ESTIMATES

National Research Council Canada

Performance Report

For the period ending
March 31, 1999

Canada

Improved Reporting to Parliament
Pilot Document

The Estimates of the Government of Canada are structured in several parts. Beginning with an overview of total government spending in Part I, the documents become increasingly more specific. Part II outlines spending according to departments, agencies and programs and contains the proposed wording of the conditions governing spending which Parliament will be asked to approve.

The *Report on Plans and Priorities* provides additional detail on each department and its programs primarily in terms of more strategically oriented planning and results information with a focus on outcomes.

The *Departmental Performance Report* provides a focus on results-based accountability by reporting on accomplishments achieved against the performance expectations and results commitments as set out in the spring *Report on Plans and Priorities.*

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Foreword

On April 24, 1997, the House of Commons passed a motion dividing on a pilot basis what was known as the annual *Part III of the Estimates* document for each department or agency into two documents, a *Report on Plans and Priorities* and a *Departmental Performance Report.*

This initiative is intended to fulfil the government's commitments to improve the expenditure management information provided to Parliament. This involves sharpening the focus on results, increasing the transparency of information and modernizing its preparation.

This year, the Fall Performance Package is comprised of 82 Departmental Performance Reports and the government's report *Managing for Results* - Volumes 1 and 2.

This ***Departmental Performance Report,*** covering the period ending March 31, 1999, provides a focus on results-based accountability by reporting on accomplishments achieved against the performance expectations and results commitments as set out in the department's pilot *Report on Plans and Priorities* for 1998-99. The key result commitments for all departments and agencies are also included in Volume 2 of *Managing for Results.*

Results-based management emphasizes specifying expected program results, developing meaningful indicators to demonstrate performance, perfecting the capacity to generate information and reporting on achievements in a balanced manner. Accounting and managing for results involve sustained work across government.

The government continues to refine and develop both managing for and reporting of results. The refinement comes from acquired experience as users make their information needs more precisely known. The performance reports and their use will continue to be monitored to make sure that they respond to Parliament's ongoing and evolving needs.

This report is accessible electronically from the Treasury Board Secretariat Internet site: http://www.tbs-sct.gc.ca/tb/key.html

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NRC · CNRC

Performance Report

For the
period ending
March 31, 1999

John Manley
Minister of Industry

Canada

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Chart of Key Results Commitments

NRC has been an early adopter of the new federal approach to performance measurement. This involves a significant shift in corporate culture from the traditional focus on activities, inputs and outputs to a new emphasis on applicable results and social and economic impacts.

Accordingly, NRC has developed performance indicators that highlight intended impacts and accomplishments, as demonstrated in the following table.

to provide Canadians with:	***to be demonstrated by:***	***achievement reported on pages:***
a research program that focuses on excellence and knowledge, and that is relevant to Canadian needs	• acceptance and use of NRC's research advances • recognition of NRC's research excellence • investment in and use of NRC's facilities • highly qualified personnel	9-11 16-18 31
economic growth by helping Canadian firms develop new, marketable technologies	• partner involvement in research projects • technical and commercial successes of firms that work with NRC • client and partner satisfaction with NRC's services and support	9-11 15-17 21 25-28
technology-based economic growth in communities across the country	• results of regional initiatives • use and impacts of codes and standards • impacts of collaboration with government and industry • influence of NRC's industrial support and information networks	9-11 18-22 25-29
transfer of NRC's research successes to Canadian firms	• number of technology and information transfers to firms • results of patent and licence sales • introduction of improved management tools and systems	1-13 22 30-32

Section I: Messages

A. The Minister's Message

At the dawn of the new millennium, Canada, with its strong and dynamic economy, is well positioned to take a lead role in the global knowledge-based economy and to realize its benefits for all Canadians. The new global economy is fundamentally different from the one we have known for most of this century: its key building blocks are knowledge, information, innovation and technology, and it is changing at an unprecedented pace. Today, it is important for businesses and individuals to be connected to the Information Highway, but tomorrow it will be essential. Electronic communications are breaking the barriers of time and distance, and the effects are being felt everywhere in Canada, from the largest cities to remote areas where the Information Highway is the only highway.

The Industry Portfolio is …

Atlantic Canada Opportunities Agency
Business Development Bank of Canada*
Canadian Space Agency
Competition Tribunal
Copyright Board Canada
Canada Economic Development for Quebec Regions
Industry Canada
National Research Council Canada
Natural Sciences and Engineering Research Council of Canada
Social Sciences and Humanities Research Council of Canada
Standards Council of Canada*
Statistics Canada
Western Economic Diversification Canada

** Not required to submit Performance Reports*

To keep Canada in the vanguard of this global economy, the government is investing heavily in knowledge, innovation, and connectedness, in order to generate well-paying jobs and a higher standard of living for Canadians. As Minister of Industry, I am responsible for a Portfolio which brings together most of the federal departments and agencies responsible for promoting innovation through science and technology and advancing knowledge. With over 40% of federal spending on S&T, a wide range of programs to help businesses -- especially small- and medium-sized businesses -- in every region of the country, a world-leading electronic commerce framework, and flexible support for exporters, the Industry Portfolio represents a powerful toolkit to help Canada make the transition to the knowledge-based economy and society of the 21st century.

The trend towards globalization also poses other challenges to Canada, which has one of the most open economies in the world. The Industry Portfolio is working with partners in the public and private sector and in academia to help Canadian companies respond and adapt to these challenges, so they can become and remain competitive in the global market. The government's agenda is based on seizing the opportunities presented by the global economy to create jobs and wealth for Canadians, and the Industry Portfolio has a key role in delivering this agenda.

I am pleased to present this Performance Report for the National Research Council Canada (NRC). This report shows the contribution that the National Research Council is making to the government's agenda by setting out the commitments that the National Research

Council has made and measuring its success in meeting these commitments over the 1998-1999 fiscal year.

As Canada's principle public sector R&D agency, NRC is a leader in the development of an innovative, knowledge-based economy through science and technology. In 1998-99, NRC aggressively built partnerships with industry, universities and government. The organization has helped to coordinate Canada's science and technology resources by creating the best environment to nurture our innovators and by linking knowledge and application. Through these mechanisms, NRC is playing a critical role in the Canadian system of innovation. In the past year, the NRC has applied its efforts to Canada's communities to encourage regional technological strengths. Through entrepreneurship, focused projects and assistance to small and medium-sized enterprises, NRC is helping industry build Canada's knowledge-based economy.

I am proud of the contribution the Industry Portfolio makes toward the government's priorities of building a stronger Canada, creating opportunities for Canadians, and investing in knowledge and innovation.

The Honourable John Manley

B. Message from the Secretary of State (Science, Research and Development)

Science and technology are key building blocks in Canada's transformation to a knowledge-based economy and society. The raw materials of the economy of the 21st century will be knowledge, information, innovation and a workforce with the skills to apply them, and increasingly the knowledge and the innovations we need will come from science and technology. Our future success depends on our ability to innovate as individuals, as communities, and as a nation.

The Industry Portfolio plays an important role in the search for knowledge and promoting innovation in Canada. The Portfolio accounts for about 40% of federal spending on S&T, with a wide range of programs spanning the continuum from basic research, right through to the commercialization of new technologies and bringing their benefits to Canadians. The breadth of the Portfolio's involvement is also significant, since it touches on many facets of our lives, including health and social sciences, space research, biotechnology and information technology, to name just some of the areas in which the Portfolio is active. This investment in knowledge and innovation is essential to creating jobs and growth, and improving our quality of life by making our economy more productive. The government is a key player in this effort, but we also place a high importance on working with other key players in the public and private sectors and in academia.

This Performance Report for 1998-99 illustrates how the National Research Council is playing its part in advancing Science and Technology in Canada. Initiatives such as these are helping to translate the promise of science and technology into real opportunities for our future.

The Honourable Gilbert Normand

Section II: NRC Overview

A. Mandate, Roles and Responsibilities

National Research Council Act

NRC is a federal government departmental corporation. Its mandate, according to the *National Research Council Act*, is to undertake, assist or promote scientific and industrial research in different fields of importance to Canada; to investigate standards and methods of measurement; and to work on the standardisation and certification of scientific and technical apparatus and instruments and materials used or usable by Canadian industries.

Under the *National Research Council Act,* NRC also has the responsibility for "operating and administering any astronomical observatories established or maintained by the Government of Canada". NRC's research and development activities include grants and contributions used to support a number of international activities.

NRC is also mandated to provide vital scientific and technological services to the research and industrial communities. This mandate is discharged through the operation of the Industrial Research Assistance Program, the Canada Institute for Scientific and Technical Information, (CISTI) and the Canadian Technology Network.

The *National Research Council Act* empowers NRC to "establish, operate and maintain a national science library" and to "publish, sell and otherwise distribute" scientific and technical information. NRC fulfils this mandate through CISTI, providing Canadians with access to worldwide scientific, technical, medical and related information and expertise.

Weights and Measures Act

NRC is responsible for primary standards of physical measurements as formally established by the *Weights and Measures Act* and the *National Research Council Act.* NRC has a specific mandate relating to "the investigation and determination of standards and methods of measurements including length, volume, weight, mass, capacity, time, heat, light, electricity, magnetism, and the investigation and determination of physical constants and the fundamental properties of matter".

B. Operating Environment

Over the years, NRC's activities in nuclear energy, defence, space and medical research, and the support of universities have led to the creation of several separate federal agencies such as Atomic Energy of Canada Limited (1952), the Defence Research Board (1947), the Medical Research Council (1969), the Natural Sciences and Engineering Research Council (1978), and the Canadian Space Agency (1989). NRC has maintained close relationships with these agencies and their successors.

As a member of the Industry Portfolio, NRC has extensive and frequent interactions with its portfolio partners at the management, policy and working levels. The organisation also has ongoing relationships with many other research-based federal departments and agencies, often as clients and collaborators in NRC-led research activity. For example in 1998-99, NRC's research institutes worked closely with Fisheries and Oceans, Industry Canada, Natural Resources Canada, National Defence, Canadian Space Agency, Agriculture and Agri-Food Canada, Foreign Affairs and International Trade and Environment Canada. This is in addition to many other partner, client and

collaborative interactions last year with non-federal government organisations – for example, provincial and municipal governments, universities, industry associations and individual companies.

C. Vision to 2001

In its Vision to 2001, NRC has taken up the challenge of contributing to Canada's technological development, competitiveness and prosperity. The vision summarises the organisation's approach to fulfilling its mandate in light of the economic and social realities facing the country now and in the coming years.

NRC's Vision:
As Canada's foremost R&D agency, NRC will be a leader in the development of an innovative, knowledge-based economy through science and engineering. This vision will be realized by:

- *being dedicated to excellence in advancing the frontiers of scientific and technological knowledge in areas relevant to Canada;*
- *carrying out focused research, in collaboration with industrial, university, and government partners, to develop and exploit key technologies;*
- *providing strategic advice and national leadership to integrate key players in Canada's system of innovation; and*
- *taking a more aggressive, entrepreneurial approach to ensure the transfer of our knowledge and technological achievements to Canadian-based firms.*

D. Business Lines

NRC is classified as a departmental corporation under Schedule II of the *Financial Administration Act*. Under the *National Research Council Act*, the general orientation and establishment of NRC's policies and programs are the responsibility of a Council comprised of up to 22 members appointed by the Governor in Council. Representing senior levels of Canadian industry and academic communities, Council members bring a broad range of knowledge and experience to the decision making process. NRC's President acts as both Chairperson of the Council and as the Chief Executive Officer of the organisation.

