NIOSH Comments to DOL

COMMENTS OF THE
NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH
ON
THE MINE SAFETY AND HEALTH ADMINISTRATION'S
REPORT, "BELT ENTRY VENTILATION REVIEW:
REPORT OF FINDINGS AND RECOMMENDATIONS"

30 CFR Part 75

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service
Centers for Disease Control
National Institute for Occupational Safety and Health

11/22/89

The National Institute for Occupational Safety and Health (NIOSH) has reviewed the Mine Safety and Health Administration (MSHA) report, "Belt Entry Ventilation Review: Report of Findings and Recommendations," and finds that the data in the report support the NIOSH position expressed in the MSHA hearings on mine ventilation [NIOSH 1988b]. The use of belt entry air to ventilate the working faces is not a safe practice, and allowance of the use of belt entry air to ventilate the working areas of a mine is a diminution of the protection of the miners' safety and health as provided by the Mine Safety and Health Act of 1977.

FLOAT COAL MINE DUST

The studies cited must be interpreted in the context of using belt air to ventilate the working face. This would require that high velocity intake air be coursed through the belt entry. The report itself notes that:

> "Studies have established that air at a velocity of 800 fpm or greater will carry dust which is being generated and put into suspension by the coal transportation process" (page 22 of the report).
>
> "The area of disbursal or distance the airborne dust will travel is directly influenced by the air velocity. Therefore, the greater the air velocity the greater the distance over which float coal dust will be deposited" (page 22 of the report).
>
> "The idea that coal dust explosions 'always go against the air' arises from the fact that in cold weather the intake air tends to dry the dust, whereas the return air is usually saturated and the dust is damp and less disbursable" (page 22 of the report).

The inference of these studies is that the introduction of high velocity intake air into the belt entries will increase the disbursement of float coal mine dust and increase the fire and explosion hazards associated with float coal mine dust.

The studies cited in the belt entry ventilation review are also supported by European reports on dust dispersion [Fumarola et al. 1977].

RESPIRABLE DUST

In analyzing the respirable data contained in this MSHA report, it is important to consider that there are only 53 mines in the United States using belt air to ventilate longwall working faces, with a total of 213 mechanical mining units (MMUs). The distribution by district is as follows (page D-10):

District	No. of Mines	No. of MMUs
1	1	1
2	14	64
4	11	35
5	13	44
6	2	3
7	8	61
9	4	5
Total	53	213

NIOSH notes that each MMU is required to be sampled at least 5 times every 2 months. We question why District 2, with 64 MMUs, has only 84 samples reported for longwall operations on Table 2 (page D-13). For the seven-month period included in the Table, we would anticipate a total of at least 1920 samples, and this seems a disproportionately low number for longwalls. We also consider inappropriate the use of data from District 9 with only 4 mines and 5 MMUs for the purpose of determining the statistical significance of dust level differences (page D-7).

NIOSH previously reviewed coal mine operator data collected by MSHA for longwall coal mining operations [NIOSH 1988a]. Because the sampling patterns are dictated in Part 70 of Title 30 of the Code of Federal Regulations (30 CFR 70) and provide for additional samples when coal dust samples exceed 2 mg/m^3 British Mine Research Equivalent (MRE), the samples are neither random nor without bias and the application of statistical significance tests to these data are not appropriate. NIOSH concluded on reviewing coal mine dust exposures for all longwall miners from 1981 through 1987, that the average coal mine dust concentrations continue to equal or exceed the 2 mg/m^3 MRE standard. The occupation with the highest exposure was the "tailgate operator" with over 48% of the samples exceeding the standard [NIOSH 1988a].

The significant data in the MSHA report are that longwall mines using belt air to ventilate the working face exceed the 2 mg/m^3 MRE dust standard on 35% of the samples included in the report. Longwall mines without belt air exceed 2 mg/m^3 MRE on 23% of the samples reported. (NIOSH is assuming the results reported are in MRE equivalents, although it is not indicated.)

NIOSH commented in the original response to this docket that the residual risk of developing pulmonary massive fibrosis (PMF) at the 2 mg/m^3 MRE dust standard is 7 per 1000 [NIOSH 1988b, citing Hurley 1987]. The same report cited also indicates that the residual risk of developing PMF at a 1.0 mg/m^3 MRE exposure is 2.8 in 1000. Neither the 2 mg/m^3 MRE for the face nor the 1.0 mg/m^3 MRE for the intake air coal mine dust levels should be treated as "safe" levels requiring no further efforts for reduction.

