

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

**REPORT OF INVESTIGATION
Surface Coal Mine
Fatal Electrical Accident
November 5, 2006**

**Kayenta Mine
Peabody Western Coal Company
Kayenta, Navajo County, Arizona
ID No. 02-01195**

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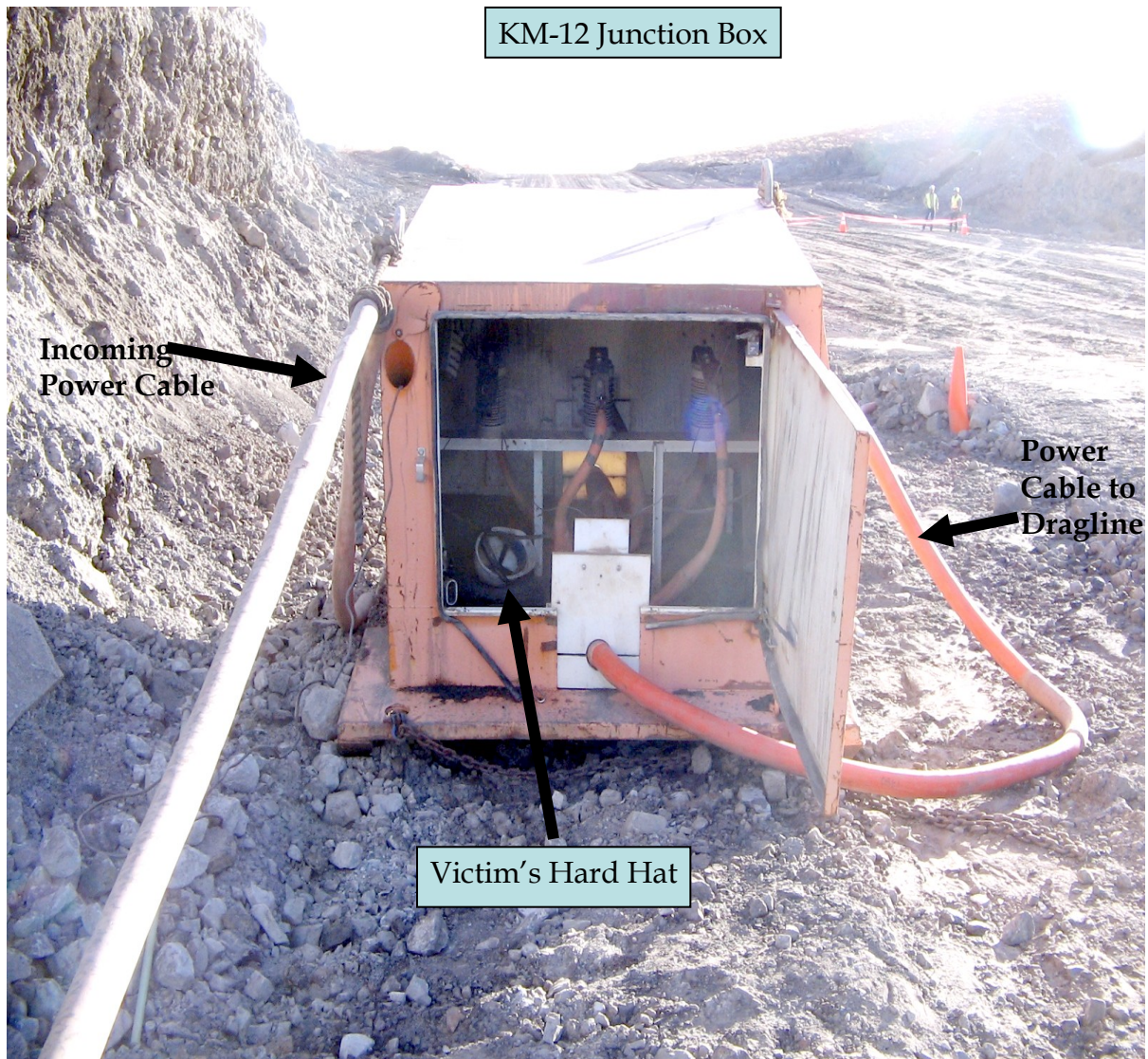
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**PHOTO OF ACCIDENT SCENE
23KV HIGH VOLTAGE JUNCTION BOX, KM-12,
LOCATED IN THE J-19 PIT, RAMP 48**



OVERVIEW

On Sunday, November 5, 2006, at approximately 8:30 p.m. Howard Harvey, Sr., a 52-year old electrician, was fatally injured when he contacted energized phases of a 23,000 volt (23 KV) high voltage circuit for an 8200 Marion dragline (dragline). He contacted the energized phases in junction box KM-12 (also referred to as a rabbit box) , located in J-19 pit, ramp 48. He was troubleshooting the dragline trailing cable at the time of the accident. While he was working on the cable, the dragline crew started the auxiliary diesel generator, located on-board the dragline, and closed (turned on or energized) the auxiliary power circuit breaker. This was done to operate the heat and lights through the auxiliary power supply of the dragline. Closing the auxiliary circuit breaker caused electrical power to travel from the dragline, through the trailing cable to the junction box; a direction opposite to the normal direction of power (back feeding).