NRC's Program has three business lines, which provide a balance between conducting research and development (R&D), offering technical and financial assistance to industry and the scientific community, and supporting the organisation with administrative and management services:

- Research and Technology Innovation
- Support for Innovation and the National Science and Technology Infrastructure
- Program Management

1. Research and Technology Innovation

The Research and Technology Innovation business line includes NRC's research programs, technology development initiatives, management of national science and engineering facilities, along with its research and technology collaborations with firms, universities and public institutions. These efforts all focus on key technological and industrial areas of Canada's economy where NRC has specific roles and recognised competencies, and where it has the ability to have an impact.

This business line is organised in terms of a portfolio of programs, facilities and services in strategic technologies, key industries and areas of research which are all critical for Canada's ability to

become an innovative society and economy.

The Research and Technology Innovation business line is structured and its performance measured in terms of the following technology areas:

Biotechnologies

Biotechnology research is strategically important to key sectors of Canada's economy. NRC's strengths in biotechnology help it serve and interact with industrial and university partners. Its five biotechnology research institutes focus on health care/pharmaceuticals, agri-food, aquaculture and the environment.

Information and Communications Technologies

The convergence of the multibillion-dollar information and communications sector with the global marketplace has created an environment where risks and rewards are great.

The two research institutes in NRC's ICT Group bring together a broad range of complementary technical capabilities and equipment to help firms reduce the risks and costs of working on the next generation of communications and information technology hardware and software.

Manufacturing Technologies

Globalisation, trade agreements, and other external pressures present challenges and opportunities for this important sector that magnify the importance of new technologies. Three NRC research institutes focus on advanced materials, software systems, intelligent production systems, industrial lasers, process technologies, sensors, and control systems.

The Research and Technology Innovation business line also focuses on key industries that are critical to Canada's economy. They include:

Construction

Construction is one of Canada's largest industries and a critical asset underpinning the international competitiveness of the country's economy. NRC is the national technology focus for cost-effective generic technology solutions, a vehicle for effective linkages to domestic and international research, technical standards and professional organisations, and a national co-ordinating mechanism for construction technology.

Aerospace

As Canada's foremost aeronautical research establishment, NRC provides R&D support to the operations of the Canadian aerospace industry which faces exacting design, performance and safety requirements and an increasingly competitive global market. Competencies include: aerodynamics; structures, materials and propulsion; flight dynamics and flight systems integration.

Ocean Engineering and Marine Industries

NRC, through its recognised competencies in the physical and numerical modeling of hydrodynamic processes, plays an important niche role for Canada in ocean engineering and marine research. It provides R&D support to various industrial sectors within the ocean industry: ocean resources, marine manufacturing, and marine transportation.

Core Research

Finally, NRC provides critical support to key areas of research and technology development that underpin Canada's innovation systems. These include NRC's responsibilities for research in national measurement standards and supporting Canada's national

measurement system, as well as its role in managing national astronomical facilities. As an organisation with a mandate for research, NRC knows the importance of long term strategic investments in leading edge research which is linked to Canada's technological and innovation needs. It recognises that incremental innovation is often based on transformational research and research methods. While all elements of the business line support these efforts, NRC has established a program with specific responsibilities for integrating NRC's competencies in the area of molecular sciences.

2. Support for Innovation and the National Science and Technology Infrastructure

The second business line encompasses NRC's assistance to industrial research and the dissemination of scientific and technical information. NRC fulfils this mandate by developing and diffusing scientific knowledge and technology in partnership with industry, governments and universities. This activity is carried out nationally via the Industrial Research Assistance Program and the Canada Institute for Scientific and Technical Information networks.

The **Industrial Research Assistance Program (IRAP**) is well known for its successes over the years in helping small- and medium-sized enterprises, (SMEs) develop and exploit technology. Founded on a national network of Industrial Technology Advisors (ITAs), IRAP contributes technical and financial assistance to help companies improve their technical knowledge and expertise to meet the challenges of a changing and competitive economy. IRAP extends the reach of its ITA network by creating extensive linkages with other government departments and agencies, helping deliver their programs in some cases.

IRAP is also responsible, in co-operation with Industry Canada, for implementing a recent government initiative, the **Canadian Technology Network (CTN**). CTN is a national network of people who provide comprehensive, easily accessed, user friendly advice to SMEs that need technical and related business help.

The mission of the **Canada Institute for Scientific and Technical Information (CISTI)** is to provide worldwide scientific, technical and medical information to Canadian users to help achieve Canada's economic and social goals. CISTI plays an essential role in Canada's science and technology infrastructure, supplying more than 25 products and services to over 13,000 clients across the nation. Also, through its Research Press, CISTI is Canada's largest publisher of scientific journals.

3. Program Management

The third business line includes corporate support and direction, and administrative services, with a focus on effective management of NRC's programs and its resources.

The Program Management business line comprises two components:

- the Executive Support function which provides policy, program and executive support for the co-ordination and direction of NRC's operations and its governing Council, and
- the Program Administration function, which supports and enables effective and efficient management of NRC's resources through its specialisation in: finance; information management; human resources; administrative services and property management; and corporate services.

Section III: NRC's Performance

A. Performance Accomplishments

Progress in Achieving NRC's Vision

In 1996, NRC outlined a new corporate Vision building on an outstanding record of past achievement and future potential as Canada's principal R&D agency. The Vision statement is NRC's commitment to play a leadership role in the development of an innovative knowledge-based economy through science and technology. *Vision to 2001* emphasises four elements:

- research excellence for the advancement of knowledge
- focused research and partnerships in key technologies
- integration of Canada's system of innovation
- entrepreneurship in knowledge and technology transfer

In implementing this new Vision, NRC has had to face new realities: the pressures of operating with a reduced appropriation base; radical change in the industrial environment due to the globalisation of markets and increasing competitiveness in knowledge-based economies; and the need for workforce renewal in the face of retirements, layoffs and competing market demands for scientific personnel. The impact of NRC's efforts to overcome these challenges while working in collaboration with its partners in the business, academic, and government communities, is illustrated in this report.

The following sections describe in more detail some of the specific initiatives NRC has undertaken toward fulfilment of its Vision.

Regional Initiatives

One of the core elements of *Vision to 2001* involves NRC's role in fostering economic growth and wealth creation through science and technology.

NRC believes that its greatest impact can be made at the local level, where its unique capability to forge linkages among different stakeholders – researchers, businesses, entrepreneurs, educators, and investors – helps create communities that foster innovation. NRC has placed a strong emphasis on building partnerships between its people and facilities, and the resources of the regions in which it operates. As a truly national organisation with an impact on the research and business communities in every province and in the territories, NRC has been able to launch a number of targeted regional initiatives.

British Columbia

Efforts have continued over the last year to implement elements outlined in the action plan for British Columbia released two years ago. In particular, NRC's Innovation Centre Director investigated ways of enhancing NRC's presence in B.C. in those areas identified as high priority by the region. These areas include: fuel cells; biotechnology; information technologies; wood products; and aerospace.

In genomics, research collaborations have been established between the Institute for Marine Biosciences (IMB) and growing biotechnology firms based in Vancouver. Innovation Centre staff are fostering the development and use of the Vancouver node of the Canadian Bioinformatics Resource network.

An important activity over the last year has been bringing together leading players in the innovation system in various sectors. These players include key industry innovators and associations, university researchers, other science and technology organisations and SMEs. For

example, NRC's Institute for Information Technology (IIT) and the Institute for Microstructural Sciences (IMS) convened several high profile sessions across the country in conjunction with regional partners like the B.C. Technology Industries Association and the York Technology Association to explore information technology opportunities. Multi-media innovation technologies arose as a promising area for further NRC involvement in the community.

Saskatchewan
In Saskatchewan, NRC and the provincial government formed an innovation steering committee. The committee, composed of leading individuals from the private sector, federal, provincial and municipal governments, universities and financial institutions, released the Saskatchewan Blueprint for Innovation in October 1998. The objective is to use research and innovation to help drive Saskatchewan's economic growth in the next century.

Since the release of the Blueprint, efforts have taken place on all its elements. For example, under a joint program with the Saskatchewan Institute of Applied Science and Technology (SIAST), the Plant Biotechnology Institute (PBI) has hosted SIAST students from two disciplines – chemical technology and biotechnology. Students completed work terms at PBI with the supervision of NRC researchers and learned advanced technologies, such as genetic engineering.

Both the University of Regina and the University of Saskatchewan have been given funds under the Blueprint to hire students with the aim of commercialising technology. As well, Western Economic Diversification (WD) has provided funding to Saskatoon and Regina economic development authorities to put together community innovation action plans. IRAP is also helping economic development authorities to develop related innovation projects for their regions.

Regional Initiative Goes National

In December 1998, NRC and the Ottawa Regional Innovation Centre created a not-for-profit organization to deliver the highly successful O-Vitesse (Ottawa – Carleton Venture in Training Engineers and Scientists in Software Engineering). The new organization, called Vitesse (Re-skilling) Canada Inc., will deliver a national service offering unique training opportunities in regions across Canada.

The expansion began with a new partnership between NRC, l'Université du Québec à Hull and two Outaouais-based companies. Proposals are being considered for programs in Toronto, Regina, Kingston, Edmonton, Winnipeg and Cape Breton.

With its expansion outside the National Capital Region, a total of 70 students will have enrolled in this training program since its inception in January 1997.

Manitoba
In Manitoba, encouraging progress has been made against the objectives outlined in the Western Medical Technologies Strategy released in April 1997. A technology demonstration site is being completed in Winnipeg's St. Boniface General Hospital Research Centre. This site will showcase a novel Magnetic Resonance Imaging (MRI) system built for functional imaging of the human brain. This system was developed through collaboration involving the Institute for Biodiagnostics (IBD), an IBD spin-off company and other suppliers.

In January 1999, a new MRI system was unveiled at Winnipeg's Health Sciences Centre. This system was procured under the Western Medical Technologies

Strategy and was supported by both IBD and WD.

IBD also helped expand the core activity of the Strategy to other communities. For example, IBD has installed an instrument in St Joseph's Hospital (London) and is leading efforts to set up MRI initiatives in Vancouver and Halifax.

Québec
In the Montreal region, NRC is working toward the implementation of an Advanced Aerospace Manufacturing Technology Program, one of NRC's strategic initiatives and part of the new strategic plan of the Institute for Aerospace Research. This initiative will be financed in partnership with Canada Economic Development for Québec Regions (CEDQR) and aerospace companies.

Nova Scotia
In Nova Scotia, the Institute for Marine Biosciences (IMB), together with In*NOVA*corp, local universities, and other research organisations, is involved in an initiative to accelerate the development of the Nova Scotia life sciences innovation community.

