

UNITED STATES
DEPARTMENT OF LABOR
MINE SAFETY AND HEALTH ADMINISTRATION

COAL MINE SAFETY AND HEALTH

REPORT OF INVESTIGATION

Underground Coal Mine

Fatal Electrical Accident
May 4, 2006

Nichols Construction LLC (PZF)
Vansant, VA
at
Buchanan Mine #1
Consolidation Coal Company
Mavisdale, Buchanan County, Virginia
I.D. No. 44-04856

Accident Investigators

Delmer Hess
Mining Engineer/Ventilation Specialist

Tony Arena
Coal Mine Safety and Health Inspector – Electrical

Jason Lane
Electrical Engineer

Arnold D. Carico
Mining Engineer/Ventilation Specialist

Originating Office
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District 5
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Ray McKinney, District Manager

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ACCIDENT SCENE



OVERVIEW

On Thursday, May 4, 2006, at approximately 1:00 p.m., Richard Allan Cox, a 40 year old Tree Trimmer/Equipment Operator with two and one-half years mining experience, was electrocuted while trimming brush along a power line that feeds power to a 480 volt bank of transformers. The victim came in contact with a guy wire that had become energized when the base of the guy wire came loose from the log it was wrapped around and the guy wire contacted one or more phases of 12,470 volts.

The accident occurred because the guy wire was not grounded or provided with an insulator below all lines and was not properly anchored. The operator failed to conduct required electrical examinations. Proper examinations would have detected the condition and prompted corrective action.

GENERAL INFORMATION

Consolidation Coal Company's Buchanan Mine #1 (Buchanan), I.D. No. 44-04856, is an underground coal mine located two miles south of Route 460, adjacent to State Route 632, at Mavisdale, Buchanan County, Virginia. Consol Energy Inc., located in Pittsburgh, Pennsylvania, is the parent company of Consolidation Coal Company. The principal officers for the mine at the time of the accident were:

Kenneth Harvey	Mine Superintendent
Kim Noah	Supervisor of Safety
Leonard Clarkston	Mine Foreman

The mine has 10 shaft openings into the Pocahontas No. 3 Seam which averages 72 inches in height. Six mine fans exhausting 4,887,000 cubic feet of air per minute provide ventilation. Laboratory analysis of return air samples showed a methane liberation rate of 11 million cubic feet per day. The face areas are ventilated using a double split system of ventilation and exhausting line curtains.

Employment is provided for 503 miners. A total of 440 underground and 63 surface miners work on three production shifts per day, seven days per week. No shifts are designated as maintenance shifts. The mine produces an average of 18,000 tons of raw material daily from seven continuous mining machine units and one longwall unit. Coal is transported from the faces by shuttle cars and belt conveyors to two bunker surge areas. Skip hoist cars transport coal from the bunkers to the surface. Workers enter the mine by way of a man/supply hoist in the #8 ventilation shaft on Contrary creek and at the Page portal. A diesel-powered track haulage system is used to transport both men and materials between the bottom of the respective shafts and work locations.

The Mine Safety and Health Administration (MSHA) completed the last regular health and safety inspection of the mine on March 31, 2006. However, a regular safety and health inspection was commenced on April 3, 2006, and was ongoing at the time of the accident. The mine was idle for the majority of 2005 due to a non-injury mine fire from February to June, and an inoperative skip shaft from September to December. The NFDL injury incidence rate for the mine in 2004 was 1.50 compared to a National NFDL of 5.70.

Nichols Construction, LLC is an independent company that has a value contract with Consol Energy, Inc. to perform work on their various properties. On the date of the accident, Nichols Construction, LLC was operating under a purchase order with the Buchanan mine to cut the right of way for the entire length of power lines that feed the pumps at Permac which supply water to the Buchanan preparation plant.

The four employees of Nichols Construction received site specific hazard training for all substations by Michael Horn, electrical engineer, for the Buchanan mine and Consol Energy on April 19, 2006. Their annual refresher training was received on December 17, 2005 and a course on cutting and clearing right of ways was taught on March 11, 2006.

DESCRIPTION OF THE ACCIDENT

The Nichols Construction crew, consisting of Jason Jackson, Foreman; Barry Whitt and Ricky Shelton, Linemen/Equipment Operators; and Richard Cox, Tree Trimmer/Equipment Operator, began clearing trees and underbrush from the Permac line on Monday, May 1, 2006. The clearing of the right of way was expected to take approximately four days to complete.

