Modifications made to the reactor during its reconstruction have made possible steady operations at 40,000 kw—a power output 33 p.c. higher than was attainable before the breakdown—with the result that a shorter time is now required for many research experiments and for the production of radioactive isotopes. Furthermore, more advanced experiments relating to atomic power development are possible and the testing of components for the new NRU reactor is more effective.

Satisfactory progress was made in the construction of the new NRU reactor at Chalk River. Like the NRX reactor, it will use natural uranium for fuel and heavy water as a moderator. The fuel elements of the NRX reactor are cooled by running river water directly through the reactor. In the NRU reactor, however, the heat will be carried out of the reactor by the circulation of the heavy-water moderator to heat exchangers from where the heat will be carried away by river water. The NRU reactor, moreover, will have a considerably higher neutron flux (density of neutrons within the core).

The Physics Division of the Corporation continued experiments with the Van de Graaff generator, the low-voltage accelerator, and the beta ray spectrometer. Experiments with these machines, together with work previously carried out with a beam of neutrons from the NRX reactor, have led to additional knowledge of nuclear energy output and of the structure of the atomic nucleus.

New and improved electronic instruments were designed for use with the NRX reactor, and continue to be studied in the search for greater reliability and reduced size. A new gamma ray health monitor was developed, for example, and has been in satisfactory operation for several months; development of radiation detection instruments for the Department of National Defence also is continuing.

The Chemistry and Reactor Research Division is carrying out extensive experiments to obtain data upon which the designs of future reactor systems will be based.

Studies have been made of the use of plutonium as a nuclear fuel and new arrangements of fuel elements for power reactors have been studied with the aid of the ZEEP reactor. Chemical and metallurgical methods for processing irradiated uranium fuel elements continue to be developed. The Department of Mines and Technical Surveys is studying the corrosion of these metals and their alloys in different materials that might be used as coolants in reactors. The Department continues to supply the personnel for the Company's Metallurgy Branch.

In the Biology Branch radioactive isotopes are being used to study deficiency diseases in mammals and the synthesis of essential constituents of living cells. Studies of the mechanism by which radiation affects living material were continued with the aid of rapidly reproducing micro-organisms.

The Commercial Products Division of Atomic Energy of Canada Limited, which has its headquarters in Ottawa, handles the marketing—some of it international—of radioactive isotopes produced at Chalk River. The Division's catalogue lists more than 100 different isotopes which may be purchased. Their industrial use ranges from testing welds to the control of thickness of material, such as paper, as it comes through the manufacturing machines. Agriculture and medicine are also served: isotopes such as iodine-131, phosphorus-32, and gold-198 are for use in the human body. The Division also provides an advisory service to users of radioactive isotopes, and a consulting and operating service which includes experimental or research work on a contract basis.