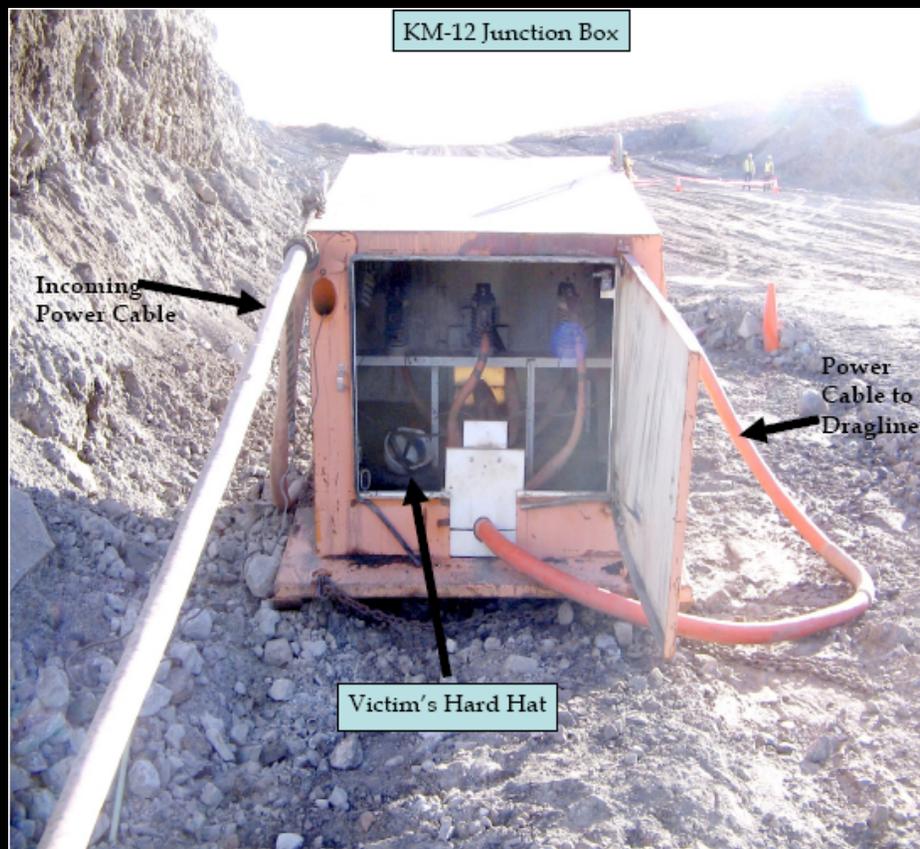


*This presentation is for illustrative and **general** educational purposes only and is not intended to substitute for the official MSHA Investigation Report analysis nor is it intended to provide the sole foundation, if any, for any related enforcement actions.*

Coal Mine Fatal Accident 2006-45



Operator:	Peabody Western Coal Company
Mine:	Kayenta Mine
Accident Date:	November 5, 2006
Classification:	Electrical
Location:	Dist. 9, Navajo County, Arizona
Mine Type:	Surface Coal Mine
Employment:	454
Production:	22,000 Tons/Day