On the fourth day, May 4, 2006, at approximately 8:30 a.m., the crew arrived at the Permac site and resumed clearing operations. Work continued without incident.

Following a break for lunch, the crew returned to the job site and began clearing brush and trees in the vicinity of a power pole that provided electrical power for a bank of three transformers which provided stepped-down voltage (12,470 volts to 480 volts) to a fresh water well pump. Other supporting structures located

near the accident scene included a 2' x 4' x 7 ½' metal building containing 480 volt electrical control circuits for the pump, and a 4' x 4' x 10' metal enclosure covering the pump. This accident scene was located approximately 1,600 feet northwest of the Permac truck shop building.

The final clearing operations for the right of way involved clearing a corner section of the right of way where an aluminum guy wire, used to stabilize the power pole, was loosely anchored to a log measuring approximately 14 inches diameter that had decayed to approximately 7 inches diameter. The guy wire was wrapped around the log once and then twisted around itself. The decayed log was located on a hillside approximately 54 feet southwest of the power pole. The guy wire was not insulated or grounded and was anchored to the power pole above the location of a bank of three transformers. The construction crew planned to cut the underbrush and small trees surrounding two poplar trees, located approximately 63 inches apart, in preparation for cutting down the two trees.

Appendix D shows the location of the four men just prior to the accident.

The hillside where they were working was steep and slippery. Jackson and Whitt were operating chain saws while Shelton and Cox were removing the cut foliage. Whitt was cutting brush with a chain saw and was positioned south of the anchor point of the guy wire. A vine was entangled in the branches of some of the small trees that Whitt was attempting to cut and Jackson stopped cutting to provide assistance. Jackson was positioned up slope from Whitt and grasped the vine to hold it tight for Whitt to cut one of the small trees. At this time, Shelton was removing brush and was located up slope from Jackson. Cox was removing brush and was located up slope from Whitt.

As Whitt raised the chain saw above his head to make a cut, he observed Cox coming down the hill behind him toward the two poplar trees. Jackson heard a loud popping noise coming from the direction of the power pole and observed that two of the three power pole 12,470 volt disconnect fuses had opened or dropped out (deenergizing two phases). Whitt stated he was wearing hearing protection and did not hear the noise. Jackson observed Cox lying on the ground in a mound area east of the poplar tree where Whitt was located. Jackson ran to assist Cox and observed that the guy wire was positioned loosely across the chest area of Cox. Jackson immediately traveled to the utility truck, obtained a hot stick, and removed the remaining third disconnect fuse. With all three phases

disconnected, the incoming 12,470 volt circuit was completely deenergized. Jackson returned to the location of Cox and removed the guy wire from across his chest and threw it down the hill.

Cox was not responsive and was not breathing. Whitt and Shelton assessed the condition of Cox and began administering cardio pulmonary resuscitation (CPR) while Jackson returned to the utility vehicle to radio for help. Mercy Ambulance service responded to the 911-emergency call and arrived at the job site at approximately 1:10 p.m. Cox was treated and transported to Clinch Valley Medical Center, in Richlands, Virginia, where he was pronounced dead upon arrival.

An autopsy was performed in Roanoke, Virginia. It identified electrocution as the cause of death, as demonstrated by multiple burns to the upper and lower extremities and to the chest.

INVESTIGATION OF THE ACCIDENT

On May 4, 2006, at approximately 3:45 p.m., Kim Noah, Supervisor of Safety, Buchanan Mine #1 contacted MSHA at the Vansant Field Office and Richard Salyers at the District Office in Norton, Virginia. Thomas McLoughlin, Geologist, was dispatched from the District Office to the accident scene. He conducted a preliminary investigation.

On Friday, May 5, 2006, an investigation team consisting of Delmer S. Hess, Lead Investigator, and Arnold D. Carico, Mining Engineer, joined with Commonwealth of Virginia, Department of Mines Minerals and Energy (DMME) and Richard Rouse, Commonwealth of Virginia, Department of Labor and Industry, Division of Occupational Health Enforcement (OSHA) representative, to conduct interviews at the Keen Mountain Office of DMME. Five individuals were interviewed. Tony Arena and Dennis Shortt, MSHA Electrical Specialists, joined the investigation to examine the accident scene. A 103(k) Order was issued to the Buchanan mine to ensure the health and safety of persons in the affected area of the power line. The investigation continued on May 8 and 9, 2006. On Thursday, May 11, 2006, the guy wire had been removed and the 103(k) Order was terminated.

