(representing Belgium, France, Germany, Italy, Luxembourg and the Netherlands), Norway, Sweden, Switzerland and the United Kingdom. It provides for a joint programme, budget and staff for research and development work with the reactor for a period of three years. Through agreements with the Institutt for Atomenergi, the United States and Finland are also associated with the reactor project. At present, a professional staff of thirty, recruited from the participating countries, is attached to the project. During the next six months the reactor will be operated at low power-levels to enable fundamental reactor physics experiments to be performed. After this period the power level will be increased gradually up to the design power of 10 MW. thermal energy.

The reactor plant will be officially opened by H.M. King Olav on October 10.

The Halden Reactor Project is one of several joint undertakings sponsored by the European Nuclear Energy Agency of the Organization for European Economic Co-operation; others are the 'Eurochemie' company for the chemical processing of irradiated fuels (established by an international convention signed in December 1957) and the *Dragon* high-temperature gas-cooled reactor project, work on which began last April.

THE DANISH ATOMIC ENERGY COMMISSION

THE report on the activities of the Danish Atomic Energy Commission* for the period April 1, 1957, to March 31, 1958, deals mainly with the erection of the Risø Research Establishment and the three reactors *DR*1, *DR*2 and *DR*3, and the work of the six departments of the Establishment. The membership of the Commission remained unchanged during the period under review, and Prof. Niels Bohr continued to act as chairman. The total cost of the Establishment was originally estimated at about 100 million kroner. The expenditure so far, including that estimated for 1958–59, is about 90 million kroner, of which about 60 million kroner is for expenditure on buildings and the remainder for the three reactors and the requisite technical and scientific equipment. On March 26, 1958, the Finance Committee authorized an additional expenditure of up to 2·5 million kroner on a linear accelerator to be used for experiments on the preservation of food and for other irradiation experiments.

On August 15, 1957, the first of the three reactors began to operate, and by September the chemical, reactor engineering, electronics and physics laboratories together with the administration building were completed and in use. Then followed the health physics department, the library and the canteen, and early in 1958 the agricultural department, the lecture hall and the buildings to house the *DR*2 reactor group were completed, leaving only the buildings for the *DR*3 reactor to be erected. A detailed map attached to the report shows the complete layout of the Establishment.

In the physics department one group has been working on the construction of a laboratory for investigations of beta- and gamma-ray activities; another group with neutron spectroscopy; and a third group with solid state physics, particularly the study of the effects of radiation damage to metals and graphite. A study has also been made of the literature on deuterium fusion and of the theoretical aspects of the utilization of the energy from deuterium fusion. The electronics department has undertaken active research on scintillation counters and on the development of a reactor simulator. Two study groups were formed in the reactor engineering department. The first was engaged in drafting a project for a heavy-water-moderated power reactor with an organic cooling medium, and the second for a high-temperature gas-cooled reactor.

A section of the report is devoted to the International Atomic Energy Agency, and to regional co-operation in Europe, including the Organization for European Economic Co-operation and Euratom. The report also gives details of geological surveys in Greenland; relations between the Commission and commerce and industry; educational activities which included experimental reactor courses with *DR*1 and lecture courses at the Technical University of Denmark; and general information services.

* Report on the Activities of the Danish Atomic Energy Commission for the period from 1 April 1957 to 31 March 1958. Pp. 62. (Copenhagen: Danish Atomic Energy Commission, 1958.)

ATOMIC POWER CONSTRUCTIONS, LTD.

ATOMIC POWER CONSTRUCTIONS, LTD., 28 Theobalds Road, London, W.C.1, which was formed in December 1956, is carrying out extensive research and development in connexion with the national nuclear power effort. The research programme is concentrated at the company's laboratories at Heston, Middlesex, and a booklet* recently prepared gives a survey of the problems being tackled. In the Calder Hall type of reactor the uranium is arranged in a pattern of vertical rods embedded in a large cylindrical 'core' of graphite. The heat generated in the rods is carried away by blowing carbon dioxide gas past them, and in order to economize in pumping power the reactor designer puts the whole of the carbon dioxide gas circuit under a pressure of some 20 atmospheres. Consequently, the core and uranium must be enclosed in a pressure vessel.

Most stringent precautions must be taken against failure of the pressure circuit in which the carbon dioxide circulates, and a major part of the work undertaken by Atomic Power Constructions, Ltd., is concerned with proving the materials and fabrication techniques which are used in the construction of the pressure vessel. An important problem is creep of the steel to be used for the pressure vessel and for the heat exchangers, and in order to acquire the necessary information sufficiently quickly an air-conditioned creep laboratory containing a battery of seventy creep machines has been set up. The strain ageing of steels at elevated temperatures; weld-

* Research and Development at the Heston Laboratories of Atomic Power Constructions, Limited. Pp. 10. (London: Atomic Power Constructions, Ltd., 1959.)