

Atomic Energy of Canada Limited



It's time to clear the air.

Annual Report 1999-2000





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Corporate Profile

ATOMIC ENERGY OF CANADA LIMITED (AECL) WAS ESTABLISHED IN 1952 AS A CROWN CORPORATION AND REPORTS TO PARLIAMENT THROUGH THE MINISTER OF NATURAL RESOURCES.



AECL develops, designs and markets CANDU® power reactors, MAPLE research reactors and MACSTOR™ waste storage facilities and manages the construction of nuclear reactor projects worldwide. The flagship product, the CANDU reactor, supplies about 15 per cent of Canada's electricity and is an important component of energy programs on four continents. AECL has also developed a variety of other products and services that are now in use around the world.

The corporation continues to build upon these achievements by advancing the research and engineering that underlie the reactor products and by supplying R&D and engineering services to CANDU plants at home and abroad. The science and technology that support the reactor business have made significant contributions that are recognized internationally. They have also enhanced national science and energy objectives and contributed to the evolution of Canada's nuclear policies.



Chalk River Laboratories



Sheridan Park, Mississauga

AECL's product development strategy continues to consolidate the corporation's position as a leading supplier of full-scope nuclear power capabilities. This gives it the capacity, in collaboration with Canadian and international partners, to capture a substantial share of the emerging global nuclear power market with a competitive and superior product.

AECL is dedicated to meeting its customers' needs, and to continuous improvement and sustainable development. The

CANDU success is a result of close collaboration with utilities and the private sector, and continues to make an important contribution to job and wealth creation.

As of March 31, 2000, the corporation employed 3,423 people full-time at sites in Canada and overseas.

Letter of Transmittal



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



Dear Mr. Goodale:

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 March 31, 2000.

Nuclear power remains the only proven greenhouse-gas-free technology capable of meeting the large-scale electricity generation demands of this century. Developed nations will attempt to contain their energy requirements by various means including increased efficiency and conservation. However, two billion people in the world are without commercial energy and that segment of the world's population will grow rapidly to four billion by 2020. Today, 20 per cent of the world's population consumes 80 per cent of the world's energy production. In 1999, a report by eminent engineer Brian George of the Royal Society and Royal Academy of Engineering concluded that the world will face a significant increase in energy requirements by a factor of two by 2050.

Nuclear generation has already been proven to be a major factor in restraining greenhouse gas emissions around the world. Large-scale commercial nuclear power generation, which began in 1958 and currently includes 440 nuclear units, has avoided the release of over eight billion tonnes of carbon dioxide into the atmosphere. Nuclear power generation supplies approximately 17 per cent of the electricity produced around the world.

AECL's CANDU reactors have been a reliable, sustainable source of electricity for more than 30 years, avoiding the release of over one billion tonnes of carbon dioxide into the atmosphere. AECL continues to build on Canada's investment in nuclear technology. The CANDU nuclear reactor is a vital part of the solution to the global climate change issue, allowing other countries to experience the same environmental and economic benefits that Canadians enjoy.

In 1999-2000, the CANDU business continued to perform well. We celebrated the completion of Wolsong Unit 4 in the Republic

of Korea and saw significant progress made in the construction of two CANDU reactors for the Qinshan CANDU project in China.

Significant growth was realized in AECL's services business. The growing market for rehabilitation and life extension of operating CANDU nuclear reactors was driven by Ontario Power Generation and other domestic owners of CANDU.

AECL continues to manage a research and development program that supports existing CANDU technology in Canada and abroad, as well as the next generation of reactor technologies for CANDU nuclear power plants. The corporation has initiated a program to bring this next generation of CANDU technologies to a fully proven state, ready for application to future reactor designs.

AECL's Research and Development Advisory Panel, a group of highly respected and independent scientific professionals, continually reviews the utility of AECL's research and development activities with a critical eye to



In 1999-2000, AECL celebrated the completion of Wolsong Unit 4 in the Republic of Korea.

to develop the long-term decommissioning program.

Last November, in Montebello, Québec, I had the distinct pleasure of meeting with some of the AECL recipients of awards for their scientific achievements, engineering and exceptional contributions. The accomplishments of these individuals and their colleagues contribute directly to the future success of the company.

This year, I was pleased to welcome Neil McMillan as a new member of AECL's Board of Directors. I wish to thank outgoing member Mary Arnold for her valuable contribution.

On behalf of AECL's Board of Directors, I thank Allen Kilpatrick, AECL's president and CEO, who will be retiring this summer, for his able leadership and counsel. During his tenure with the corporation, he has furthered Canada's CANDU export program and AECL's relationships with its stakeholders and customers. To his credit and the credit of all AECL staff, in 1999-2000 AECL achieved the best year in its financial history, retaining the largest net earnings ever recorded. This solid foundation is the legacy on which AECL will continue to build for the years to come.

Respectfully,

Robert F. Nixon
Chairman of the Board

ensure that they are leading edge and of value to the corporation. During the year, AECL's Board of Directors looked to this panel for its recommendations in areas such as safety, research and next-generation reactor design.

Discussions continue with the federal government on funding the Canadian Neutron Facility for Materials Research (CNF), emphasizing the urgency of a positive decision. The CNF represents next-generation neutron-based materials research and innovation in Canada. This facility will provide an advanced materials research capability to meet the needs of Canadian universities and industry (each year about 180 collaborators carry out 100 research projects in this key area). The CNF will be an essential testing facility to advance the CANDU power reactor design to ensure the future competitiveness of the Canadian nuclear industry. It is encouraging that university consortia are being established to secure funding for state-of-the-art analysis equipment associated with the CNF.

At AECL's Chalk River Laboratories, the first MAPLE medical isotope reactor received its operating licence from the Atomic Energy Control Board – now the Canadian Nuclear Safety Commission – in August 1999. This is the first reactor in the world to be built exclusively to produce medical isotopes – essential, life-saving substances used in nuclear medicine around the world. The isotopes produced include molybdenum-99, most widely used by hospitals and clinics to diagnose cancer and heart disease without the need for surgery; xenon-133, used in nuclear medicine for lung ventilation and for blood flow studies; iodine-131 to diagnose and treat thyroid disorders; and iodine-125, used annually in more than 15 million medical tests.

After careful consideration, the AECL Board of Directors addressed the long-standing matter of recording the historical liability for decommissioning on AECL's financial statements. On behalf of the Government of Canada, AECL has now chosen to recognize this liability and is working with the Government of Canada

President's Message

IT'S TIME TO CLEAR THE AIR. TIME IS OF THE ESSENCE IF THE WORLD IS SERIOUS ABOUT ADDRESSING GLOBAL WARMING AND HALTING OR REVERSING THE PRESENT GROWTH IN CARBON DIOXIDE CONCENTRATION.



Nuclear energy, in conjunction with other approaches, including renewable sources and conservation, must play an important role in the world's energy future.

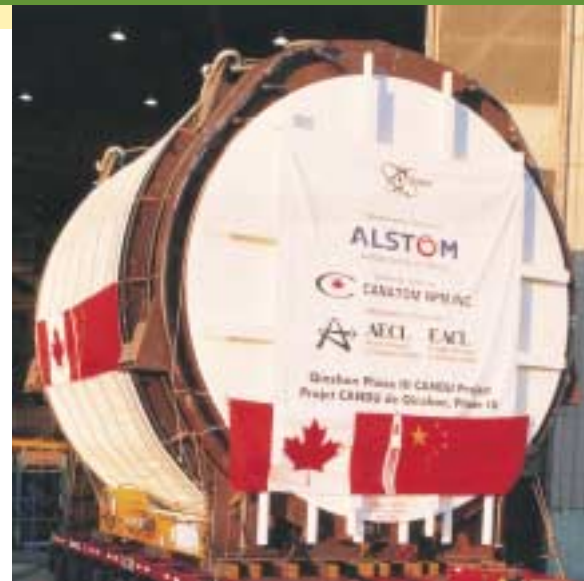
Currently, nuclear power saves our planet from about two billion tonnes of carbon dioxide emissions a year. In Canada alone, without nuclear generation, greenhouse gas emissions from electricity production would double.

Fortunately, the environmental benefits of nuclear power are increasingly being recognized. In 1997, the Kyoto Summit on Climate Change brought the issue of global warming to the world stage. Then in 1998, the World Energy Congress signaled a definite shift in attitude by recommending to industry and governments that nuclear power should play a major role in strategies to combat global warming.

"No other reliable and carbon-free alternative to nuclear will be available in anything like the quantities required for baseload electricity production between now and the target date for

the Kyoto reductions of 2010," said Gerald Doucet of the World Energy Council. "More electricity generating capacity will be built in the next 25 years than was built during the previous century. Some of it, in growing amount from a tiny base, will come from renewables. But quite simply, even at current low world oil prices and assuming massive shifts toward natural gas combined cycle generation to offset coal usage, you cannot get there from here without nuclear energy."

A team of engineers, scientists and economists in the United Kingdom similarly concluded that it is "vital to keep the nuclear option open." In their 1999 report prepared for the Royal Society and the Royal Academy of Engineering, *Nuclear Energy – the future climate*, they said, "We cannot be confident that the combination of efficiency, conservation and renewables will be enough to meet the needs of environmental protection while providing a secure supply of electricity at an acceptable cost."



A shift in public attitudes in the United States is reflected in a public opinion poll conducted in February 2000 which shows more than 60 per cent support for nuclear power among college graduates/registered voters and the general public. Public support for nuclear power is also growing in countries such as Sweden and Germany, which had been planning to phase it out. In looking at the energy alternatives, many Swedes and Germans now believe that their governments were too hasty in turning away from the nuclear option.

A Canadian poll in 1997 revealed that 77 per cent of respondents thought the use of nuclear energy to generate electricity would increase over the next 50 years and 68 per cent thought that electricity from nuclear power plants will be important in meeting Canada's future energy needs.

“Utilities in Canada, the United States and elsewhere are now giving serious consideration to life extension of their nuclear plants.”

Utilities in Canada, the United States and elsewhere are now giving serious consideration to life extension of their nuclear plants. They recognize the value of their current nuclear assets and the competitive electricity that can be generated by these plants after life extension programs are put in place. Utility investments in this area represent significant services opportunities for AECL and the utilities would reap continuing environmental benefits from nuclear generation.