The cause of the accident was failure to establish guidelines to safely energize the dragline's auxiliary on-board power supply and to allow unqualified persons to do this work. The victim lacked knowledge on the operation of the auxiliary power supply and did not lock and tag out or isolate the on-board auxiliary power supply from the main trailing cable. Furthermore, an improperly designed mechanical interlock device allowed both the main and auxiliary circuit breakers to be closed at the same time. Also, the phase conductors were not grounded to the system ground. The victim had only disconnected and locked the visual disconnect for the normal power supply that feeds the dragline. The absence of a safety transfer switch, as shown on the dragline wiring diagram in the 480-volt auxiliary power supply circuit, contributed to the cause of the accident.

GENERAL INFORMATION

The Kayenta Mine, owned and operated by Peabody Western Coal Company, is a surface bituminous coal mine located approximately 15.5 miles southwest of Kayenta, Navajo County, Arizona. The principal officers for Peabody Western Coal Company and the Kayenta Mine at the time of the accident were Scott Williams, General Manager; Daniel Ashike, Safety Manager; Jeffrey Shiflett; Heavy Maintenance Manager; and Gregg Kitchen; Mine Manager.

The Kayenta Mine supplies coal to the Navajo Generating Station near Page, Arizona. Mining at the Kayenta Mine involves removal of topsoil and overburden, extraction of multiple coal seams having varying overburden depths and interburden thickness, and the reclamation of mined areas in a systematic manner. Coal seams split, change to burnt coal, and pinch out in very short distances. The average, maximum recovery depth is approximately 220 feet. Mining at Kayenta Mine utilizes major excavators (four draglines, shovels, and front-end loaders) and support equipment in the overburden and coal removal process.

The mine works three eight-hour shifts: 12:00 a.m. to 8:00 a.m., 8:00 a.m. to 4:00 p.m., and 4:00 p.m. to 12:00 a.m. Coal is produced five days per week, three shifts per day.

The mine employs 454 miners and produces approximately 8,000,000 tons of coal per year. Miners are represented by the United Mine Workers of America.

Prior to the accident, the last Mine Safety and Health Administration (MSHA) regular inspection was completed on August 4, 2006. The non-fatal days lost (NFDL) incidence rate for the mine from January to September, 2006, was 0.52. The National incidence rate for surface coal mines for the same period was 1.47.

DESCRIPTION OF ACCIDENT

On Sunday, November 5, 2006, at 2:45 p.m., the dragline in the J-19 pit lost electrical power. Two day shift electricians, Gilbert Graymountain and Willie Frank, were assigned to work on the problem. They determined there was a ground fault problem with the high voltage trailing cable between junction boxes KM-21 and KM-03. They disconnected this cable from both junction boxes. At the end of the shift, Graymountain informed Rodger Grey, dayshift electrical supervisor, and Dennis Grass, evening shift electrical supervisor, of the problem and that they had left the cable disconnected.

The evening shift started work at 4:00 p.m. Albert Dandy, electrician, and Howard Harvey, Sr., electrician and victim, were assigned to replace the disconnected cable with a new cable. They completed this work between 6:00 and 6:30 p.m. Harvey traveled to the KM-321 vacuum circuit breaker, closed the visual disconnect and closed the circuit breaker to restore power to the dragline, but the circuit breaker opened (tripped, turned off, or deenergized) again. This occurred several times. Harvey and Dandy determined the problem was in the ground check circuit which is used to monitor the continuity of the grounding conductor. The purpose of the ground check circuit is to assure the grounding conductor is continuous to the frame of the dragline. If the ground check or grounding conductor circuit is broken or above an established ohmic value, the circuit breaker will open. Harvey again opened the visual disconnect at KM-321 and locked out (but did not tag out) the circuit to the dragline (No. 2 circuit at KM-321). They continued to check the cable with Harvey working from the visual disconnect end and Dandy from the dragline end. Dandy found a bad limit switch on junction box KM-03 and went to the shop to get a new switch at approximately 8:00 p.m. When leaving to get the new switch, he noticed that the lights on the dragline were on and realized the auxiliary on-board generator had been started.

At approximately 8:00 p.m., the dragline crew was getting cold and wanted to start the on-board diesel generator for the auxiliary power circuit to operate the heating system and lights. Regnar Greenstone, dragline operator, called on the two-way radio for permission to start the auxiliary power. He called Dandy and Harvey but got no response. He was able to contact Grass and received permission to start the auxiliary power from Grass. He stated he was instructed by Grass to tell the electricians when they called that they would be starting up the generator and energizing the auxiliary power circuit. Grass stated that he gave permission to start the generator as long as they got with the electricians. Dandy and Harvey were not told that the auxiliary

generator was started by the dragline crew. Greenstone then told Danny Boone, dragline oiler, to start the generator and turn on the auxiliary power and told Freddie Pelts, No. 4 man, to accompany Boone to learn how this was done.

The diesel powered generator was started. Boone had obtained a key to the electrician's lock that only qualified electrical persons were authorized to have and opened the locked gate to the enclosure for the auxiliary power circuit breaker control panel. The locked enclosure was intended to keep out unauthorized personnel such as Boone. He unlocked the gate, entered the enclosure, and turned on the 225 ampere auxiliary power circuit breaker. This turned on the dragline's lights and heat. Boone did not open the main power circuit breaker, and the inoperative mechanical interlock between the circuit breakers permitted the auxiliary and main circuit breakers to be closed at the same time causing power to back feed through on-board transformers and energize the trailing cable to approximately 23 KV. The auxiliary power circuit breaker tripped opened after about 15 minutes deenergizing the lights, heaters, and other circuits. Boone tried to reset the auxiliary circuit breaker without success. He then turned off the generator. Greenstone stated that non-electricians had energized the auxiliary power on other occasions.

