

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

REPORT OF INVESTIGATION

Underground Coal Mine

Fatal Machinery Accident
May 18, 2004

at

Air Quality #1 Mine
Black Beauty Coal Company
Wheatland, Knox County, Indiana
I. D. No. 12-02010

Accident Investigators

Michael D. Rennie
Coal Mine Safety and Health Inspector

Arthur D. Wooten
Coal Mine Safety and Health Inspector (Electrical)

Leland Payne
Educational Field Services

Robert J. Holubeck
Approval & Certification Center - Technical Support

Brian Malin
Approval & Certification Center - Technical Support

Originating Office - Mine Safety and Health Administration
District 8
2300 Willow Street, Suite 200, Vincennes, Indiana 47591
James K. Oakes, District Manager

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Accident Scene
No. 3 Entry of the No. 4 Working Section

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OVERVIEW

On May 18, 2004, at approximately 1:50 a.m., Christopher D. Qualls, Mechanic/Electrician, was fatally injured when he was crushed between the remote controlled continuous mining machine and the coal rib. There were no eyewitnesses to the accident. Based upon the physical evidence observed at the scene and statements obtained during interviews, the accident investigation team concludes that Qualls was moving the continuous mining machine from the face area of the No. 3 Entry on the No. 4 Working Section to allow access for servicing when the accident occurred.

The cause of the accident was the failure to ensure that all workers followed the safety precautions contained in the mine's approved Roof Control Plan in regard to not standing or walking between the continuous mining machine and the coal rib while the machine is in motion. The victim was located in a pinch point created by the continuous mining machine and the coal rib.

GENERAL INFORMATION

Black Beauty Coal Company's Air Quality # 1 Mine is located 2.3 miles southwest of Wheatland, Knox County, Indiana and employs 206 persons underground and 36 persons on the surface. The mine is opened by one slope and five shafts into the Danville #7 Coal Seam which averages 72 inches in thickness and produces coal three shifts per day, five days a week.

The mine produces an average of 16,000 tons of raw coal per day from four advancing continuous mining sections. Coal is extracted from the faces by Joy 14CM remote controlled continuous mining machines. Electric shuttle cars and/or battery ramcars transport the coal to the section loading point, where the coal is then transported from the section to the surface by a series of belt conveyors. The face areas are ventilated by blowing line curtains and scrubber-equipped continuous mining machines.

The mine is ventilated by two mine fans and liberates 627,217 cubic feet of methane per day. The immediate mine roof consists of 10 to 30 feet of gray shale, and the overburden is a maximum of 350 feet. Roof support is installed using roof bolting machines equipped with automated temporary roof support systems.

The Training Plan that was in effect at the time of the accident was approved on February 6, 2004. The Roof Control Plan that was in effect at the time of the accident was approved on July 25, 2000.

The principal officers for the Air Quality #1 Mine at the time of the accident were:

President.....	Daniel Hermann
Superintendent	Douglas Grounds
Engineering Manager	Jonathon Dever
Safety Director	Ronald Madlem

An MSHA Safety and Health Inspection, AAA, began on April 1, 2004, and was ongoing at the time of the accident. The previous MSHA Safety and Health Inspection had been completed on March 31, 2004.

The calendar year 2003 National Non-Fatal Days Lost (NFDL) incidence rate for underground coal mines was 5.93 and the NFDL incidence rate for this mine was 6.62.

DESCRIPTION OF ACCIDENT

On Monday, May 17, 2004, the second-shift production crew completed the mining of the left side rooms of the No. 4 Working Section. The section foreman conducted a pre-shift examination for the on-coming shift before he and the crew left the working section.

The third shift maintenance crew for the No. 4 Working Section arrived on the section at approximately 12:01 a.m. on May 18, 2004. The crew consisted of Kris Robinson (Foreman), two electricians/mechanics, and three laborers. Two of the three laborers were not involved in the accident. They were scheduled to relocate the mining equipment from the completed rooms to the working section entry faces, move the belt feeder and prepare the belt for the next production shift. When the move was completed, they were to service and repair the mining equipment.

Robinson first examined the areas where work was to be performed, and then the maintenance crew began moving the mining equipment from the left-side rooms to the entry faces. The right-side continuous mining machine was moved to the No. 7 Entry and the left-side continuous mining machine was moved to the No. 3 Entry. The roof bolting machine was moved to the No. 6 Entry.