NRC is working with Nova Scotia hospitals, universities and other partners to create a neuroscience and medical imaging technology cluster in Halifax. The proposed strategy includes: building and integrating a diverse set of research capabilities around a core facility; linking research at the universities and hospitals to technology commercialisation; and linking the Nova Scotia neuroscience and medical imaging technology cluster to the national network of research and demonstration sites that IBD has already built on the same technology across Canada.

Initial consultations for a community-based initiative in Cape Breton started in 1998. A project scoping study presented in December 1998 suggested the creation of an Information Technology Innovation Centre in Cape Breton. NRC, InNOVAcorp, Enterprise Cape Breton Corporation and the University College of Cape Breton are partners in this initiative, and will provide some early stage funding.

International Interactions

NRC is one of Canada's most effective links to other national research and development bodies around the world. Its international influence created a receptive climate in other countries for Canadian technology and Canadian SMEs, encourages a two-way flow of S&T information, and makes the services of these organisations available to clients and partners in Canada. NRC's international efforts have also helped attract foreign investment to Canada.

For example, the revitalisation of NRC's relationship with France's Centre national de la recherche scientifique led to the approval of 10 new joint projects for a total value of $10 million in biotechnology, information and communications technology, manufacturing technology and transformational sciences. In addition, the signing of a memorandum of understanding with the French Association nationale pour la valorisation de la recherche led to the creation of links and partnering between Canadian and French SMEs in the agri-food and biotechnology sectors.

In partnership with the British Council in the United Kingdom, NRC announced the Co-operative Research Projects and Researcher Exchange Awards. These awards, provided from a newly established joint S&T fund, were chosen from among 15 proposals and totalled more than $1 million.

NRC expanded its co-operation with the National Science Council of Taiwan

through a number of focused workshops on aerospace, next-generation Internet technologies and biomedical sciences. To complement this effort, NRC/IRAP hosted a study session for a Taiwanese task force on the concepts of IRAP and CTN. NRC and NSC are now supporting six collaborative R&D projects in the areas of microlelectronics, biotechnology, industrial materials and molecular sciences.

As a follow-up to the contribution agreement established in 1997-98 between IRAP, the Canadian International Development Agency (CIDA) and the Agency for the Assessment and Application of Technology (BPPT) of the Government of Indonesia, the development of the Canada/Indonesia Technology Network (CITN) has progressed rapidly. In the first year, CITN focused on the development of human and electronic networks and linkages and collaboration between Indonesian and Canadian business.

The CITN will increase the opportunities for technology exchanges and joint ventures between SMEs and/or R&D centres of both countries, which will lead to IT ventures, technology transfer and expanded sales of Canadian goods and services. This will also facilitate the increase of linkages between government and research institutions.

The success of this project has prompted IRAP and CIDA to establish technology networks in other countries. In 1998-99 negotiations took place with Thailand, Singapore and Vietnam.

NRC/IRAP organised and led a number of technology missions to Korea, Singapore and China. In Singapore, NRC signed four co-operative research agreements. NRC also led a number of Canadian companies to an industrial investment seminar in Singapore, providing them with opportunities to form technology-based joint ventures and to receive venture financing.

Entrepreneurship

In addition to promoting technology commercialisation, NRC has fostered a new spirit of entrepreneurship at NRC. It has established new policies and programs to help NRC technologies move into the economy and to promote the establishment and growth of innovative, knowledge-based businesses.

For example, NRC has developed a program that enables its employees, through secondments with industry partners, to provide scientific or technical support to industrial firms developing NRC technologies for the marketplace. NRC staff seconded to industry are able to develop an in-depth understanding of the industrial work environment and how decisions regarding research and development activities are made in that particular industry. In turn, industry employees seconded to NRC get a closer look at the role that NRC can play in supporting technology development and commercialisation. More than a dozen NRC staff took advantage of this Program in 1998-99.

In December 1998, NRC and Inno-centre signed a collaborative agreement to support new NRC spin-off companies. Inno-centre is a Montreal-based organisation that has distinguished itself as a Canadian leader in coaching entrepreneurs with scientific backgrounds. This pilot project collaboration will provide assistance uniquely tailored to the needs of scientists who want to create their own companies to commercialise NRC technology.

Changes in culture, approach and procedure at NRC have resulted in improvements in technology transfer. Where no Canadian receptor exists, the

organisation encourages its researchers to spin off their own companies in order to commercialise their technologies.

In 1998-99, NRC researchers spun off nine new firms, bringing the four-year total to 27.

Spin-off Companies in 1998-99

- *IatroQuest (IBS)*
- *MRV Systems (IBD)*
- *AmikaNow! (IIT)*
- *Novo Science (BRI)*
- *Crechem Technologies Inc. (ICPET)*
- *VLEP (ICPET)*
- *JenEL TVD (ICPET)*
- *Vitesse (Re-skilling) Inc.*
- *Iridian Spectral Technologies Ltd. (IMS)*

1. Research and Technology Innovation Business Line

Comparison of Total Planned Spending to Actual Spending

Departmental Planned versus Actual Spending by Business Line (millions of dollars)

Business Line	Operating [1]	Capital	Grants and Contributions	Subtotal Gross Expenditures	Statutory Items [2]	Total Gross Expenditures	Less Revenue Credited to the Vote	Total Net Expenditures
Research and Technology Innovation								
Planned spending	180.0	29.4	40.6	250.1	24.2	274.2	-	274.2
Total authorities	*194.5*	*43.9*	*42.7*	*281.1*	*35.4*	*316.5*	-	*316.5*
Actuals	**173.3**	**38.3**	**42.7**	**254.3**	**21.5**	**275.8**	**-**	**275.8**

Notes

(1) Operating includes contributions to employee benefit plans.

(2) Spending of revenues pursuant to the NRC Act.

Planned spending indicates numbers reported in the 1998-99 Report on Plans and Priorities.

Numbers in italic denote Total Authorities for 1998-99 (Main and Supplementary Estimates and other authorities).

Bolded numbers denote actual expenditures and revenues in 1998-99.

Numbers exclude the spending of proceeds from the disposal of surplus crown assets.

Due to rounding, figures may not add to totals shown.

This, the first of three business lines, encompasses all of the research activity conducted at NRC.

The objective of the Research and Technology Innovation business line is to…

achieve sustained knowledge-based economic and social growth in Canada through research, technology and innovation in key areas.

More than at any other time in its history, NRC's research is strategically focused. This means that choices made about the kinds of research to pursue and which industrial partners to work with are based on important current and emerging Canadian needs.

Research projects typically take several years of development before their results are ready for their intended application. The time element associated with this research spectrum makes it difficult for NRC, or any other research organisation, to quantify the impacts that it has in any given year on Canadians, Canadian firms and the economy. However, indicators of NRC's research quality, involvement with industrial and other partners, and the transfer and sale of its information, services and technology can be considered as solid measures of its annual performance.

The realignment four years ago of 10 of NRC's 16 research institutes under the umbrella of technology groups has helped consolidate the research program through combined strategic planning, pooling of resources and the development of closer working relationships. The technology groups were formed so that NRC can better respond to the changing priorities of three major Canadian industrial sectors, biotechnology, manufacturing, and information and communications technology. To ensure the integration of all of NRC's program elements participate, representatives from IRAP and CISTI are also involved in technology group activities.

Biotechnology Group:
Biotechnology Research Institute (Montreal)
Institute for Biological Sciences (Ottawa)
Plant Biotechnology Institute (Saskatoon)
Institute for Marine Biosciences (Halifax)
Institute for Biodiagnostics (Winnipeg)

The Biotechnology Group currently has a combined portfolio of 121 collaborative research agreements with partners across Canada, with a total value of $74.3M, including 67 industry partners, 24 universities and 30 other federal and provincial government departments. Last year, the group created three new spin-off companies and generated 10 licences and 21 patents. Over the year, 32 firms used incubation facilities within the group's institutes, and 18 products and processes were commercialised.

Manufacturing Technologies Group:
Industrial Materials Institute (Boucherville)
Institute for Chemical Process and Environmental Technologies (Ottawa)
Integrated Manufacturing Technologies Institute (London, Vancouver)

The Manufacturing Technology Group (MTG) has a portfolio of 352 research contracts with 268 clients, an increase of 5% over 1997-98. Of this total, 88% are from industry and 63% are SMEs. In 1998-99, the MTG generated 9 patents and 8 Intellectual Property licences. Ninety–three percent of MTG clients surveyed reported that direct industrial impacts had already occurred or were likely to occur in the future.

Information and Communications Technology Group:
Institute for Microstructural Sciences (Ottawa)
Institute for Information Technology (Ottawa)

The ICT group has a portfolio of 69 collaborative agreements with partners, including 66 companies, 45 universities and 9 government agencies.

In 1998-99, the group generated 12 new licences, and two spin-off companies. Two new patents were issued and 22 patent applications were made. The recently opened Industry Partnership Facility now hosts four start-up companies. Researchers gave 340 presentations, seminars and workshops, and represented NRC on 196 national and international committees.

NRC provides Canadians with a research program that focuses on excellence and knowledge, and that is relevant to Canadian needs

NRC's research projects are chosen so that they lead to tangible benefits to Canadians. It is a fundamental principle at NRC that research activities undertaken must be of high quality and be relevant to Canadian needs.

The impact of NRC's works becomes obvious when researchers receive awards and other forms of recognition from the scientific and engineering communities, and when companies begin to implement the actual discoveries or technologies developed. Case studies demonstrate the "pick-up" potential of research work.

In an era where the amount of available information has skyrocketed, NRC's Institute for Information Technology (IIT) has developed software to summarise documents, including web pages.

EXTRACTOR is a new software tool that automatically summarises any document by scanning the text to select several short phrases which best describe the subject matter. This IIT-developed technology is currently available for use with English, French or Japanese text.

The technology is designed to be included in products that have a wide variety of applications. To date, three companies have obtained licenses for the technology and another 30 potential licensees have submitted formal expressions of interest.

The technology is currently being used by Strategis - Industry Canada's business Internet site - to organise voluminous material. Other applications include summarising lengthy e-mail messages for transmission to portable wireless devices like pagers.

EXTRACTOR is an excellent example of how advanced information technologies can simplify information retrieval and can be used to assist companies and individuals in the decision-making process.

Virtual Environments

Virtual Environment Technology (VET) has been a reality in the entertainment sector for some time and its impact has been profound. VET is now set to revolutionise activity from research and development to manufacturing and testing.

In October 1998, NRC, supported by industry collaborators SGI Canada and Electrohome Ltd., announced that it would create a VET Centre at its Integrated Manufacturing Technologies Institute (IMTI) in London, Ontario. Two other collaborators, the Diesel Division of General Motors of Canada and the University of Western Ontario, also joined NRC in early 1999.

IMTI's VET Centre is the first of its kind in Canada. It provides industry with the ability to create, develop and test products and to simulate processes in a virtual environment, therefore eliminating many costs and enhancing productivity.

The Steacie Institute for Molecular Sciences (SIMS) undertakes long-term interdisciplinary research, in selected areas of molecular science that have the potential to impact key sectors of the Canadian economy. SIMS works in partnership with researchers, inside and outside of NRC, to develop innovative technologies in areas such as therapeutics, diagnostics, advanced electronics, telecommunications, precision manufacturing, optoelectronics,

information sciences and advanced materials.