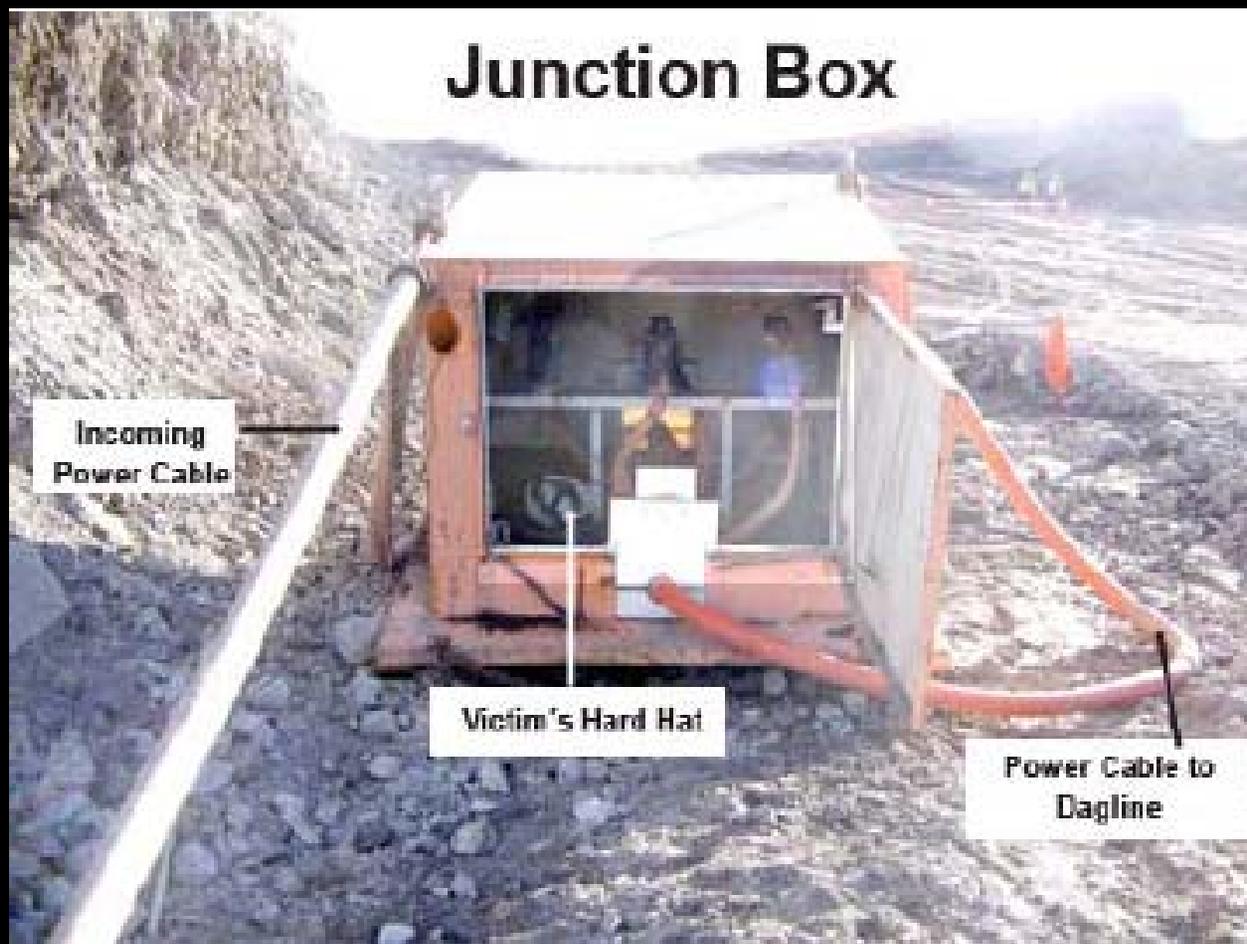
ACCIDENT DESCRIPTION



On Sunday, November 5, 2006, at approximately 8:30 p.m. a 52-year old electrician, was fatally injured when he contacted energized phases of a 23,000 volt high voltage circuit for a dragline. He contacted the energized phases in a junction box. 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. 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 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.

ACCIDENT DESCRIPTION cont.



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.

ROOT CAUSE ANALYSIS

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.

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.

ROOT CAUSE ANALYSIS cont.

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.

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.

ENFORCEMENT ACTIONS

§104(d)(1) Citation No. 7284127 was issued to Peabody Western Coal Company for a violation of 30 CFR 77.507.

Condition or Practice:

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.

ENFORCEMENT ACTIONS

§104(d)(1) Order No. 7284128 was issued to Peabody Western Coal Company for a violation of 30 CFR 77.501.

Condition or Practice:

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.

ENFORCEMENT ACTIONS

§104(d)(1) Order No. 7284129 was issued to Peabody Western Coal Company for a violation of 30 CFR 77.704.

Condition or Practice:

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.

ENFORCEMENT ACTIONS

§104(d)(1) Order No. 7284130 was issued to Peabody Western Coal Company for a violation of 30 CFR 77.502.

Condition or Practice: 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.

ENFORCEMENT ACTIONS

§104(d)(1) Order No. 7284131 was issued to Peabody Western Coal Company for a violation of 30 CFR 77.500.

Condition or Practice: 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.

BEST PRACTICES

- Ensure that equipment is de-energized, locked out, and tagged before performing electrical work. Do not rely on someone else to do these things for you.
- Thoroughly communicate to determine that it is appropriate to reset a breaker.
- Ensure that electrical work is only performed by a qualified person or one trained to perform electrical work under the direct supervision of a qualified person.
- Never assume that you know how a circuit is wired. Ask for help and/or consult a wiring diagram/schematic if you are unsure.