Keith Scott and Christopher Qualls, Mechanic/Electricians, started servicing the right-side continuous mining machine. Robinson, Tim Williams, and Ben Smith, both laborers, were working at the belt tail moving and repositioning the ratio feeder. When the servicing work was almost complete on the right-side continuous mining machine, Qualls informed Scott that he was going to go to the roof bolting machine to check the hydraulic oil level and then travel to the left-side continuous mining machine to prepare it for servicing.

After Scott had completed the work on the right-side continuous mining machine, he traveled directly to the left-side continuous mining machine where he found Qualls crushed between the discharge boom of the continuous mining machine and the right coal rib. Scott stated that no more than five minutes had elapsed between when Qualls had left the right-side continuous mining machine until he found him crushed against the rib.

After finding Qualls crushed against the rib, Scott ran to the belt entry and yelled for Kris Robinson. Scott informed Robinson that Qualls was seriously hurt. He then proceeded to the mine phone and contacted the surface for assistance. Robinson instructed Williams to get the first aid equipment and then to meet him at the left-side continuous mining machine. Ben Smith went to the phone and notified the surface of the accident.

Robinson ran to the left-side continuous mining machine where he found Qualls crushed by the discharge boom against the coal rib. Robinson, Scott, and Williams maneuvered beneath the boom and removed the remote control unit from Qualls. Robinson and Williams held Qualls while Scott used the remote control unit to swing the boom away from Qualls. After freeing him from the boom, Robinson immediately checked Qualls but found no signs of life. Cardio pulmonary resuscitation (CPR) was started by Robinson and Williams.

Jesse Emmons, Advanced EMT, was dispatched to the working section and upon arrival took over care of the victim. CPR continued while Qualls was being transported out of the working section to the Hart Street Portal bottom, where Halter/Smith Ambulance Service paramedics assumed care of the victim. Qualls was then transported to Good Samaritan Hospital in Vincennes, Indiana where he was pronounced dead at 3:22 am by Donald Halter, Deputy Knox County Coroner. Heavy bruising was present along the right side of the victim's chest and the Coroner's report stated that the cause of death was blunt crushed chest injury.

INVESTIGATION OF THE ACCIDENT

Ron Madlem, Safety Director, reported the accident to the Mine Safety and Health Administration (MSHA) Vincennes Field Office Supervisor, Gary W. Jones, at approximately 2:10 a.m. (EST) on Tuesday, May 18, 2004. Bruce D. Harris, Coal Mine Inspector, and Jones traveled to the mine. A 103(k) Order was issued to ensure the health and safety of persons in the affected areas of the mine until an accident investigation could be completed.

A joint investigation was conducted by MSHA and the Indiana Bureau of Mines to determine the cause(s) of the accident and to prevent a similar occurrence. Before traveling to the accident scene, the investigation team held preliminary interviews with persons who were on the working section at the time of the accident. The team examined the immediate area where the accident occurred. The accident area and equipment were photographed and measurements were taken at the scene. Training records, examination records, and work practices relative to the accident were reviewed. The continuous mining machine involved in the accident was put through operational tests to verify if it was functioning properly at the time of the accident. No functional defects were observed during these tests.

Investigators tested and evaluated various parts of the equipment that were involved in the accident. A list of the sites, equipment, and dates of these evaluations and tests are listed below:

Accident Site, May 19 and 20, 2004
Magnetek – Power Control Systems, Pittsburgh, PA, July 20, 2004 (Firing Package, Left and Right SCR Bridge)
Approval and Certification Center, July 21, 2004 (Left and Right Tram Motor Directional Contactor Assemblies)
Matric Limited, Seneca, PA, July 22, 2004 (Remote Control System)
Joy Mining Machinery, Franklin, PA – July 22, 2004 (Left and Right Tram Motor Directional Contactor Assemblies)
Black Beauty Coal Co. Air Quality #1 Mine, Vincennes, Indiana, July 27, 2004 (Left and Right Tram Motor Directional Contactor Assemblies)

DISCUSSION

1. There were no eyewitnesses to the accident.
2. The victim was moving the left-side continuous mining machine located in the No. 3 Entry back from the working face. At the accident location, the victim may have been trying to reposition or change direction of the machine when the accident occurred. (See Appendix C)

