ESTIMATES

National Research Council Canada

2001-2002
Estimates

Part III – Report on Plans and Priorities

Canada

The Estimates Documents

Each year, the government prepares Estimates in support of its request to Parliament for authority to spend public monies. This request is formalized through the tabling of appropriation bills in Parliament. The Estimates, which are tabled in the House of Commons by the President of the Treasury Board, consist of three parts:

Part I – The Government Expenditure Plan provides an overview of federal spending and summarizes both the relationship of the key elements of the Main Estimates to the Expenditure Plan (as set out in the Budget).

Part II – The Main Estimates directly support the *Appropriation Act*. The Main Estimates identify the spending authorities (votes) and amounts to be included in subsequent appropriation bills. Parliament will be asked to approve these votes to enable the government to proceed with its spending plans. Parts I and II of the Estimates are tabled concurrently on or before 1 March.

Part III – Departmental Expenditure Plans which is divided into two components:

(1) **Reports on Plans and Priorities (RPPs)** are individual expenditure plans for each department and agency (excluding Crown corporations). These reports provide increased levels of detail on a business line basis and contain information on objectives, initiatives and planned results, including links to related resource requirements over a three-year period. The RPPs also provide details on human resource requirements, major capital projects, grants and contributions, and net program costs. They are tabled in Parliament by the President of the Treasury Board on behalf of the ministers who preside over the departments and agencies identified in Schedules I, I.1 and II of the *Financial Administration Act*. These documents are to be tabled on or before 31 March and referred to committees, which then report back to the House of Commons pursuant to Standing Order 81(4).

(2) **Departmental Performance Reports (DPRs)** are individual department and agency accounts of accomplishments achieved against planned performance expectations as set out in respective RPPs. These Performance Reports, which cover the most recently completed fiscal year, are tabled in Parliament in the fall by the President of the Treasury Board on behalf of the ministers who preside over the departments and agencies identified in Schedules I, I.1 and II of the *Financial Administration Act*.

The Estimates, along with the Minister of Finance's Budget, reflect the government's annual budget planning and resource allocation priorities. In combination with the subsequent reporting of financial results in the Public Accounts and of accomplishments achieved in Departmental Performance Reports, this material helps Parliament hold the government to account for the allocation and management of public funds.

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Report on Plans and Priorities

National Research Council Canada

2001-2002
Estimates

Brian Tobin
Minister of Industry

Canada

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Section I: Messages

Minister's Portfolio Message

Our vision of Canada is a country that is strong and dynamic, a leader in the global knowledge-based economy, and a country where all Canadians have the opportunity to benefit from economic and social prosperity.

That is why the government is investing in knowledge and innovation -- fundamental contributors to our quality of life. Through strategic investments in skills development, knowledge creation and new technologies, the government is committed to expanding Canada's knowledge base, innovation and research capacity, and accelerating Canada's leadership in the new economy.

The government's strategy of investing in knowledge and innovation is already helping to create new businesses, products, processes and jobs. The fifteen organizations within the Industry Portfolio contribute to economic growth, which leads to a higher quality of life and social well-being for all Canadians.

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
Canadian Tourism Commission*
Enterprise Cape Breton Corporation*
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 Reports on Plans and Priorities*

With over forty percent of the federal government's science and technology funding and many of the key micro-economic levers at its disposal, the Industry Portfolio is instrumental in promoting innovation through science and technology; helping small- and medium-sized enterprises grow; encouraging trade and investment; and promoting economic growth in Canadian communities.

I am pleased to present the Report on Plans and Priorities for the National Research Council Canada (NRC) which describes for Canadians the expected achievements over the next three years:

- Fostering the growth of Canada's national, regional and community-based science and technology research, innovation and knowledge infrastructure, networks and systems, integrating public and private sector strengths and supporting the growth of the new economy;

- Nurturing the growth of new, sustainable and competitive technology clusters in regions across Canada, to help develop the innovative capacity and socio-economic

potential of Canada's communities;

- Working at the frontiers of scientific and engineering research in core areas of importance to Canada, in partnership with industry, universities and government organizations, to meet national challenges and capitalize on the emerging opportunities of the global economy;

- Working to attract, train and retain the highly skilled science and engineering research and technical talent Canada needs, from both within Canada and around the world;

- Creating new research and technology-based enterprises, transferring and commercializing new technologies, and disseminating new knowledge to industry to foster economic growth, improved competitiveness and wealth creation for Canada;

- Securing access to international research networks and science facilities, building new international research and technology alliances, and enhancing opportunities and access for Canadian firms and technologies to the world stage; and

- Improving the innovative capabilities of Canadian firms through the provision of integrated and coordinated technological and financial assistance, the sharing and dissemination of scientific, technical and other information, knowledge and intelligence, and other relevant resources.

Through organizations like the National Research Council Canada, we will work together to build on the strengths and opportunities that exist throughout Canada.

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The Honourable Brian Tobin

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

These are times of rapid social, economic and technological change. How these changes will impact on our country and our citizens are subjects that the government has been tackling head-on with the collaborative efforts of our partners in academia, the private sector, voluntary groups and other government agencies and organizations.

The fabric of our lives is increasingly woven by advances in science and technology. Our health care, our jobs, our safety, and our culture reflect the profound influences of science and technology. Research goes hand-in-hand with a community's ability to ensure its continued quality of life, economic growth, and sustainable development.

Our standard of living is closely tied to our success in fostering knowledge creation, adaptability and innovation. Canadians enjoy the fruits of a strong and growing economy. But we cannot simply assume that this prosperity will continue forever. Governments, in tandem with their research partners, need to take a broad approach that encompasses a multi-disciplinary perspective which includes the natural sciences and engineering, the health sciences, the social sciences, and the humanities. Decisions taken by governments - and well-founded by sound advice from credible sources - will affect the lives of individual Canadians, the interaction of our communities, and the future of our firms at both the national and international levels.

We must lead the world in selected research and technology sectors and we must create and retain world-class technology entrepreneurs -- people with the know-how and the drive to market our research discoveries. We must build on Canada's image as a technologically advanced, entrepreneurial, creative and innovative nation. We must strengthen our science and technology presence in global markets abroad.

The government's vision of the future is one of a society whose economy is competitive, whose population is healthy, whose children are prepared, and which invests in knowledge and skills.

_____

The Honourable Gilbert Normand

MANAGEMENT REPRESENTATION

Report on Plans and Priorities 2001-2002

I submit, for tabling in Parliament, the 2001-2002 Report on Plans and Priorities (RPP) for the National Research Council Canada.

To the best of my knowledge the information:

- accurately portrays the agency's mandate, priorities, strategies and planned results of the organization,
- is consistent with the disclosure principle contained in the *Guidelines for Preparing a Report on Plans and Priorities,*
- is comprehensive and accurate, and
- is based on sound underlying departmental information and management systems.

I am satisfied as to the quality assurance processes and procedures used in the RPP's production.

The reporting structure, on which this document is based, has been approved by Treasury Board Ministers and is the basis for accountability for the results achieved with the resources and authorities provided.

Name:_____

Date:_____

Section II: NRC Overview

2.1 What's new: Fostering the emergence of innovation-driven technology clusters in Canadian communities

The National Research Council (NRC) is a key federal contributor to the growth of Canada's knowledge-based economy (KBE), its competitiveness in world markets, and its overall quality of life. NRC's goal is not only to develop new knowledge and technologies, but also to help industry transform discoveries into new products and services and move these quickly into the marketplace. Increasingly, NRC is working with communities and regions to apply its infrastructure, knowledge, research, programs and people to help build local technology clusters and, subsequently, increase the competitive advantage of Canadian firms and encourage economic growth.

The two initiatives described immediately below provide concrete examples of the concerted effort by NRC, its federal partners and the communities they serve to develop dynamic, locally based technology clusters across Canada. NRC brings its strengths, in partnership with public and private organizations, to help increase the critical mass of professional, technological, financial, knowledge and related resources to foster the innovation essential for growth and wealth creation. NRC works closely with local business partners and stakeholders in developing and implementing strategies and action plans to bring together firms, educational organizations, economic development agencies and others in the community, thus linking them into national and international networks.

The Atlantic Canada Innovation Initiative

On June 29, 2000, the Prime Minister announced the $700 million *Atlantic Investment Partnership (AIP)* to strengthen the innovation capacity and competitiveness of the Atlantic Region through economic development and investment incentives. The AIP included $110 million for NRC for the expansion of its regional presence and the development of new community-based technology clusters and support activities. Following the announcement, NRC began a series of consultations and community roundtables with Atlantic stakeholders. While these dialogues still continue, agreements are being reached on plans and expected outcomes, as the following paragraphs describe.

NRC has been working closely with the ***Nova Scotia*** life sciences community to help the region become one of the world's top research and development (R&D) centres in this sector. NRC will build on its existing research and partnership strengths in the fields of genomics, biotechnology and medical diagnostics and increase the scientific capacity of its Institute for Marine Biosciences in ***Halifax*** and its Institute for Biodiagnostics located in ***Winnipeg, Manitoba***. New NRC investment on ***Cape Breton Island*** will capitalize on the importance of information technology (IT). Drawing on its research base in information technologies, NRC will establish a nucleus of IT research staff in ***Sydney***.

In ***Newfoundland***, an ocean engineering cluster is emerging around NRC's Institute for Marine Dynamics in ***St. John's***, Memorial University of Newfoundland and a number of

local firms. The mandate of associated NRC laboratories will be expanded to meet the future needs of industry and to provide the research foundation for the cluster to grow to a world-leading capacity. Among other actions, NRC will establish a *Young Entrepreneurs Program* and an industry partnership facility to spin off technologies and attract further investment. In ***Prince Edward Island,*** NRC will expand its presence to help increase the receptor capacity of businesses and strengthen the province's innovation infrastructure. NRC is working, in consultation with the PEI community and the Atlantic Canada Opportunities Agency (ACOA), to develop a bioresources-based technology cluster roadmap. This process will allow NRC and other stakeholders to better define the innovation role they could play to meet PEI's needs and ensure that the province is a strong player in building Canada's KBE.

A new NRC research institute devoted to e-business and information technology will be a key element for a technology cluster in ***New Brunswick***. The institute will have its main base in ***Fredericton*** with satellite laboratories in ***Moncton*** and ***Saint John***. These groups will be linked by a high-speed broadband network and will be tied closely into NRC's national facilities and capabilities.

Aerospace Technology Infrastructure Initiative

Following the February 2000 Budget, NRC received $43.4 million in government support over five years for the development of the *Aerospace Technology Infrastructure Initiative*. This initiative was planned to establish facilities and new research programs in Montreal and Ottawa, associated with NRC's Institute for Aerospace Research. Progress to date is described in the following two paragraphs.

On October 10, 2000, the Prime Minister announced that the *Advanced Aerospace Manufacturing Technology Centre* would be constructed on the campus of the Université de Montréal, ***Montréal, Québec***. The Centre will expand NRC assistance in developing, demonstrating and implementing advanced manufacturing methods that could lower the cost of manufactured aerospace products. The Centre will emphasize the timely and efficient transfer of leading edge technology to small- and medium-sized enterprises (SMEs) to help them become better integrated with Canada's major aerospace manufacturers. Preliminary design for the new Centre is in process. Construction will start in fall 2001 and be completed in early 2003. Development of the research program, recruitment of staff and major equipment purchases are already underway. Until the Centre is completed, research projects will be temporarily housed in facilities operated by NRC and its partners. A major partner is Canada Economic Development for Quebec Regions, which is contributing $25 million to the project.

The other component of this initiative involves the development of the *Gas Turbine Environmental Research Centre* at NRC's research complex in ***Ottawa, Ontario***. The facility will support industry work in developing gas turbines that will operate at high altitudes and low temperatures, in compliance with increasingly stringent environmental and safety requirements. This initiative also will help address the high costs of meeting airworthiness and environmental compliance requirements that affect the ability of Canadian manufacturers to compete in world markets.

