It Happened...

On April 9, 1989, a belt examiner found a fire along the main belt entry caused by hot slag from cutting and welding operations conducted days prior.

On April 16, 1990, a fire occurred in the tailgate entry of a longwall when a methane gas feeder was ignited by a torch that was used for cutting of a roof bolt protruding from the roof.

On April 18, 1990, a fire occurred in an area where belt conveyor supports were being recovered. A cutting torch had been used to remove roof bolts supporting the belt conveyor structure. The fire was found on the shift after cutting was completed.

On June 27, 1990, a miner was cutting the hub off a scoop. The grease in the hub caught fire.

Typical cutting torch arrangement

Best Practices Fire Protection

Card No. BPFP-1

CUTTING AND WELDING

CUTTING and WELDING procedures should be established which minimize the risk of a mine fire. This operation should be conducted by persons trained to recognize the fire hazards associated with cutting and welding. Too often, miners have taken for granted that an area is safe following cutting and welding, only to have a fire develop at a later time.

- **ALWAYS** follow your mine's cutting and welding plan.
- **ALWAYS** wear appropriate personal protective clothing and equipment.
- **ALWAYS** check the work area for methane gas.
- **ALWAYS** examine the work area for potential hazards.
- **ALWAYS** provide good ventilation.
- **ALWAYS** use suitable curtains to shield surrounding areas from sparks and molten metal.
- **ALWAYS** remove combustibles from the work area if possible.
- **ALWAYS** wet down combustibles or cover them with suitable non-combustible material.
- **ALWAYS** ensure that the cutting torch is equipped with check valves and flame arrestors to prevent flames from flashing back into the acetylene gas cylinder.
- **ALWAYS** inspect area for fire and maintain a fire watch for at least 30 minutes after work has been completed.

- **NEVER** apply heat to an enclosed vessel or confined spaces such as tanks, mounted tires, or mechanical equipment with enclosed cavities.
- **NEVER** conduct cutting and welding when mine fire protection water is out of service.

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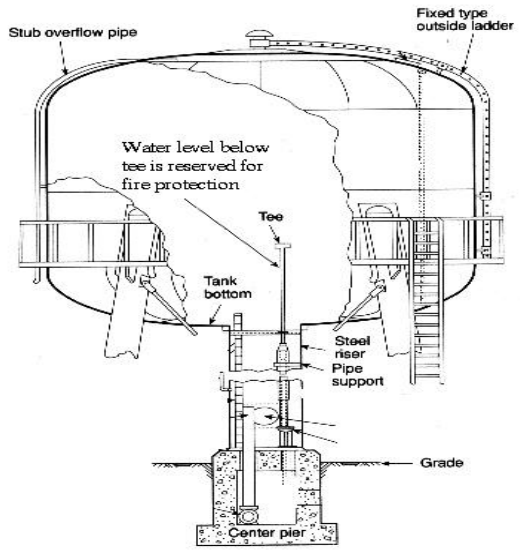
TIPS CONTINUED…

- Have the ability to supply adequate flow and pressure to any fixed water based fire suppression system.
- Repair temporary water connections ASAP.
- When static pressure exceeds 150 psi, pressure regulation should be provided.
- Water system pressures should be compatible with foam equipment used.

It Happened...

On January 18, 1984, undetected sparks from cutting operations ascended through a small opening in the planks of a false roof and a fire developed. A fire hose near the drive was used to fight the fire. The nozzle for the hose was missing, making fire fighting difficult and prolonging the time to extinguish the fire.

On April 7, 1987, coal and coal dust was ignited due to heat from the belt rubbing. Fire fighters encountered extremely high water pressures in the four inch line throughout the mine. This caused hoses and couplers to rupture while fighting the fire and delayed fire fighting efforts.



Water tank showing standpipe used for maintaining a volume of water reserved for firefighting.

Best Practices Fire Protection

Card No. BPFP-2

WATER SUPPLY

WATER SUPPLY CONSIDERATIONS are an absolute necessity in underground coal mining. Maintaining a supply of water reserved for fire fighting will have a critical impact on the ability to fight a mine fire. For example: a surface water storage tank may be equipped with standpipes at different levels to ensure a water reserve for fire fighting.