On his return, Dandy met Harvey at junction box KM-12 at approximately 8:10 to 8:15 p.m. Harvey told Dandy that the ohmic value of the ground monitor circuit was fluctuating from 3 to 9 ohms and that it may be because the generator was on. Dandy continued on to junction box KM-03 to install the limit switch. At approximately 8:30 p.m., he noticed that the lights to the dragline were off. The bolts on the limit switch were too short so he returned to the shop and obtained longer bolts. He returned to junction box KM-03 and installed the switch. At approximately 9:10 p.m., Dandy returned to junction box KM-12 and found Harvey unresponsive and leaning inside the box. After checking Harvey, Dandy realized that he had received fatal injuries. He called Randall Hendrix, production manager, to report the accident and obtain emergency assistance. Emergency personnel responded, and after it was determined that electrical power was off, Harvey was checked and found to be deceased.

INVESTIGATION OF THE ACCIDENT

Cord Cristando, MSHA Field Office supervisor, Aztec, New Mexico, was notified of the accident at approximately 9:50 p.m., November 5, 2006. Cristando instructed the mine to secure the location of the accident to prevent further injury pending an investigation by MSHA. MSHA personnel were dispatched to the mine. Jeffrey Bill Scott, Coal Mine Safety and Health Inspector, Aztec, New Mexico, arrived at the mine and issued a Section 103(k) order to ensure the safety of persons at the mine until an investigation could be conducted and the area deemed safe. The MSHA accident investigation team arrived at the mine on November 7, 2006, and began the investigation (refer to Appendix A for a list of persons participating in the investigation). The accident scene was examined, measurements were taken, documents obtained, and witnesses interviewed. The investigation at the mine site concluded on November 15, 2006.

DISCUSSION

Dragline

The J-19 pit was a coal stripping operation, which included an 8200 Marion electrical dragline for removing overburden. The dragline was driven by 1,000 horsepower, 7,200 volt synchronous motors.

Electrical System

The electrical system for the J-19 pit consisted of a 23 KV alternating current, resistance grounded circuit, originating at a substation (see Appendix B for a sketch of the electrical system). The substation was rated 10,000 KVA (10 MVA). Incoming voltage was 69 KV. The main transformer was configured delta-wye and the wye secondary was resistance grounded. The 23 KV circuit, which provided power to portable and mobile equipment, was protected with circuit breakers and protective relays to guard against the harmful effects of under voltage, grounded phase, short circuit, and over current conditions. Power was transmitted to the dragline through a series of trailing cables with junction boxes used to connect the multiple lengths of cable.

A switch house, KM-321, was installed in series with the cables and junction boxes. This switch house was equipped with two 25 KV vacuum circuit breakers, protective relays (the same relays as the substation), and visual disconnect devices. The circuit that supplied the dragline was labeled the No. 2 circuit. An Atkinson high voltage (pilot wire type) ground check monitor monitored the grounding conductor from this location to the dragline frame. The visual disconnects at KM-321 did not provide automatic grounding of the phase conductors when the disconnect was in the open position. Harvey installed his lock on the disconnect at this location. Harvey's name was etched into the lock and was found installed on the disconnect during the investigation. The key to the lock was found on the victim. The phase conductors were not grounded to the system ground while the electricians performed their work.

Power in the No. 2 circuit flows from the KM-321 vacuum circuit breaker switch through a system of trailing cables connected between six junction boxes, KM-21, KM-03, KM-12, KM-31, KM-09, and KM-26. These junction boxes were located along the highwall and roadway at J-19 pit to the dragline and spanned a distance of approximately 7,500 feet. The junction boxes were also referred to as "rabbit" boxes. Junction boxes were installed at approximately 1,500-foot intervals so that cable could be easily added or removed as needed. The 23 KV circuit entered the dragline through collector rings located on the dragline and then to various on-board transformers for utilization.

On the dragline, the 23 KV circuit passed through a mechanical disconnect device and supplied two 5,000 KVA 23,000 to 7,200 volt transformers. The 7,200 volt circuit then supplied various electrical motors via molded case circuit breakers, including the swing motors, motor/generator sets, etc. A branch circuit of the 7,200 volt circuit supplied an

additional 1,000 KVA 7,200/480 transformer. The 480 volt circuit then supplied 480 volts to motor control centers (MCC)-A and -B through 1,200 and 400 ampere molded case circuit breakers. MCC-A supplied 480 volts to various 480 volt motors for the hoist blowers, drag blowers, propel blowers, etc. MCC-B supplied 480 volts to various motor loads, lights, space heaters, etc.

The accident occurred at the Atkinson-type KM-12 junction box. The junction box was provided with door and cover limit switches that cause the KM-321 circuit breaker for the 23 KV incoming power to open if the doors or cover are opened. These switches were General Electric Part No. CRZISH-11 and were connected in series with the ground check monitor circuit. The Atkinson Model A-2 8000 (BTS N.091780AA) ground monitor circuit originated at the KM-321 switch house.

Auxiliary Generator

Located on-board the dragline was a 180 horsepower Deutz, Model F8L-413 diesel engine, which powered the auxiliary generator. The generator was a three phase system, manufactured by Lima, Serial No. 63535XM rated 230/460 volt and 315/157 amperes. The generator supplied 480 volts to MCC-B through a 225 ampere molded case circuit breaker when normal power to the machine was not available. During normal operation, that is, the substation feeding power to the dragline through the trailing cable, MCC-B was supplied 480 volts via a 400 ampere molded case circuit breaker. There were no electrical or mechanical devices installed to prevent the normal power and auxiliary power circuit breakers from being energized at the same time. There were no safety measures taken to prevent anyone from starting the diesel generator.