NRC Radio Detector Looks into Space

Thanks to a new detector developed by NRC's Herzberg Institute of Astrophysics (HIA), astronomers are looking deep into the cores of star-forming clouds in the Milky Way and to galaxies beyond.

Developed for the James Clerk Maxwell Telescope in Hawaii, Receiver A3 is the most sensitive spectral line detector at the telescope. The detector tunes instantly to observe spectral lines emitted by more than 100 molecules known to exist in space. At the heart of this new receiver is a tiny superconducting electrical switch, so small that 50 switches, set side by side, would span the width of a human hair. NRC specialists designed and built the intricate structure that houses the device.

The various images obtained from these spectral lines yield different perspectives on the formation processes associated with stars and galaxies.

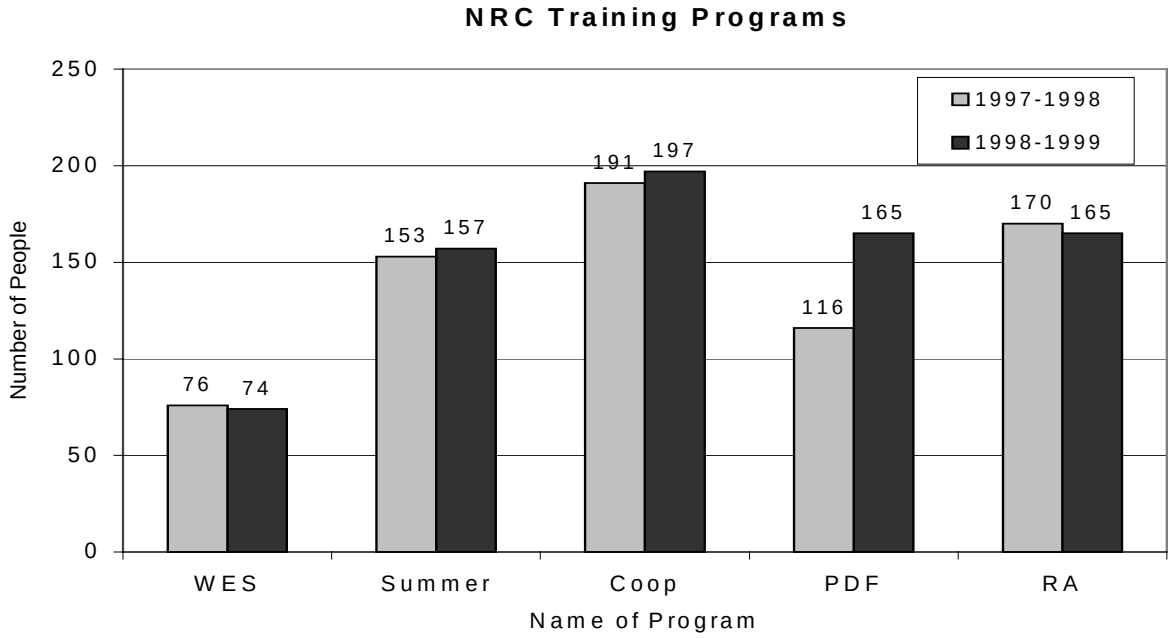
In 1998-99, researchers at SIMS worked closely with Hydro-Québec to develop a new material for electrodes that produce chlorates as a bleaching agent for the paper industry. This new material is expected to save about $6 million per year in electrical energy costs.

An internationally acknowledged measure of research quality and relevance is formal recognition by other peers in Canada and around the world. This recognition comes through awards, acceptance of papers by well-known publications, and speaking invitations to conferences and seminars. Last year, 48 employees received prestigious national and international awards for their work, including three medals from the Royal Society of Canada in physics and chemistry, and the prestigious Ionnes Marcus Marci Medal from the European Society for Spectroscopy.

In 1998-99, NRC researchers produced 1,924 documents in conference proceedings and in refereed publications, as well as 797 books, book chapters and technical reports. In 1997-98, there were over 2,620 documents of these types produced. In 1998-99, NRC researchers gave presentations at over 980 conferences.

Investing in equipment and buildings is an essential component of NRC's strategy to stay at the leading edge of changing Canadian science and technology needs. In 1998-99, the organisation spent about $51 million on equipment, capital acquisitions and building improvements. These include renovations to the Sussex Laboratories for health and safety upgrades, and the completion of two Industry Partnership Facilities, one in Montreal and one in Ottawa. This amount includes the $16M that NRC received as a one-time infusion to invest in research equipment. For example:

- computer systems upgrade for image processing (for MRI);
- test facility equipment and upgrades of computers and equipment; and
- test equipment for electronics and optoelectronic devices.



NRC delivers annually on a commitment to give on-the-job training to some of Canada's best young scientists and engineers. These programs are aimed at undergraduate and recent graduates, offering many of them opportunities to train directly with NRC researchers. (WES: Women in Engineering and Science, PDF: Post Doctoral Fellows, RA: Research Associates)

NRC contributes to economic growth by helping Canadian firms develop new, marketable technologies

In order to augment the competitiveness of Canadian firms, NRC must work with them to create technology opportunities. Developing new research collaborations and partnerships, as well as making progress in existing ones, is an important indicator of the organisation's ability to anticipate and act on emerging trends in science and technology. In 1998-99, NRC's research program participated in approximately 339 new collaborations, compared with about 303 in 1997-98.

NRC's Institute for Chemical Process and Environmental Technology (ICPET) has worked with manufacturing industries to combine positive environmental management practices with new technology development. In 1998-99, ICPET's Environmental Management Office (EMO) was opened to expand and co-ordinate such activities among NRC's research institutes and their clients, as well as between NRC and federal government departments.

Within the context of international programs like ISO 14000, and industry-driven programs such as Responsible Care™, companies are recognising the need to invest in sound environmental management systems and practices. Wise investment choices not only consider the development or adoption of new technology but also the use of innovative assessment tools to predict the environmental "cost" of such technologies during development.
The EMO works with NRC research institutes and their clients to develop computer-based tools for designing, assessing or modifying a technology to improve its environmental performance. Using these tools, institutes and their

clients can better rationalise technology development decisions that may affect the environment. Rather than examining environmental costs over an entire process, costs are linked to various components of the process, targeting areas where the greatest efficiencies can be achieved.

Canada exports more canola oil than any other country in the world. Canadian canola accounts for about 7% of the food oil market in the US, with sales over $330M per year. To maintain this position, Canada must be continually improving its canola oil.

For the US market, oil must contain less than 7% saturated fat to be labeled as low in saturated fat. NRC's Plant Biotechnology Institute (PBI) is presently spearheading a consortium of 10 organizations with an interest in Polish type canola, to develop breeding lines with targeted oil compositions. A consortium makes this type of research viable, as it reduces the cost/risk ratio.

NRC's Industrial Materials Institute (IMI) works with Canadian industries such as aerospace, energy, telecommunications, electronics, transportation, information technologies, plastics and metal producers to develop improved production processes and higher quality products. For example, IMI has entered into an agreement with a new Quebec-based business, Pharma Laser, to exploit laser-plasma spectroscopy technology developed at IMI. This technology enables rapid and continuous analysis of the composition of a material, in this case, pharmaceutical pills. This technology assists the manufacturer in both production line correction and real-time modification of the manufacturing process, resulting in a greater degree of overall product quality control.

Industry and Government Join Forces at the Canadian Centre for Housing Technology

NRC's Montreal Road Campus now has a unique subdivision with the completion of construction of the Canadian Centre for Housing Technology (CCHT) in 1999. The three technically advanced homes establish a Centre for the acceleration of the development and acceptance of innovative Canadian technologies in both domestic and export markets.

The Centre itself is based on a $1.5 million partnership of NRC, the Canada Mortgage and Housing Corporation (CMHC), and Natural Resources Canada. It consists of two Research Houses, and a display-and-demonstration building called the InfoCentre. The Reference and Test Houses are side-by-side and identical in orientation, size and construction. Both are built to R-2000 specifications and Healthy Housing principles, to establish a "best practices" example of current construction.

Founded on the premise that "the house is a system," the Centre uses its Research Houses to evaluate the impact of innovative products and alternate construction techniques on total house performance. One house will act as a control house and the other as the research lab. Features such as windows, heating systems, ductwork, and controls can be altered or replaced, allowing for an assessment of their effect on house performance.

Institutes associated with NRC's Biotechnology Group have been able to assist Canadian companies develop new technologies or processes which have positive downstream impacts on the economy and on Canadians. For

example, NRC's Institute for Biodiagnostics (IBD), located in Winnipeg, conducts research and develops leading edge, instrumentally based, non-invasive medical diagnostic technologies in partnership with medical schools, universities, other research organisations and the private sector. These partnerships not only enhance the growth and diversification opportunities for Canadian companies, but also provide more effective diagnosis, treatment and monitoring of diseases

IBD, provincial and federal governments and several scientific and medical institutions have recently pooled their resources and installed a Magnetic Resonance Imaging (MRI) scanner at Winnipeg's Health Sciences Centre. This equipment is based on IBD developed technology for functional imaging of the brain. The addition of non-invasive MRI imaging equipment will enhance Western Canada's capabilities in diagnosing and treating injuries and diseases, such as brain tumours, strokes and heart disease.

The Biotechnology Research Institute (BRI), located in Montreal, is currently working with partners to address the serious land contamination problems that have occurred in a number of major Canadian urban centres as a result of past industrial or commercial activities.

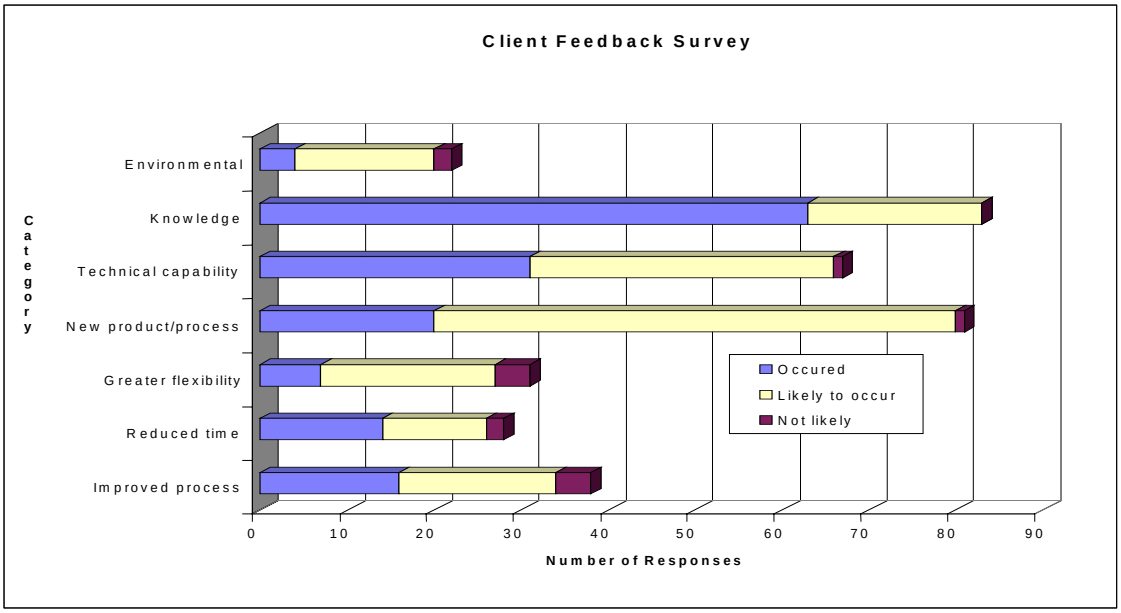
In carrying out this activity, BRI has joined with Canada Economic Development for Quebec Regions (CEDQR), the government of Quebec's Mineral Research Centre and the City of Montreal to found the Montreal
Centre of Excellence in Brownfields Rehabilitation (MCEBR). Strategic alliances with other key Canadian stakeholders from industry and public organisations have also been formed. MCEBR will provide scientific and technical support and specialised infrastructure to its partners in both the private and public sectors who wish to demonstrate new methods and technologies to assist Canadian urban areas reclaim contaminated land sites.

