Natural Resources Canada
Ressources naturelles Canada

Earth Sciences Sector
Business Plan
1999/2002

Canada

Earth Sciences Sector Success Stories

- Scientists at the Geological Survey of Canada Calgary have completed and published a full assessment of the undiscovered petroleum resource potential of Canada's Pacific Margin (Queen Charlotte Basin, Tofino Basin and Georgia Basin). This assessment indicates a total hydrocarbon resource of 9.8 billion barrels of oil and 43.4 trillion cubic feet of gas. Release of the report proved to be very timely. It was immediately put to use by provincial and federal authorities engaged in evaluating the possible merits of lifting a long-standing moratorium on west coast oil and gas exploration.
- Based on its knowledge of Canadian gold deposits, the Geological Survey of Canada, in collaboration with the Newfoundland Provincial Survey and Memorial University, has demonstrated that there is a strong potential for AuCu epithermal- and porphyry-styles mineralization in Canadian ancient deformed terrain. These results are the basis of the renewed industry activity in the Newfoundland Avalon Zone.
- Under a joint project with several industry partners, the Geological Survey of Canada (GSC) has developed and will maintain digital databases on global geology and mineral deposits. The project capitalizes on GSC's recognized expertise in mineral deposits and will aid Canadian companies involved in worldwide exploration for gold, copper, nickel and zinc deposits.
- Twelve months after the initiation of the North Baffin/Melville Peninsula Geoscience Knowledge Base compilation, the final geoscience products have been publicly released. Partners on the project include the Geological Survey of Canada, Polar Continental Shelf Project, Government of the Northwest Territories, Qikiqtaaluk Corp. and the Department of Indian and Northern Affairs. The goal of this northern partnership program is to assist in stimulating increased economic activity and mineral resource potential assessment, and facilitating capacity building in northern communities.
- The Polar Continental Shelf Project supported 176 Arctic programs engaged in research regarding renewable and non-renewable resource and environmental assessments, climate change, contaminants and traditional knowledge research. Collaborations with other Arctic operators, including the Canadian Coast Guard and the Department of National Defence, resulted in significant cost savings and highly efficient delivery of services to client groups.
- The February 16, 1999 federal budget allocated $60 million over five years to build a geospatial data infrastructure under GeoConnections, a centrepiece of Minister Goodale's Winning in the Knowledge-based Economy Action Plan. This investment will ensure that, through GeoConnections, the federal government, with its provincial, territorial and industry partners, develops technologies to address the rapidly expanding use and application of geographic information. GeoConnections will help to ensure that the Earth Sciences Sector's knowledge, technology and skills will contribute significantly to all sectors of the economy and to communities across Canada.
- An additional investment of $60 million over three years was announced to establish one Smart Communities Demonstration Project in each province, in the North and in an Aboriginal community. Through the Sustainable Communities component of the Minister's Action Plan, the Earth Sciences Sector supports the delivery of geospatial data and other government information to communities for sustainable development and balanced decision-making. These efforts are expected to contribute to the Smart Communities Demonstration Project.

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This document can be viewed on the World Wide Web
by accessing the Earth Sciences Sector Homepage Site at
http://www.nrcan.gc.ca/ess/homepage.cgi?.e

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Publishing date: April 1999

Ce document est aussi disponible en français.

Natural Resources Canada

Mission

Natural Resources Canada provides the knowledge and expertise for the sustainable development and use of Canada's natural resources and the global competitiveness of the resource and related sectors for the well-being of present and future generations.

Vision for Canada's Natural Resources Sector

For the next century, Canada must become the world's "smartest" natural resource developer: the most high tech, the most environmentally friendly, the most socially responsible and the most productive.

NRCan Business

NRCan advances the development of Canada's economy by providing expert scientific and economic knowledge to Canadians, and by promoting the sustainable development and use of Canada's natural resources and the competitiveness of the energy, forest, mining, geomatic and geoscience sectors. It is committed to good governance, to the delivery of high-quality products and services, to the protection of the health and safety of Canadians, and to partnerships with private and public sector organizations.

Operating Principles

NRCan has adopted operating principles to define the business standards, beliefs and values of the organization and what it is trying to achieve. The Earth Sciences Sector employs these principles to guide its day-to-day activities and sharpen the focus of its plans and priorities.

Respect, honesty, equity, fairness and integrity are the basis of our relationship with Canadian citizens, our clients and each other. We value the commitment and dedication of the people who form our organization and subscribe to the following beliefs.

Strong Leadership is Essential

We value leadership that provides a vision of the future and creates an environment of trust and respect. By example and involvement, leadership demonstrates a clear sense of direction, fosters teamwork, is accountable, and motivates and supports our organization in reaching its objectives.

People are Our Principal Strength

We work in a challenging and healthy environment that enables us to achieve our work goals and reach our full potential. We have the tools and opportunities to acquire the skills and expertise to perform our jobs; we are encouraged to be innovative; and we are recognized for our achievements.

Effective Planning Helps Us to Improve

We believe that planning for improvement is key to our ability to manage effectively and to measure performance and the impact of our activities. Through continuous learning and improvement, measurement and evaluation, we deliver efficient and relevant programs that support government priorities and objectives and meet the needs of our clients and stakeholders.

Creativity and Innovation are Key to Our Future

We value and support creativity and innovation in the development of leading-edge science and technology, policies and programs, better internal practices and improved service delivery. Creative thinking and innovative solutions can help us meet the challenges we face.

The Canadian Public Interest is Paramount

We help our minister, under law and the Constitution, to serve the public good and enhance the economic, social and environmental well-being of Canada.

Quality Service to Clients is Our Standard

We incorporate a strong focus in all our activities by consulting with our clients and stakeholders to ensure that we understand their needs and expectations and that our programs are relevant and useful. In delivering the best value for funds entrusted to us, we seek excellence in our products and services.

Effective Communication is a Shared Responsibility

We create an environment and provide the means for open, honest and transparent communication that encourages the sharing of timely information throughout our organization and with clients and stakeholders. Collectively and individually, we demonstrate our value and contribution to Canadian society.

Cooperation is the Foundation of Our Success

We believe cooperation to be the foundation for meeting the challenges of the future. Through partnerships, teamwork and strategic alliances, we work together toward common goals both within and outside the organization.

Earth Sciences Sector

Mission

As Canada's principal earth sciences agency, the Earth Sciences Sector will provide Canadians with timely and reliable geomatics and geoscience knowledge, products and services of the highest standards and in the most cost-effective manner possible. Through an ongoing commitment to quality services and the excellence of its employees, the Sector will maintain a strong, positive impact on Canada's national well-being, continually seeking innovations in its delivery of programs and in the way it works with its clients, stakeholders and partners.

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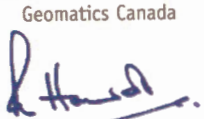

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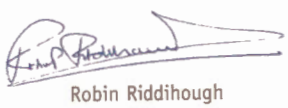

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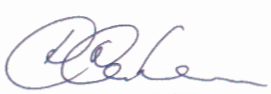

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Message from the Assistant Deputy Minister

I am pleased to introduce the 1999/2002 Business Plan for the Earth Sciences Sector. It provides details of the services and products that we will deliver to government, industry, the universities and the general public over the next three years.

As the Sector moves into its fourth year, its component organizations—the Geological Survey of Canada, Geomatics Canada and the Polar Continental Shelf Project—are developing a unified vision of the contribution that they make to Canadian society and the Canadian economy. This vision is one of providing a unique and authoritative centre of expertise for Canadian geoscience and geospatial data and knowledge. Using the Internet, the Sector is moving rapidly to provide access to a national geospatial knowledge base that I believe is essential for all aspects of the sustainable development of Canada's natural resources and the wise use of its landmass and offshore areas.

A five-year Strategic Plan that will move the Earth Sciences Sector towards this goal will be issued in the fall of 1999 and will outline the context and intent for the actions in this Business Plan. The Strategic Plan will show how the Sector intends to focus and develop its programs and in particular how it will ensure that it has the capacity to deliver them.

As I have said in my introduction to previous editions of the Business Plan, there is full alignment between the activities of the Sector and the goals of Natural Resources Canada. As the Plan continues to evolve in structure and format, it is my hope that this alignment remains clear and understandable to the reader. Whether staff, client or stakeholder, it is important that you understand what we intend to deliver and why we believe it is needed by Canada and Canadians.

Marc Denis Everell
Assistant Deputy Minister
Earth Sciences Sector

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1 Earth Sciences Sector: The Context

The Earth Sciences Sector Business Plan is one in a series of Natural Resources Canada (NRCan) planning documents. The series also includes the NRCan Business Plan, the NRCan Report on Plans and Priorities, and Earth Sciences Sector branch, centre and division business plans. These plans are linked by reference to a consistent planning framework for the 1999/2002 planning period, including the use of common departmental policy goals and objectives.

The Earth Sciences Sector (ESS), which represents approximately 35 percent of the total resource allocation of NRCan, was formed in 1995 through the amalgamation of the Geological Survey of Canada (GSC), Polar Continental Shelf Project (PCSP), Geomatics Canada (GC) and the Sector Corporate Services group. As a predominantly science and technology-based line sector of NRCan, ESS is the principal national agency for earth science knowledge and innovation. GSC is a major contributor to a comprehensive geoscience knowledge base of Canada. GC provides a reliable system of surveys, spatial referencing, maps, remotely sensed data and geographically referenced information describing the Canadian landmass. PCSP helps Canada exercise its sovereignty over its Arctic regions by providing comprehensive, coordinated logistical support to northern scientific research programs.

Introduction

The priorities and action plan for the government's second mandate are outlined in the document *Securing our Future Together*, the Speech from the Throne (September 2, 1997), and the February 1998 and 1999 budgets. Recurrent in these documents are the following themes:

- ensuring strategic fiscal management;
- restoring a sense of national unity;
- improving service quality and operational efficiency;
- fostering international trade and investment; and
- investing in knowledge, skills and innovation for jobs and growth.

To build a strong economy and secure society, the 1999 federal budget highlights the government's continued commitment to "... advance living standards by promoting well-paying jobs, productivity growth and equal opportunities for all, and by providing a safety net for those in need".

The government's objectives have guided ESS planning, program directions and management focus for the past three years. They will continue to form the basis for ESS activities for the planning period.

Update on Government Priorities

With the nation's finances in better shape, the 1999 federal budget extends the government's strategy to equip Canadians to succeed in the 21st century. The strategy is organized around the following three themes:

- maintaining sound economic and financial management;
- investing in key economic and social priorities; and
- providing tax relief and improving tax measures.

Government fiscal priorities remain consistent as a precondition for strengthening the economy and building a stronger country. Building a higher standard of living for Canadians translates into a strategy for increasing Canada's long-term productivity—to put in place an economic and social environment that supports the best use of capital, spurs innovation and attracts investors. Priorities include encouraging new investment, stimulating job creation and generating national wealth.