LOCATIONS

Working Sections Belt Conveyors Haulage Entry

- **ALWAYS** maintain the mine water system in working order.
- **ALWAYS** report water supply problems to mine management.
- **ALWAYS** store fire hose, nozzles, water cars, and related equipment in easily accessible locations.
- **ALWAYS** store extra hose coupling gaskets, spanner wrenches, and other tools with the fire hose.

- **NEVER** make changes to the fire protection water system without management's approval.
- **NEVER** close any valves affecting the supply of fire water without contacting your supervisor.
- **NEVER** use pipe wrenches or other non-fire protection tools on fire hose connections.

TIPS FOR WATER SYSTEM DESIGN

- Locate waterlines in accessible areas, such as the wide side of the belt entry.
- Only use valves, piping and equipment approved for the fire protection water system.
- Have the ability to supply 50 gpm to three hoses at a nozzle pressure of 50 psi.

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J. Davitt McAteer, Assistant Secretary

REMEMBER **P. A. S. S.**

Pull - **A**im - **S**queeze - **S**weep if you have to fight a fire with a fire extinguisher.

It Happened...

On October 6, 1989, two fifty ton locomotives and the loaded cars they were pulling derailed. This caused extensive damage to the equipment, trolley and railbed. A short circuit of the trolley wire caused a fire inside the locomotive rectifier. The fire was extinguished after an hour by using eight fire extinguishers

On April 11, 1990, a fire occurred in a transformer located in the track entry. The fire was discovered when the section belt stopped. Six fire extinguishers were utilized until water could be directed to the fire area.

On June 18,1990, a wedged shaped rock lodged between the belt and the take-up roller causing the belt to slip. This caused a fire at the head pulley and the second drive roller. Fire fighting activities lasted nearly an hour. Fire extinguishers were used while the fire hose was retrieved and installed.

Target Board for storing fire extinguishers and small equipment in a highly visible and accessible location.

Best Practices Fire Protection

Card No. BPFP-3

FIRE EXTINGUISHERS

FIRE EXTINGUISHERS are often the initial resource for fire fighting activities. These devices, when used in the early stages of a fire, can provide additional time until fire fighting resources arrive at the scene. Fire extinguishers need to be stored in a visible location and be readily accessible.

LOCATIONS

Working Sections
Track Locomotives
Self-propelled Mantrips
Personnel Carriers
Welding and Cutting
Diesel Equipment
Electrical Installations
Fuel Storage Locations
Oil Storage Locations
Wooden Doors with Powerlines

- **ALWAYS** maintain fire extinguishers in working order.
- **ALWAYS** keep fire extinguishers well marked and readily accessible.
- **ALWAYS** remove extinguishers found without inspection tags and have them checked.
- **ALWAYS** have extinguishers serviced by a trained person or qualified contractor.
- **ALWAYS** locate fire extinguishers upwind of potential fire areas.

- **NEVER** put a discharged fire extinguisher back until it has been serviced and recharged.
- **NEVER** allow unqualified personnel to recharge a fire extinguisher.
- **NEVER** keep a rusty fire extinguishers in service.

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TIPS FOR FIRE SUPRESSION DESIGN:

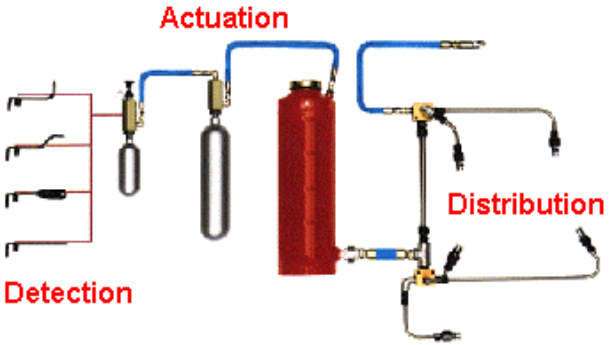
- Design water spray systems to deliver 0.75 gpm of water per square foot of belt with a residual pressure of at least 10 psig to the most remote nozzle. Wet pipe sprinklers should be designed to provide at least 10 psig residual pressure to the most remote four flowing heads.
- Use accepted design practices established by MSHA when designing fire suppression systems. This should include considerations for testing and maintenance.
- Locate spray nozzles or sprinkler heads for maximum effectiveness.
- Flexible hoses, such as hydraulic hoses, used to feed sprinklers or spray nozzles should be of an MSHA-approved flame resistant construction.