Over the past year, staff at the Institute for Marine Biosciences (IMB), located in Halifax, have worked closely with industrial partners to develop a high-speed, distributed computer network and Internet site that provide convenient access to international genetic databases and bioinformatic software tools for Canadian researchers in government, university and industry.

The existence of a comprehensive Canadian bioinformatics infrastructure facilitates biotechnology research that has applications in human health, agriculture, forestry, fisheries and environmental protection. It also helps Canada attract and retain researchers, and encourage biotechnology companies to set up activities in this country.

In 1998-99, working with the Department of National Defence and the Orenda Aerospace Corp., the Institute for Aerospace Research (IAR) completed a multi-year program on the development of life extension techniques for F404 engines that could be used to extend the usable life of high-cost components in both civil and military gas-turbine engines.

Longer component lives translate into overall lower operating costs. For example, it is estimated that the Canadian Forces will realise cost savings of $78 million over the next 15 years by implementing the new technology for the F404 engines alone. At Orenda, the new technology will translate into increased competitiveness in world markets.



Over the past three years, 289 clients were surveyed for their feedback on directly attributable impacts of projects undertaken with institutes in the Manufacturing Technologies Program. To date, 160 responses have been received. Results of that survey, shown above, indicate that work with NRC has directly resulted in or is likely to result in a new product or process.

Development of national codes and standards

Two NRC Institutes, the Institute for Research in Construction (IRC) and the Institute for National Measurement Standards (INMS) focus on developing and improving national building and fire codes and measurement standards. The application of these codes and standards provides domestic firms with a basis for international trade, demonstrates Canadian product conformance to international quality standards, and gives Canadian industry opportunities to penetrate the international market.

In cancer treatment with radiation, it is critically important to measure and deliver the dose accurately. The Ionizing Radiation Standards group at INMS has played a leading role in a worldwide change in clinical dosimetry standards. As well as developing state-of-the-art primary standards of absorbed dose, NRC has been instrumental in developing a new clinical protocol for use of these standards. In 1998, The American Association of Physicists in Medicine formally approved the protocol.

Once implemented in Canada and the United States, these advances made by NRC will be applied routinely to the cancer treatment of about 600,000 patients per year and will improve both clinical efficiency and the accuracy of the delivered dose.

IRC's Canadian Construction Materials Centre (CCMC) has entered into a new agreement with the Japanese Centre for Better Living (CBL) which should make it easier for Canadian manufacturers of housing components to penetrate the Japanese homebuilding market. Under this agreement, Canadian products can

be tested in Canada to determine whether they meet or exceed CBL requirements, thereby eliminating the need for further time-consuming testing in Japan. Additionally, a report by CCMC confirming technical conformity will eliminate the need for technical review by CBL's evaluation committee. An administrative assessment of the Canadian product that covers such things as security of supply, competitive pricing and the distribution network for the product in Japan will continue to be undertaken by CBL. If these are all found satisfactory, the product will then be given the coveted Better Living (BL) label.

The use of products bearing the BL label is promoted in all public housing in Japan, as well as in any other housing that has a public component to its financing. At this moment, the focus for Canadian manufacturers is on windows, doors and kitchen cabinets, but this list is likely to grow.

NRC transfers its research successes to Canadian firms

Ultimately, the objective behind NRC's research activity is to provide companies with opportunities to benefit from marketable ideas, processes and technologies. At an appropriate stage in knowledge and technology development, NRC's researchers will often apply for patents when it becomes obvious that these products may have market potential at some point for Canadian companies. The organisation will also signl licences with firms who want to apply NRC-generated knowledge and technology in their businesses. The number of new patents and licence sales each year and the revenues from them is a measure of the quality and applicability of much of NRC's research activity.

In 1998-99, NRC secured 61 patents on inventions and new technologies and applied for 27 more. By the end of the year, the total number of active patents was 629. Also during the year, the organisation entered into 56 new licensing agreements. The royalties collected from licences in 1998-99 totalled over $1.6 million.

Since its creation in January 1999, IatroQuest Corporation has grown from its original two employees to seven. It is fully financed with "smart money", has been awarded a $500,000 major research grant and has developed key strategic alliance partnering.

The company, which spun off from the Institute for Biological Sciences (IBS), attributes this success to their mentorship by Inno-centre and the opportunity to occupy incubator space at NRC.

NRC's Institute for Marine Dynamics (IMD), located in St. John's, Newfoundland, is Canada's national centre for ocean technology research and development. In collaboration with industry and university partners, IMD pursues research in ship technology and offshore engineering, focusing on such areas as ship and underwater vehicle dynamics, ice effects on marine systems, mooring and towed body simulation, wave-current interaction and wave impact analysis.

In 1998-99, an alliance between IMD and Marineering Ltd. (an NRC spin-off company) created a joint venture company called OCEANIC Consulting Corporation. In OCEANIC, the alliance members hope to build a new private sector SME to market, manage and perform the delivery of marine system performance evaluation services. OCEANIC would become the primary commercialiser of IMD's core-business technology. In a 5-year period, revenues are expected to grow from $2.5 to $10 million annually, with approximately 20

new jobs being created at OCEANIC and another 10 at IMD.

NRC's Institute for Microstructural Sciences (IMS), by working in close collaboration with industry and universities, keeps Canada at the leading edge of technologies that will drive the information revolution over the next decade.

A major IMS success in 1998 was the successful spin-off of thin film technology to Iridian Spectral Technologies Inc. The main applications of this technology are found in optical telecommunication systems for use in conjunction with fibre amplifiers and dense wavelength division multiplexing modules. The company currently resides in NRC's Industrial Partnership Facility, because of its close proximity to IMS facilities and expertise. The success of Iridian demonstrates the Institute's ability to commercialise its technology for the economic benefit of Canada.

Key Reviews

In 1997-98, NRC made several changes to its strategic planning and assessment process. A revised five-year assessment schedule was developed which ensures that assessment results are addressed in the strategic plans of NRC's research institutes, programs and branches. The revised process will also improve NRC's ability to assess performance against established objectives.

The Assessment Process

NRC draws on several elements in assessing its programs and activities. Program evaluation and comprehensive audit elements are typical in government organisations. Peer review is more specific to an R&D organisation in that it studies the quality and relevance of research work. A typical peer review of an NRC institute normally involves an on-site examination by several distinguished individuals from the scientific and industrial communities, followed by a report of their findings and recommendations to NRC's senior management.

NRC has other review mechanisms that complement the assessment function. These include: advisory boards and committees with industrial representation; client feedback; reviews of publications submitted to journals; formal, annual program reviews; and self assessment using performance frameworks.

Assessments

In 1998-99, NRC carried out a full assessment of the Herzberg Institute of Astrophysics (HIA) and conducted a peer review of the Tri-University Meson Facility (TRIUMF).

The HIA assessment included a program evaluation, a peer review and a bibliometric study. The assessment concluded that the institute is conducting high quality research and that HIA's scientific and engineering expertise has allowed Canada to become a world leader in the field of astronomy. The assessment also confirmed that the Institute has played a major role in the development of international astronomy facilities and is a world leader in the areas of adaptive optics and data archiving and management.

The assessment report concluded that Canada and Canadian firms have received significant downstream economic benefits by participating in international astronomy partnerships. In order to maximise its relevance, leverage and impacts, the assessment report recommended that HIA should develop mechanisms to increase its public outreach program and that the institute should increase its collaborations with Canadian universities and the Canadian Space Agency.

The peer review of TRIUMF evaluated the quality of the Laboratory's research programs that have been carried out since 1995. The findings of this review have contributed to the development of a new five-year plan for the organisation. It found that TRIUMF is a thriving, internationally recognised laboratory. It concluded that, because of the possibilities for new technologies in both physical and life sciences, it is necessary that Canada remain a leader in subatomic physics.

The peer review concluded that TRIUMF is a major scientific facility that clearly demonstrates Canada's status as one of the most advanced G-7 countries in the subatomic physics field.

2. Support for Innovation and the National Science and Technology Infrastructure Business Line

Comparison of Total Planned Spending to Actual Spending

Departmental Planned versus Actual Spending by Business Line (millions of dollars)

Business Line	Operating [1]	Capital	Grants and Contributions	Subtotal Gross Expenditures	Statutory Items [2]	Total Gross Expenditures	Less Revenue Credited to the Vote	Total Net Expenditures
Support for Innovation and the National Science and Technology Infrastructure								
Planned spending	27.4	-	124.6	152.0	24.6	176.6	-	176.6
Total authorities	*35.3*	*0.3*	*105.3*	*140.9*	*25.4*	*166.3*	*-*	*166.3*
Actuals	**37.6**	**1.7**	**104.5**	**143.8**	**24.8**	**168.6**	**-**	**168.6**

Notes

(1) Operating includes contributions to employee benefit plans.

(2) Spending of revenues pursuant to the NRC Act.

Planned spending indicates numbers reported in the 1998-99 Report on Plans and Priorities.

Numbers in italic denote Total Authorities for 1998-99 (Main and Supplementary Estimates and other authorities).

Bolded numbers denote actual expenditures and revenues in 1998-99.

Numbers exclude the spending of proceeds from the disposal of surplus crown assets.

Due to rounding, figures may not add to totals shown.

This, the second of NRC's two program-oriented business lines, is dedicated to offering different kinds of support to research and development across Canada.

The objective of the Support for Innovation and the National Science and Technology Infrastructure business line is to …

- *improve the innovative capability of Canadian firms through the provision of integrated and coordinated technological and financial assistance, information and access to other relevant resources; and*
- *stimulate wealth creation for Canada through technological assistance, information and access to other relevant resources.*

This business line is comprised of the Industrial Research Assistance Program, the Canada Institute for Scientific and Technical Information, and three Technology Centres. It offers a unique range of services and products that contribute to the economic viability of knowledge-based companies and to the progress of other research organisations. Because of the client and service orientation of this business line, these factors are important when describing its performance.

