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# GENERAL INFORMATION

## Coal Mine Fatal Accident 2004-04



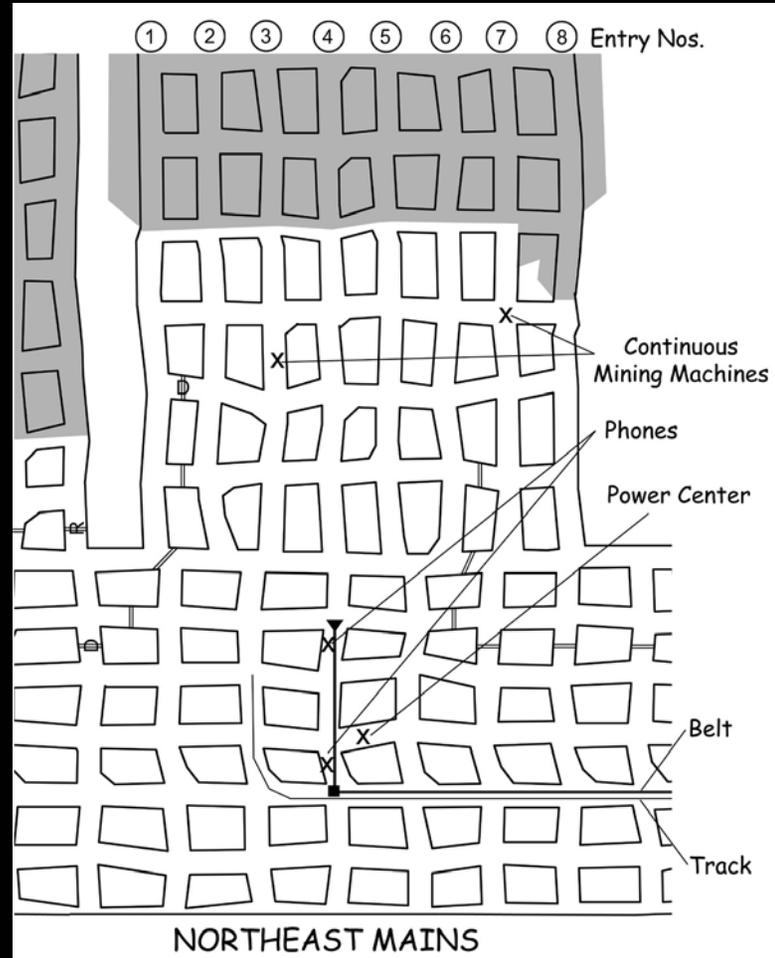
Operator:	Spartan Mining Company, Inc. (Massey Energy)
Mine:	Ruby Energy Mine
Accident Date:	February 5, 2004
Classification:	Electrical
Location:	District 4, Mingo County, WV
Mine Type:	Underground
Employment:	37
Production	3,500 tons/day

# ACCIDENT DESCRIPTION

- At 7:20 a.m. the day shift crew arrived on the working section.
- The left-side continuous mining machine (CM) operator second mined pillars from the No. 4 entry to the No. 1 entry and then backed the machine 2 crosscuts outby in the No. 3 entry.
- The left-side CM operator and the section electrician serviced the machine while the right-side CM was used to mine the next row of pillars.
- The section foreman instructed the left-side CM operator to move his machine into position in the No. 4 entry to start mining when the right-side CM finished mining in No. 5 entry.

# ACCIDENT DESCRIPTION

- While moving the left-side CM forward, the operator accidentally let the ripper cutting drum down onto the CM trailing cable.
- A bit lug damaged the cable, bursting the inner voltage insulation, allowing 2 power phases to contact each other.
- The resulting short circuit caused mine power (underground and outside) to deenergize, including power to the mine fan and the preparation plant. The left-side CM circuit breaker also opened.