2.2 NRC: Unleashing Canada's potential through research, technology and innovation

NRC is an internationally recognized, multi-sectoral and multi-disciplinary federal research performer, technology developer and innovation organization. With an annual appropriation of about $525 million and more than 3000 staff, NRC works locally, nationally and internationally in partnership with Canada's firms, universities, hospitals, provincial research organizations, communities and other government agencies. Its business is focused on scientific research, technology development and transfer, knowledge creation, dissemination and exploitation, and support for innovation. NRC's efforts are aimed at enhancing Canada's quality of life and supporting knowledge-based economic growth and diversification through research, technology, industry support and innovation.

New Vision and Outcomes

For the past five years, NRC's priorities have been guided by a broad Vision. A new *Vision to 2006* (below) is now being developed and shaped by employees and stakeholders as a result of the most extensive consultations ever conducted by NRC.

NRC's Proposed Vision to 2006

Recognized globally for research and innovation, NRC will be a leader in the development of an innovative, knowledge-based economy in Canada through science and technology.

This Vision is founded on five strategic pillars or Key Results Commitments:

Strategic Pillars (Key Results Commitments)	Intended Outcomes by 2006
▪ **Outstanding people**, forefront research, infrastructure and programs whose hallmark is excellence and creativity.	NRC will be regarded by staff and their peers as a major innovator in research and human resources management.
▪ **Leadership in research and development**, integrating public and private strengths to create opportunities and meet national challenges for Canada.	NRC will assume a leadership position in at least three new vital domains of scientific and engineering research needed for Canada to meet national challenges and capitalize on the opportunities of a global knowledge economy.
▪ **Fostering technology clusters** that develop the innovative capacity and socio-economic potential of Canada's communities.	NRC will contribute to the development of new, sustainable and competitive innovation clusters in at least ten Canadian communities.
▪ **Creating value** for Canada through new technology-based enterprises, technology transfer and knowledge dissemination to industry.	NRC will be recognized by its partners as Canada's leading developer of new research and technology-based enterprises and respected for its innovative S&T commercialization practices.
▪ **Securing access to global research networks and science facilities**, and enhancing international opportunities for Canadian firms and technologies.	NRC will be recognized by its stakeholders for its contributions to a more effective Canadian innovation system that assures access to international facilities and research networks, provides opportunities for Canadian firms, and builds new research and technology alliances.

Throughout the first half of 2001, consultations will continue both internally and externally. A final version of *Vision to 2006* will be presented for the approval of the Governing Council of NRC in June 2001. Composed of leaders from Canadian industry and the university and government sectors, the Governing Council provides strategic direction for NRC, makes decisions on major policy and resource allocation matters, and assesses all NRC activities and proposed initiatives.

To realize its new *Vision to 2006*, NRC will develop new strategic directions, goals, outcomes and related performance indicators. As well, during 2001-2002, NRC will seek approval of a new Planning, Reporting and Accountability Structure (PRAS) from Treasury Board Ministers.

From Discovery to Innovation

From several perspectives, NRC is a unique and valuable science and technology (S&T) asset for Canada and in the world.

1. ***NRC spans the innovation spectrum from research to technology commercialization.*** NRC has achieved national and international recognition for its research performance, knowledge creation, technology development and commercialization, and support of national and local innovation capacity. Furthermore, it provides critical access for Canada's scientists and businesses to NRC's national facilities, as well as to the best research, scientific, technical and medical information and knowledge available in the world.

2. ***NRC is a national organization with regional and community presence.*** It is a keystone within Canada's innovation system providing national scientific and engineering infrastructure, research, and knowledge to Canada's public and private sectors. Its strength lies in the breadth of its connections with other innovators and its ability to mobilize those capabilities in response to national and regional goals. In all, NRC is physically present in over 90 communities across Canada via its network of 17 research institutes, 3 technology centres, 260 Industrial Technology Advisors, and 1,000 Canadian Technology Network members.

3. ***NRC is a strategically focused, integrated and agile knowledge organization*** that works to leverage the value of its investments in people, infrastructure and knowledge. NRC is a unique organization by virtue of its combination of research and development (R&D) infrastructure and performance, standards activities, scientific information services, technical and technology transfer programs and innovation activities. Over the course of its history, NRC has continually adapted its R&D portfolio and support services to meet the evolving needs of its industrial and public sector clients and partners. During the past five years, NRC has moved decisively into emerging, strategically important fields such as genomics, fuel cells, nanotechnology, bioinformatics, and urban infrastructure codes, as well as creating innovative new programs for the recruitment and training of highly qualified people, youth training and pre-commercialization assistance to SMEs.

2.3 NRC provides value for Canadians

NRC helps build Canada's system of innovation and innovation capacity in a number of ways. These include supporting the development of new networks of R&D performers, promoting multi-disciplinary approaches to scientific and technical challenges, and facilitating the exploitation of knowledge, know-how and technologies by Canadian companies through a variety of vehicles to speed up the commercialization of new technologies and improve the competitiveness of Canadian industry. At the level of broad medium- and long-term benefits for Canadians, NRC aims to provide leadership in three major domains:

Enhancing Canadian Research and Development Performance

NRC will play a key role in helping Canada to become one of the top five countries in the world in research performance, and in using this capability to develop the knowledge foundation for the industries of tomorrow.

Context: Currently, Canada is in the second tier of R&D performers internationally, with a Gross Expenditures on Research and Development (GERD) to Gross Domestic Product (GDP) investment ratio of 1.6%. To reach the top five in the world will imply a significant growth in both R&D investment and performance by the public and private sectors. As one of the top research performers in Canada, NRC will use its capabilities and work proactively with other federal agencies, academia and industry to improve national performance.

Strengthening Canada's Innovation System

NRC will be recognized by its stakeholders for national leadership in moving Canada into a prominent place in the global knowledge economy. NRC will work with industry, academia and governments to improve the effectiveness of the Canadian innovation systems by fostering networks and technology clusters.

Context: The emergence of a global knowledge economy has created many new pressures and opportunities for national research organizations. Not only has NRC worked more closely with others, it has also demonstrated leadership in creating essential

national and international innovation infrastructure, networks, and systems and in pursuing strategic initiatives in domains that anticipate Canada's future needs for knowledge-based industries. NRC will use its unique position in the nation's innovation system to enhance the generation, diffusion and commercialization of its knowledge and exert new efforts to increase the impacts of its research and innovation activities for Canadians.

Providing Value for Canada

NRC will contribute significant innovations that support Canada's quality of life, improve the environment, enhance the quality of health, and create new sources of wealth for Canadians.

Context: NRC continually develops new solutions and technologies that help Canada adapt to and compete in the global economy. Increasingly, this includes contributions such as the development of cleaner production processes, new medical treatments, and improved health management practices and technologies. These advances support the quality of life for Canadians through improved health, better environmental stewardship, and new jobs and opportunities for the highly qualified personnel Canada needs. Furthermore, they also create substantial economic growth opportunities as NRC's partners successfully exploit its new techniques, knowledge and technologies to create innovative products and services for domestic and international markets.

2.4 Planning Context: A national challenge for the future

National and International Context

As we enter the new century, the remarkable pace of technological change and the generation of new knowledge witnessed in the last decade will only continue to accelerate. The introduction of new technologies is giving rise to new fields of endeavour and reshaping our traditional industrial base. We are on the threshold of exciting new developments in technologies such as genomics, information technologies, photonics, biotechnology, alternative clean energy sources such as fuel cells, new materials and nanotechnology that cut across disciplines and industries. Intellectual capital and innovation will be key to the success of the next generation of wealth creators. Addressing key societal issues such as quality of life, sustainable development, and training people to meet evolving workplace demands will also depend on human ingenuity and the best use of new knowledge.

Canada is not alone in facing these and other challenges. Many countries are also looking to improve national performance in areas such as R&D and innovation. To reach its potential as a knowledge-based economy, Canada must take stock of its current performance and identify those areas requiring greater effort. The following studies and figures point to several areas where Canada has the potential for improving its overall R&D and innovation performance.

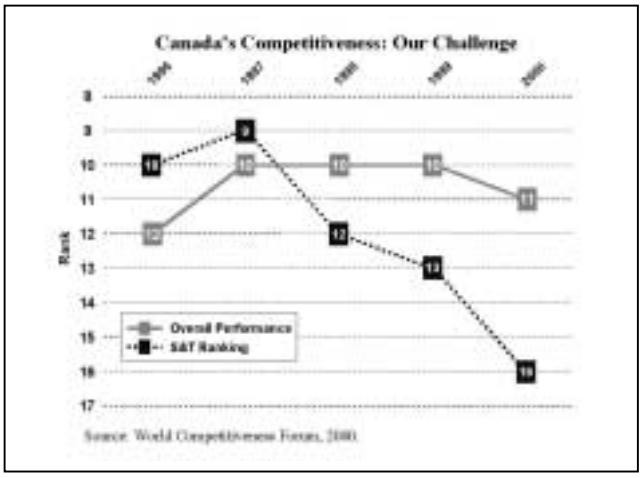
- In its 2nd Annual Innovation Report, "Collaborating for Innovation", the Conference Board of Canada notes that Canada's innovation gap has been increasing in most areas.

Comparative Performance in Technology Innovation		
Indicator	**Canada's world ranking**	**20 year trend**
R&D Intensity	9	↘
Business R&D as share of industry sales	8	→
Government spending in R&D as % of GDP	10	↘
Researchers per 1,000 of labour force	8	↗
National patent applications	8	↘
External patent applications	8	↘
Technology balance of payments	5	↗

Source: Conference Board of Canada, 2000

- According to the World Competitiveness Forum, Canada's S&T ranking has dropped from 12th to 16th in the world over the past five years.

- Canada's GERD/GDP has remained relatively static at less than 1.6% for the last decade.



Federal Context

In its vision for the future of Canada, the Government has stated that it plans to ensure that Canada will be a smart country in the future, one in which knowledge, innovation, and research capacity will expand considerably. In the January 2001 *Speech from the Throne*, the Government committed to at least doubling current federal expenditures in research and development, and helping move Canada to become one of the top five countries for R&D performance by 2010. "In making the new investments, the Government will:

- Continue to pursue excellence in Canadian research by strengthening the research capacity of Canadian universities and government laboratories and institutions;
- Accelerate Canada's ability to commercialize research discoveries, turning them into new products and services; and
- Pursue a global strategy for Canadian science and technology, supporting more collaborative international research at the frontiers of knowledge."

The Government clearly recognizes that increased investment in both basic and applied R&D is needed. Basic research creates ideas and pushes forward the frontiers of knowledge. Applied research transforms this knowledge into new products, services and technology. NRC, with its national R&D infrastructure and capabilities, is well positioned to lead in improving Canada's R&D performance, building essential networks of researchers and entrepreneurs, providing the training ground for the next generation of highly skilled workers, and translating new knowledge into economic and social benefits for Canadians.

NRC can play a strong role in helping the government attain its goal not only through its own research and innovation investments and activities, but also through intensifying the leveraged impact of its joint R&D projects and extensive national and international networks. NRC works with numerous private and public partners, locally, nationally and internationally, creating essential knowledge and commercialization networks. These partners also contribute their resources - financial, staff, knowledge, strategic intelligence, etc. - to joint endeavours and collaborations, which enhance the size, quality and impact of the projects to achieve results that could not be realized alone.

NRC has established a strong track record in forming alliances with business and other organizations. In 1999-2000, NRC implemented 352 new formal agreements, for a total of 614 active collaborations over that period. An additional 577 formal collaborations were maintained with national organizations and 298 with international bodies. The value of the collaborative agreements NRC signed was over $91 million, with cash contributions from partners totalling more than $35 million. The in-kind contributions of partners totalled almost $33 million.