It Happened...

On January 10, 1990, a fire occurred on the face behind the headgate drum of the shearer as it was cutting drawrock. The shearer had been stopped previously to check the oil in the gearcase due to potential overheating. Flames were extinguished in 1-2 minutes with the fire suppression sprays and a wash down hose.

On June 18, 1990, belt slippage occurred when a rock lodged between the belt and the take-up roller. Friction at the head pulley caused a fire. The water spray system did not activate due to a malfunctioning solenoid. Two fire extinguishers and a fire hose were used to fight the fire.

On November 24, 1994, a fire occurred at a belt drive. Smoke was diverted to a return air course. A fire fighting crew used fire extinguishers and water to extinguish the blaze. The fire suppression system had been activated and controlled the fire.



Example of a basic fire suppression system

Best Practices Fire Protection

Card No. BPFP-4

FIRE SUPPRESSION

FIRE SUPPRESSION SYSTEMS vary in their design and application. All systems except automatic sprinklers should be provided with an emergency manual release that can be operated from a safe, smoke-free location during a fire.

LOCATIONS

Belt Drives	Diesel Fuel Storage Locations
Oil Storage Locations	Mobile Equipment
Battery Charging Stations	Working Sections

- **ALWAYS** report fire suppression system problems to mine management.
- **ALWAYS** keep fire suppression detectors in working order.
- **ALWAYS** check to ensure that your actuation system is operable.
- **ALWAYS** protect hose and valve fittings from damage.
- **ALWAYS** provide regulators for high pressure water applications.
- **ALWAYS** use automatic sprinklers whenever possible.
- **ALWAYS** keep manual actuators unobstructed.
- **ALWAYS** check for signs of physical damage or conditions that would prevent system operation.

- **NEVER** keep valves to your suppression system turned off, unless maintenance is being performed and the area is manned.
- **NEVER** allow nozzles and sprinkler heads to become obstructed.
- **NEVER** allow untrained employees to maintain your fire suppression system

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- **NEVER** rely only on your of smell to warn you of a fire.
- **NEVER** make field repairs to faulty sensors, replace them with approved new ones.

It Happened...

On December 12, 1994, an electrical fault in the transformer windings caused a fire in a 1500 KVA load center. A CO sensor three crosscuts outby the fire went into alarm and was subsequently investigated. The fire was contained within the load center and put out with fire extinguishers.

On May 5, 1995, a belt fire occurred due to friction against the belt structure. Brattice cloth and material under the belt caught fire. The fire was detected by a CO monitoring system and prompt response by mine personnel prevented the fire from burning out of control.

On January 3, 1998, following two ten hour production shifts, a belt fire occurred when the belt was stopped. An idler roller failed causing frictional heating from metal to metal contact. The fire was discovered after activation of the audible alarm on the surface by the CO monitoring system.

Example carbon monoxide sensor installation

Best Practices Fire Protection

Card No. BPFP-5

FIRE DETECTION

FIRE DETECTION SYSTEMS vary in their design and application. Different types of detectors look for different products generated by the fire. Some detectors look for heat, some look for specific gases such as carbon monoxide (CO), some look for smoke, and some look for light produced by a flame. With advances in technology, its is possible to have different combinations of detection

to monitor a wider spectrum of fire conditions.

