



AECL  
The Renaissance of the Nuclear Industry



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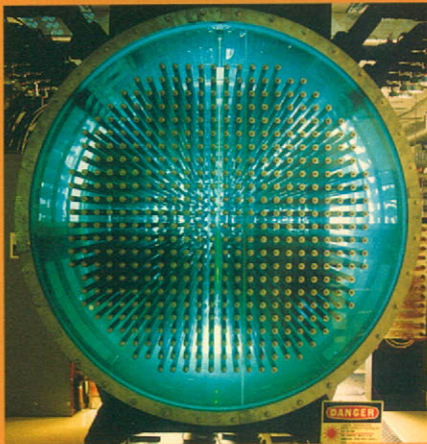
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# NUCLEAR RENAISSANCE

Test model of a CANDU reactor



Energy is a critical resource. It fuels our homes, our businesses and our industry, and it affects our quality of life. Six billion people live on our planet today. Two billion of them have never experienced the benefits of electricity. Already supply lags demand in many areas of the world. And due to use of carbon-based fuels, greenhouse gas and acid rain emissions are already reaching harmful levels.

Today, one of the keys to advancing our civilization, and protecting the health of our planet and our people, is nuclear energy. It provides 16 per cent of the world's electricity, outranking all other sources as a clean, efficient, economic, large-scale primary energy source. Deregulation of the electricity supply industry has led to a transformation in nuclear utility management, with a greater focus on well-run plants and high availability and capacity factors. Older plants are now being refurbished to provide cost-competitive electricity. In Asia, nuclear plants are under construction and, in other countries, new reactors are once again under consideration.


Nuclear energy, combined with strategic use of other energy sources, can lay the basis for a thriving 21<sup>st</sup> century global economy built on clean energy. Atomic Energy of Canada Limited (AECL) is proud to be a part of this emerging nuclear industry renaissance.



# CORPORATE PROFILE







AECL is a world-class nuclear technology and engineering company providing customers with a full range of advanced energy products and services. AECL is the total nuclear solutions company—from R&D support, nuclear services, design and engineering to construction management, specialist technology, and waste management and decommissioning.

As a full-service supplier in the rapidly growing business of nuclear power plant life extension, upgrading and refurbishment, AECL provides timely, cost-effective delivery of technology solutions to assist utilities in maintaining peak performance of their nuclear assets.

AECL is committed to support its customers in all aspects of nuclear power technology management. We provide on-site expertise, closely supported by our nuclear science laboratories, testing capability and engineering facilities. AECL maintains the safety, design and licensing, research and development (R&D) that ensures safe and economic operation of CANDU® reactors.

AECL's customers are utilities and other clients around the world. AECL designed and developed the CANDU pressurized heavy water reactor, the MAPLE reactor and the MACSTOR® spent fuel storage facility, and manages construction of plants and facilities worldwide with international partners. The CANDU reactor supplies about 12 per cent of Canada's electricity and is an important component of clean-air energy programs on four continents.

To meet public concerns about energy security and air quality, as well as the need for cost-competitive electricity generation, AECL is developing the Next-Generation (NG) nuclear power plant. This new technology builds on knowledge of proven CANDU materials, components and systems, and on feedback from the utilities that have operated CANDU plants, some for more than 30 years. AECL's new reactor design can be sized to meet customer requirements and incorporates pre-fabricated modules, which will result in faster construction, greater efficiencies and lower cost.

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. The nuclear industry provides 30,000 high-quality, high-tech jobs for Canadians and makes a positive contribution to Canada's GDP of about \$6 billion per year.

As of March 31, 2001, AECL employed 3,306 full-time staff in Canada and overseas. AECL was established in 1952 as a Crown corporation. AECL's major research and commercial facilities are located at Chalk River and in Mississauga, Ontario.



# LETTER OF TRANSMITTAL

The Honourable Ralph Goodale, P.C., M.P.  
Minister of Natural Resources  
House of Commons  
Ottawa



CANDU calandria

Dear Minister,

In accordance with subsection 150(1) of the *Financial Administration Act*, I am pleased to submit the Annual Report of Atomic Energy of Canada Limited (AECL) for the fiscal year ended 2001 March 31.

You will no doubt be aware of the growing international sense that nuclear energy is poised for what some are terming a “renaissance”. I am of the firm belief that this is indeed the case. Numerous recent media reports have been positive towards nuclear for the very reasons we have been putting forward for years—clean, safe, reliable and economic.

I look forward to a renewed mandate for AECL to play a major part in this future direction by ensuring current reactors operate safely and economically, by developing Next-Generation (NG) nuclear technology to meet emerging energy needs and by expertly managing the legacy of past nuclear policy decisions.

AECL is already part of the strong growth industry surrounding nuclear services. We have participated with New Brunswick Power, Ontario Power Generation (OPG), Bruce Power and Hydro-Québec in refurbishment and other business opportunities. AECL continued to record positive financial results for 2000-2001 due in part to the nuclear services business.

In our offshore projects, good progress is being made in the construction of two CANDU 6 reactors at the Qinshan site in China, and in Romania with the anticipated completion of Cernavoda Unit 2. Also in Romania, AECL was successful in the competition for spent fuel storage at Cernavoda Unit 1.

Discussion continued with the government on the Canadian Neutron Facility (CNF), the proposed research reactor to ultimately replace NRU. AECL supports the CNF and plans to keep NRU in operation until a replacement nuclear research facility can begin operation.

I believe AECL has made significant progress in bringing the MAPLE medical isotope reactor project to fruition for the customer, MDS Nordion. We await approval from the Canadian Nuclear Safety Commission to resume nuclear commissioning. The MAPLEs, when operating, will produce more than 60 per cent of the world’s key medical isotopes, in particular, molybdenum-99, widely used in cancer and heart disease diagnostics.



The Research and Development Advisory Panel to the Board of Directors—including experts from across Canada—once again provided a rigorous review of AECL's R&D activities, independently assuring the Board that the programs have the appropriate quality, scope, composition, and balance between short- and long-term activities.

The first MOX fuel bundle containing U.S. and Russian excess weapons plutonium was loaded into NRU in December, a key milestone in this important non-proliferation initiative. In a good example of public-private sector cooperation, AECL and Zircotec Precision Industries, a Canadian nuclear fuel manufacturer, signed a manufacturing royalty agreement for AECL's next-generation CANFLEX fuel bundle. Previously, CANFLEX passed a demonstration irradiation test in New Brunswick's Point Lepreau Generating Station with flying colours.

I congratulate the government on introducing the *Nuclear Fuel Waste Act*. This proposed legislation is a major step forward in dealing with nuclear fuel waste in Canada and will ensure the long-term management of nuclear fuel waste will be carried out in the best interests of Canadians.

On behalf of the Board I would like to sincerely thank Allen Kilpatrick for his excellent service to the corporation as Vice-President Marketing and Sales, and as President and CEO for the past two years. We wish him the very best in retirement. I am pleased to welcome Marcel Aubut as a new member of AECL's Board of Directors. I thank outgoing member Karen Pitre for her valuable contribution.

I take great pleasure in welcoming Robert Van Adel as President and CEO of AECL. The Board of Directors heartily endorses Bob and his vision of AECL as a full nuclear life-cycle solutions provider. We strongly support his strategic plan for AECL as a strong commercial enterprise going forward.

As you know, this will be my last *Letter of Transmittal*. I have welcomed my opportunity as Chairman of the Board to contribute to AECL's progress. I believe the corporation is now well positioned to participate fully in the renaissance of nuclear energy, and I wish it well.

Respectfully,



Robert F. Nixon, Chairman of the Board





# PRESIDENT'S MESSAGE



AECL delivered a year of solid results in the 2000-2001 fiscal year and I would like to thank my predecessor, Allen Kilpatrick, for his contributions to the corporation during this period. I would also like to thank all our employees for their efforts. We have a well-trained and highly skilled workforce that represents a wide range of expertise.

Financial performance for the year was driven by a doubling of revenues from AECL's nuclear services business and the ongoing CANDU 6 construction project in China, which AECL leads. Excellent progress was made, as well, in preparing for the next construction phase of Romania's second CANDU 6 reactor.

In terms of new sales of AECL's CANDU 6 and CANDU 9 reactor products, the outlook is mixed. While some international sales have been deferred, there is renewed interest in certain key markets, including Canada. At the same time, the nuclear services business continues its rapid growth.

CANDU utilities in Ontario, New Brunswick and Québec are either planning or undertaking reactor life extension. Canada's largest utility, Ontario Power Generation (OPG), plans to return refurbished reactors to service in the coming year. British Energy, a global nuclear company and newcomer to the Canadian scene, has entered into a long-term lease of OPG's Bruce nuclear station through Bruce Power Inc. Bruce Power has declared its intent to refurbish two of the Bruce A reactors. In Atlantic Canada, New Brunswick Power has also expressed its intent to extend the life of its Point Lepreau station. AECL is well positioned to meet the needs of these and other CANDU customers, given our historic role as CANDU developer, designer, builder, and services provider.

The economic benefits of refurbishing and life-extending nuclear power plants are well known. Even more importantly, Canada's reactors will avoid the release of approximately 100 million tonnes of carbon dioxide annually, a significant contribution to Canada's commitment to clean air.



In North America and elsewhere, growing demand for electricity, resulting power shortages, concerns about air pollution and climate change, plus the rising cost of fossil fuels, are stimulating a renewed interest in nuclear power. Some government and industry leaders see signs of an emerging renaissance for nuclear energy, which is encouraging. For example, there is discussion of building new CANDU units to export electricity to the growing U.S. market. In Alberta there is emerging interest in applying nuclear as a clean energy source in megaprojects.

In order to better position itself to realize these opportunities and prosper, AECL plans to pursue two overriding objectives. The first is to become a total nuclear solutions company, creating value for our customers and shareholder by offering products and services covering the nuclear life cycle. Accordingly, AECL will effectively manage Canada's nuclear platform and obligations, deliver timely technology-based services, and aggressively pursue the refurbishment and life extension business. AECL will also lead the R&D effort to leverage 60 years of Canadian nuclear expertise and develop Next-Generation (NG) technology for a made-in-Canada energy option. This advanced NG technology will be modular, lower-cost, faster to build and fully competitive in deregulated electricity markets. AECL plans a project-ready launch for the new reactor in time to enter the market in advance of other vendors.

The new AECL needs to be driven by the incentives and flexibility inherent in a commercial approach to managing its businesses as a total solutions enterprise. To progress towards financial self-sustainability, we intend to grow revenues and maximize earnings from commercial opportunities. Research and product development will be managed according to self-correcting market disciplines. AECL will deliver its mandate cost-effectively, emphasizing efficiency, accountability, and transparency to enhance shareholder and customer value.

Guided by this enterprise approach, a renewed AECL will ensure that Canada has the option to deploy a new generation of world-class and competitive nuclear energy technology. Going forward, AECL will build upon the impressive contributions it has already made to Canadian science and engineering, while enhancing the enormous economic, environmental and human health benefits of which all Canadians can be proud.



Robert Van Adel, President and CEO





# CORPORATE GOVERNANCE



This fiscal year was an important year for governance activities at AECL. Among the most significant activities that can be undertaken by a Board is the selection of a President and Chief Executive Officer. With the retirement of Allen Kilpatrick, the Board actively took part in the search for a successor, conducting interviews with potential candidates and making the final recommendation on succession to the Minister of Natural Resources and to the Privy Council Office.

An evaluation of the effectiveness of all Committees of the Board was completed, with the results discussed at each individual Committee and recommendations implemented.

The annual Board workshop with Executive Management was held in November, and an orientation session for new Directors also took place.

Officials from the Office of the Auditor General attended a meeting of the Committee on Corporate Governance to review the key findings set out in the Report of the Auditor General on Governance of Crown Corporations recently tabled in the House of Commons.

The Board and this Committee are committed to continuously enhance the governance of AECL and look forward to an active year ahead.