Economic growth for Canada will only be possible with a foundation of sound social policies. Government priorities will continue to be delivered through close integration of both social and economic programs as well as in partnership with the provinces, territories and Canadian citizens. To continue the progress made to date, the February 1999 budget committed new spending to the following key economic and social priorities: health, knowledge and innovation.

In its ongoing commitment to the Kyoto Protocol, tackling climate change continues to be a major focus for the government. Funding for the Climate Change Action Fund (CCAF) was allocated in the 1998 federal budget.

Prospering in the Global Economy

In a global economy, economic instability has an impact on all countries. Canada's response to date has been to maintain a balanced plan of sound fiscal management, responsible tax policy and focused investment. This strategy will position Canada for the new millennium and will help minimize the impact of global economic uncertainties as well as strengthen the social safety net.

The emerging knowledge-based economy is a global phenomenon. The revolution in information and communication technologies is facilitating access to information. As the new information technology becomes more a part of everyday society, there will be increasing demand for access to expertise and knowledge. Organizations are responding by developing information infrastructures on the Internet to render decision-making easier and to enable transactions such as electronic commerce and banking, to name but a few. Through the Connecting Canadians strategy, Canada is responding by developing its knowledge and information infrastructure to be accessible to all Canadians by the year 2000 and to make Canada the most connected nation in the world.

The Standing Committee on Finance identified a set of key principles for government action. These include a government environment that is flexible and adapts to the new global economy, while recognizing that there is a legitimate role for government in producing an educated workforce, investing in human capital, and creating scientific knowledge. Based on these principles and others, the goals to be pursued by governments include establishing a healthy fiscal, monetary and social climate; getting government right; taking advantage of the market's strengths; and investing in the infrastructure of a productive economy.

Highlights of the 1998 and 1999 Federal Budgets

The government's priorities put in place the foundation for a stronger, more productive economy by investing in two main areas: knowledge and innovation, and people. As Finance Minister Paul Martin said in his budget speech on February 16, 1999, "The fact is, much of our economic challenge can be summarized in two words—knowledge and innovation. These are the new raw materials of the 21st-century economy." The government's framework for innovation comprises four main thrusts: creating knowledge; disseminating and sharing knowledge; commercializing knowledge; and supporting employment.

Building on the commitment in previous budgets to help build a national system of innovation in Canada, the 1999 budget confirms additional funding for the Canada Foundation for Innovation, the Networks of Centres of Excellence (NCE) and Technology Partnerships Canada (TPC). Funding for the NCEs was almost doubled in the 1999 budget, compared to the previous year, with the result that there will be a total of 22 Networks (up from 14) and that there will be a competition for new Networks in 1999 instead of 2001. Continued investment in these initiatives supports the government's commitment to creating, disseminating and commercializing knowledge, as well as to developing highly skilled knowledge workers. These measures contribute to "... strengthening Canada's research facilities, providing more opportunities for advanced research, developing new and better uses of the information highway and strengthening federal programs that invest with companies to transform new ideas into products and services".

The 1999 budget has provided the Canadian Space Agency with an additional investment of $430 million over three years, and ongoing stable funding of $300 million annually starting in 2002/2003. Priorities of the Canadian Space Program and the Long-term Space Plan III include satellite observation of the earth for environmental monitoring and resource management, including collection and dissemination of space data for forest monitoring and climate change research. The Canadian Space Agency has been instrumental in the success of Canadian space technology firms in such fields as space robotics, earth observation, science and satellite communications.

Increased funding to the Granting Councils in the 1998 federal budget addressed two key areas: support to graduate students engaged in research, for post-graduate scholarships and for post-doctoral fellowships; and expansion of existing partnership programs between university researchers and the private sector. Funding for the Granting Councils was again increased in the 1999 budget, restoring the Granting Councils' funding to peak (1994/1995) levels.

The Connecting Canadians strategy continues to be a major element in the government's knowledge and innovation agenda, working to make Canada a world leader in the development and use of advanced information and communications technologies. Connecting Canadians addresses the commitment made in the government's Speech from the Throne "... to provide individuals, schools, libraries, small and large businesses, rural and Aboriginal communities, public institutions, and all levels of government with new opportunities for learning, interacting, transacting business and developing their social and economic potential" (Speech from the Throne, 1997). Two elements of the government's plan to disseminate knowledge and share ideas that were funded in the 1999 budget are the NRCan-led GeoConnections initiative and the Industry Canada-led Smart Communities initiative.

The dissemination of geospatial information and knowledge is promoted through GeoConnections. Under GeoConnections, the federal government and its provincial, territorial and industry partners will, for the first time ever, make diverse geographic information holdings accessible to Canadians, particularly in rural and remote communities. As stated in the 1999 budget speech, "The goal of this initiative is to develop and make available—through the information highway—comprehensive and integrated data about Canada's geography, environment, people and resources. Information will be categorized by geographical location to give users a detailed and timely profile of the physical, demographic and economic characteristics of any given region. In addition to keeping Canada at the forefront of mapping, GeoConnections will have applications in areas ranging from climate change monitoring to business development."

The government promotes the sharing of ideas through the Smart Communities initiative. Building on the recommendations of a Blue Ribbon Panel reporting to Industry Minister John Manley, this initiative will see one Smart Communities Demonstration Project established in each province, in the North and in an Aboriginal community over the next three years. The purpose of this initiative is to pave the way for innovative uses of information technology in the spirit of the international Smart Communities movement. This involves linking people and organizations together to share ideas and interests, and to promote community economic development. As outlined in the budget, "Communities will explore ways of developing electronic Internet-based information and services so that the benefits of this technology can be delivered to users in a more integrated and accessible fashion. The lessons learned in the course of these demonstration projects will advance the use of information technology at the community level across Canada".

Investing in people involves an investment in education and skills. The Millennium Scholarship Fund helps improve the capacity of young Canadians to learn and to succeed. Renewal of the Youth Employment Strategy and the Canada Jobs Fund help youths obtain work experience and access to learning opportunities and career information. The Earth Sciences Sector has created the Geomatics Canada Scholarship Program in cooperation with the Canadian Institute of Geomatics. The program assists in furthering the education and training of students in geomatics, promotes and increases the knowledge skills of the geomatics profession, and enhances the public good of all Canadians by promoting geomatics and its contribution to the economic and social well-being of Canada.

Gathering Strength—Canada's Aboriginal Action Plan was announced on January 7, 1998, as the government's response to the Royal Commission on Aboriginal Peoples report. The action plan has four objectives: renewing partnerships with Aboriginal people; strengthening Aboriginal governance; developing a new fiscal relationship; and supporting strong communities, people and economies by investing in health, public safety, education and economic development. The government's steps to renew its partnership with First Nations were made official with the signing of the Political Accord in June 1998. This reaffirmed the government's commitment to building and strengthening partnerships with all Aboriginal peoples, including Métis, Inuit and First Nations. A renewed consultation process has been confirmed on the basis of current priorities of Aboriginal peoples.

The Canadian Rural Partnership, a four-year initiative announced in the 1998 budget, has helped fund projects designed to support rural community development. On the basis of input from dialogue with citizens from across the country, culminating in a National Rural Workshop in October 1998, the government tabled a new Federal Rural Policy in late 1998. This initiative coordinates the development of federal policies and programs that support rural communities using a cross-government approach. With representatives from more than 25 government departments and rural teams from each province and territory, the initiative directs funding to rural development issues and concerns. The emphasis is to develop the means to enhance the quality of life in rural communities and better equip them to compete in a global economy, so that rural communities are able to contribute fully to the growth and stability of Canada. To date, a number of pilot projects supporting grassroots participation in community-based projects (including one NRCan Sustainable Communities Initiative pilot project) have been funded.

Federal Government Science and Technology

Science and technology (S&T) are important drivers in the knowledge-based economy and in increased innovation. Knowledge and skills are becoming increasingly important factors in promoting the comparative advantages of nations. Science and technology will promote the development of new ideas, research, the adoption of advanced technologies, and will position Canada as a major competitor in the global economy. The transition to a knowledge-based economy refers not only to the high technology industries, such as information and communications technology and biotechnology, but also refers to resource industries, such as forestry, energy, mining and agriculture that have been successful in transforming themselves into high technology industries over the past several decades.

The federal role in S&T and in science and technology policy is to provide leadership and to guide Canadians in the transition to the knowledge-based economy. In 1996, the federal government established an S&T strategy and published *S&T for the New Century—A Federal Strategy*. This strategy recognizes that S&T plays a critical role in the health and well-being of Canadians and in the country's ability to generate sustainable employment and economic growth. In this context, it outlines a strategic approach to the development of S&T policies and programs that recognizes the need to develop a national system of innovation and a system of partnership and collaboration.

There are a number of management challenges to ensuring that federal S&T meets government needs and moves in the directions outlined in the Federal S&T Strategy: examining existing management practices; reviewing government capacities to deliver science and technology (human resources issues, particularly recruitment, rejuvenation and retention); fostering collaboration and partnerships among government departments; and communicating and increasing the availability of information to Canadians. In December 1998, the Auditor General released a report that identified a number of areas where additional progress was required in implementing the Federal S&T Strategy, including effective interdepartmental management of horizontal files such as climate change.

Although there is still much to do, the government (and NRCan in particular, as noted by the Auditor General) are proud of a number of accomplishments in S&T management. Progress has been achieved in the area of human resources issues facing the S&T community. Having reviewed the issues, science-based government departments are turning towards implementation. Success has been noted in horizontal management, where science-based departments have jointly developed a code on the conduct, management and use of federal S&T. Collaboration on S&T in support of sustainable development has been a success. Important achievements include publication of the first annual report on S&T *(Minding Our Future)*, released in early 1998; the joint development of new performance frameworks for horizontal files such as climate change; and research and development (R&D) impact assessments. Challenges continue and efforts will be directed towards communication, rewards and recognition, policy research, and restoration of public confidence.

In 1997, the Clerk of the Privy Council challenged science-based departments and agencies to ensure that government and other S&T providers had the capacity to meet the S&T needs of the nation over the next decade. To take up the challenge, a number of departments, including NRCan, initiated studies of their future capacity requirements. A parallel and interrelated process undertaken by the government's S&T human resources community is addressing the revitalization of the S&T workforce through the development of strategies for recruitment, rejuvenation and retention of staff. An important milestone was the government Science Managers' Conference, held in Ottawa in December 1998 under the leadership of NRCan's Deputy Minister. Issues such as human resource management, performance measurement, capacity, communication and others were examined.

There were two important exercises initiated in 1998/1999 that involved most science-based departments and agencies in the federal government and will shape the government's science agenda in 1999/2000. A committee of assistant deputy ministers from science-based departments and agencies is studying the issue of the role of the federal government in performing S&T and its capacity to deliver, in response to the Clerk's challenge to make the case for science in government. Although Canada's Federal S&T Strategy was launched in 1996, current discussions on S&T across government relate to concerns regarding the government's ability to meet the needs of the nation in the new millennium, the void that will occur in the workplace when many retire in the next decade (2005/2010), and recent shortcomings in science policy linkages in government departments.