Operating Context

Wind tunnels. National metrology facilities. Plant DNA sequencing facility. Marine dynamics test facility. Gas turbine engine test cells. Astronomical observatories and data systems. Canadian Centre for Housing Technology. Industry partnership and incubator facilities. Large-scale protein purification facility. These are some of the unique national facilities for scientific and engineering research that NRC manages as part of Canada's system of innovation. However, NRC is facing challenges in keeping its facilities and equipment up-to-date to so that it can continue to support Canadian industry in becoming more technology intensive and innovation driven,

NRC's staff and specialized research equipment are located in 200 laboratories, test facilities and offices across Canada. Many buildings were constructed 30 to 40 years ago, and now require considerable upgrades to maintain the government's infrastructure investment, currently valued at about $800 million. Reinvestment is also needed to maintain many large pieces of research and related equipment. NRC must consider how it will provide the necessary infrastructure and equipment to meet emerging opportunities and requirements. Industries in the KBE face considerable competitive pressures by new and increasingly sophisticated technologies produced within ever-shorter cycles. NRC faces similar challenges in maintaining its standing as a premier research organization. To keep up with international developments in science and technology, constant upgrades

are necessary. NRC is now preparing its Long Term Capital Plan and will identify priorities for action.

Two additional factors are causing budgetary pressures for NRC: rising utility and fuel costs and downward fluctuations of the value of the Canadian dollar against the US dollar. With such a large physical asset portfolio to manage, NRC faces budgetary pressures when utility and fuel rates increase. The second factor can impact NRC's ability to undertake international R&D collaborations and projects that are essential to opening global markets to Canadian industries and firms. Furthermore, NRC purchases much of its scientific and technical equipment and journals in US dollars. Consequently, changes in the value of the Canadian dollar affect NRC's operating expenditures.

Excellence in research and innovation at NRC depends heavily on its ability to attract, train and retain highly qualified scientists, engineers, technologists and other professionals. While NRC continues its efforts to offer the kind of working environment that attracts and keeps top quality staff, it is facing stiff competition from the business and university sectors for the most talented knowledge workers. Since its people are at the core of NRC's successes, it will strive to ensure that it continues to be a magnet for the most talented and imaginative workers.

2.5 Financial Spending Plan

($ millions)	Forecast Spending 2000-2001 *	**Planned Spending 2001-2002**	Planned Spending 2002-2003	Planned Spending 2003-2004
Budgetary Main Estimates (gross)	525.3	**577.1**	573.6	565.7
Non-Budgetary Main Estimates (gross)	0.0	**0.0**	0.0	0.0
Less: Respendable revenue	0.0	**0.0**	0.0	0.0
Total Main Estimates	525.3	**577.1**	573.6	565.7
Adjustments **	71.4	**9.9**	18.0	17.0
Net Planned Spending	596.7	**587.0**	591.6	582.7
Less: Spending of Revenues Pursuant to section 5(1)(e) of the NRC Act	67.7	**56.6**	61.6	68.3
Plus: Cost of services received without charge	13.3	**13.7**	13.1	13.1
Net Cost of the Program	542.3	**544.1**	543.1	527.5

Full Time Equivalents	3,063	**3,127**	3,127	3,127

Note:
Due to rounding, figures may not add to total shown.
* Reflects best forecast of total planned spending to the end of the fiscal year.
** Adjustments are to accommodate approvals obtained since the Main Estimates and are to include Budget initiatives, Supplementary Estimates, etc.

2.6 NRC's Mandate, Roles and Responsibilities

NRC is a federal government departmental corporation operating under the *National Research Council Act* and the *Weights and Measures Act.*

The *National Research Council Act* directs NRC "...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 standardization and certification of scientific and technical apparatus and instruments and materials used or usable by Canadian industries."

Under the 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 (R&D) activities include providing grants and contributions used to support a number of international activities.

Weights and Measures 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".*

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

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 (STM) and related information and expertise. CISTI is Canada's major STM information resource and publisher and stands third in world ranking.

Official Languages: NRC respects the spirit of the *Official Languages Act* and has accordingly instituted many internal activities to promote the use of both official languages.

NRC's Business Lines

NRC's plans and priorities are developed through three business lines:

Business Line I – Research and Technology Innovation

The Vice-President, Research, and the Vice-President, Technology and Industry Support, co-manage this business line. Details follow on the next page.

Research and Technology Innovation Business Line details:

- **Biotechnology** - Biotechnology Research Institute, Institute for Biodiagnostics, Institute for Biological Sciences, Institute for Marine Biosciences and Plant Biotechnology Institute
- **Information and Communications Technologies** - Institute for Microstructural Sciences and Institute for Information Technology
- **Manufacturing Technologies** - Industrial Materials Institute, Institute for Chemical Process and Environmental Technology, Integrated Manufacturing Technologies Institute and Innovation Centre
- **Aerospace Technologies** - Institute for Aerospace Research
- **Ocean Engineering and Marine Industries** - Institute for Marine Dynamics
- **Astronomy and Astrophysics** - Herzberg Institute of Astrophysics
- **Construction** - Institute for Research in Construction
- **Molecular Sciences** - Steacie Institute for Molecular Sciences
- **Measurement Standards** - Institute for National Measurement Standards

Business Line II – Support for Innovation and the National Science and Technology Infrastructure

The Vice-President, Technology and Industry Support, is the responsible manager.

Support for Innovation and the National Science and Technology Infrastructure Business Line details:

- **Scientific, Technical and Medical Information** - Canada Institute for Scientific and Technical Information
- **Innovation Assistance to SMEs** - Industrial Research Assistance Program
- **Engineering and Technology** - Canadian Hydraulics Centre, Centre for Surface Transportation Technology and Thermal Technology Centre

Business Line III – Program Management

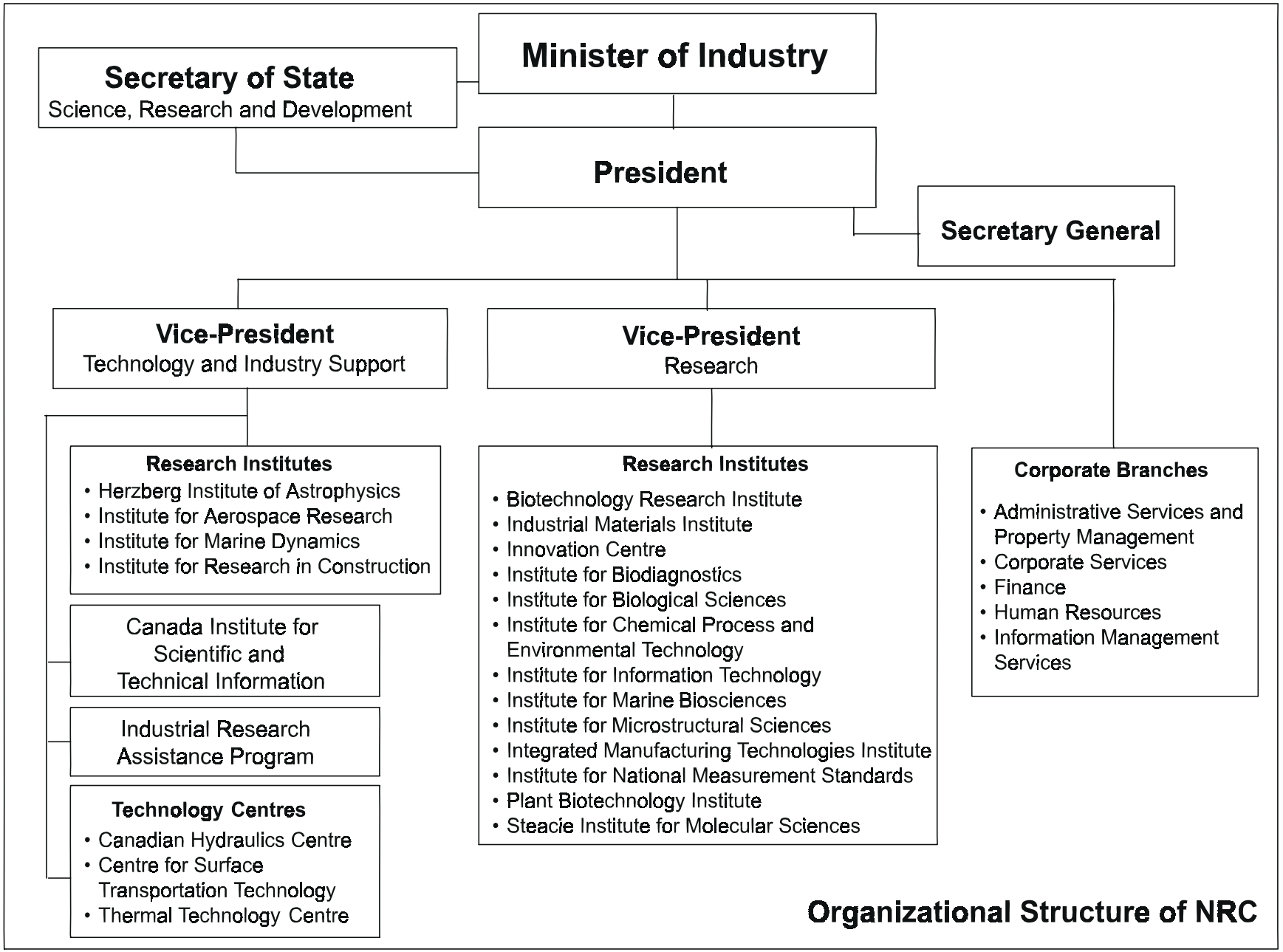
The President, NRC, manages this business line.

Program Management Business Line details:

- **Administrative Services and Property Management**
- **Corporate Services**
- **Finance Branch**
- **Human Resources Branch**
- **Information Management Services Branch**

NRC's Organization

NRC’s functional reporting relationships are outlined in the organizational chart which follows.



Organizational Structure of NRC

NRC is a dynamic partner within the federal government's Industry Portfolio

As a Schedule 2 organization, NRC reports directly to the Parliament of Canada through the Minister of Industry and is one of fifteen departments and agencies that make up the Industry Portfolio. Together these organizations are uniquely positioned to further the government's agenda in building a KBE in all regions of Canada, thereby promoting economic growth and job creation.

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
Canadian Tourism Commission
Enterprise Cape Breton Corporation
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

NRC works in partnership with the members of the Industry Portfolio to leverage complementary resources and exploit synergies in a number of specific areas:

- *Innovation through S&T* - helping firms to use and exploit knowledge and technology to competitive advantage;
- *Growth of SMEs* - providing technical assistance, information services and facilities;
- *Economic growth of Canadian communities* - fostering community economic development through technology clustering;
- *Knowledge workers* - attracting, developing and retaining highly qualified personnel to meet the workplace needs of today and tomorrow; and
- *Trade* - helping firms to develop world class technology for emerging niche markets and meet the technical standards being set by various importing nations for products and technologies.

Examples of the various ways in which NRC collaborates with its Portfolio partners follow. In the fall of 2000, the Montréal Centre of Excellence in Environmental Site Remediation went into full operation. Initiated by NRC's Biotechnology Research Institute in collaboration with Canada Economic Development for Québec Regions, Environment Canada and the City of Montréal, the Centre is helping solve the problems of contaminated urban sites, or brownfields, by developing effective bioremediation methods. Since summer 2000, NRC has been working with Atlantic Canada Opportunities Agency in implementing its technology clusters initiatives under the auspices of the *Atlantic Investment Partnership* (see "What's New, pages 5-6). NRC has also been working in close partnership with Western Economic Diversification Canada in endeavours such as helping to advance the *Saskatchewan Blueprint for Innovation* and the *Western Medical Technologies Strategy*.

Since 1998, under the leadership of Industry Canada and jointly with Technology Partnerships Canada and the Business Development Bank of Canada, NRC's Industrial Research Assistance Program has been delivering a five-year $30 million/year program providing repayable financial assistance to Canadian SMEs for technology projects at the pre-commercialization stage. Also in 1998, NRC and the Natural Sciences and Engineering Research Council (NSERC) co-commissioned a panel of eminent scientific advisors to develop a consensus view about a long range program (over 10-15 years) for Canadian astronomy and astrophysics. Two final examples of NRC's portfolio partnerships include the NSERC/NRC Research Partnership Program and the Innovation Network established with NSERC and the Social Sciences and Humanities Research Council.