# ACCIDENT DESCRIPTION

- The section foreman and a shuttle car (SC) operator were a few feet outby the left CM when the trailing cable was damaged.
- The SC operator traveled outby where he met the scoop operator and informed him that a scoop was needed to help get the left-side CM ripper head raised to free its trailing cable.
- The section electrician phoned the superintendent from the belt head. The superintendent stated that he did not know what deenergized the high voltage and that all underground personnel would have to come outside if the mine fan did not resume operation within 15 minutes.
- The left-side CM operator observed the cable and informed the section foreman that he did not believe the damage was too bad.
- The section foreman went to the section loading point mine phone and called the superintendent, who told him that the mine fan was down and to call back shortly.
- The section foreman then returned to the intersection immediately outby the left CM, where he could see the top of the scoop's canopy operating in front of the CM.
- The section foreman told the electrician that the power was off, the mine fan was down, and they would have to go outside in 15 minutes.

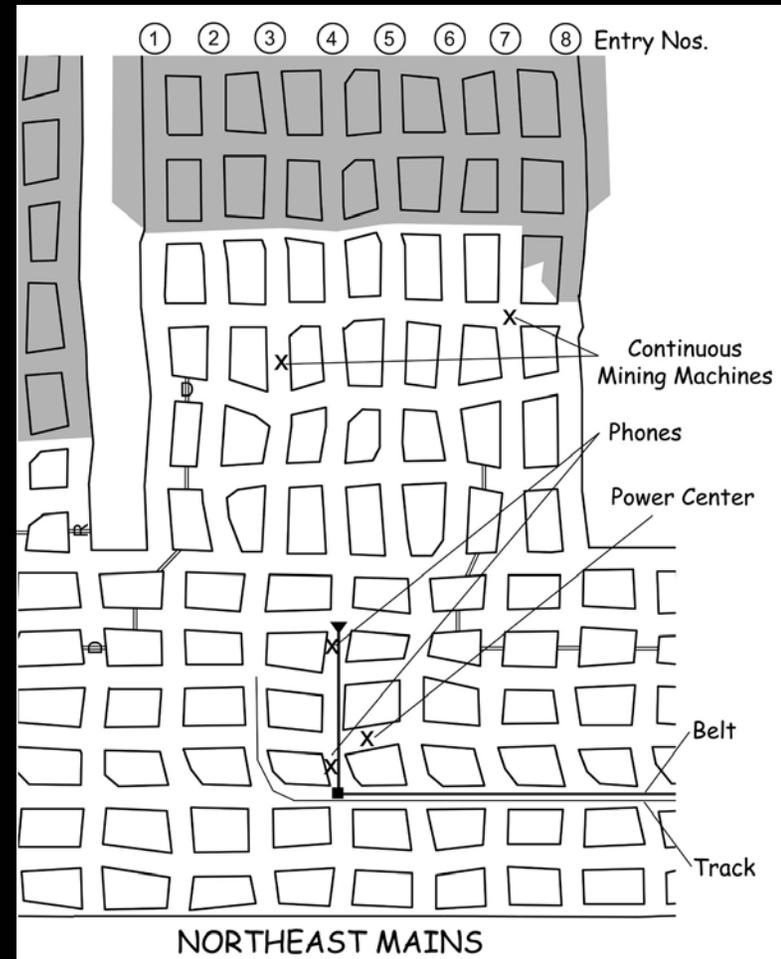
# ACCIDENT DESCRIPTION

- The scoop operator bumped the scoop against the ripper drum, freeing the trailing cable.
- The electrician arrived at the CM and told the miners that he needed to check the damaged area of the trailing cable. He also informed them that the fan was off and that they only had 15 minutes until they had to leave the section.
- The electrician cut about 14" of the outer jacket, exposing the three power phases, ground, and monitor wires. Two of the power phases were burned and needed to be cut and spliced. The outer jacket on the third power phase was damaged and needed to be reinsulated. The ground and monitor wires were not damaged.



