CHALK RIVER REACTORS

Canada now has three reactors at Chalk River, two in operation and one under construction. The ZEEP reactor, the first to operate outside the United States, went into operation in 1945 and has a power of 10 watts, though for some experiments it has been operated up to 250 watts. The NRX reactor, which went into operation in 1947, has a power of 40,000 kilowatts. The NRU reactor, now under construction, is expected to have a power of 200,000 kilowatts. It will go into operation in 1956.

These reactors all use natural uranium for fuel and heavy water for moderator, and are fundamentally research reactors. Because of its high flux over a relatively large volume, the NRX reactor is being used by Canada, the United States and the United Kingdom for various experiments related to the development of atomic power. The high neutron flux of NRX enabled Canada to pioneer in the production of radioactive isotopes of high specific activity (which means that a given quantity of material gives off a large amount of radiation), wuch as cobalt-60 for therapy units used in the treatment of cancer. The replacement value of NRX has been estimated to be $11,000,000.

The NRU reactor will produce significant quantities of plutonium and will have a neutron flux five times that of NRX, thus making possible advanced fundamental research and engineering studies. As it will have a high neutron flux over a relatively large volume and will have extensive experimental facilities, it will be the finest nuclear engineering test facility in existence.

Like NRX, the new reactor will "burn" natural uranium in rod form and will use heavy water for a moderator. But a major difference in the design will be the method of cooling. In NRX ordinary river water flows down over the uranium rods in the calandria -- the aluminum tank which contains the moderator and the fuel rods. As ordinary water is a much stronger absorber of neutrons than heavy water, the former has been kept out of the core of the NRU reactor. The heavy water in NRU will serve not only as the moderator but also as the coolant -- it will circulate through eight 17-ton heat exchangers outside the reactor core. River water will flow through the heat exchangers to take the heat away from the heavy water, which circulates back into the reactor core.

The NRU reactor is housed in a huge building that has three basements. The distance from the floor of the lower basement to the roof is 145 feet -- the height of a 12-storey building. The building is really a combination of buildings for it contains physics and chemistry laboratories and associated shops. The main room, which contains the reactor structure and experimental area, is about 90 feet high, 175 feet long and 100 feet wide. A large amount of space above the reactor is necessary to allow the removal of highly radioactive fuel rods, which are raised up into a 225-ton shielded container called a "rod removal flask". (The NRX rod removal flask weighs 25 tons.) The The estimated cost of this research and production facility is $40,000,000.