3. The front of the continuous mining machine was located 87 feet from the No. 3 Entry face.
4. The mine floor in the immediate area was dry and smooth with a very small change in elevation.
5. The seam height in the immediate area was 6 ½ feet.
6. The entry width at the rear bumper of the continuous mining machine was 19-feet 2-inches (See Appendix D) . The diagonal measurement of the No. 29 Crosscut intersection averaged 31-feet.
7. The Joy continuous mining machine, Model No. 14CM-15-11DX, Serial No. JM 4631C, Company No. 14, was being operated by radio remote control at the time of the accident. The remote control unit was a Matric Model TX-3, S.N. 75205AD013 D, which operated on a carrier frequency of 458 MHZ.
8. The remote control unit showed no visible damage.
9. The light switches were found in the “On” position with both the area lights and headlights burning.
10. The following components were removed from the continuous mining machine involved in the accident for further testing:
 - Matric Limited Remote Control Demultiplexer, Model: 500-200, P/N 100087264, S/N 90201ADO12B, MSHA IA 457
 - Matric Limited Permissible Radio Transmitter with strap, Model TX3 (458 MHz), P/N 100112672, S/N 75205AD013D, MSHA Approval 2G-4096-0
 - Matric Limited Receiver, Type RX1, P/N 100016248, S/N 83810AC001 D, MSHA IA-18528-0-1br
 - Matric Limited Antenna, P/N 00601843-0251, S/N 5024233-000.
 - Magnetek Firing Package, P/N RP601849-1124, S/N 4040601-001
 - Magnetek Left SCR Bridge, P/N RP 601849-0121, S/N 31295-001
 - Magnetek Right SCR Bridge, P/N 601849-121, S/N NB 3592-1701
 - Joy tram motor contactor assembly (left), P/N 00601525-0000
 - Joy tram motor contactor assembly (right), P/N 00601525-0000
 - Koehler 5000 series cap lamp, with marking “93”

11. The results of the evaluations and tests that were performed on the above components are summarized below:

A) The remote control system consisting of the TX3 remote station, victim's cap lamp and battery, machine-mounted remote control antenna, remote control receiver, and demultiplexer panel all functioned properly. The following deficiencies were noted, but were unlikely to have contributed to the accident:

- i) The right-tram control lever had a torn protective rubber boot. The tear measured approximately 0.90 mm by 3.25 mm.
- ii) The right-tram control lever was found to be out of parallel with the left tram control lever. The distance between the levers at the top was approximately 15.10 mm, and the distance between the levers at the bottom was approximately 18.90 mm.
- iii) The area beneath the remote control toggle switches contained fine coal dust.
- iv) The receiver was out of tune beyond the acceptable Matric range of 5 kHz +/- 100 Hz.
- v) On the machine-mounted remote control antenna, there was a crack along the base of the plastic dome, extending from one side of the dome to the other.
- vi) Rust was noticeable on the heat sink on the bottom case of the Right Tram Motor SCR Bridge.
- vii) There was a cut, approximately 5.4 mm long, in the cable jacket of the power cable from the cap lamp battery to the TX3 remote station, near the PTO connector. This cut did not extend into any wire inside the cable.
- viii) The victim's cap lamp and battery were fully functional. However, there were two notches cut, one on each side of the plastic base of the PTO connector on the top of the battery jar. On the "belt-loop" side of the battery, the notch measured approximately 5.4 mm long by 6.4 mm high. On the opposite side, the notch measured approximately 6.5 mm long by 5.9 mm high. On the "belt-loop" side, the notch provided access to an electrical connection inside the PTO connector. The full battery voltage is available between the electrical connection inside this notch and the bolt in the center and extending above the PTO connector. This is a permissibility discrepancy of 30 CFR 19.7(f).

