SAFETY IN MINES RESEARCH BOARD

THE seventeenth annual report of the Safety in Mines Research Board for 1938 has recently been published*. In referring to safety instruction, it is pointed out that teachers, managements and trade union officials are convinced of the value of safety instruction. Safety principles classes for boys are established in every coalfield and similar classes are being formed for adults. Many applications for permission to attend demonstrations at the Research Station, Buxton, have had to be refused on account of lack of accommodation, but during the year there were twenty-two demonstrations which were attended by 5,983 visitors, of whom 3,864 were adults and 2,119 were boys. After demonstrations of coal dust explosions, methods of firing shots and the testing of electrical appliances, discussions were held, usually initiated by some member of the research staff. Many lectures have been given in the coalfields by members of the staff to an estimated total of 16,000 persons.

Cinema Films, Lantern Slides and Exhibits. The Board has prepared cinema films, lantern slides and exhibits, which have been used by teachers and safety officers in connexion with their work. One hundred and twelve loans of cinema films, representing three or four hundred exhibitions in addition to two hundred exhibits, have been made, which indicates the popularity of this branch of the Board's work.

Dispersability of Stone Dusts. An underground gallery at the Station has been used for comparing the dispersabilities of dust deposits during explosions. Various stone dusts have been used separately in thin layers, and as mixtures alone and with coal dust. Work on this problem is being continued, but it can be stated that improvements in the dispersability of dusts is obtained by the addition of light precipitated carbonates. Carbon black causes remarkable improvement. The minimum speed of an air current required to disperse weathered gypsum is 3,400 ft. per minute, whereas with the addition of only 1 per cent of carbon black this speed is reduced to 2,100 ft. per minute. The nature of the action is being studied, but obviously a disadvantage in the use of the mixture is the darkening of the dust, which affects the illumination of roadway.

'Water-proofing' of Colliery Stone Dusts. If ordinary stone dust comes in contact with moisture either in the atmosphere or on the surfaces of roadway in mines, it will not retain its dispersability. Both in Great Britain and in the United States, dusts have been produced which are not readily wetted by water. The dust is ground limestone, with which is incorporated $\frac{1}{2}$ per cent of palmitic or stearic acid. These dusts are highly dispersible and resist damp atmospheres extremely well. Incidentally, the fatty acid protector is readily incorporated during the grinding of the dust, and there appears to be no reason why the process should not be applicable to other dusts.

Gob-fire Experiments. For many years work has been proceeding on gob fires. In the experimental chamber, heatings have taken place when warmed air has been passed through packs consisting of coal and dirt. This state has been reached when the ingoing air

has been at temperatures as low as 150° F. The heatings have been within a foot or two of where the air entered the pack.

In one experiment the chamber was filled with coal from the roof coal above the Barnsley Bed less than 3 in. in size, of which one third was ground to pass through a $\frac{1}{4}$ -in. sieve. After ten weeks a heating occurred. The temperature of the air was raised in stages from 160° F. to 212° F. and the rate of flow varied between 0.5 and 10 cubic feet per minute. A heating developed when the rate of flow was 5 cu. ft. per minute.

A similar experiment was carried out but without fine coal, and a heating developed in four weeks. When the temperature of the air was raised from 185° F. to 200° F., the carbon monoxide content of the return increased in six days from 0.002 per cent to more than 0.024 per cent.

Noise. Another interesting investigation is that concerned with the reduction of noise. It has been found that the proper maintenance of mechanical details and attention to the air exhaust is necessary to obtain substantial noise abatement. A silencer has been designed for use with pneumatic picks which adds $1\frac{1}{2}$ lb. to the weight of the pick, equivalent to an increase in weight of 7 per cent. Good results have also been obtained by piping the exhaust air from the road rippers on the surface, and whilst this idea cannot be applied to portable machines underground, it might with advantage be used in connexion with stationary engines. The metallic ring can be reduced appreciably by drilling a $\frac{1}{4}$ -in. diameter hole at a distance of about 12 inches from the shank of the pick steel and filling it with molten lead plugged with a steel cap.

Experiments are being carried out on sound absorption in connexion with the silencing of electric motors.

Health Researches. Experiments are in progress at the Physiological Laboratory, St. Bartholomew's Hospital, on dust inhalation and related problems. Cages of guinea pigs have been placed at selected positions at collieries working anthracite, and a large number of lungs have been examined. It has been noticed that the lungs of animals from the screens contain more dust than those of animals kept underground. Much work has been done on dust suppression, and with the aid of wetting agents it has been possible to design plant using: (a) a compressed air mist; (b) a mechanically formed mist; (c) turbulent passage through water; and (d) filtration by means of a compressed metal wool mattress. Under practical conditions considerable improvement has been effected by the use of these appliances at loading points underground and in connexion with screening on the surface.

With regard to poisonous gases it has been shown that a high degree of protection against carbon monoxide can be obtained with a commercial canister. When tested against a 1 per cent mixture of carbon monoxide in air saturated with water vapour at 17° C. and flowing at a rate of 32 litres per minute, each canister had a total leakage of carbon monoxide of 960 c.c. in four hours, which is the limit set in the official tests of the United States Bureau of Mines.

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* Mines Department. Seventeenth Annual Report of the Safety in Mines Research Board, including a Report of Matters dealt with by the Health Advisory Committee, 1938. Pp. iv+123+10 plates. (London: H.M. Stationery Office.) 2s. net.