

In 1944 the Canadian-United Kingdom team moved from the University of Montreal, where preliminary studies had been carried out, to the site which was established on the Ottawa River, about five miles from the town of Chalk River.

On September 5, 1945 ZEEP went into operation. It operated at a mere 10 watts but it made possible a study of the value of a heavy water natural uranium system and it has continued to be useful for studies of fuel rod arrangements. Two years later on July 22, 1947 the NRX reactor went into operation. It was then, and so remained for several years, the most powerful research reactor in the world. The NRX reactor still plays a leading role by (1) making possible important experiments relating to the development of atomic power, (2) enabling the fundamental properties of atoms and nuclei to be determined, and (3) producing radioactive isotopes of high specific activity (i.e., the relation of the amount of radiation to a given weight of material). Both the United States and the United Kingdom are, like AECL, using NRX for atomic power studies. Since its reconstruction following a breakdown on Dec. 12, 1952 this reactor has operated at a power output of 40,000 kw. (a measure of the heat produced)—one-third higher power than before the breakdown.

In 1946 the United Kingdom established its own atomic energy program and in the same year the Atomic Energy Control Act was passed in Canada "to make provision for the control and supervision of the development, application and use of atomic energy." This Act created the Atomic Energy Control Board which was given three main powers: (1) to conduct research and production operations, either directly or through other agencies reporting to it; (2) to regulate the production and application of materials relating to atomic energy, particularly fissionable materials; and (3) to make and administer security regulations required by the Canadian atomic energy program.

The Chalk River project was operated on behalf of the Atomic Energy Control Board by the National Research Council until 1952 when a Crown corporation, Atomic Energy of Canada Limited, was established to operate the project on behalf of the Board. A 1954 amendment to the Atomic Energy Control Act requires AECL to report directly to the Cabinet Minister who is Chairman of the Committee of the Privy Council on Scientific and Industrial Research. The Atomic Energy Control Board continues to report to the same Minister and its functions remain unchanged.

The next stage in the Canadian program, following the creation of a separate United Kingdom program, consisted mainly of carrying on fundamental research at Chalk River, using the facilities of the two natural uranium heavy-water reactors. The need for a source of higher neutron flux for fundamental research and for engineering studies resulted in the decision in 1951 to build another natural uranium heavy-water reactor known as NRU. This reactor is expected to have a neutron flux four times that of NRX and a heat output of 200,000 kw., five times that of NRX. The NRU reactor has three main functions: (1) the production of significant quantities of plutonium; (2) the provision of advanced experimental facilities for fundamental research and for the testing of power station fuel-coolant systems; and (3) the production of radioactive isotopes of high specific activity, particularly Cobalt-60 which is used in the treatment of cancer.

*The Chalk River Project.*—The principal function of this Project is to carry out fundamental research and preliminary engineering development. The Project provides the data which utilities and manufacturers need for a nuclear power program. The work is carried out by an Administration and Operations group and a Research and Development group. The former is responsible for general administration, the operation of the nuclear reactors and associated chemical process plants, the construction and maintenance of buildings, the provision of steam and auxiliary power for the project, and the correlation of the experience of the operating branches with the results obtained by the research branches to produce engineering information for major projects handled by outside organizations.

The activities of the Research and Development group which cover a wide field of fundamental and applied research in physics, chemistry, metallurgy, and biology, are carried out by four divisions: Reactor Research and Development, Chemistry and