- B) Testing revealed that another TX3 remote station did not cause cross-activation with the continuous miner.
- C) Testing revealed that handheld radios or magnets did not cause unintentional continuous miner machine movement.
- D) Functional testing of the firing package and left and right SCR tram bridges demonstrated these components to function properly.
- E) Functional testing of the continuous miner was conducted after the accident and demonstrated the machine to be functioning properly.
- F) The left motor's forward contactor was not adjusted correctly to actuate the interlock. During laboratory testing, when voltage was applied to energize the forward coil, the interlock would intermittently not actuate. If this malfunction were to occur on the continuous miner, when an operator attempted to tram the machine with both motors in the forward direction, only the right motor would respond. This right tram forward movement is identical to the last movement of the machine involved in the accident. However, during functional tests on the continuous miner on the day after the accident, and with the contactor assembly installed on the training panel and on another continuous miner, this malfunction was not witnessed.
- G) Functional testing showed that the right tram motor's reverse function could be precluded if the right tram forward interlock inadvertently actuated. During testing at the Air Quality #1 Mine on July 27, 2004, this could only be repeated by opening the traction controller and manually pivoting the armature plate. If this were to occur while the machine is tramping in reverse with both motors, this would cause the machine to slew in a counter-clockwise movement. This movement would be similar to the slew marks noted on the floor as the victim trammed the machine in reverse, away from the face. However, during functional testing, this could not be repeated on a continuous miner that was subjected to vibration. Also, this movement would cause the conveyor boom to pivot towards the victim's location. However, this was not the last movement of the machine, as evidence showed that a right tram forward action was the last movement.
- H) No evidence was found to suggest that a tram motor or motors could become inadvertently energized, or to tram in a direction opposite to that selected by an operator.

12. The continuous mining machine discharge boom and remote control unit had been moved from their original positions to free the victim. The position of each switch on the remote control unit at the time of the accident could not be determined since all the switches return to a neutral

position when released. Mine personnel stated that the pump motor was off, and the machine lights were on when they arrived at the accident scene. This indicates that the remote control Shutdown Bar, Circuit Breaker Trip, or Pump Start/Off switch had been activated.

13. The continuous mining machine was designed with the following tram speeds:

- 15 ft/min- "SLOW"
- 30 ft/min- "2nd"
- 68 ft/min- "3rd"
- 85 ft/min- "HIGH/TURBO"

14. The continuous mining machine was designed such that when the tram switches were split (one forward, one reverse) the highest tram speed possible was 30 ft/min. However, if only one of the tram switches was operated, the highest tram speed was 68 ft/min.

15. Tests were conducted to determine the time for the right corner of the machine discharge boom to contact the rib. The results are tabulated below:

Tram Speeds with machine repositioned with boom straight, 7 feet off rib, rib to bumper was 43 inches.	Time (seconds)
Right tram forward in 1 st speed	10.9
Right tram in 2 nd speed	4.8
Right tram in 3 rd speed	2.9
Right tram in Turbo speed	2.8

16. Sometimes when the operators of remote controlled continuous mining machines are operating this type of equipment from locations in front of the machine and/or are looking in the direction outby the machine, they can become disoriented with the machine tramming lever control function.
17. A review of the victim's training records showed that the required task training was not complete and up-to-date. No record was available to indicate that the victim had been trained in the task of operating the continuous mining machine.
18. Training materials were reviewed from previous safety meetings and from annual refresher training that was received by the victim. Four safety meetings had been conducted since January 21, 2004. These meetings included "Stay Out Of The Red Zone" safety bulletin and recent Fatal-

Grams where miners had been crushed between remote controlled continuous mining machines and coal ribs. In addition, a Joy Mining Machinery Safety Notice concerning the accidental movement of the continuous mining machine when the remote control unit was placed near a magnet was also discussed in one of the safety meetings.

ROOT CAUSE ANALYSIS

A root cause analysis was conducted and the following causal factors were identified:

Causal Factor: The approved Roof Control Plan was not being complied with when the continuous mining machine operator was positioned in a hazardous location and was crushed between the discharge boom of the continuous mining machine and the coal rib. The approved Roof Control Plan requires the continuous mining machine operator be positioned so as to avoid danger from pinch points and moving equipment.

Corrective action: Before resuming operations, training sessions were conducted by mine management emphasizing adherence to the safety precautions in the approved Roof Control Plan.

Causal Factor: The approved Training Plan was not being followed. Task training required by the plan for the operation of remote controlled continuous mining machines was not being conducted.

Corrective Actions: Mine management shall ensure that all persons who are required to operate continuous mining machines are task trained in accordance with the approved Training Plan.

Causal Factor: Deficiencies were found in the records required for task training.

Corrective actions: Mine management shall ensure that all persons receive the proper task and proficiency training and the results are recorded and kept on file.

CONCLUSION

The cause of the accident was the failure to ensure that all workers followed the safety precautions in regard to not standing or walking between the continuous mining machine and coal rib while the continuous mining machine is in motion. While moving the left-side continuous mining machine out of the face area of the

No. 3 Entry, the machine pivoted for some undetermined reason(s) and crushed the victim between the continuous mining machine discharge boom and the coal rib causing fatal injuries.

