Canadian Nuclear Laboratories | Laboratoires Nucléaires Canadiens

National Research Universal (NRU)

Completed in 1957, the NRU reactor was a landmark achievement in Canadian science and technology.

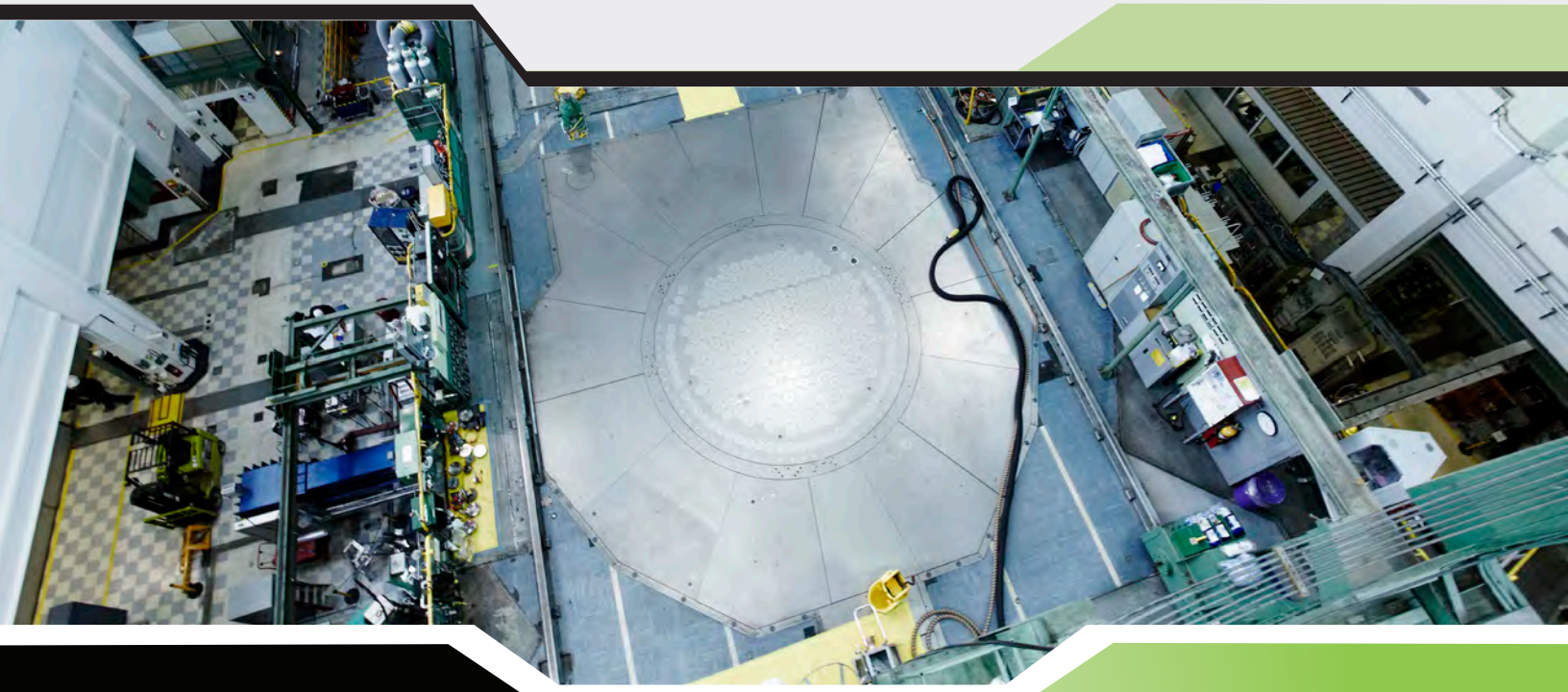
At 200 million watts of power, it was a quantum leap forward from its predecessor the National Research Experimental (NRX) reactor, and once again showcased Canada's Chalk River Laboratories (CRL) as a world leader in nuclear technology.