DISCUSSION

The Permac property is located on state route 632, in Page Fork near Oakwood in Buchanan County, Virginia. The property is approximately 1.4 miles southwest of the Buchanan preparation plant. Consolidation Coal Company acquired the former Permac, Inc. permit, no. 1300338, in September 2001. On March 21, 2006, Consolidation Coal Company submitted a permit revision to the Division of Mined Land Reclamation (DMLR) to allow raw coal hauled from the Island Creek Coal Company VP 8 Mine to be stockpiled on the Permac property.

The permit revision requested that specific areas of the DMLR permit, no. 1300338, be used for this coal stockpiling operation, and therefore be relinquished to the Buchanan Mine #1 preparation plant permit, which is DMLR active surface permit no. 1400047. An isolated area within the boundaries of permit no. 1300338, also included in the relinquishment revision request to the Buchanan Mine #1 permit, was intended to cover the water well pump and supporting structures originally used by the former Permac, Inc. operation. This permit revision was granted field approval by a DMLR inspector, which allowed coal stockpile operations to commence. Final permit processing of the field approved revision is pending at DMLR.

When Permac abandoned the property, the power lines were left in place. They had been constructed while the Permac facility was operational. On this property, there are approximately 2,500 feet of three phase 12,470 volt power lines from the American Electric Power metering point to the accident location. Prior to the accident, the power lines extended beyond this point to other areas of the property. After the accident they were terminated at the well pump.

The well pump is used to provide an additional water supply source for the Buchanan Mine #1 preparation plant. The water is pumped from the well to holding tanks above the Permac shop building. The water then gravity flows from the tanks to another pump in the Permac shop building which pumps the water to a sediment pond near the Buchanan preparation plant. The water is then pumped from the pond to the preparation plant.

Electricians assigned to the preparation plant frequently (monthly) examine the electrical facilities on the Permac site, including the deep well pump.

The guy wire on the transformer pole at the well pump location was attached to the power pole at one end. The other end was tied around a decayed log lying on the ground, located in the right of way approximately 54 feet southwest of the power pole. The guy wire was not connected to the system ground or provided with insulators installed near the pole end.

The transformers are a three phase, wye-wye connected bank with both the primary and secondary solidly grounded to the power company neutral. The primary voltage is 12,470 volts from a four wire system, and the secondary is 480 volts. The accident caused two of the primary fuses to blow. Investigation into the cause of the two blown fuses resulted in three possibilities.

First, when the victim contacted the guy wire, it could have caused contact with two phases of the incoming lines resulting in a phase-to-phase-to-ground fault with the victim completing the ground path. Because there were no eye witnesses to the event, how the victim made initial contact with the guy wire is unknown. The rough terrain of the area makes it probable that he fell onto the guy wire or tripped and reached for the guy wire to catch himself. This scenario would have resulted in movement of the guy wire.

The guy wire was examined along its length with particular attention made to the areas where contact with the high-voltage lines could have been made. One spot showed signs of an electrical arc and was in an area that made contact with a high-voltage wire.

Second, the transformer connection itself could have resulted in the second fuse blowing. The wye-wye connection produces a phenomenon that affects electrical equipment. Overvoltages, third harmonics, and circulating current are the most prevalent conditions experienced during operation. These conditions generally shorten the expected life of electrical equipment because they break down the component's electrical insulation. The mining company had previous problems with this installation and had replaced the transformer bank on two separate occasions.

Another condition that can occur during a single ground fault is ferroresonance. Ferroresonance causes severe overvoltages when one primary phase is quickly opened and there is an adequate amount of capacitance in high voltage primary transmission lines, with a light or zero load on the secondary. Typically several miles of open-air three-phase distribution line is necessary to produce this

amount of capacitance. If the guy wire contacted one phase and caused that fuse to blow, at least one of the remaining fuses would have blown almost immediately if ferroresonance created this condition. Ferroresonance is eliminated when all three phases are opened simultaneously.

Third, there could have been an existing high resistance ground fault on one of the phases on the system that did not generate enough current to blow a fuse. When the guy wire contacted a different phase as the victim fell onto it, it resulted in a phase-to-phase fault path through the victim to earth with amperage high enough to blow two fuses. Because the primary was solidly grounded this scenario is unlikely. High resistance ground faults on a solidly grounded system will generally clear themselves (i.e. a tree limb against a line will catch on fire and fall away), or the fault will degrade the insulating medium until it becomes a low resistance path, resulting in high amperage current that will blow a fuse.