2.1 The Industrial Research Assistance Program

The Industrial Research Assistance Program, commonly known as IRAP, helps innovative Canadian SMEs develop and exploit technologies. The program offers both financial support and technical advice to firms, tailoring these services to the needs of individual clients.

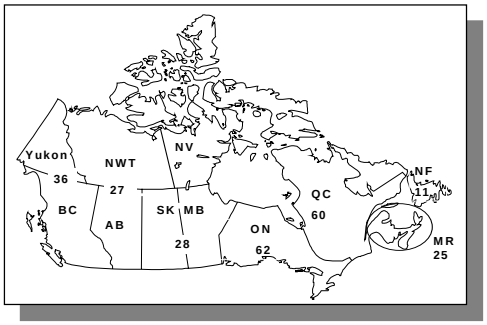
IRAP is considered to be one of the most successful industrial assistance programs in the world primarily because:

- it concentrates on helping small- and medium-sized firms,
- it is efficiently delivered through a network of specialists from organisations located across Canada,
- the network's responsive nature ensures that the program's focus is on current regional and industrial priorities;
- while it provides financial assistance, it also links firms to valuable sources of technology advice without charge; and
- the financial assistance provided is based on the premise that firms share the costs and risks with IRAP.

NRC contributes to economic growth by helping Canadian firms develop new, marketable technologies

Of the 260 Industrial Technology Advisors (ITAs) who deliver the program, 70% of them work directly for 130 different public and private organisations, including provincial research organisations, research centres, universities and colleges, industrial associations and other professional groups which comprise the IRAP network. All IRAP's ITAs have industrial experience combined with either a general knowledge of technologies or an in-depth expertise in specific areas. They represent the best expertise available to SMEs in 90 Canadian cities.

Distribution of IRAP ITAs



Tilapia, a fish native to Africa, can be bred year round in captivity, making it a highly coveted commercial fish. One Ontario company is presently trying to compete with US producers selling fish to the Toronto market. A contribution from IRAP helped Northern Tilapia to conduct research and to bring back stock from Egypt that are more resistant to disease and faster growing than American breeding stock.

The company anticipates replacing 10 to 15% of fish imported by American suppliers into Toronto this year. IRAP's assistance has allowed the company to create six new jobs and to enter into new fish markets.

In 1998-99, IRAP provided advice and technical assistance to some 12,000 clients. As well, about 3,800 firms received financial assistance. This represents an increase of approximately 15% in the number of firms receiving assistance over 1997-98. IRAP's total contributions to these projects amounted to over $79 million, a 30% increase over the previous year. It is important to note that the program encourages companies to cover as much of their project costs as possible, with firms contributing between 30% to 40% last year. Approximately $29 million was expended on contribution agreements with organisations to provide ITAs and to cover their associated administration costs.

During 1998-99, IRAP introduced the Precommercialisation Assistance (PA) and Sustainable Development initiatives. PA is a joint venture between NRC's IRAP and Industry Canada's Technology Partnerships Canada (TPC) to assist SMEs through financial contributions for small projects ($1.5M or less). These repayable contributions are for near-

market development of new or significantly improved products, processes and technologies.

Last year, IRAP made significant progress in implementing the PA initiative through its network of ITAs and partner organisations. During this, its first full year of operation, IRAP PA has provided financial assistance to 40 projects for a total contribution of $15 M over the next four years.

IRAP's second new initiative, Sustainable Development, fosters the implementation of sustainable development practices within SMEs while making them more competitive and profitable in the process. The focus is on pollution prevention and energy efficiency rather than end-of-pipe pollution control. In its first year, IRAP has worked to increase awareness and acceptance of this initiative through its network of SMEs.

Atmospheric waste from some companies is a definite nuisance and potentially harmful to the surrounding population. A new oxidation process perfected by Biothermica International Inc. of Montreal has proved to be superior to all the others presently being used. As well, this company's technology is proving to be more cost effective than existing similar processes.

IRAP's involvement made it possible for this company to perfect a leading edge technology in response to acute problems.

IRAP manages two components of the federal *Youth Employment Strategy in Science and Technology*, a two-year Human Resources Development Canada program.

The first program, the *S&T Internships Program,* was designed to help SMEs hire recent science, engineering, technology and business graduates for six-month internships. The second program, the *Science Collaborative Research Internship Program*, was designed to help SMEs hire graduates of Canadian universities with a hiring objective of 90 people for joint projects with NRC. As of March 31, 1999, IRAP had led more than 1,000 intern projects in both programs of which some 5% involved multimedia technologies and 3% involved aboriginal firms/graduates. The *S&T Internship Program* has been a greater success than anticipated and has required IRAP to contribute over $1.1 million in additional funding to the Program to cover additional projects.

The *Science Collaborative Research Internship Program*, the smaller of the two programs, has not been as successful due mainly to the costs and difficulties involved in establishing partnerships between SMEs and NRC for short term funding (six-month internships). As a result, $400,000 has been re-profiled from this program to the *S&T Internships Program* to allow additional internships to be supported.

CIE Research of Charlottetown, P.E.I., has been working with IRAP to develop a multi colored, LED, computerized, animated, display sign which can be programmed to provide information in color and with animation. The project was completed in 1998-99 and resulted in both Canadian and US patents being granted.

CIE Research is presently negotiating with larger companies to license out the technology.

NRC contributes to technology-based economic growth in communities across the country

As part of its strategic plan to offer a full range of services to clients across Canada, IRAP is enhancing its linkages with NRC's research institutes and CISTI. One way the program is doing this is by partnering with them in NRC's community-based initiatives, contributing to collaborative efforts with other government organisations in all parts of the country (covered earlier in the Report).

In recent years, IRAP has extended its reach and influence in the innovation system through the Canadian Technology Network (CTN). CTN is a "people" network that not only links public and private sector organisations offering innovation support services in Canada, but also successfully works at building Canada's innovation infrastructure. During the past year, CTN membership has grown from 880 to 1000 members, including industry associations, research organisations, government departments, universities and colleges. CTN has also played an important role in exporting IRAP's model of innovation assistance to other countries. In collaboration with CIDA, CTN is exporting Canadian innovation knowledge with the objective of increasing opportunities for Canadian firms.

2.2 The Canada Institute for Scientific and Technical Information

For researchers, the opportunity to have quick and dependable access to the best, most current information available pertaining to their fields of study is crucial. The Canada Institute for Scientific and Technical Information (CISTI) plays an essential role in providing researchers across the country with scientific, technical and medical information (STM).

CISTI is a world leader in technical library services, and is also Canada's largest publisher of scientific journals. It holds one of the largest STM information collections anywhere, and disseminates this information through a state-of-the-art electronic document delivery system.

While its main information storage location is in Ottawa, CISTI has nine Information Centres situated in NRC's research institutes and Innovation Centres outside of the National Capital Region. The newest of these Information Centres opened in 1998-99 in the NRC Innovation Centre in Vancouver. These Information Centres focus on regionally important technology areas, and are accessible to the public.

Current pressures demand that CISTI continually adjust the way it delivers information to clients in order to keep pace with changes in information management technology. Over the past few years, CISTI has been positioning itself to become Canada's major STM resource by:

- increasing and improving the range of its publishing and document delivery services; and
- maintaining its world class collection, thereby giving Canadians access to the best and most current scientific, technical and medical information from around the world.

Total CISTI sales reached approximately $18.8 million in 1998-99, up from $15 million the year before, and its cost recovery ratio has also increased slightly. However, information management, technology refurbishment, CISTI's commitment to modernising its operations and maintaining its collection as a valuable Canadian asset all require re-investment of its revenues as well as new investment. For example, the inflationary factor in the scientific information industry is very high, and CISTI must spend in the

order of $10 million annually just to maintain its collection at existing levels.

There are several indicators that demonstrate how effectively CISTI performed in 1998-99:

- the total number of CISTI clients was 26,114, up from 25,974 the previous year;
- over 13,600 Canadians were registered as users of CISTI's online Catalogue service during the year, an increase of 27% since 1997-98;
- 3.1% of all articles published by Canadian researchers were published in NRC Research Press journals;
- over 776,000 document orders were placed worldwide through CISTI's Document Delivery services. Sixty-six percent of these were placed by Canadian researchers;
- document delivery sales to the US market reached $4.4M in 1998-99, an increase of 76% over 1997-98.

In the past several years, CISTI has been developing its capabilities to provide information online. At present, researchers have 11 ways to order documents electronically through CISTI. Most recently CISTI launched BiblioNet, a Web-based service for the Information Technology and Telecommunications Sector. This is clearly the way of the future. In the last year, both the Canadian Agriculture Library and the Canadian Bioinformatics Resource have been using CISTI-supported infrastructure and processes. The use of CISTI's Virtual Library has grown steadily in the last two years. In 1998-99, an additional 600 users were added, bringing the total to 3,818 registered users.

2.3 Technology Centres

NRC presently has three technology centres that function on a full cost recovery basis:

- the Canadian Hydraulics Centre;
- the Centre for Surface Transportation Technology; and
- the Thermal Technology Centre.

These centres, each with a small contingent of staff, offer specialised testing and other engineering-oriented services to their clients.

While not part of NRC's core activities, the technology centres provide unique engineering facilities and services to Canadian industry. As of 1998-99, two of the Centres, the Canadian Hydraulics Centre and the Centre for Surface Transportation Technology, are operating on a cost-neutral basis. Efforts are being made to move the third centre in the same direction.

3. Program Management Business Line

Comparison of Total Planned Spending to Actual Spending

Departmental Planned versus Actual Spending by Business Line (millions of dollars)

Business Line	Operating [1]	Capital	Grants and Contributions	Subtotal Gross Expenditures	Statutory Items [2]	Total Gross Expenditures	Less Revenue Credited to the Vote	Total Net Expenditures
Program Management								
Planned spending	43.5	5.4	5.2	54.1	1.1	55.2	-	55.2
Total authorities	*47.2*	*7.2*	*5.2*	*59.6*	*2.8*	*62.4*	-	*62.4*
Actuals	**60.9**	**11.3**	**5.2**	**77.4**	**2.1**	**79.5**	**-**	**79.5**

Notes

(1) Operating includes contributions to employee benefit plans.

(2) Spending of revenues pursuant to the NRC Act.

Planned spending indicates numbers reported in the 1998-99 Report on Plans and Priorities.

Numbers in italic denote Total Authorities for 1998-99 (Main and Supplementary Estimates and other authorities).

Bolded numbers denote actual expenditures and revenues in 1998-99.

Numbers exclude the spending of proceeds from the disposal of surplus crown assets.

Due to rounding, figures may not add to totals shown.

This business line provides support services to NRC management and the two program-oriented business lines. Its activities include executive services as well as specialised support in finance, information management, human resources, administration, property management and corporate services.

The objective of the Program Management business line is to …

provide efficient, client-focused services which enhance NRC's effectiveness as an integrated, dynamic science and technology organization.

While generally operational in nature, all areas of the business line – which in 1998-99 comprised five corporate branches – made progress in their commitment to support NRC's more businesslike, entrepreneurial pursuits.

