



Technical Study Panel on the Utilization of Belt Air and the Composition and Fire Retardant Properties of Belt Materials in Underground Coal Mining

FINAL RECOMMENDATIONS

1. CONVEYOR BELT FLAMMABILITY TESTING AND APPROVAL

The Technical Study Panel strongly recommends that MSHA move post-haste to revise (as suggested elsewhere in this report) and re-propose and implement the Proposed Rule- Requirements for Approval of Flame-Resistant Conveyor Belts (*Federal Register, Dec. 24, 1992, Vol. 57, No. 248*) that was withdrawn in 2002 (*Federal Register, July 15, 2002, Vol. 67, No. 135*). The objective is to significantly reduce the frequency and hazard of conveyor belt fires in mines that elect to course belt air to the working face. The Panel believes that current requirements for testing and approval of flame-resistant conveyor belt have proven to be outdated and inadequate to provide an acceptable level of flame resistance and, therefore, safety for U.S. miners, based on both the historical record of conveyor belt fires in the U.S. and in comparison to general standards of the global mining community.

2. OTHER BELT TESTS

The Technical Study Panel recommends that MSHA adopt a drum friction test to be utilized for a period of two years to evaluate and assess the contribution to conveyor belt fire safety of such a test. Continuance of this test would be based on the MSHA evaluation at the end of this time period.

3. IMPROVED FIRE RESISTANCE STANDARDS FOR ALL UNDERGROUND COAL MINES

This Panel feels strongly that the conveyor belt flame resistance testing and standards recommendation in this report for mines that course belt air to the working section shall also be extended by MSHA to all underground U.S. coal mines.

4. COORDINATING BELT TESTING WITH OTHER COUNTRIES

The Panel recommends that those in MSHA who perform or are involved in belt fire resistance testing and approval establish contacts and maintain dialogue with their counterparts in other key mining countries.

5. BELT ENTRY AND CONVEYOR BELT MAINTENANCE

The Technical Study Panel strongly recommends that the Federal Mine Safety and Health Administration (MSHA) rigorously enforce existing standards on underground conveyor belt maintenance and fire protection. The Panel anticipates that rigorous enforcement by MSHA will result in more consistent compliance by all operators to these standards. This applies especially with regard to the availability and functionality of belt fire suppression systems; the availability and proper working order of firefighting equipment; the function of smoke, carbon monoxide and other sensors and alarm systems designed to detect fires in belt entries; and the training of mine personnel for fighting mine fires, such as conveyor belts. This also applies to the other conveyor belt fire prevention and maintenance items noted in the discussion section.

MSHA should pay particular attention to required examinations of the belt lines by mine examiners and ensure (1) each belt line is kept in good working order at all times to prevent belts from rubbing stands, (2) damaged rollers are replaced immediately, (3) belt lines are adequately rock dusted, and (4) flammable materials such as fine coal, coal dust, oil, grease and trash are not permitted to accumulate along belt lines.

6. SPECIAL REQUIREMENTS FOR THE USE OF BELT AIR

The Panel recommends that the mines using belt air on a working section must be held to a higher standard that involves use of (1) an atmospheric monitoring system (AMS) and suitable monitoring instruments, (2) belt materials that meet the BELT and other test standards recommended by this Panel, and (3) more vigorous inspection procedures by MSHA inspectors. In addition, we recommend that the BELT and other test standards recommended by this Panel be applied to all belt conveyors used in underground coal mines.

7. BELT AIR APPROVAL RECOMMENDATION

The Panel recommends that MSHA evaluate the safety of the use of belt air coursed to the working section as part of the approval of the mine ventilation plan. The District Manager must take special care to evaluate whether the belt air can be routed to the working section in a manner that is safe for all miners involved.

8. DISCONTINUING POINT-TYPE HEAT SENSORS

Except as stated below, the Panel recommends that MSHA initiate rulemaking that would discontinue the use of point-type heat sensors currently required under 30 C.F.R. § 75.1103-4(a)(1) for early warning and detection of conveyor belt fires in U.S. underground coal mines. The Panel does not recommend discontinuing the use of point-type heat sensors for activation of belt fire suppression systems.

9. SMOKE SENSORS

The Panel recommends that MSHA consider rulemaking that would require the use of smoke sensors, in addition to CO sensors, in mines that use belt air on the working section, to provide for earlier warning and possibly more reliable detection of conveyor belt fires in these mines. MSHA should also consider rulemaking to revise 30 C.F.R. §§ 75.1100-1103, Fire Protection, which was promulgated in 1972, in order to take advantage of advances that have occurred in fire detection and fire prevention technology.

10. USE OF DIESEL DISCRIMINATING SENSORS

The Panel recommends that MSHA perform regular, periodic reviews of the AMS records required by 30 C.F.R. § 75.351(o) at mines using belt air to ventilate working sections. During these reviews at mines that also use diesel equipment, MSHA should evaluate the number of occurrences of false alarms due to diesel exhaust CO. In those instances where such false alarms are excessive, MSHA should require the use of a system of diesel discriminating sensors.