# CORPORATE OBJECTIVES



AECL's primary objective, through a further-enhanced customer focus, is to continue to build on and expand the successes achieved through Canada's investment in nuclear technology, while moving towards enhanced commercial viability. In support of this goal, AECL's Corporate Objectives for 2000-2001 were as follows:

## **1) Achieve Financial Targets**

AECL has been financially successful in its commercial activities in the past, and will continue to do so in the future. The flat reactor market in the short term will be offset by demonstrated growth in the nuclear products and services market.

## **2) Pursue New Opportunities to Secure Services Revenues**

AECL will capitalize on the current trend for utilities to refurbish existing plants. AECL is assuming the role of full-service partner with utilities to assist with plant-life extension and upgrading on a commercial basis. To achieve this objective, AECL will deliver cost-effective, timely technology solutions.

## **3) Secure Sale of New Reactors**

The reality is that the market for new sales remains flat for the short term. However, there are strong indications that there will be a renaissance of nuclear, particularly in the United States. AECL is developing a new generation of CANDU reactors to be available to meet the needs of customers in this new, emerging market. We will provide further-improved technology to meet existing and emerging energy needs.

## **4) Renew Mandate with Federal Government**

Since the 1995 Program Review, there have been significant reductions in shareholder funding for research and development (R&D). AECL continues to engage the shareholder regarding funding for policy obligations, including R&D supporting safety, design and licensing activities for existing CANDU reactors, and the ongoing movement towards self-sufficient viability for its commercial activities, led by a growing nuclear products and services business.

## **5) Address Public Acceptance of Nuclear Power and AECL**

While Canadians in general, and Ontarians in particular, recognize the benefits of nuclear-generated electricity, more needs to be done in educating the public. AECL is cooperating with the Canadian Nuclear Association (CNA) and other key Canadian nuclear stakeholders to address this need, with a particular focus on clean air, and reliable, economic supply of electricity.

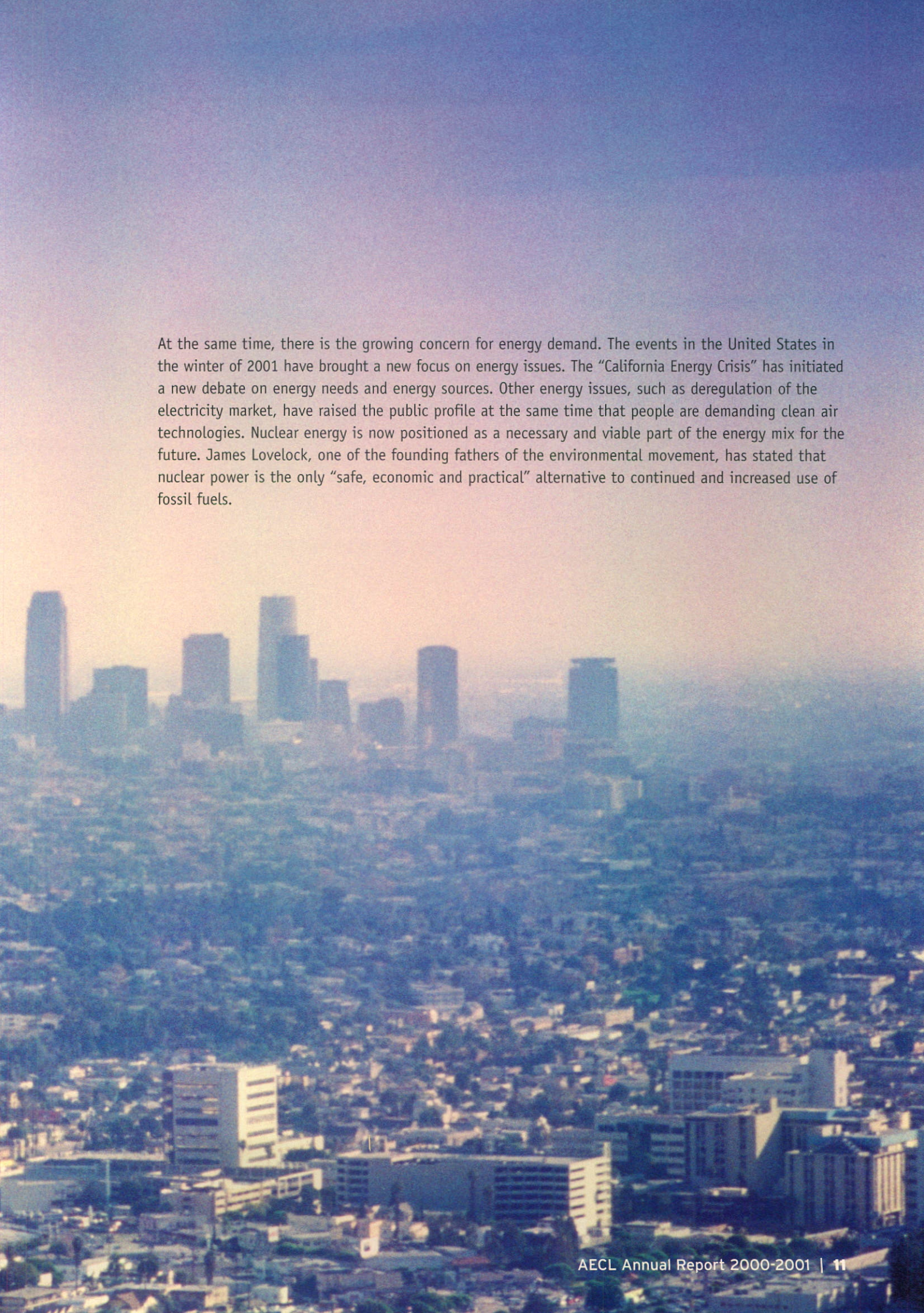


# NUCLEAR TECHNOLOGY AND CLEAN AIR

Research clearly shows that the public is aware of the potential for smog and pollutants to have an immediate and detrimental impact on their health. While concern for climate change is growing, it still lags behind the overall concern for clean air.

Research indicates that the climate change issue and the international discussion surrounding emissions reductions are not well understood and have yet to register with people as a personal issue. What is clear is that Canadians are highly resistant to actions on smog or greenhouse gases that involve personal lifestyle changes.





At the same time, there is the growing concern for energy demand. The events in the United States in the winter of 2001 have brought a new focus on energy issues. The “California Energy Crisis” has initiated a new debate on energy needs and energy sources. Other energy issues, such as deregulation of the electricity market, have raised the public profile at the same time that people are demanding clean air technologies. Nuclear energy is now positioned as a necessary and viable part of the energy mix for the future. James Lovelock, one of the founding fathers of the environmental movement, has stated that nuclear power is the only “safe, economic and practical” alternative to continued and increased use of fossil fuels.





Given the low emissions of nuclear plants, extending the life of existing nuclear power plants is a key component in addressing clean air quality initiatives and working towards meeting greenhouse gas emission reductions. Many utilities around the world have made such commitments. For example, Ontario Power Generation (OPG) is returning its four units at the Pickering A station to service, as they provide an economical and environmentally responsible option for electrical generating capacity.

The use of CANDU technology to generate electricity has avoided, to date, more than one billion tonnes of carbon dioxide emissions, 11 million tonnes of sulphur dioxide and 2.5 million tonnes of nitrogen oxides. In addition, no particulates are released, thus avoiding any contribution to smog production. CANDU reactors have proven to be a key part of the clean air solution, and without them, Canada's greenhouse gas reduction targets and the public demands for clean air would be virtually impossible to achieve. For example, without the CANDU reactors in Ontario, the air quality in the southern region of the province would suffer and greenhouse gas and acid rain emissions would increase by 15 to 20 per cent.

#### **Canada's Voluntary Climate Change Challenge and Registry (VCR)**

In October 2000, AECL submitted its *Action Plan for Reducing Greenhouse Gas (GHG) Emissions* to the Voluntary Climate Change Challenge and Registry (VCR). The *Action Plan* presents a profile of AECL's GHG reduction performance at its Canadian facilities for the period 1990 - 1999 together with a statement of its commitment to further reductions in the period from 2000 - 2005.

Setting a strong example for other enterprises in the nuclear industry, AECL has reduced its GHG emissions by 47 per cent since 1990, and has documented a reduction of almost 71,000 tonnes of CO<sub>2</sub>e. Among the initiatives that have contributed toward these reductions are:

- significant improvements in the energy efficiency of our buildings
- replacement of refrigerants with less environmentally harmful equivalents, and improved procedures to recover refrigerant and reduce leaks
- reduced GHG emissions from our vehicle fleet by using less emissions-intensive fuels such as ethanol and propane
- improved efficiency of research and process operations





AECL's commitment to further reduce its GHG emissions by 20 per cent below 1999 levels by the year 2005 represents a reduction of 16,000 tonnes of CO<sub>2</sub>e. AECL will achieve this new target by continuing to support established environmental policies and procedures, including a continued commitment to investigate cost-effective energy management measures.

VCR Inc. awarded AECL with a Gold Champion Level Reporter Status for its *2000 Action Plan for Reducing Greenhouse Gas Emissions*. AECL earned the highest honour awarded by surpassing the rigorous reporting standards of VCR's Champion Reporting System.

AECL also received a prestigious Leadership Award at VCR Inc.'s *Annual Council of Champions and Leadership Awards Ceremony* in March 2001.

### **The ABC Program**

As part of AECL's commitment to help Canada meet its Kyoto commitments, AECL continued to support the *Action By Canadians*<sup>®</sup> (ABC) Program. The ABC Program is a unique national-level public education and action initiative designed to engage Canadians in voluntarily reducing their GHG emissions. The ABC Program provides employees with the knowledge and tools they need to understand the link between climate change, greenhouse gases and energy use, as well as actions that individuals can take to reduce GHG emissions.

In the past fiscal year, AECL employees pledged to reduce a total of 243 tonnes of CO<sub>2</sub>, equivalent to planting 26,300 trees, or 47 cars removed from the road per year.

### **Multi-Stakeholder Initiatives**

AECL has been an active participant in various multi-stakeholder initiatives such as the *Pilot Emission Reduction Trading* (PERT) project and the *Greenhouse Gas Emission Reduction Trading* (GERT) pilot. AECL has also partnered with national environmental organizations to participate in *Earth Day* and *Environment Week* activities.





# COMMUNITY RELATIONS

Throughout 2000-2001, AECL continued to actively engage in community relations and public information programs designed to foster awareness and understanding of the company's activities at its various sites.

Good progress was made in establishing and nurturing new and existing relationships with elected and appointed officials, business associations, service groups and neighbouring communities, via briefing sessions, educational initiatives and partnerships with local schools, public tours, open houses, media relations, public consultation programs, distribution of information materials and participation in community events. All of these initiatives focussed on enhancing science literacy, promoting science in technology and further opening lines of communications with surrounding communities.

The *Science for Educators Seminar* celebrated its 25<sup>th</sup> anniversary at Chalk River Laboratories (CRL) in April 2000. This unique three-day program for teachers of all levels provides valuable hands-on experience and networking opportunities with practising researchers and peers.

In January 2001, nearly 100 participants registered for a two-day science communications workshop entitled *Can we speak a common language?*, sponsored by AECL, the Canadian Nuclear Society and other organizations, held at the Bedford Institute of Oceanography in Nova Scotia. Journalism, public relations, and science students met with professional journalists, public relations practitioners and scientists to gain a mutual understanding for each other's work and to develop effective methods for bridging the scientific communications gap.





Visitors at Chalk River Laboratories

AECL is a proud research partner with the Deep River Science Academy, which currently has campuses in Ontario and Manitoba. Aimed at Canadian high school students, the Academy offers an exciting and unique six-week summer program of academic course work and research on real scientific projects. AECL also sponsors regional science fairs across the country as part of its commitment to promote science and technology with Canadian youth.