Section III: Plans, Results, Activities and Resources

Business Line I – Research and Technology Innovation

3.1 Business Line Details

Business Line details:

- **Biotechnology** - Biotechnology Research Institute, Institute for Biodiagnostics, Institute for Biological Sciences, Institute for Marine Biosciences and Plant Biotechnology Institute
- **Information and Communications Technologies** - Institute for Microstructural Sciences and Institute for Information Technology
- **Manufacturing Technologies** - Industrial Materials Institute, Institute for Chemical Process and Environmental Technology, Integrated Manufacturing Technologies Institute and Innovation Centre
- **Aerospace Technologies** - Institute for Aerospace Research
- **Ocean Engineering and Marine Industries** - Institute for Marine Dynamics
- **Astronomy and Astrophysics** - Herzberg Institute of Astrophysics
- **Construction** - Institute for Research in Construction
- **Molecular Sciences** - Steacie Institute for Molecular Sciences
- **Measurement Standards** - Institute for National Measurement Standards

Objective: To achieve sustained knowledge-based economic growth and social benefits in Canada through research, development and the application of technology and innovation.

Description: The ***Research and Technology Innovation*** business line includes NRC's research programs, technology development initiatives, and the management of national facilities in science and engineering. It also includes research and technology collaborations with firms, universities and other public institutions. Efforts focus on strategic technological and industrial areas of Canada's economy where NRC has both present and future competencies and where it will have an impact on business competitiveness and growth. A description of the mandate and responsibilities of each institute listed above is included in *Section VI, Other Information.*

3.2 Net Planned Spending and Full Time Equivalents

($ millions)	Forecast Spending 2000-2001	**Planned Spending 2001-2002**	Planned Spending 2002-2003	Planned Spending 2003-2004
Net Business Line Spending:	360.0	**367.3**	360.0	347.2
Full Time Equivalents	2,135	**2,180**	2,180	2,180

3.3 Key Results Commitments, Planned Results, Related Activities and Resources

KEY RESULTS COMMITMENT #1

Outstanding people, forefront research, infrastructure and programs whose hallmark is excellence and creativity.

Planned Result: NRC will be regarded by staff and their peers as a major innovator in research and human resource management.

Related Activities:

Over the next three years, the *Research and Technology Innovation* Business Line will fully implement NRC's new Employment Philosophy aimed at attracting and retaining the best employees in Canada (refer to page 37 for more details). The Employment Philosophy will also sustain NRC's performance and success by maintaining a challenging environment and making NRC an "employer of choice". The key strategies and actions to be undertaken will be:

- The recruitment of new research and technical talent from universities and community colleges in Canada and internationally;
- Increased emphasis on industry and university exchanges and secondments in key areas of opportunity for Canadian research; and
- Targeted implementation of the Leadership Management Development Program to equip researchers for research management responsibilities.

KEY RESULTS COMMITMENT #2

Leadership in research and development, integrating public and private strengths to create opportunities and meet national challenges for Canada.

Planned Result: NRC will assume a leadership position in at least three new vital domains of scientific and engineering research needed for Canada to meet national challenges and capitalize on the opportunities of a global knowledge economy.

Related Activities:

During the planning period, the *Research and Technology Innovation* Business Line will continue to identify strategic research and technology fields that offer the most promising opportunities for exploitation and subsequently develop the necessary capabilities that will help Canada become a strong and competitive technology player in the KBE.

Genomics and Biotechnology: In collaboration with government, academic and industrial partners, NRC continues to expand its Genomics and Health-Related Research program launched in 1999-2000 in agriculture, pathogenesis, age-related human diseases

and health diagnosis development. By building on the established regional innovation clusters around its five biotechnology institutes, NRC fosters a Canada-wide genomics network supported by an infrastructure that offers high-capacity DNA sequencing, bioinformatics, proteomics, and DNA microarray technology. NRC's activities will be coordinated with the activities of the recently created Genome Canada. NRC will collaborate actively with Genome Canada to enhance the impact of genomics on research and Canada's new bioeconomy.

In related activities over the coming year, NRC will facilitate an interdepartmental consultation on technology forecasting and competitive intelligence in biotechnology under the auspices of the Canadian Biotechnology Strategy (CBS). This initiative is intended to support the CBS in all its key objectives by providing critical intelligence information that will allow strategic decision making for economic growth, stewardship and citizen engagement.

Canadian Bioinformatics Resource (CBR): CBR is a national network of nodes that provides access to bioinformatics tools to universities and research organizations across Canada. During the planning period, NRC will continue to build on the success of CBR by establishing a close relationship with Genome Canada centres, developing a method enabling SMEs to access CBR more directly, further developing the training component and expanding the CBR's infrastructure.

Information and Communications Technology: Given the breadth and pervasiveness of information technology in the Canadian economy, NRC's Institute for Information Technology will focus its activities in selected niche areas for the future: knowledge management, e-commerce, network "middleware" and high-performance computing (HPC). NRC will continue to support the coordination of HPC efforts across Canada, in particular, the operation of C3.ca Association's Coordination Office within the Institute for Information Technology. In support of research and innovation, C3.ca is linking HPC players from universities, colleges, industry and government, sharing resources, people, tools and information over advanced networks.

As for the Institute for Microstructural Sciences (IMS), optical and wireless-networking, photonics, and molecular and nano electronics will be the focus of its R&D efforts with industry and universities in the coming years. In particular, IMS research will concentrate on the next generation components required for the infrastructure that will provide seamless communication services with new high performance materials.

Marine & Ocean Technology Roadmap: The Institute for Marine Dynamics in St. John's, Newfoundland, which is playing a leading role in the formation of a national Ocean Engineering Industry Cluster, has initiated a technology roadmap on marine and ocean technology in support of NRC's *Atlantic Canada Innovation Initiative* (see **Atlantic Canada**, page 25). Undertaken in cooperation with Industry Canada and Canada's ocean engineering industry sector, this roadmap will identify:

- future market needs;

- potential technology areas and individual technologies ready for development and commercialization;
- a new research agenda for the ocean engineering industry sector; and
- potential markets and how to develop these.

Manufacturing Technologies Group's Impact Strategy Implementation: Building upon in-depth consultations with industry, research and government partners, the Manufacturing Technologies Group (MTG) completed its *Impact Strategy* for 2000-2005 last year. The Strategy will support competitiveness of the Canadian manufacturing sector through the following actions:

- Advancing key technologies for Canadian manufacturing:
  - Virtual Manufacturing Initiative; and
  - Nanotechnology for Manufacturing Initiative.
- Enhancing business and innovation systems:
  - a national manufacturing innovation forum; and
  - an e-business and innovation infrastructure.

Over the planning period, the MTG will develop and implement these strategic actions. The key priority for the MTG during 2001 will be to participate in the development of a Canadian nanotechnology initiative. The MTG will also work to establish an e-business and innovation infrastructure for the Group and its stakeholders. It will expand its partnerships with groups in the manufacturing sector and subsequently launch the new manufacturing innovation forum. MTG will also work to ensure the completion of the *National Fuel Cell Initiative* and to collaborate with Fuel Cells Canada and the Natural Sciences and Engineering Research Council (NSERC) in building fuel cell capacity.

Canadian Light Source (CLS): As part of its commitment to provide Canadians with leading-edge research facilities, NRC is involved in developing the synchrotron facility in Saskatchewan. CLS will be completed by the end of 2003. NRC's researchers from five institutes in manufacturing, biotechnology and molecular sciences will be heavily involved in the beamline programs. NRC will contribute $4 million over two years towards the capital cost of construction and is committed to annual contributions of $2 million during the operating phase (starting in 2004).

Emerging Multi-Disciplinary Areas of Research - Nanotechnology and High Performance Computing: In consultation with government, university and industry partners, NRC is already planning for the next generation of research endeavours. New areas include molecular electronics, nanotechnology, photonics, the multi-faceted bio-industry and intelligent buildings and structures. In the coming year, many researchers, including those in fundamental molecular science, will use NRC's new high performance computing infrastructure. For example, this convergence among high performance computing, molecular and materials science, and visualization technologies will enable researchers to develop predictive models for materials properties based on the molecular composition.

KEY RESULTS COMMITMENT #3

Fostering technology clusters that develop the innovative capacity and socio-economic potential of Canada's communities.

Planned Result: NRC will contribute to the development of new, sustainable and competitive innovation clusters in at least ten Canadian communities.

Related Activities:

Atlantic Canada: NRC's *Atlantic Canada Innovation Initiative* is described in Section 2.1, *What's New*, pages 5-6. The following summarizes NRC's planned activities in the Atlantic Region. NRC will lead in the growth of new technology-based clusters in Halifax (life sciences, medical diagnostics), New Brunswick (e-business and information technology), Newfoundland (marine and oceans technologies), Cape Breton (information technologies) and Prince Edward Island (life sciences innovation infrastructure). Over the next three years, NRC will work closely with key stakeholders in these communities to capitalize on the strengths and opportunities identified in the regional roundtables held during 2000-2001. Expansion of NRC's Atlantic presence will require the staffing of over 100 new research positions during the planning period.

Aerospace: NRC's *Aerospace Technology Infrastructure Initiative* is described in Section 2.1, *What's New*, page 6. Two facilities are under development. The Institute for Aerospace Research will build a new ***Aerospace Manufacturing Technology Centre*** in Montréal which will benefit the many SMEs in the supply chain, helping boost the production of Canadian aircraft parts and components. The Centre will create about 50 highly skilled research jobs, as well as provide training and employment for 20-30 young scientists every year. The Centre will also foster multi-partner projects with universities, governments and companies of the Canadian aerospace community. The ***Gas Turbine Environmental Research Centre*** to be upgraded at NRC's research complex in Ottawa will support industry work in developing gas turbines for operation at high altitudes and low temperatures. This will enable the industry to meet airworthiness and environmental compliance requirements.

KEY RESULTS COMMITMENT #4

Creating value for Canada through new technology-based enterprises, technology transfer and knowledge dissemination to industry.

Planned Result: NRC will be recognized by its partners as Canada's leading developer of new research and technology-based enterprises and respected for its innovative S&T commercialization practices.

Related Activities:

Industry Partnership Facilities: NRC has major industry partnership facilities (IPFs) in Ottawa and Montréal, a smaller facility at the Institute for Biodiagnostics in Winnipeg, and one under construction in Saskatoon. IPFs are a key element in building regional technology clusters. They provide specialized facilities and services, such as business consulting assistance, to aid the early-stage growth of technology-based companies. They allow start-up companies access to NRC researchers and facilities – key factors in promoting commercial success. In support of NRC's *Atlantic Canada Innovation Initiative,* IPFs will be constructed at the Institute for Marine Biosciences in Halifax, Nova Scotia, and at the Institute for Marine Dynamics in St. John's, Newfoundland.

Creating New Businesses: NRC will continue to generate or assist in the creation of new companies. In 1999-2000, NRC helped form 21 new businesses, seven of which were founded entirely by NRC researchers who became private sector entrepreneurs in order to commercialize their work. NRC encourages and supports its staff in setting up companies to commercialize discoveries and technologies. As well, NRC continues to explore innovative approaches to transfer discoveries and technologies to Canadian firms.

Construction and Municipal Infrastructure: The Institute for Research in Construction will pursue its role as the national centre for innovation in construction, providing unique and critical technology expertise and facilitating technology transfer in building envelope and structure, fire risk management, indoor environment and urban infrastructure. A new *National Guide to Sustainable Municipal Infrastructure* will be developed in partnership with the Federation of Canadian Municipalities. The Guide will help municipal officials manage their physical infrastructure better by providing them with decision making and investment planning tools. It will address new construction, maintenance and rehabilitation of infrastructural systems, such as water distribution and wastewater collection, roads and sidewalks, bridges and overpasses, and other physical systems.

Technology Networking - Special Interest Groups: Over the years, NRC has looked for ways to improve and broaden knowledge dissemination and technology transfer to industry. One vehicle is NRC's Special Interest Groups. These address specific research and technology issues of importance for over 115 Canadian manufacturing companies. Building on this successful experience, three new Special Interest Groups will be launched in 2001-2002 in the manufacturing sector: virtual manufacturing; precision and freeform fabrication; and product data exchange. NRC institutes are also considering adopting the Special Interest Group model to perform pre-competitive research and promote the early adoption of new technologies, in the e-business and environmental sectors.

