help. Hookstown and Hanover Volunteer Fire Departments received the call at 1:23 p.m., responded and secured the accident site. The victim was pronounced dead at the scene by Renea Esoldo, Chief Deputy Coroner Beaver County, at 2:15 p.m.

INVESTIGATION OF THE ACCIDENT

The MSHA District 2 District Manager was notified of the fatality by Joe Sbaffoni, Director of Inspections, Pennsylvania Bureau of Deep Mine Safety, on Friday June 13, 2003 at approximately 2:45 p.m. A Coal Mine Safety and Health inspector was dispatched to the mine site from the MSHA Kittanning Field Office. A 103(k) order was issued to assure the safety of all persons until the investigation could be completed. An accident investigation team was assembled and dispatched to the mine. The investigation was conducted in conjunction with representatives of the Pennsylvania Bureau of Deep Mine Safety.

The investigation team took photographs, made sketches and gathered physical evidence. Interviews conducted on site were completed on Monday, June 16, 2003. The persons who took part in the investigation and who were interviewed are listed in Appendix I. The onsite investigation was completed on Saturday, June 28, 2003, at which time the 103(k) order was terminated.

DISCUSSION

1. In June 2000, the mine power supply system was switched from a diesel generator to utility power. A 23,000 to 12,470 volt main transformer fed the enclosed unit containing a 12,470 to 4,160/480 volt transformer and high voltage switchgear. (See Appendix II).
2. Duquesne Light Company required that an independent inspection of the site be conducted prior to power being placed on-line. The inspection was conducted by D'Amico Electrical Inspection.
3. As a result of this inspection, the main disconnects were raised from approximately 30 feet above the ground to approximately 40 feet above the ground.
4. Rick Workman, the former maintenance foreman, stated that based on his experience, it took 30 to 45 minutes to operate the main disconnects on the pole. The hotstick used to open and close the main disconnects was 38 feet-10 inches long, making it very difficult to control.
5. St. Clair, Lambert and Hensley were familiar with the design and installation of the substation. Although St. Clair was an underground shift maintenance foreman, he and the other maintenance foremen had previously performed work on the substation.
6. In November of 2001, Tom Stitt, an independent contractor, recommended that a capacitor bank be installed at the substation to improve the mine power factor. Mine personnel, including Hensley and St. Clair, installed a capacitor bank on the roof of the enclosed unit. The capacitor bank was not secured to the roof. Because of the location of the capacitor bank disconnects, the capacitor bank had to be pushed forward 6 to 8 inches to allow removal of the fuse from the center disconnect.
7. Information obtained during interviews indicated that St. Clair used the hotstick to open the fused disconnects for the capacitor bank, but not to close them. This put him in close proximity to live unguarded parts. After the accident, the hotstick was found leaning against the substation fence.

8. The victim's injuries are consistent with the physical evidence obtained from the terminals on the capacitor bank.
9. Following the accident, the high voltage gloves were tested by an independent laboratory according to ASTM F 496 testing procedures and passed.

ROOT CAUSE ANALYSIS

A root cause analysis was used to compile and categorize information from the accident. The analysis identified the following causal factors:

1. *Causal Factor:* The main disconnects for the substation were not opened and tagged out prior to electrical work being performed inside the substation.

Corrective Action: A Gang Operated Air Brake Disconnect (GOAB) was installed at the forty feet high location on the pole, in series with the main disconnects. The GOAB is operated by mechanical linkage located at ground level. The GOAB will serve as the primary disconnect for the substation and is capable of being locked and tagged out. A written safe work procedure requiring opening the main disconnects prior to performing electrical work in the substation was posted at the substation entrance. All qualified electrical personnel will be retrained in safe work procedures in substations.

2. *Causal Factor:* The location of the main disconnects, 40 feet above ground, made the main disconnects very difficult to operate from the ground.

Corrective Action: The GOAB as presently installed is readily accessible.

3. *Causal Factor:* The location of the capacitor bank and capacitor disconnects required the victim to be exposed to unguarded live parts.

Corrective Action: When and if the capacitor bank is reinstalled it will be completed in accordance with the National Electrical Code. The use of hotsticks shall be discussed in the retraining of qualified electrical personnel.

CONCLUSION

The cause of the accident was failure to de-energize the high voltage circuit prior to performing electrical work. The root cause was management's failure to establish and enforce safe work procedures. Contributing causes included the location of the main disconnects and the installation of the capacitor bank and capacitor bank disconnects.

ENFORCEMENT ACTIONS

A 103 (k) order (7061093) was issued on June 13, 2003 and terminated on June 28, 2003 to assure the safety of any person at the mine until an investigation could be completed to determine that the mine was safe. .

A 104(d)(1) Citation (7081758) was issued for a violation of 30 CFR 77.501. A maintenance foreman was performing electrical work in the mine substation without opening and tagging out the main disconnects. This work consisted of operating disconnects, removing fuses and moving electrical components while in proximity to exposed energized electrical parts. This work resulted in the electrocution of the foreman on June 13, 2003. Two other maintenance foremen were present and observed the work being performed.

A 104(d)(1) Order (7081759) was issued for a violation of 30 CFR 77.704-9. The disconnection switch on a high voltage surface line was operated without using an insulated stick which was adequately insulated and maintained to protect the operator from the voltage to which he was exposed. The victim was observed closing a fused disconnect for the capacitor bank by hand while wearing high voltage gloves but not using an insulated stick. This contributed to a fatality that occurred on June 13, 2003.