The second government-wide exercise involves the newly established Committee of S&T Advisors (CSTA), which comprises representatives from the senior ministerial advisory boards of departments and reports to the Cabinet Committee on the Economic Union through the Secretary of State for Science, Research and Development. CSTA is examining the role of government in S&T, its capacity to deliver S&T, as well as the issue of science advice to government. CSTA will report to the Cabinet Committee on Economic Union on these two issues in 1999.

The Earth Sciences Sector is continuing to develop new and innovative relationships with the provinces and territories, universities and industry on program delivery (e.g. the Intergovernmental Geoscience Accord) and information dissemination (e.g. GeoConnections). With other federal S&T agencies, we recognize our mutual interdependency in terms of delivering upon our respective mandates and in addressing cross-cutting science policy issues. The Sector developed strong research partnerships with some universities. These arrangements were reduced significantly over the past few years and ESS is now re-introducing their modern equivalents at both program and institutional levels (e.g. the ESS-Natural Sciences and Engineering Research Council (NSERC) Research Partnership Program). These are essential for the delivery of national programs. They also address concerns about the supply of future graduates with the skills to meet future ESS challenges. International partnerships need to be fostered, as they provide significant benefits for Canada.

ESS needs to explore new and innovative ways of doing business in order to work effectively and efficiently with the national capacity for the earth sciences. This includes partnerships, networks [e.g. the NCE Geomatics for Informed Decisions (GEOIDE)] and strategic alliances [e.g. the Canadian Space Agency (CSA) and the Canada Centre for Remote Sensing (CCRS)]. It needs to pursue new funding in priority areas for the government, and build win-win partnerships to increase the resources (financial, intellectual) and reach of the programs. As an example, the NSERC-ESS Lithoprobe partnership has been an outstanding success for Canada. Interdepartmental and intergovernmental cooperation is critical to climate change science, impacts and adaptation research. Initiatives include working with the Department of Fisheries and Oceans (DFO) and Environment Canada (EC) on coastal zone impacts of sea level rise, and with Agriculture and Agri-Food Canada (AAFC) on groundwater for agricultural use in the Prairies. In the Metals in the Environment Program in GSC, ESS has established partnerships with the Canada Centre for Mineral and Energy Technology (CANMET), the Canadian Forest Service (CFS), Health Canada (HC), AAFC and EC. ESS regional presence and program delivery is an important consideration.

Sustainable Development and Climate Change

Sustainable development has been at the forefront of the international community's priorities since the Earth Summit in Rio de Janeiro, Brazil in 1992. The United Nations Commission on Sustainable Development (UNSCD) was established following this meeting to ensure effective follow-up, in particular on Agenda 21, a plan for achieving sustainable development by the 21st century. A clear definition of the term "sustainable development" was developed by the Brundtland Commission as "Development that meets the needs of the present without compromising the ability of future generations to meet their own needs". Work is ongoing to ensure a high level of visibility for sustainable development issues and to improve the UN's coordination of environment and development activities.

The Canadian government maintains a leadership role in sustainable development, both internationally and domestically. At the Third Conference of the Parties in Kyoto, Japan in December 1997, Canada committed domestic and international efforts towards the reduction of greenhouse gases. With the international community, Canada has been working to promote sustainable development and to reach practical solutions to global environmental problems, such as the reduction of greenhouse gases and toxic chemicals. Through its work with the World Trade Organization, the United Nations, the International Labour Organization and the North American Commission for Environmental Cooperation, the government participates in the development of standards for protecting people and the environment. It remains a leader in the international community by providing expertise on environmental issues to other nations.

International commitment to the climate change issue arose from the Kyoto Protocol and the United Nations Framework Convention on Climate Change (UNFCCC). Countries agreed that work is necessary in the areas of science (both monitoring and research), impacts and adaptation. Scientific effort is required in order to increase our understanding of the magnitude, rate and regional distribution of changes and in turn to better estimate the risks associated with climate change. Scientific research is also necessary to help understand the impact of climate change on health and safety, the environment, the economy and the social fabric, and to support the development of adaptation strategies.

Domestically, Canada continues to implement strategies to support sustainable development and environmental protection. Some of the initiatives include:

- completing the national parks system by the year 2000;
- strengthening environmental and health science capacity by funding research on toxic substances;
- modernizing the Canadian research infrastructure through the Canadian Foundation for Innovation;
- working with the provinces to develop and implement the highest environmental standards;
- supporting environmental efficiency and innovation in Canadian firms and products through R&D support and tax policies;

- continuing to establish marine conservation areas and to develop legislation and policies for a marine conservation system;
- developing legislation to identify, protect and recover species at risk within federal jurisdiction; and
- requiring all federal government departments to develop a sustainable development strategy.

Sustainable development ensures that Canada uses its resources in a manner that protects the health of the natural environment. It involves the development of strategies for making balanced decisions on the use of natural resources and for maintaining the economic and social benefits of natural resources for future generations. A key guiding theme for NRCan is sustainable development. It responds to the view of Canadians that the use and development of Canada's natural resources is undertaken in a way that protects the health of the natural environment and ensures a legacy for the future.

Policy Development

The future of governance and policy development lies in partnership and shared responsibility. An integrated process for policy development and program delivery involves an increased sharing of decisions on government programs with both the provinces and territories, and Canadian citizens. In the Youth Employment Strategy, government works with provincial and territorial partners, as well as private and voluntary sectors, to help youths develop skills and obtain access to work experience.

Citizen-centred governance is also an important element in an integrated and collaborative approach to policy development. The future sees a return to community and governments centred on citizens. Success depends on active and meaningful participation in public consultation. The government is exploring different approaches for successful citizen engagement. The National Forum on Climate Change, conducted in the spring of 1998, is an example of the jury model of engagement. Citizen engagement is not a substitute for consultation, which continues to have a valuable role, but does provide new ways of bringing citizens into the public policy and decision-making processes. An example of another government program that was developed through community engagement and dialogue is the Canadian Rural Partnership program.

Canadians are concerned about the quality and accountability of their government, and want to be involved in policy development and decision-making. Good governance is achieved through a flexible and adaptive workforce committed to improved, cost-effective and efficient service delivery, partnerships, furthering the public good in areas such as health and safety, and providing services that are responsive to the needs to the citizens and regions of Canada. Initiatives include NRCan's Guide to Good Management and S&T Management Framework, and the Treasury Board's Modernization of Comptrollership initiative.

Policy development and governance is also shared across government departments. Progress in rural and community development, northern development, climate change, sustainable development, and science and technology are a few examples of horizontally managed files. In addition to participating in all of these commitments, the Earth Sciences Sector is leading a major program, GeoConnections, to provide access to geographic data through the Internet. The Clerk of the Privy Council's Sixth Annual Report to the Prime Minister features GeoConnections as an example of a successfully managed activity. GeoConnections was also included in an August 1998 report by the Canadian Centre for Management Development, which examines different government practices related to efficient government service delivery.

Future Federal Science and Policy Issues

The Organization for Economic Cooperation and Development (OECD), in its publication *Science, Technology and Industry Outlook 1998,* indicated four key forces driving the long-term changes in OECD economies other than economic growth: technological change; globalization; changing lifestyle and demand patterns; and threats to the global environment. Other issues facing Canada and the global community include the growth in the human population; climate change; upgrading the transportation infrastructure; risks associated with natural hazards; demand for energy, mineral, soil and water resources; devolution of land and resource management to First Nations and the territories; the need to increase productivity performance and international competitiveness of industry; and mitigation of the environmental impacts of human activities. ESS will also need to foster continued rapid growth in technological capabilities for the acquisition, management, analysis and dissemination of earth science information through the Internet and other media, as well as the development of widely available precise satellite positioning.

There is an increasing expectation by Canadians that the government should seek to mitigate the impact of natural disasters and understand their link to climate change, protect the environment, ensure a food supply untainted by toxic substances, sustain resource-dependent communities, and meet the needs and aspirations of First Nations and northerners in managing their lands and resources. Canadians are aware of the issues and are more involved in decision-making related to their land and resources than ever before. Canadians are demanding more geo-information as the evolution in both technology and government service delivery support more citizen engagement and involvement in policy development and decision-making. These changes are bringing about a shift in the organizational culture, from a focus on serving the scientific and technical community to serving a much broader client base.

A number of key science policy issues for the earth sciences were identified through the ESS S&T Capacities Study and they relate to Canadian and global trends. The key issues are:

- sustainable resource development, particularly in the frontier regions of the North and offshore;
- supply of potable water (particularly groundwater);
- climate change;
- public health and safety (e.g. natural hazards);
- toxic substances and contaminants in the environment;

- waste management;
- environmental protection;
- land use and landscape management;
- coastal zone and offshore management (e.g. *Oceans Act*, marine protected areas);
- innovation to increase the productivity and global competitiveness of Canadian industry;
- Canadian sovereignty in offshore areas and the North (e.g. Law of the Sea);
- evolution in governance due to the settlement of land claims, devolution, and division in the territories;
- capacity-building in Aboriginal, rural and northern communities; and
- transformation of the national infrastructure to take advantage of satellite, telecommunications and information technology.

ESS needs to be responsive to emerging policy issues and government priorities and requires flexible and innovative staff and management. The increasingly complex nature of issues and of science and technology, coupled with reduced resources and capacity in all organizations, has resulted in the development of partnerships, networks and strategic alliances within the national and international earth sciences community.

Minister's Action Plan—Winning in the Knowledge-Based Economy

Building a higher standard of living for Canadians translates into a strategy for increasing Canada's long-term productivity—to put in place an economic and social environment that supports the best use of capital, spurs innovation and attracts investors. NRCan is addressing key policy challenges of the government's productivity agenda through its action plan for Winning in the Knowledge-based Economy (WINS). These challenges include the following:

- addressing Canada's lagging productivity and innovation relative to its competitors, and the need to foster competitive natural resource industries and the value-added sector in the knowledge-based, global marketplace;
- building capacity and creating work opportunities in rural, remote, northern and Aboriginal communities by providing access to government information and services through initiatives such as GeoConnections;
- implementing Canada's commitment to the Kyoto Protocol domestically through climate change-related policy development, scientific research and technology development; and
- maintaining an investment climate and national infrastructure, including accessible scientific knowledge and technology, that attracts investment to the natural resource sector.

WINS was announced in 1997 as the departmental contribution towards meeting the government's key priorities. It influences many of the programs and policies of the department. The strategy focuses on the following five areas.

- Create national consensus: engage Canadians in a nationwide, collaborative effort to obtain consensus on natural resources, their role in the country's economic and social life, and the sustainable development of Canada's natural resources.

