

Ratcliffe (4 and 7), Mr. F. G. Smith (5 and 6), Dr. R. L. Smith-Rose (1, 2 and Executive Committee).

It is understood that Profs. S. Chapman and H. S. W. Massey will also attend the meeting in Sydney by special invitation.

In accordance with established procedure, the various national committees will submit reports to the General Assembly reviewing the advances made within their own countries in each of the fields of research indicated by the seven commissions. As the results of this work may have an important bearing on associated scientific fields and also on the practice of radio communication, the Union is represented on several other international scientific bodies and also on the appropriate study groups of the Comité Consultatif International des Radiocommunications (C.C.I.R.). This arrangement forms a very satisfactory liaison whereby the fundamental problems confronting the practical radio engineer are brought to the notice of the astronomer, meteorologist and radio-physicist, and whose results can be quickly applied to communications technique.

BRITISH CAST IRON RESEARCH ASSOCIATION

By DR. J. G. PEARCE, O.B.E.

Director

A FURTHER stage in the progress of the British Cast Iron Research Association was reached on July 2 when the president, Dr. J. E. Hurst, formally opened some extensions additional to those previously reported (*Nature*, 166, 261; 1950). These include chemical and spectrographic laboratories, sands laboratory, heavy stores, and accommodation for operational research, development, and work on foundry atmospheres. A fuels and furnaces building is under construction.

The spectrographic laboratory houses a quantummeter, an American direct-reading spectrograph, which is channelled to permit estimations of twelve elements occurring in the cast iron alloys, and which is expected to record the elements spectrographically determined in normal material within one minute. The instrument comprises a high-precision source unit built to reproduce almost any type of electrical discharge, a spectrometer measuring through a photoelectric cell system, and a console recording the photocell current through an electronic system. The use of the instrument was demonstrated, although it is not yet fully calibrated. The technique for the spectrographic determination of elements in cast iron was published by the Association in 1948, its application to the less common elements in 1949, and to foundry slags in 1952. It is anticipated that it may be possible to determine both carbon and also phosphorus (not usually determinable by spectrographic analysis), the only element of those normally required that is still incapable of spectrographic determination being sulphur.

It is not practicable to review in detail the whole of the work accomplished and in progress; but some indication of its scope is given by the fact that during the past two years the Association's *Journal of Research and Development* has published seventy-nine reports, including reports presented to a number of conferences held for members during this period.

The establishment of practical foundry processes since 1948 for producing nodular graphite in the as-cast state by means of cerium or magnesium is now a matter of history. Certain difficulties in effecting perfect nodulization by magnesium, thought to be due to interfering elements, have now been resolved. The Association has established the subversive elements concerned, the range beyond which they are troublesome, and that their ill effects can be removed by the use of cerium in conjunction with magnesium. The Association's research manager, Mr. H. Morrogh, has recently received the McFadden Gold Medal of the American Foundrymen's Society for his work in developing nodular graphite iron. These processes have raised very difficult analytical problems for both the chemist and the spectrographer, on account of the very small amounts concerned, not only of the elements used for securing the nodular structure, added and residual, but also of the interfering elements. The vacuum fusion method is employed for the determination of gases.

An investigation into the fluidity of cast iron has been completed, and active work is proceeding on the vitreous enamelling of cast iron, on chilled irons, and on shrinkage and porosity, these latter defects being studied with the aid of gamma rays.

In the field of moulding sands, the emphasis has moved to a study of the properties at elevated temperatures, at which, of course, they are used in practice. Special apparatus has been acquired for this purpose from the United States, and the Association has designed and built its own apparatus for evaluating the stress-strain characteristics of sand aggregates, both at ordinary and at elevated temperatures, and has already related the results to certain common defects due to sand. High-frequency heating is used for giving temperatures required before the sand bond can be affected by the heat. The property known as 'flowability' is being studied, and considerable work has been done on the use of synthetic resins as bonding materials. These resins are used in the shell-moulding process, which has excited considerable interest in foundry circles, the normal mould being replaced by a thin shell of resin-bonded silica sand.

Progress has been made on the study of foundry atmospheres, particularly with reference to the presence of toxic gases and the measurement of dust and dust movement; in particular, the conventional system of hood-extraction used on pedestal grinders, commonly used in foundries for cleaning castings, has been shown to be entirely inadequate. A design has been evolved by the Association, involving the use of high-velocity air streams above and at the side of the working area, using less power than the normal system, and keeping the breathing zone of the operator clear of dust to a remarkable degree. Co-operation with manufacturers is being arranged.

The Operational Research Team set up in 1950 for visiting foundries with the object of recommending steps for promoting production efficiency has now made more than two hundred visits and collected considerable information. The iron-founding industry is operating in the United Kingdom at a record level of output, approaching 4 million tons of iron castings per annum, employing 150,000 people, and the output per man per annum has increased materially in recent years, by some 28 per cent since 1945 and some 13 per cent since 1948, in spite of difficulties relating to raw materials and personnel.