In 1999-2000, AECL's services business continued to grow. The corporation has a major role in helping Ontario Power Generation in its program to return the performance of its CANDU nuclear reactors to world-class levels. This includes work for the potential return to service of the Pickering A nuclear reactors. Good support to the operation and maintenance of these CANDU reactors is expected to assist the utility in extending their operating life for years to come.

Throughout the year, AECL continued to work with countries that, having invested in nuclear technology, will have the advantage in effectively controlling greenhouse gas emissions. In the Republic of Korea, the fourth CANDU reactor, Wolsong Unit 4, began commercial operation in October 1999. Construction of the two 700 MWe-class CANDU reactors in Qinshan, China are at the midway point. The reactors will go into commercial service in 2003. Prospects for future

Construction of the two 700 MWe-class CANDU reactors in Qinshan, China is at the midway point.



CANDU reactor sales in Asia and elsewhere remain encouraging, although the timing of decision making has been deferred due to economic factors.

The MDS Nordion Medical Isotopes Reactor (MMIR) Project at AECL's Chalk River Laboratories will provide a secure supply of medical isotopes to the global market for decades to come. It features two MAPLE reactors and a processing facility that will be completed in November 2000. In August 1999, the first MAPLE reactor received its operating license from the Atomic Energy Control Board – now the Canadian Nuclear Safety Commission. This is the first reactor in the world to be built exclusively to produce medical isotopes used in medical diagnostics and treatment. Canada provides more than 60 per cent of the world's reactor-based medical isotopes and produces over 80 per cent of cobalt for treating cancer.

As you will see from the financial statements in this annual report, AECL exceeded the financial targets that it had set for 1999-2000 and had an excellent year. This included the largest net income retained in the history of the corporation, which was largely achieved through a combination of successful performance of business contracts and ongoing management of expenses.

To the credit of AECL's staff, the corporation realized its accomplishments this year, while addressing the additional

challenge of meeting the CANDU utilities' needs for Y2K preparedness. AECL established the Year 2000 Project to address date-related concerns about the performance of the CANDU reactors after 1999. In the days following the Y2K rollover, CANDU owners praised AECL for its leadership role in organizing the cooperative and successful Y2K effort.

For the past 10 years, the nuclear industry was fortunate to have been well represented by Murray Stewart, who resigned his position as president and CEO of the Canadian Nuclear Association at the end of December 1999. His in-depth knowledge of the nuclear industry made him an excellent advocate on its behalf. AECL welcomes and looks forward to working with his successor William Clarke.

As I prepare to retire later this summer, I have great confidence in the future of nuclear power and the CANDU business. Global warming is not the only factor behind the growing support for nuclear power. Nuclear power is a safe, reliable, clean and proven way to generate electricity. Nuclear power plants have been generating electricity for half a century, with almost 8,000 reactor years of experience.

Furthermore, AECL continues to focus on the competitiveness of its CANDU technology. Development work is

under way to reduce significantly the capital costs of the nuclear plant. We are confident that this can be reached for advanced CANDU plants.

Perhaps my greatest source of confidence in the future of nuclear power is AECL's staff. I am proud to have been a member of an organization filled with so many dedicated and talented individuals whose knowledge and ingenuity hold great promise for our CANDU product and the planet.



R. Allen Kilpatrick
President and Chief Executive Officer

Corporate Governance

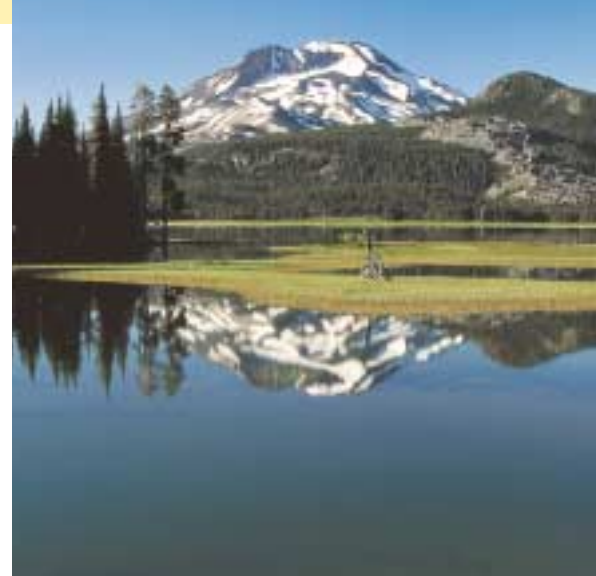


The Committee on Corporate Governance was established by the Board of Directors in 1997 and approved Guidelines based on those recommended by the Minister of Finance and the President of the Treasury Board in June of 1996 in their publication entitled “Corporate Governance in Crown Corporations and Other Public Enterprises.”

The Committee has been active since its inception, and has, among other things, implemented processes at the Board level and in all of the Committees of the Board whereby the effectiveness of the Board’s stewardship is continuously examined, continuous development is encouraged and enhanced, and independence is maintained.

The activities of the Committee for the past year included a Board evaluation, with a view to ascertaining members’ views as to the functioning of the Board, its effectiveness, its independence and relationship with management, and the means by which its processes can be improved. The annual Board/Management workshop was held, and is planned again for the coming year. Additionally, the Committee developed an effectiveness questionnaire for each of the Committees of the Board, and will complete its survey of all Committee members this year. Orientation sessions will again be held for new members.

The Board will continuously seek to improve its governance activities in the context of its adopted Guidelines.



Corporate Objectives



AECL continues to set corporate objectives against which to measure its progress. Establishing the objectives is integral to the corporate planning process and the resulting objectives are reviewed and approved by the Board of Directors.

The current focus of the objectives is to set targets that drive the corporation to adapt to important changes in the market for AECL's products and services. These changes are also driving the need to assess changes in the corporation's relationship with its shareholder, the Government of Canada.

The key objectives for the current business cycle are:

1. Renew the Relationship with AECL's Shareholder

Since the time of Program Review in 1995, there have been significant changes in the relationship with AECL's shareholder in terms of research and development funding. In addition, both in Canada and abroad, a drive to privatize the generation of electricity is

demanding changes in AECL's product development strategies. Other changes make it very attractive for generators to rehabilitate and upgrade nuclear power plants. The combined effect of these trends is to demand innovative approaches to the power markets and new business structures for suppliers. Hence, AECL continues to engage in a process of redefining and renewing the relationship with the shareholder, in order to maximize the corporation's ability to participate in these commercial markets.

2. Sale of CANDU Reactors

One of AECL's primary objectives is the sale of CANDU reactors in the global marketplace. The target continues to be an average of one reactor sale per year.

3. Growth in the Business of Servicing Existing CANDU Reactors

AECL plans to capitalize on the increasing opportunity for major rehabilitation of existing CANDU plants. The corporation has developed aggressive

year-over-year growth targets which seek to increase AECL's share of these programs.

4. Meet Financial Targets

AECL plans to meet the financial targets that are set annually by the Board of Directors. These targets require profitability and strive for continuously improving financial performance.

5. Improve the Public Image of Nuclear Power and AECL

AECL recognizes that nuclear technology and its application are controversial. In cooperation with the Canadian Nuclear Association and other nuclear stakeholders, the corporation plans to vigorously promote the benefits of nuclear technology, especially in relation to climate change, and its overall public image.

Nuclear Technology and Clean Air



TODAY, MORE GREENHOUSE GASES ARE BEING RELEASED INTO THE ATMOSPHERE THAN ARE BEING ABSORBED.



Many scientists believe this imbalance may lead to climate change and be a significant cause for concern.

Reports by the Intergovernmental Panel of Climate Change in 1990 and 1992 suggest that some of the possible side effects of rapid change include: large-scale disruptions of forestry, agriculture and fisheries; extinction of flora and fauna species on land and in the ocean, disruption of precipitation patterns, loss of coastal land, and adverse effects on human health.

Concern about the global implication of greenhouse gases for climate change and air quality brought 160 industrialized and developing countries to Kyoto, Japan in December 1997. Individual targets for emissions reductions were established for developed countries based on their national economic circumstances. Canada agreed to reduce its emissions to six per cent below 1990 levels by the years 2008 to 2012 – a daunting task.

Not only will increased use of nuclear energy be an important part of the solution to reducing carbon dioxide emission levels, but it can also have a significant impact in reducing local air quality problems such as smog. Nuclear energy is a proven greenhouse-gas and air pollution-free technology that can meet the large-scale electricity demands of our planet. Nuclear energy has already been demonstrated to be one of the best methods of avoiding

oxides. Without Ontario's nuclear reactors, for example, annual carbon dioxide emissions would increase by 15 per cent to 20 per cent and Southern Ontario's air quality would be much worse.

CANDU nuclear reactors do not produce greenhouse gases or gases that cause acid rain or smog. Air and water discharges from CANDU power plants are free of contaminants such as heavy

“Nuclear energy is a proven greenhouse-gas- and air pollution-free technology that can meet the large-scale electricity demands of our planet.”

carbon dioxide, nitrogen oxides and sulfur dioxide emissions in Canada. The use of CANDU technology to generate nuclear power has avoided to date over one billion tonnes of carbon dioxide emissions, 11 million tonnes of sulphur dioxide and 2.5 million tonnes of nitrogen

metals, organic compounds and acid gases. The same is true of all CANDU nuclear power plants around the world, so that countries investing in CANDU technology will have the advantage in effectively controlling greenhouse gas and smog emissions in the future.

AECL has participated in the government's overall strategy for greenhouse gas reductions. In addition to the contribution being made by nuclear reactors, AECL in its own activities is participating in voluntary programs.

The Voluntary Climate Change Registry (VCR)

The Voluntary Climate Change Registry (VCR) was first established by Natural Resources Canada in 1995 as a key element of Canada's National Action Program on Climate Change. Today it is operating as a public-private partnership and includes participants from over 650 industries, government and non-government agencies. The registry serves as a catalyst for all participants to take voluntary actions that will contribute towards the reduction of Canada's greenhouse gas emissions. Its purpose is to provide a record through an annual VCR report of all emissions reductions and voluntary actions planned and executed by organizations. AECL is documenting its greenhouse gas initiatives and activities.