- Tackle climate change: play a lead role in identifying and developing climate change initiatives to support the commitments made by Canada at Kyoto in 1997 to reduce greenhouse gas emissions and help mitigate the impacts of climate change. The department is the recognized leader in government and provides knowledge and technical advice to industry and other government departments.
- Multiply work opportunities: strengthen the resource base of regions that depend on resource development, particularly rural, northern and Aboriginal communities. NRCan provides support to industry, helps extend the lifespan of existing resource operations, strengthens the capacity of Aboriginal communities to exploit resource sector opportunities, and helps rural and urban communities to expand and add value to their resource-based industries. These initiatives will enhance Canada's ability to sustain direct and indirect employment in the resource sector, with new value-added and knowledge-intensive growth in all regions.
- Increase resource trade and investment: expand access to international markets and promote an investment climate for Canadian resource-based products, knowledge, technologies, equipment and services.
- Spur innovation: encourage innovation in the natural resource industries and related high growth areas, such as geomatics and environmental technologies, and help build the next generation of knowledge-based, value-added firms.

Each component of WINS contains a number of initiatives with short- and long-term implications for ESS. The Earth Sciences Sector is responding to the department's priorities by leading a number of initiatives, including the Resource Innovation Initiative, the Communities Initiative and the Science, Impacts and Adaptation component of the Climate Change Initiative.

Earth Sciences Sector Initiatives

Towards a Vision for the Earth Sciences Sector

ESS is facing a period of dramatic cultural change for which it needs to be flexible, highly relevant, proactive and politically astute within a clear and focused understanding of its role in government and the community.

The changes foreseen come mainly from the technological revolution, which, through the increased use of the Internet, will place ESS knowledge about the Canadian landmass and its resources at the fingertips of most Canadians. A new and broader range of clients will put greater demands on the Sector's expertise and knowledge about a wide range of issues. New products, syntheses and knowledge integrations will be demanded. The link between ESS scientific and technical knowledge and policy choices, at all levels of government, will become more urgent and will have to be communicated quickly in ways that are understood.

To prosper, the Sector will have to refine, negotiate and clearly understand its role in the geoscience and geomatics communities. It will have to build partnerships, taking the lead where necessary but being a team player where appropriate. It will have to place itself firmly in the policy agenda and be proactive in providing and communicating relevant advice and expertise. To meet all these challenges, ESS will have to develop, recruit, train and nurture a workforce that is highly skilled, adaptable and interactive and that can communicate at all levels.

While a final vision statement has not yet been agreed upon, the concept that is emerging is that of recognition of the Earth Sciences Sector as the pre-eminent authority on Canadian geoscience and geospatial data and knowledge. Final agreement on the vision and its characteristics is expected in the spring of 1999. This will be followed by a campaign of internal communication to ensure that all staff understand the directions and strategic context that have been identified. In the fall of 1999, the ESS Strategic Plan will be issued. It will lay down the strategic directions for the Sector over the next five years.

WINS Communities Initiative

The Communities Initiative in the WINS aims to facilitate community-based decision-making on the sustainable development and use of land and resources and the creation of work opportunities in rural, remote, Aboriginal and northern communities. It comprises two distinct elements: first, the Community Capacity-building Strategy and second, the interdepartmental Sustainable Communities Initiative (SCI). These complementary elements represent the policy and program thrusts of NRCan's overall Communities Initiative, which is well integrated with community-related initiatives in other federal government departments, as well as provincial, territorial, Aboriginal and community governments.

The purpose of the SCI is to bring rural, Aboriginal and urban communities closer to decision-making about sustainable development. It is a partnership of Natural Resources Canada with federal government departments, notably Industry Canada, Indian and Northern Affairs Canada, Health Canada, Environment Canada, Agriculture and Agri-Food Canada, Statistics Canada, Human Resources Development Canada, as well as provincial, territorial and community governments and organizations. Together, the partners aim to build or strengthen the capacity of Canadian communities that wish to obtain, generate, use and discuss relevant information on the Information Highway, so as to improve their ability to plan and make decisions.

Sustainable Communities pilot projects, described later in this section, can be viewed as a community-oriented application of GeoConnections. These projects will make full use of results available from GeoConnections and from online initiatives in various suppliers' organizations. They will also promote interim solutions where necessary, and provide advice on the preparation of supplementary data layers of local interest not available elsewhere.

One of the SCI pilot projects is a Canadian Rural Partnerships project involving the Montreal Lake Cree Nation in northern Saskatchewan.

The goals of the community capacity-building strategy are to:

- define the needs of rural, remote, northern and Aboriginal communities in terms of work opportunities, economic diversification and decision-making related to sustainable land and resource development and use;

- assist communities to help themselves by building capacity, facilitating easy access to NRCan information and services, and building partnerships with governments at all levels, industry and the voluntary sector; and
- define NRCan's role and strategy for contributing to community capacity-building.

WINS Resource Innovation Initiative

The Resource Innovation Initiative (RII) is a broad-based federal initiative that builds, in part, upon the strong record of science and technology achievements in the natural resource sector and that sector's international reputation for innovation excellence in many areas. This initiative will target efforts in three key areas:

- creation of and access to national knowledge networks;
- development and commercialization of technology for sustainable resource management and value-added industries; and
- promotion of a strong S&T capacity and further building of a knowledge-intensive workforce through skills development.

WINS Latin America Geomatics Trade Post

The World Bank has determined that Latin American countries that have undertaken serious reform have enjoyed an average 2 percent higher per capita income growth in the 1990s than those that have not. Therefore, it is encouraging that over the last several years a number of countries in the region have shown a deep commitment to reform.

Latin America's strong growth in 1996 reflected resumed positive growth in Argentina, whose economy expanded by approximately 4.4 percent. In Chile, one of the earliest and most consistent performers in the region, the economy grew by 7 percent.

A primary stimulus for the increasing demand for geomatics in this region is the widespread implementation of land reform programs. The World Bank and the Inter-American Development Bank have made the connection between security of land tenure and sustained economic growth, and are financing many projects in Central and South America. In addition, the increasing focus on sustainable resource development (both land and marine) and the environment and, in some countries, the privatization of state-owned utilities, are also fuelling demand.

As a result of the increasing demand for geomatics services in these regions, coupled with the Canadian industry's expertise, the Earth Sciences Sector, in conjunction with the Canadian geomatics industry, has targeted the Latin American market. An important step in developing this market was to establish a trade post in Latin America. By positioning a marketing post directly in the region of most interest to industry, government is showing commitment to and leadership in exploiting the global market for this high-tech industry.

The primary objective of the post is to increase the gross revenues of Canadian industry from export activities in Latin America to at least $30 million over three years. In addition, other objectives include reducing the risk and cost of doing business in Latin America; enhancing the international competitive advantage of all members in sourcing, securing and servicing multi-phased projects; providing small and medium-sized firms with opportunities to participate on larger projects; and enhancing working relationships between private firms and Geomatics Canada.

The Canadian geomatics industry plans to assume responsibility for this Latin American trade post after the successful completion of the first three years. This coincides well with its plans for future development in the region. This initiative will also encourage the development of a second such trade post in the Asia-Pacific region, where the market for geomatics technologies and Canadian expertise is of the same order of magnitude.

Climate Change Science

NRCan's activities to increase energy efficiency and reduce the emission of greenhouse gases have played a large part in the development of strategies and policies to mitigate climate change. The role of science in reducing the uncertainties about the magnitude and rate of change of climatic parameters, understanding the consequences of that change (impacts) and developing adaptation strategies to minimize the societal consequences is an important contribution to policy development.

Reducing uncertainties about climate change was a significant element of the Green Plan, which came to an end in 1996. During and subsequent to that program, ESS has been involved in monitoring parameters that influence or are influenced by climate change. This includes such diverse activities as the in situ monitoring of glaciers and the remote observation of the growth and decay of vegetation as a source or sink of carbon. The latter is a key objective of collaboration between CCRS and the Canadian Forest Service. It will provide input to the post-Kyoto international negotiating process.

ESS has been involved in monitoring and modelling the impact that an increase in global temperature has on the land surface, and thus on pipelines and other infrastructure caused by the decay of permafrost. These processes are poorly understood, yet form the basis for determining the impacts of climate change on Canada and Canadians.

Impacts compatible with current predictions of climate change are already being observed. Those predicted changes would result in far more serious impacts in the future even if current commitments to emission reduction were achieved.

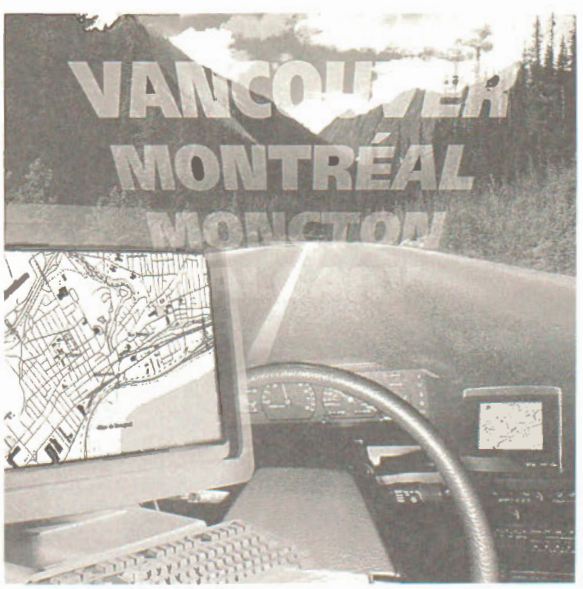
In April 1998, the federal, provincial and territorial ministers of energy and environment agreed that Canada must do its part to address climate change. Using the newly established Climate Change Action Fund, they decided to move forward on strengthening voluntary action and establishing credit for early actions to reduce greenhouse gas emissions, and on developing a national implementation strategy on climate change. Science and technology figures prominently in the development of the strategy.

Canada's commitments in Kyoto include the development of the scientific understanding of climate change, and the development, sharing and implementation of adaptation strategies. Part of the Climate Change Action Fund (CCAF) has been targeted to addressing science, impacts and adaptation, and a business case to support those activities has been submitted. Environment Canada (EC) is responsible for the science activity while NRCan is responsible for the adaptation activity. Both activities will, by their nature, be national or international in scope. Coordination within NRCan will be achieved through the Director Generals' Committee on Climate Change Response Strategies. The immediate objective is the development, through the Climate Change Secretariat, of a National Implementation Strategy to address climate change over time scales of a decade to a century.

Establishment of the CCAF has brought with it additional responsibilities for the Sector. A significant element of the ESS program is devoted to the science of climate change (paleo-climate studies; sustainability of water resources; remote sensing related to carbon sinks and sources; radiation; and process responses). In addition, responsibility for the federal program related to impact and adaptation has been assumed by the Assistant Deputy Minister (ADM) of ESS, and a director general co-chairs the interdepartmental technical committee designing and implementing this program. These factors have increased the Sector's effort on climate change. A Liaison Office has been established within the Sector to coordinate these adaptation activities. A national workshop in October 1998, proceeding from the conclusions of a national virtual workshop, identified research that, on time scales of two, five to 10, and 20 years, would be needed to develop adaptation strategies for different sectors of the economy. On the science side, the immediate priority is related to the sources and sinks of greenhouse gases as input to Canada's international negotiation strategy on climate change. ESS is heavily involved in this activity, particularly through the application of remote sensing to monitor changes in vegetation, its carbon uptake through agriculture and forestry, and its discharge through fires and crop usage. These are critical elements of the carbon budget required as input to address the Kyoto protocol. There have also been significant advances in the use of satellites to collect data that can be used to determine the degree to which solar radiation is reflected by the atmosphere rather than being captured within it. The potential applications of GPS and radio observatories in climate change monitoring remain largely untapped. All in all, there is much that the Sector has to offer in providing input into important policy decisions.