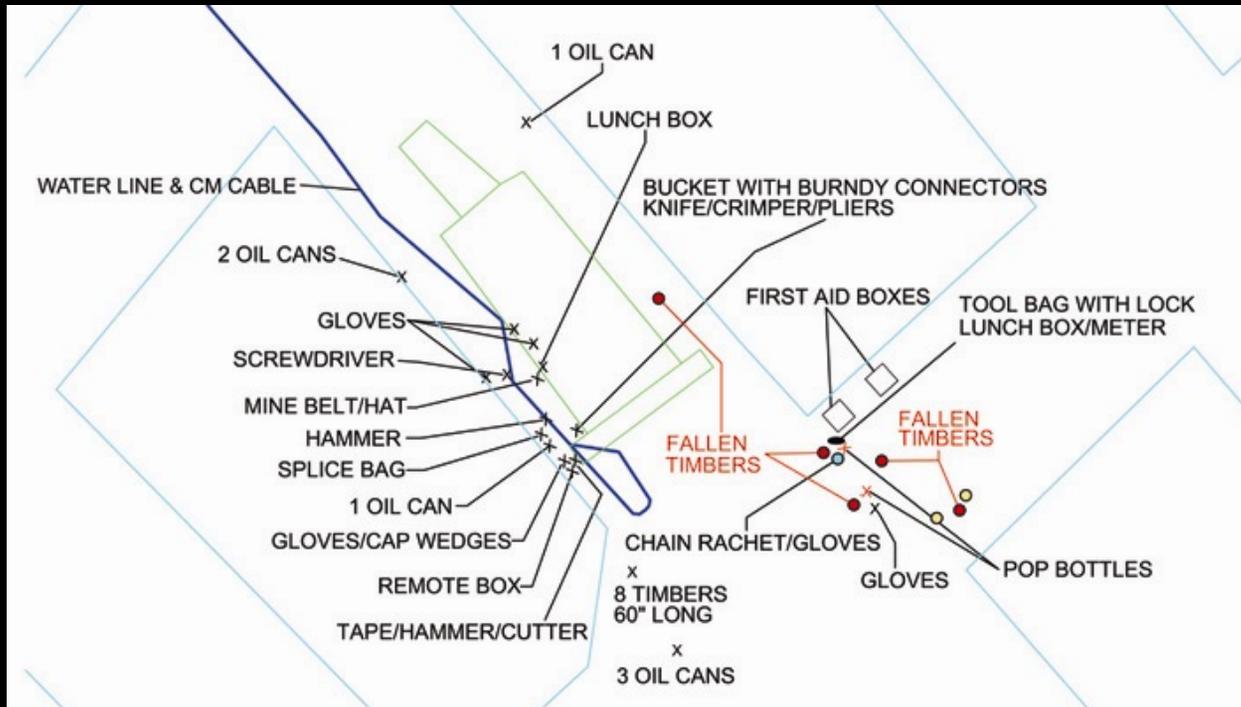
# ACCIDENT DESCRIPTION

- The CM operator heard a humming noise and felt air movement. He asked the SC operator to go to the section power center to see if the power had come back on.
- After repairing the first two phases, the electrician cut the 3<sup>rd</sup> phase apart and prepared both ends for the connector.
- The section foreman was waiting near the loading point phone, when he noticed air pressure on the back-up check curtains. After a minute or two, he heard the take-up jack on the belt take-up engage.
- The section foreman went to the power center and started closing the circuit breakers for all the face equipment.



# ACCIDENT DESCRIPTION

- All cable plugs were still attached to their receptacles on the power center.
- He first closed the circuit breaker for the right-side CM. When he closed the breaker for the left-side CM, it immediately tripped out, and centered.
- The electrician, who was still working on the 3<sup>rd</sup> power phase, received fatal electrical shock.
- The section foreman continued to engage the circuit breakers for the shuttle cars, scoop chargers, and pumps.



# ACCIDENT DESCRIPTION

- As the SC operator walked toward the power center to see if the power had come back on, he saw the section foreman closing the circuit breakers.
- The SC operator called out to the section foreman, telling him not to put the breaker in on the left-side CM.