The ABC Program

Action by Canadians (ABC) is an innovative new program launched by the Energy Council of Canada that encourages Canadians to make pledges to reduce their individual greenhouse gas emissions. The goal of the ABC Program is to work with industry and others

to engage Canadians in the issue of climate change. The program aims to demonstrate that measurable reductions in greenhouse gas emissions can be secured by motivating individuals to take action on climate change. Public education is key to achieving this goal. The program's initial approach to delivering its education is through a series of workshops targeted at individuals across Canada, either through their place of employment or in their community.

AECL is proud to be a leader and partner in this program. A series of workshops will be delivered to AECL employees starting in April 2000. AECL is committed to reaching beyond the workplace, by building on the success of its staff programs and forging links with other climate change programs in the local communities.

Community Relations

DURING THE YEAR, AECL CONTINUED TO UNDERTAKE COMMUNITY RELATIONS AND PUBLIC INFORMATION PROGRAMS AND ACTIVITIES DESIGNED TO FOSTER AWARENESS AND UNDERSTANDING OF THE COMPANY'S ACTIVITIES AT ITS VARIOUS SITES.



The objective of these programs is to further the development of mutually effective working relationships with neighboring stakeholders, including elected and appointed officials, business associations, service groups and the community-at-large. The programs include tours, briefing sessions, public education, partnership with local schools, distribution of information materials, and participation in open houses and many community events.

Improving the science culture in Canada is crucial to public understanding and acceptance of the important role that nuclear energy plays in meeting domestic and world energy needs in an environmentally sustainable and responsible manner. In the past year, AECL undertook public education initiatives with the goal of enhancing science literacy.

The *Science for Educators Seminar*, held at AECL's Chalk River Laboratories (CRL) in April 1999, ongoing for more than 20 years, provided an opportunity for science teachers to spend time at the

CRL site, visit the laboratories, talk with scientists and researchers, and conduct hands-on experiments. The teachers who attended the seminar valued seeing science in action and learning some new techniques for lab programs in their schools. They returned to their classrooms with enhanced knowledge of the nuclear industry and a renewed enthusiasm for science.

AECL participated in the Renfrew County *Partnership in Education Program*, which aims to increase interest in science and technology among students in schools across Canada. This year, AECL's CRL welcomed

"In the past year, AECL undertook public education initiatives with the goal of enhancing science literacy."

students in grades seven and 10 for special tours of the site, visits to the labs and discussions with scientists and researchers. Over 40 school groups tour the CRL site each year.

As part of the *Science for Educators* program, teachers participated in a fun and interactive environmental session that featured a hands-on exercise to teach the fundamentals of groundwater flow.

Encounters with Canada is a federal government program that brings students from across Canada to Ottawa for a week of lectures, workshops, sightseeing and interaction with other young Canadians. During the

year, AECL provided speakers during parts of the program devoted to the science-minded young people, as well as a tour of CRL.

In December 1999, AECL staff presented a cheque to the United Way for more than \$144,000, demonstrating their commitment to the community.



Ontario university students furthered their studies in hydrogeology and environmental sciences in August and September 1999 when they attended the field course *Biogeochemical Processes in Natural Waters*, held in and around Deep River and CRL. The course has become an annual event supported by staff of AECL's Environmental Research Branch. Organized by the University of Toronto, the field course teaches students how to evaluate a range of physical, chemical and biological processes that occur in wetlands, streams, lakes and near-surface groundwaters. Although the emphasis was on field techniques, students also gained experience in chemical analyses of natural waters and computer modeling. They toured the CRL site and met with AECL staff to learn about their work.

In 1999, AECL became a sponsor of the Ontario Science Centre's (OSC) school programs and the inaugural sponsor of the OSC's *Teacher in Residence Program*. AECL plays a part in

helping the OSC develop and deliver science programs that support the formal education each year of about 200,000 students from kindergarten to high school. Under the *Teacher in Residence Program*, the OSC brings skilled, experienced teachers from the formal education system who work in partnership with OSC staff, informing them of the needs, issues and changes within the school system. Students benefit from further enriched science programming, while participating teachers are provided with a unique professional development opportunity. In September 1999, a teacher was seconded to the OSC from the Toronto District School Board to deliver science programs for the 1999-2000 academic year. Another teacher will be appointed for 2000-2001.

In October 1999, AECL organized a two-day workshop for journalism students, in collaboration with other institutions and agencies, including the Canadian Nuclear Society. The workshop *Reporting on Climate Change Issues* was held

in Stanley Bridge, Prince Edward Island. Participants included 80 journalism and public relations students, and faculty, representing five post-secondary educational institutions in Atlantic Canada, and a number of communications teachers from New Brunswick. Then in March, 2000, AECL held the professional development workshop *Reporting on Scientific Issues*, at the Kempenfelt Conference Centre, near Barrie, Ontario. About 50 post-graduate journalism students from Humber College were joined by seasoned scientists and science communicators. The goal of both these events was to bridge the communication gap between scientists and journalists.

In 1999-2000, AECL sponsored the YTV *Youth Achievement Award for Innovation, Science and Technology*. The annual YTV awards program, broadcast in April, celebrates individual accomplishments of Canadian youth and encourages and inspires other young people to make their own personal difference.

The commitment of AECL staff to their communities was exemplified by the highly successful outcome of this past year's United Way campaign. On December 7, 1999, AECL presented a cheque to the United Way for more than \$144,000 – funds raised from employees at all sites for their respective local United Way campaigns conducted in the fall of 1999.

CANDU Business



INTERNATIONAL CANDU PROJECTS

Asia-Pacific

The Asia-Pacific region is an emerging market for nuclear power given the population and a strong focus on improving the standard of living. In addition, some of the countries in the region have limited indigenous fuel resources.

In November 1999, AECL presented its Pre-feasibility Study on the construction of CANDU power plants in Vietnam, which is expected to be a net importer of electrical energy by 2010. Nuclear power is among the options being seriously considered.

AECL maintains a regional office in Bangkok and continues to support the Chair in Nuclear Engineering at Chulalongkorn University in that city. 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. This is a very effective and efficient way to support nuclear engineering

programs and the internal training needs of prospective customers.

In addition to courses related directly to CANDU technology, AECL also sponsored a variety of other educational opportunities related to radiation biology, management training and public education. Also, engineers and scientists from Indonesia and Vietnam were attached to AECL's product development function in Canada.



Work on the steam generator for the first Qinshan CANDU reactor was performed in the Republic of Korea.



The first of two calandrias for the Qinshan CANDU Project arrived in the port of Shanghai in June 1999 before making the last leg of its journey to site.



The second calandria destined for China leaves the manufacturer in Tracy, Québec.

China

Construction of the two 700 MWe-class CANDU units at Qinshan, in Zhejiang Province, China is at the half-way point. Civil work is well advanced and mechanical installation is progressing. Engineering and procurement are on schedule to support the construction program, which will see both units in service in 2003.

Training of the Third Qinshan Nuclear Power Company's commissioning staff in Canada at Hydro Québec's Gentilly 2 CANDU station is more than half complete. Expatriate staffing as of March 31, 2000 is at 120, with 300 local staff in AECL's site project

management organization. More than 4,000 construction contractors' staff are working on the project.

In 1999-2000, AECL signed agreements with leading Chinese organizations for cooperation on educational and research programs. The corporation signed several agreements in 1999 with Xi'an Jiao Tong University for development of educational training materials incorporating CANDU related topics. In 2000, AECL signed a joint development agreement with the Shanghai Nuclear Energy Research and Design Institute, and an agreement with the China Machinery and Equipment Company – International

Engineering Company for cooperation in exploring localization in China of the manufacture of CANDU components.

Republic of Korea

AECL successfully completed its scope of work on the Wolsong 2, 3 and 4 Project when Wolsong Unit 4 entered into commercial operation on October 1, 1999. All three units thus entered into service on schedule, and have operated with excellent performance records ever since. Indeed, Wolsong Unit 3 was declared number one in the world by the journal *Nuclear Engineering International* for the period June 1998 to September 1999.

AECL continues to work toward having CANDU 9 included in Korea's plans for the next nuclear projects.

Romania

In Romania, Cernavoda Unit 1 continues to operate well, providing roughly 10 per cent of Romania's electrical supply. Negotiations are under way for a contract to complete Unit 2. Financing is being sought from Export Credit agencies to complement Romanian government funds for the project.

Turkey

In October 1997, AECL submitted a competitive bid to supply two 700 MWe-class CANDU reactors to Turkey. TEAS, the Turkish utility, has completed the evaluation

of the three submitted bids. Selection of the preferred bidder has been postponed several times. The Turkish government continues to state its determination to proceed with a nuclear power program and to complete the bidding process. A decision is still expected in 2000. AECL's CANDU bid has been shown to be very competitive against the French/German and Westinghouse pressurized water reactors.

MARKETING SUPPORT

In support of its marketing efforts, AECL has continued its international *Energy for the Next Millennium* campaign to provide information about AECL and its products and services to customers and potential customers

worldwide, and to communicate the benefits of nuclear energy. The corporation redesigned all marketing materials to conform to the campaign's consistent look. An increased focus was placed on developing materials to further build awareness of AECL's services capabilities, to assist clients with public acceptance issues, to provide historical and up-to-date information on CANDU stations and projects, and to provide marketing brochures for the proposed Canadian Neutron Facility. During the year, AECL participated in trade shows in Canada, China, Indonesia and the Republic of Korea.



AECL is negotiating to complete Unit 2 at the Cernavoda site in Romania.



Commissioning staff of the Third Qinshan Nuclear Power Company are trained at the Gentilly 2 Nuclear Power Plant, in Québec.

" AECL has continued its international *Energy for the Next Millennium* campaign to provide information about AECL and its products and services to customers and potential customers worldwide."

“ AECL has continued to support all the CANDU utilities and other services customers around the world with a variety of uniquely qualified staff and facilities. ”

SERVICES SUPPORT TO NUCLEAR PLANTS

AECL's ability to respond to the challenging needs of its customers was highlighted in several areas during the past year. The fiscal year saw AECL's services business revenues reach new highs.