The data cited in the MSHA report indicate that belt air is dustier than primary intake air. The higher the velocity of the belt air, the more coal mine dust is entrained in the belt air. Respirable dust entrainment was observed at 700 fpm in the Lucerne No. 6 Mine tests cited in the report (page D-5). The report's comparison of high velocity belt air to low velocity belt air in discussing dilution is not entirely appropriate as it assumes the use of belt air to ventilate the face. The report concludes from the samples considered that "intake air that is coursed through belt haulageways is twice as dusty as the primary intake air (0.2 mg/m^3 vs. 0.5 mg/m^3) according to MSHA inspector dust samples" (page D-7).

The rate of production for longwall mining machines is an important factor in the amount of dust and methane generated. Longwall production rates have increased from an average of 650 tons per shift in 1977, to 2000 tons per shift in 1989 [TS Ary, Keynote Address, Twentieth Annual Institute on Coal Mining Safety Health Research, Blacksburg, VA]. In order to offset the additional dust and methane generated by this threefold increase in production, dust control and ventilation improvements are required. Belt air usage represents the least expensive method of increasing ventilation to the face--not the best for worker health and safety.

NIOSH is also concerned with the report's failure to discriminate between longwall plows and longwall shears in reporting the dust concentration at the face. NIOSH analysis of longwall dust data from 1982 through 1987 indicates that longwall shears have mean dust concentrations approaching twice as high as longwall plows [NIOSH 1988a]. This could be a significant confounding factor in the data as reported.

Longwall mines have a poor record for complying with the coal mine dust standard. The 1987 mean coal mine dust concentration for tailgate operator samples for longwall shears was 4.1 mg/m^3 MRE [NIOSH 1988a]. The data contained in the MSHA report indicate that longwall operations using belt air exceeded the standard on 35% of the samples. This frequency of violations is not acceptable, even allowing for the variability in the data.

Additional selection biases should be considered in evaluating the reported samples on longwall mines using belt air. For example, in order to be allowed to use belt air to ventilate the working face under the present standard the mine operator must have obtained a section by section variance from MSHA. Is it probable that only those mines where the belt conveyor entries have better than average dust control, maintenance, and fire protection would be granted a variance?

FIRE DETECTION SYSTEMS

The MSHA report addresses the theoretical efficiency of various fire detection apparatuses. The effective measure of the safety of any fire detection system is how well it actually performs in the mining environment. The testimonies presented at the hearings conducted by MSHA on mine ventilation are filled with criticism of performance of carbon monoxide (CO) monitoring systems in the mining environment. A careful review of the data in this MSHA report confirms the poor performance of CO monitors in belt entry fires.

In Appendix C, MSHA reports on 13 small mine fires occurring during the period October 1988 to May 1989. Five of these incidents were detected by miners either before or simultaneously with the monitoring system (page C-1). This must be considered in light of the fact that there only 53 mines operating with belt entry air, and that an unreported number of these mines use heat sensors instead of CO monitors.

The data reported in appendix A for reportable mine fires confirm this poor performance of CO monitors. For 4 fires reported in mines where belt air is used at the face with CO monitoring systems, two of the fires were detected by sight, one fire was detected by sight and sensor, and only one fire was detected by the sensor alone. Of these four fires, one burned for 288 hours and one resulted in the mine being sealed.

These data clearly indicate that even with CO monitors and the air velocity specifications presently in effect, belt entries are fire hazards. The annualized risk of a small belt fire occurring based on the appendix C data is at least .5 fires per year for mines with CO monitoring. The annualized risk of a major belt fire occurring in mines using belt air based on the 1987 and 1988 data is .04 fires per year. These are not acceptable risk levels for intake airways.

CONCLUSION

The data contained in this report confirm that using belt air to ventilate the working face is unsafe and unhealthy for miners. The MSHA report emphasizes the availability of techniques and technology to reduce the dust levels and fire risks in belt entries. The MSHA report fails to recognize that it is not necessary to introduce these risks into the mining environment. Alternative means of providing additional ventilation to the longwall working face do exist and are used by many of the Nation's mine operators.

The respirable dust data included in this report are incomplete and subject to certain sampling biases. However, taken in conjunction with other NIOSH data, they indicate that serious dust control problems exist at some longwall mining operations and that these unhealthy conditions are more likely to exist in mines using belt air to ventilate the working face than in mines that do not.

Fumarola G, Testino S, et al. [1977]. Wind erosion of storage piles and dust dispersion in scale model wind tunnel experiments. Tokyo, Japan: Proceedings of the 4th International Clean Air Congress, May 16-20, 1977.

NIOSH [1988a]. Trends in coal mine dust exposures for longwall miners: 1981-1987. Morgantown, WV: U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control, National Institute for Occupational Safety and Health.

NIOSH [1988b]. Comments of the National Institute for Occupational Safety and Health on the Mine Safety and Health Administration proposed rule on safety standards for underground coal mine ventilation: 30 CFR Part 75, April 28, 1988. NIOSH policy statements. Cincinnati, OH: U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control, National Institute for Occupational Safety and Health.