LOCATIONS

Belt drives	Unattended electrical equipment
Bleeder entries	Beginning and end of belt flights
Idle areas	

- **ALWAYS** investigate fire alarms immediately. Treat an alarm as if a fire exists until proven otherwise.
- **ALWAYS** determine the causes of nuisance alarms and correct the problem.
- **ALWAYS** keep sensors clean and dry and maintain them in working order.
- **ALWAYS** report fire detection system problems to mine management.
- **ALWAYS** test the sensors in a fire area as soon as possible after the fire is extinguished.
- **ALWAYS** replace sensors that show signs of fire damage.
- **ALWAYS** connect sensors together using MSHA approved flame-resistant cable that also meets the specifications of the detection system manufacturer.
- **ALWAYS** monitor your detection systems from one central location.
- **ALWAYS** consider the use of infrared or thermal imaging systems for detecting hot spots.

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Best Practices Fire Protection

Card No. BPFP-6

VENTILATION

Following VENTILATION changes, it is important to measure the airflow and direction in all areas affected by the ventilation change. A good practice to apply after a major air change is to assign a certified person to examine all of the affected areas for low airflow. This is especially important in areas where power centers and charging stations are located.

- **ALWAYS** maintain a minimum air velocity in any set of entries that would prevent smoke roll back in the event of a fire.
- **ALWAYS** utilize individuals that are trained and certified to evaluate the effects of a major ventilation change.
- **ALWAYS** mark and identify piping used for ventilating accumulations of methane to the returns, particularly in high spots on the haulage.
- **ALWAYS** park your vehicle outby high spots during haulage preshift examinations, and check for accumulations of methane before proceeding.
- **ALWAYS** keep a positive air pressure on all stopping lines in entries designated smoke-free.
- **ALWAYS** understand the pressure relationships when cutting through or holing into previously mined areas and their effects on other areas of the mine.
- **ALWAYS** automate (where practical) ventilation devices used to control airflow where vehicles must travel to minimize damage to these controls.
- **ALWAYS** maintain airways free from obstructions which hinder effective ventilation.

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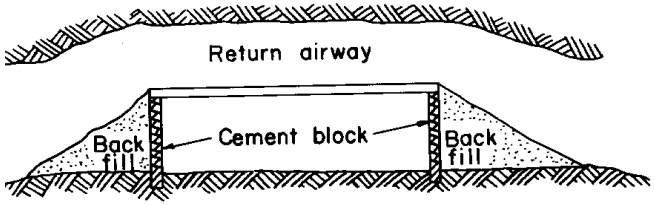
- **ALWAYS** minimize recirculation to prevent mine gasses from accumulating to dangerous levels.
- **ALWAYS** examine critical ventilation controls on a regular basis to ensure they are performing as intended.
- **ALWAYS** train mine rescue personnel to recognize the hazards associated with changing ventilation in a mine fire situation.
- **ALWAYS** remove power from completed panels and idle areas as soon as possible.

DESIGN CONSIDERATIONS

- **ALWAYS** consider maintaining a computer model of the mine's ventilation system to evaluate air changes, fan outages and potential fire situations.
- **ALWAYS** design and install ventilation controls to serve their intended function and minimize leakage.



Typical example of overcast design

- **ALWAYS** consider methane liberation from other areas of the mine in addition to the working face. Examples include: virgin ribs, gob areas, old works etc.
- **ALWAYS** consider air migration between mines in multiple seam applications.
- **ALWAYS** consider mounting a pressure measuring device at key regulators to quickly determine changes in the mine's ventilation system.
- **ALWAYS** consider electrical installation locations to minimize the use of pipe overcasts.
- **ALWAYS** train key mine personnel in the use and understanding of the equipment used in making ventilation measurements.

- **NEVER** use the fan explosion doors to gain access to the mine without creating an airlock for this purpose.
- **NEVER** assume that the proper adjustments have been made following a change in ventilation.
- **NEVER** restore power to an area where the ventilation has been changed without a thorough examination.
- **NEVER** make changes to the ventilation during a mine fire that could adversely affect miners inby.

It Happened...

On March 11, 1989, a smoldering fire was detected under a roof fall at a 4-way intersection. Ventilation curtains were installed to course the air from the fall area directly into the return air course. The fall was cleaned up and the hot spot was extinguished with water.

On July 5, 1989, a fire was discovered at an underground battery station. Sealing operations were begun. The air was short-circuited by removing the first permanent stopping between the intake and return entries inby the mine portals while the final seals were constructed.