A contributing factor to the cause of the accident was that the victim had not been task trained on remote control continuous mining machines nor had he demonstrated that he could safely operate remote control continuous mining machines at this mine.

In addition, other contributing factors were the victim's possible disorientation relative to the location of the continuous mining machine and the remote control unit tram lever function, the high tram speed, the possible malfunction of auxiliary contactors on a tram control contactor assembly, and the slight unevenness of the mine floor.

Approved by:

JAMES K. OAKES
District Manager

ENFORCEMENT ACTIONS

Section 103(k) order No. 7595722 was issued on May 18, 2004 stating:

The mine has experienced a fatal accident wherein a miner was pinched between the boom of the Joy continuous miner and the coal rib. This order is issued to ensure the safety of any person in the coal mine until an examination or investigation is made to determine that the continuous miners and associated remote control equipment are safe. Only those persons selected from company officials, state officials, miner's representatives, or other persons who are deemed by MSHA to have information relevant to the investigation may enter or remain in the affected area.

Section 104(a) citation No. 7579717 was issued on January 5, 2005, stating:

75.220(a) (1)

Mine management did not ensure their mine personnel were complying with the approved Roof Control Plan. The Roof Control Plan safety precautions stipulate that mine personnel are not to stand or walk between the continuous mining machine and the coal rib while the continuous mining machine is in motion. A fatal machinery accident occurred on May 18, 2004, when a continuous mining machine operator was positioned in a hazardous location and was crushed between the discharge boom of the continuous mining machine and the coal rib.

Section 104(a) citation No. 7579718 was issued on January 5, 2005, stating:

48.7(a)

A review of the mine operator's training records revealed that task training in the safe operation of remote controlled continuous mining machines was not provided to a miner who was fatally injured on May 18, 2004, while operating a remote controlled continuous mining machine. The review also revealed that the fatally injured miner had not demonstrated proficiency in the safe operation of remote controlled continuous mining machines.

APPENDIX A

Listed below are those persons who participated and/or were present during the investigation:

BLACK BEAUTY COAL COMPANY

Douglas R. Grounds	Mine Superintendent
Greg Xanders	Administration Manager
Chad Barras	Corporate Safety Director
Dave Joest	Peabody Attorney
Mark Swain	Maintenance Foreman
Terry Marsh	General Mine Foreman
Jon Dever	Mine Engineer
Terry L. Courtney	Midnight Shift Mine Foreman
Ron Madlem	Safety Supervisor

INDIANA BUREAU OF MINES

Joe Batson	Chief State Mine Inspector Indiana Bureau of Mines
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MINE SAFETY AND HEALTH ADMINISTRATION

James K. Oakes	District Manager Coal Mine Safety and Health
Gary R. Jones	Supervisory Coal Mine Safety and Health Inspector
Bryan P. Sargeant	Staff Assistant / Supervisory Coal Mine Safety and Health Inspector

MINE SAFETY AND HEALTH ADMINISTRATION (Cont.)

Michael D. Rennie	Coal Mine Safety and Health Inspector
Arthur D. Wooten	Coal Mine Safety and Health Inspector (Electrical)
Bruce D. Harris	Coal Mine Safety and Health Inspector
Leland Payne	Mine Safety and Health Specialist Educational Field Services
Robert Holubeck	Electrical Engineer Approval & Certification Center
Bryan Malin	Electrical Engineer Approval & Certification Center

APPENDIX B

Listed below are those persons who provided information that was pertinent to the investigation:

KNOX COUNTY OFFICIALS

Gordon Becher	Knox County Coroner
Donald Halter	Deputy Knox County Coroner

BLACK BEAUTY COAL COMPANY

Brian Keith Scott	Mechanic/Electrician
Timothy Edward Williams	General Underground Laborer
Kris A. Robinson	Foreman
Mark Bedwell	Maintenance Foreman
Denny Gibbons	Continuous Mining Machine Operator
Greg Swinney	Continuous Mining Machine Operator
Gregory R. Hunt	Mechanic/Electrician
Steve Rich	Mechanic/Electrician
Mike Sutton	Mechanic/ Electrician
Mike Boyer	Continuous Mining Machine Operator
Sammy Marcroft	Foreman

APPENDIX B (Cont.)