Technology Licensing and collaborative research with industry, academia and government have been core activities for NRC in creating and disseminating R&D outcomes with commercial value. Over the past five years, the number of NRC's industrial research partners has more than doubled. The resulting licensing activities have expanded in both numbers and value. With the implementation of NRC's strategies

in research programming and community-based technology clusters, the scope and impact of NRC's licensing activities is expected to more than double within three years.

KEY RESULTS COMMITMENT #5

Securing access to global research networks and science facilities, and enhancing international opportunities for Canadian firms and technologies.

***Planned Result**:* NRC will be recognized by its stakeholders for its contributions to a more effective Canadian innovation system that assures access to international facilities and research networks, provides opportunities for Canadian firms and builds new research and technology alliances.

Related Activities:

Reducing Technical Barriers to Trade: As Canada's national metrology institute (NMI), NRC's Institute for National Measurement Standards (INMS) is the lead agency for the development and implementation of major international metrology cooperations aimed at reducing technical barriers to trade. Many of these cooperative efforts have been established to support trade-related treaties such as NAFTA, APEC and the forthcoming Free Trade Area of the Americas (FTAA). The Mutual Recognition Arrangement (MRA) signed recently by the NMIs of 38 industrialized nations, including Canada, provides an even stronger basis for achieving internationally recognized equivalence of national measurement standards and procedures.

Meeting international technical standards is key to the competitiveness of Canadian companies. Over the next three to five years, Canada will need to be highly active in this arena to ensure that its measurement standards and calibration and accreditation procedures are accepted without question among all the signatory nations. This will ensure that Canadian companies have full access to international markets and the opportunity to sell their products around the world.

The 1999 external assessment of INMS highlighted not only the crucial importance of the institute's role in reducing technical barriers to trade, but also noted the critical need for increased funding for these activities. The assessment panel noted that INMS, as a national metrology institute, has the lowest per capita funding of any industrialized country, receiving only about 20% to 60% of what other countries invest. During the planning period, INMS will be completing a comprehensive strategic planning exercise that will lay the groundwork for developing a national agenda in metrology and measurement standards.

Astronomy: The Herzberg Institute of Astrophysics will continue to play a lead role in providing Canadians with access to and participation in major international astronomical research facilities and programs, as well as maintain Canada among the first three leading nations in this research area. The Herzberg Institute has been leading Canadian research efforts for over 20 years using major international facilities such as the Canada-France-

Hawaii Telescope and, more recently, the James Clerk Maxwell Telescope, the Canadian Galactic Plane Survey and the Wide Field Infrared Camera. The Institute is also managing Canada's contribution to and involvement in the twin Gemini telescopes in Hawaii and Chile.

The astronomy community, led by the Canadian Astronomical Society and with assistance from NRC, has developed a strong consensus on Canada's ***Long Range Plan for Astronomy*** and is currently championing implementation of the Plan. Implementation would enable Canada to participate in major new international programs, such as the Atacama Large Millimeter Array, the Square Kilometer Array, the Very Large Optical Telescope and the Next Generation Space Telescope. Because of the costs involved, no single country can afford to build these facilities on its own.

Building Products: The Institute for Research in Construction will enhance international promotion of Canada's regulatory and conformity assessment system of building products and systems. This provides Canadian technology with technical credibility and facilitates export of Canadian building products. The Canadian Centre for Housing Technology in Ottawa will host foreign delegations, providing significant exposure to potential export markets.

TRIUMF: TRIUMF is Canada's national laboratory for fundamental research in particle and nuclear physics. It represents Canada's contribution to the worldwide network of subatomic physics facilities. Over 200 scientists from across Canada and other countries use the facility each year. TRIUMF is managed as a joint venture by a consortium of universities. The operation of the facility depends on a Government of Canada contribution administered by NRC. As a result of a recent positive external peer review, the government made an increased funding commitment of $200 million over the next five years (2000-2005). NRC is currently preparing a results based accountability framework for TRIUMF.

Business Line II – Support for Innovation and the National Science and Technology Infrastructure

3.4 Business Line Details

Business Line details:

- **Scientific, Technical and Medical Information** - Canada Institute for Scientific and Technical Information
- **Innovation Assistance to SMEs** - Industrial Research Assistance Program
- **Engineering and Technology -** Canadian Hydraulics Centre, Centre for Surface Transportation Technology and Thermal Technology Centre

Objectives:

(1) 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
(2) To stimulate wealth creation for Canada through technological assistance, information and access to other relevant resources.

Description: The ***Support for Innovation and the National Science and Technology Infrastructure*** business line reinforces NRC's role as a major R&D participant within the larger Canadian science and technology infrastructure. The business line encompasses the dissemination of scientific, technical and medical (STM) information and the provision of innovation assistance to Canadian small- and medium-sized enterprises (SMEs). NRC also maintains key engineering and technology-based facilities to support specific industrial sectors of the economy. A description of NRC's support for innovation programs and engineering and technology facilities is included in *Section VI, Other Information.*

3.5 Net Planned Spending and Full Time Equivalents

($ millions)	Forecast Spending 2000-2001	**Planned Spending 2001-2002**	Planned Spending 2002-2003	Planned Spending 2003-2004
Net Business Line Spending:	168.8	**155.2**	168.1	170.0
Full Time Equivalents	385	**393**	393	393

3.6 Key Results Commitments, Planned Results, Related Activities and Resources

KEY RESULTS COMMITMENT #1

Outstanding people, forefront research, infrastructure and programs whose hallmark is excellence and creativity.

***Planned Result**:* NRC will be regarded by staff and their peers as a major innovator in research and human resource management.

Related Activities:

Over the next three years, the *Support for Innovation and National Science and Technology Infrastructure* Business Line will fully implement NRC's new Employment Philosophy aimed at attracting and retaining the best employees in Canada (refer to page 37 for more details). The Business Line plans to develop a productive, satisfied workforce and enhance the use of network partners and other resources for complementary expertise and services for the benefit of clients. The Canada Institute for Scientific and Technical Information (CISTI) will implement a new leadership program, an employee development assignment plan, and investigate implementing a new program for students interested in a career in scientific publishing. The Industrial Research Assistance Program (IRAP) will foster an entrepreneurial and learning organization with a new human resource management strategy.

KEY RESULTS COMMITMENT #2

Leadership in research and development, integrating public and private strengths to create opportunities and meet national challenges for Canada.

Planned Result: NRC will assume a leadership position in at least three new vital domains of scientific and engineering research needed for Canada to meet national challenges and capitalize on the opportunities of a global knowledge economy.

Related Activities:

The *Support for Innovation and the National Science and Technology Infrastructure* Business Line will enhance its leadership in developing competitive scientific and technical advice and information, with customised, effective and state of the art business tools for technology development and innovation. CISTI will enhance access to its information products and services by developing a flexible, customer-centric business system that supports e-commerce and provides improved reporting for clients and management. IRAP and the Canadian Technology Network (CTN) will provide the essential link with private sector priorities and challenges to inform and validate the strategic directions of NRC's existing and planned research programs.

KEY RESULTS COMMITMENT #3

Fostering technology clusters that develop the innovative capacity and socio-economic potential of Canada's communities.

Planned Result: NRC will contribute to the development of new, sustainable and competitive innovation clusters in at least ten Canadian communities.

Related Activities:

IRAP will play a key enabling role in facilitating technology cluster development by promoting collaborative R&D and interactions among SMEs, universities, government laboratories and other partners.

CISTI will expand its current network of 10 NRC Information Centres to Fredericton, New Brunswick, Prince Edward Island, and Montréal – Aerospace Centre. An "e-Infostructure" will be developed at St. John's, Newfoundland, that will provide access to and archiving of the licensed electronic scientific, technical, and medical (STM) journals in CISTI's collection. It will have sufficient capacity to contain, in principle, all electronically published STM information generated worldwide. The e-Infostructure will offer easy access and advanced searching capabilities and will lay the groundwork for the development of a national digital STM library for Canadians.

KEY RESULTS COMMITMENT #4

Creating value for Canada through new technology-based enterprises, technology transfer and knowledge dissemination to industry.

Planned Result: NRC will be recognized by its partners as Canada's leading developer of new research and technology-based enterprises and respected for its innovative S&T commercialization practices.

Related Activities:

The *Support for Innovation and National Science and Technology Infrastructure* Business Line will enhance linkages between Canadian SMEs and national and international providers of technologies and help identify new venture financing and to market opportunities. IRAP will explore opportunities for supporting technology spin-offs from universities and provide extended advice and support to SMEs in intellectual property management, technology transfer and licensing strategies.

To fulfil its role as an important national asset, CISTI's collection must be positioned to ensure secure growth. CISTI will expand and improve access to its collection to meet the increasing need for STM information in the knowledge-based economy. CISTI will also enhance its service to industry by offering new innovation products that support

competitive technical intelligence, technology roadmapping, strategic planning, and technology forecasting in conjunction with other federal departments and organizations.

Technology Centres

The ***Thermal Technology Centre*** will continue to provide objective and valued expertise and technology evaluation in order to help Canadian firms in the development, testing and accreditation of new promising refrigeration and heat transfer technology and equipment.

The ***Canadian Hydraulics Centre*** will continue to provide leading technology and optimization of designs for structures against wave and ice forces, and water environmental disasters such as flooding and pollutant discharges.

The ***Centre for Surface Transportation Technology*** will enhance international opportunities for the Canadian transportation industry by providing vehicle engineering and testing expertise and facilities, particularly in the railway sector.

KEY RESULTS COMMITMENT #5

Securing access to global research networks and science facilities, and enhancing international opportunities for Canadian firms and technologies.

Planned Result: NRC will be recognized by its stakeholders for its contributions to a more effective Canadian innovation system that assures access to international facilities and research networks, provides opportunities for Canadian firms and builds new research and technology alliances.

Related Activities:

IRAP will continue to create and facilitate technology opportunities and linkages for Canadian SMEs at the national and international levels. It will further develop the Canadian Technology Network (CTN) as a powerful tool linking technology and innovation expertise, resources and services.

IRAP will continue to organize and lead international technology missions to help SMEs penetrate the global marketplace and improve their technology transfer competencies. Furthermore, IRAP will seek to facilitate SMEs' access to international markets and technologies through its cooperative agreements with organizations such as the Hong Kong Productivity Council, the Small and Medium Industry Promotion Corporation (Korea), the National Science and Technology Development Agency (Thailand), and the National Science and Technology Board (Singapore).

CISTI will provide extended access for Canadians to the world's STM information by actively pursuing agreements with information institutions around the world. The focus

will be on seeking new agreements with institutions in Eastern Europe and the Far East, and on enhancing and consolidating the systems support to the existing agreements with Britain, France, Japan, China, and Korea.

Business Line III – Program Management

3.7 Business Line Details

Business Line details:

- **Administrative Services and Property Management**
- **Corporate Services**
- **Finance Branch**
- **Human Resources Branch**
- **Information Management Services Branch**

Objective: To provide efficient, client-focused services that enhance NRC's effectiveness as an integrated, dynamic and entrepreneurial science and technology organization.

Description*:* The ***Program Management*** Business Line provides policy, program advice and executive support for the coordination and direction of NRC's operations and its Governing Council. It also supports and enables effective and efficient management of NRC's resources through its specialization in finance, information management, human resources, administrative services, property management and corporate services.

As a provider of services to Canada's largest public research organization, the Business Line responds to and supports a number of unique service demands, such as managing the spin off of companies from within NRC, handling extensive technology licensing and managing a large number of highly specialized facilities and equipment needs.

3.8 Net Planned Spending and Full Time Equivalents

($ millions)	Forecast Spending 2000-2001	**Planned Spending 2001-2002**	Planned Spending 2002-2003	Planned Spending 2003-2004
Net Business Line Spending:	67.9	**64.5**	63.5	65.5
Full Time Equivalents	543	**554**	554	554

3.9 Key Results Commitments, Planned Results, Related Activities and Resources

Over the next three years, the *Program Management* Business Line will fully implement NRC's new Employment Philosophy aimed at attracting and retaining the best employees in Canada (refer to page 37 for more details).