On October 11, 1992, a fire was discovered in a conveyor entry near a portal. High air velocities through the conveyor enclosure and airlock area caused the fire to spread rapidly. The mine fans were shut down after the mine was evacuated.

Typical mine fan installation

It Happened…

On November 25, 1998, a fire rekindled following a roof fall in the gob. The longwall area and eventually the mine was sealed. All miners were successfully evacuated through the use of Personal Emergency Device (PED) System.

Example of a communication station for dispatcher

Example of a mine wide monitoring control room

Best Practices Fire Protection

Card No. BPFP-8

COMMUNICATIONS

COMMUNICATIONS during a mine emergency are a critical part of fire fighting and evacuation activities. A successful evacuation or fire fighting operation is dependent on the quality of the information that is communicated. The sooner miners are notified of a problem, the greater the chance of escape and/or fire fighting activities can begin. TIME IS NEVER YOUR FRIEND during a mine fire.

LOCATIONS

Working sections Strategic locations Belt drives

- **ALWAYS** provide accurate information to the surface regarding emergency situations.
- **ALWAYS** consider the use of personal communication devices that could provide key mine personnel early warning in the event of a fire or emergency situation.
- **ALWAYS** consider optional forms of remote communication such as; interlocking mine power or main belt operation with the main mine fans.

- **NEVER** disregard or take lightly reports of a mine fire.
- **NEVER** assume anything has been completed during an emergency, ASK FIRST!

- **REMEMBER:**

TIME IS NEVER YOUR FRIEND!

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It Happened...

On June 17, 1992, an equipment fire occurred involving an excavator loading machine. Several attempts were made to extinguish the fire with dry chemicals and water but were unsuccessful. Finally, low expansion foam was applied to extinguish the fire.

On October 21, 1994, a mine fire occurred on the tailgate of a longwall. A grease seal failed in the tailgate sprocket causing oil to leak out. Heat from the bearing ignited the oil on the floor. Foam was brought to the area and applied along with fire extinguishers and rock dust to extinguish the fire.

Example of a foam generator in use

Best Practices Fire Protection

Card No. BPFP -9

FOAM GENERATORS

FOAM GENERATORS can be an effective tool for fighting a fire. A foam generator can attack a fire from distances up to 1500 feet and reduce the exposure to the immediate fire area. High expansion foam can be pushed into the fire area or parallel entries to reduce oxygen levels in the fire area and to cool the fire.

- **ALWAYS** train miners to properly operate a foam generator.
- **ALWAYS** use smoke-free air to produce an effective foam.
- **ALWAYS** have an adequate supply of foam concentrate for fire fighting capabilities kept at the mine site.
- **ALWAYS** match the flow ratings when using separate foam nozzles and proportioners.
- **ALWAYS** ensure that the foam concentrate is compatible with your equipment and water supply.
- **ALWAYS** operate a foam generator within the suggested pressure range.
- **ALWAYS** conduct periodic testing and inspections of your foam generators to ensure proper operation.
- **ALWAYS** remember that foam concentrate has a shelf life and expiration dates should be checked periodically.

- **NEVER** use foam concentrate that is stored in open containers or was previously frozen for fire fighting.
- **NEVER** operate a foam generator without pressure gauges.

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TIPS FOR FIRE HOSE INSTALLATIONS

- Equip fire taps with gated wye valves so that two hoses can be brought into service on a fire simultaneously.
- A clamped or pinned type coupling provided in the water hose joint nearest to a continuous miner could allow rapid switchover for firefighting use.
- Provide regulators for high water pressure situations.
- Maintain a laminated list of equipment at each storage location to enhance routine inspections.

It Happened...

On July 24, 1989, a roof fall in the trolley haulage entry caused an energized trolley wire to come in contact with combustible material from the roof fall. The mine was evacuated. Water from fire hoses was eventually used to extinguish the fire.

On January 2, 1992, the metal cables in a slope belt were caught in a return roller causing it to stick and create heat. The belt caught fire and was extinguished with fire hoses.