Active partnerships continued with the Ontario Science Centre's *Teacher in Residence* program and the *Yes I Can!* project, hosted by York University's Faculty of Pure and Applied Science. The *Teacher in Residence* program seconded skilled teachers to the Ontario Science Centre where they collaborate to develop programs for more than 200,000 students from kindergarten to high school. The *Yes I Can!* project, is a web-based program that allows elementary and secondary teachers to research a database of more than 5,000 resources.

Openness and transparency about AECL's site operations is key to maintaining positive relationships with local communities. More than 7,500 visitors toured the Chalk River site in 2000-2001 and another 1,400 took advantage of a public open house, held in September 2000.

A local media event was held in August 2000 to announce the expansion of Chalk River's community relations program. Two new bilingual publications were introduced: *It's time to clear the air* and a quarterly newsletter, *CRL Community News*. Both publications were provided to more than 33,000 households and businesses throughout Renfrew and Pontiac Counties.

Improving the quality of life for the people in their communities is important to AECL employees. In 2000-2001, staff at AECL sites collectively contributed \$150,000 to the United Way campaign.



Fuelling machine ram assembly

## SERVICES IN SUPPORT OF OPERATING CANDU PLANTS

Deregulation of electricity supply has led to a greater focus on well-run plants with high capacity factors. Utilities are looking more and more to refurbishing older nuclear power plants as a way to increase their investment and provide an electricity source that does not emit greenhouse gases. As the designer of the CANDU reactor, AECL is a technology leader capable of delivering complete project management, as well as engineering, manufacturing and field services, and is moving towards risk- and benefit-sharing partnerships with CANDU utilities.

### **Bruce Power**

In 2000, AECL was engaged by Bruce Power to lead a detailed inspection and condition assessment of the fuel channels and steam generators and preheaters in Bruce Units 3 and 4, while others were assessing other systems in those units. This was the largest inspection job ever undertaken in a CANDU plant. AECL's work, in cooperation with subcontractors, was concluded in March 2001, and shortly after, Bruce Power announced its decision to restart the units and to begin to issue contracts for work to support the restart.

### **Hydro-Québec**

AECL is providing technical support to Hydro-Québec during Phase I of the Gentilly 2 Plant Life Management feasibility study, in order to help Hydro-Québec's senior management evaluate the cost and economics of refurbishing the 18-year-old CANDU station.

### **Korea Hydro and Nuclear Power Company**

In November 2000, AECL signed a contract with the Korea Electric Power Company (KEPCO)—now known as the Korea Hydro and Nuclear Power Company (KHNP)—for the engineering and design and related services for a Tritium Removal Facility at the Wolsong site. The facility is scheduled to be in service in 2005.

KHNP purchased an AECL Fuel Channel Inspection System, together with AECL's latest material sampling system, which is used to remove pressure tube material for hydrogen analysis. It is to be delivered in 2001.

A major milestone was achieved with the successful completion and shipment of the first spare fuelling machine, on schedule, to Wolsong Units 2, 3, and 4 in March 2001. This was a major deliverable on a competitive contract placed with AECL in 1997, and this is the first complete fuelling machine to be fully manufactured, assembled and tested by AECL.

AECL supported the Wolsong Unit 2, 3 and 4 plant outages by providing products and services that were required for preventive maintenance. The last unit, Wolsong Unit 4, will complete its warranty period on June 30, 2001.

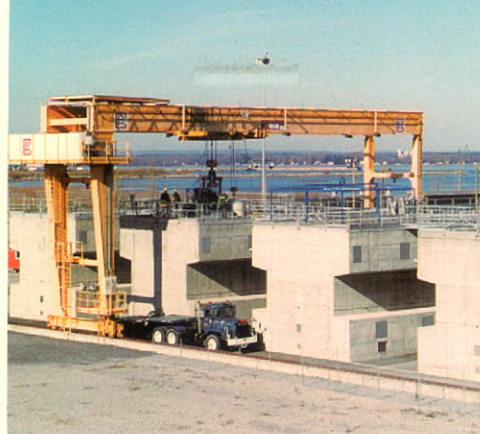
### **New Brunswick Power**

In January 2001, New Brunswick (NB) Power appointed AECL as general contractor to assess the Point Lepreau Nuclear Generating Station and define what refurbishments would be required to extend station





Pickering NGS



MACSTOR



Steam generator cleaning

life by 25 years. NB Power has allocated \$40 million for this task, with AECL performing a portion of the work in-house, and managing NB Power's and subcontractors' staff on the remainder of the work.

Once the assessment is completed in early 2002, NB Power's Board of Directors will compare the costs and benefits of refurbishment and life extension against other generation options. If the decision is made to go ahead, NB Power intends to appoint AECL as project manager and implement a risk- and benefits-sharing partnership.

NB Power and AECL signed a separate agreement, subject to refurbishment project approval, for the complete retubing of all the fuel channels in the Point Lepreau reactor.

#### **Nucleoeléctrica Argentina Sociedad Anónima (NASA)**

During the year 2000, AECL successfully completed the primary-side steam generator (SG) cleaning at the Embalse CANDU station in Argentina. This was to restore the efficiency of primary heat transfer by removing the magnetite deposits on the SG tubes. AECL is a pioneer in the technology to mechanically clean the SG's primary side.

#### **Ontario Power Generation**

AECL continued its support of Ontario Power Generation's (OPG) CANDU units, and had, on average, 125 staff seconded to work at OPG sites throughout the year. AECL continued to play a major role in the Pickering A Return to Service (PARS) project. AECL was contracted as OPG's design agency for this project and is undertaking the nuclear steam plant and balance-of-plant engineering. This work has been primarily focussed on Unit 4—the first unit to be returned to service—and the project schedule has required AECL to build up a resource base of approximately 300 staff. At the end of the fiscal year, with the Unit 4 engineering work nearing completion, AECL was asked to initiate engineering on Units 1, 2 and 3. In addition to the design agency engineering work, AECL is also undertaking work in the overhaul and maintenance of fuel handling systems.

AECL also continues to provide station services to OPG's Darlington Generating Station.

#### **Societatea Nationala Nuclearelectrica SA (SNN)**

In September 2000, SNN—the owner/operator of the Cernavoda nuclear power plant—issued an international call for tender for the supply of an Intermediate Dry Spent Fuel Storage (IDSFS) system to be constructed at the Cernavoda site on a turnkey basis. AECL's successful proposal was based on its proven MACSTOR dry spent fuel storage system. The work, which is being project managed by AECL, is underway.

#### **U.S. Utilities**

Another fiscal year highlight is the successful installation of AECL's CAN8 pump seals at Amergen's Clinton nuclear power plant in October 2000. Clinton is the fifth U.S. nuclear power plant to purchase AECL pump seals for their main reactor pumps.



## REACTOR PROJECTS AND MARKETS

### Asia-Pacific

The Asia-Pacific region is a potential market for nuclear power. Its economy has high potential for growth, given the size of the population and the strong focus on improving the standard of living. In addition, most of the countries in the region have limited options to generate electricity, or would find it advantageous to exploit nuclear and sell their high-grade fossil resources to generate hard currency. AECL has maintained a regional office in Bangkok.

AECL continued to support the Chair in Nuclear Engineering at Chulalongkorn University in Bangkok. This has led to the development of a computer-based, distance-learning program, which enables AECL to offer a comprehensive course on CANDU technology in all of the countries in the region.

### China

Progress on the Qinshan CANDU project continued. Many “first time” successes have been achieved during the execution of this project. These include constructing the reactor building walls in record time, as well as record times for installing major equipment by heavy crane lifts through the open top of the reactor building, and for installing piping systems, including feeders, primary system and calandria piping. Use of advanced systems for planning and executing construction work, combined with the skills of contractor personnel, have resulted in high construction quality with minimal rework.

More than 200 Third Qinshan Nuclear Power Company (TQNPC) operating staff have returned from training at Hydro-Québec’s Gentilly 2 CANDU station, and are continuing their training on the full-scope control centre simulator at the Qinshan site. AECL extended its cooperation with Chinese nuclear institutions and universities and presented a number of technical seminars. AECL is also working with Xi’an Jiao Tong University to produce textbooks and multimedia course materials featuring CANDU technology, and with the Shanghai Nuclear Engineering Research and Design Institute (SNERDI) to develop advanced engineering tools. AECL has agreed with SNERDI to cooperate in providing technical support to the operation of the Qinshan Phase III CANDU plant. Canadian and Chinese manufacturers are also cooperating in the first phase of a study to evaluate the potential localization of CANDU equipment manufacture.

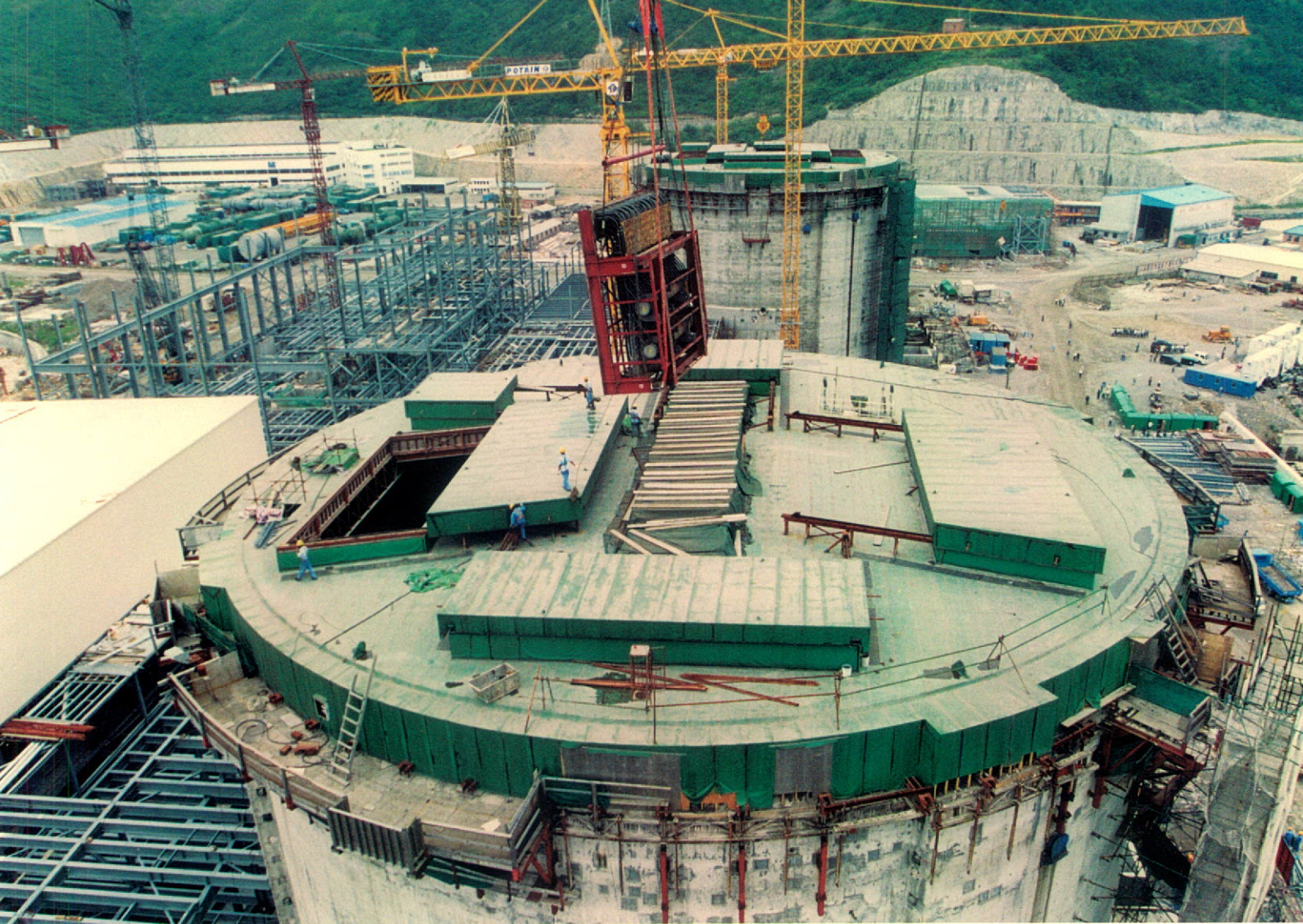
### MDS Nordion Medical Isotopes Reactor (MMIR) Project

In August 1996, MDS Nordion contracted AECL to build two new MAPLE reactors and an isotope processing facility at Chalk River Laboratories. The construction of the facilities was completed in May 2000.