ADMINISTRATIVE SERVICES AND PROPERTY MANAGEMENT BRANCH

Planned Results

- improved practices in procurement
- implementation of an Electronic Document Management System for NRC
- new and expanded facilities to support new NRC initiatives
- environmental audits for two research institutes
- Emergency Preparedness program for NRC's regional facilities
- improved energy efficiency and meeting NRC's greenhouse gas emissions reduction targets

Related Activities

Administrative Services

Building on previous commitments, NRC will continue to pursue increased contracting with Aboriginal businesses in keeping with the Procurement Strategy for Aboriginal Businesses. NRC is also committed to reducing administrative burden and net costs by increasing the use of Acquisition Cards (e.g., MasterCard) for low dollar value purchases.

As reliance on electronic records and the risk of losing corporate memory increase, the acquisition and implementation of an Electronic Document Management System (EDMS) will allow NRC to manage its paper-based and electronic information in a coordinated, cost effective manner. To extend the range of NRC's electronic corporate memory, ASPM will undertake the development of policies for e-mail and web-based records, as well as begin a technical and functional needs analysis.

Property Management

In 2001-2002, NRC will expand existing facilities in Saskatoon, as well as construct new research facilities in Montréal, Fredericton, Halifax and St. John's. As part of its campus development program, NRC will create a marketing strategy for the Montreal Road campus in Ottawa in collaboration with the Canada Lands Corporation.

The environmental audit program will review NRC's Institute for Marine Dynamics (St. John's) and Integrated Manufacturing Technologies Institute (London). The management of Emergency Preparedness will be re-examined at the agency level. NRC will try to meet its greenhouse gas emissions reduction target by continuing to support the federal House In Order program with energy surveys.

As well, NRC will implement other energy efficiency projects, including: upgrades to the central heating plant; lighting retrofits in four buildings; and an energy performance contract for NRC's Industrial Materials Institute in Boucherville, which is expected to save $200,000, as well as reduce greenhouse gas emissions by 2000 tonnes, each year.

CORPORATE SERVICES BRANCH

Planned Results

- strategic positioning of NRC to capitalize on opportunities related to federal/national R&D and innovation initiatives, as well as program integrity and capital rust-out
- new NRC strategic and regional initiatives designed and implemented
- strategic positioning and promotion of NRC within and outside the Government of Canada
- development, communication and implementation of NRC's *Vision to 2006*
- international positioning of NRC as a valuable S&T partner, including establishment of new linkages
- stimulation of technology transfer, new business ventures and spin-offs
- continued improvements to NRC's performance measurement and results-based management systems
- effective risk management

Related Activities

To achieve these planned results, CSB will:

- align corporate communications and government relations strategies around major governmental themes on national innovation and R&D;
- strengthen the NRC Stakeholders Relations Program;
- implement and communicate NRC's *Vision to 2006* to staff, stakeholders, key decision-makers and partners in Canada and other countries;
- promote Canadian and NRC's S&T competency in major scientific initiatives;
- contribute to government-wide initiatives such as S&T in sustainable development and Trade Team Canada activities;
- support the participation of 10-15 Canadian SMEs in at least six international missions, especially in technology-based joint ventures;
- develop tools to facilitate international cooperation and information sharing;
- continue to explore new ways of effectively transferring NRC's technologies and intellectual property to Canadian businesses and promote an entrepreneurial environment within NRC to encourage the creation of new business ventures and spin-offs. The following table indicates projected outcomes for the planning period:

Transfer of NRC's research success to Canadian firms			
Projections based on continuation of trends during the past three years			
	2001-2002	2002-2003	2003-2004
Licences	75	80	85
Patents (issued)	85	90	95
Patents (applications)	200	230	250
Collaborations (active)	650	700	750
New ventures formed upon NRC technologies	12	15	20
Subset: spin-off from NRC	8	9	10

- analyze information on patents issued, licences granted, collaborative research projects, licensing revenues, spin-offs, etc., so as to identify opportunities to improve services and the rate of take-up by Canadian companies;
- undertake full-scale assessments of the Industrial Research Assistance Program (IRAP) and the Manufacturing Technologies Group (MTG);
- strengthen NRC's performance measurement and reporting system;
- in collaboration with key partners, establish technology roadmap initiatives in: Ocean Engineering and Technologies; Bioresource-based Technology; and Nanotechnology;
- negotiate a revised Planning, Reporting and Accountability Structure with the Treasury Board Secretariat;
- develop performance frameworks in support of new national and/or regional NRC initiatives; and
- contribute to government wide S&T policy reviews (federal science capacity, etc.).

FINANCE BRANCH

Planned Results

- alignment of all areas affected by the introduction of the Financial Information Strategy (FIS)
- improvements to the availability of financial information to support NRC's entrepreneurial undertakings and regional initiatives

Related Activities

During the first half of 2001-02, NRC will ensure that its accounting processes, financial data and reports are all properly aligned with the new FIS environment. Special care will be given to the people side, helping scientists, managers and finance officers to learn to make the shift to decision-making based on improved integrated financial information.

During the course of the year, a major undertaking will be the development and implementation of a "Data Warehouse" which will build on the new accrual accounting information and result in significant improvements in the integration of financial information with NRC's inputs and outputs.

Over the next few years, the Finance Branch will ensure that necessary process and reporting improvements are implemented to ensure that financial systems and processes support the need for fully integrated management information. The growing importance of the entrepreneurial attitude in NRC requires that the Finance Branch continue to concentrate on ensuring the availability of first rate financial analysis and support of business plans for new undertakings, collaborations and spin-off decisions. The costing and pricing of new products and service offerings and the development of a better financial environment to support regional initiatives will also constitute on-going priorities in coming years.

HUMAN RESOURCES BRANCH

Planned Results

- implementation and deployment of NRC's Employment Philosophy
- improved human resources management tools

Related Activities

In 2000, NRC launched a new "Employment Philosophy" in preparation for the commencement and implementation of NRC's *Vision to 2006*. This philosophy will create an NRC known not only for its creativity and outstanding contributions to science and technology and economic development in Canada, but also for being "a great place to work".

NRC's intent is to create an environment that is known for its competitive salaries, benefits and continuity prospects; top quality management and leadership; important programs and interesting jobs; extensive learning, personal growth and career enhancement opportunities; an inviting and participative climate (respect, recognition, teamwork, balance between work and personal life); and access to the latest in technology, equipment, facilities and business practices.

From this major undertaking, NRC expects the following related outcomes:

- development of a human resources services organization focused on the provision of strategic and transactional assistance to managers at the local level. The benefits will be increased organizational productivity, employee commitment and growth of NRC's intellectual capital;
- enhanced managerial accountability for high quality people management, including measurement of management and leadership behaviour against pre-determined competency profiles and outcomes (360^0 performance planning and review approach);
- new human resources management tools and processes, including:
  - web-based recruitment programs focused on Canadian university (20 hires) and community college students (20 hires) and staff, including related Employment Equity target group programs (15 hires);
  - development programs: Career Development Investment through Individual Learning Accounts representing two per cent of NRC's annual wage envelope; by the end of the planning period, NRC expects all employees to have benefited from short-, medium- or long-range development activities; and a Leadership Management Development Program targeting 125 participants;
  - implementation of an enhanced manager/leader selection program;
  - use of competency profiles for selection, performance management, career planning, succession planning, and training and development programs;
  - revision of compensation policies and programs to link them to the development of the employee in the job, and to the employee's performance; and
  - development and implementation of a new gender-free classification system.

In measuring its progress towards these objectives, NRC will use as input, Treasury Board's "Framework for Good Human Resources Management in the Public Service".

INFORMATION MANAGEMENT SERVICES BRANCH

Planned Results

- strengthened NRC information technology infrastructure
- Information Management / Information Technology (IM/IT) Governance Framework and related guidelines and policies

Related Activities

As a robust information technology infrastructure plays an increasingly important role in the ability of NRC to deliver its programs effectively, NRC will continue to strengthen key elements of that infrastructure through strategically-targeted investments in corporate business systems, data networks, and information technology security. These initiatives will enhance NRC's ability to exploit new and emerging technologies and research and management applications (Public Key Infrastructure, Government-On-Line) in all of its programs.

In addition, NRC will build on the progress made during 2000 in establishing a formal Council-wide IM/IT Governance Framework. Through the committee structure associated with the Framework, NRC will continue to develop and implement IM/IT policies and guidelines that will result in improved cost-effectiveness of its information technology infrastructure, and enhanced security of its information holdings.

Section IV: Joint Initiatives

4.1 Government-wide Initiatives

Sustainable Development Strategy

As a Schedule II (Financial Administration Act) departmental corporation, NRC is not subject to the 1995 amendments to the Auditor General Act requiring the preparation of a Sustainable Development Strategy (SDS). However, under NRC's Environmental Management Policy, considerable progress has been achieved towards attaining the underlying objectives of the 1995 amendments. The most notable achievement has been the installation of a cogeneration plant on NRC's Montreal Road Campus, Ottawa. This initiative, combined with water and energy audits, has resulted in a significant reduction in utility costs. As an added dividend, the energy conservation program will become instrumental in NRC meeting its Federal House In Order greenhouse gas emissions reduction target, to be established in March 2001.

NRC's environment audit program will be continued, with plans to review the operations of the Institute for Marine Dynamics in St. John's and the Integrated Manufacturing Technologies Institute in London. The management of Emergency Preparedness will be re-examined at the corporate level with the objective of better coordination and support for the various components of this area. NRC will continue its support of the Federal House In Order program with energy surveys of its regional facilities (Winnipeg, Montréal, and elsewhere) with the objective of meeting NRC's greenhouse gas reduction target.

NRC will continue to monitor its sewage and air emissions for compliance with municipal and provincial requirements, and conduct environmental safety audits of its research facilities. Also, NRC will undertake a review of its management framework in support of emergency preparedness during 2001.

Government-On-Line Initiative

NRC's Canada Institute for Scientific and Technical Information (CISTI) will take a leadership role in developing collaborative software, extensive searching tools for information databases, and other internet tools of use to the Government-On-Line Initiative. CISTI also plans to modify existing systems and develop a new delivery mechanism for electronic commerce over the web. The result will be maximized utilization of CISTI's collections of scientific, technical and medical information, development of new desktop information delivery technologies and extension of client support services to all Canadians.

4.2 Collective Initiatives - Technology Cluster Initiatives Underway

Collective Initiative	Key Result Commitment	List of Partner(s)	Money Allocated by Partners ($millions)	Planned Results
Atlantic Investment Partnership	Fostering technology clusters that develop the innovative capacity and socio-economic potential of Canada's communities	ACOA/NRC	NRC has been allocated $110 million over the next five years from the $700 million Atlantic Investment Partnership for its *Atlantic Canada Innovation Initiative.*	▪ Create a globally competitive research and technology base for cluster development at the community level ▪ Foster community leadership, champions and knowledge-based strategies ▪ Leverage funding and new investment in the cluster with stakeholders ▪ Stimulate the emergence of new firms, jobs, exports and investment growth
Aerospace Technology Infrastructure Initiative	Provide the technology infrastructure needed to ensure the long term international competitiveness of the Canadian aerospace industry (including access to national facilities, and leadership and direction in technology transition)	NRC/CED-Q	NRC has been allocated $43.4 million over the five-year period 2000-01 to 2004-05 for the development of the initiative, which comprises the construction of facilities and establishment of new research programs in Montréal and Ottawa. Additionally, CED-Q is contributing $25 million over the five-year period toward the capital costs associated with the construction of the Advanced Aerospace Manufacturing Technology Centre in Montréal.	▪ Industrial and economic development: increasing and leveraging investments in Canadian aerospace technology; and increasing capacity of Canadian firms ▪ Regional development: developing and transferring technology within local community ▪ Advancement of knowledge: development, transfer and growth of knowledge and highly qualified personnel ▪ Environmental and safety improvements: improve environmental, safety and quality performance of aerospace industry

Other Collective Initiatives

Collective Initiative	Key Result Commitment	List of Partner(s)	Money Allocated by Partners ($millions)	Planned Results
Canadian Biotechnology Strategy: Genomics-based Research	Enhance the quality of life of Canadians in terms of health, safety, the environment, and social and economic development by positioning Canada as a responsible world leader in biotechnology	NRC AAFC NRCan EC HC DFO CIHR	The government has allocated a total of $55 million over the three-year period 1999-00 to 2001-02 among the following organizations: NRC $17 million AAFC $17 million NRCan $5 million EC $3 million HC $10 million DFO $2.5 million CIHR $0.5 million	▪ Stewardship: increased dissemination of genomics information; impact in terms of value-added and influence in technology identification, adoption, and development; establishment of critical mass and strengthening of national genomics program through excellence in federal research programs ▪ Economic benefits: increased business development; improved management practices developed; improved technical & economic performance of genomics clients and target population ▪ Citizenship engagement: improved awareness and understanding of genomics research and its potential impacts; stakeholder and/or client community recognition and support of genomics organizations and their product and/or services.