- In late 1998, Ontario Power Generation (OPG) began to plan for the return to service of the Pickering A units. OPG retained AECL to undertake the engineering required for Unit 4 procurement, installation and licensing support with a team which grew from 20 staff in December 1998 to the current complement of 300.
- AECL has continued to support all the CANDU utilities and other services customers around the world with a variety of uniquely qualified staff and facilities. In support of OPG's continuing Nuclear Asset Optimization Program, AECL had, on average, 125 staff seconded to work at OPG sites throughout the year. Various AECL teams were mobilized on both planned and urgent request bases to respond to customer needs both domestically and overseas.
- During 1999, a skilled group of AECL engineers and technicians successfully completed the first fuel channel inspection in Romania at Cernavoda Unit 1. Plans are under way as well to provide this new AECL service to CANDU utilities in Argentina and the Republic of Korea.
- Two fuelling machine ram assemblies, fabricated, assembled and tested by AECL, were delivered to the Korea Electric Power Corporation (KEPCO) for use in servicing the four units at Wolsong. Next year, two spare fuelling machines will be completed and shipped to KEPCO. In addition, several components which are unique to the core CANDU business were fabricated and delivered to the Qinshan CANDU Project.

A view of the empty reactor pool for MAPLE Unit 1 at Chalk River Laboratories. The reactor achieved its first sustained chain nuclear reaction in February 2000.





Seen in the foreground, an exterior view of the buildings housing the two new MAPLE isotope production reactors and associated processing facility at Chalk River.

- During the past year, AECL delivered the first Digital Cerenkov Viewing Devices to Euratom and demonstrated this new product to the International Atomic Energy Agency (IAEA). This device allows inspectors to verify spent fuel bundles stored in various facilities as part of the IAEA monitoring program.
- AECL's fuel fabrication facility at Chalk River Laboratories (CRL) supplied additional fuel to the HANARO research reactor in the Republic of Korea and is in the process of manufacturing fuel for the MAPLE reactors currently under construction at AECL's Chalk River site.
- AECL responded to client requests to develop innovative and new partnering arrangements for the refurbishment and subsequent operations of a CANDU plant.

MDS NORDION MEDICAL ISOTOPES REACTOR (MMIR) PROJECT

In August 1996, MDS Nordion Inc. contracted AECL to build two new MAPLE isotope production reactors and an associated processing facility at CRL. MDS Nordion will own the facilities and manage the commercial supply of medical isotopes. AECL will operate the facilities for MDS Nordion. The new facilities

will replace the isotope production role of AECL's National Research Universal (NRU) reactor, which has been in operation since 1957.

In April 1997, following public consultations on the project, the Atomic Energy Control Board (AECB) – now the Canadian Nuclear Safety Commission – (CNSC) approved the environmental assessment for the MMIR Project. The AECB granted construction approvals for the facilities in December 1997 and operating licenses for the first MAPLE reactor and the processing facility in August 1999.

The first MAPLE reactor achieved its first sustained chain nuclear reaction on February 19, 2000. The acceptance tests for the first MAPLE reactor and the processing facility began in May 2000.

An operating license for the second MAPLE reactor was requested from the CNSC in June 2000.

The MMIR project will be completed in November 2000, at which time the Canadian production of medical isotopes will have been transferred from the NRU reactor to the new MAPLE reactors, which will provide a secure supply of medical isotopes to the global market for many decades.



Inside the control room for the MAPLE Unit 1 reactor.

Product Development

DURING 1999-2000, AECL UNDERTOOK A REVIEW OF THE OPPORTUNITIES FOR DEVELOPING THE NEXT GENERATION OF REACTOR TECHNOLOGIES FOR CANDU NUCLEAR POWER PLANTS.



CANDU TECHNOLOGY FOR THE NEW CENTURY

The potential was recognized for substantially lower capital costs through the application of a suite of enabling technologies. AECL has initiated a program to bring this next generation of CANDU technologies to the fully proven state, ready for application to future reactor designs.

AECL is exploring opportunities for regional and global cooperation in such future-oriented development. The next generation technology program will provide an additional vehicle for cooperative development. This program will also create a strong link between the evolutionary improvement of current reactor products in the near term, and the long-term development of CANDU to its ultimate potential.

CANDU REACTORS

The year 1999-2000 saw the application of a number of results of AECL's product development activities to the Qinshan CANDU Project. AECL's 3-D CADDs (Computer Aided Design and

Drafting) systems and capabilities provide important benefits that result in further construction and installation effectiveness. By applying advanced electronic engineering, AECL continues to position the CANDU product for major cost reductions across engineering, procurement and construction. A state-of-the-art engineering, project management and project control system is now in place on the Qinshan and Pickering Return to Service projects. The system allows for integrated electronic data management and communication among all major participants in the projects. This includes a material management system, fully integrated with the 3-D CADDs model, resulting in accurate material demand. Another feature is a state-of-the-art electronic document and drawing storage and management system, implemented at both Sheridan Park and the China site. These systems have eliminated the need to ship large quantities of paper drawings and documents back and forth between the engineering office and site. The transfer process has become fully electronic.

AECL's Computer Aided Design and Drafting systems and capabilities provide important benefits that result in further construction and installation effectiveness for CANDU projects.



“ AECL’s state-of-the-art CANDU 9 design represents a fully-developed and proven product.”

CONTROL CENTRE DESIGN

A major upgrade in the control room design will enhance safety through improved critical safety parameter monitoring and direct support for various emergency response facilities; and create operating and maintenance cost reductions from advanced alarm management, improved operator plant state monitoring, the use of information now available for process surveillance and condition-based maintenance programs, reduced outage times and faster restoration to power generation; and equipment obsolescence protection and high performance for the plant display system.

For future projects, continuing CANDU 6 improvements developed this year include more streamlined scheduling for faster construction; and design adaptations ready to incorporate CANFLEX® fuel and improve capital cost effectiveness. The CANDU 6 design is being maintained in a fully-licensable state by carrying out a thorough review with Canada’s regulator, the Canadian Nuclear Safety Commission (formerly the AECB).

AECL’s state-of-the-art CANDU 9 design represents a fully-developed and proven

product. Continuing enhancements have focused on streamlining project delivery and on building partnerships, both in Canada and offshore. In particular, cooperative development with engineering, manufacturing and construction organizations in the Republic of Korea is building on the successes of the CANDU program in that country. Fuel handling design improvements completed in the last year will deliver both cost reduction and performance enhancement.

The year 1999-2000 also saw an emphasis on product development to support enhanced performance of the existing fleet of operating CANDU units. Many CANDU units are entering the middle years of operating life. As a result, plant life management, to ensure good performance through the design life and on to life extension, is assuming greater importance. AECL has pioneered a cooperative program with Canadian utilities to thoroughly review plant status and aging effects, and to initiate maintenance, refurbishment and configuration management actions to ensure excellent long-term plant performance. This program is also attracting interest from offshore CANDU utilities.

CANDU PRODUCTS AND SERVICES DEVELOPMENT

A number of products and services are being developed to enhance AECL business opportunities with the CANDU utilities. One such product is the system health monitor ChemAND (Chemistry ANALysis and Diagnostic system). ChemAND tracks system health based on current and historical plant chemistry data for four plant systems. ChemAND has recently completed successful field trials at Hydro Québec’s Gentilly-2 Nuclear Power Plant and is now commercially available. By assessing the impacts of current operation and of specific events on major components, it becomes an effective plant life management tool. Not only are diagnostic and monitoring tools like ChemAND valuable for supporting operations of current CANDU plants, they are also an integral part of technology being built into new designs to create a “smarter” CANDU.

“The year 1999-2000 also saw an emphasis on product development to support enhanced performance of the existing fleet of operating CANDU units.”



AECL staff at Chalk River Laboratories are seen here with the new Finned Strainer technology that was supplied to Ontario Power Generation's Pickering site.

In 1999, AECL completed the development and assembly of a system for fuel channel inspection as an important contribution to the safe and effective operation of CANDU reactors, and as an opportunity to enhance AECL's services business. In November 1999, this system was used to successfully complete an inaugural fuel channel inspection at Cernavoda Unit 1. A fuel channel inspection is scheduled for August 2000 at the Embalse CANDU reactor in Argentina. The new system provides a significant increase in capabilities (twice the inspection coverage in half the time) over existing alternatives, and provides AECL and its CANDU utility clients with state-of-the-art, rapid, and efficient fuel channel inspection capability.

COMPONENTS AND SYSTEMS

Ensuring high capacity factors for CANDU reactors requires effective surveillance and diagnostics for system and component health for inspection of CANDU steam generators. AECL has developed a family of eddy-current probes that can be used to detect and characterize all types of tube-wall damage. This technology can be used to ensure that new steam generators have been manufactured to specifications and operating steam generators are not susceptible to damage due to vibrating and fretting.

Nuclear Research

AECL PERFORMS RESEARCH IN A NUMBER OF AREAS PRIMARILY IN SUPPORT OF THE DESIGN AND LICENSING BASIS OF CANDU REACTORS.



Specific objectives for the research programs are to continue to ensure the safe and effective operation of CANDU reactors; to develop new products and services to enhance AECL's business opportunities; to provide the basis for specific enhancements to AECL's CANDU 6, CANDU 9 and MAPLE reactor designs; to support the pre-commercial development of advanced CANDU designs; and to support Canadian government policy.

FUEL CHANNELS

Fuel channels are key components of CANDU reactors. R&D activities analyze the performance of existing fuel channels, use this information together with small-scale testing to extend the fundamental understanding of in-service behavior, and use the resulting models to generate fitness for service guidelines, and to develop advanced fuel channels with improved performance.

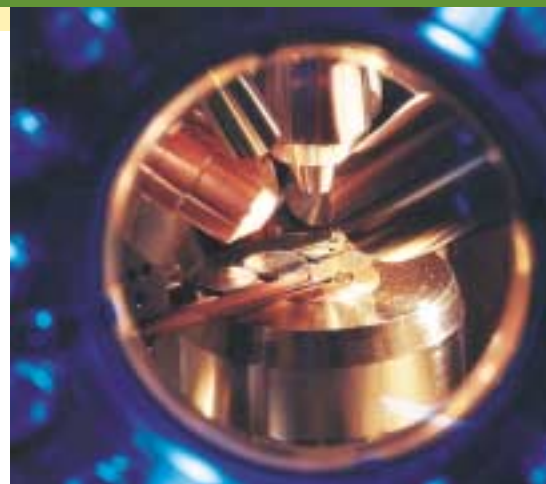
REACTOR SAFETY

AECL's system thermalhydraulics computer code, CATHENA, is a fundamental tool for designing and licensing CANDU and MAPLE reactors. Recently, there has been growing international interest in the code for use in analyzing other reactors, and in developing expertise in CANDU technology. In 1999-2000, CATHENA was transferred to organizations in Argentina and Indonesia, and was relicensed for use in Germany. In addition, the transfer of CATHENA to organizations in several other countries is under way, including China, the Republic of Korea, Romania and Turkey. These transfers, and transfers of other AECL computer codes, are being undertaken through the recently established AECL Code Centre. The Code Centre's mandate is to facilitate access to AECL's analytical codes, and to provide for training and ongoing user support for participating organizations.