MDS Nordion will have legal title to the new facilities and will manage the commercial supply of isotopes. AECL, as the licensed operator, will operate and maintain the facilities for MDS Nordion.

The AECB—now the Canadian Nuclear Safety Commission (CNSC)—granted operating licences for the first MAPLE reactor and the isotope processing facility in August 1999, and the second MAPLE reactor in June 2000. AECL interrupted nuclear commissioning work in July 2000, after issues with the reactor shut-off rods were identified. Subject to regulatory approval, nuclear commissioning will resume in 2001. Once in operation, the MAPLE reactors and isotope processing facility will provide a secure supply of medical isotopes to the global market for many decades.





Qinshan Phase III site

### **Republic of Korea**

The CANDU reactors at the Wolsong site continued their outstanding performance over the past fiscal year. According to figures from the Korea Hydro and Nuclear Power Company (KHNP), Wolsong Units 2, 3, and 4 have all exceeded a 90 per cent capacity factor since coming into service (data through March 31, 2001). Unit 1, which has been in service since 1983, has a lifetime capacity factor of 85 per cent. In fact, each of the four CANDU units in Korea exceeds the average capacity factor, 84.6 per cent, of KHNP's 16 operating reactors.

### **Romania**

In Romania, Cernavoda Unit 1 continues to operate efficiently. It provides about 10 per cent of Romania's electrical supply, resulting in considerably reduced requirements for imported oil. AECL is continuing incremental work to complete Unit 2, with Ansaldo, an Italian partner, as technical advisors at the site. Negotiations for the contract to complete Unit 2 were concluded in March 2001, and the signing of the contract is expected early in the new fiscal year.

### **Turkey**

In August 2000, the government of Turkey, under pressure from the International Monetary Fund (IMF) to reduce its debt obligations, announced the cancellation of the Akkuyu bid process and deferred the project for a number of years. AECL suspended its activities in Turkey as of September 2000. Turkey's need for increased base-load generation continues to make nuclear an appealing alternative for the future.



# PRODUCT AND SERVICES DEVELOPMENT



NG CANDU computer concept

AECL is continuously evolving its nuclear technology products and services for the twenty-first century, building on our in-depth knowledge of CANDU materials, components and systems, and on feedback from the operating experience of CANDU utilities.

In addition, next-generation systems, components, tools and processes are being developed to meet utility needs to operate reactors safely and cost effectively, and to extend reactor life. Ensuring high capacity factors for CANDU reactors requires effective surveillance and diagnostics, inspection, and increased component life.

## **CANDU 9**

CANDU 9 is AECL's 900 MWe CANDU design. Built on proven technology, the CANDU 9 design incorporates enhancements for safety, constructability, operability and economics. During this fiscal year, the focus of the work on CANDU 9 was to optimize critical paths, reduce construction time, and complete a comprehensive design database, as well as key parts of the Preliminary Safety Analysis Report. The Korea Power Engineering Company (KOPEC) in the Republic of Korea defined the design as "technically sound and safe".

The development work on the CANDU 9 reactor leads to some of the technological advancements found in the next generation of CANDU reactor designs.

## **Next-Generation Nuclear Power Plants**

During this fiscal year, AECL focussed on the development of the conceptual design for a medium-sized next-generation (NG) power plant. This concept retains proven elements of the CANDU design, while making significant innovations, including:

- a more compact reactor core design, reduced in size by a factor of one-third for the same power output
- improved thermal efficiency through higher-pressure steam turbines
- the reduced use of heavy water—one quarter of the heavy water that existing plants require—thus reducing cost
- the use of slightly enriched uranium (SEU) to extend fuel life to three times that of existing natural uranium fuel
- further additions to CANDU's inherent passive safety
- reductions in already low environmental emissions



With these advanced features, it is possible to reduce the capital cost of constructing the plant dramatically—by up to 40 per cent—compared with existing designs. By the end of this fiscal year, the design team had defined its design requirements, and had confirmed the practicality of the next-generation design concept. AECL also continues to develop improvements to project engineering, manufacturing and construction technologies as part of this focus on enabling technologies for the next generation.

### **Plant Life Management (PLiM)**

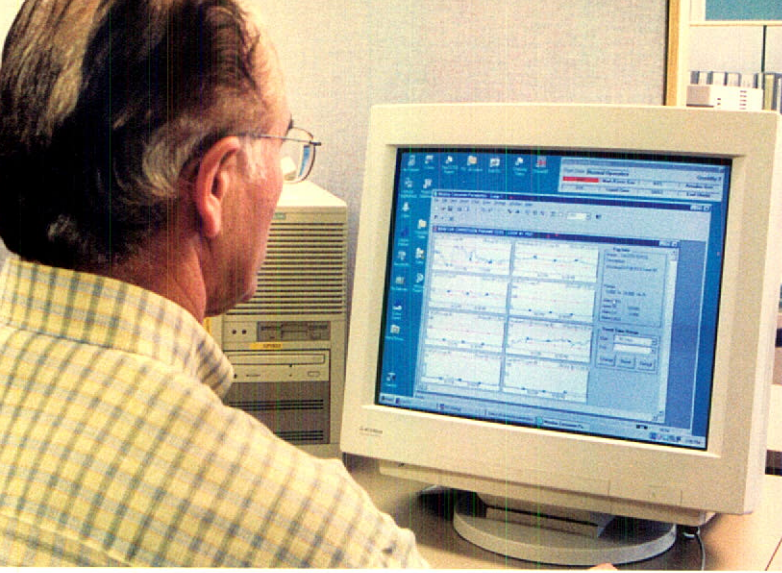
Over the past five years, AECL has worked with CANDU reactor owners to develop and implement a comprehensive and integrated CANDU Plant Life Management (PLiM) program that will keep their plants operating successfully and reliably through to design life and beyond. In this fiscal year, PLiM program work has advanced significantly and has assisted utilities with important decisions regarding plant life extension. More than three-quarters of the detailed life assessments of critical structures and components have been completed, or are well advanced, as are the maintenance optimization studies for about one-half of the critical systems.

In addition to the continuing program with New Brunswick Power for the Point Lepreau Nuclear Generating Station, both Hydro-Québec and the Korea Hydro and Nuclear Power Company have initiated significant PLiM efforts for Gentilly 2 and Wolsong Unit 1 respectively.



Gentilly 2 NGS





ChemAND



IntEC

### **System Health Monitors**

AECL is developing a suite of new power plant life-management products called System Health Monitors (SHM). These will help CANDU utilities to reduce operating and maintenance costs and increase capacity factors through improved surveillance monitoring, targeted maintenance, and avoided unplanned shutdowns caused by equipment failure. Linked to the plant data historian, a SHM will allow operators to compare today's performance with past conditions, enabling staff to target when and where to inspect, and assisting in planning remedial maintenance activities before equipment degrades or fails.

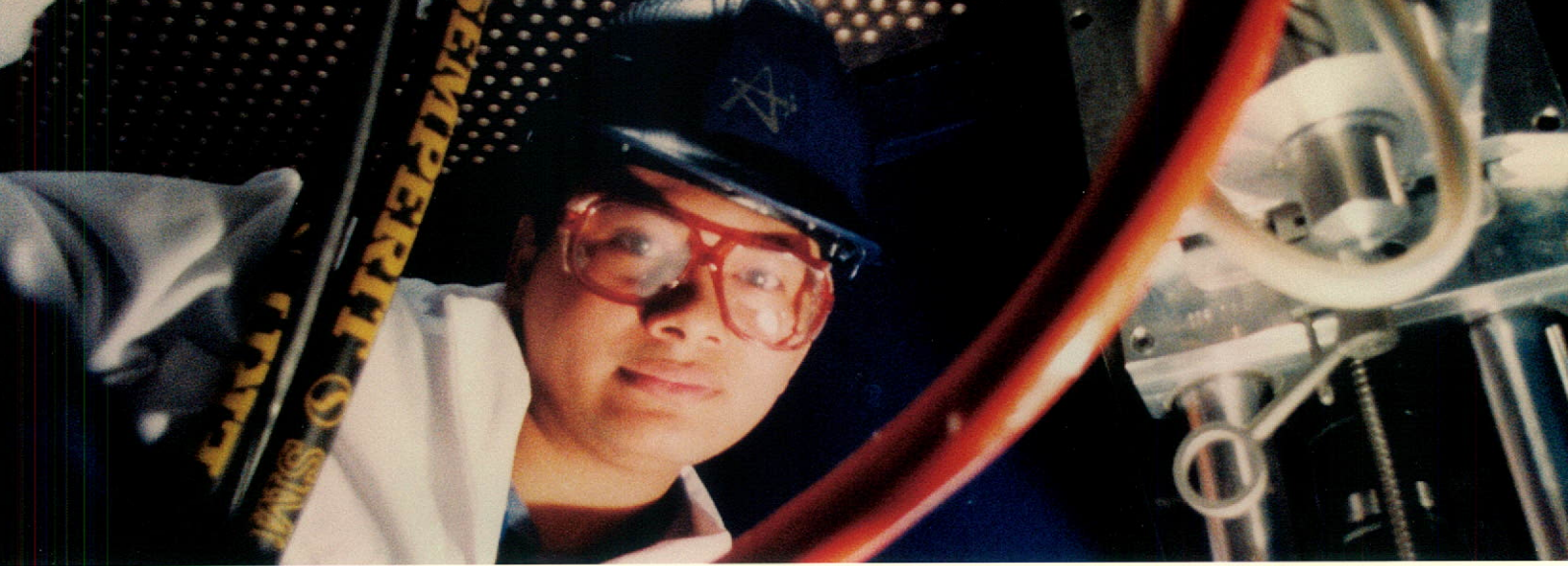
SHMs are an integral part of AECL's strategy to develop a "smart" CANDU with improved tools for monitoring, diagnostics, prediction, analysis and control of key processes in the plant. ChemAND™, a SHM for plant chemistry, has been thoroughly tested at Gentilly 2 and is now commercially available.

### **Wiring & Cabling**

To help designers, constructors and operators of CANDU plants manage the information associated with the 800,000 terminations, 1.25 million metres of cable, and 60,000 wired devices, and to reduce CANDU costs, AECL developed a software tool called Integrated Electrical and Control (IntEC).

Driven by input and feedback from the Wolsong and Qinshan projects, the functionality of IntEC has been enhanced in the past year to strengthen its use as a construction, commissioning and maintenance tool.





Steam generator inspection

### **Inspection and Sampling Tools**

In this fiscal year, AECL refurbished its fast-response fuel channel inspection system with updated control technology and data analysis equipment. It can be quickly deployed to a station with an unexpected shutdown and it is a less expensive alternative when dry channel inspection is appropriate.

This refurbished system is complementary to the state-of-the-art AECL Fuel Channel Inspection System (AFCIS), which is a wet channel system. These two new inspection systems are faster and more efficient than alternative technologies.

The multi-head sampling tool is another current innovation. Analysis of small samples of material removed in-reactor is now the Canadian Nuclear Safety Commission (CNSC) standard for life assessment of CANDU pressure tubes. AECL developed pressure tube sampling in 1987 and has continued to introduce enhancements for improved performance and reduced application time. The current version is capable of obtaining all samples required from a fuel channel in a single visit. It is designed for delivery by AECL's new Advanced Delivery Machine, and reduces sampling time and worker radiation dose.

