

## FUEL RESEARCH.

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In tracing the history regarding the discovery of coal in India we have to go back to 1774 during the time of Warren Hastings. The Geological Survey of India was established some time later apparently with the object of developing the coal resources and other economic minerals. The earliest reports of the Survey Department mostly dealt with the coalfields of the different parts of India. With regard to the personnel of this department during those days it may be mentioned that there were officers with special qualifications in mining who were entrusted with the development of the coalfields.† With the establishment of the Mines Department in 1902 the Geological Survey Department discontinued to maintain the mining experts and to develop their laboratory for systematic fuel and economic mineral research. I may quote here the following lines from Holland's declaration † in 1907: 'Whether, therefore we like it or not, the official geologist in this country is bound by the terms of his appointment to remember that, either directly or indirectly, his work should aim in the long run at *development* of our mineral resources'. In my opinion however, the *proper development* of coal and other economic minerals has not been maintained. By *proper development* I would include not only the discovery of the mineral property but also the carrying out of systematic researches for finding out the various uses to which they may be efficiently put so that the producers and consumers as well as those interested in trade and commerce might be properly educated in this respect. The people of this country have remained ignorant about the utility of these economic minerals for want of knowledge in industrial application of them. Even now we do not find the conditions very much changed or improved. This lack of knowledge with regard to the proper utilisation of coal among the producers and consumers is due to the lack of serious attention to the problems of research both by the Government and the industry.

In the early days of the Geological Survey Department it will be found that the start was made in maintaining the mining experts. If that beginning had received continued nursing we would have possibly found today a well-organised fuel research station established in the laboratory of the G.S.I. side by side with the mineral research laboratory to help the mineral industry as well as in solving various problems. The results of such investigations could have been broadcast in cheap pamphlets amongst the industry and the interested public, thereby educating them in the matter of mineral development

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† See Fox, C. S.—Presidential Address to the Min. & Geol. Inst. (1936), pp. 27-29.

and utilisation. But from a careful study of the reports published by the G.S.I. we find that no systematic researches on industrial lines have been carried out either on coal or on other economic minerals. In this connection reference may be made to the brisk activity of the U.S. Geological Survey and Bureau of Mines and the geological institutions of the U.S.S.R. who bring out, year after year, much useful information with regard to their country's economic minerals and broadcast them in cheap pamphlets which have a very wide circulation reaching every corner of their country. Similar steps should be taken by the India Government in publishing useful information in cheap bulletins. If the U.S.A. and U.S.S.R. can bring out publications at such a low cost there is no reason why the India Government should not be able to issue even cheaper publications when labour is so cheap in India. The question is well worth investigating by the relevant authorities.

Though one hundred years have elapsed since the development of the Bengal coalfield, we are still debating the question of establishing a fuel research station. We do not yet know how long it will be before the actual foundation of such a station takes place. I hope by now that the Central and Provincial Governments have realised the necessity of establishing research stations to study especially such a basic material as coal.

Something may be mentioned here about the improper and unscientific method of coal utilisation by the railways of India. It is well known that on the recommendation of the Noyce Committee in 1925 the Indian Coal Grading Board was started. In some measure at least, the grading of portions of seams is the cause of much of the waste that is going on. If partial grading and working of seams is stopped it should conduce to the conservation of coal. The ways in which the high class caking and chemical grade coals are used up by the railways are well known and have already received much publicity. It is not yet known what steps the Railway Board is going to take in the immediate future to give up this wasteful practice. If they start to use low grade non-caking coals even now, the high grade caking coals and chemical grade coals will be saved for their legitimate use. The low grade fuels could be utilised efficiently in the pulverised state and coal or coke would be made into gaseous fuel for steam generating purposes, etc. The railways should be able to modify the fire-place of locomotive boilers to use pulverised coal. This step would lead to better utilisation of lower grade coals. Locomotives are already in use in other countries to burn pulverised coal.

Intensive researches should be started to find out the possibilities of burning different grades of coal in a powdered state, to convert low grade coals into gas at central gas-generating stations to supply gas to the different industries in the neighbouring places. Economic possibilities of starting carbonisation plants should be carefully studied and if such a plant can be installed the recovery of oil and other valuable by-products could be made and the ideal smokeless patent fuel could be obtained. This semi-coke will be far superior to the low grade soft coke that is produced and marketed nowadays. The

possibility of obtaining liquid fuel by hydrogenation of coal, etc. should also receive due consideration by such a Research Board. It is also well worth investigation if gasification of coal underground as practised in Soviet Russia will be feasible and practicable in India. The rich volatiles of the high class Raniganj coals should be utilised for the manufacture of chemicals and steps should be taken to prevent these coals from being used in locomotives and other steam-raising plants when other grade coals will equally suit their purpose.

