

Fuel Research Station

Annual Visitation

MORE than three hundred representatives of science and technology visited the Fuel Research Station at Greenwich on May 31. The chairman of the Fuel Research Board, Sir Harold Hartley, was unfortunately unable to be present, and the visitors were received by Dr. F. S. Sinnatt, the director of fuel research. Nearly two hundred and fifty representatives of the Institution of Gas Engineers visited the Station on June 1.

The Fuel Research Station is the headquarters of the fuel research organization of the Department of Scientific and Industrial Research, and is equipped not only with laboratories but also with large-scale plant. In all processes involving heat treatment of coal, the rate of heating has considerable influence, consequently the scale effect is of importance. The aim of the Station is to obtain results that can be directly translated into practice by industry, and this involves the use of plant of a size comparable with that used in industry.

Coal is a variable and complex substance, and the first requisite for its scientific utilization is a knowledge of the properties of the various seams. These are being studied in nine laboratories situated in the principal coal fields. The normal method of examination consists in obtaining a pillar of coal from the coal face, and this is transported to the laboratory, where it is examined in detail. Variations that occur throughout the thickness of the seam are thus ascertained. A section of such a pillar was shown, with an X-ray photograph of a slice cut from the same pillar. This shows the banded structure of the coal, and the distribution of the inorganic matter in the various bands. A number of specimens illustrated the great variations to be found in coal and its associated impurities. When a sufficient number of sections has been examined, it becomes possible to form a picture of the seam over the whole coal field and to predict with some certainty the characteristics of the seam in areas not yet worked. Examples were shown of 'Iso-vol' maps from two different coal fields, showing the volatile content of a seam as it varies from point to point. The areas are clearly indicated from which coal specially suitable, for example, for coke making, gas making, or steam raising, can be obtained.

Modern methods of utilizing coal have increased the importance of a knowledge of the inorganic constituents present, and methods for the examination and analysis of coal and its associated impurities are continually being studied and improved. When coal is burned a certain amount of 'ash' remains, and this is easily determined, but does not necessarily represent in amount the inorganic matter originally present. An exhibit illustrated the changes that take place during ignition, the method of determining the amount of inorganic matter in the original coal, and the actual composition of the coal substance itself.

Various examples of the more common minerals concerned were exhibited. A list of the less common constituents that have been met with was on view, together with specimens of coal containing barytes and galena. Micro-analytical methods for determining

the amounts of some of these rarer constituents were shown. Both the normal methods of analysis and modifications for special cases were on view.

One of the difficulties in the examination of coal is the preparation of a fair sample. In the first place, the gross sample taken must be truly representative of the bulk consignment. In the second place, this sample must be reduced to the small sample of finely ground coal which is required in the laboratory, without losing its representative character. New facilities for the rapid and convenient reduction of gross samples have recently been provided.

An investigation of general interest concerns the burning of coal in the open domestic grate. The experiments are being carried out in two specially built rooms of gas-tight construction, so that the air can only enter by one path where it can be precisely measured. The radiation from the fire and the smoke produced are recorded. The results show that the quality of the coal, the size of the coal, the relative amounts of air passing through the fire and entering the flue by passing over the fire, the brickwork surrounding the fire, and the design of the grate all have a significant influence on the amount of smoke emitted.

Two vehicles—a one-ton and a five-ton lorry—were shown, which have been converted to run on producer gas from solid fuels. The first is fitted with a producer made by a British firm and has been used for comparing the efficiencies of different types of fuel—charcoal, cokes of various kinds, and anthracite. The second is fitted with a producer designed at the Fuel Research Station to study the principles involved in the design, with the view of making a more flexible producer. It is giving promising results.

The synthesis of hydrocarbons from carbon monoxide and hydrogen is being studied in several plants, including one producing about 5 litres of liquid hydrocarbons a day. The primary products consist of motor spirit, diesel oil and waxes of high melting point, together with heavy hydrocarbon gases. Lubricating oils, esters and soaps have been prepared from the primary products.

One of the water-gas plants at the Station has been modified so that coal can be used instead of coke. Non-caking coals, either high or low in volatile matter, can be used. This forms one means for the total gasification of coal. Experiments are in progress on raising the calorific value of the water gas, by treating a portion with a catalyst so as to produce hydrocarbon gases. Another modification enables a gas to be made with a higher proportion of hydrogen, and so more suitable for the synthesis process.

Other plant on view included the chamber ovens being used for experiments on the carbonization of blends of coal; the hydrogenation plant, used for studying the suitability of different coals and the action of catalysts; the coal cleaning plant; the plant for boiler firing by pulverized fuel; and the marine boiler for examining bunker coals.

A striking demonstration showed the 'dust proofing' effect of a small quantity of oil when sprayed over coal.