After installing the new section of trailing cable, Harvey and Dandy worked on the trailing cable pilot circuit. A high ohmic value was measured in the pilot circuit. This prompted the two electricians to test and inspect the door and cover switches and the pilot circuit at each junction box.

Transfer and Mechanical Interlock Switches

During the investigation, a wiring diagram was found on-board the dragline and was presented to the investigation team. The wiring diagram illustrated a safety transfer switch that should have been installed, but was not. Interviews did not determine why this switch was not installed. Its purpose was specific for use with the auxiliary power supply. The wiring diagram illustrated that in position 1, 480 volts from the generator would be directed to MCC-B and normal power would be prevented from entering MCC-B. If the switch was manually moved to position 2, it would isolate the generator circuit from the normal circuit and would then permit normal power to be transmitted to MCC-B. The wiring diagram also showed a mechanical interlock device installed between the auxiliary power molded case circuit breaker (225 ampere) and the normal power molded case circuit breaker (400 ampere). The purpose of the mechanical interlock was to prevent the normal power and auxiliary power circuit breakers from

being in the closed position at the same time. The mechanical interlock device (metal bar) was installed between the circuit breakers but did not prevent them from being closed at the same time. The safety transfer switch or a functional mechanical interlock between the circuit breakers would have prevented the fatal accident. See appendix C for a picture of the interlock and circuit breaker handles. The 225 ampere auxiliary circuit breaker was a General Electric No. CAT-TJK436F000. The 400 ampere General Electric main circuit breaker had a 225 ampere trip unit No. CAT-TJK436T225.

Lock out, Tag out, and Grounding

The operator's written dragline and shovel lock out and tag out procedures required that when working on electrical components with separate power sources, these sources must be identified, confirmed through visual disconnect that the power was off, and locked and tagged out at the disconnects. Also, when working on high voltage power feeders and pit distribution systems, these procedures required that the circuit conductors be grounded using grounding jumpers. Grounding jumpers for this purpose were provided at the mine site.

The electricians had locked out the dragline trailing cable at KM-321 prior to performing electrical repairs, but did not connect the phases to ground. Grass was present and instructed Harvey to place his lock at the KM-321 vacuum circuit breaker to lock out the visual disconnect. It was not tagged out nor did Grass give instructions to install a tag or ground the phase conductors. This occurred at approximately 4:45 p.m., November 5, 2006. The electricians did not lock and tag out the auxiliary power supply from the dragline nor were they instructed to do so.

Evidence indicated that Harvey, while working on the pilot circuit at the KM-12 junction box, contacted the left and middle phase buss bars inside the junction box causing a phase to phase fault through his body resulting in fatal injuries. The amount of electrical power was approximately 23 KV.

Harvey had worked at the Black Mesa Mine (operated by Peabody Western Coal Company) which is adjacent to the Kayenta Mine, and had transferred to the Kayenta Mine 12 weeks before the accident. He was familiar with the 7400 Marion dragline at Black Mesa Mine. That dragline also had an on-board generator. The generator circuit used on that machine was provided with controls and switches that were safely designed, installed and maintained. A transfer switch was used to prevent the auxiliary power and normal power circuits from being closed at the same time. It is thought that when Harvey and Dandy observed the lights on the dragline they assumed switching had been done in a safe manner at the dragline or they were not aware the auxiliary power could back feed high voltage to and through the trailing cable.

Dandy stated that he observed the dragline lights on and that he and Harvey were not called to switch the power. He knew that a key was needed to switch on the auxiliary power system and thought that only qualified electricians were supposed to have access

to it. He stated that he had seen the third electrician on the shift, Kee Wilson, and thought he may have switched on the auxiliary power.

Grass received a call via two-way radio from Greenstone requesting the on-board auxiliary diesel generator be turned on. Greenstone reported that power was needed because the crew was cold. Interviews with the dragline crew indicated that Grass gave permission to start the generator. However, Grass did not assign an electrician to switch the controls to operate the auxiliary power system. Grass told Greenstone to tell the electricians when they called that the auxiliary power had been turned on. Boone, who was not a qualified electrician, after starting the auxiliary diesel generator, entered the locked enclosure intended for authorized personnel only, and closed the 225 ampere auxiliary circuit breaker. Boone left the main 400 ampere circuit breaker in the closed position, which resulted in 480 volts from the generator being applied to the secondary side of the 1,000 KVA, 7,200 to 480 volt transformer increasing the voltage to 7,200 volts to the primary side of the transformer. The 7,200 volts were then applied to the secondary side of the 23,000 to 7,200 volt transformers increasing the voltage on the primary side to approximately 23 KV and was transmitted to the dragline trailing cable and junction boxes.

Monthly electrical examinations

30 CFR 77.502 and 77.502-2 require monthly examinations of electrical equipment. The required monthly examinations failed to recognize that the mechanical interlock was present but was not installed or maintained to perform its intended function and that the safety transfer switch was missing. Absence of the transfer switch and a properly installed mechanical interlock resulted in 480 volts from the generator to be applied to on-board transformers increasing the voltage to approximately 23 KV to the machine trailing cable. The faulty circuit breaker interlock and the absence of the safety transfer switch appeared to have existed for years.