The method of soft coke manufacture needs immediate improvement and it is to be regretted that the Soft Coke Cess Committee has been unable to make any marked progress in this direction. A simple method of heating in chamber ovens should be evolved with arrangements for the recovery of by-products. Investigations in the economic possibility of starting such a plant should be taken up and, if necessary, small concerns should combine and amalgamate to install and work an economic unit plant to produce and supply semi-coke of uniform and better quality. The Fuel Research Board could well utilise the cess fund at the disposal of the Soft Coke Cess Committee and the surplus fund lying with the Coal Grading Board. These are some of the ways in which research work could be started for the guidance and benefit of the coal consumers. Research work, if carried out in a well-organised way, would have brought about marked improvement in coal utilisation long ago and the things would not have remained in such a helpless condition as we find them today. It is a pity that the Government allowed this state of affairs to continue for such a long time.

According to the recommendation of the Burrows Committee a separate fuel research station should be installed and that about half the cost should be obtained by levy of cess on the coal industry. Now that the people of this country have begun to acquire the consciousness of proper mineral development and have awakened to the needs of industrial research and experiment stations to foster the basic industries in India, I think it will not be difficult for the Government to devise ways and means to establish a fuel research and mineral research station at an early date. The entire cost of such an organisation should be borne by the Government and it is not at all desirable that the coal industry should be subjected to any further taxation. To have a separate institution with separate whole-time staff would be an ideal thing no doubt for the country if it can afford to have it. But this involves a very big scheme which will take time to evolve and put into effect.

Until a well-organised, independent and separate fuel research station is established in India, I think that well-planned research work could be started without delay in the various lines of coal investigation in the existing institutions for the immediate benefit and development of the country's resources. To give initiation to such a programme of work, I would suggest that the India Government be moved by the coal industry so that the various technical and research departments under the control of the Central Government may

be asked to take up certain important and useful problems of coal research and that various other recognised laboratories in India may also be approached to undertake pieces of suitable work and co-operation and co-ordination should be maintained by a central organising body. This programme, if carefully worked out and followed by such an organising Board, will give an early return at a minimum cost. About the India Government departments mention may be made of the Geological Survey of India, Industrial Research Department, the Alipur Test House, Indian School of Mines, Cawnpore Technological Institute, etc. Of the private bodies mention may be made of Messrs. Tata & Co., Bird & Co., etc. and of some of the well-equipped laboratories of Indian Universities. If it is found that some of the Government departments have suitable workers and laboratory facilities, there should be no difficulty in persuading the Government to take an interest in the matter and to render help to the industry. Moreover I believe that it is also the duty of the country's Government to see that various technical departments under its control carry on researches into some important economic problems relating to different industries and that results of such investigations are made widely available to the people. There should be a central all-India body to control and supervise the work to be carried out in the different institutions and to co-ordinate the results obtained from these different sources. Such a body may be styled as the National Research Council. The National Institute of Sciences of India may be given the power to form expert committees in connection with various branches such as Fuel Research Board, Agriculture Research Board, Chemical Industries Research Board, Metallurgical Research Board, etc. These boards will distribute work among the different laboratories and supervise the work whenever necessary. Salaried research assistants and scholars (both whole-time and part-time) may be appointed to work under the guidance of competent authorities. Regarding the equipment of the laboratories I would suggest that the laboratories themselves should give partial financial help in necessary equipment as this type of research when conducted in those laboratories will materially help the teachers and students alike. In this way definite and well-planned work may be immediately started through the co-operation of the different laboratories. In this connection reference may be made to the excellent work carried out by the various engineering and experiment stations run by the United States Bureau of Mines in co-operation with some of the Universities as well as with certain local industries. In this way an immense amount of exceedingly useful work beneficial to industries has been accomplished in the U.S.A.

If this scheme is favoured, a conference of representatives of Government research departments and those of willing private firms and Universities may be held when the distribution and allocation of work in different lines of coal research may be discussed and arrangements made for meeting the expenditure in connection with the officers of the central board, laboratory equipment, research assistants, scholars, etc.

The scheme as outlined above in skeleton will require only a fraction of the heavy capital expenditure of establishing a separate and independent research station and this scheme can be made to work in a short time.

If the National Institute of Sciences of India is given the responsibility and status of that of the National Research Council of other countries I think it will prepare a scheme for work in the lines suggested above in the best interests of the country and will surely prove itself worthy of its name.

It should be mentioned here that simultaneously with the initiation of fuel research there should also be research on safety in mines, *i.e.* for the safety of labourers and for the safe and maximum extraction of coal. It is time that India began to solve her problems in relation to the local conditions and needs instead of being idle or borrowing ideas from others. There is talent enough in the country which could be employed to useful purposes. It is for the Government to organise the work and utilise this talent for the ultimate good of the country.