JOY MANUFACTURING COMPANY

Dave Thomas	Electrical Certification Engineer
John L. Dodd	Sales / Service Engineer
Clint Glover	Design Engineer
Samuel G. McDowell	Senior Electrical Engineer

STAMLER

John Duty	Field Representative
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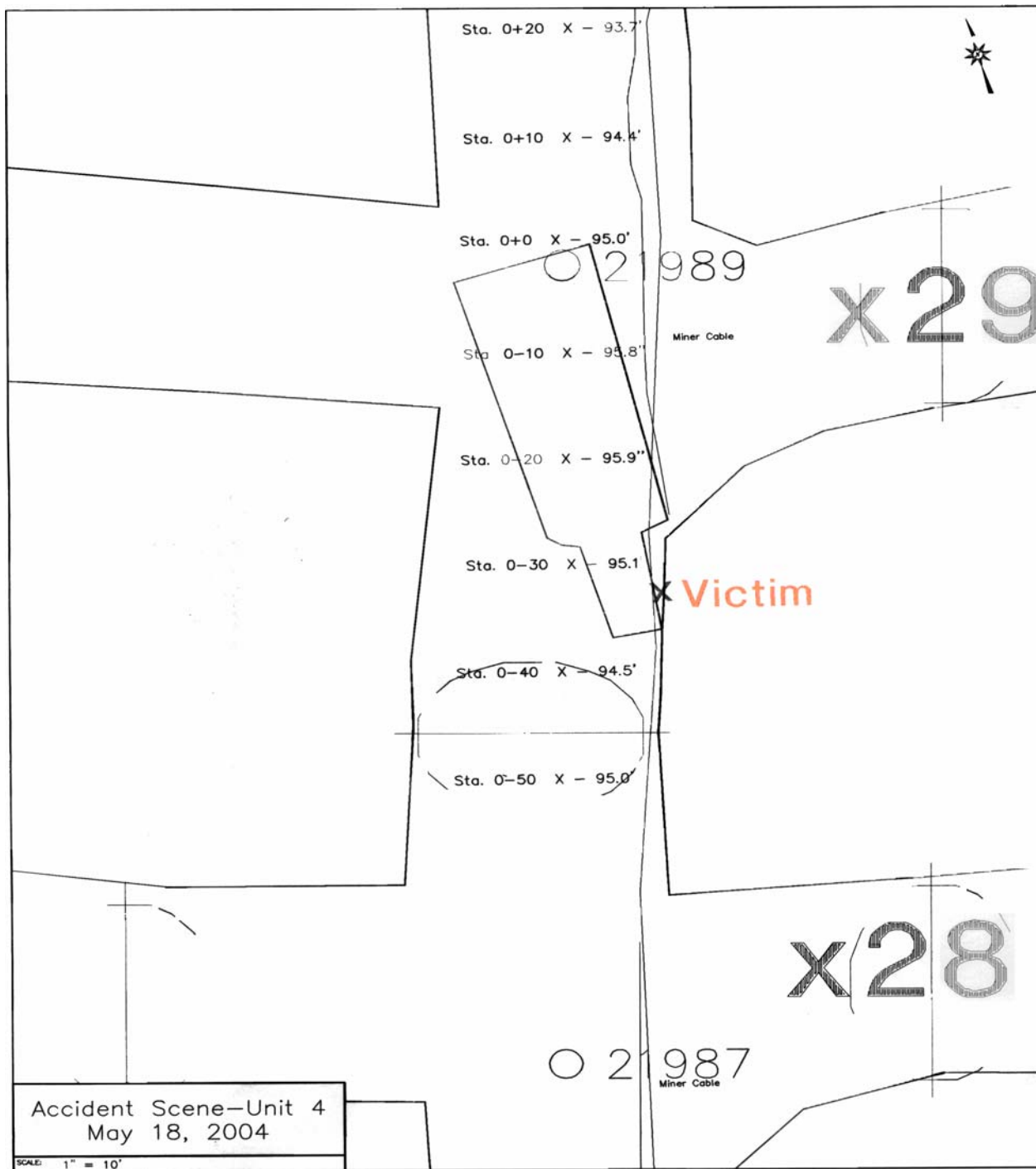
MATRIC LIMITED

Douglas L. Sturtz	Manager Customer Service
Russell Cataldo	Electronic Technician
Wally Goughler	Electronic Technician
Donnie Cousins	Electronic Technician