For the inspection of CANDU steam generators, AECL has partnered with R/D Tech of Québec City to develop a new eddy current probe known as the X-probe. It can be manipulated through many of the less accessible small-radius steam generator tubes, allowing faster steam generator inspections and minimizing reactor downtime.

### **Pump Seals**

Over the past ten years, AECL's pump seal development has produced three- to five-fold increases in seal life, while meeting increasingly demanding operating requirements. A CAN-seal is currently being developed for retrofit in Sulzer-Bingham pumps. This enhanced CAN8 seal design is providing excellent performance in Grand Gulf (U.S.A.), Bruce A and B, Darlington and Clinton (U.S.A.) nuclear plants. They are also being supplied to Qinshan Phase III, Wolsong, Cernavoda and Embalse plants.



# NUCLEAR RESEARCH

AECL ensures that the safety, licensing, and design basis for Canadian nuclear technology is maintained through its R&D programs.

## **Fuel Channels**

A key activity for Fuel Channel R&D is understanding and predicting ageing phenomena, in order to help utilities appropriately manage reactor ageing, and to develop improved fuel channels for future reactors.

When exposed to the hot primary coolant for extended periods, pressure tubes absorb deuterium as a result of an oxidation reaction. This can make them more susceptible to crack formation and growth. Experiments are underway to predict and reduce deuterium absorption and extend pressure tube life.

Pressure tubes also gradually change shape as they are exposed to neutrons in a reactor. Increases in diameter can affect the efficiency of heat removal by the coolant. Studies show that changes in trace element concentrations in the pressure tube alloy, and in the microstructure that develops during manufacturing, can affect the rate of diametral expansion. Due to better understanding of the causes, inspection activities can be focussed on those pressure tubes that are likely to have the fastest expansion rates.

The studies have resulted in maintenance programs that ensure current pressure tubes will reach their design life. They also help in designing fuel channels for new and refurbished reactors that have longer life and improved operating margins.

## **Reactor Core Technology**

### *CANFLEX Advanced Fuel Bundle*

The CANFLEX® fuel bundle is being developed to enable CANDU utilities to maintain operating margins and to provide the carrier for AECL's advanced fuel designs. During this fiscal year, the demonstration irradiation of CANFLEX fuel at the Point Lepreau Nuclear Generating Station was completed, with the last of 24 bundles successfully irradiated and discharged from the reactor. Post-irradiation examination of two bundles has confirmed their good performance. A small change—slightly higher bearing pads—was made to the CANFLEX Mk IV design, and measurements confirm that this results in greater thermalhydraulic margins. Bearing pads are small appendages attached to the outer fuel elements to keep the fuel bundle off the pressure tube. To prepare for the next stage of development, AECL has entered into a collaboration with Argentina, which could lead to a demonstration irradiation of CANFLEX fuel having slightly enriched uranium. This will help support future advanced CANDU fuel and reactor designs.

### *DUPIC Fuel Cycle*

Demonstration of the synergy between pressurized water reactors (PWRs) and CANDU reactors continued with the advancement of the DUPIC (Direct Use of PWR fuel In CANDU) fuel concept. The DUPIC fuel cycle involves the dry-recycle of spent PWR fuel into CANDU reactors, and is the subject of a cooperative research program between the United States, Canada and the Republic of Korea. During this fiscal year, one DUPIC fuel element was removed from AECL's National Research Universal (NRU) research reactor for post-irradiation examination, after having reached a burnup beyond that of normal CANDU fuel. This is in addition to the burnup already achieved during previous irradiation of this fuel in a commercial pressurized water reactor. The two other DUPIC fuel elements continued their irradiation in NRU, on their way towards an additional burnup of approximately three times that of natural uranium. The collaborative program was expanded, with a commitment by the Korean Atomic Energy Research Institute (KAERI) to fabricate DUPIC elements for irradiation in NRU.





### *Reactor Physics*

A major series of reactor physics measurements was completed in the ZED-2 (zero power) research reactor at the Chalk River Laboratories. Coolant void reactivity—the change in neutron multiplication during a hypothetical loss-of-coolant accident—was measured for fresh fuel, and for simulated mid-burnup fuel, for a range of fuel channel temperatures, from 30 – 300°C. These results are being used to validate the reactor physics computer programs used by the CANDU industry.

### **Reactor Safety**

The focus of the Reactor Safety R&D program is to ensure that the behaviour of a CANDU reactor, in case of an accident, is well understood, and that any potential impact on the public is minimal. AECL has been focussing on enhancing safety by placing more emphasis on passive means. Passive systems act without requiring operator intervention or external power to ensure the safety of the reactor, and can therefore be very reliable.

A major undertaking by AECL has been the formal qualification and validation of the main computer programs used in safety and licensing analysis. Significant progress was achieved during this fiscal year in completing individual validation exercises for a number of computer programs, aimed at identifying the uncertainties in the prediction of key safety parameters.

Safety assessment of CANDU has also included predicting behaviour in severe and very unlikely accidents, such as the generation of hydrogen from overheated fuel. Passive recombiners have been developed to convert hydrogen and oxygen to water to ensure safety.

CANFLEX fuel bundle





### Heavy Water Technology

There have been significant achievements in this fiscal year, in the development and demonstration of technology for processing and producing heavy water. Following a successful demonstration of the Combined Electrolysis and Catalytic Exchange (CECE) process for upgrading heavy water, the CECE-UD facility was re-configured to demonstrate detritiation: Though designed only for a detritiation factor of 100, CECE-UD demonstrated a factor of more than 50,000, establishing that very high detritiation factors are possible. This has provided AECL with the confidence to adopt this technology for future application in CANDU projects.

The prototype Combined Industrial Reforming and Catalytic Exchange (CIRCE) heavy water production facility, which was built in co-operation with Air Liquide Canada (ALC), went into operation at ALC's site in Hamilton, Ontario. The plant was officially opened on July 26, 2000 and its performance has been excellent. First reactor-grade heavy water was produced on March 31, 2001.

Modifications to the trickle-bed catalyst technology that underlies the CECE and the CIRCE processes are showing significant improvements in performance, and hence, reduced costs can be achieved.





### **Health and Environmental Research and Development**

In this fiscal year, efforts continued to develop methodology to minimize emissions, to develop improved technologies for monitoring radiation at the workplace and in the environment, and to assess the biological effects of ionizing radiation (now funded by Health Canada). Environmental transport and dose assessment models used in licensing applications were further refined and validated.

### **Support for Utilities**

AECL provides a wide range of R&D support to CANDU utilities in ensuring the performance and licensability of their reactors. For domestic utilities, much of this support is cost-shared through the CANDU Owners Group (COG). Internationally, AECL collaborates with foreign research organizations through information exchanges and cooperative programs. These international arrangements support the operation of foreign CANDU power plants and assist Canadian government policy initiatives in the area of nuclear cooperation agreements.

An important initiative under COG has been to investigate phenomena that can affect the integrity of reactor feeder pipes. This past year, a joint program was established to develop techniques to address this issue. AECL is providing expertise in applying a chemical treatment that has shown promising results.

Prototype CIRCE heavy water production facility





# NUCLEAR OPERATIONS



Chalk River Laboratories

## **ISOTOPE SUPPLY**

AECL's NRU reactor is the world's main producer of isotopes for medical diagnostics and therapy. More than 18 million medical procedures that use radioactive isotopes are performed each year worldwide. The NRU reactor produces about two-thirds of the world market demand for molybdenum-99, used for diagnosis, and about 80 per cent of the world market demand for cobalt-60, used for cancer therapy. Other essential, life-saving substances produced in the NRU reactor include xenon-133, for lung ventilation and blood flow studies; iodine-131, for diagnosing and treating thyroid disorders; and iodine-125, used for the treatment of prostate cancers and in millions of medical tests.

## **OPERATING FACILITIES FOR RESEARCH AND DEVELOPMENT**

The Canadian Nuclear Safety Commission (CNSC) issued Nuclear Research and Test Establishment Operating Licenses in October 2000 to permit continued operation of Chalk River Laboratories (CRL) and Whiteshell Laboratories (WL) for a further two years. This was the first license renewal under the new *Nuclear Safety and Control Act* and Regulations pursuant to the Act.





Whiteshell Laboratories



NRU Research Reactor

### **Chalk River Laboratories (CRL)**

NRU is one of the few research reactors in the world available for a wide variety of commercial irradiations. These applications include fuels and materials testing for all types of nuclear reactors, fuel testing under accident conditions, and research sample irradiations.

The NRU reactor also provides facilities for neutron scattering, not only for the study of structure and dynamics of solids and liquids, but also for the determination of residual stress, texture and temperature inside engineering components.

During the fiscal year, NRU operated safely and reliably at a capacity factor exceeding 77 per cent, and has a lifetime capacity factor of 70 per cent. This operating performance satisfied both AECL's R&D needs and the supply of radioisotopes for MDS Nordion.

CRL's Shielded Facilities offer comprehensive remote handling services and facilities for post-irradiation examination (PIE), analysis, testing, processing of irradiated reactor fuel, reactor components, radioactive materials and repair of equipment. In April 2000, the commissioning of a new remote optical microscope was completed. AECL's Irradiated Materials Transportation (IMT) shipping flask has been specifically designed, built and certified for transportation of irradiated nuclear fuel, components and material samples throughout the world, by road, rail, air and sea.

### **CRL Site Refurbishment**

During the current fiscal year, AECL expanded the Infrastructure Refurbishment 10-year Plan (IRP) into an overall comprehensive Site Master Plan (SMP) for CRL. During the initial three years of the IRP, tasks related to immediate health, safety and environment enhancements, and licensing compliance were completed. As well during this period, initiatives were undertaken to refurbish steam generation and distribution, and complete some building upgrades and removals.

### **Whiteshell Laboratories (WL)**

Work continued on developing the environmental assessment and establishing the licensing strategy for implementing the WL Decommissioning Program. The Comprehensive Study Report (CSR) underwent review by federal departments, and comments were provided to the CNSC and the Department of Fisheries and Oceans (DFO). The revised CSR was provided by AECL to the CNSC and DFO. A formal public review of the revised CSR will commence in parallel with follow-up federal department review.



# WASTE MANAGEMENT

Compared with other energy sources, nuclear power reactors use a small amount of fuel and produce a small amount of waste. Today, safe ways exist to manage that waste, including AECL's MACSTOR dry spent fuel storage system. Longer-term disposal concepts have also been developed and Canada is a world leader in this area.

In this fiscal year, AECL continued its responsibility to manage other Canadian radioactive wastes, and further enhanced the management of radioactive wastes from activities at its Chalk River Laboratories.

## **Nuclear Fuel Waste Management Program**

The Government of Canada recently introduced legislation for the long-term management of nuclear fuel waste. The legislation calls for nuclear utilities to form a waste management organization (WMO) to manage and coordinate the full range of activities relating to the long-term management, including disposal, of nuclear fuel waste. Discussions are in progress among the owners of nuclear fuel waste, including AECL, to develop the administrative framework for the WMO.

Pending the formation of the WMO, Ontario Power Generation (OPG) has continued to provide technical direction and financial support to further develop the disposal technology and to maintain key areas of technical expertise. During 2000-2001, AECL continued to work in partnership with OPG to develop and perform the R&D work scope. Research and demonstration projects were carried out for clients in France, Japan, United Kingdom and the United States.

## **Low-Level Radioactive Waste Management**

The Low-Level Radioactive Waste Management Office (LLRWMO) continued its program of cleanup and interim management of historic wastes across Canada. AECL has operated the LLRWMO since 1982, through a cost-recovery arrangement with Natural Resources Canada (NRCan). Management of low-level radioactive waste includes monitoring and maintenance activities at all licensed interim storage sites, and at known contaminated sites, until long-term storage or disposal facilities are available. Technical support was provided to NRCan during its consultation with Port Hope area municipalities, leading to Principles of Understanding on implementation of three community-driven conceptual designs for long-term storage facilities.