Building Partnerships with the New Government of Nunavut

The Earth Sciences Sector has for many years played a key role in land and resource management in the North through delivery of various geoscience programs, operation of the Canada Lands Survey System and the National Topographic Data Base (NTDB). Both the Yukon and Northwest Territories are undergoing major political changes arising from the settlement of First Nations land claims. New First Nations government bodies are sharing in governing Canada's North. ESS is committed to continuing to provide the same level of services to all citizens and government agencies across the new North.



The Earth Sciences Sector delivers a large and long-standing program in the North, with scientific, policy, regulatory and logistical responsibilities, and remains strongly committed to working in partnership with the Government of Nunavut, other federal departments, and northern communities and stakeholders towards the future social, economic and environmental well-being of Nunavut. Recent examples of partnership projects include the 1997/1998 North Baffin and 1998/1999 Central Baffin Partnership projects that ESS completed in conjunction with the Qikiqtaaluk Corporation (an Inuit economic development corporation), the Government of the Northwest Territories, and Indian and Northern Affairs Canada (INAC).

In conjunction with the Government of Nunavut and INAC, ESS has agreed to establish a physical presence in Nunavut. Planning for the establishment of both an intergovernmental Nunavut geoscience office in Iqaluit, and a Legal Surveys Division Client Liaison Unit (CLU) at a site yet to be determined, includes ESS staffing during 1999. The Nunavut Geoscience Office will be a partnership between the Government of Nunavut's Department of Sustainable Development, INAC and GSC. The Legal Surveys Division CLU will be established in association with the Nunavut departments of Justice and Community Government, and Housing and Transportation. It is hoped that the partnerships of these offices will serve as a model for collaborative government program delivery and capacity-building.

In addition, ESS is committed to working with officials of the Government of Nunavut and INAC to develop appropriate agreements and memoranda of understanding that will establish the framework for enhanced collaboration. For example, the draft Nunavut Geoscience Accord for overall program coordination between GSC, Nunavut's Department of Sustainable Development and INAC is currently being negotiated and is expected to be in place soon after the formation of the new territory of Nunavut that took place on April 1, 1999.

As part of INAC's efforts to coordinate the development of a consistent federal Nunavut communication strategy, ESS continues to work closely with NRCan's Communications Branch to develop an effective departmental Nunavut communications plan.

Long-term Space Plan III

The Long-term Space Plan III (LTSP III) was approved in February 1999 as part of the most recent budget, and discussions are underway to begin its implementation this year. Priorities for LTSP III include the acquisition, via satellite, and use of earth observation data to better understand environmental issues related to the Kyoto Protocol (e.g. monitoring of forests as carbon sinks vs. sources); to provide state-of-the-art rescue and recovery assistance in response to natural disasters; and to sustain Canada's position as a world leader in earth observation technologies and applications, both of which are essential for the continued growth of an industry dedicated to developing new uses for an array of space technologies.

Research Partnership Program

In October 1998, the Earth Sciences Sector and the Natural Sciences and Engineering Research Council of Canada (NSERC) signed a Memorandum of Understanding (MOU) to establish a research partnerships program to support innovative collaborative projects that address priority research areas in the earth sciences. This five-year agreement will provide $1.5 million a year in research support to Canada's universities. ESS will contribute up to $500 000 annually.

The purpose of the program is to:

- capitalize on the R&D capacity existing in academic, government, industrial and other institutions;
- build strong linkages and create synergy between researchers in universities, the private and public sectors, and ESS;
- achieve the efficient and effective transfer of research results and technology to identified contacts in the public and private sectors; and
- train and develop highly qualified personnel in priority areas, consistent with future human resource requirements in the public and private sectors.

The cost will be shared. Private sector and industrial partners will provide at least one-third of direct cash project costs. ESS and NSERC will share the remainder on a 50/50 basis. Cash and in-kind contributions by other interested partners, such as federal and provincial departments, ministries or agencies and non-profit organizations, are welcome, but will not form part of the funding ratio.

GeoConnections

GeoConnections is a joint federal-provincial-industry program to build the Canadian Geospatial Data Infrastructure (CGDI) part of the Information Highway. GeoConnections programs will:

- enable the development of core inventory, access and data delivery technologies;
- support the connection of spatial information from all NRCan sectors;
- pilot the development of the Canadian Geoscience Knowledge Network (CGKN);
- develop a basic spatial data framework, referenced to the Canadian Spatial Reference System (CSRS), to enable data integration, applications development and harmonized data collection;
- establish a national secretariat to support implementation in NRCan, and support the National Roundtable on Spatial Information to coordinate efforts between departments, governments, and industry;
- leverage the private sector to develop required technology components and develop connection to value-added databases; and
- develop human resources by promoting internships and skills development for Canadian graduates.

Partnerships and Linkages

Geoconnections partnerships include 12 federal departments and agencies, provincial and territorial agencies, the private sector and Canadian universities. Partnerships and linkages are very strong in this program. Funding for the current phase of GeoConnections is being devoted to making NRCan a best practices organization and to promoting the wider adoption of a horizontal approach.

Activities

Each of the sectors in NRCan is working within the CGDI Knowledge Initiative Working Group to develop implementation plans to bring major geospatial databases online through CGDI. Other initiatives undertaken under GeoConnections include basic infrastructure activities such as training and support for participation in the Canadian Earth Observation Network (CEONet), development of GeoGratis, and implementation of Web site services. These activities are of direct benefit to all holders of geographic information within the department, other federal agencies, provincial and territorial agencies, and clients.

GeoInnovations was launched to seed the development of technology and new innovative tools in partnership with the private sector. This program will leverage co-investments from the private sector, which will, in turn, develop required infrastructure technologies, and gain marketable skills and experience. Where appropriate, technology will be transferred from NRCan activities to the private sector to further add value, and foster enhancements and commercialization.

Development of the human capital of the geomatics sector and wider user community will be provided through the Geomatics Skills Network project. In partnership with Human Resources Development Canada and Industry Canada, the Geomatics Skills Network project will develop a Web-based clearinghouse for employers and job seekers. The project will provide students and recent graduates with experience in building opportunities to complement entry into the job market. An industry-public-academic sector steering committee is guiding the development of the project.

Benefits

Specific benefits of GeoConnections include the following.

- Start-up support to implement GeoConnections within NRCan supports further development of the technologies and services required for implementation across the geospatial community in the federal, provincial and territorial governments, and the private and academic sectors.
- Making spatial information assets electronically accessible for the first time supports the wider application of these information assets.
- GeoConnections will deliver significant government information content for the Information Highway, making government a model user of the Information Highway.
- Access to NRCan spatial assets will enable the private sector to commercialize information and develop new value-added knowledge products.
- Partnership with the private sector to develop the required tools and technologies will support spin-off sales for the industry and the transfer of technology from NRCan laboratories.

- Implementation of CGDI across the department furthers the efforts of the Knowledge Initiative (KI) by inventorying spatial assets, information and services and making these available to clients.
- Geospatial information obtained via CGDI will help rural, remote and Aboriginal communities develop capacities for better decision-making and local economic development.
- GeoConnections provides excellent opportunities for NRCan to demonstrate its leadership related to spatial information and management of cross-government issues.

Marine Geoscience Review

In 1998, ESS initiated a systematic review of its major science programs. The first review, that of the Marine Geoscience Program within the Sector, took place over the summer of 1998, with the final report, as well as a response from the Sector, released in March 1999.

The Canadian Geoscience Council accepted the invitation to review GSC's marine geoscience activities, through a panel chaired by Dr. Jeremy Hall of Memorial University of Newfoundland.

The review panel observed a program with impressive strengths and worrisome weaknesses, and numerous examples of innovative technology, exemplary responsiveness to client needs and excellent examples of projects addressing immediate societal needs. The panel expressed concerns about the loss of corporate memory in the next five to 10 years and that the existing extensive marine geoscience knowledge base is less accessible, less consistent and less systematic than it should be. The review panel made several recommendations in the areas of program direction, implementation, human resources and physical infrastructure. Key examples are a recommendation to develop a more coherent, compelling and focused long-term vision and strategy for the marine program, and especially to develop national priorities for the program based on a three-tier system, with long-term objectives met through medium- and short-term goals. The Sector's response embraced most of these recommendations and outlined how they were going to be addressed.

ESS Science and Technology Capacities Study—Planning for the Future

In 1998/1999, the Earth Sciences Sector examined its S&T capacity in the context of national needs and capacities for the earth sciences over the next decade, against a backdrop of evolving science policy issues and technology. To define and frame ESS's future S&T capacity, staff and managers were interviewed in division focus groups, which in the end included more than 250 staff members. The focus groups responded to the following questions: What is ESS's capacity to deliver S&T over the next five to 10 years, in response to demographics, evolving program demands, future issues and technological changes? What are the S&T gaps and related competencies and how can they be addressed? As well, ESS consulted with external advisory and stakeholder groups comprising geoscience and geomatics representatives from other federal government departments, provincial and territorial government agencies, universities and the private sector. The ESS S&T Capacities Study is linked to the NRCan science capacity exercise, an interdepartmental capacities exercise, and research underway in the new Council of S&T Advisors on the role of the federal government in S&T and its capacity to deliver.

ESS is addressing an increasing number of societal issues and government priorities that involve integrated economic and social policy goals as well as public good goals such as risk management (including health and safety, and environmental protection) and innovative service delivery (e.g. GeoConnections). Looking ahead, there are a number of issues that the nation may face over the next decade. These include the growth in the human population, climate change, upgrading of the national transportation infrastructure, risks associated with natural hazards, and demand for energy, mineral, soil and water resources. They also include competing demands for land and resource use, new responsibilities for land and resource management for First Nations and the territories, the need to increase the productivity and international competitiveness of Canadian industry, and mitigation of the environmental impacts of human activities. In addition, there is a parallel growth in technological capabilities for the acquisition, management, analysis and dissemination of earth science information through the Internet and other media.

There are significant capacity gaps at present, brought on by a lack of recruitment, Program Review, voluntary departures and further resource reductions. Sector demographics indicate the potential retirement of more than 30 percent of the workforce between the years 2003 and 2010. Cumulative experience, knowledge, and the continuity of national expertise and knowledge will be lost, unless steps are taken to ensure the recruitment and mentoring of the next generation while retaining key current staff and fostering an effective program for emeritus scientists. ESS will be in competition for highly qualified personnel and the supply from Canadian institutions will be insufficient to meet the demand (e.g. marine geoscience, and the quantitative modelling of earth observation data). Consideration needs to be given to communicating with universities and colleges regarding future expertise needs; supporting undergraduate and graduate students through direct training, graduate scholarships and supplements; and ESS-NSERC Research Partnership grants to faculty.

