

Mining Research.

THE Executive Board of Mining Research of the University of Birmingham has just issued a report on the work of the Mining Research Laboratory for the years 1921-1924, the report being signed by Dr. J. S. Haldane, who is the chairman of this Board. The report gives an interesting summary of the various researches which are being undertaken, some of which deal with problems of very great importance to the coal industry. Necessarily some of these researches are purely scientific, whilst others are essentially practical, but it is quite obvious that the results of even the first named are likely to find important practical applications. A great deal of work has been done upon the absorption of various gases by coal, and the effect that these phenomena may have upon the spontaneous combustion of coal has been carefully investigated. A certain amount of work has been done on the application of wireless electricity to underground problems, but no definite conclusions appear to have been reached, and the work has, for the present at any rate, been laid aside. A most interesting group of physiological experiments has been carried out by means of an experimental chamber by which it is possible to test the effect of various gases upon men at rest and at work; as the result of these experiments, accurate information as to the effect of carbon monoxide upon those exposed to its influence has been rendered available, and it has been shown that this poisonous gas is absorbed far more readily by men doing work than when they are at rest. Another series of these experiments has tested the suggested new method of treatment for carbon monoxide poisoning as well as for asphyxiation, the value of carbon dioxide for this purpose having been shown by these researches, with which the name of Dr. Haldane is closely associated.

Another set of researches, the ultimate results of which may be of very far-reaching importance, are those upon the discoveries of Dr. Bergius dealing with the hydrogenation of coal. It has been found that when coal is mixed with a suitable liquid such as phenol, and heated to approximately 400° C. in an atmosphere of hydrogen under a pressure of 155 atmospheres for a considerable length of time, hydrogen is absorbed and a quantity of coal, in some cases up to 40 per cent., is converted into an oil-like liquid. The various constituents of coal have been tested, and it is found that clarain and durain are hydrogenated with comparative facility, but that fusain is very little affected. The possibility of hydrogenating coal under these conditions has thus been definitely confirmed, and substantial yields of liquid products have been obtained, though the nature of these liquids has not yet been fully investigated; it is stated that they appear to contain oxygen, and that it is a question yet to be determined whether it is possible to eliminate this oxygen by further hydrogenation and thus to obtain hydrocarbons. Attention is directed to the fact that the behaviour of clarain and durain is approximately the same, and that the liquids obtained by treating these constituents give almost identical analytical results, and it is suggested that this fact would appear to support Prof. Wheeler's contention that clarain and durain contain constituents of similar chemical type. Although up to the present the results obtained by the hydrogenation of coal have a purely scientific interest, it must be remembered that they only represent the initial stages of a very complex investigation, and that it is quite possible that the ultimate outcome of this may produce results of the utmost economic importance.

Researches on the spontaneous combustion of coal have occupied a considerable portion of the work of the Mining Research Laboratory. It will be remembered by those interested that the Mining Research Laboratory of the University of Birmingham was established to continue the work originally started in the Doncaster Research Laboratory, which was established with the definite object of investigating spontaneous fires in the collieries of that district. It is, however, only proper to point out that whilst the investigation was due in the first instance to the necessity for combating the dangers to which the coal of the district was especially liable, the Doncaster Coal Owners' Committee from the outset placed all its laboratory results freely and fully at the disposal of the entire coal mining industry, and took care to publish all the results obtained by its laboratory staff. This work has been continued at Birmingham, and the oxidisability of different types of coal has been recently studied, as also has the liability of the various constituents of coal to spontaneous combustion. The results have clearly shown that fusain is relatively insensible chemically, and that its oxidation is negligible as a source of heat in initiating spontaneous combustion. On the other hand, it is pointed out that bands of fusain, on account of their open physical structure, may play an important part in aiding spontaneous combustion by forming channels through which supplies of air can readily reach the more oxidisable constituents of the coal.

A number of researches, all bearing on the investigation of the oxidation of coal, are being carried on, and it is worth noting that they are being assisted by a grant from the Miners' Welfare Fund, made on the recommendation of the Safety in Mines Research Board of the Mines Department. It is, of course, of the greatest importance to the industry that all the mining research now carried on throughout Great Britain should be co-ordinated by a central authority, not with the view of controlling the work, but mainly to see that no excessive overlapping occurs and to take care that provision may be made for filling up any important gaps in our knowledge which may be left between a number of individual lines of research. It is interesting to note that a number of respirators, most of which have originated in the United States, and are designed to enable men to live for a certain time in an atmosphere of carbonic oxide by oxidising this gas to the relatively innocuous carbonic acid, have been examined, and the results are now being published in the Transactions of the Institution of Mining Engineers.

Finally, we have a group of researches conducted in order to determine the effect of specially hot and deep mines, this work now being carried out in conjunction with a committee of the Institution of Mining Engineers, financed by grants from the Department of Scientific and Industrial Research and the Miners' Welfare Committee on the recommendation of the Safety in Mines Research Board of the Mines Department. Nine reports have already been published as communications to the Institution of Mining Engineers, a form in which they are conveniently available for men engaged in mining operations in all parts of the world. The work is being continued and there is still a large field open for research.

It will be obvious from this brief summary of the report that the Mining Research Laboratory of the University of Birmingham is doing work of the utmost value to the mining industry; by far the greater part of this work bears directly upon the safety, health, and welfare of men engaged in the coal mining industry.