On September 26, 1996, smoke was detected coming from a battery compartment of a personnel carrier parked in a charging station. A battery fault occurred causing a fire. It was extinguished using a fire hose.

Example of manifolds, fire hoses and nozzles commonly used.

Best Practices Fire Protection

Card No. BPFP-10

HOSES and NOZZLES

HOSES AND NOZZLES should be stored properly, in sufficient quantities, and at easily accessible locations. Additional water hose for equipment operation can also be stored at or near fire hose storage locations to provide additional resources for fire fighting.

LOCATIONS

Portable Water Cars (300 feet of hose)
Section Loading Point (Capable of reaching the face)
Strategic Locations Along Belt Conveyors (500 feet of hose)

- **ALWAYS** standardize hose and pipe connections.
- **ALWAYS** install manifolds with multiple hose connections so that more than one hose can be used to attack a mine fire.
- **ALWAYS** install manifolds in the upright position upwind of the belt drive so a suppression system and a fire hose can be operated simultaneously.
- **ALWAYS** store short coiled lengths of fire hose for easy handling and transportation.
- **ALWAYS** use fire hose nozzles rated for the mine's water pressure.
- **ALWAYS** check for missing gaskets when connecting fire hose.

- **NEVER** travel over fire hose with a mine vehicle.
- **NEVER** drag fire hose over sharp objects.
- **NEVER** allow hose to become pinched between equipment and the mine floor.

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It Happened...

On May 17, 1989, a mine examiner and assistant mine foreman were conducting a weekly examination of the return entries and bleeder evaluation points. They encountered smoke in a return at the bottom of a shaft. Upon further investigation, a fire was discovered in an idled area of the mine. The fire was fought directly with water. Mine rescue teams under apparatus manned the fire hoses. Subsequently, seals were constructed around the fire area and the area flooded.

On March 9, 1994, a fire occurred on a conveyor belt head drive. Persons working on the active section inby the fire location exited the mine through the main intake system. A company mine rescue team began fire fighting efforts and the fire was extinguished.

On May 14, 1994, a roof bolter noticed a fire at the back of his machine after returning to work after dinner. Applying rock dust and using a fire extinguisher failed to extinguish the flame. The mine rescue team was sent in to fight the flames. A water line was installed and the fire extinguished.

Mine rescue teams making preparations.

Best Practices
Fire Protection

Card No. BPFP-11

MINE RESCUE TEAMS

MINE RESCUE TEAMS need to be well organized and directed by mine management. All team members must know their area of responsibility and particular duties. Team members should have knowledge of the mine's ventilation system and location of fire fighting equipment.

- **ALWAYS** maintain adequate airflow at your back to prevent smoke and contaminants from rolling back at you.
- **ALWAYS** brief mine rescue teams on the specific tasks to be accomplished.
- **ALWAYS** de-brief mine rescue teams for vital information learned during a mine emergency.
- **ALWAYS** provide a reliable means of communication with mine rescue teams and outby personnel.
- **ALWAYS** prepare to provide the necessary resources and logistical support to your mine rescue teams.

- **NEVER** allow untrained personnel to respond as part of a mine rescue team.
- **NEVER** assume anything during a mine emergency.

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It Happened...

On July 25, 1989, a fire occurred near an underground battery charging station after a three day idle period. Mine examiners encountered thick smoke four hundred feet from the station. Fire fighting personnel indicated the fire was out of control and the area was sealed. The cause of the fire was undetermined.

On November 5, 1991, a fire believed to be the result of spontaneous combustion was discovered in a mine entry. The fire quickly spread inby and filled the area with heavy smoke and dangerous levels of carbon monoxide. Twelve fire brigade and mine rescue teams failed to extinguish the flames. Seals were built and the fire area isolated. Remote sampling of the area ensued.

Example of Fire Brigade Training

Best Practices
Fire Protection
Card No. BPFP-12

FIRE BRIGADES

FIRE BRIGADES are becoming more popular and their services are being incorporated into an overall mine emergency planning strategy. Once a fire is identified, fire brigades are often the first responders prepared to extinguish fire. Proper training and equipment are critical to the success of a fire brigade.