The first and second cases are both probable scenarios for blowing two fuses in this accident. Due to the lack of eye witnesses, no conclusion could be drawn. The terrain at the accident location was steep, damp and slick. Cox was wearing suitable footwear for the type of work he was performing.

Immediately prior to the accident, Whitt observed Cox moving behind him and down slope. After the accident occurred, the coworkers observed the victim lying on his back, face up, with the guy wire lying across his chest. Whitt stated he observed a burn on his chest. It was estimated that the victim received a shock voltage equivalent to approximately 7,200 volts, phase to ground. During the accident reenactment, when the guy wire was positioned in contact with one of the three phase wires suspected to be the point of contact, the end of the guy wire measured approximately eight feet down slope from the location of the log where the guy wire was originally attached.

ROOT CAUSE ANALYSIS

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

Root Cause: Management failed to ensure that the guy wire was securely anchored and provided with insulators or connected to the system ground. An adequate procedure or practice was not in place to ensure that electrical equipment, components and structures were properly installed and maintained.

Corrective Action: The guy wire at the accident scene was removed. The company has undertaken an inspection of all power lines and supporting infrastructure on mine property to ensure they are maintained in safe operating condition.

Root Cause: The operator failed to conduct electrical examinations of the infrastructure associated with the deep well pump at the Permac site.

Corrective Action: The Operator has examined all their surface facilities including the associated infrastructure.

CONCLUSION

The victim sustained fatal injuries when he came into contact with an energized guy wire. The guy wire became detached from the log to which it was anchored allowing the uninsulated and ungrounded guy wire to contact at least one of the phase conductors of the 12,470 volt circuit. The victim either leaned on or fell across the guy wire, causing it to become detached from the log.

The accident occurred because the guy wire was not grounded or provided with an insulator below all lines and was not properly anchored. The operator failed to conduct required electrical examinations. Proper examinations would have detected the condition and prompted corrective action.

Approved:

Ray McKinney
District Manager

ENFORCEMENT ACTIONS

1. Section 103(k) Order No. 7342379, was issued May 5, 2006, to Consolidation Coal Company, Buchanan Mine #1 stating, "There has been an electrocution involving 12,470 volt power transmission lines at a power pole where the power is transformed to 480 volts. The 480 volt power drives a well pump which provides water for the Buchanan Mine #1 preparation plant/surface facilities. The installation is located on the Permac Property which has been purchased by Consolidation Coal Company. While clearing right of way leading to the installation, a contractor worker for Nichols Construction, LLC (contractor code PZF) was fatally shocked when he came into contact with an energized guy wire attached to the pole containing the transformers. The guy wire was loosened at the ground level by work being done by the contractor, sagged into one of the energized primary leads to the transformer, and was contacted by the victim. The only work permitted at this time at this installation is either to repair and properly install the guy wire or to remove it from the pole. Presently, the fused disconnects have been pulled and no power exists below the transmission line level."
2. 104(a) citation, number 7316737, citing 30CFR, section 77.705 was issued to Consolidation Coal Company, Buchanan Mine #1 stating, "A power pole, supporting high-voltage transmission lines, located at the pump site supplying water for the Buchanan preparation plant on the Permac Property was supported by guy wires that did not have insulators installed near the pole end. The guy wires were not connected to the system ground."
3. 104(a) citation, number 7316742, citing 30CFR, section 77.502 was issued to Consolidation Coal Company, Buchanan Mine #1 stating, "The monthly examination of the entire electrical installation including the starter/contacter box for the well pump at the Permac site of the Buchanan Preparation Plant was inadequate. The power pole supporting the bank of transformers for the electrical controls to the well pump was not maintained to assure safe operating conditions, in that, the guy wire was not grounded or insulated and was not adequately anchored."