Assessment and Communication of the Impact and Value of ESS S&T Programs

Much of the work of the Earth Sciences Sector is often unrecognized by Canadians, except as geological or topographic maps or images of earth as viewed from space. The impact and value of ESS S&T programs include the following.

- Geological maps, geochemical and geophysical data, and mineral deposit models lower exploration costs, thus increasing Canada's competitive advantage in attracting investment in exploration and new discoveries.
- Exploration technologies and geomatics applications transferred to Canadian industry improve their international competitiveness and create jobs for Canadians.
- Reliable surveys of boundaries, accurate positioning using the latest Global Positioning System (GPS) technology, community-focused spatial information, capacity-building and decision-making tools support the sound management of lands and resources by First Nations and territorial governments with devolved responsibilities.
- Up-to-date and reliable aeronautical charts and scientifically sound landslide hazard risk maps are published to ensure safe air, road and rail travel.
- Seismic risk assessments in the National Building Code provide information necessary to minimize the loss of life and damage due to earthquakes, while avoiding unnecessary expenditures.

- Monitoring of the nuclear Comprehensive Test Ban Treaty (CTBT) allows Canada to acquire and provide data to detect and distinguish nuclear explosions.
- The effects of climate change on weather events, sea and groundwater levels, glaciers in the Cordillera, and permafrost in the Mackenzie Delta are studied to produce information for the development of adaptation strategies.
- Canadians expect balanced decisions to be made about the environment and the sustainable development of natural resources. Geoscience and geomatics information and expertise are made available for balanced decision making about the environment and the sustainable development of natural resources.
- From radio observatories and a continuously operating network of GPS tracking stations to geodetic and gravity survey monuments, the CSRS provides the globally compatible national framework that serves as the reference for all spatial positioning and navigation in Canada.

Impact studies already conducted clearly demonstrate ESS contributions to the advancement of knowledge, promotion of sustainable job creation and economic growth, and improvement of the quality of life.

Over the next year, ESS Communications, the Chief Geoscientist Office, Business Development, and the Policy, Planning and Coordination Division (PPCD) will be working together to document the impact and value of ESS programs and activities and to communicate those findings. PPCD will chair a working group representing those offices and program managers that will coordinate the following actions.

- Impact and value assessments and success stories of the past five years will be identified, and a system developed to make this information more broadly available. An impact study regarding an estimation of the value of GSC's Bedrock Geoscience Program is currently underway. Several new studies will be developed in 1999/2000, with a focus on evaluating the impact of public good programs.
- A suite of innovative communication approaches will be prepared to ensure that all those who need to know about the social and economic impacts of ESS activities and programs will have easy access to past, current and future findings.
- A framework will be designed to capture existing program data, to identify key areas that would benefit from a study and communication strategy, and to store operational data and the results of future studies. The Sector Project System already in use may provide an efficient way to capture impact information, and possible linkages will be explored.

Northern S&T Strategy

The Earth Sciences Sector continues to be a key participant in the Assistant Deputy Ministers' Interdepartmental Committee on Northern S&T and has taken an active role in the Northern S&T Working Group, which supports the Committee. Both of these groups continue to be involved in the development of a federal Northern S&T strategy to address the needs of northern science and technology in the context of federal government priorities.

The government's Northern S&T strategy is directed by an interdepartmental committee chaired by the ADM of INAC's Northern Affairs Program. The ADM of the Earth Sciences Sector represents NRCan on this committee. This committee provides a forum for federal departments and agencies to exchange information, cooperate and collaborate in developing a new federal strategy for northern S&T.

ESS is presently chairing the Working Group on Facilities and Logistics, with membership from EC, DFO and PCSP.

A meeting of the Interdepartmental ADMs' Committee on Northern S&T was convened on September 10, 1998. At this meeting, Peter G. Johnson, President of the Association of Canadian Universities for Northern Studies (ACUNS), made a presentation on the state of northern science. Following the ACUNS presentation, the Northern S&T Working Group presented the recommendations that resulted from the February 1998 northern practitioners workshop, and an overview of the three critical themes that the working group would address, including maximization of facilities and logistics, enhanced information sharing and access, and more effective communication and improved strategic coordination.

ESS is supporting a PCSP-led project to develop an inventory of Arctic research facilities, and to provide this inventory as a publicly available Web-enabled database. This is in response to a direct request from the ADMs' Interdepartmental Committee on Northern S&T.

A northern S&T forum was organized in February 1999 by INAC officials in Inuvik and included participation by ESS staff.

NRCan and ESS continue to take an active role in ensuring that the strategy is finalized and published. ADMs are also considering expanding the committee membership to include other federal departments and agencies (e.g. DND and Parks Canada) and have expressed interest in having the working group convene another workshop in Inuvik.

NRCan is the largest federal government provider of S&T in the Canadian North, with the delivery of major geoscience programs in the North and the provision of northern S&T logistics through PCSP. NRCan's northern S&T activities provide a knowledge infrastructure essential to decision-making in support of sustainable development, by private and public sector stakeholders, including northern communities and Aboriginal organizations. The prominence of NRCan in the delivery of northern S&T and logistics has resulted in the department being asked to investigate options for obtaining additional resources to support northern logistics (i.e. PCSP), and to develop an updated inventory of northern research facilities that will help ensure the best possible use of the federal government's and other stakeholders' resources at the lowest cost to all involved.

Strategic Plan for Recruiting, Retaining and Rejuvenating Human Resources in the Earth Sciences Sector for the Next Decade

Further to the review of S&T capacities within ESS for the next decade, a strategy was developed to recruit, retain and rejuvenate human resources. The four main thrusts of the strategy are:

- recruiting new staff to help ESS deliver its current and future business;
- providing an attractive work environment;

- providing career development tools and coaching for employees; and
- seeking partnerships with other organizations to open up new horizons for ESS employees.

Major components of the strategy that will be launched in 1999/2000 are as follows.

Under a strategic plan for external recruiting in science and technology, ESS will recruit approximately 25 employees (equivalent to 1 percent of the ESS budget) in S&T at the entry level in the following 12 priority areas of expertise:

- multidisciplinary geology and geophysics (marine, bedrock, surficial);
- mineral deposits, particularly gold;
- hydrogeology;
- climate change science and monitoring;
- natural hazards science;
- data modelling and simulation;
- environmental geochemistry;
- space geodesy;
- applying earth observation imagery to mapping;
- hyperspectral earth observation imagery;
- legal surveys; and
- Geographic Information Systems (GIS) and information management, including 3D/4D visualization and development of integrated information products.

A skills profile will be developed to complement professional qualification requirements in the selection process. The following qualities will be sought:

- flexibility;
- team spirit;
- entrepreneurial spirit;
- multidisciplinary approach;
- communication skills; and
- information technology skills.

Thirty percent of new employees will be on term appointments for at least two years, and the remaining 70 percent will occupy indeterminate positions. New hiring should help ESS to achieve the Public Service Commission employment objectives for equity target groups over the next three years, as indicated in the following table.

Employment Equity	ESS					NRCan	
		% of total ESS employees				% of total of NRCan employees	
	N_1	1998/1999	1999/2000	2000/2001	2001/2002	N_2	1998/1999
Total Employees	**1 399**					**3 809**	
Equity Target Groups							
Aboriginal persons	13	0.9	1.3	1.4	1.5	48	1.3
Visible minorities	48	3.4	4.0	4.2	4.4	209	5.5
Persons with disabilities	27	1.9	2.2	2.2	2.2	81	2.1
Women	448	32.0	34.0	35.0	37.0	1 402	37.0
Francophones	383	27.4	29.0	30.0	31.0		

N_1 = numbers of ESS employees in 1998/99, N_2 = numbers of NRCan employees in 1998/99

ESS will recruit, retain and rejuvenate its human resources through several initiatives.

- The Geomatics Professional Development Program (GPDP) will be enhanced, including:
  - 12 new participants every year;
  - funding from GC, GSC, the NRCan WINS initiative, and 10 private sector partners and public agencies; and
  - working assignments at ESS, in the private sector, or at other government agency.
- The Professional Enhancement Program (PEP) will be launched.
- The Sector will conduct marketing for external recruitment and internship programs. A marketing plan, including Web sites and ads in the print media, will be developed to target university campuses and professional associations, such as the Geomatics Industry Association of Canada (GIAC).
- The Management Development Program for ESS will build on CCRS, GSC and Mapping Services Branch (MSB) efforts.
- The Sector will emphasize continuing education, implement a departure interview mechanism, and survey employees about the work environment.
- The ESS-NSERC research partnership program will provide research funding for post-graduate students.
- Scholarships, including Aboriginal scholarships, will be provided for geomatics and post-graduate studies in earth sciences.
- A significant expansion in the hiring of co-op, Federal Student with Work Experience Program (FSWEP) and post-doctoral students is anticipated. This is summarized in the following table.

Types of Students	1998/1999	1999/2000	2000/2001	2001/2002
Fellowship	33	40	45	50
Co-op	77	85	90	95
FSWEP	182	195	205	215
Total	**292**	**320**	**340**	**360**

ESS ResSources

As the largest source of scientific and technical information in NRCan, the Earth Sciences Sector plays a key role in positioning the department as a leader within the Canadian natural resources sector as it adapts to the knowledge-based economy. In support of NRCan ResSources, the Sector has established ESS ResSources, a major initiative to position the Sector as a leader in the knowledge-based economy. Several factors have contributed to the decision to make such a commitment: recognition that the business of the Sector has always been knowledge; impact of new information technologies on the way ESS collects, interprets, manages and disseminates information; government commitment to providing citizens with access to information they require; a desire to link to and build on all information activities and knowledge initiatives already underway; and recognition that the "sharing of information" culture needs to be strengthened.

The development of an ESS ResSources strategic plan has laid the groundwork for the implementation of an action plan in 1999/2000. This will have four main thrusts: determination of client needs and client satisfaction; improved access to information and expertise; promotion of sound data management practices; and communication of Sector achievements. ESS ResSources will operate on three levels: it will provide a strategic, operational and coordination framework for ESS activities and link them with departmental ones; it will provide leadership in the promotion of a sharing of information culture; and it will foster client-focused approaches to information management challenges.

Geoscience Knowledge Network

Dramatic improvements in data management and communications technology over the past decade are transforming the way in which geoscience knowledge (e.g. metadata, publications, data and expertise) is managed and disseminated. In early 1998, the GSC, in collaboration with GeoConnections, initiated the Geoscience Knowledge Network (GKN) project to demonstrate and evaluate Internet access to and distribution of its geoscience knowledge in a client-focused manner. Many provincial and territorial geological surveys are currently investing in similar projects to develop Internet access to their knowledge. A distributed network permits development of a broader Canadian GKN (CGKN), which will link federal, provincial and territorial data, and potentially includes knowledge held within academia and the private sector. The resulting "single window" access will facilitate national and international access to Canadian geoscience knowledge, enhancing Canada's competitive position in the global geoscience and resource exploration community.