A close-up of an irradiated fuel sheath sample that is in position to be analyzed using the X-ray photoelectron spectrometer (XPS).

As further evidence of the international interest in CATHENA, AECL is leading the IAEA-sponsored International Standard Problem on the Intercomparison and Validation of Computer Codes for Thermalhydraulic Safety Analyses of Heavy Water Reactors. CATHENA will be one of the computer codes used in this study, which will include participation from Canada, Argentina, Italy, the Republic of Korea, Romania and other interested countries.

"Fuel channels are key components of CANDU reactors. R&D activities analyze the performance of existing fuel channels."



FUEL AND FUEL CYCLES

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. In 1999-2000, significant progress was made in the qualification of the CANFLEX fuel bundle. In the irradiation demonstration at the Point Lepreau Generating Station, 20 bundles were successfully irradiated and discharged from the reactor, leaving four CANFLEX bundles in the core, which will complete their irradiation by late summer in 2000. Two bundles are undergoing post-irradiation examination at the hot-cell facility at Chalk River Laboratories. Performance of the fuel has been excellent.

A series of thermalhydraulic experiments has quantified the improvement in performance over existing fuel designs. CANFLEX can be used in existing reactors, and to increase the power output in new reactors.

Demonstration of the synergy between pressurized water reactors (PWRs) and CANDU reactors continued with the advancement of the DUPIC 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. In 1999-2000, three DUPIC fuel elements being irradiated in the NRU research reactor reached a burnup typical of natural uranium CANDU fuel, on their way towards ~three-times natural uranium burnup.

HEAVY WATER

Upgrading

The CECEUD facility has been successfully used to demonstrate the effectiveness of combined electrolysis-catalytic exchange technology for upgrading feedwater containing varying amounts of deuterium to greater than reactor-grade heavy water. This technology has the potential to reduce the capital cost of CANDU.

Supply

The production of reactor-grade heavy water from existing supplies of tritiated heavy water is possible using a process similar to the CECEUD demonstration. The reference approach is to recycle this used heavy water through a Heavy Water Processing System (HWPS) that will detritiate, and as necessary, upgrade the water for use in CANDU.



A staff member of AECL's Corrosion and Surface Science Branch at Chalk River Laboratories uses the new XPS to study chemistry detail at the fuel-sheath interface in irradiated CANDU fuel. The XPS was commissioned for radioactive samples in fall 1999 and is used in the development of advanced CANDU fuels for enhanced performance at extended burnup.



An artist's rendering of the Canadian Neutron Facility that AECL and the National Research Council of Canada, in partnership with universities and industry, are jointly proposing to support next-generation neutron-based materials research and innovation in Canada.

The conceptual design of the HWPS has been completed, including a design review by AECL's Office of the Chief Engineer and the cost estimate and project schedule have been defined.

Catalytic extraction of deuterium from large industrial hydrogen sources is also an attractive option for heavy water supply. In pursuit of this option, AECL and Air Liquide Canada (ALC) are cooperating to demonstrate the Combined Industrial Reforming and Catalytic Exchange (CIRCE) process for heavy-water production. A prototype CIRCE plant was installed this year at ALC's Steam-Methane-Reformer-based hydrogen production plant in Hamilton. Commissioning of the CIRCE plant is well advanced and operation is targeted to begin by June 2000.

HEALTH AND ENVIRONMENTAL RESEARCH AND DEVELOPMENT

The objectives of this program are to minimize radionuclide emissions at the source, develop improved technologies for monitoring radiation at the workplace and in the environment, and do the necessary science to properly assess the biological effects of ionizing radiation.

RESEARCH REACTORS

AECL has continued with engineering, licensing and environmental review activities in readiness for the proposed Canadian Neutron Facility. This facility will provide essential experimental capability for the wider scientific research community in Canada, and will also play a vital role in underlying research into nuclear science and technology. Preparatory work has given AECL the opportunity for cooperative development at the university level on computer simulation tools.

SUPPORT FOR UTILITIES

An important application for AECL's R&D is to support improved plant performance and licensability for CANDU utilities. With its nuclear laboratories and facilities such as hot cells and a research reactor, AECL is uniquely positioned to provide a wide-range of R&D services. AECL's support for CANDU utilities is typically cost-shared through the CANDU Owners Group (COG). The benefits to AECL include increased CANDU marketability, CANDU design enhancements, and development of new products and services. In 1999-2000, AECL participated in the development of a new

COG organization that is separately incorporated and that continues to provide station support, joint projects and R&D in the areas of fuel channels, safety and licensing, health and safety and chemistry, and materials and components.



Operation of this prototype CIRCE (Combined Industrial Reforming and Catalytic Exchange) plant for heavy water production in Hamilton, Ontario is due to begin in June 2000.

Nuclear Operations

THE NATIONAL RESEARCH UNIVERSAL (NRU) REACTOR CURRENTLY PRODUCES EXCLUSIVELY FOR MDS NORDION ABOUT TWO THIRDS OF THE WORLD'S MARKET DEMAND FOR MOLYBDENUM-99 (MO-99) - THE ISOTOPE MOST WIDELY USED IN HOSPITALS AND CLINICS IN THE CARE OF PATIENTS SUFFERING FROM CANCER, HEART DISEASE AND OTHER ILLNESSES.



ISOTOPE SUPPLY

Globally, an estimated 50,000 people a day benefit from diagnostic procedures using radiopharmaceuticals derived from Mo-99. Other essential, life-saving substances produced by the NRU include xenon-133, used in nuclear medicine for lung ventilation and for blood flow studies, iodine-131 to diagnose and treat thyroid disorders; and iodine-125, used annually in millions of medical tests.

OPERATING FACILITIES FOR RESEARCH AND DEVELOPMENT

Authority for the operation of AECL's nuclear facilities is granted by the Canadian Nuclear Safety Commission (CNSC) - formerly the AECB - under licenses issued for the company's two research centres at Chalk River Laboratories (CRL) in Ontario and at Whiteshell Laboratories (WL) in Manitoba. Work began during the year preparing AECL's application to the AECB for renewal of the site licenses, expected by October 2000. The existing site licenses were issued in the fall of 1998 for a two-year period. AECL's site licenses cover 13 operating facilities at CRL and six at WL.

During the year, extensive work was undertaken preparing for the Y2K rollover. Contingency plans and other preparations covering all facilities at both sites, were credited for an uneventful rollover. Immediately after the rollover, facility checks were completed with no problems found.

During the year, significant progress was made in other areas such as implementation of a corporate-wide quality assurance program; installation of upgrades to the NRU research reactor and installation of a new active drain system, at CRL.

The 43-year-old NRU reactor at CRL remains one of the largest and most versatile research reactors in the world. In operation since 1957, the reactor was built for three purposes: to provide engineering research and development support for the CANDU power reactor program; as a major Canadian facility for basic neutron physics research; and as a supplier of medical and industrial radioisotopes.

The NRU now produces 60 per cent of the world's molybdenum-99 supply. The NRU reactor 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 year, NRU operated safely and reliably at a capacity factor exceeding 75 per cent. This operating performance satisfied both AECL's R&D needs and the supply of radioisotopes for MDS Nordion.



The NRU reactor at AECL's CRL produces 60 per cent of the world's molybdenum-99 (Mo-99) supply. Mo-99 is the isotope most widely used by hospitals and clinics to diagnose illnesses including cancer and heart disease without the need for surgery.

Several of the NRU's operating and safety systems have been undergoing safety upgrades over the past three years. Four of the seven upgrades were in service by the end of the year. Work progressed on the qualified emergency water supply, the new emergency core cooling, and the emergency power

While the NRU provides AECL's R&D community with an operating reactor environment within which to test fuels and materials, CRL's Shielded Facilities enable scientists and technicians to examine radioactive materials removed from the reactor or received from CANDU utilities. The facilities consist of a series of shielded



“The 43-year-old NRU reactor at CRL is one of the largest and most versatile research reactors in the world.”

supply upgrades, expected to be completed by October 2000. In tandem with these upgrades, analytical work on NRU safety issues continued. Work on the Reactor Safety Evaluation Project will culminate in the issuance of a revised final safety analysis report to the CNSC on or before October 31, 2000.

“hot cells” or small laboratories equipped with remote handling arms, thick concrete walls and leaded-glass windows filled with a liquid shielding material. A project was undertaken during 1999-2000 to complete Conduct of Operations Procedures for the Shielded Facilities. As well, a shielded facility refurbishment plan was developed during the year.

CRL's Shielded Facilities enable scientists and technicians to examine radioactive materials removed from the NRU reactor or received from CANDU utilities.

An integral part of facility operations at CRL is an active drain system that directs low-level radioactive liquid wastes to a treatment centre. Replacement of this existing system began during the year after approval was received from the AECEB (now the CNSC), AECL's Safety Review Committee, and Ontario's Technical Standards and Safety Authority.

A major upgrade to CRL's Waste Treatment Centre was completed during the year. The centre's new liquid waste evaporator now has the capacity to treat all major radioactive liquid waste streams produced at the site, including those from the laboratories and the NRU reactor.

CRL's Heavy Water Upgrading Plant was brought to a safe shutdown state during 1999 in preparation for decommissioning.

being revised during the summer of 1999. Early in 2000, WL's hot cells 2-18 were cleared of all major equipment and materials. Preliminary decontamination of most cells was completed. Operational clean-up of the laboratory complex is in progress.

SITE REFURBISHMENT

In 1999-2000, the Infrastructure Refurbishment team embarked on the expansion of the Infrastructure Refurbishment 10-year Plan (IRP) into an overall comprehensive Site Master Plan (SMP) for CRL. The initial three years of the IRP successfully completed tasks related to immediate safety, health and licensing compliance; initiated refurbishments in steam generation and distribution, and completed some building upgrades and removals. The SMP defines a vision for the future development of the CRL site into

Future SMP initiatives include hot cell facility improvements, core laboratory building refurbishments, site aesthetics and grounds improvements, and further consolidation of administration and lab functions. The corporation will continue to implement the strategy endorsed by the SMP aimed at establishing a 21st century nuclear research site.