MAGNETEC POWER ELECTRONICS GROUP

Joe Ley	Facility Manager
Gary Bolbat	Sales and Marketing Engineer
Mayibeth Walter	Buyer/Planner
Rick Bender	Electronic Technician

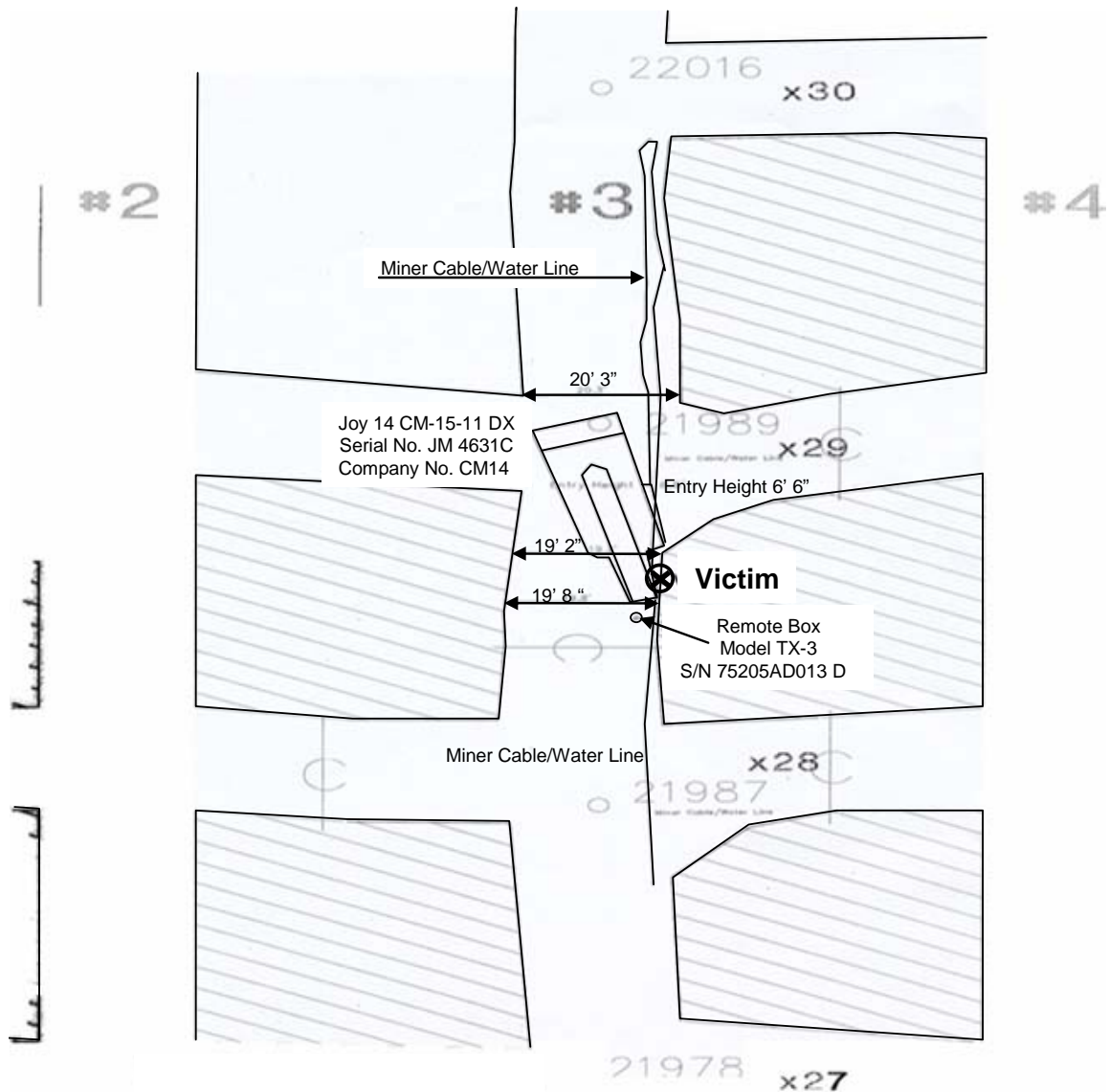
APPENDIX C



UNIT NO. 4 LOCATION

Black Beauty Coal Company
Air Quality # 1 Mine
I.D. 12-02010

APPENDIX D



**Location of No. 4 Unit Accident Site
Black Beauty Coal Company
Air Quality # 1 Mine
I.D. 12-02010**