The section foreman replied,  
"Oh, no."

# TRAILING CABLE

- The 2/0 SHD trailing cable was not moved to a safe location to prevent damage by the continuous mining machine while it was being repositioned.
- Since the monitor wire and the ground wire were not damaged, the circuit breaker engaged when reset.
- Fourteen minutes had elapsed after the trailing cable was damaged when electrical power was restored.

# TRAILING CABLE

- Mine policy concerning damaging trailing cables was to:
  - Issue warning slips to persons causing cable damage.
  - A second offense could result in several days of leave without pay.
  - A third offense could result in discharge.
- This policy had not been enforced during the two years prior to the accident.
- The section foreman did not look at the trailing cable, but asked the CM operator about the damage twice and was told both times that it didn't look too bad.
- The section foreman did not inform the superintendent about the possible trailing cable damage.
- The section foreman did not inform the electrician to disconnect the trailing cable plug from the circuit breaker receptacle or instruct him to perform the necessary troubleshooting, testing, and repair work on the trailing cable to restore it to a safe condition.

# POWER OUTAGE

- Electrical power was supplied to the mine's re-closer switch, which was mounted on a utility pole located where power entered mine property.
- The short-circuit response time of the re-closer was improperly set. When the CM cable was damaged, the short circuit current caused the re-closer to trip. This disrupted power to the surface and underground working areas and also caused the fan to stop.
- The section foreman, upon recognizing the power outage and that the main mine ventilation fan was down, did not take proper action as required by 30 CFR 75.313(a).
  - Everyone should have been withdrawn from the working sections, to a point outby the loading point. Electrically powered equipment in the working section should have been de-energized and other mechanized equipment in the working section shut off.
  - However, work was performed with a scoop inby the section loading point, one crosscut outby the pillar line, after knowing that the main mine fan was down.
  - At no time did the section foreman direct these persons to travel outby the section loading point.

# EXAMINATIONS

- 30 CFR 75.313(b) required certified persons to examine for methane in the working places before work was resumed and before equipment was energized or re-started in these areas.
- However, the section foreman energized the electric equipment on the working section without first checking for a methane accumulation across the pillar line or other areas where methane may have accumulated.
- Hazards for which 30 CFR 75.313 was intended to provide protection (i.e., accumulations of methane) did not contribute to the accident. Therefore, enforcement actions for violations of this standard were issued during a separate inspection.
- However, due care toward compliance with this standard would have provided several coincidental opportunities to prevent the accident by:
  - removing persons from the section, and
  - increasing the likelihood that the section foreman could have recognized that electrical work was being performed.

# LOCK-OUT PROCEDURES

- The SC, CM, and scoop operators assumed that the electrician had already traveled to the section power center to disconnect, lock, and tag the disconnects.
- The electrician knew he was working on a limited time schedule due to the mine ventilation fan being down.
- He did not travel to the section power center to disconnect the trailing cable and lock and tag the plug.
- He may have thought he could make the repairs before the electrical power was restored or before having to travel outside.
- He may have also been working under the assumption that the damage to the cable had tripped the breaker at the section power center and was not expecting anyone else to close the breaker.

# ROOT CAUSE ANALYSIS

*Causal Factor:* The continuous mining machine's trailing cable was not placed in a safe location out of the way while the continuous mining machine was repositioned.

*Corrective Actions:* Mine management had a policy in place to take action against persons responsible for damaging trailing cables. Management should monitor how trailing cables are protected and handled during equipment moves to ensure that available resources and procedures are adequate to prevent damage to the cables.

# ROOT CAUSE ANALYSIS

*Causal Factor:* The section foreman was present when the continuous mining machine cable was damaged and observed the loss of power resulting from the damage. The section foreman failed to remove this piece of equipment from service due to the damaged cable.

