AECL
R&D CAPABILITIES

AECL
Atomic Energy
of Canada Limited

INTRODUCTION

Atomic Energy of Canada Limited (AECL) is a global nuclear technology and engineering company that designs and deploys CANDU® nuclear power reactors, and various other advanced energy products and services. We support our customers over the entire plant life cycle through our extensive R&D program, design and engineering, construction management, commissioning expertise, nuclear services, and waste management and decommissioning services.

Responsible for the safety, design and licensing R&D of CANDU reactors worldwide, AECL has some of the best test and R&D facilities on the planet.

As a full-service supplier with capabilities spanning all facets of nuclear power plant upgrades, refurbishments and power uprates, AECL and its partners, can provide timely, cost-effective technology solutions to assist utilities in maintaining peak performance and maximizing the returns on their nuclear assets.

AECL is committed to support its utility customers in all aspects of nuclear power operation and maintenance. We provide on-site expertise with around-the-clock support from our engineers and scientists who have access to some of the best test and R&D facilities in the world. AECL maintains the safety, design and licensing R&D that ensures safe and economic operation of CANDU reactors worldwide.

AECL's customers include CANDU and LWR utilities, and many other international organizations. AECL designed and developed the CANDU pressurized heavy-water power reactor and the MAPLE multi-purpose reactor capable of producing medical isotopes. Another AECL core product, the MACSTOR spent fuel storage system, has been successfully deployed in Canada and internationally. In addition, AECL manages construction of plants and facilities worldwide with international partners. CANDU reactors supply ~15% of Canada's electricity and make significant contributions to clean-air energy programs on four continents.

CANDU technology has won international kudos for its safety, economics and ease of operability. To better address public concerns on energy security, air quality and the need for cost-competitive electricity generation, AECL has developed the ACR™ (Advanced CANDU Reactor), AECL's next-generation CANDU nuclear power plant, with evolutionary design features and improved economics.

Canada is one of only a few countries that has developed and successfully marketed a nuclear electricity generating system around the world. Through the CANDU business, Canada retains its option to use nuclear power to avoid massive quantities of greenhouse and acid gas emissions. In the last decade, AECL has successfully completed six CANDU reactors worldwide ahead of schedule and on budget. A seventh unit, Cernavoda 2 in Romania, is currently under construction.

AECL'S R&D CAPABILITIES

The majority of AECL's R&D activities are carried out at its premier research and development facility, the Chalk River Laboratories (CRL), located about 200 km northwest of Ottawa. Customer-focused and ever ready to collaborate with its clients on innovative and creative solutions, CRL staff are world experts in applied physics, metallurgy, chemistry, biology and a variety of engineering disciplines.

Located at CRL, the National Research Universal or NRU is the world's third largest research reactor. This superior R&D facility continues to test fuels and materials for the advancement of the existing CANDU and new Advanced CANDU Reactor (ACR™) designs, provide neutrons for the National Research Council's neutron scattering program and produce the majority of the world's medical isotopes used in the diagnosis and treatment of cancer and other life-threatening diseases.

AECL
Atomic Energy of Canada Limited

NUCLEAR R&D FACILITIES

The highly sophisticated facilities located at the CRL site provide a platform for the production, use and study of highly radioactive materials. The many systems, facilities and programs that are in place enable us to carry out all our R&D and other activities in compliance with health, safety, environmental, and regulatory requirements. The major nuclear facilities and services utilized in support of the national nuclear program include:

- Research reactors (e.g., the National Research Universal (NRU) research reactor)
- Isotope production reactors (e.g., two new MAPLE reactors are being commissioned and will be operated by AECL for MDS Nordion)
- Shielded facilities (hot cells)
- Nuclear materials production (e.g., fuel fabrication)
- Nuclear labs and experimental facilities
- Shops for radioactive materials

In addition to the major nuclear facilities, additional specialized R&D facilities are required to support AECL's customers. These include scientific instruments, dedicated laboratories and large integrated test facilities such as:

- ZED-2: a critical facility used to investigate reactor physics phenomena and measure key reactor physics parameters
- Recycle Fuel Fabrication Laboratory: a specialized laboratory for the fabrication of fuels that require isolated handling procedures
- Fuel fabrication laboratories: a suite of laboratories used to fabricate fuel for irradiation experiments in research reactors, and to develop fuel manufacturing technology
- Biological Research Facility: a specialized facility for studying the effects of ionizing radiation on small mammals in a controlled environment
- Environmental test facilities: facilities (many based in the field) used to investigate the movements and effects of radioactive materials on the environment, and to develop methods of treating effluents and mitigating releases
- Engineering Technologies facilities: a suite of test rigs and development facilities for reactor components (e.g., pump seals, valves, joints, etc.) and non-destructive examination techniques
- Thermalhydraulics facilities: a set of loops circulating water and modelling fluids (e.g., freon, CO_2) at various temperatures and pressures to investigate thermalhydraulic phenomena for reactor systems
- Fission product research laboratories: laboratories to study the behaviour of fission products that may be released from failed fuel
- Chemistry and component test loops: loops and autoclaves used to study the chemistry of reactor systems, and the corrosion behaviour of reactor materials and components
- Surface science laboratories: specialized instruments for the examination of surfaces on a microscopic scale
- Materials science laboratories: laboratories that can be used to characterize the behaviour of reactor materials, and in particular can be used to study cracking mechanisms for zirconium alloys. An important parallel capability is maintained for characterizing highly radioactive materials in the hot cells
- Analytical chemistry laboratories: a suite of laboratories and specialized instruments used for analytical chemistry techniques

For more information, we invite you to contact:

Michael Ingram
General Manager
Engineering Services and Customer Relations

AECL
2251 Speakman Avenue
Mississauga, ON L5K 1B2 Canada
Tel.: (905) 403-7449
Fax: (905) 403-7357
Email: ingramm@aecl.ca
www.aecl.ca

Wayne Inch
Director
Business, Nuclear Laboratories

AECL
Chalk River Laboratories
Chalk River, ON K0J 1J0 Canada
Tel.: (613) 584-8811 ext. 3788
Fax: (613) 584-8224
Email: inchw@aecl.ca
www.aecl.ca