Training and Experience

Howard Harvey, Sr., age 52, had 24 years 36 weeks mining experience with 12 weeks at the Kayenta Mine. His previous experience had been at the Black Mesa Mine. He had 17 years and 4 weeks experience as an electrician. A review of training records indicated that Harvey received new miner training, including a mine tour, after he transferred to the Kayenta Mine. He had also recently received electrical refresher training. Harvey was a qualified electrician according to 30 CFR 77.103.

ROOT CAUSE ANALYSIS

An analysis was conducted to identify the most basic causes of the accident that were correctable through reasonable management controls. The following root causes were identified:

1. Root Cause: Management did not have effective procedures or safely designed and installed equipment in place to ensure that when the auxiliary power supply on the dragline was energized it did not back feed into the trailing cable of the dragline.

Corrective Action: Management removed the auxiliary generator, which was heavily damaged in the accident, and does not intend to replace the generator or use an auxiliary power system on this dragline.

2. Root Cause: Management allowed unqualified persons to energize the auxiliary power supply on the dragline whose lack of knowledge and understanding of electrical circuits and circuit breaker switching resulted in a fatal electrical accident.

Corrective Action: Management removed all current keys and locks from use. A new system with numbered keys assigned for use only by specific qualified electricians was instituted. This system uses keys that cannot be duplicated.

3. Root Cause: Management did not ensure that adequate monthly electrical examinations of the 480 volt auxiliary power system on the dragline were conducted.

Corrective Action: Management implemented a checklist to identify all electrical equipment required to be examined on the dragline. This checklist is used by management to ensure that all required equipment examinations are made.

4. Root Cause: Management did not ensure that lock out, tag out, and grounding procedures were consistently followed when electrical work was performed.

Corrective Action: Management implemented a new lock and key system for qualified electricians and re-emphasized and trained electricians on the lock out, tag out, and grounding procedures.

CONCLUSION

On Sunday, November 5, 2006, at approximately 8:30 p.m. Howard Harvey, Sr., a 52-year old electrician, was fatally injured when he contacted energized phases of a 23,000 volt (23 KV) high voltage circuit for a dragline. The cause of the accident was failure to establish guidelines to safely energize the dragline's auxiliary on-board power supply and to allow unqualified persons to do this work. The victim lacked knowledge on the operation of the auxiliary power supply and did not lock and tag out or isolate the on-board auxiliary power supply from the main trailing cable. Furthermore, an improperly designed mechanical interlock device allowed both the main and auxiliary circuit breakers to be closed at the same time. Also, the phase conductors were not grounded to the system ground. The victim had only disconnected and locked the visual disconnect for the normal power supply that feeds the dragline. The absence of a safety transfer switch, as shown on the dragline wiring diagram in the 480-volt auxiliary power supply circuit, contributed to the cause of the accident.

Approved by:

Allyn C. Davis
District Manager

Date

ENFORCEMENT ACTIONS

A 103(k) Order No. 7606630 was issued to Peabody Western Coal Company to ensure the safety of the persons working on the 8200 Marion Dragline, J-19 Pit, Ramp 48, HV trailing cable, electrical feeds, and substation until an investigation could be conducted and area determined to be safe before resuming operations.

A 104(d)(1) Citation No. 7284127 was issued to Peabody Western Coal Company for a violation of 30 CFR 77.507. The electrical circuit for the 480-volt diesel powered generator supplying auxiliary power on the 8200 Marion dragline was not provided with switches or other controls that were safely designed, constructed, or installed. An electrical wiring diagram on-board the dragline showed a safety transfer switch in the circuit and a mechanical interlock device for the 225 ampere (auxiliary power) and 400 ampere (main power) circuit breakers. The safety transfer switch was not installed and the mechanical interlock device was defective in that it did not prevent the auxiliary and main circuit breakers from being turned "on" at the same time. These conditions resulted in the 480 volts from the generator being transmitted via the main transformers to the machine trailing cable causing fatal injuries to an electrician working on the cable on November 5, 2006. These conditions existed for a long time; were not as illustrated in the wiring diagram; and posed serious hazards to the workers. The circuit and circuit breakers had been examined numerous times by qualified electricians but the unsafe conditions were not corrected. A second electrician was working on the machine's trailing cable at the time of the accident and was also exposed to the same electrical hazards that caused the fatal accident.

A 104(d)(1) Order No. 7284128 was issued to Peabody Western Coal Company for a violation of 30 CFR 77.501. On November 5, 2006, electrical work was performed by qualified electricians on the 8200 Marion dragline high voltage trailing cable without locking out and suitably tagging the disconnecting devices for the auxiliary power supply circuit on-board the dragline. While conducting this work, one of the qualified electricians was fatally injured when the auxiliary power supply circuit was energized and backfed through the main on-board transformers and to the trailing cable. The electricians had locked out the dragline trailing cable at the KM-321 vacuum circuit breaker visual disconnect prior to performing electrical repairs, but did not lock and tag out the auxiliary power supply on the dragline. Dennis Grass, chief electrical supervisor, was present and instructed the victim to place his lock at the KM-321 vacuum circuit breaker to lock out the visual disconnect, but did not instruct the electricians to lock and tag out the auxiliary power supply. Locking out the auxiliary power supply would have prevented the fatal accident. A second electrician was working on the machine's trailing cable at the time of the accident and was also exposed to the same electrical hazards that caused the fatal accident.