A 104(d)(1) Order (7081762) was issued for a violation of 30 CFR 77.516. The high voltage disconnects provided for the 23,000 to 12,470 volt transformer located in the surface substation did not comply with the 1968 National Electrical Code in that they were not readily accessible. Article 100 of the NEC defines “Readily Accessible” as capable of being reached quickly for operation, renewal, or inspection, without requiring those to whom ready access is requisite to climb over or remove obstacles or to resort to portable ladders, chairs, etc. The disconnects were mounted on an electric pole forty feet from the ground. The disconnects could not be reached quickly for operation. This contributed to a fatality that occurred on June 13, 2003.

A 104(d)(1) Order (7081763) was issued for a violation of 30 CFR 77.516. The high voltage capacitors installed on the roof of the enclosed unit in the surface substation did not comply with the provisions of the 1968 National Electric Code. Article 710-34 (f) of the NEC states “Unguarded live parts above working space shall be maintained at elevations not less than required by the following table: Table 710-34 (f) Voltage between phases 11001 – 22000, Minimum Vertical Clearance of Unguarded Parts 9 foot 3 inches”. The high voltage capacitor disconnect switches were mounted forty-four inches above the roof of the enclosed unit. The capacitor bank and terminals were located below the disconnects. This contributed to a fatality that occurred on June 13, 2003.

APPENDIX I

PERSONS PARTICIPATING IN THE INVESTIGATION

Mountain Spring Coal Company

Gregory D. Patterson	Vice-President-General Manager
David W. Chambers *	Superintendent/Mine Foreman
Numan Lambert *	Chief Maintenance Foreman
Thomas H. Hensley *	Maintenance Foreman

Tensone Transport – Independent Contractor

Gary Eisel *	Front End Loader-Operator
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Turney Electric, Inc. – Independent Contractor

Wendall C. Turney
John Stevenson
Ron Lipscomb

D’Amico Electrical Inspection

Gene D. D’Amico	President
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Pennsylvania Department of Environmental Protection

Daniel Smicik	Supervisory Inspector
Robert Ceschini	Supervisory Inspector (Electrical)
Paul F. Eckenrode	District Mine Inspector
James D. Bence	District Mine Inspector (Electrical)
Alan Martin	Supervisor (Equipment Approval)

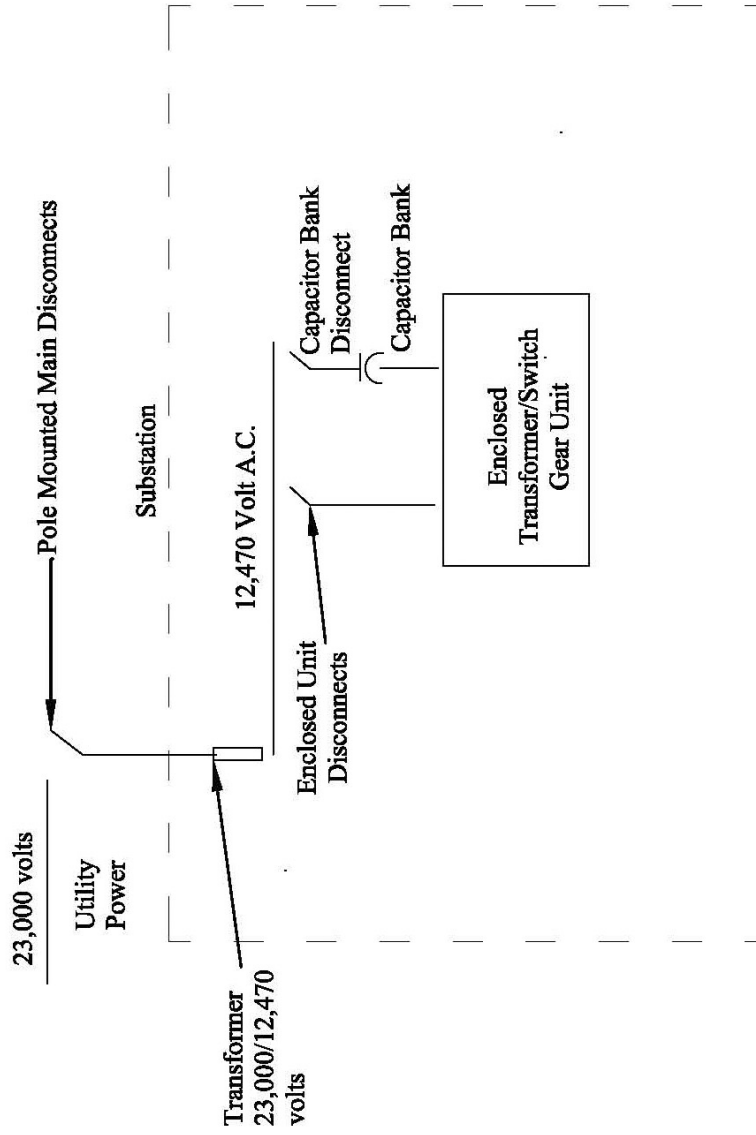
Mine Safety and Health Administration

Joseph S. Tortorea	Supervisory Mining Engineer
Carl Kubincanek	Coal Mine Safety and Health Inspector
Eugene Kelly	Coal Mine Safety and Health Inspector (Electrical)
Joseph O’Donnell	Coal Mine Safety and Health Inspector
James Young	Education and Field Services Training Specialist

* PERSONS INTERVIEWED

APPENDIX II

High Voltage One-Line Diagram of the Substation



#1 Mine
Mountain Spring Coal Co.
Beaver County, PA
I.D. 36-08725

Not Drawn to Scale

Submitted by:

Carl Kubincanek

Eugene Kelly

Approved By: ORIGINAL SIGNED BY
Cheryl McGill
District Manager—Coal Mine
Safety and Health District 2