In April 1998, NRC created the Information Management Services Branch (IMSB). The immediate and most obvious effect of this action was the consolidation under a single corporate structure of a number of formerly discrete organisational elements associated with the management of information technology at NRC. The creation of IMSB was more than a simple reorganisation. It signalled an emerging appreciation that the manner by which NRC manages its information and information technology assets would have a profound effect on the ability of the organisation to achieve its Vision as a leader in the development of an innovative, knowledge-based economy through science and technology.

"The efficiency with which NRC manages its information and the effectiveness with which it brings this information to the advantage of its clients and stakeholders will be the hallmarks of NRC's successes in the years to come … Simply put, information management has become mission-critical for NRC."

Dr. Peter Hackett, Vice President Research, NRC

One of the most visible demonstrations of NRC's continuing efforts to improve its business processes is in the maintenance of its buildings and facilities located across Canada. Not only must NRC satisfy health, safety and efficiency concerns, but, as a world-class research organisation, it must maintain excellent facilities in order to conduct leading-edge science and to attract industrial collaborators.

Over the past year, NRC had several highlights in this area:

- a comprehensive investigation of equipment and property to assess Year 2000 compliance;
- the stripping, redesigning and rebuilding of a Test Cell to permit testing of gas turbines with high-pressure natural gas and aviation fuels;
- removal of five outdated underground petroleum storage tanks;
- receipt of the 1998 Real Property Management award for the M-2 Ice Storage Facility.

In 1998-99, the Human Resource Branch (HRB) developed an Employer of Choice Strategy as a long-term strategy for people management at NRC. In support of this, NRC management finalised policies in the areas of employee career development, managerial succession planning/leadership development, 360 degree feedback for managers, a competency-based people management framework applicable to all positions at NRC, and a performance bonus plan accessible to all NRC staff. The goals of the strategy are to achieve high levels of employee commitment and loyalty, high levels of personal productivity and impact, and constant growth of intellectual capital and organisational change readiness.

Special human resource management initiatives over the year included the establishment of a university liaison office aimed at increasing NRC's ability to recruit the best of the best, and the establishment of an Aboriginal recruitment campaign aimed at recruiting 20 new professionals as researchers, technologists and administrators.

Section IV: CONSOLIDATED REPORTING

Year 2000 Readiness

In 1998, NRC created a Steering Committee (Core Group) of senior managers, chaired by the Vice-President of Technology and Industry Support, to oversee and monitor progress towards Year 2000 readiness. The Core Group put in place a management framework, which included a Year 2000 Project Office, to formalise its approach to addressing Year 2000 issues, and to communicate the importance of Year 2000 readiness to all NRC institutes and branches throughout Canada.

NRC has identified and is in the process of completing the evaluation of over 5000 mission critical assets, including research and information technology assets, and more than 800 infrastructural assets in over 170 NRC buildings. No major difficulties were encountered in the 1998-99 year.

During this period, NRC signed a formal agreement with Public Works & Government Services Canada (PWGSC) to examine and run diagnostic tests in selected NRC buildings. To date, few areas require remediation. Full readiness is planned for the summer of 1999.

A legal and business risk assessment is underway. Licenses, collaborative and tenant agreements and all other possible legal issues were examined. This work was completed in mid June 1999, and provided an opportunity to re-evaluate risk exposure in the context of NRC's Contingency Plan.

NRC completed its Contingency Plan by the end of June 1999. This overall plan includes a roll-up and integration of all institute and branch plans. The Project Office is working hand-in-hand in this area with representatives from DND's National Contingency Planning Group.

NRC has recognised the importance of independent reviews of Year 2000 preparedness, and will continue to contract for third-party reviews when necessary. This will include working closely with other government departments assigned specific Year 2000 related responsibilities such as the Canadian Food Inspection Agency.

In addition, NRC has conducted a "readiness review" in each institute and branch. The purpose of this review was to monitor Year 2000 preparedness, assess the implementation of established Year 2000 policies and guidelines, and to review any high-risk areas and the adequacy of related contingency plans.

NRC has already performed a significant amount of work to ensure it is Year 2000 ready, and will continue to dedicate the necessary resources to complete the necessary actions in a timely manner.

Section V: Financial Performance

A. Financial Performance Overview

Like other federal departments and agencies, NRC receives its budget through Main and Supplementary Estimates voted by Parliament. In 1998-99, NRC's Main Estimates budget was approved at $472.1 million. Through Supplementary Estimates, NRC received an additional $57.8 million for items such as the Youth Employment Initiative, Operating and Capital Budget carry-forwards.

Pursuant to the NRC Act, the organisation is able to spend revenues earned through the provision of goods and services. In 1998-99, the NRC earned $49.3 million in revenue and used $48.4 of these receipts to offset expenditures.

Over the years, NRC has found that it is not always possible to spend revenues in the same fiscal year that it earns them. To compensate for this, the organisation has been able to accumulate and retain unspent revenue from one year to the next.

In 1998-99, NRC's actual expenditures were 11%, or $51.9 million higher than planned. This increase was largely financed from the funding received through Supplementary Estimates.

B. Financial Summary Tables

The following tables apply to NRC:

Financial Table 1 - **Summary of Voted Appropriations**

Financial Table 2 - **Comparison of Total Spending to Actual Spending**

Financial Table 3 - **Historical Comparison of Total Planned Spending To Actual Spending**

Financial Table 5 **- Resource Requirements by Organization and Business Line**

Financial Table 6 - **Respendable Revenues by Business Line**

Financial Table 8 - **Statutory Payments**

Financial Table 9 - **Transfer Payments**

Financial Table 10 - **Capital Spending by Business Line**

Financial Table 11 - **Capital Projects**

Financial Table 15 - **Contingent Liabilities**

Financial Table 1

Summary of Voted Appropriations

Financial Requirements by Authority (millions of dollars)				
		1998-99		
Vote		Planned Spending	Total Authorities	Actual
	National Research Council Program			
70	Operating expenditures	219.9	244.5	**239.3**
75	Capital expenditures	34.8	51.4	**51.3**
80	Grants and contributions	170.4	153.2	**152.4**
(S)	Spending of revenues pursuant to the National Research Council Act	50.0	63.6	**48.4**
(S)	Contributions to employee benefit plans	31.0	32.5	**32.5**
	Total Department	**506.1**	**545.2**	**524.0**

Notes

Figures above exclude the spending of proceeds from the disposal of surplus crown assets.

Total Authorities are Main and Supplementary Estimates plus other authorities.

Due to rounding, figures may not add to totals shown.

Financial Table 2

Comparison of Total Planned Spending to Actual Spending

Departmental Planned versus Actual Spending by Business Line (millions of dollars)

Business Lines	FTEs	Operating [1]	Capital	Grants and Contri-butions	Subtotal Gross Expendi-tures	Statutory Items [2]	Total Gross Expendi-tures	*Less Respend-able Revenues	Total Net Expendi-tures
Research and Technology Innovation									
Planned spending	2,002	180.0	29.4	40.6	250.1	24.2	274.2	-	274.2
Total authorities	*2,002*	*194.5*	*43.9*	*42.7*	*281.1*	*35.4*	*316.5*	-	*316.5*
Actuals	**2,219**	**173.3**	**38.3**	**42.7**	**254.3**	**21.5**	**275.8**	**-**	**275.8**
Support for Innovation and the National Science and Technology Infrastructure									
Planned spending	387	27.4	-	124.6	152.0	24.6	176.6	-	176.6
Total authorities	*387*	*35.3*	*0.3*	*105.3*	*140.9*	*25.4*	*166.3*	-	*166.3*
Actuals	**518**	**37.6**	**1.7**	**104.5**	**143.8**	**24.8**	**168.6**	**-**	**168.6**
Program Management									
Planned spending	543	43.5	5.4	5.2	54.1	1.1	55.2	-	55.2
Total authorities	*543*	*47.2*	*7.2*	*5.2*	*59.6*	*2.8*	*62.4*	-	*62.4*
Actuals	**529**	**60.9**	**11.3**	**5.2**	**77.4**	**2.1**	**79.5**	**-**	**79.5**
Total									
Planned spending	2,932	250.9	34.8	170.4	456.1	50.0	506.1	-	506.1
Total authorities	*2,932*	*277.0*	*51.4*	*153.2*	*481.6*	*63.6*	*545.2*	-	*545.2*
Actuals	**3,266**	**271.8**	**51.3**	**152.4**	**475.5**	**48.4**	**524.0**	**-**	**524.0**
Other Revenues and Expenditures									
Revenue credited to the Consolidated Revenue Fund									
Planned spending									-
Total authorities									-
Actuals									**(0.2)**
Cost of Services provided by other departments									
Planned spending									10.3
Total authorities									*10.3*
Actuals									**9.3**
Net Cost of the Program									
Planned spending									516.4
Total authorities									*555.5*
Actuals									**533.1**

Notes

***These revenues were formerly called "Revenues Credited to the vote".**

(1) Operating includes contributions to employee benefit plans.

(2) Spending of revenues pursuant to the NRC Act.

Planned spending indicates numbers reported in the 1998-99 Report on Plans and Priorities.

Numbers in italic denote Total Authorities for 1998-99 (Main and Supplementary Estimates and other authorities).

Bolded numbers denote actual expenditures and revenues in 1998-99.

Numbers exclude the spending of proceeds from the disposal of surplus crown assets.

Due to rounding, figures may not add to totals shown.

Financial Table 3

Historical Comparison of Total Planned Spending to Actual Spending

Departmental Planned versus Actual Spending by Business Line (millions of dollars)					
			1998-99		
Business Lines	Actual 1996-97	Actual 1997-98	Planned	Total Authorities	Actual
Research and Technology Innovation	226.3	258.2	274.2	316.5	275.8
Support for Innovation and the National Science and Technology Infrastructure	126.4	146.4	176.6	166.3	168.6
Program Management	65.1	90.6	55.2	62.4	79.5
Total	**417.8**	**495.3**	**506.1**	**545.2**	**524.0**

Notes

Total Authorities are Main and Supplementary Estimates plus other authorities.

Figures above exclude the spending of proceeds from the disposal of surplus crown assets.

Due to rounding, figures may not add to totals shown.

Financial Table 5

Resource Requirements by Organization and Business Line

Comparison of 1998-99 Planned Spending and Total Authorities to Actual Expenditures by Organization and Business Line (millions of dollars)

	Business Lines			
Organization	**Research and Technology Innovation**	**Support for Innovation and the National Science and Technology Infrastructure**	**Program Management**	**Total**
Research Institutes				
Planned spending	274.2			274.2
Total authorities	*316.5*			*316.5*
Actuals	**275.8**			**275.8**
Industrial Research Assistance Program				
Planned spending		136.0		136.0
Total authorities		*123.6*		*123.6*
Actuals		**121.5**		**121.5**
Scientific and Technical Information				
Planned spending		31.9		31.9
Total authorities		*34.4*		*34.4*
Actuals		**38.4**		**38.4**
Technology Centres				
Planned spending		8.7		8.7
Total authorities		*8.3*		*8.3*
Actuals		**8.7**		**8.7**
Corporate Branches				
Planned spending			46.0	46.0
Total authorities			*53.0*	*53.0*
Actuals			**67.1**	**67.1**
Executive Support				
Planned spending			9.2	9.2
Total authorities			*9.4*	*9.4*
Actuals			**12.4**	**12.4**
TOTAL				
Planned spending	274.2	176.6	55.2	506.1
Total authorities	*316.5*	*166.3*	*62.4*	*545.2*
Actuals	**275.8**	**168.6**	**79.5**	**524.0**
% of TOTAL				
Planned spending	54.2%	34.9%	10.9%	100.0%
Total authorities	*58.1%*	*30.5%*	*11.4%*	*100.0%*
Actuals	**52.6%**	**32.2%**	**15.2%**	**100.0%**

Notes

Figures above exclude the spending of proceeds from the disposal of surplus crown assets.