APPENDIX A - Individuals Participating In the Investigation

The following individuals provided information and/or were present during the investigation:

Consolidation Coal Company

Michael Canada Chief Inspector

Nichols Construction, LLC

Jack Nichols, Jr.	President
Phil Mullis	Safety Director
Roger Bench	Area Safety
Aaron Morrison	Supervisor
Christopher Ratliff	Area Supervisor
Timothy Ratliff	General Foreman
Jason Jackson	Foreman (Crew Leader)
Ricky Shelton	Lineman/Equipment Operator
Barry Whitt	Lineman/Equipment Operator

Virginia Department of Mines, Minerals and Energy

Frank Linkous	Chief, DMME
Carroll Green	Supervisor
Joseph S. Altizer	Coal Mine Inspector
Dwight Miller	Technical Specialist, Electrical
Anthony Sturgill	Technical Specialist, Drafting
Gary Shifflet	Inspector, Division of Mined Land Reclamation
Terry A. Ratliff	Coal Mine Inspector

Mine Safety and Health Administration

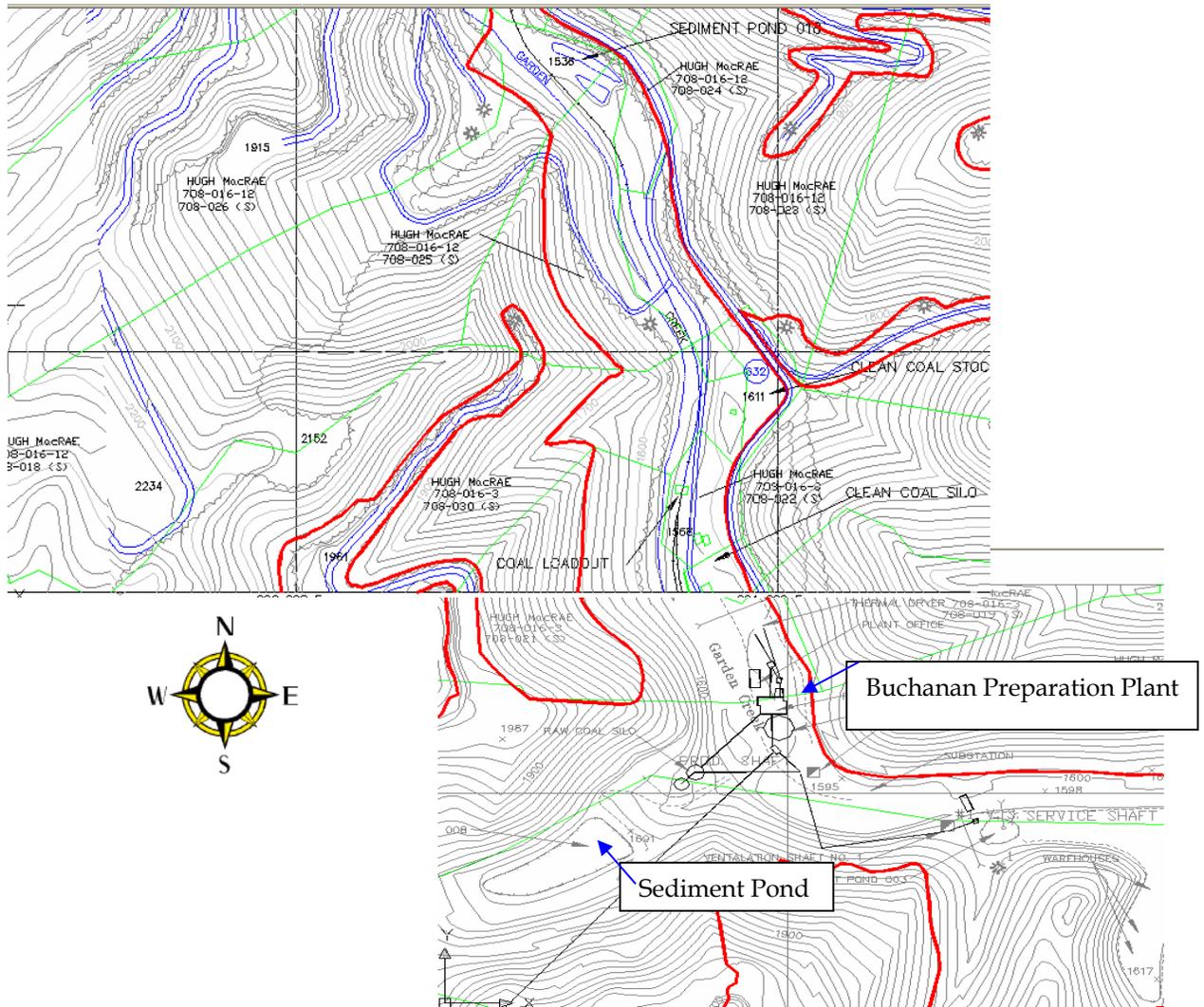
Delmer Hess	Mining Engineer
Jason Lane	Electrical Engineer
Arnold D. Carico	Mining Engineer
Tony Arena	Electrical Inspector
Thomas McLoughlin	Geologist
Dennis Shortt	Electrical Inspector