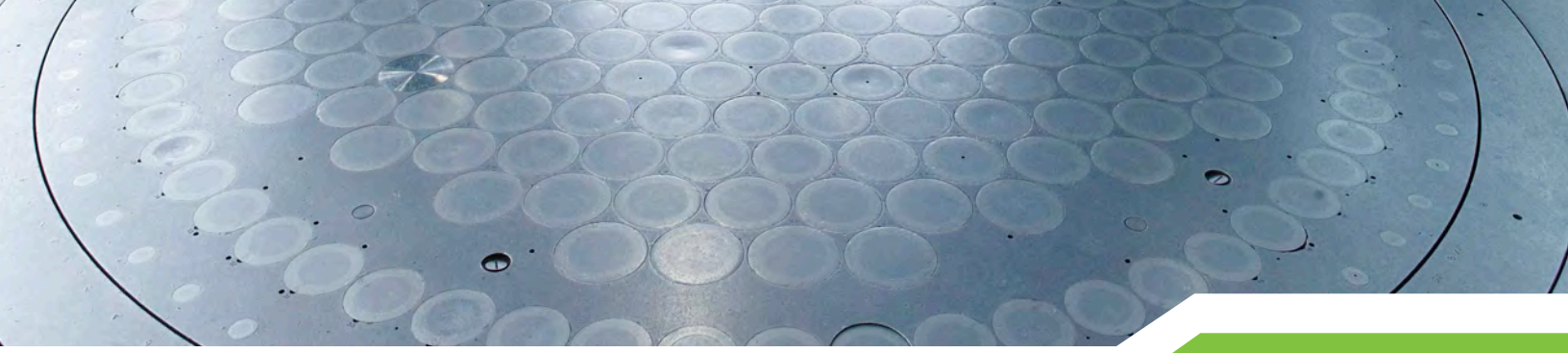
A world-class science facility, NRU has been the birthplace of many scientific achievements. Canadian physicist Bertram Brockhouse won the Nobel Prize in Physics for his influential work at the NRX reactor, then later NRU, using neutron scattering to explore materials. A beam of neutrons can be directed onto a specimen of material, and by measuring how that beam is reflected, scientists can learn a great deal about the structure of the specimen at the atomic level. Using the technique that Brockhouse pioneered, the Canadian Neutron Beam Centre at NRU today enables scientists from across Canada and around the world to investigate new materials with neutrons. NRU is a unique and powerful science facility in Canada.

Each year more than 200 professors, students and industrial researchers come to the Canadian Neutron Beam Centre to make use of this national resource. Because neutrons can probe any kind of material, they can be applied to research in metals, alloys, polymers, biomaterials, glass, ceramics, thin films, cement and minerals. This work is leading to advances in medical, industrial and scientific fields to the benefit of all Canadians.

Isotopes produced at Chalk River Laboratories include:

- Molybdenum-99 (daughter product Technicium-99m): Used for medical diagnosis (imaging) of the brain, thyroid, heart, lungs, liver, kidney, spleen and bone marrow.
- Iodine-131: An isotope used mainly in therapy, imaging and diagnosis.





- Iodine-125: Used in prostate cancer treatment (brachytherapy), in-vitro diagnostic kits (radio immunoassays), bone densitometry devices, protein iodination.
- Xenon-133: A medical diagnosis tool, especially for scanning lungs.
- High Specific Activity (SA) Co-60: Nickel-plated cobalt-59 pellets are irradiated in NRU for two to four years, becoming High SA Co-60. The High SA Co-60 produced in NRU is primarily used in cancer treatment applications.
- Iridium-192: Used as intense source of radiation for industrial imaging, including radiography and weld inspection. Also used in portable units for cancer therapy and radiography.

A Foundation for the Industry

The NRU reactor does not generate electricity, it generates knowledge. The reactor serves as a cornerstone of the entire Canadian nuclear power industry, and continues to be an essential component in the development of CANDU® nuclear reactor designs. Inside NRU, a nuclear reaction occurs, just as in a full-scale CANDU reactor; however, NRU is strictly a research tool. It contains testing equipment allowing scientists and engineers to put new fuels or materials into the reactor and see how they behave. NRU is a unique facility in Canada providing knowledge that helps CNL build safer and more efficient nuclear power plants.

From fuel testing, to materials and component life cycle work, to industry-leading safety and design work, this reactor continues to offer the Canadian nuclear industry the support it needs to lead the nuclear renaissance. This reactor stands as a shining example of a true Canadian success story, and the foundation in the development of the nuclear industry in this country. Domestic nuclear power generation prevents millions of tonnes of greenhouse gas emissions each year by reducing Canada's use of fossil fuels, a breath of fresh air for millions of Canadians.

At 6:10 a.m. on November 3, 1957, the NRU reactor reached criticality for the first time. The NRU reactor was a landmark achievement in Canadian science and technology, and now, five decades later NRU is still as important a resource as ever.

NRU continues to provide a unique facility for scientists across Canada through the work of the Canadian Neutron Beam Centre and many other organizations. It was home to Professor Bertram Brockhouse, whose work was honoured with a Nobel Prize in physics, and it produced the fundamental knowledge required to develop, maintain and evolve Canada's fleet of CANDU® power stations. All the while, NRU leads the world in the production of life-saving medical isotopes to the benefit of millions of people around the globe each year.