



# Belt Drive Fire Suppression

in underground coal mines

Stakeholder Meetings in March 2008

## Fire Suppression Committee

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Richard McDorman, Mining Engineer

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On January 19, 2006, an underground coal mine fire occurred at approximately 5:14 p.m. at the 9 Headgate longwall belt take-up storage unit of the Aracoma Alma Mine #1 located near Stollings, Logan County, West Virginia.



Two miners perished. The fire was not fully extinguished until January 24, 2006.

Subsequently, MSHA issued several citations.

- 8 were issued because there was only a **single branch line** over the top of the top belt as opposed to two branch lines.
- 9 were issued because the **water would not spray on the required portion** of the belt.
- 10 were issued for **improper installation**.
- 2 were issued for **violations of NFPA 13**.
- 1 was issued because there was **no connection to the water source**.

An MSHA internal review made several belt fire suppression recommendations.

MSHA's fire suppression committee is reviewing the requirements for belt fire suppression systems in 30 CFR 75.1101, 75.1103 and 75.1107.

These sections include references to various National Fire Protection Association (NFPA) standards which are also required to be complied with. These NFPA standards are 13 (1969), 13A (1971), 15 (1969), 17 (1969), and 11A (1970).

The committee is in the process of identifying the specific NFPA provisions requiring compliance.

At present, after reviewing over 180 pages of 30 CFR standards and NFPA provisions, the committee has identified over 130 requirements.

Of these, over 85 (approximately 65%) were found in NFPA standards. These requirements deal with the important issues of system design, installation, testing and maintenance.

The Aracoma Internal review concluded that MSHA inspections of the belt entries at Aracoma Alma Mine No. 1 failed to identify the inadequate fire suppression systems in the belt entries and that MSHA inspection personnel did not effectively enforce the requirements of water sprinkler systems at the mine.

The MSHA program policy manual (PPM) provides guidance for only 5 or 11% of the 30 CFR standards found in sections 75.1101, 75.1101-3, 75.1101-5, 75.1101-8, and 75.1101-13.

MSHA is developing updated guidance for compliance.

MSHA would allow sufficient time for compliance.

Currently there are approximately 575 active producing underground coal mines. There are 39 mines in the nation with dry powder chemical systems, mostly installed on the number one belt drive at the portal because of freezing temperatures in the winter. No coal mine has a foam generator system.

# Compliance Issues

regarding

**Design, Installation, Testing, and Maintenance**

**include the following:**

# SPRINKLER SYSTEMS

- Piping from water line to sprinklers (type, size, etc.)
- Water delivery rate
- Water line flow and pressure capability
- Pressure pump on surface
- Areas, surfaces, and equipment to be protected
- Methods of protecting areas, surfaces, and equipment
- Vertical and horizontal positioning of sprinklers
- Spacing of sprinklers
- Acceptance tests
- Annual functional tests
- Weekly examinations
- Record keeping
- Training

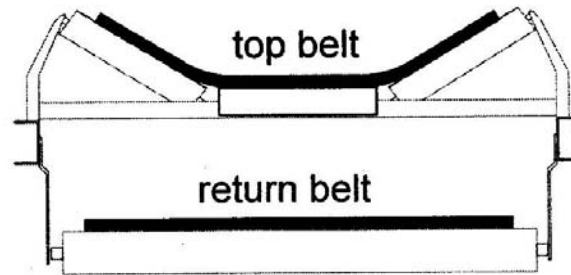


# DELUGE-TYPE WATER SPRAY SYSTEMS

- Piping from water line to water sprays (type, size, etc.)
- Water delivery rate
- Water line flow and pressure capability
- Pressure pump on surface
- Areas, surfaces, and equipment to be protected
- Methods of protecting areas, surfaces, and equipment
- Vertical and horizontal positioning of water spray nozzles
- Vertical and horizontal positioning of heat sensors
- Spacing of water spray nozzles
- Spacing of heat sensors
- Acceptance tests
- Annual functional tests
- Weekly examinations
- Record keeping
- Training