Virginia Department of Labor and Industry, Division of Occupational Health
Enforcement, Industrial Hygienist Senior

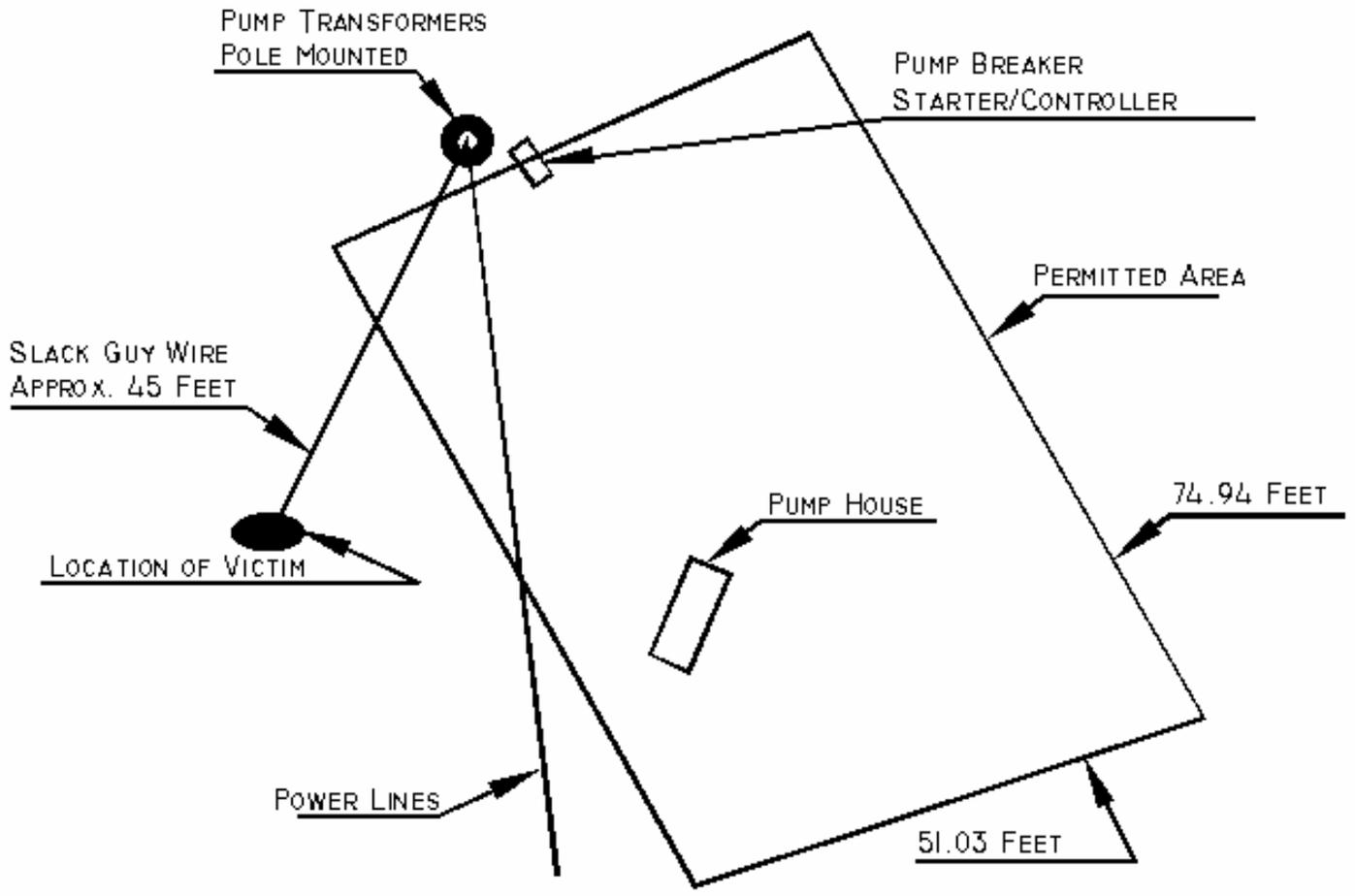
Richard Rouse

Compliance Officer

Continuation of the topographic map in the southern direction



APPENDIX C - Plan View of the permitted area. Plotted by DMME using GPS.



APPENDIX D - Sketch showing the location of the four men just prior to the accident.