- **ALWAYS** provide fire brigades with the equipment necessary to fight a fire directly.
- **ALWAYS** provide a reliable means of communication with fire brigades and outby personnel
- **ALWAYS** train fire brigade personnel in the operation of all fire fighting equipment and systems that they will be expected to use.
- **ALWAYS** supplement training with in mine practice.
- **ALWAYS** keep underground haulage switches that are designated for fire car and fire equipment storage free from obstructions and operating properly.
- **ALWAYS** know the quantity and types of fire fighting equipment stored on a fire car.

- **NEVER** allow untrained personnel to respond as part of a fire brigade.
- **NEVER** allow fire brigades to make ventilation changes on their own.
- **NEVER** allow fire brigade members to participate in any activities unless they have passed a mine rescue physical or its equivalent.

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It Happened...

On March 9, 1992, a fire occurred on a coal feeder and caused extensive damage to the equipment. A contributing factor to the extensive damage were the excessive amounts of loose coal, coal dust and oil which were permitted to accumulate on and around the electrical and mechanical components of the coal feeder.

On March 22, 1992, an equipment fire occurred, caused by a frictional heating due to a mechanical failure in the power train. The fire spread across the entire piece of equipment and was enhanced by combustible materials around the work area such as coal dust, loose coal, hydraulic oil and resin cartridges.

On March 2, 1995, smoke was observed coming from a belt conveyor portal. The underground power was de-energized and the miner's exited via the intake aircourse. The fire originated when a metal bearing became hot enough to ignite accumulations of grease around the roller.

Example of a storage area for combustible materials.

Best Practices
Fire Protection

Card No. BPFP-13

COMBUSTIBLE MATERIALS

COMBUSTIBLE MATERIALS, including coal dust, loose coal, scrap paper, wood, plastic, spilled oil or diesel fuel, and oily rags are all examples of easily ignitable materials in a mine. Such materials can typically be ignited by small ignition sources and can rapidly grow into a dangerous and uncontrollable fire. Adequate control of these materials are necessary to reduce a mine's potential for fire. Good housekeeping and rock dusting are effective techniques in reducing these hazards.

- **ALWAYS** remove accumulations of loose coal and coal dust in belt entries, especially around moving equipment.
- **ALWAYS** remove combustible waste materials.
- **ALWAYS** store lubricating oil and grease used underground in fire resistant, closed containers.
- **ALWAYS** construct designated storage locations for oils and grease of fire resistant materials.
- **ALWAYS** apply sufficient rock dust in order to reach the desired concentration of inert material.

REMEMBER:

- Materials saturated with combustible liquids ignite easier.
- The ignition potential of combustible materials increases in the presence of explosive gases.

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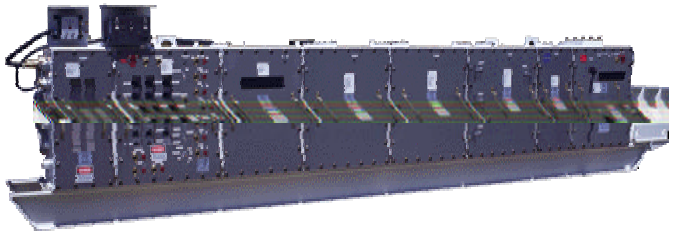
It Happened...

On July 23, 1989, a maintenance crew leaving the mine encountered smoke coming from a battery charging station. They donned their SCSR's and extinguished the fire using extinguishers, sand, and water. The battery charger was left in the on position allowing the charging cables to heat until they ignited.

On April 11, 1990, a fire occurred in a transformer located in the track entry. The fire was discovered when a section belt stopped. The fire was confined to the transformer and extinguished using water and fire extinguishers.

On March 21, 1991, a power center caught fire, resulting in a loss of power and smoke on the section. The miners were evacuated to intake air outby the power center. The power to the load center was disconnected and the flames extinguished.

On November 7, 1992, a fire occurred in an electrical installation. The possible mis-alignment of the switch blade caused an arc which caught the insulation on fire. The miner extinguishing the fire, donned his SCSR and evacuated the area.