## **Management of AECL's Operational Radioactive Waste**

At AECL's Chalk River Laboratories (CRL), the new Liquid Waste Evaporator at the Waste Treatment Centre (WTC) treated all major radioactive liquid waste produced at the site during the year. Effluent quality exceeded the targets set by the Canadian Nuclear Safety Commission (CNSC). A new Holding Tank Facility (HTF) for radioactive liquid waste that will be treated in the WTC will soon be completed and operational, as will an active drain directing low-level wastes to the WTC.

Also, facilities are almost completed that will allow low-level, solid radioactive waste to be compacted into steel containers and stored in above-ground structures. These facilities will be used for wastes generated at CRL, as well as for those contracted for management with Canadian hospitals and research organizations.

## **Management of Health, Safety and the Environment**

AECL continued to comply with applicable health, safety and environmental regulations and to improve performance in these areas. The CNSC approved revised Derived Release Limits (DRL) for radioactive emissions from CRL and Whiteshell (WL), based on the new public dose limit of 1 mSv/a. Radioactive emissions from AECL sites and facilities remain well below the DRL. During 2000-2001, AECL undertook to implement the ISO-14001 international standard for Environmental Management at CRL, with the initial objective to seek ISO-14001 certification at CRL in 2001.

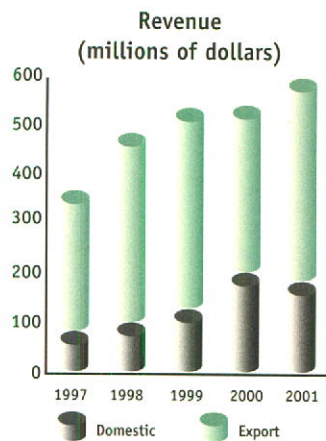




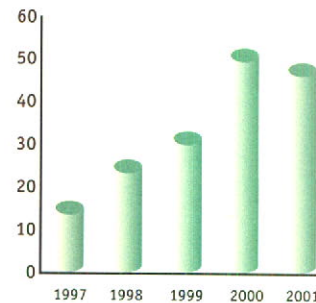
Underground Research Laboratory



# FINANCIAL REVIEW AND ANALYSIS



**Operating Profit from Commercial Operations (millions of dollars)**



## COMMERCIAL OPERATIONS

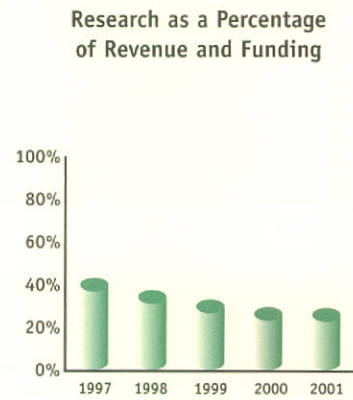
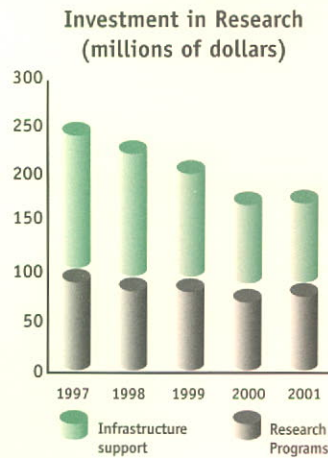
Commercial activities in 2000-2001 included the continuation of the Qinshan project in China, now in its fifth year, for the construction of two CANDU 6 reactors, ongoing engineering services and manufacturing support to CANDU owners, nuclear technical services and the production of medical isotopes. Revenue from commercial operations at \$602.4 million in 2000-2001 grew by \$50.6 million relative to 1999-2000. With an increased level of equipment and material delivery, the current year cost of sales at \$518.1 million were 86 per cent of revenue versus 83 per cent last year. Consequently, profits from commercial operations held at a level consistent with the prior year.

Although opportunities are developing for new reactor builds around the world, they are not expected to come to fruition for the next three to five years. Current commercial activities continue to focus on the service and plant life extension (refurbishment) markets for existing CANDU reactors. The opportunities for plant life extensions, such as currently structured with New Brunswick Power Corporation, are particularly encouraging. Spending on both marketing and administration at \$20.6 million and on product engineering at \$13.9 million were reduced year over year in line with current market conditions.

## RESEARCH

Research programs focussed on ongoing development of the CANDU technology, technical support to the Canadian nuclear utilities, updating heavy water production methodologies and nuclear fuel waste management. The cost of conducting these activities included research programs at \$91 million, underlying facility infrastructure and support at \$72 million as well as amortization expense of \$16 million. The increase in the total cost from \$173.4 million in the previous year to \$178.9 million in 2000-2001 is primarily the amortization expense related to assets previously acquired with government and third-party funding, which is offset by a corresponding amortization of deferred capital funding. In 2000-2001, the corporation accelerated the amortization period for certain research assets based on revised retirement dates, which resulted in amortization of deferred capital funding of \$12.6 million versus \$6.8 million in the previous year. Funding at \$145.7 million, derived from a combination of federal appropriations, contributions from third parties and deferred funding, partially offset the associated costs.





Although as high as 42 per cent five years ago, the corporation's total investment in research programs and infrastructure remains at a significant level—24 per cent of its revenue and funding. Since 1997, the reduction has been primarily in the non-CANDU areas of nuclear research.

### DECOMMISSIONING ACTIVITIES

The obligation for decommissioning and site remediation costs was recorded at the discounted value of \$383.5 million (2000 - \$377.5 million) as a long-term liability on the corporation's consolidated balance sheet. The 2000-2001 drawdown against the obligation for expenditures related to decommissioning activities at its Chalk River and Whiteshell facilities was \$16.8 million (2000 - \$18.7 million). Funding for the corporation's decommissioning activities was derived from federal appropriations of \$12.3 million received as part of the government's Program Integrity initiative, \$5.4 million from monies which have been set aside for this purpose from the net proceeds of the sale or lease of government funded heavy water inventory and \$0.2 million from the sale of decommissioned assets. The decommissioning expense includes the annual accretion of the decommissioning and site remediation provision of \$23.0 million (2000 - \$21.5 million) as well as \$0.9 million (2000 - \$0) for other Program Integrity activities.

### CASH FLOW

In 2000-2001, the cash outflow of \$46.3 million from operating activities, versus the \$34.9 million inflow in the previous year, was primarily a reflection of the use of customer advances received in prior year(s) for fulfillment of commercial contractual obligations. During the year, the corporation transferred \$12.5 million to the segregated cash fund for decommissioning activities, acquired \$7.4 million in capital assets, and reduced its long-term debt by \$1.0 million. After the net cash outflow for the year of \$67.0 million, cash, advances and short-term investments were \$52.2 million at year end (2000 - \$119.2 million).

Segregated cash of \$8.1 million at March 31, 2001 (2000 - \$14.0 million) includes the unused proceeds of government funded heavy water transactions and Program Integrity funding.

### SUMMARY

The corporation achieved net income of \$11.8 million through the combined operations of successful delivery on its commercial activities, maintenance of the research and technology infrastructure in support of its customer base, as well as undertaking certain decommissioning activities related to historic facility and site remediation.



# MANAGEMENT RESPONSIBILITY

The consolidated financial statements, all other information presented in this Annual Report and the financial reporting process are the responsibility of the management and the Board of Directors of the corporation. These statements have been prepared in accordance with Canadian generally accepted accounting principles and include estimates based on the experience and judgment of management. When alternate accounting methods exist, management has chosen those it deems most appropriate in the circumstances.

The corporation and its subsidiaries maintain books of account, financial and management control, and information systems, together with management practices designed to provide reasonable assurance that reliable and accurate financial information is available on a timely basis, that assets are safeguarded and controlled, that resources are managed economically and efficiently in the attainment of corporate objectives, and that operations are carried out effectively. These systems and practices are also designed to provide reasonable assurance that transactions are in accordance with Part X of the *Financial Administration Act* and its regulations, as well as the *Canada Business Corporations Act*, the articles, and the by-laws and policies of the corporation and its subsidiaries. The corporation has met all reporting requirements established by the *Financial Administration Act*, including submission of a corporate plan, an operating budget, a capital budget and this Annual Report.

The corporation's internal auditor has the responsibility for assessing the management systems and practices of the corporation and its subsidiaries. AECL's external auditors conduct an independent audit of the consolidated financial statements of the corporation and report on their audit to the Minister of Natural Resources.

The Board of Directors' Audit Committee, composed of directors who are not employees of the corporation or its subsidiaries, reviews and advises the Board on the consolidated financial statements, AECL's auditors' report thereon, the plans and reports related to special examinations and oversees the activities of internal audit. The Audit Committee meets with management, the internal auditor and AECL's external auditors on a regular basis.



Robert Van Adel  
*President and Chief Executive Officer*



Raymond E. Grisold  
*Vice-President Finance, Treasurer  
and Chief Financial Officer*



# AUDITORS' REPORT

TO THE MINISTER OF NATURAL RESOURCES

We have audited the consolidated balance sheet of Atomic Energy of Canada Limited as at March 31, 2001 and the consolidated statements of operations, contributed capital, deficit and cash flow for the year then ended. These financial statements are the responsibility of the Corporation's management. Our responsibility is to express an opinion on these financial statements based on our audit.

We conducted our audit in accordance with Canadian generally accepted auditing standards. Those standards require that we plan and perform an audit to obtain reasonable assurance whether the financial statements are free of material misstatement. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements. An audit also includes assessing the accounting principles used and significant estimates made by management, as well as evaluating the overall financial statement presentation.

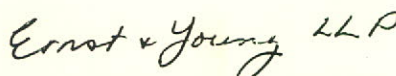
In our opinion, these consolidated financial statements present fairly, in all material respects, the financial position of the Corporation as at March 31, 2001 and the results of its operations and its cash flows for the year then ended in accordance with Canadian generally accepted accounting principles. As required by the *Financial Administration Act*, we report that, in our opinion, these principles have been applied, except for the changes in the method of accounting for employee future benefits as explained in Note 12 to the financial statements, on a basis consistent with that of the preceding year.

Further, in our opinion, the transactions of the Corporation and of its wholly-owned subsidiaries that have come to our notice during our audit of the consolidated financial statements have, in all significant respects, been in accordance with Part X of the *Financial Administration Act* and regulations, the *Canada Business Corporations Act*, and the articles and by-laws of the Corporation and its wholly-owned subsidiaries.

We wish to draw your attention to Note 1 to the consolidated financial statements which indicates the Governor in Council has not approved the Corporation's five-year Corporate Plans since 1994-95, and the Corporation continues to work with the government to address budget and policy issues affecting the Corporation.