"A major upgrade to CRL's Waste Treatment Centre was completed during the year."

During the year, work continued in preparation for nuclear facility decommissioning at WL. The report was accepted by the AECEB for technical review by federal government departments and the Manitoba Conservation Technical Advisory Committee. A public consultation program was undertaken as part of the work on the Comprehensive Study Report and comments received have been addressed in the report. There was also significant progress in the area of project planning, with the Detailed Decommissioning Plan

a cost-effective, fully functional nuclear research establishment capable of supporting all the CANDU core programs well into the future. Consolidation of space utilization will permit the removal of aging facilities, ultimately resulting in decreased operating and maintenance costs, while ensuring that AECL maintains site ability to competitively sustain nuclear research capabilities and attract outside investment.

Environmental Programs



WASTE MANAGEMENT

Nuclear Fuel Waste Management Program

In 1989, an Environmental Assessment Panel was appointed by the Minister of the Environment to examine AECL's disposal concept and on March 11, 1998 the panel submitted its report to the federal government.

A key outcome of the government response is the expectation that the producers and owners of nuclear fuel waste in Canada establish 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 between the producers and 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 develop further the

disposal technology and to maintain key areas of technical expertise. During 1999-2000, AECL worked in partnership with OPG to develop the required R&D work scope. The R&D included work on the geosciences, particularly as it relates to site characterization, engineered barriers, geotechnical studies, the operation of the Underground Research Laboratory, performance assessment, and disposal facility conceptual engineering. Other research and demonstration projects were carried out for clients in France, Japan, United Kingdom and the United States.

Staff of AECL's Environmental Technologies Branch are shown collecting water samples and flow data from Upper Bass Stream as part the Environmental Monitoring Program at CRL.

"AECL was directed by the federal government to privatize the components of its operation that had carried out the R&D in the Nuclear Fuel Waste Management Program."

In the December 1998 announcement on the future of the Whiteshell Laboratories, AECL was directed by the federal government to privatize the components of its operation that had carried out the R&D in the Nuclear Fuel Waste Management Program, including the Underground Research Laboratory and the relevant activities at Whiteshell. This initiative is being undertaken in partnership with the Economic Development Authority of Whiteshell. During 1999-2000, as an interim step towards privatization, the Waste Technology Business Unit was established, comprising the staff, facilities assets and liabilities to be included in the privatization. The process of soliciting interest from the private sector is in progress with the objective of completing the privatization by the late fall of 2000.

LOW-LEVEL RADIOACTIVE WASTE MANAGEMENT

The Low-Level Radioactive Waste Management Office (LLRWMO), operated by AECL through a cost-recovery arrangement with Natural Resources Canada (NRCan), continued its program of cleanup and interim management of historic wastes across Canada on behalf of the federal government. Monitoring and maintenance activities are carried out at all licensed interim storage sites and at identified unremediated sites until permanent disposal facilities are available to the LLRWMO. Technical support to NRCan continued in its discussions with three local communities on long-term storage options for management of the historic wastes located in the Port Hope, Ontario area.

MANAGEMENT OF AECL'S OPERATIONAL RADIOACTIVE WASTE

Significant enhancements continue to be made to the manner in which radioactive wastes are managed at AECL's Chalk River Laboratories (CRL).

As the result of a multi-million dollar project which has taken nearly three years to complete, the Waste Treatment Center, a radioactive liquid waste processing facility (originally intended for research purposes) has been upgraded to enable it to treat all of the ongoing major aqueous radioactive waste streams that are generated at the CRL site. The liquid wastes are passed through a large evaporator which concentrates the radioactive contaminants, and the resulting concentrated product is solidified prior to storage.

As part of a second major initiative, facilities are now being constructed which will allow low-level solid radioactive waste to be compacted into steel containers and stored in above ground structures. This technology will significantly reduce the volume occupied by the solid waste and will provide a means for isolating the waste from the environment. These facilities will be used for wastes generated at Chalk River, as well as for the wastes received from non-AECL Canadian waste generators (e.g., hospitals, research organizations).

The Underground Research Laboratory remains a valuable research facility for the disposal of nuclear fuel waste.



MANAGEMENT OF HEALTH, SAFETY AND THE ENVIRONMENT

As in past years, AECL's operations during 1999-2000 were in compliance with applicable health, safety and environmental regulations, and did not present a hazard to the public or the environment.

AECL continued to effectively manage the radioactive wastes generated by its own operations, and continued to provide a national service which manages low-level radioactive wastes generated by various Canadian institutions and industries, such as hospitals, universities, and suppliers of medical radioisotopes.

"AECL's operations during 1999-2000 were in compliance with applicable health, safety and environmental regulations."

In addition, projects were undertaken that will further improve performance in both radiological and non-radiological operations aspects.

The implementation of AECL's environmental management system at Canadian sites, in line with the draft ISO-14001 international standards, continued in 1999-2000. In addition, an employee awareness training program was developed and delivered to a total of about 2,000 employees.

Operation of AECL's Canadian sites and facilities continued to be carefully controlled and monitored so as to comply with regulations governing protection of the environment and health and safety. Radioactive emissions from AECL sites and facilities remained well below regulatory-approved Derived Release Limits in 1999-2000.

The Occupational Safety and Health and Radiation Protection Programs at AECL continue to ensure the safety of AECL employees, contractors and visitors to our sites, by meeting or exceeding the letter and spirit of all applicable safety, health and environmental laws and regulations and, where appropriate, international standards.

AECL remains committed to the safety and well-being of all employees, and to the protection of the environment, and will continue to monitor its programs to ensure that they are consistent with regulatory requirements and good international practices.

Financial Review and Analysis

AECL ACHIEVED A RECORD \$43.3 MILLION PROFIT IN 1999-2000. THIS REFLECTS INCREASED PROFITS FROM COMMERCIAL OPERATIONS AND CONTINUED ATTENTION TO RESEARCH SPENDING LEVELS RELATIVE TO AVAILABLE FUNDING.



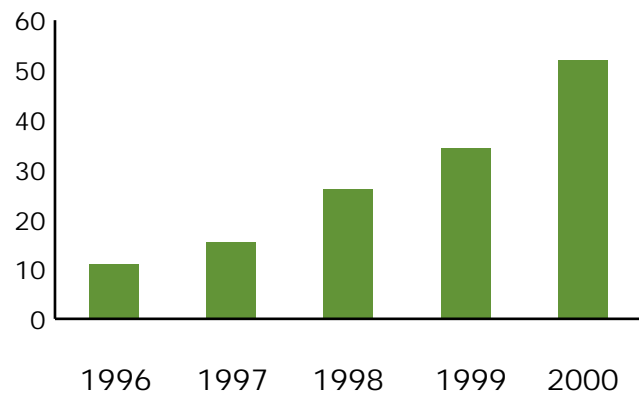
The current year's earnings were also impacted by the recognition of other parliamentary appropriations for government assistance towards Program Review decisions taken in prior years.

Of a more significant nature for the fiscal year 1999-2000, the corporation recognized a decommissioning and site remediation obligation which is described in Note 10 to the consolidated financial statements. The effect of such recognition has been treated as a restatement of prior periods with the primary impact being reflected on the consolidated balance sheet. The provision at March 31, 2000 was \$377.5 million, which reflects the discounted value of a 100-year program using a conservative, risk-free rate for government long-term bonds.

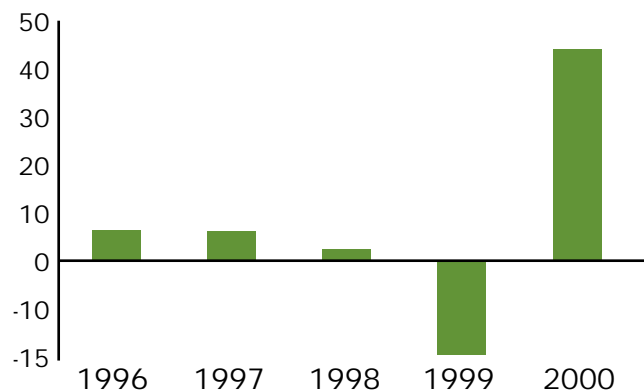
Currently, the corporation is undergoing a comprehensive review of the decommissioning strategy with the government as part of the overall federal environmental policy. Historically, the government has maintained funding



OPERATING PROFIT FROM COMMERCIAL OPERATIONS
(MILLIONS OF DOLLARS)



INCOME/(LOSS) FROM OPERATIONS
(MILLIONS OF DOLLARS)



arrangements with the corporation to address ongoing decommissioning activities, which the corporation believes represent government legacy issues which arose as part of the nation's nuclear energy program. Accordingly, the corporation expects that the government will continue to finance this obligation.

fluctuate from year to year dependent upon the number of major proposals in progress. In 1999-2000, marketing and administration costs reduced by \$2.5 million to \$21.6 million, which was offset by a corresponding increase in product development.

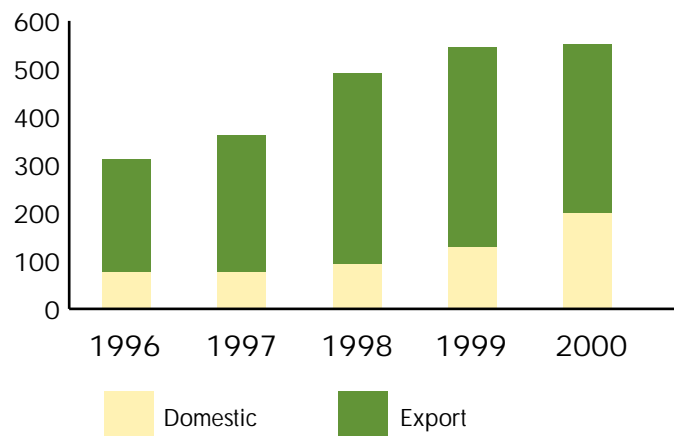
Cash flow also improved, raising the year-end cash position to \$119.2 million. This balance, as in previous years, included advances from customers against work to be delivered in future years.