A 104(d)(1) Order No. 7284129 was issued to Peabody Western Coal Company for a violation of 30 CFR 77.704. On November 5, 2006, electrical work was performed by qualified electricians on the 8200 Marion dragline high voltage trailing cable. The electricians did not connect each phase conductor to the system ground. While

performing this work, one of the electricians was fatally injured when the auxiliary power supply circuit on the dragline was energized and backfed through main transformers on-board the dragline energizing the trailing cable to approximately 23 KV. The electricians had locked out the dragline trailing cable at the KM-321 vacuum circuit breaker visual disconnect prior to performing electrical repairs, but did not connect the phases to the grounding system. Dennis Grass, chief electrical supervisor, was present at the KM-321 vacuum circuit breaker when this work was done but did not instruct the electricians to ground the phase conductors. Connecting the phase conductors to the system ground would have prevented the fatal accident. A second electrician was working on the machine's trailing cable at the time of the accident and was also exposed to the same electrical hazards that caused the fatal accident.

A 104(d)(1) Order No. 7284130 was issued to Peabody Western Coal Company for a violation of 30 CFR 77.502. The auxiliary power supply circuit and mechanical interlock between the 225 ampere (auxiliary power) and 400 ampere (main power) circuit breakers located on-board the 8200 Marion dragline were not adequately examined, tested and properly maintained to assure safe operating conditions. An electrical drawing present on the dragline illustrated the presence of a 2-position safety transfer switch. The transfer switch was not installed at the time of the fatal accident that occurred on November 5, 2006. The transfer switch was illustrated as a manually operated 2-position switch. In one position, 480 volts from the auxiliary diesel powered generator is transmitted to motor control center B (MCC-B). In position 2, normal power from the trailing cable is transmitted to MCC-B. The transfer switch would have provided a positive means to prevent the auxiliary and normal power circuits from being connected together. Additionally, the wiring diagram showed the normal and auxiliary power circuit breakers provided with a mechanical interlock to prevent both circuits from being closed at the same time. A mechanical interlock was present but was not installed or maintained to perform its intended function. The required monthly examinations by qualified persons failed to recognize these hazardous conditions. Absence of the transfer switch and a properly installed mechanical interlock (conditions which appeared to have existed for years) resulted in 480 volts from the generator to be applied to on-board main transformers increasing the voltage to approximately 23 KV to the machine trailing cable. This caused fatal injuries to an electrician working on the trailing cable. A second electrician was working on the machine's trailing cable at the time of the accident and was also exposed to the same electrical hazards that caused the fatal accident.

A 104(d)(1) Order No. 7284131 was issued to Peabody Western Coal Company for a violation of 30 CFR 77.500. On November 5, 2006, electrical work was performed on the trailing cable for the 8200 Marion dragline and power had not been removed from the cable. Persons on the dragline energized a 480-volt auxiliary power supply which back fed through the on-board main transformers and energized the trailing cable on which two electricians were working, causing fatal injuries to one of them. Electrical circuits and equipment shall be deenergized while work is done on them. The auxiliary power supply circuit was energized by a person not qualified as required in 30 CFR 77.103. After starting the on-board diesel generator, this person entered a locked area intended

and posted for “authorized persons only” and turned on the 225 ampere circuit breaker which connected auxiliary power to the main on-board transformers. The unqualified person obtained a key (No. GH75) that was provided to be used only by qualified persons and which was kept in a locker on the dragline. A lack of knowledge and understanding by the unqualified person of electrical circuits and circuit breaker switching resulted in the fatal electrical accident that occurred that day. The chief electrical supervisor was contacted by the dragline operator requesting the auxiliary power supply to be turned on. The supervisor gave permission to energize the auxiliary power supply at that time. The electrical supervisor was aware that repairs were being made to the dragline trailing cable by two electricians he assigned to conduct the work. The second electrician working on the machine’s trailing cable at the time of the accident was also exposed to the same electrical hazards that caused the fatal accident.

APPENDIX A

List of Persons Participating in the Investigation

PEABODY WESTERN COAL COMPANY OFFICIALS

David Beerbower	Executive Vice President
David Ashike	Safety Manager
William A. Vance	Safety/Training Manager
Gregg Kitchen	Mine Manager
Jim Shackelford	Senior Corporate Electrical Engineer
Jeffrey Shiflett	Heavy Maintenance Manager
Scott Williams	General Manager
Dennis Grass	Electrical Foreman
Gehl Tucker	Attorney at Law
Karen L. Johnston	Attorney at Law
Rodger Grey	Electrical Foreman
Randall Hendrix	Production Manager

UNITED MINE WORKERS OF AMERICA

Phillip L. Russell, Sr.	International Health & Safety Representative
Phillip Etsitty	Local Safety & Health Committee Chairman
Lewis Yazzie	Local Representative
Marie Justice	International Health & Safety Representative
Albert Dandy	Electrician
Kee Wilson	Electrician
Tom Nimrod, Jr.	Local Union President
Gilbert Graymountain	Electrician
Willie Frank	Electrician
Robert McClure	Dragline Operator
Regnar Greenstone	Dragline Operator
Freddie Pelts	Dragline 4 th Man
Danny Boone	Dragline Oiler
Arlo Ketchum	Electrician

NAVAJO NATION DIVISION OF NATURAL RESOURCES MINERALS DEPARTMENT

Ben Gilmore	Safety Officer
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NAVAJO DEPARTMENT OF CRIMINAL INVESTIGATION