John Wiersema, CA  
Assistant Auditor General  
for the Auditor General of Canada



Ernst & Young LLP  
Chartered Accountants

Ottawa, Canada  
11 May 2001



# CONSOLIDATED BALANCE SHEET

AS AT MARCH 31

(thousands of dollars)	2001	2000
<b>ASSETS</b>		
Current		
Cash, advances and short-term investments (Note 3)	\$ 52,238	\$ 119,222
Segregated cash and short-term investments (Notes 3 and 4)	8,095	14,015
Accounts receivable (Note 3)	80,396	71,704
Due from Receiver General	768	850
Inventory	12,092	10,446
	<b>153,589</b>	216,237
Heavy water inventory (Note 5)	564,361	565,942
Capital assets (Note 6)	102,772	113,925
	<b>\$ 820,722</b>	<b>\$ 896,104</b>
<b>LIABILITIES</b>		
Current		
Accounts payable, advances and accrued liabilities	\$ 178,602	\$ 255,885
Current portion of restructuring and other provisions (Note 13)	27,509	24,635
Current portion of deferred decommissioning funding (Note 7 and 9)	8,095	14,015
Current portion of long-term debt (Note 8)	1,027	1,027
	<b>215,233</b>	295,562
Decommissioning and site remediation provision (Note 10)	383,500	377,500
Restructuring and other provisions (Note 13)	36,789	36,276
Deferred capital funding (Note 9)	45,223	57,249
Employee future benefits (Note 12)	50,455	49,755
Long-term debt (Note 8)	6,533	7,560
	<b>737,733</b>	823,902
<b>SHAREHOLDER'S EQUITY</b>		
Capital stock		
Authorized - 75,000 common shares		
Issued - 54,000 common shares	15,000	15,000
Contributed capital (Note 7)	535,298	534,820
Deficit	(467,309)	(477,618)
	<b>82,989</b>	72,202
	<b>\$ 820,722</b>	<b>\$ 896,104</b>

The accompanying notes are an integral part of these consolidated financial statements

Approved by the Board:



Jean-Pierre Soublière, Director



Robert Van Adel, Director



# CONSOLIDATED STATEMENT OF OPERATIONS

FOR THE YEAR ENDED MARCH 31

(thousands of dollars)	2001	2000
<b>COMMERCIAL OPERATIONS</b>		
Revenue	\$ 602,439	\$ 551,855
Expenses		
Cost of sales	518,104	456,110
Marketing and administration	20,616	21,596
Product development	13,870	22,424
	552,590	500,130
Operating profit from commercial operations	49,849	51,725
<b>RESEARCH ACTIVITIES</b>		
Funding		
Parliamentary appropriations (Note 9)	108,918	105,650
Cost recovery from third parties	24,109	24,865
Amortization of deferred capital funding	12,644	6,762
	145,671	137,277
Expenses	178,945	173,384
Net research expense	(33,274)	(36,107)
<b>DECOMMISSIONING ACTIVITIES</b>		
Funding		
Parliamentary appropriations (Note 9)	12,300	-
Decommissioning funding (Note 7)	5,442	18,668
Asset sales	157	7
	17,899	18,675
Decommissioning expense (Note 10)	23,899	21,475
Net decommissioning expense	(6,000)	(2,800)
<b>OTHER PARLIAMENTARY APPROPRIATIONS (NOTE 9)</b>	-	32,100
<b>INTEREST INCOME AND OTHER (EXPENSE)</b>	1,271	(1,668)
<b>NET INCOME</b>	<b>\$ 11,846</b>	<b>\$ 43,250</b>

*Amortization disclosure (Note 6)*

*The accompanying notes are an integral part of these consolidated financial statements*



# CONSOLIDATED STATEMENT OF CONTRIBUTED CAPITAL

FOR THE YEAR ENDED MARCH 31

(thousands of dollars)	2001	2000
Balance at beginning of the year	\$ 534,820	\$ 535,015
Transfer to/(from) deferred decommissioning funding (Note 7)	478	(195)
<b>BALANCE AT END OF THE YEAR</b>	<b>\$ 535,298</b>	<b>\$ 534,820</b>

# CONSOLIDATED STATEMENT OF DEFICIT

FOR THE YEAR ENDED MARCH 31

(thousands of dollars)	2001	2000
Balance at beginning of the year	\$ (477,618)	\$ (520,868)
Change in accounting policy (Note 12)	(1,537)	-
Balance at beginning of the year, as restated	(479,155)	(520,868)
Net income	11,846	43,250
<b>BALANCE AT END OF THE YEAR</b>	<b>\$ (467,309)</b>	<b>\$ (477,618)</b>

*The accompanying notes are an integral part of these consolidated financial statements*



# CONSOLIDATED CASH FLOW STATEMENT

FOR THE YEAR ENDED MARCH 31

(thousands of dollars)	2001	2000
<b>OPERATING ACTIVITIES</b>		
Cash receipts from customers	\$ 568,403	\$ 539,224
Cash receipts from parliamentary appropriations	122,000	136,900
Cash paid to suppliers and employees	(743,536)	(649,109)
Interest received (net)	6,834	7,858
Cash from (used in) operating activities	(46,299)	34,873
<b>INVESTING ACTIVITIES</b>		
Funds provided to segregated cash	(12,522)	(195)
Proceeds on disposal of capital assets	295	50
Acquisition of capital assets	(7,431)	(15,450)
Cash used in investing activities	(19,658)	(15,595)
<b>FINANCING ACTIVITIES</b>		
Reduction in long-term debt	(1,027)	(1,063)
Cash used in financing activities	(1,027)	(1,063)
<b>CASH, ADVANCES AND SHORT-TERM INVESTMENTS:</b>		
CHANGE	(66,984)	18,215
BALANCE AT BEGINNING OF THE YEAR	119,222	101,007
BALANCE AT END OF THE YEAR	\$ 52,238	\$ 119,222
<b>INTEREST AND BANK CHARGES PAID DURING THE YEAR</b>	<b>\$ 575</b>	<b>\$ 508</b>

*The accompanying notes are an integral part of these consolidated financial statements*



# NOTES TO THE CONSOLIDATED FINANCIAL STATEMENTS

FOR THE YEAR ENDED MARCH 31, 2001

## 1. THE CORPORATION

Atomic Energy of Canada Limited (AECL) was incorporated in 1952 under the provisions of the *Canada Corporations Act* (and continued in 1977 under the provisions of the *Canada Business Corporations Act*) pursuant to the authority and powers of the Minister of Natural Resources under the *Nuclear Energy Act*.

The corporation is a Schedule III Part I Crown corporation under the *Financial Administration Act* (FAA) and an agent of Her Majesty the Queen in right of Canada. The corporation is exempt from income taxes in Canada. As required by the FAA the corporation submits annually its Corporate Plan, and operating and capital budgets to the government for its review and approval. While the Governor in Council has not approved the corporation's five year Corporate Plan since 1994-1995, the corporation has received approval for the 2000-2001 to 2004-2005 Corporate Plan for the period April 1, 2000 through March 31, 2001.

These financial statements include the accounts of the corporation's wholly-owned subsidiaries, AECL Technologies Inc., incorporated in the state of Delaware, U.S.A. in 1988, and AECL Technologies B.V., incorporated in the Netherlands in 1995.

## 2. SIGNIFICANT ACCOUNTING POLICIES

The corporation's financial statements are prepared in accordance with Canadian generally accepted accounting principles. The significant accounting policies are:

### a) Use of Estimates

The corporation's financial statements include estimates and assumptions that affect the amounts reported in the financial statements and accompanying notes. The more significant areas requiring the use of estimates are in relation to costs of future decommissioning; future contract costs; restructuring and other provisions; and employee future benefits. The corporation reviews these estimates annually and does not expect the current assumptions to vary significantly in the near term.

### b) Cash, Advances and Short-Term Investments and Segregated Cash

Short-term investments are carried at the lower of cost or market.

### c) Foreign Currency Translation

Transactions denominated in a foreign currency are translated into Canadian dollars at the exchange rate in effect at the date of the transaction. Monetary assets and liabilities outstanding at the balance sheet date are adjusted to reflect the exchange rate in effect at that date. Exchange gains and losses arising from the translation of foreign currencies are included in income.

### d) Inventory

Heavy water is valued at the lower of average cost and net realizable value. Supplies are valued at cost.



#### **e) Capital Assets**

Capital assets are recorded at cost which is amortized on a straight-line basis over the estimated useful life of the asset as follows:

Machinery and equipment	- 3 to 20 years
Buildings, reactors and land improvements	- 20 to 40 years

#### **f) Decommissioning and Site Remediation Provision**

The provision reflects the present value of the expected decommissioning and site remediation costs. The provision is increased each year to reflect the time value of money, adjusted for changes in management estimates of costs, and is reduced by the actual expenditures incurred.

#### **g) Long-term Contracts**

Revenue and costs on long-term contracts are accounted for by the percentage of completion method based on expenses incurred and applied on a conservative basis to recognize the absence of certainty on these contracts. Full provision is made for estimated losses, if any, to completion of contracts in progress.

#### **h) Parliamentary Appropriations**

Parliamentary appropriations that are not in the nature of contributed capital are recorded as funding in the year for which they are appropriated, except as follows. Appropriations restricted by legislation and related to expenses of future periods are deferred and recognized as revenue in the period in which the related expenses are incurred. Appropriations used for the purchase of capital assets are deferred and amortized on the same basis as the related asset.

Effective in 1996-1997, and pursuant to the 10-year arrangement for funding decommissioning activities, the corporation retains net proceeds from the sale or lease of certain heavy water. The net proceeds are transferred from contributed capital to deferred decommissioning funding and are then recorded as funding in the consolidated statement of operations as related expenditures are made.

#### **i) Cost Recovery from Third Parties**

The corporation and the Canadian nuclear utilities (Ontario Power Generation, New Brunswick Power and Hydro-Québec) have a common interest in the safe, efficient and economical use of power utilizing CANDU technology. Research programs aligned with these objectives are undertaken by the corporation and cost-shared with the utilities. Funding under these arrangements is included in cost recovery from third parties and is recognized as the related expenses are incurred.

#### **j) Pension Plan**

Employees are covered by the Public Service Superannuation Plan administered by the Government of Canada. Contributions to the Plan are limited to those made by both the employees and the corporation on account of current service. These contributions represent the total pension obligations of the corporation and are charged to income on a current basis. The corporation is not required under present legislation to make contributions with respect to actuarial deficiencies of the Public Service Superannuation Account.

#### **k) Employee Future Benefits**

Employee future benefits include:

- workers' compensation claims, which, in accordance with the *Government Employees' Compensation Act*, the corporation reimburses Human Resources Development Canada for current payments billed by the provincial compensation boards
- specific termination benefits as provided for under collective agreements and conditions of employment.



The corporation accrues the obligations for these employee future benefits over the employees' service periods. The cost of benefits earned is actuarially determined using management's best estimate of expected salary escalation, retirement ages of employees and expected health care costs. The latest actuarial valuation of these plans was performed in 2000-2001. Actuarial gains or losses are recorded in the year realized.

### **3. FINANCIAL INSTRUMENTS**

Unless otherwise specified, the fair value of the corporation's financial instruments approximates cost.

#### **a) Cash, Advances and Short-term Investments and Segregated Cash**

Bank deposits are maintained at levels required to meet daily operating needs. Any surplus deposits are invested in the short-term money market. The investing strategy is based on a conservative risk assessment. All instruments are rated R1 Low or higher by the Dominion Bond Rating Service and the portfolio is diversified by limiting investments in any one issuer and balancing the fund amongst Canadian federal and provincial government guaranteed, financial and commercial paper issuers. The instruments in the portfolio generally mature within 90 days.

#### **b) Foreign Exchange Contracts**

The corporation enters into foreign exchange forwards to reduce the risk associated with the purchase and sale of goods in foreign currencies. Forward contracts in effect as at March 31, 2001 amount to \$0.9 million (2000 - \$2.5 million). These contracts are for British pounds at rates which do not vary significantly from market and which will be settled upon completion of the underlying transaction. The contracts expire within one year. All forwards are offset by contracts with third parties for payment in foreign currencies.

#### **c) Accounts Receivable**

Accounts receivable represent normal trade instruments. Four customers (2000 - two), each representing greater than 10 per cent of the total accounts receivable, comprise an aggregate 65 per cent (2000 - 53 per cent) of total accounts receivable. No significant amounts are due in foreign currency. The corporation does not believe it is subject to any significant credit risk.

### **4. SEGREGATED CASH AND SHORT-TERM INVESTMENTS**

Segregated cash and short-term investments include the unused portion of heavy water proceeds available for future decommissioning activities (Note 7).

### **5. HEAVY WATER INVENTORY**

Heavy water inventory includes 1,100 megagrams provided to the Sudbury Neutrino Observatory Institute at no cost, the majority of which is scheduled for return in 2001-2002. In addition, the corporation has contractual commitments to sell heavy water in support of ongoing reactor projects.