COMMERCIAL OPERATIONS

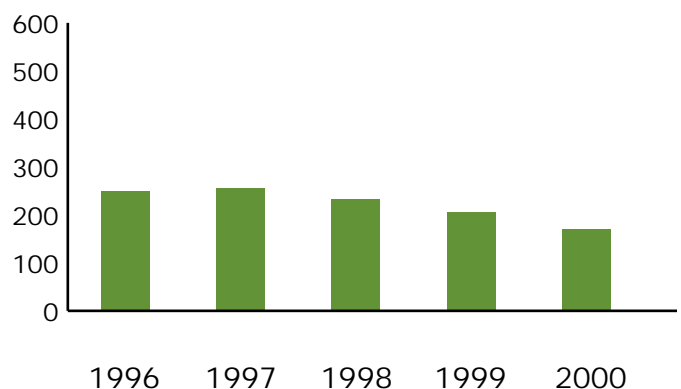
Overall, the corporation's revenue grew to \$551.9 million in 1999-2000, reflecting increased domestic sales and continued momentum on overseas projects. Domestically, there was solid growth in engineering service work for Canadian CANDU owners which, together with the medical isotope reactor project, represented an increase of 54 per cent over the prior year. On the international front, activity on the two Qinshan CANDU 6 reactors continued in its fourth year of the project. Activities for Korea's Wolsong 2, 3 and 4 reactors are complete with only Unit 4 remaining under a warranty period.

Profit from commercial operations increased by \$17.5 million to \$51.7 million in 1999-2000, as a result of both increased business activity and a higher percentage of engineering service work as compared with a greater volume of lower margin material deliveries in the previous year's cost of sales. Marketing and administration costs can

REVENUE
(MILLIONS OF DOLLARS)



INVESTMENT IN RESEARCH
(MILLIONS OF DOLLARS)



RESEARCH

The corporation invests significant funds in research each year. Funding for the investment which was provided by the government and other third parties in 1999-2000 was \$137.3 million. In addition, the corporation self-funded \$36.1 million of the research expenditures. At the time of the government's Program Review (1996), 50 per cent of the corporation's revenue and funding was directed towards either product development or research. With the reductions in government funding following Program Review, spending on non-CANDU areas has been reduced or eliminated and the overall research and development investments as a percentage of revenue and funding has decreased to 28 per cent.

Research costs of \$173.4 million represent direct research program expenditures as well as the costs incurred in support of these programs, including the cost of maintaining two research laboratories. The programs focused on ongoing development of the CANDU technology, technical support to the Canadian nuclear utilities, updating heavy water production methodologies and nuclear fuel waste management.

DECOMMISSIONING ACTIVITIES

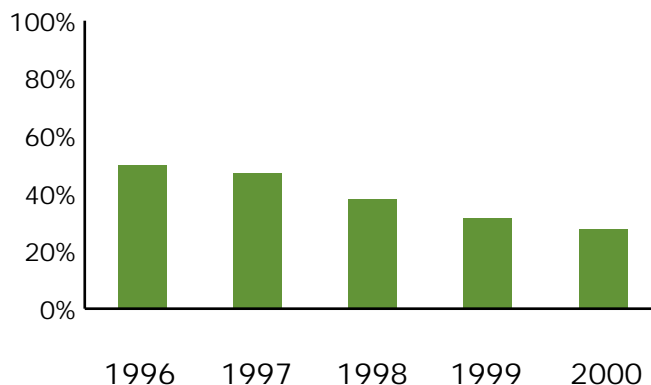
Decommissioning expenditures in 1999-2000 were \$18.7 million compared with \$16.3 million in the previous year. Primary activities included the continuation of the planning phase for Whiteshell Laboratories decommissioning, the completion of the first phase for the upgrading of the Chalk River Laboratories Waste Treatment Centre, as well as ongoing decommissioning and remedial

work at Chalk River. These activities were funded from the net proceeds of the sale or lease of government funded heavy water inventory. The annual accretion of the decommissioning and site remediation provision which is recorded as the decommissioning expense was \$21.5 million (1999- \$21.3 million).

CASH FLOW

Cash, advances and short-term investments at March 31, 2000 were \$119.2 million versus \$101.0 million in the prior year. The increase of \$18.2 million was a result of net cash inflows of \$34.9 million from operating activities with outflows for capital of \$15.5 million and payments against long-term debt of \$1.1 million. Cash received from customers was \$539.2 million, a reduction of \$41.4 million over last year, reflecting lower funding from provincial utilities and the completion of certain major project work. Cash paid to suppliers and employees totaled

RESEARCH & PRODUCT DEVELOPMENT AS A PERCENTAGE OF REVENUE AND FUNDING



\$649.1 million, a reduction of \$66.7 million from the previous year with lower commercial and research expenses.

As part of an agreement with Treasury Board to use the proceeds of government funded heavy water transactions for decommissioning, the corporation separately identifies the unused proceeds as part of the segregated cash on the consolidated balance sheet. At the end of the year, the segregated cash balance stands at \$14.0 million after the drawdown of \$18.7 million to meet the planned decommissioning requirements.

IMPACT OF THE YEAR 2000

The corporation experienced no financial or business concerns relating to the Year 2000 Issue. While not expecting to incur significant additional costs nor to encounter problems, the corporation will continue monitoring throughout the 2000 calendar year.

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 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 thereto and 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.

R. Allen Kilpatrick
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, 2000 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 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, 2000 and the results of its operations and its cash flows for the year then ended in accordance with generally accepted accounting principles. As required by the *Financial Administration Act*, we report that, in our opinion, these principles have been applied, after giving retroactive effect to the change in the method of accounting for decommissioning and site remediation as explained in note 10 to the consolidated 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
May 12, 2000

Consolidated Balance Sheet

AS AT MARCH 31



(thousands of dollars)	2000	1999
		Restated (Note 10)
ASSETS		
Current		
Cash, advances and short-term investments (Note 3)	\$ 119,222	\$ 101,007
Segregated cash (Notes 3 and 4)	14,015	32,722
Accounts receivable (Note 3)	72,554	92,798
Inventory	10,446	12,601
	216,237	239,128
Heavy water inventory (Note 5)	565,942	566,431
Capital assets (Note 6)	113,925	110,950
	\$ 896,104	\$ 916,509
LIABILITIES		
Current		
Accounts payable, advances and accrued liabilities	\$ 249,634	\$ 275,041
Current portion of restructuring and other provisions (Note 12)	24,635	20,500
Current portion of deferred decommissioning funding (Note 7)	14,015	23,300
Current portion of long-term debt (Note 8)	1,027	1,063
	289,311	319,904
Decommissioning and site remediation provision (Note 10)	377,500	374,700
Restructuring and other provisions (Note 12)	36,276	56,465
Deferred decommissioning funding (Note 7)	-	9,187
Deferred revenue	6,251	6,471
Deferred capital funding (Note 6)	57,249	64,504
Accrued employee termination benefits	49,755	47,544
Long-term debt (Note 8)	7,560	8,587
	823,902	887,362
COMMITMENTS AND CONTINGENCIES (Note 13)		
SHAREHOLDER'S EQUITY		
Capital stock		
Authorized - 75,000 common shares		
Issued - 54,000 common shares	15,000	15,000
Contributed capital (Note 7)	534,820	535,015
Deficit	(477,618)	(520,868)
	72,202	29,147
	\$ 896,104	\$ 916,509

See accompanying notes to the consolidated financial statements

Approved by the Board:

Jean-Pierre Soublière, Director

R. Allen Kilpatrick, Director

Consolidated Statement of Operations

FOR THE YEAR ENDED MARCH 31



(thousands of dollars)	2000	1999 Restated (Note 10)
COMMERCIAL OPERATIONS		
Revenue	\$ 551,855	\$ 544,413
Expenses		
Cost of sales	456,110	466,356
Marketing and administration	21,596	24,059
Product development	22,424	19,798
	500,130	510,213
Operating profit from commercial operations	51,725	34,200
RESEARCH		
Funding		
Parliamentary appropriations (Note 9)	105,650	102,400
Cost recovery from third parties	24,865	41,315
Amortization of deferred capital funding	6,762	7,178
	137,277	150,893
Expenses	173,384	203,568
Net research expense	(36,107)	(52,675)
DECOMMISSIONING ACTIVITIES		
Funding		
Decommissioning funding (Note 7)	18,668	16,349
Asset sales	7	-
	18,675	16,349
Decommissioning expense (Note 10)	21,475	21,349
Net decommissioning expense	(2,800)	(5,000)
OTHER PARLIAMENTARY APPROPRIATIONS (Note 9)	32,100	8,000
INTEREST INCOME AND OTHER (EXPENSE)	(1,668)	169
NET INCOME (LOSS)	\$ 43,250	\$ (15,306)

Amortization disclosure (Note 6)

See accompanying notes to the consolidated financial statements

Consolidated Statement of Contributed Capital

FOR THE YEAR ENDED MARCH 31



(thousands of dollars)	2000	1999
Balance at beginning of the year	\$ 535,015	\$ 557,508
Transfer to deferred decommissioning funding (Note 7)	(195)	(22,493)
BALANCE AT END OF THE YEAR	\$ 534,820	\$ 535,015

Consolidated Statement of Deficit

FOR THE YEAR ENDED MARCH 31



(thousands of dollars)	2000	1999
Balance at beginning of the year, as previously reported	\$ (520,868)	\$ (135,862)
Change in accounting policy (Note 10)	-	(369,700)
Balance at beginning of the year, as restated	(520,868)	(505,562)
Net income (loss)	43,250	(15,306)
BALANCE AT END OF THE YEAR	\$ (477,618)	\$ (520,868)

See accompanying notes to the consolidated financial statements

Consolidated Cash Flow Statement

FOR THE YEAR ENDED MARCH 31



(thousands of dollars)	2000	1999
OPERATING ACTIVITIES		
Cash receipts from customers	\$ 539,224	\$ 580,660
Cash receipts from parliamentary appropriations	136,900	120,800
Cash paid to suppliers and employees	(649,109)	(715,797)
Interest received (net)	7,858	11,085
Cash from (used in) operating activities	34,873	(3,252)
INVESTING ACTIVITIES		
Funds provided to segregated cash	(195)	(22,493)
Proceeds on disposal of capital assets	50	182
Acquisition of capital assets	(15,450)	(20,646)
Cash used in investing activities	(15,595)	(42,957)
FINANCING ACTIVITIES		
Reduction in long-term debt	(1,063)	(1,109)
Cash used in financing activities	(1,063)	(1,109)
CASH, ADVANCES AND SHORT-TERM INVESTMENTS:		
CHANGE	18,215	(47,318)
BALANCE AT BEGINNING OF THE YEAR	101,007	148,325
BALANCE AT END OF THE YEAR	\$ 119,222	\$ 101,007
INTEREST AND BANK CHARGES PAID DURING THE YEAR		
	\$ 508	\$ 530

See accompanying notes to the consolidated financial statements

Notes to the Consolidated Financial Statements

FOR THE YEAR ENDED MARCH 31, 2000



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 *Atomic Energy Control 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. The Treasury Board has approved an annual operating and capital budget for the corporation each year up to, and including, the 1999-2000 fiscal year.

