CANADIAN INSTITUTE FOR NEUTRON SCATTERING

Planning to 2050 for Materials Research with Neutron Beams in Canada

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National Laboratory to Replace Aging Chalk River Reactor

Canadian Scientists Describe the Proposed Canadian Neutron Centre

MONTREAL, CANADA, May 19, 2009 – The Canadian science community that uses the neutron beams produced by the NRU reactor in Chalk River has released its plan to replace it with a national laboratory.

"The public has been told in the media that there is no plan to replace the NRU reactor," says Dr. Dominic Ryan, President of the Canadian Institute for Neutron Scattering (CINS), "But there is a plan. The proposed facility is called the Canadian Neutron Centre (CNC)."

Today, CINS released its description of this visionary facility summarized for non-scientists on its website (www.cins.ca). At the request of the National Research Council (NRC), CINS compiled the required scientific details for the CNC for research with neutron beams.

According to CINS' plan, this national laboratory will surpass the NRU reactor in all three of the aging reactor's missions. Those missions are (1) the production of medical isotopes, (2) nuclear energy R&D, and (3) materials research using neutron beams.

The proposed CNC will be centred on an NRU-like reactor modified to take full advantage of advances in technology and safety measures. Completed in 1957, the NRU reactor has had a long successful history, unlike the MAPLE reactors, which were plagued with problems.

"That we were asked to produce our plan for the CNC shows that this is being seriously considered within the federal government," said Dominic Ryan. "Representatives of the nuclear and isotope communities have also

been asked to document their design-requirements for a new facility, but those plans have not been published."

"To move this plan forward, we recommend the creation of a government-mandated steering group that reflects the vision for the CNC as national infrastructure for science and industry. That vision is central to the success of the plan. The CNC is not an issue of medical isotopes, nor is it an issue of AECL's future. It's much broader than that. The CNC is needed for the competitiveness of Canadian science and industry for the next 50 years."

"We worked closely with fellow scientists from the NRC Canadian Neutron Beam Centre (NRC-CNBC) to produce this plan," Dr. Ryan said.

The NRC-CNBC in Chalk River is Canada's scientific hub for research using neutron beams as probes of materials. Neutron beams are versatile tools used to determine fundamental properties of materials, information that often cannot be obtained by any other means. Since everything is made of materials, even our own bodies, materials research using neutron beams has a broad range of applications.

"The neutron beam laboratory at the CNC will be an excellent fit with Canada's science and technology strategy," said Dr. Ryan. "It will support a wide spectrum of basic research, and will also contribute significantly to all four of Canada's priority areas."

The federal science and technology strategy, released in May 2007, seeks to balance Canada's needs to diversify basic research with focusing on priority areas of strength and opportunity. Howard Alper, Chair of the Science, Technology and Innovation Council, has suggested that 30% of research in Canada should be for priority areas, while 70% should be for a broader spectrum of basic research.[1] The strategy identifies Canada's four priority areas as: environmental science and technologies, natural resources and energy, health and related life sciences and technologies, information and communications technologies (ICT).

While scientists all over Canada use neutron beams for their diverse research programs, many of these programs are in these priority areas. For example, neutron beams are currently being used at the NRC-CNBC to study hydrogen storage materials toward greener vehicles, to enhance the safety of components in CANDU power plants and improve nuclear fuels, to develop targeted drug delivery systems for enhanced medical diagnosis and

[1] Howard Alper. News Conference of the Science, Technology and Innovation Council. National Press Theatre, Ottawa. May 5, 2009.

treatment, and to study novel materials which promise innovations in electronics, the backbone of the ICT industry.

While the plan focuses on the use of neutron beams for research, it also recognizes that the CNC is needed for Canada's future in the nuclear energy industry and isotope production.

A 27-day shutdown of the NRU reactor in late 2007 showed that the age of the reactor puts the medical isotope supply at risk. To find global solutions to secure the supply of medical isotopes, Canada initiated an international forum in Paris held in January that included eighty participants from 16 countries.

"Talking with other countries to coordinate the medical isotope supply is important. But why would other countries agree to coordinate the supply with us, unless we bring our own source of isotopes to the table?" asked Dr. Ryan. "The need to invest in a reactor source of isotopes for the long term is inescapable. Despite the appearance of a crisis, the answer is obvious: we have a ready-made solution. The NRU reactor has served us well for 50 years, and the CNC will build on that success."

Currently, revenues from isotope sales would not significantly offset the costs of construction of a new NRU-like reactor beyond the incremental costs of the isotope production. This is due to long-term guaranteed supply contracts between AECL and MDS Nordion that determine the isotope prices. The most recent was a 40-year contract in 2006 as an attempt to settle quarrels over the MAPLE reactors. When the MAPLE project was cancelled in 2008, MDS filed a $1.6 B lawsuit against AECL.

"Canada is effectively subsidizing the US healthcare system by selling medical isotopes at unsustainably low prices," asked Dr. Ryan. "But the CNC is an opportunity to finally move beyond the historic problems of the isotope industry. Given a more appropriate business model, revenue from isotope sales would easily eliminate the price tag as an objection to the CNC."

Recently, MDS Nordion and TRIUMF announced a collaboration to investigate production of Mo-99, an important medical isotope for diagnosis, using accelerators. Although this technology is intended to eliminate proliferation concerns with respect to the use of highly enriched

uranium to produce Mo-99 in reactors, no technical reasons prohibit production of Mo-99 from low-enriched uranium with new reactors.[2]

"It is unfortunate that the some media reports have presented accelerators as an option to replace the NRU reactor, when even TRIUMF and MDS Nordion aren't saying that for many good reasons," said Dr. Ryan. "Their proposal is a long-term research and development program toward a single-product solution that must overcome major scientific and economic problems. Considering that it may take up to 10 years to transition to the new CNC, a decision is needed soon."

About CINS

The Canadian scientific community of neutron beam users is organized within the Canadian Institute for Neutron Scattering (CINS). CINS promotes scientific research with neutron beams. Incorporated in 1989, CINS now has more than 400 members, including about 300 Canadian academics, with other members from industry, government laboratories and foreign institutions. Canadian neutron scattering researchers and students are found in over 50 university departments, which are distributed among more than 20 universities spread across every province of the country. There are currently 15 institutional members who pay fees that are applied to encourage scientific research using neutron beams, and to ensure access for the Canadian neutron scattering community to competitive research facilities.

SOURCE: CINS

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[2] *Medical Isotope Production Without Highly Enriched Uranium.* The National Academies of Sciences. 2009. Prepublication copy. http://www.nap.edu/catalog/12569.html, pp. E.1, E.4.