In the international field, close ties are kept with the United States Atomic Energy Commission and the United Kingdom Atomic Energy Authority, both of which have representatives permanently at Chalk River. There is an agreement with the United States for co-operative work on heavy-water-moderated reactors; it provides for the free exchange of all technical data in this field and a commitment by the USAEC to spend $5,000,000 in the United States on research and development related to reactors of Canadian design. More or less formal collaboration has also been established with the International Atomic Energy Agency, the Organization for Economic Co-operation and Development, and Euratom, as well as with India, France, Sweden, West Germany, Switzerland, Japan and Pakistan. In India, construction and running-in of the Canada–India reactor was completed during 1960, and the reactor was formally inaugurated in January 1961.

Chalk River Project.—The Chalk River Project is a research and development establishment. Basic and applied research is carried on by about 200 professional scientists and engineers supported by 300 technicians devoted to research in nuclear physics, nuclear chemistry, radiobiology, reactor physics, radiation chemistry, environmental radioactivity, physics of solids and liquids, and other subjects, using as their primary facilities the two major reactors, NRX and NRU, the auxiliary reactors, ZEEP, PTR and ZED-2, the tandem Van de Graaff accelerator and analytical facilities such as a precision beta-ray spectrometer, mass spectrometers, electron microscopes, multi-channel pulse analyzers, automatic recorders, analogue and digital electronic computers.

Basic research is carried on in many fields, especially that of the structure of atomic nuclei, and of the interactions of neutrons, not only with individual nuclei but also with liquids and crystalline solids, particularly those involving energy transfer. For nuclear structure studies, the tandem Van de Graaff has made pioneer work possible by providing multiply-charged ions of precisely known energy and direction. It has proved possible to produce nuclei in specific energy states by different routes and to identify and analyse the states, thereby deducing the spin and other characteristics and discovering, for example, a correlated series of rotational states in the nucleus neon-20. Not only is this important to a basic understanding of nuclear structure, but it also finds application in unravelling the complex of nuclear reactions responsible for the genesis of nuclei in the interior of stars.

Studies of neutron interactions with matter are made possible by the intense beams of neutrons available from the NRU reactor. By monitoring the neutrons in cosmic radiation it has been possible to find correlations with the occurrence of solar flares and contribute to the recent advances of knowledge of phenomena in interplanetary space. Isotope techniques have brought about revisions in the basic theory of chemical reactions induced by radiation. This basic research may find a useful early application in the technology of using an organic liquid as coolant in nuclear power reactors.

The research facilities of the NRX and NRU reactors have continued to attract individual scientists as well as teams from other countries. A team of Brookhaven (U.S.A.) and AECL scientists is using a neutron beam with a high-speed chopper and long flight path for nuclear interaction studies. Another team with scientists from Harwell (Br.) and other countries is using another system of choppers for studying details of the slowing-down of neutrons by moderators. Both in NRX and NRU the exceptional facilities for irradiations in high temperature water, steam and organic liquids have brought teams from Britain and the United States to conduct tests important for the design of future power reactors.