## 6. CAPITAL ASSETS

(thousands of dollars)	2001		2000	
	Cost	Accumulated Amortization	Cost	Accumulated Amortization
Commercial operations				
Land and improvements	\$ 949	\$ 245	\$ 949	\$ 245
Buildings	16,802	10,515	12,336	9,547
Machinery and equipment	15,903	11,448	13,969	9,769
	33,654	22,208	27,254	19,561
Research				
Land and land improvements	22,197	17,776	22,197	17,403
Buildings	87,499	50,623	87,147	48,487
Reactors and equipment	221,407	185,597	218,732	174,437
	331,103	253,996	328,076	240,327
Construction in progress	14,219	-	18,483	-
	\$ 378,976	\$ 276,204	\$ 373,813	\$ 259,888
<b>NET BOOK VALUE</b>		<b>\$ 102,772</b>		<b>\$ 113,925</b>

Amortization of capital assets for the year ended March 31, 2001 amounted to \$18.5 million (2000 - \$11.9 million) in part offset by amortization of deferred capital funding of \$12.6 million (2000 - \$6.8 million).

## 7. CONTRIBUTED CAPITAL AND DEFERRED DECOMMISSIONING FUNDING

Included in contributed capital is approximately \$342 million (2000 - \$342 million) related to parliamentary appropriations received for the production of heavy water inventory. Up to and including 1995-1996, the corporation was required to repay the government, by way of a dividend, the net proceeds from the sale of government funded heavy water. A 1997 Decision of the Treasury Board directs the corporation to hold the proceeds from the sale or lease of government funded heavy water in a segregated fund for use in decommissioning activities for the 10-year period following the Decision. Commencing in 1996-1997, as government funded heavy water is sold or leased, the net proceeds are transferred from contributed capital to deferred decommissioning funding which is used to fund ongoing decommissioning activities. The corporation continues to account for these transactions as a reversal of the originally established contributed capital. Subsequent to 2005-2006, unless the Decision is renewed, the prior arrangement will apply whereby net proceeds would be repayable to the government and decommissioning activities would be funded through parliamentary appropriations.

The government is currently reviewing its overall environmental policy, which will include the decommissioning activities of the corporation's facilities and waste storage on its property. As part of this policy review, the government has proposed that the corporation and the government work jointly on a comprehensive management strategy. The corporation expects that this strategy will include determination of a financial framework to address funding of future decommissioning activities. Accordingly, the corporation expects that the government will continue to finance this obligation.

The government has recently introduced the *Nuclear Fuel Waste Act* Bill C-27, presently before the House of Commons, that provides for the establishment of a Waste Management Organization to manage future expenditures for the life cycle management of nuclear fuel waste for AECL and other nuclear fuel waste owners in Canada.



## 8. LONG-TERM DEBT

(thousands of dollars)	2001	2000
Loans from Government of Canada		
To finance leased heavy water and other assets, maturing through 2008 at interest rates varying from 4.79% to 8.71%	\$ 7,560	\$ 8,587
Current Portion	(1,027)	(1,027)
	\$ 6,533	\$ 7,560

Repayments of loan principal amounts required over succeeding years are as follows (millions of dollars): 2002 - \$1.0; 2003 - \$1.0; 2004 - \$1.0; 2005 - \$1.0; 2006 - \$1.0; and subsequent to 2006 - \$2.6.

## 9. PARLIAMENTARY APPROPRIATIONS

The use of government funding by the corporation was as follows:

(thousands of dollars)	2001	2000
Research operating expenses	\$ 108,918	\$ 105,650
Other expenses		
Program Integrity - Decommissioning activities	12,300	-
Year 2000	-	24,500
Year 2000 frozen allotment	-	(8,000)
Termination costs	-	15,600
	12,300	32,100
Capital:		
Program Integrity - Decommissioning activities	700	-
	\$ 121,918	\$ 137,750

In 2000-2001, the corporation received \$108.9 million (2000 - \$105.7 million) in support of its nuclear research programs which reflects the base appropriation of \$100 million adjusted for salary and wage escalation. In addition, funding of \$120 million has been allocated to the corporation as part of the government's Program Integrity initiative, which is to be received over a five-year period to assist with projects for health and safety upgrades, including the safe, long-term management of nuclear materials or waste. In 2000-2001, \$13 million (2000-\$0) was received.

In 1999-2000 parliamentary appropriations included \$16.5 million as part of the government's program to assist Crown corporations and departments in defraying Year 2000 costs. The government considers this appropriation to be an advance which it intends to recover through reductions of appropriations over a five-year period beginning in 2001-2002.



## 10. DECOMMISSIONING AND SITE REMEDIATION PROVISION

When prototype reactors, heavy water plants, nuclear research, development and other facilities have no further commercial or research value to the corporation, they are retired and subsequently decommissioned in accordance with Canadian Nuclear Safety Commission regulations. Due to the variety of facilities, the decommissioning process may differ in each case. In some situations decommissioning activities are carried out in stages with intervals of several decades between them to allow radioactivity to decay before moving on to the next stage. Activities include dismantling, decontamination, residual waste storage and disposal.

The estimated future decommissioning and site remediation costs require that judgments be made about the regulatory environment, health and safety considerations, the desired end-state, technology to be employed and, in some cases, research and development for these activities that extend well into the future. The corporation has prepared a broad plan of activities to be carried out over the next 100 years. The plan follows a hierarchy of decommissioning activities to achieve: a controlled and controllable state for all redundant nuclear facilities that removes short-term risks; a sustainable, stable, safe state of the facilities under surveillance; and cost-optimized completion of actions to achieve a final end state that is an accepted completion of the decommissioning process as required by the regulator. The time-frame recognizes that the major nuclear facilities at Chalk River, including medical isotopes production, will require a managed and active site for a minimum of 100 years into the future. The provision has been conservatively discounted at a 5.75% risk-free rate.

The funding of actual expenditures of \$16.8 million (2000 - \$18.7 million) is described in Note 7.

## 11. RELATED PARTY TRANSACTIONS

In addition to the transactions disclosed in Note 9, the corporation had the following transactions with the Government of Canada:

(thousands of dollars)	2001	2000
Repayment of loans		
Principal	\$ 1,027	\$ 1,063
Interest	468	453
	<hr/>	<hr/>
	\$ 1,495	\$ 1,516
Payments to the Public Service Superannuation Plan	\$ 25,619	\$ 12,064

In the normal course of business, the corporation also enters into various transactions with the Government of Canada, its agencies and other Crown corporations.



## 12. EMPLOYEE FUTURE BENEFITS

Effective April 1, 2000, the corporation adopted the new Canadian Institute of Chartered Accountants standard for employee future benefits. This change in accounting policy has been applied on a cumulative basis without restatement of individual prior periods. Post-employment benefits, other than pensions, are now recorded by an actuarially determined liability and expense. The effect of this change is a \$1.5 million increase in the employee future benefits liability and in the deficit in 2000-2001. In the years prior to 2000-2001, workers' compensation benefits payments were recognized as an expense in the year paid.

The corporation's employee pension benefits are covered through the Public Service Superannuation Plan as described in note 2(j). The corporation sponsors certain post-employment benefits as described in note 2(k). The discount rate used to calculate the interest cost on the accrued benefit obligation is based on corporate high yield bonds with the same expected duration as the employee future benefits. The following table provides information about these plans.

(thousands of dollars)	2001	2000
<b>For the year</b>		
Current service cost	\$ 2,528	\$ 2,359
Interest on accrued benefit obligation	3,979	3,655
Actuarial (gain) loss	(1,763)	(12)
Benefits paid	(4,471)	(3,391)
<b>As at March 31</b>		
Accrued benefit obligation	\$ 54,965	\$ 53,155
Current portion	(4,510)	(3,400)
	<b>\$ 50,455</b>	<b>\$ 49,755</b>

The significant actuarial assumptions used in calculating the accrued benefit obligation are as follows:

	2001	2000
Discount rate	7.25%	4.23%
Rate of compensation increase	3% + merit	3% + merit

## 13. RESTRUCTURING AND OTHER PROVISIONS

The corporation carries provisions for restructuring as well as certain commercial activities. The charge to earnings for the estimated cost of undertaking actions pursuant to the government's 1996 Program Review was made in 1995-1996 and the remaining balance will be drawn down as the restructuring actions take place.

## 14. COMPARATIVE FIGURES

Certain 1999-2000 amounts have been reclassified to conform with the current year's presentation.



# FIVE-YEAR CONSOLIDATED FINANCIAL SUMMARY

(millions of dollars)	2001	2000	1999	1998	1997
<b>OPERATIONS</b>					
Revenue	<b>602</b>	552	544	490	362
Parliamentary appropriations for research operations	<b>109</b>	106	102	142	167
Cost recovery from third parties	<b>24</b>	25	41	52	73
Research expenses	<b>179</b>	173	204	232	256
Net income (loss)	<b>12</b>	43	(15)	2	6
<b>FINANCIAL POSITION</b>					
Cash, advances and short-term investments	<b>52</b>	119	101	148	133
Heavy water inventory	<b>564</b>	566	566	590	622
Capital expenditures	<b>7</b>	15	21	20	17
Capital assets	<b>103</b>	114	111	108	100
Total assets	<b>821</b>	896	917	1,006	1,032
Decommissioning and site remediation provision	<b>384</b>	378	375	370	364
Long-term debt (excludes current portion)	<b>7</b>	8	9	10	11
Shareholder's equity	<b>83</b>	72	29	67	94
<b>OTHER</b>					
Export revenues	<b>417</b>	352	415	396	285
Number of full-time employees	<b>3,306</b>	3,423	3,384	3,652	3,675



# BOARD OF DIRECTORS AND OFFICERS

## BOARD OF DIRECTORS

Robert F. Nixon □○❖\*▲★  
*Chairman of the Board*

Robert G. Van Adel ❖\*▲★  
*President & Chief Executive Officer*

Marcel Aubut\* □\*❖  
*Lawyer*  
*Heenan, Blaikie & Aubut*

Pierre Fortier □❖★  
*Company Administrator & Consultant*

J. Raymond Frenette □\*  
*Director*

James S. McKee \*★  
*Professor Emeritus*  
*University of Manitoba*

A. Neil McMillan □○❖  
*President*  
*Claude Resources Inc.*

Louis-Paul Nolet □○❖▲  
*President & Chief Executive Officer*  
*groupe tp 2000 Inc.*

Marnie Paikin ○▲  
*Director*

Karen J. Pitre \*\* \*★  
*President*  
*Lonsdale Group*

Jean-Pierre Soublière □❖▲  
*President & CEO*  
*Anderson Soublière Inc.*

Hugh Wynne-Edwards \*▲★  
*President*  
*Terracy Inc.*

## OFFICERS

Robert G. Van Adel  
*President & Chief Executive Officer*

Raymond Grisold  
*Vice-President*  
*Finance, Treasurer & Chief Financial Officer*

Allan Hawryluk  
*General Counsel and Corporate Secretary*

Gary Kugler  
*Senior Vice-President*  
*Nuclear Products and Services*

Michael Taylor  
*Vice-President*  
*Corporate Affairs*

David Torgerson  
*Senior Vice-President*  
*Technology*

Gary Walker  
*Acting Vice-President*  
*Human Resources*

Robert G. Van Adel was appointed as President & Chief Executive Officer February 5, 2001

R. Allen Kilpatrick retired as President & Chief Executive Officer January 31, 2001

\*appointed to the Board of Directors January 9, 2001

\*\*retired from the Board of Directors December 11, 2000

## COMMITTEES

- Audit
- Corporate Governance
- ❖ Finance
- \* Health, Safety & Environment
- ▲ Human Resources
- ★ Science & Technology



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Design: Dakis & Associates Inc.

Printing: C.J. Graphics

Principal Photography: Mel Loynd, Mike Brown





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Printed in Canada on chlorine-free stock with  
vegetable-based inks. Fully recyclable.

Le présent rapport est publié aussi en français.  
Veuillez appeler le (905) 823-9040.

© Atomic Energy of Canada Limited. 2001

ISBN 0-662-30652-X

ISSN 0067-0383

Supply & Services Canada - Cat. No. CC1-2001E  
AECL-12120