Example of a longwall controller box

Best Practices Fire Protection

Card No. BPFP-14

ELECTRICAL EQUIPMENT

ELECTRICAL EQUIPMENT in underground mines is designed to safely supply and distribute significant quantities of electrical energy to various parts of the mine. Equipment safety depends on proper selection, installation and maintenance. Under adverse conditions, the energy supplied to the equipment can become uncontrolled, often appearing as extreme heat leading to a potential deadly fire.

- **ALWAYS** keep at least five bags of rock dust and a dry chemical fire extinguisher near underground electrical equipment such as compressors, pumps, transformers, power centers, and battery charging stations.
- **ALWAYS** vent harmful or explosive gases emitted by permanent underground electrical installations to the return entries.
- **ALWAYS** house permanent underground electrical installations in noncombustible structures or provide a fire suppression system.
- **ALWAYS** report electrical problems to your supervisor.
- **ALWAYS** keep electrical installations and the immediate area surrounding electrical equipment free of combustible materials and well rock dusted.

- **NEVER** attempt to repair electrical equipment unless you are certified to do so.
- **NEVER** take a lit flame safety lamp into a battery charging station.
- **NEVER** lay or store anything on top of electrical equipment including power centers and transformers.

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It Happened...

On June 18, 1990, a fire occurred along a belt entry. A wedge shaped rock lodged between the belt and take-up roller caused the belt to slip. The friction caused a fire at the head pulley and the second drive roller. The fire was extinguished using two extinguishers and water.

On March 18, 1998, smoke was detected near a unit belt drive. Mandoors were opened to divert the smoke. The belt slippage switch was not operating properly.

On November 1, 1991, smoke was detected in a conveyor belt entry. Elevated concentrations of carbon monoxide were not detected by the sensors 100 feet inby. Smoke and flames were observed near the drive pulley. The fire was extinguished with water.

Example of a typical belt conveyor

Best Practices
Fire Protection

Card No. BPFP-15

BELT CONVEYORS

BELT CONVEYORS require constant maintenance and monitoring. Belt slippage tests could be designed with a handle or small hydraulic jack that permits the examiner to physically raise the belt off of a roller in order to simulate belt slippage and test for conveyor sequencing.

- **ALWAYS** replace worn or damaged idlers on a conveyor line as soon as possible.
- **ALWAYS** investigate the smell of burning rubber coming from a conveyor line.
- **ALWAYS** remove accumulations of float dust from conveyor lines and make certain of adequate rock dusting.
- **ALWAYS** plainly mark locations of fire taps along conveyor lines.
- **ALWAYS** make certain that threads on fire taps along conveyor lines are covered and clean.
- **ALWAYS** make certain that fire hose provided along conveyor lines is properly stored in containers.

- **NEVER** take fire hose from conveyor lines to use for purposes other than fire fighting.

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Mine Safety and Health Administration

It Happened...

On November 5, 1991, a fire occurred in the main entries. Haze and light smoke was detected first followed by an alarm on the CO system. The mine was evacuated. Efforts to quell the fire failed and the underground area was sealed.

On February 7, 1994, a mechanic encountered smoke while conducting a weekly examination of electrical installations. Upon being notified of the fire, mine officials ordered a mine wide evacuation and directed men to escape via emergency escape facilities.

On August 23, 1995, the batteries on a scoop caught fire while being charged in the charging station. The batteries shorted together. The flames were extinguished with dry chemical, but re-ignited several times. The mine was evacuated.

Example check-in check-out board

Best Practices
Fire Protection
Card No. BPFP-16

EVACUATION PLANS provide the road map which miners should use during an emergency. Miner's should know their escapeways and be aware of their surroundings. Evacuation plans should be used when drills are conducted to reinforce the instructions outlined in the plan.

- **ALWAYS** know the location of primary and secondary escapeways leading from your assigned work area.
- **ALWAYS** know what duties your supervisor expects you to perform on your section in case of a fire.
- **ALWAYS** make certain to check-in and check-out every time you go underground.
- **ALWAYS** use available transportation when possible to escape from a mine fire before going on foot to escape.

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EVACUATION PLANS