Total Authorities are Main and Supplementary Estimates plus other authorities.

Corporate Branches **actual figures** include the implementation costs of the **Integrated Enterprise Business System (SIGMA).**

Due to rounding, figures may not add to totals shown.

Financial Table 6

*Respendable Revenues by Business Line ($ millions)

Business Lines	Actual 1996-97	Actual 1997-98	1998-99 Planned Revenue	1998-99 Total Authorities	1998-99 Actual
Research and Technology Innovation	24.4	22.8	24.2	24.2	21.1
Support for Innovation and the National Science and Technology Infrastructure	18.0	21.0	24.6	24.6	25.4
Program Management	2.7	4.8	1.1	1.1	2.8
Total Revenues	**45.1**	**48.6**	**50.0**	**50.0**	**49.3**

Notes

*These revenues were formerly called "Revenues Credited to the Vote"

In accordance with section **5.1 (e)** of the **National Research Council Act**, NRC is authorized to spend its operating revenues and therefore does not net-vote.

Total Authorities are Main and Supplementary Estimates plus other authorities.

Due to rounding, figures may not add to totals shown.

Refer to Table 8 for statutory payments.

Financial Table 8

Statutory Payments

Spending of Revenues Pursuant to the NRC Act (millions of dollars)					
			1998-99		
Business Lines	Actual 1996-97	Actual 1997-98	Planned Spending	Total Authorities	Actual
Research and Technology Innovation	21.5	23.9	24.2	35.4	21.5
Support for Innovation and the National Science and Technology Infrastructure	13.3	19.9	24.6	25.4	24.8
Program Management	2.9	15.0	1.1	2.8	2.1
Total Statutory Payments	**37.7**	**58.8**	**50.0**	**63.6**	**48.4**

Notes

Total Authorities are Main and Supplementary Estimates plus other authorities. The total of $63.6M for 1998-99 includes an amount of $14.3M carried forward from previous years.

Due to rounding, figures may not add to totals shown.

Financial Table 9

Transfer Payments

Transfer Payments by Business Line (millions of dollars)					
			1998-99		
Business Lines	**Actual 1996-97**	**Actual 1997-98**	**Planned Spending**	**Total Authorities**	**Actual**
GRANTS					
Program Management	5.1	5.2	5.2	5.2	5.2
Total Grants	**5.1**	**5.2**	**5.2**	**5.2**	**5.2**
CONTRIBUTIONS					
Research and Technology Innovation	41.5	41.1	40.6	42.7	42.7
Support for Innovation and the National Science and Technology Infrastructure	82.8	87.5	124.6	105.3	104.5
Total Contributions	**124.3**	**128.6**	**165.2**	**148.0**	**147.2**
Total Transfer Payments	**129.4**	**133.8**	**170.4**	**153.2**	**152.4**

Note

Total Authorities are Main and Supplementary Estimates plus other authorities.

Financial Table 10

Capital Spending by Business Line

Capital Spending by Business Line (millions of dollars)

Business Lines	Actual 1996-97	Actual 1997-98	1998-99 Planned Spending	1998-99 Total Authorities	1998-99 Actual
Research and Technology Innovation	31.8	33.7	29.4	43.9	38.3
Support for Innovation and the National Science and Technology Infrastructure	1.6	1.2	0.0	0.3	1.7
Program Management	9.8	9.9	5.4	7.2	11.3
Total Capital Spending	**43.2**	**44.8**	**34.8**	**51.4**	**51.3**

Notes

Total Authorities are Main and Supplementary Estimates plus other authorities.

Due to rounding, figures may not add to totals shown.

The above figures exclude revenues used for capital purchases.

Financial Table 11

Capital Projects

Capital Projects by Business Line (millions of dollars)

Business Lines	Current Estimated Total Cost	Actual 1996-97	Actual 1997-98	1998-99 Planned Spending	1998-99 Total Authorities	1998-99 Actual
Research and Technology Innovation						
Industry Partnership Facility (Building M-50)	6.4		3.7	2.7	2.7	**2.7**
High Resolution NMR Facility	1.2			1.2	1.2	**1.2**
Montreal Centre of Excellence for Site Rehabilitation	1.4		0.7	0.5	0.5	**0.1**
Housing Innovation Facility	0.8		0.2	0.6	0.6	**0.5**
Upgrade to the Institute's for Biological Sciences laboratories on Sussex Drive	1.4		0.5	0.6	0.6	**0.6**
Steacie Institute for Molecular Sciences - Chemical Biology Laboratory	1.7		1.3	0.4	0.4	**0.4**
Link from the Biotechnology Research Institute to the Industry Partnership Facility (1)	5.1		2.5	2.6	2.6	**2.0**
Herzberg Institute of Astrophysics Victoria Building Addition - Planning and Design	0.6					**0.6**
Replacement of Obsolete Magnetic Resonance Equipment	0.7					**0.3**
Innovation Program in the Manufacture of Plastic Films	1.9					**0.3**
Biosafety Level II Pilot Plant for Production and Purification of Gene Therapy	0.7					**0.7**
Area CCD Detector for Synchrotron Beamline	0.6					**0.6**
Silicon Graphics Equipment Upgrade	1.9					**1.9**
Virtual Environment Technologies Centre of Excellence	1.9					**1.9**
Fit-up of New Laboratories at Biotechnology Research Institute	1.2					**1.2**
Advanced Thermoforming Technology	0.5					**0.5**
Support for Innovation and the National Science and Technology Infrastructure						
Electronic CISTI	1.8		0.6	0.7	0.7	**0.6**
Program Management						
Integrated Enterprise Business System	26.4		11.6	9.5	9.5	**4.8**
Sprinkler System in Building U-61	0.6		0.4	0.2	0.2	**0.2**
MS Exchange Deployment	2.1					**1.8**
Year 2000 - Wide Area Network Upgrade	0.9					**0.9**
Acquisition of Additional Oracle Licences	0.9					**0.9**

Note

(1) NRC funding only; total cost at $7.8M.

Total Authorities are Main and Supplementary Estimates plus other authorities.

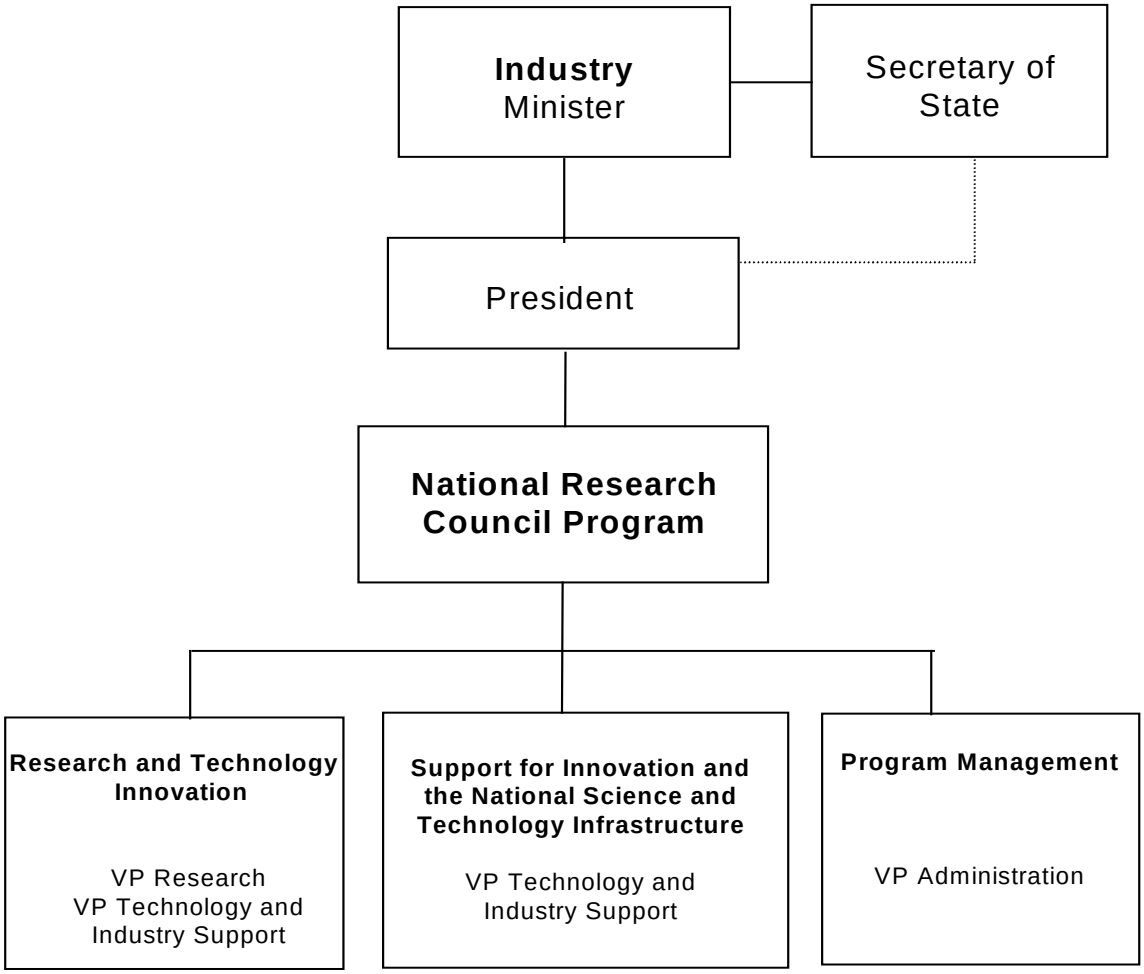
Financial Table 15

Contingent Liabilities

Contingent Liability (millions of dollars)			
	Amount of Contingent Liability As at March 31		
Contingent Liability	**1997**	**1998**	**1999**
Claim and Pending and Threatened Litigation			
Litigation	15.5	15.5	0.0
Total	**15.5**	**15.5**	**0.0**

Section VI: Supplementary Information

A. NRC Organisation Chart



B. Acts Administered in Whole or in part by the National Research Council

The National Research Council is responsible for administering the *National Research Council Act.* The latest revision to the NRC Act is R.S.C. 1985, c. N-15 (never amended)

NRC has responsibility for calibration and certification of standards of measurement under the *Weights and Measures Act,* and also provides technical support to the Canadian Commission on Building and Fire Codes.

The *Atomic Energy Control Act* makes provision for the Atomic Energy Control Board to establish a granting program through NRC, but this possibility is not currently a practice.

C. Listing of Statutory and Council Reports

Annual Report 1998-99

D. Contact for Further Information

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Section VII: Index