In December 1998, the GSC hosted a two-day National Geological Surveys Committee workshop, in Ottawa, to explore the CGKN concept with representatives from all of the provincial and territorial geological surveys. A strong consensus emerged that the development of the proposed CGKN was essential to maintaining Canada's position as a world leader in the provision of geoscience information. An action plan was developed to establish a number of federal-provincial working groups to resolve outstanding issues and to report to the National Geological Surveys Committee in the first quarter of 1999.

Geomatics for Informed Decisions

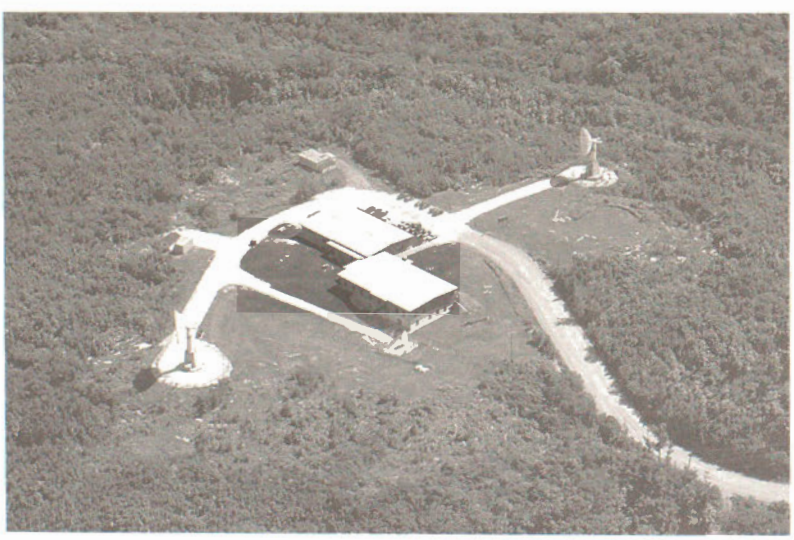
The formation of the Geomatics for Informed Decisions (GEOIDE) Network was announced on October 15, 1998 at Laval University by NSERC's National Centres of Excellence program. GEOIDE was established through a national competition that started with 74 entries in 1997, and ended with three successful proposals. This network will benefit from a federal investment of nearly $12 million over four years in a program that now has 14 networks. GEOIDE brings together 97 researchers from 24 universities with partners from 26 companies and 16 other organizations, including several areas of GC and GSC. Both the Geodetic Survey Division and the CCRS were instrumental in spurring initial interest and supporting the development of collaborative projects that led to the successful proposal. The GEOIDE Network links all sectors involved in geomatics and is expected to facilitate the efficient transfer of research results into marketable products in Canada.

Professional Enhancement Program

The Professional Enhancement Program (PEP) is an initiative designed to provide opportunities for ESS and external organizations to participate in collaborative research, and to share expertise and operating costs for mutually beneficial projects. The main objective of this program is to foster alliances that meet the strategic research goals of ESS and external organizations.

The foundation of the program is a work assignment that broadens the skill sets and experience of participating staff actively involved in R&D in the fields of geoscience or geomatics.

Any qualified indeterminate ESS employee may participate in PEP. PEP is also open to employees in external organizations, including companies, professional associations, universities, centres of excellence, and government departments and agencies.



PEP will focus on priority areas identified in the GSC, GC and PCSP strategic plans, where the sharing of expertise through employee work assignments between ESS and an external organization will generate value-added synergy for a project. Overall project goals and milestones will be defined by the Sector and the external organization involved in a particular project. Each PEP project will be research-oriented and will provide tangible benefits for ESS and the external organization.

The operating costs of a project will be shared between ESS and the external organization in accordance with an agreed financial arrangement. Salaries of employees on a work assignment will continue to be paid by the home organization.

Each project will be governed by a negotiated agreement that will specify the obligations and expectations of each party, as well as how the results of the project are to be shared.

2 Earth Sciences Sector: Major Components and Financial Summary

The Earth Sciences Sector is Natural Resources Canada's largest sector. It comprises Geomatics Canada, the Geological Survey of Canada, Polar Continental Shelf Project and the ESS Corporate Services group.

Earth Sciences Sector Funding by Major Components

	1998/1999	1999/2000	2000/2001	2001/2002
Geomatics Canada	90 404	93 216	95 245	94 602*
Geological Survey of Canada	65 645	67 363	67 829	68 147
Polar Continental Shelf Project	3 581	3 593	3 601	3 601
Corporate Services	17 842	18 271	18 330	18 332
Total ($000)	**177 472**	**182 443**	**185 005**	**184 682**

* Variances due to termination of land claim settlements.

(Corporate Services includes the ADM's Office; Policy, Planning, Information and Services; Business Development; Quality Management Advisor; Chief Geoscientist Office; Human Resources Services; Senior Advisors, Sector Communications and the Sector Financial Advisor Office.)

The Earth Sciences Sector is committed to delivering its program and regulatory responsibilities in partnership with clients and stakeholders in other federal departments, the provinces and territories, the private sector and academia. In order to ensure the comprehensive representation of client requirements, the department has established the Minister's National Advisory Board on Earth Sciences (MNABES) to advise the Minister of Natural Resources on the scientific and program directions of the Sector.

In order to achieve the vision expressed by the Minister, and due to scarce resources available from traditional sources of funding, the Sector is actively engaged in developing alternative sources of funding. ESS fosters a strong relationship with its stakeholders, both internal and external to the government, through the signing of cost-sharing arrangements for the development of joint projects. The Sector is also involved in the sale of products and the provision of consulting and technical services, both domestically and internationally, on a cost-recovery basis, including Geomatics Canada Revolving Fund (RF) projects. The following tables summarize the funding received from those alternative sources on a cash basis and indicate appropriation funding by expenditure category.

Earth Sciences Sector Funding Mechanisms

	1998/1999	1999/2000	2000/2001	2001/2002
Appropriation from Parliament	138 879	142 336	142 959	141 634
Vote netting	2 281	2 823	2 828	2 830
Revolving Fund	16 812	16 284	17 218	17 218
Joint projects with external parties	5 500	6 000	6 500	7 000
Joint projects with other federal departments	14 000	15 000	15 500	16 000
Total ($000)	**177 472**	**182 443**	**185 005**	**184 682**

(Except for appropriations from Parliament, figures represent targets to be met by ESS managers.)

Earth Sciences Sector Appropriation by Major Category of Expenditure

	1998/1999	1999/2000	2000/2001	2001/2002
Salaries	67 639	70 663	70 625	70 633
Employee benefits plan	14 203	14 131	14 124	14 126
Operating expenses, including capital	55 773	56 638	57 306	55 971
Grants and contributions	1 264	904	904	904
Total ($000)	**138 879**	**142 336**	**142 959**	**141 634**
FTEs (full-time equivalent employees)	1 281	1 296	1 296	1 296

Geomatics Canada

Geomatics Canada (GC) programs underpin key federal government policy objectives, including knowledge infrastructure, promotion of jobs, support of sustainable development, and health and safety issues. They support a wide range of activities of national interest that include maintaining Canada's borders; regulating and surveying Canada Lands; providing the national surveying, spatial positioning and mapping fabric; developing national scale maps depicting issues of the day; and collecting and managing a growing volume of digital data. GC also provides leadership in the use of topographic map information, Global Positioning System (GPS) technology and remote sensing applications.

GC uses a Treasury Board-approved Revolving Fund (RF) to respond to external demands for its products and services. An important strength of the RF is that it directly supports NRCan's commitment to reduce the subsidization of the department's commercial products and services by implementing user fees sufficient to recover costs. The RF aims at being self-sufficient but, unlike commercial businesses that strive for maximum profits, the Revolving Fund's target is to achieve a zero balance. A separate Geomatics Canada Revolving Fund Business Plan is available describing RF activities for the 1999/2002 planning period.

GC's programs are delivered by the following organizations.

Geodetic Survey Division

The primary role of the Geodetic Survey Division (GSD) is to establish the Canadian Spatial Reference System (CSRS) and to maintain, improve and facilitate access to it in accordance with evolving client needs and technologies ranging from geomatics and navigation to natural resources and the environment. This national infrastructure and related standards serve as a reference, allowing spatial information to be exchanged and merged in a seamless manner. Compatibility of spatially referenced information from various federal, provincial, municipal and private sources is fundamental to GeoConnections and the Canadian Geospatial Data Infrastructure (CGDI).

GSD is playing an increasingly vital role in safeguarding Canadian interests by maintaining the foundation for spatial positioning. In this era of satellite-based positioning, for example, the Division has, in step with the advances and opportunities of rapidly evolving technology, already adapted operations to provide access to the reference system in real time for users of GPS. As national economies throughout the world become more dependent on information technologies, it becomes increasingly necessary to ensure a globally consistent national reference for spatial positioning and related multidisciplinary applications. Very Long Baseline Interferometry (VLBI), active control system and gravity technologies now form the basis for the geodetic program. The Division's role, both in the International GPS Service and in the newly formed International VLBI Service, serves Canadian science and technology.

Legal Surveys Division and the International Boundary Commission

Under the *Canada Lands Surveys Act* and related legislation, the Surveyor General and the Legal Surveys Division (LSD) are responsible for the Canada Lands Survey System. This responsibility includes regulating legal surveys, maintaining a publicly accessible archive of survey documents and information, surveying Canada Lands (including Aboriginal land claims) and protecting the interests of the Government of Canada with respect to these lands. The International Boundary Commission, an integral part of LSD, is jointly responsible with its American counterpart for maintaining the boundary between Canada and the United States.

Canada Centre for Remote Sensing

The Canada Centre for Remote Sensing (CCRS) is internationally recognized as a leading centre of excellence in the use of earth observation data, and supports an expanding industry sector including world leaders in global ground station, image analysis and radar mapping markets. CCRS is responsible for the reception, processing, archiving and dissemination of remotely sensed data for Canada. In conjunction with the private sector, it develops remote sensing technology and applications. CCRS, through its National Atlas of Canada team, also works with industry to develop spatial information applications. CCRS is developing the Canadian Earth Observation Network (CEONet) component of the Canadian Geospatial Data Infrastructure (CGDI) to provide users with real time access to remote sensing satellite and other spatial databases, both land and marine, through the Internet.

In addition, the GeoAccess Division has become the lead agency for the implementation of CGDI as well as the Sector coordinator for the GeoConnections initiative. As part of this commitment, GeoAccess will provide the CGDI Secretariat.

Mapping Services Branch

As Canada's national mapping agency, the Mapping Services Branch (MSB) is responsible for the acquisition, management and dissemination of topographic and toponymic (geographical name) information for the Canadian landmass, and for the production and distribution of aeronautical charts and publications required to ensure the safety of aviation in Canada.