11. REVIEW OF AMS RECORDS

The Panel recommends that MSHA perform regular, periodic reviews of the AMS records required by 30 C.F.R. § 75.351(o) at mines using belt air to ventilate working sections. During these reviews, MSHA should evaluate the number of false alarms due to sensor or system malfunction or due to other gases such as hydrogen that may affect the function of carbon monoxide sensors. In those instances where such false alarms are excessive, MSHA shall require appropriate steps to improve system maintenance and durability and, as needed, installation of sensors that are not subject to influence from other gases.

12. AMS OPERATOR TRAINING CERTIFICATION

The Panel recommends that MSHA commence rulemaking that would require the qualification and certification of AMS operators as defined by 30 C.F.R. § 75.301. The highest priority of the AMS operator is operating the AMS.

13. MINIMUM AND MAXIMUM AIR VELOCITIES

Minimum Air Velocity: In mines using AMS as a condition for using the belt entry to ventilate working sections, the minimum air velocity in the belt entry should be 100 feet per minute (fpm).

Maximum Air Velocity: In mines using AMS as a condition for using the belt entry to ventilate working places, the maximum air velocity should be 1,000 feet per minute (fpm).

The District Manager may approve exceptions to the minimum and maximum air velocity recommendations in the mine ventilation plan.

14. ESCAPEWAYS AND LEAKAGE

Primary escapeways should be designed, constructed, and maintained in accordance with the provisions of 30 C.F.R. § 75.333 (b)-(d) to minimize the air leakage.

Primary escapeways should be ventilated with intake air preferably and, to the extent possible, the primary escapeway should have a higher pressure than the belt entry.

15. LIFELINES

The Technical Study Panel endorses the lifeline regulations outlined by MSHA (*Federal Register*, 2006) but is recommending two additional methods of strengthening the rules. First, the Panel recommends that all coal mine lifelines be standardized across the country with regard to the tactile signals attached to the lifeline. Second, the Panel recommends that three standardized tactile signals be designed to indicate (1) impediment to travel ahead (door, regulator, overcast, pool of water, etc.), (2) SCSR cache in the adjacent crosscut, and (3) to doors located in the crosscut.

16. POINT-FEEDING

The Technical Study Panel recommends that when point-feeding from adjacent entries into the belt entry is performed to supplement air flow through the belt entry, as provided by 30 C.F.R. § 75.350(d), those mines have an additional requirement to more quickly provide two separate escapeways in an emergency situation.

Specifically, the Panel recommends that two CO sensors be placed in the primary escapeway outby every point-feed regulator with 1,000 feet of space between the two (if possible). We propose that if both of these monitors reach the CO alert level of the mine, or if one sensor reaches the alarm level, a warning signal be given at the regulator location. The AMS operator shall then have the ability and authority to remotely close or open the point-feed regulator after consulting with the responsible person. The section foreman in the affected section must also be notified so that checking on the cause of the problem and evacuation can be initiated in a quick and orderly manner.

17. RESPIRABLE DUST

Respirable dust concentrations in the air coursed through a belt conveyor entry and used to ventilate working sections should be as low as feasible and must not exceed the current regulated concentration of 1.0 mg/m^3 . District managers shall have the authority to force improvements in dust control in the belt entry if the dust concentration exceeds an 8-hour TWA of 1.0 mg/m^3 or is shown to be raising the concentration in the working section above the exposure limit. If the improvements are not effective, the District Manager shall have the authority to revoke the authorization to use belt air in the working section.

18. MINE METHANE

The methane released from broken coal on the conveyor belt and from the belt entry presents a problem in some mines that can affect the ability to keep the methane below 1.0% at the working place. It is therefore recommended that the MSHA District Manager shall require adjustments to the ventilation system if the belt air is being utilized on the working section and is causing difficulty in keeping the methane below 1.0% in the working place. In addition, it is recommended that the District Manager regularly scrutinize any working section where the belt air used on the working section has methane readings at or above 0.5% methane (measured 200 feet outby the tailpiece of the belt) to prevent the methane liberated on a conveyor belt or from the belt entry from increasing the methane content at the working place above 1.0%.

19. INSPECTIONS

The Technical Study Panel considers the inspection of mines utilizing belt air in the working section as a priority that must be addressed. Accordingly, the Panel recommends that a more structured procedure be instituted to help mine inspectors complete their inspection duties with greater ease and efficiency and reduce chances of overlooking safety hazards. This recommendation is aimed at the mines using belt air in the working section, but can be applied to any underground coal mine.

20. RESEARCH

The Technical Study Panel recommends that research utilizing ventilation modeling, engineering design and risk analysis be performed to investigate the following areas:

- (1) development of guidelines for improved escapeway design in various ventilation situations,
- (2) ways to reduce air leakage through ventilation controls, and
- (3) use of booster fans in underground coal mining operations.