# DRY POWDER CHEMICAL SYSTEMS

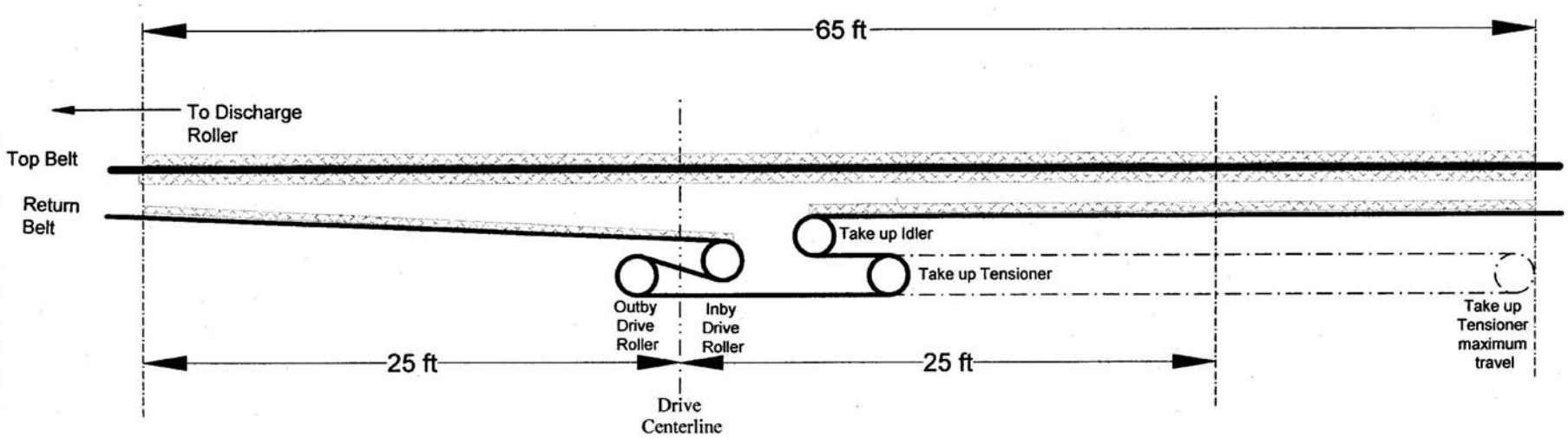
- Areas, surfaces, and equipment to be protected
- Methods of protecting areas, surfaces, and equipment
- Determining area of surfaces to be protected
- Vertical and horizontal positioning of nozzles
- Vertical and horizontal positioning of heat sensors
- Equipment that can be protected with a pre-engineered dry chemical system
- Equipment that must be protected with an engineered dry chemical system
- Spacing of heat sensors
- Acceptance tests
- Annual functional tests
- Weekly examinations
- Record keeping
- Training



