

but in most cases the chief absorption is by the broken coal and carbonaceous shale, and particularly by the coal and shale dust which is always produced in mining.

Par and Wheeler state that pillar coal in a particular district after 25 years loses only 2.5% of its calorific value; this illustrates the imperviousness of unbroken coal to the air. The main deterioration in pillar coal is found, however, to be due to its increased friability resulting chiefly from the heavy pressure to which it has been subjected.

Interesting figures are given by Haldane and Meachen,¹ to show that 80% of the heating which air undergoes while passing through a mine, can be accounted for only by the weathering of the pyrite and the coal itself. Their experiments which are described below were carried out at the Hamstead colliery, South Staffordshire, where the "Thick Seam" is worked at a depth of about 2000 feet below the surface, and their observations and conclusions are so interesting that no apology need be offered for summarizing them at some length.

They noticed that the general effect of opening up the mine was to warm both the coal and the strata adjacent to the workings. The average temperature on the surface at Hamstead is 49° F. At the bottom of the intake shaft the temperature is much more constant than at the surface and averages 60° F. The air is compressed as it descends the shaft and this compression would account for a gain in temperature of 10°. A little moisture is taken up by the air in the shaft, and this must tend to cool the walls so that some heat is transmitted to the air from the strata.

From the pit bottom the air steadily increases in temperature at the rate of about 6° for every 3000 feet. In the workings the temperature is generally about 80° to 85°. In the return airway there is a relatively slow though steady fall of temperature from the face to the upcast shaft. The average temperature in the main north return airway is 77°. Analysis of the air shows that this fall in temperature is probably due to the leakage of air from the intake to the return airway.

To determine the temperature of the undisturbed coal a maximum and minimum thermometer was inserted into the end of a 10-foot borehole in freshly cut coal. The hole was then closed with clay and left undisturbed for at least several days. Several such experiments showed the temperature of the coal to be 66°. Similar experiments were made in coal which had been long exposed. They showed that coal behind such an exposed surface gradually rises in temperature. Thus at two places in the side of a main road the temperature at the ends of 10-foot boreholes were taken in 1894 and 1898. In 1894 the temperatures were 66° and in 1898 they were 93° and 90°.

It was impossible to correctly calculate the total heat generated in the mine since there must have been large radiation losses through the walls, roof and floor. The amount of heat, which escaped by the return airway,

¹ Trans. Inst. of Min. Eng. Vol. 16, 1898, p. 457.