Acronyms:

AAFC	Agriculture and Agri-Food Canada
ACOA	Atlantic Canada Opportunities Agency
CED-Q	Canada Economic Development for Quebec Regions
CIHR	Canadian Institutes of Health Research
DFO	Department of Fisheries and Oceans
EC	Environment Canada
HC	Health Canada
NRCan	Natural Resources Canada

Section V: Financial Information

5.1 Capital Spending by Business Line

5.2 Capital Projects by Business Line

5.3 Summary of Transfer Payments

5.4 Source of Respendable Revenue

5.5 Net Cost of Program for the Estimates Year

5.1 Capital Spending by Business Line

($ millions)	Forecast Spending 2000-2001	**Planned Spending 2001-2002**	Planned Spending 2002-2003	Planned Spending 2003-2004
Research and Technology Innovation	52.2	**69.0**	61.4	44.6
Support for Innovation and the National Science and Technology Infrastructure	1.2	**0.0**	0.0	0.0
Program Management	7.8	**7.2**	5.9	5.4
Total	61.2	**76.2**	67.3	50.0

5.2 Capital Projects by Business Line

($ millions)	Currently Estimated Total Cost	Forecast Spending to March 31, 2001	**Planned Spending 2001-2002**	Planned Spending 2002-2003	Planned Spending 2003-2004	Future Years' Requirements
Research and Technology Innovation						
Nova Scotia						
Aquaculture Addition (DA)	1.8	1.8				
Québec						
Advanced Aerospace Manufacturing Technology Centre (I-PPA)	34.1	1.5	**10.3**	10.2	6.1	6.0
Montréal Centre of Excellence in Environmental Site Remediation (DA)	1.4	1.4				
Virtual Environment Technologies for Material Processing (DA)	1.2	1.2				
Ontario						
Gas Turbine Environmental Research Centre (I-PPA)	19.3	0.5	**9.1**	9.5	0.2	
M-10 Test Cell Facilities for Combustion Research and Development (DA)	1.6	1.6				
Centre for Research in Cleaner Manufacturing (DA)	1.7	1.7				
Scanning Probe Microscopy System (DA)	1.3	1.3				
Dynamic Secondary Ion Mass Spectrometer for Surfaces and Interfaces (DA)	1.5	1.5				
Saskatchewan						
Addition to Plant Biotechnology Institute Building (S -EPA)	9.0	1.8	**5.2**	2.0		
British Columbia						
Upgrade and Expansion of Facilities - the Herzberg Institute of Astrophysics (S - EPA)	9.6	9.3	**0.3**			
Program Management						
Ontario						
M-6 Boiler Replacement (DA)	1.4	0.5	**0.9**			

5.3 Summary of Transfer Payments

($ millions)	Forecast Spending 2000-2001	**Planned Spending 2001-2002**	Planned Spending 2002-2003	Planned Spending 2003-2004
Grants				
Program Management	1.0	**1.0**	1.0	1.0
Total Grants	1.0	**1.0**	1.0	1.0
Contributions				
Research and Technology Innovation *	50.8	**47.6**	46.5	45.5
Support for Innovation and the National Science and Technology Infrastructure	97.0	**85.0**	93.4	93.4
Total Contributions	147.8	**132.6**	139.9	138.9
Total Grants and Contributions	148.8	**133.6**	140.9	139.9

* Includes funding for TRIUMF: Located on the campus of the University of British Columbia, the Tri-University Meson Facility (TRIUMF) was established in 1968 and is Canada's national laboratory for research in particle and nuclear physics. An internationally recognized laboratory, TRIUMF is managed as a joint venture by a consortium of five universities (Universities of Alberta, British Columbia, Victoria, Carleton and Simon Fraser) and operated with contribution funds from the Government of Canada, which are managed by NRC.

5.4 Source of Respendable Revenue

Spending of revenues pursuant to the NRC Act ($ millions)	Forecast Revenue 2000-2001	**Planned Revenue 2001-2002**	Planned Revenue 2002-2003	Planned Revenue 2003-2004
Research and Technology Innovation				
Fee for Service	26.8	**19.7**	21.3	22.4
Rentals	1.4	**1.5**	1.5	1.8
Royalties	4.5	**2.8**	3.5	3.8
Publications	2.4	**1.6**	1.5	1.5
Other	0.3	**0.2**	0.2	0.2
Support for Innovation and the National Science and Technology Infrastructure				
Fee for Service	9.3	**5.8**	6.1	6.1
Royalties	0.0	**0.1**	0.1	0.2
Publications	20.2	**23.0**	25.1	27.5
Program Management				
Fee for Service	1.1	**0.3**	0.3	0.3
Rentals	0.5	**0.5**	0.5	0.5
Other	1.2	**1.1**	1.5	4.0
Total	67.7	**56.6**	61.6	68.3

Note:

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

5.5 Net Cost of Program for the Estimates Year

($ millions)	**Total**
Planned Spending	**587.0**
Plus:	
Services Received without Charge	
Contributions covering employees' share of insurance premiums and expenditures paid by Treasury Board Secretariat	**12.9**
Employee compensation under Workers Compensation Acts paid by Human Resources Development Canada	**0.4**
Accommodation - PWGSC	**0.1**
Cost of legal services provided by the Department of Justice Canada	**0.3**
	13.7
Total Cost of Program	**600.7**
Less:	
Spending of revenues pursuant to the NRC Act	**56.6**
2001-2002 Net Cost of Program	**544.1**

Section VI: Other Information

Research and Technology Innovation

Biotechnology Research Institute – BRI (Montréal, Québec)

BRI's research programs are closely linked to the changing needs of pharmaceutical and natural resources industries. Established in 1987, BRI is the largest laboratory site in Canada dedicated to biotechnology R&D. Located in the centre of Montréal's biopharmaceutical and environmental clusters, BRI is uniquely positioned to promote, assist and perform research closely linked to the needs of industry.

As part of NRC's Biotechnology Group, BRI scientists work in three major areas: pharmaceutical biotechnology, environmental biotechnology and bioprocess. BRI is also involved in two major Centres: the Montréal Centre of Excellence in Environmental Site Remediation and the National Joint Centre for Structural Biology.

Herzberg Institute of Astrophysics – HIA (Victoria and Penticton, British Columbia)

HIA operates all astronomical observatories established by the Government of Canada and ensures the Canadian scientific community can access these facilities. The Institute is responsible for the Dominion Astrophysical Observatory (DAO) in Victoria, B.C., the Dominion Radio Astrophysical Observatory (DRAO) in Penticton, B.C., and the Canadian Astronomy Data Centre in Victoria, B.C. The Centre receives data from national and international telescopes, including, with support from the Canadian Space Agency, the Hubble Space Telescope.

Through HIA, NRC is an international partner in the Hawaii-based 3.6-m Canada-France-Hawaii optical Telescope (CFHT) and the 15-m James Clerk Maxwell Telescope (JCMT) for short-wavelength radio emission. HIA is also an international partner in the Gemini twin 8-m optical telescopes, one in Hawaii, which began operations in 2000, and the other in Chile, which will be completed in 2001. These collaborations heavily leverage Canada's investment in astrophysics, providing our researchers with new opportunities and positioning Canada as a major player in international astronomy.

HIA is known worldwide for its astrophysics research, as well as for its development of innovative technological instruments and user-oriented software, including: optical design and coating procedures; optical and infrared detector technology; multi-object spectroscopy; adaptive optics; data processing, archiving, and data mining; antenna design; signal processing; sub-millimetre instrumentation and phase monitoring for radio interferometry.

Industrial Materials Institute – IMI (Boucherville, Québec)

IMI promotes the growth and competitiveness of Canadian industry through research and development activities related to materials processing technologies. IMI works across a

broad spectrum of industrial sectors, including aerospace, automotive, advanced materials, steel, plastic, food and beverage packaging, energy, information technologies, raw materials production, instrumentation, and finished-product manufacturing.

IMI offers multidisciplinary expertise focused on the next generation of technologies and high-performance systems necessary to produce new materials and manufacture the products that consumers in the 21st century will demand. R&D efforts are centred on two fields of activities: Design of Materials Processing and Virtual Technologies and Intelligent Control. The Institute has received international recognition for its work with scientific collaborators, as well as for its active involvement in technology transfer to industry.

Innovation Centre – IC (Vancouver, British Columbia)

NRC's Innovation Centre in Vancouver, British Columbia was established to help companies compete more effectively by innovating and applying advanced manufacturing technologies. The Centre directly supports the manufacturing industry, by developing long-term strategic research competencies relevant to the needs of this industry, with particular emphasis on integration with other players in the British Columbia innovation community. The Centre also provides an important link to NRC institutes and programs across Canada.

The Innovation Centre aligns NRC with B.C.'s specific innovation needs. The Centre is a meeting place for regional innovation, offering multi-disciplinary research programs and housing the Fuel Cells Technology Centre. It is a focal point for the Industrial Research Assistance Program in B.C. and home to a new NRC Information Centre.

The Centre undertakes research in sensors, control and surface technologies, as well as manufacturing integration. It collaborates with manufacturing and processing sectors on projects related to wood products, value-added energy resources, process equipment and plant machinery and other areas. The Centre, which is the heart of NRC's recently announced National Fuel Cells Research and Innovation initiative, provides the valuable research infrastructure for this promising field.

Institute for Aerospace Research – IAR (Ottawa, Ontario and Montréal, Québec)

IAR supports the needs of the Canadian aerospace community and maintains strong ties within the international aerospace sector. The Institute promotes and assists research and development in aircraft and related vehicle design, manufacture, performance, use and safety. IAR interacts extensively with a number of industry sectors – from manufacturing and air carriers to repair and overhaul companies – to ensure its major research programs and activities stay aligned with industry's emerging needs. IAR explores essential industry research competencies and knowledge at its three laboratories: aerodynamics, flight research, and structures, materials and propulsion.

IAR provides the major national facilities used to design, develop and certify Canadian aerospace products, and the core competencies to maintain and develop the facilities and to interpret the data they supply. The Institute's facilities include seven wind tunnels, air

compressor/exhauster facilities, engine test cells, a full-scale structural fatigue rig, aeroacoustics chambers, a Flight Data Recorder Playback Centre and a fleet of research aircraft.

Institute for Biodiagnostics – IBD (Winnipeg, Manitoba)

IBD conducts research and develops leading edge instrument-based, non-invasive medical diagnostic technologies. The Institute performs its research in partnership with medical schools, universities, other research organizations and industry. Partnerships help IBD improve growth and diversification opportunities for Canadian companies and fuel the Institute's ability to more effectively diagnose, and monitor treatment for, diseases that significantly affect Canadians.

IBD has four core research groups: the Biosystems Group, the Informatics Group, the Magnetic Resonance Technology Group and the Spectroscopy Group.

Institute for Biological Sciences – IBS (Ottawa, Ontario)

IBS conducts innovative research in neurobiology and immunochemistry of importance to the health and pharmaceutical sectors. IBS carries out its research programs with partners in industry, university and hospital settings and with other R&D organizations.