Darlene James
Reeder Nez

Criminal Investigator
Criminal Investigator

MINE SAFETY AND HEALTH ADMINISTRATION

David Head
Richard J. Boyle

Electrical Inspector
Coal Mine Safety and Health Inspector/
Diesel Specialist

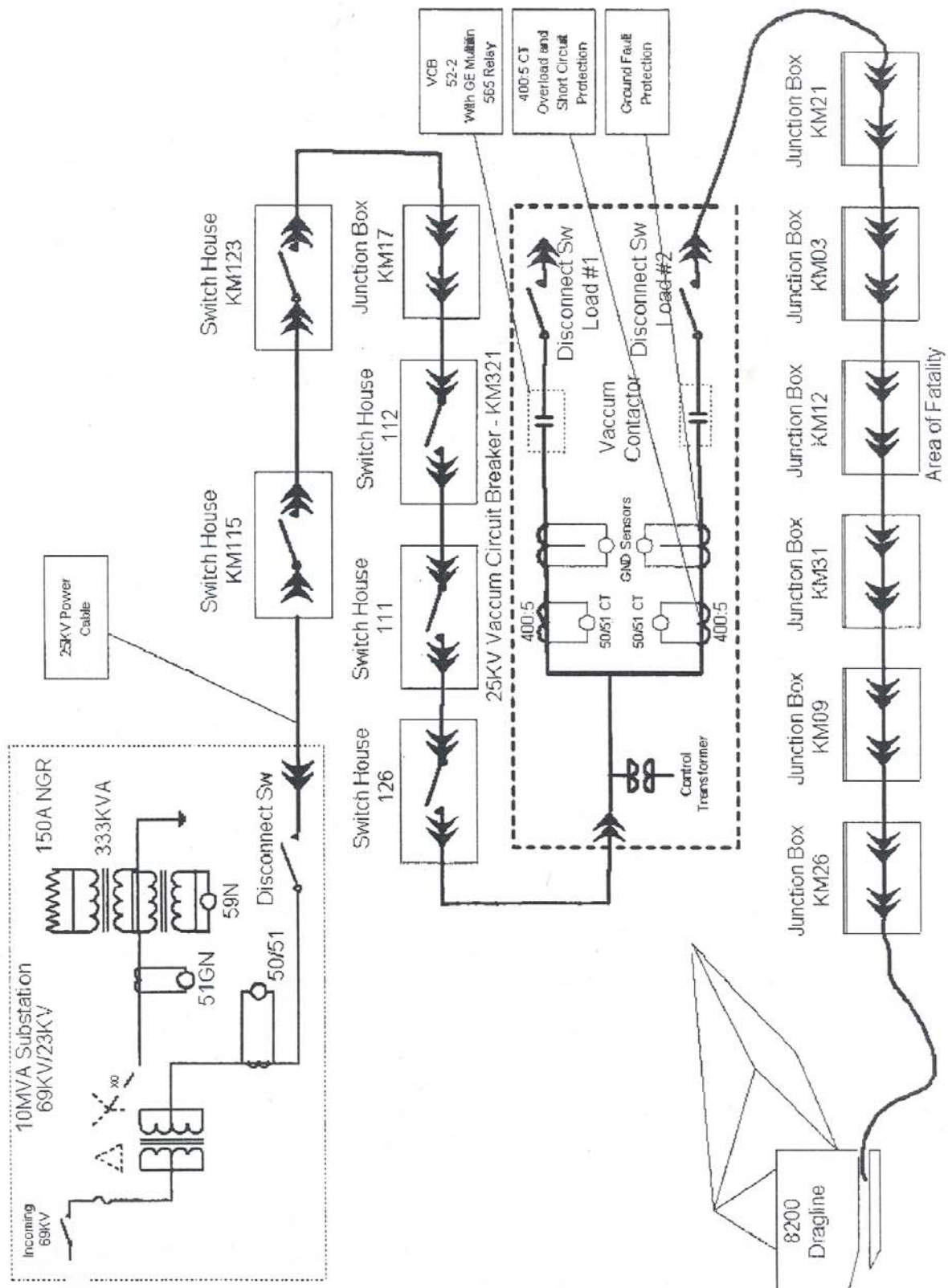
James Kirk
Steve M. Powroznik
Larry W. Neil

Electrical Supervisor
Training Specialist
Coal Mine Safety and Health Inspector/
Lead Accident Investigator