*Corrective Actions:* Mine management should retrain foreman and other mining personnel about the hazards of a damaged trailing cable. All mining personnel should be instructed in the corrective actions that should be followed when possible damage to a power cable has occurred, including first removing the unsafe condition. Persons should be instructed to disconnect, lock and tag, allowing a qualified person to troubleshoot, test, and do repair work to restore the power cable or equipment to a safe condition.

# ROOT CAUSE ANALYSIS

*Causal Factor:* The qualified person performing electrical work did not disconnect the plug from the circuit breaker receptacle, and lock and tag the disconnect plug.

*Corrective Actions:* Mine management should reinstruct all personnel on proper procedures to be followed when repairing power cables or performing repair work on equipment. Persons should deenergize equipment or power cables, disconnect at the power source, lock, and tag.

# ROOT CAUSE ANALYSIS

*Causal Factor:* The person engaging the circuit breaker on power cables and equipment did not first see that all persons were in the clear before energizing the power cables to the equipment.

*Corrective Actions:* Management should develop and implement a policy that power cables and/or equipment are not to be energized before ensuring that all persons are in the clear of the cable and/or equipment being energized.

# CONCLUSION

- The continuous mining machine trailing cable was not adequately protected to prevent damage while moving the continuous mining machine.
- The accident occurred because management did not ensure that persons were protected against potential electrical hazardous after the left continuous mining machine damaged the trailing cable.
- The section foreman did not direct the section electrician to remove the trailing cable to the out-of-service mode (disconnect, lock and tag) until troubleshooting, testing and restoring the trailing cable to a safe condition was completed.
- The certified person performing electrical work did not disconnect the trailing cable plug from the circuit breaker receptacle, lock the disconnect device and tag.
- The accident occurred when the unlocked and untagged trailing cable was re-energized while repairs were being performed and without first ensuring that all persons were in the clear of the cable.

# ENFORCEMENT ACTIONS

## A 104(a) Citation was issued for violation of 30 CFR 75.606.

On February 5, 2004, the 2/0 SHD trailing cable that provides 995 volt power to the Joy 14CM15 left side continuous mining machine, serial no. 1408, was not protected to prevent damage by mobile equipment. When the continuous mining machine, which was parked about 20' outby survey station 3463, was trammed forward about 21", a bit lug on the ripper head mashed the trailing cable.

# ENFORCEMENT ACTIONS

## A 104(d)(1) Citation was issued for violation of 30 CFR 75.1725(a).

On February 5, 2004, the operator, after witnessing the creation of an unsafe condition on a piece of mobile equipment, failed to cause the equipment to be immediately removed from service. When the 995 volt Joy 14CM15 left side continuous mining machine, serial no. 1408, trammed onto its 2/0 SHD trailing cable, the section foreman was present and knew that the cable was damaged. He also witnessed the continuous mining machine losing power when this occurred. Afterward, the section foreman closed the circuit breaker, thereby energizing the trailing cable, without first: (A) causing the cable plug to be immediately disconnected from its receptacle and (B) instructing the section electrician to do the necessary troubleshooting, testing, and repair work on the cable to restore it to a safe condition.

# ENFORCEMENT ACTIONS

## A 104(a) Citation was issued for violation of 30 CFR 75.511.

On February 5, 2004, the section electrician and the continuous mining machine operator performed electrical work on a distribution circuit while the disconnecting device was not locked out nor suitably tagged. They were splicing and repairing a damaged area in the 2/0 SHD trailing cable which provided 995 volts to the Joy 14CM15 left continuous mining machine, serial no. 1408, while the cable plug was connected to the plug receptacle. While performing this work, the circuit breaker was closed, causing the section electrician to be electrocuted.

# BEST PRACTICES

- Personally lock-out and tag-out electrical circuits before you perform electrical work on a cable or component.
- Do not rely on someone else to **deenergize** or disconnect a circuit for you.
- Never assume that a circuit breaker will not be reset - even if there is no apparent reason for resetting the breaker.
- Never disturb or ignore an electrical tag or lock.
- Thoroughly communicate to determine that it is appropriate to reset a breaker.