IBS research focuses on: neuro-degenerative diseases, such as stroke, Alzheimer's, Parkinson's and epilepsy; osteoporosis; vaccines and immunotherapies against infectious diseases and therapeutic cancer vaccines. IBS encompasses two major research programs: the Cell Biology program and the Immunochemistry program.

IBS has a strong track record for transferring technology and knowledge to multi-national, small and medium-size Canadian firms. IBS is also closely involved with the development and activities of three Canadian Centres of Excellence Networks: Bacterial Diseases, Arthritis and Stroke.

Institute for Chemical Process and Environmental Technology – ICPET (Ottawa, Ontario)

ICPET develops chemical technologies to help Canadian industry improve the commercial viability and competitiveness of their products, reduce costs, manage their environmental performance and gain efficiency in their process operations. The Institute's core research competencies are functional materials; cleaner production technologies; advanced diagnostics; separation processes and simulation and design.

ICPET recently established an Environmental Management Office to facilitate NRC's response to sustainable development, and to link this actively to the competitiveness and environmental agendas of both Canadian industry and the federal government. The office has particularly emphasized support of activities responding to climate change challenges and has also undertaken a "user-friendly" integration of environmental impact analysis tools for use in product, process and business/operations optimization.

Institute for Information Technology – IIT (Ottawa, Ontario)

IIT creates and commercializes new software and systems technology, strengthens software engineering practices in the private sector, and communicates, educates and consults to help Canada prosper in the information age and knowledge economy. With information technology permeating all sectors of the economy, IIT is playing an increasing role in sectors other than information technology, including manufacturing, biotechnology and electronic business.

IIT collaborates in information and telecommunications technologies with business, universities, and government agencies, as a key player to strengthen this sector. IIT helps industries across Canada improve their competitiveness in information technology, develop innovative solutions to industry problems, and identify new business opportunities. IIT's five research groups include interactive information; software engineering; integrated reasoning; network computing and visual information technology. The Institute also supports Canada's high performance computing community, managing the C3.ca Coordinating Office.

Institute for Marine Biosciences – IMB (Halifax, Nova Scotia)

IMB's targeted innovative and strategic biotechnology research in aquaculture and genomics focuses on diversifying Canada's aquaculture industry and on developing genomics technologies. On behalf of NRC, IMB operates and manages the Canadian Bioinformatics Resource (CBR), a national facility dedicated to providing Canadian researchers with convenient, effective access to biotechnology-related databases and bioinformatics software tools.

CBR will be a key component of the Canadian Stroke Network, a Network of Centres of Excellence. IMB is working with the network to create a workable model to ensure that needed infrastructure is provided in the most effective way possible. IMB is also a member of AquaNet, the Network of Centres of Excellence dedicated to aquaculture development. CBR now also has several associate member nodes in other government departments and at universities.

Institute for Marine Dynamics – IMD (St. John's, Newfoundland)

IMD's mission is to provide innovative solutions and engineering expertise related to ocean technology. In collaboration with industry and university partners, the Institute pursues research programs 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. IMD research supports a wide range of Canadian and international projects, from high-performance naval vessel operations to offshore oil and gas exploration.

The Institute's facilities include the world's longest ice tank (90 metres), an offshore engineering basin, and a 200-metre towing tank. IMD's specialized equipment includes a marine dynamic test facility to evaluate vessels in six degrees of freedom of motion, a

planar motion mechanism to study manoeuvring characteristics, a yacht dynamometer and a cavitation tunnel.

Institute for Microstructural Sciences – IMS (Ottawa, Ontario)

IMS collaborates with Canadian industry to provide national leadership in developing the strategic base for information technology – creating the enabling technologies needed for future hardware used to acquire, process, transmit, store and display information. The Institute works with the leading-edge technologies that will drive the information revolution during the next decade.

IMS partners with industry to exploit the technological advances that result from research and to reduce the risk to industry by investing in those alternative technologies, which if achieved, would represent a paradigm shift. The Institute's core competencies include: photonic device design and fabrication, semiconductor process development (organic and inorganic), thin film technology, nanotechnology, and acoustics. IMS applies its expertise in novel materials and components to solve problems posed by the need for advanced hardware through both national and international initiatives.

Integrated Manufacturing Technologies Institute – IMTI (London, Ontario)

IMTI plays a major role in promoting the international competitiveness of Canadian manufacturers by focusing its research and development on leading edge technologies for discrete product and equipment manufacturing at the design and production levels. The Institute works with manufacturers and other technology providers to address manufacturing challenges through joint research projects.

IMTI conducts research in virtual manufacturing, systems modelling and simulation, concurrent and distributed manufacturing technologies, intelligent production systems, industrial laser processes, and systems and solid freeform fabrication. IMTI's research, conducted in collaboration with key industry sectors such as aerospace, automotive, tooling, medical devices and electronics, is breaking new ground for Canadian industry.

Institute for National Measurement Standards – INMS (Ottawa, Ontario)

Measurement standards are one of the foundations of a modern economy. Essential to industry growth and international competitiveness these standards assure the validity, accuracy and traceability of measurements made throughout the economy. This assurance occurs through documented calibration chains that relate measurements to the high-accuracy national measurement standards maintained by each country's national metrology institute.

As Canada's national metrology institute, INMS is a fundamental enabling element in the Canadian government's infrastructure. It supports Canadian industry and the public by facilitating Canada's global trade and global co-manufacturing and by providing the necessary standards and calibration-related services. INMS strengthens the competitiveness of Canadian companies by facilitating the traceability of their measurements and developing new measurement standards and services on a timely

basis. Furthermore, it addresses health and environmental issues through chemical metrology services.

Institute for Research in Construction – IRC (Ottawa, Ontario)

IRC partners with industry to improve the safety, durability and comfort of Canadian homes, offices and other work environments, and to extend the service life and performance of municipal infrastructure, such as roads, bridges and water systems. Key program areas include: indoor environments; building envelope and structure; urban infrastructure rehabilitation; and fire risk management.

IRC provides a national evaluation service that determines how suitable innovative construction products and technologies are for their intended use. As a national code centre, it supports the development of the National Building Code and other national model codes on which construction regulation across Canada is based. Furthermore, IRC disseminates practical technical information to construction practitioners.

Plant Biotechnology Institute – PBI (Saskatoon, Saskatchewan)

PBI is a major centre for plant biotechnology research in Canada, with expertise in transformation, promoters, gene expression, genomics, metabolic pathways, DNA sequencing and biochemistry. PBI probes the areas of plant biotechnology that will enhance Canada's position in the highly competitive global market of crops and crop products and then transfers the new technologies and resulting products to Canadian industry. The Institute is a world leader in the genetic engineering of wheat and in modifying Brassica seed oil.

PBI's main research areas include: Brassica technology; cereal biotechnology; legume biotechnology; gene expression; growth regulation; promoter technology; and seed oil modification. Transgenic plant and DNA technologies help the Institute develop novel systems to analyze and manipulate genes, leading to state-of-the-art technologies and crop development.

Steacie Institute for Molecular Sciences – SIMS (Ottawa and Chalk River, Ontario)

SIMS carries out long-term interdisciplinary research in selected areas of molecular science that can potentially impact key sectors of the Canadian economy. SIMS focuses on moving the frontiers of molecular scale sciences and technology out of the lab and into the marketplace. With research partners both inside and outside NRC, SIMS helps develop innovative technologies across a wide spectrum including therapeutics, diagnostics, advanced electronics, telecommunications, precision manufacturing, optoelectronics, information sciences, and advanced materials. SIMS works with other NRC Institutes to determine how interdisciplinary science can support Canada's manufacturing, information and communications, and biotechnology sectors.

SIMS teams offer expertise in chemical synthesis, material characterization, understanding the chemistry of biological processes, predicting material properties, and using femtosecond lasers in optics and telecommunications research applications. SIMS

has established research in functional materials, molecular spectroscopy, neutron program for materials, femtosecond science, chemical biology, molecular interfaces, and theory and computation.

Support for Innovation and the National Science and Technology Infrastructure

Canada Institute for Scientific and Technical Information – CISTI (across Canada)

CISTI is North America's largest, most comprehensive provider of scientific, technical and medical (STM) information, as well as Canada's leading publisher of scientific journals and books. As the global economy evolves from resource to knowledge-based, CISTI is increasingly considered a key component of Canada's S&T information infrastructure. Canadians access the information resources of CISTI and the world through CISTI's Web-based catalogue and state-of-the-art document delivery service. Fast turnaround times and electronic document delivery ensure that Canadians have access to the STM information they need when they need it. CISTI resources benefit researchers, innovators, students, librarians and medical workers in industry, universities, government, hospitals and libraries across Canada and throughout the world.

A national network of NRC information centres, staffed by highly trained specialists, brings vital information resources and expertise to local innovation communities. These centres help researchers and innovators in fields of strategic importance, including biotechnology, biosciences, molecular sciences, astrophysics and specific industry sectors. CISTI's publishing program, NRC Research Press, offers scientists and engineers 14 international, peer-reviewed journals and a growing list of monographs and conference proceedings.

Industrial Research Assistance Program – IRAP (across Canada)

IRAP's mission is to connect Canada's innovative small and medium-size enterprises (SMEs) with the information, resources and financial support they need to turn good ideas into commercially viable products and services. For more than 50 years, IRAP has helped SMEs develop and adopt innovative technologies that yield new products, create high-quality jobs and increase Canadian industry's competitiveness. IRAP support stimulates R&D and builds technical knowledge and expertise in Canadian firms.

Central to IRAP's success is its backbone of 262 Industrial Technology Advisors (ITAs) who work with some 12,000 firms annually in all regions of the country and in all industrial sectors. IRAP offers direct access to the latest technological advances, expertise, facilities and resources, and cost-shared financing of innovative technical projects. IRAP also helps clients access expertise in the business end of innovation, such as marketing, financing and production through the Canadian Technology Network (CTN). CTN links innovation-related resources and provides path-finding services to SMEs through its 1,000-strong membership. CTN's consultation network includes private sector firms, many levels of government and a number of industry associations.

NRC Technology Centres

Canadian Hydraulics Centre – CHC (Ottawa, Ontario)

CHC is Canada's largest hydraulics and coastal engineering laboratory. It operates on a cost-recovery basis, providing physical and numerical modelling and analysis services in the general field of hydraulics to Canadian and international engineering communities. CHC specializes in coastal engineering, environmental hydraulics and cold-regions technology. CHC facilities available to industry include three large wave basins, two wave flumes, a coldroom and an ice basin which are used for physical model studies of: breakwaters; harbours; ship moorings; beach and shoreline protection; near and offshore fixed and floating structures; scour and depression of sediments; ice forces on structures; and river and estuary hydraulics.

CHC also develops and applies advanced numerical models of: wave propagation (motion and forces of both intact and broken ice covers interacting with structures); coast environmental management; water resources; rivers and watersheds; sediment transport; pollutants; oil and chemical spill fate; water quality; environmental production; and decision support systems.

Centre for Surface Transportation Technology – CSTT (Ottawa, Ontario and Vancouver, British Columbia)

CSTT operates as a cost-recovery NRC Technology Centre, offering clients its unique expertise and facilities to improve the productivity, competitiveness, reliability and safety of rail and road transportation equipment and systems. CSTT's expertise includes vehicular engineering research and development, computer modelling and analysis, field testing, climatic simulation and vehicle performance.

CSTT methodologies have improved Canadian safety standards for tank containers carrying dangerous goods. The Centre is developing improvements to introduce North American freight rail technology and equipment in other parts of the world and designing performance evaluation methodology to improve such things as aircraft de-icing fluids.

Thermal Technology Centre – TTC (Ottawa, Ontario)

Working on a cost recovery basis, Thermal Technology Centre engineers, researchers and technologists offer R&D services related to thermal engineering systems and advanced process heat transfer equipment to clients working in fields such as: commercial refrigeration, air-conditioning, and heat pump and process heat transfer equipment manufacturing. TTC combines its specialized technical competencies and experience with state-of-the-art test facilities, in collaboration with industry and government departments and agencies that are particularly focused on energy and the environment.