Cross section view of standard belt surfaces

Not To Scale



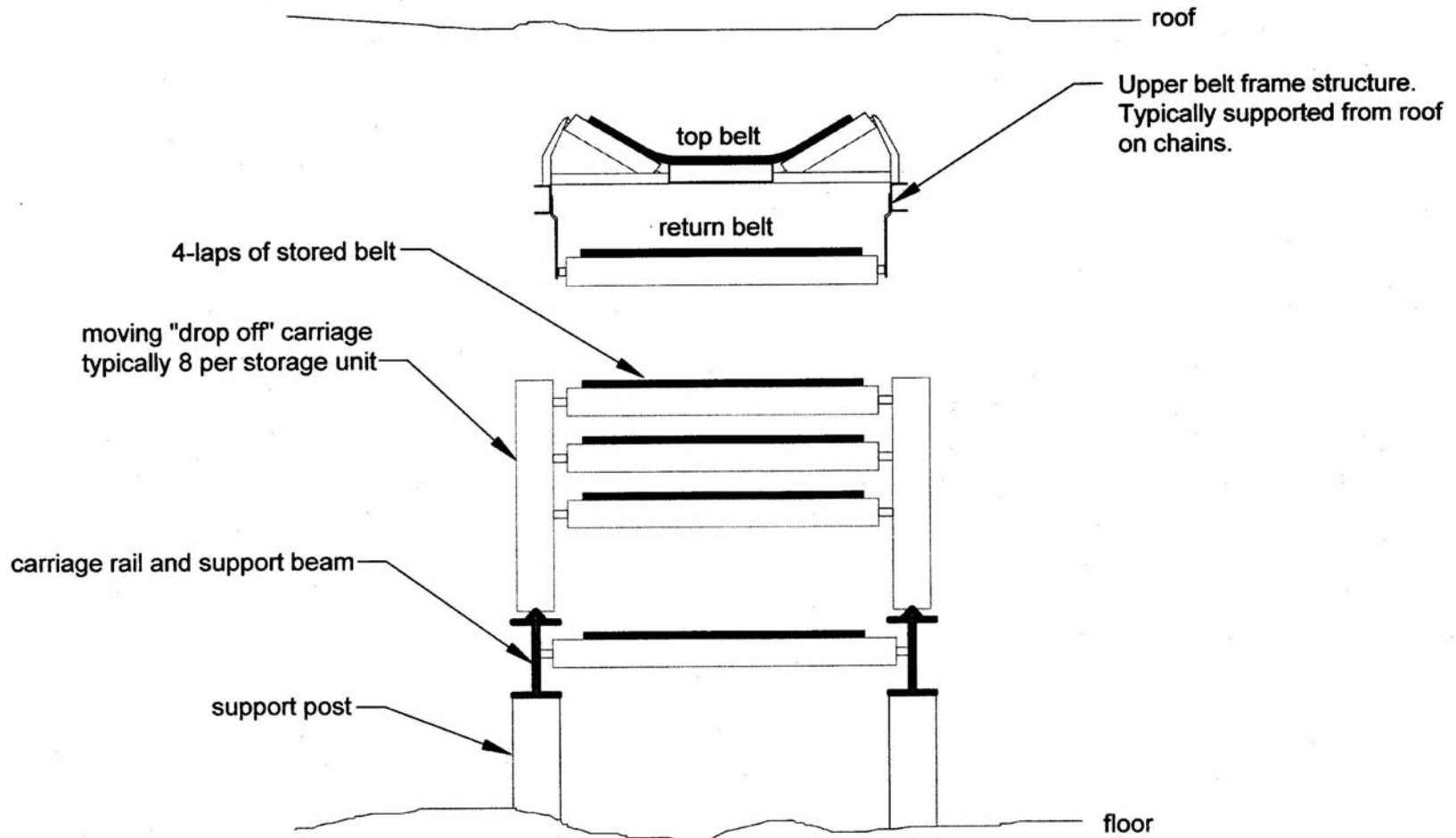


**Extended 50+ feet of protected belt length**

Discharge roller beyond 25 feet of centerline  
 Take up tensioning roller beyond 25 feet of centerline  
 65 foot protection shown is an example, actual value will be on a case by case basis

Cross hatch indicates belt surfaces and areas to be protected by fire suppression system

Not To Scale



Cross section view of a typical multi-lap storage take up unit

Not To Scale

## EXAMPLES

(1) Preliminary sprinkler water flow and pressure estimates for standard belt drives and take-ups are approximately 250 gallons per minute at 50 psi.

On level grade:

- For 5,000 ft of pipe, 4" pipe (or the hydraulic equivalent) would most likely be needed;
- For 11,800 ft of pipe, 6" pipe (or the hydraulic equivalent) would most likely be needed;
- For 26,400 ft, 6" pipe (or the hydraulic equivalent) would most likely be needed.

(2) Preliminary sprinkler water flow and pressure estimates for multi-level belt storage type take-ups are approximately 325 gallons per minute at 50 psi.

# Comments and Questions