The Governor in Council has not approved the corporation's five-year Corporate Plan in its entirety since 1994-1995 and, as a result, the related five-year Corporate Plan Summaries have not been tabled in Parliament as contemplated by the FAA. The government and the corporation continue to consider budget and policy issues affecting the corporation.

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

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 estimation of future contract costs; establishing restructuring and other provisions; and estimates of future decommissioning costs. 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 and this cost 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 future 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 future costs, and it 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

The Government of Canada, through parliamentary appropriations, funds certain operations of the corporation as described in Notes 7 and 9. Except as noted below, parliamentary appropriations are recorded separately in the consolidated statement of operations as used.

Parliamentary appropriations specified for the acquisition of capital assets are recorded as deferred capital funding on the consolidated balance sheet and are amortized on the same basis as the related capital assets.

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 and these proceeds are recorded in the consolidated statement of operations as deferred decommissioning funding as related expenditures are made.

i) Cost Recoveries 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. The corporation's contributions to the Plan are limited to contributions 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 Termination Benefits

Employees are entitled to specific termination benefits as provided for under collective agreements and conditions of employment. The liability for these benefits is recognized as benefits accrue to the employees. The accumulated liability is based on an actuarial determination and reviewed on a periodic basis.

l) Workers' Compensation

In accordance with the *Government Employees' Compensation Act*, the corporation reimburses Human Resources Development Canada for current payments for workers' compensation claims and pensions billed by the provincial compensation boards. The benefit payments are recognized as an expense in the year paid to the provincial compensation boards.

m) Post-Retirement Benefits

The corporation provides supplemental life insurance benefits to its retired employees. A small group of retirees or spouses of deceased retirees are paid an allowance each year to cover their cost for medical benefits under a grandfathering arrangement. The cost of post-retirement benefits is recognized as an expense in the year paid.

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, 2000 amount to \$2.5 million (1999 - \$10.5 million). The majority of these contracts are for the purchase of French francs or 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. Two customers (1999 - three), each representing greater than 10 per cent of the total accounts receivable, comprise an aggregate 53 per cent (1999 - 65 per cent) of total accounts receivable. No substantial amounts are due in foreign currency. The corporation does not believe it is subject to any significant credit risk.

4. SEGREGATED CASH

Segregated cash is the unused portion of proceeds available for future decommissioning activities (Note 7).

5. HEAVY WATER INVENTORY

Heavy water inventory includes leased amounts with expiry occurring in 2000-2001, as well as 1,100 megagrams which have been 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)

	2000		1999	
	Cost	Accumulated Amortization	Cost	Accumulated Amortization
Commercial operations				
Land and improvements	\$ 949	\$ 245	\$ 949	\$ 245
Buildings	12,336	9,547	11,431	8,901
Machinery and equipment	13,969	9,769	12,597	8,443
	27,254	19,561	24,977	17,589
Research				
Land and improvements	22,197	17,403	22,173	17,050
Buildings	87,147	48,487	88,782	47,661
Reactors and equipment	218,732	174,437	220,563	172,364
	328,076	240,327	331,518	237,075
Construction in progress	18,483	-	9,119	-
	\$ 373,813	\$ 259,888	\$ 365,614	\$ 254,664
NET BOOK VALUE		\$ 113,925		\$ 110,950

Amortization of capital assets for the year ended March 31, 2000 amounted to \$11.9 million (1999 - \$17.1 million) in part offset by amortization of deferred capital funding of \$6.8 million (1999 - \$7.2 million).

7. CONTRIBUTED CAPITAL AND DEFERRED DECOMMISSIONING FUNDING

Included in contributed capital is approximately \$342 million (1999 - \$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 received 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 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.

8. LONG-TERM DEBT

(thousands of dollars)	2000	1999
Loans from Government of Canada		
To finance leased heavy water and other assets, maturing through 2008 at interest rates varying from 4.00% to 8.84%	\$ 8,587	\$ 9,650
Current Portion	(1,027)	(1,063)
	\$ 7,560	\$ 8,587

Repayments of loan principal amounts required over succeeding years are as follows (millions of dollars): 2001 - \$1.0; 2002 - \$1.0; 2003 - \$1.0; 2004 - \$1.0; 2005 - \$1.0; and subsequent to 2005 - \$3.6.

9. PARLIAMENTARY
APPROPRIATIONS AND
OTHER GOVERNMENT
FUNDING

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

(thousands of dollars)	2000	1999
Research operating expense	\$ 105,650	\$ 102,400
Other		
Year 2000	24,500	8,000
Year 2000 frozen allotment	(8,000)	-
Termination costs	15,600	-
	32,100	8,000
	\$ 137,750	\$ 110,400

Parliamentary appropriations include \$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 from reductions of appropriations over a three-year period beginning in 2001-2002. Also included is \$15.6 million representing the release of a previously frozen allotment by the government to cover termination costs incurred during the Program Review implementation period.

10. CHANGE IN ACCOUNTING POLICY - DECOMMISSIONING AND SITE REMEDIATION PROVISION

a) Change in Accounting Policy

The corporation has changed its accounting policy to recognize the decommissioning and site remediation obligation retroactively with restatement of the 1998-1999 comparative figures. Previously such decommissioning and site remediation costs were expensed as incurred.

The effect of the change in accounting policy on the consolidated financial statements was as follows:

(thousands of dollars)	2000	1999
Increase in decommissioning expense	\$ 2,800	\$ 5,000
Reduction of net income	2,800	5,000
Recognition of decommissioning and site remediation provision	377,500	374,700
Increase in deficit	377,500	374,700

b) 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 per cent risk-free rate based on the government's 30 year bond rate.

The funding of actual expenditures of \$18.7 million (1999 - \$16.3 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)	2000	1999
Repayment of loans		
Principal	\$ 1,063	\$ 1,109
Interest	453	501
	\$ 1,516	\$ 1,610
Payments to the Public Service Superannuation Plan	\$ 12,064	\$ 11,073

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. RESTRUCTURING

The corporation carries provisions for restructuring as well as other 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.

13. UNCERTAINTY DUE TO THE YEAR 2000 ISSUE

The Year 2000 Issue arises because many computerized systems use two digits rather than four to identify a year. Date-sensitive systems may recognize the year 2000 as 1900 or some other date, resulting in errors when information using year 2000 dates is processed. In addition, similar problems may arise in some systems which use certain dates in 1999 to represent something other than a date. Although the change in date has occurred, it is not possible to conclude that all aspects of the Year 2000 Issue that may affect the corporation, including those related to customers, suppliers, or other third parties, have been fully resolved.

14. COMPARATIVE FIGURES

Certain 1998-1999 amounts have been reclassified to conform with the current year's presentation.

Five-Year Consolidated Financial Summary



(millions of dollars)	2000	1999	1998	1997	1996
OPERATIONS					
Revenue	552	544	490	362	312
Income (loss) from operations *	43	(15)	2	6	6
Net income (loss) *	43	(15)	2	6	(19)
Research expenses	173	204	232	256	254
Cost recovery from third parties	25	41	52	73	81
FINANCIAL POSITION					
Cash, advances and short-term investments	119	101	148	133	146
Heavy water inventory	566	566	590	622	584
Capital expenditures	15	21	20	17	10
Capital assets	114	111	108	100	109
Total assets	896	917	1,006	1,032	993
Decommissioning and site remediation provision *	378	375	370	364	355
Long-term debt (excludes current portion)	8	9	10	11	15
Shareholder's equity *	72	29	67	94	109
OTHER					
Parliamentary appropriations for research operations	106	102	142	167	164
Export revenues	352	415	396	285	235
NUMBER OF FULL-TIME EMPLOYEES	3,423	3,384	3,652	3,675	3,881

* These items have been restated to reflect the change in accounting policy as described in Note 10.

BOARD OF DIRECTORS

Robert F. Nixon ■●★▼▲◆
Chairman of the Board

R. Allen Kilpatrick ★▼▲◆
President and Chief Executive Officer

Mary C. Arnold* ■●★
Senior Partner
Arnold Consulting Group Ltd.

Pierre Fortier ■★◆
Senior Advisor to Chairman
of the Board, Innovitech Inc.

J. Raymond Frenette ■▼
Director

James S. McKee ▼◆
Professor Emeritus
University of Manitoba

A. Neil McMillan** ■●★
President
Claude Resources Inc.

Louis-Paul Nolet ■●★▲
Senior Partner
L.P. Nolet & Associates Inc.

Marnie Paikin ●▲
Director

Karen J. Pitre ▼◆
President
Lonsdale Group

Jean-Pierre Soublière ■★▲
President and Chief Executive Officer
Anderson Soublière Inc.

Hugh Wynne-Edwards ▼▲◆
Chairman of the Board
B.C. Research Inc.

*Mary C. Arnold
retired November 12, 1999

**A. Neil McMillan
was appointed June 30, 1999

OFFICERS

R. Allen Kilpatrick
President and Chief Executive Officer

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

William T. Hancox
Vice-President, Marketing and Sales

Allan A. Hawryluk
General Counsel
and Corporate Secretary

A. Douglas Hink
Vice-President,
Strategic Development

Gary Kugler
Vice-President,
Commercial Operations

Donna G. Pasteris
Vice-President, Human Resources
and Administration

David F. Torgerson
Vice-President, Research
and Product Development

COMMITTEES

- Audit
- Corporate Governance
- ★ Finance
- ▼ Health, Safety and Environment
- ▲ Human Resources
- ◆ Science and Technology



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