Jeffrey Bill Scott

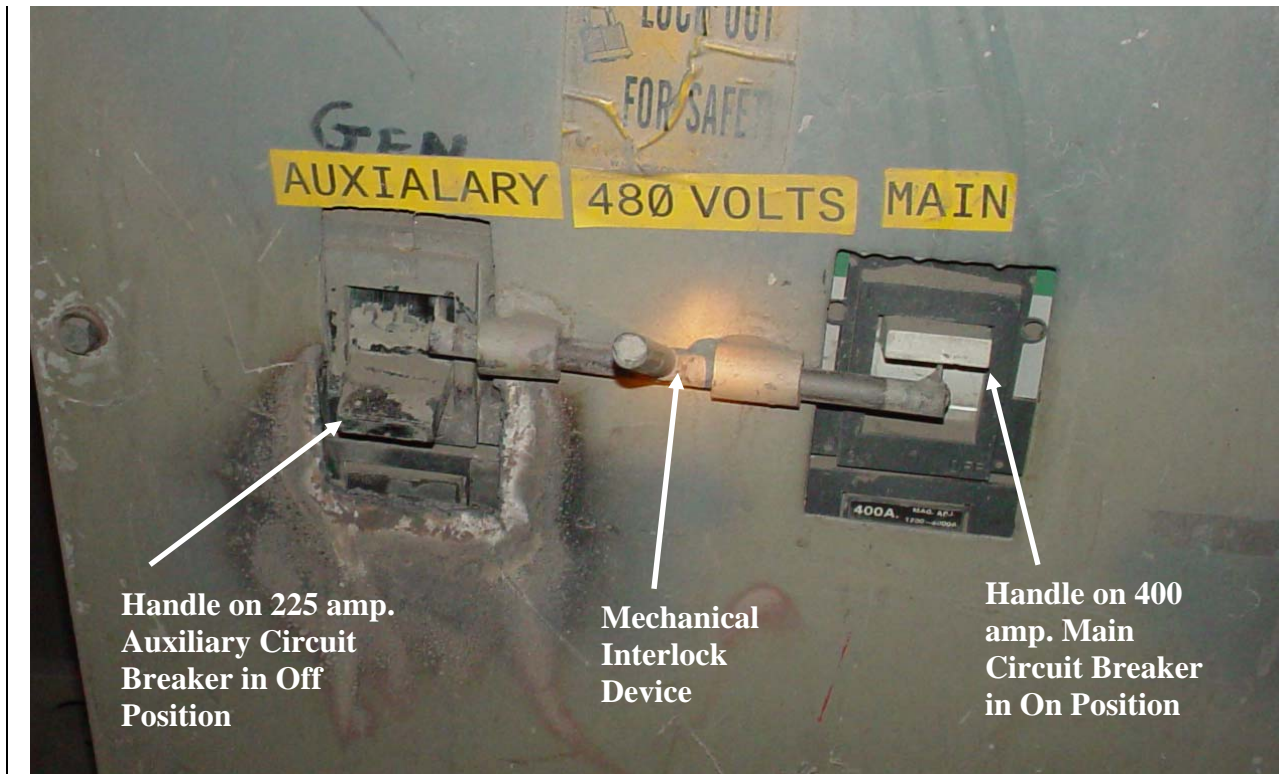
Coal Mine Safety and Health Inspector

APPENDIX B **SKETCH OF J-19 PIT ELECTRICAL SYSTEM**



APPENDIX C

PICTURE OF MECHANICAL INTERLOCK AND CIRCUIT BREAKER HANDLES
LOCATED ON METAL PANEL IN LOCKED AREA ON DRAGLINE



APPENDIX D

VICTIM INFORMATION - MSHA FORM 7000-50b

Accident Investigation Data - Victim Information

Event Number: 4 2 6 4 2 3 6

U.S. Department of Labor
Mine Safety and Health Administration



Victim Information: 1																
1. Name of Injured/Ill Employee: Howard Harvey, Sr.				2. Sex M		3. Victim's Age 52		4. Last Four Digits of SSN:				5. Degree of Injury: 01 Fatal				
6. Date(MM/DD/YY) and Time(24 Hr.) Of Death: a. Date: 11/05/2006 b. Time: 20:30								7. Date and Time Started: a. Date: 11/05/2006 b. Time: 16:00								
8. Regular Job Title: 102 Electrician						9. Work Activity when Injured: 020 Electrical maintenance/repair						10. Was this work activity part of regular job? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>				
11. Experience: a. This		Years	Weeks	Days	b. Regular Job Title:		Years	Weeks	Days	c. This Mine:		Years	Weeks	Days	d. Total Mining:	
Work Activity:		17	4	0	Job Title:		17	4	0	Mine:		0	12	0	Mining: 24 36 0	
12. What Directly Inflicted Injury or Illness? 042 Electrical conductor										13. Nature of Injury or Illness: 210 Electrical shock/electrocution						
14. Training Deficiencies: Hazard: New/Newly-Employed Experienced Miner: Annual: Task:																
15. Company of Employment: (If different from production operator) Operator Independent Contractor ID: (if applicable)																
16. On-site Emergency Medical Treatment: Not Applicable: First-Aid: CPR: EMT: <input checked="" type="checkbox"/> Medical Professional: None:																
17. Part 50 Document Control Number: (form 7000-1) 220063200025 18. Union Affiliation of Victim: 2555 United Mine Workers of Amer.																

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6. Date(MM/DD/YY) and Time(24 Hr.) Of Death:								7. Date and Time Started:								
8. Regular Job Title:						9. Work Activity when Injured:						10. Was this work activity part of regular job? Yes <input type="checkbox"/> No <input type="checkbox"/>				
11. Experience: a. This		Years	Weeks	Days	b. Regular Job Title:		Years	Weeks	Days	c. This Mine:		Years	Weeks	Days	d. Total Mining:	
Work Activity:					Job Title:					Mine:					Mining:	
12. What Directly Inflicted Injury or Illness?										13. Nature of Injury or Illness:						
14. Training Deficiencies: Hazard: New/Newly-Employed Experienced Miner: Annual: Task:																
15. Company of Employment: (If different from production operator) Independent Contractor ID: (if applicable)																
16. On-site Emergency Medical Treatment: Not Applicable: First-Aid: CPR: EMT: Medical Professional: None:																
17. Part 50 Document Control Number: (form 7000-1) 18. Union Affiliation of Victim:																

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1. Name of Injured/Ill Employee:				2. Sex		3. Victim's Age		4. Last Four Digits of SSN:				5. Degree of Injury:				
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Work Activity:					Job Title:					Mine:					Mining:	
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