Using information contained in the National Topographic Data Base (NTDB), the Centre for Topographic Information produces digital and hard-copy topographic maps at scales of 1:50 000 and 1:250 000. The Branch's Aeronautical and Technical Services (ATS) group updates and amends aeronautical charts and publications for air safety in Canada on a cyclical basis, and maintains a central map printing operation.

In addition to these principal activities, MSB is the custodian of the federal aerial photography archives and offers aerial photography acquisition, reproduction and distribution services. The Branch supports the activities of the Canadian Permanent Committee on Geographical Names through the provision of a committee secretariat and the maintenance of the Canada Geographical Names Data Base (CGNDB).

Geomatics Canada Funding Mechanisms

	1998/1999	1999/2000	2000/2001	2001/2002
Appropriation from Parliament	59 892	62 232	62 727	61 484
Vote netting	0	0	0	0
Revolving Fund	16 812	16 284	17 218	17 218
Joint projects with external parties	1 100	1 200	1 300	1 400
Joint projects with other federal departments	12 600	13 500	14 000	14 500
Total ($000)	**90 404**	**93 216**	**95 245**	**94 602**

Geological Survey of Canada

The Geological Survey of Canada (GSC) delivers its research under six broad programs: Bedrock Geoscience; Surficial Geoscience; Marine Geoscience; Hydrocarbon Geoscience; Minerals Geoscience; and Geological Hazards and Environmental Geoscience. The Bedrock Geoscience Program and the Minerals Geoscience Program are the responsibility of the Director General, Minerals and Regional Geoscience Branch, while the Director General of the Sedimentary and Marine Geoscience Branch is responsible for the four remaining GSC programs. Much of the output of these programs is made publicly available through the cartographic and publishing activities of the Geoscience Information Program provided by the Sector's Policy, Planning, Information and Services Branch (PPISB). In addition, GSC summary program plans are available, in both conventional paper format and on the Internet.

The Bedrock and Surficial Geoscience Programs provide the national geoscience knowledge framework that underpins all private and public sector activities related to the sustainable development of Canada's onshore mineral, energy, water and other resources, land-use decision-making, and public health and safety linked to natural hazards. The Marine Geoscience Program provides the same knowledge framework for Canada's offshore areas and supports Canada's offshore sovereignty and territorial claims. The Hydrocarbon and Minerals Programs develop models that describe the formation of economically recoverable resources. This research provides new guidelines and technologies for exploration, which not only help maintain robust mining and energy resource industries in Canada, but also underpin the assessment of resource potential in areas scheduled for development or designation as parks. The Geological Hazards and Environmental Geoscience Program seeks, through research and monitoring, to reduce risks from earthquake and geomagnetic hazards, landslides, global climate change, natural release of metals and other hazards of the natural environment.

The components of GSC's scientific program are delivered from seven divisions grouped within the Minerals and Regional Geoscience Branch and the Sedimentary and Marine Geoscience Branch. Each division has primary responsibility for a specific science component carried out on a national scale (e.g. minerals). Activities in the four regional divisions may also span several science program components as they apply to that region.

Minerals and Regional Geoscience Branch

The Minerals and Regional Geoscience Branch comprises the Continental Geoscience Division and the Mineral Resources Division, both located in Ottawa, and GSC Pacific, with offices in Sidney and Vancouver (British Columbia) and in Ottawa.

Continental Geoscience Division

The Continental Geoscience Division provides comprehensive knowledge about the bedrock geology of the Canadian landmass, with emphasis on the Canadian Shield, as well as its architecture and tectonic history. This is achieved through the integration of bedrock mapping to document the nature and relationships of surface geology, geophysical surveys to reveal the nature of the earth's crust at depth and its physical rock properties, and geochronology and related studies to unravel time and space dimensions of earth history. The Division also contributes to the national geoscience knowledge base by developing methodologies and standards for digital integration, analysis, and dissemination of diverse data sets and knowledge bases.

Mineral Resources Division

The Mineral Resources Division provides comprehensive knowledge of Canada's mineral resources, develops and tests new concepts and methods for mineral exploration, and provides mineralogical and chemical expertise and services. The Division undertakes systematic geochemical surveys, which constitute the National Geochemical Reconnaissance, and conducts multiparameter airborne geophysical surveys. As well, it provides information relating to the natural distribution of environmentally significant elements.

GSC Pacific

GSC Pacific is responsible for national programs to monitor seismicity, establish earthquake hazard zonation, monitor change in the earth's magnetic field, and enhance the knowledge infrastructure relating to the Cordilleran mountain system and adjacent offshore areas. The active tectonic growth of the Pacific margin through plate convergence is unique in Canada and has ramifications for natural hazards and mineral and energy wealth.

Sedimentary and Marine Geoscience Branch

The Sedimentary and Marine Geoscience Branch comprises the Terrain Sciences Division (Ottawa), GSC Atlantic (Dartmouth), GSC Quebec (Sainte-Foy) and GSC Calgary.

Terrain Sciences Division

The Terrain Sciences Division provides comprehensive knowledge of the surficial geology and geomorphic processes of the Canadian landmass. Current activities include regional surficial geology studies, a hydrogeological study of key Canadian aquifers, research on permafrost, development of mineral exploration methods, and environmental geochemistry. The Division also provides geoscience information on natural and human-induced geological processes and hazards that may adversely affect public health and safety, and sustainable development.

Additionally, by monitoring current environmental conditions and evaluating past environmental change, the Division collects baseline information for the modelling, explanation and assessment of potential global changes, including changes in climate. It houses the Climate Change Impact and Adaptation Liaison Office of the Climate Change Action Fund.

GSC Atlantic

GSC Atlantic carries out coastal and offshore geoscientific surveys and provides expert geological, geophysical, geochemical and geotechnical information on the coastal zone, seabed, offshore sedimentary basins and geological processes. The Division also contributes to assessments of resources, hazards and environmental quality for the east coast and Arctic regions and the contiguous ocean basins. A recent application of this knowledge base was the delineation of Canada's offshore boundaries under the United Nations Convention on the Law of the Sea.

GSC Quebec

GSC Quebec provides comprehensive knowledge about the geology of the Laurentian Margin (Grenville and Appalachian geological provinces) and the Quaternary geology of eastern Canada. Integrated and multidisciplinary research activities contribute to the Minerals Geoscience Program and the Geological Hazards and Environmental Geoscience Program. The Division is also responsible for the GSC hydrogeology initiative.

In 1988, following an agreement between the Institut national de la recherche scientifique (INRS) (a branch of the Université du Québec) and GSC, INRS-GéoRessources and GSC Quebec formed a joint research centre. This partnership brings together GSC scientists along with university researchers and allows strong collaboration with the provincial government and private corporations.

GSC Calgary

GSC Calgary provides comprehensive knowledge, technology and expertise related to the geology and resource potential of the sedimentary basins of western and northern mainland Canada, the Arctic islands and adjacent offshore regions, and national resource estimates for oil, gas and coal. The Division serves as GSC's national centre for research in palaeontology, coal and organic geochemistry.

Geological Survey of Canada Funding Mechanisms

	1998/1999	1999/2000	2000/2001	2001/2002
Appropriation from Parliament	57 794	58 511	58 577	58 495
Vote netting	2 051	2 552	2 552	2 552
Revolving Fund	0	0	0	0
Joint projects with external parties	4 400	4 800	5 200	5 600
Joint projects with other federal departments	1 400	1 500	1 500	1 500
Total ($000)	**65 645**	**67 363**	**67 829**	**68 147**

Polar Continental Shelf Project

The Polar Continental Shelf Project (PCSP) coordinates logistics support and provides related assistance for the purposes of advancing scientific knowledge of the Arctic region and contributing to the exercise of Canada's sovereignty in that region and its adjacent waters. By providing a comprehensive coordination, transportation, communications and logistics support infrastructure, PCSP ensures its clients maximum physical safety and scientific productivity.

Research supported by PCSP has helped Canada develop a national knowledge base related to more than one-third of the Canadian landmass and to contribute to sustainable development in the North. PCSP support has resulted in the identification of mineral and hydrocarbon deposits and has contributed to a better understanding of the human and environmental impacts of development, and the northern environment's impact on infrastructure development.

As government agencies move toward implementation of a Northern S&T strategy to more effectively coordinate research priorities and programs, PCSP serves as an excellent example of the cost effectiveness and efficiencies of horizontal management of a program portfolio across departments and client agencies. PCSP is working in partnership with other government agencies, including the Canadian Coast Guard of the Department of Fisheries and Oceans (DFO) and the Department of National Defence (DND), to maximize the use of collective resources for the benefit of the northern scientific community. PCSP also promotes partnerships with its scientific client groups through formal and informal joint venture activities, and seeks to extend its services through cost sharing and cost recovery of expenditures from partners and clients.

PCSP supports not only government and university research in the Arctic, but also community-based traditional knowledge studies and programs conducted by resource co-management boards established under northern land claims agreements. PCSP also provides services to non-Canadian research groups on a cost-recovery basis and promotes bi-polar scientific exchanges through the Canadian Arctic-Antarctic Exchange Program.

PCSP's ability to support clients remains constrained due to budget reductions in recent years. Scientific research in the Arctic in support of national, territorial and international program and policy priorities and commitments has been reduced, with some programs ending entirely. PCSP has been able, to some degree, to offset the impact of its reduced budget on its clients by effectively cash managing carry-forward funds, deferring capital purchases, reducing some services, relying on increased cost recoveries from federal and territorial government client groups, and capitalizing on in-kind support from other agencies in order to minimize overhead and dedicate the bulk of resources to delivering logistics support to its clients. NRCan has arranged bridge funding for PCSP totalling $1 million in 1999/2000. Options for long term increased funding for PCSP are being pursued.

Polar Continental Shelf Project Funding Mechanisms

	1998/1999	1999/2000	2000/2001	2001/2002
Appropriation from Parliament	3 581	3 593	3 610	3 601
Vote netting	0	0	0	0
Revolving Fund	0	0	0	0
Joint projects with external parties	0	0	0	0
Joint projects with other federal departments	0	0	0	0
Total ($000)	**3 581**	**3 593**	**3 601**	**3 601**
Actual/Estimated recoverable expenditures from partners and clients	**2 360**	1 500	1 500	1 500

Earth Sciences Sector Corporate Services

Policy, Planning, Information and Services Branch

The Policy, Planning, Information and Services Branch (PPISB) provides leadership and a central focus for the administrative, information, policy and planning functions of the Sector. It provides support services to the Sector's line programs, delivers the Geoscience Information Program, provides strategic direction and policy coordination on behalf of the Sector, and oversees the management of Sector human and financial resources.

PPISB is a primary window on the information resources of the Sector, publishing and distributing the scientific output of the GSC, developing and managing digital cartographic services, providing library and information services through the Earth Sciences Information Centre, and developing and managing the information technology infrastructure. It delivers general administrative services to the Sector, including facilities, telecommunications, security, inventory, shipping and mail, records, and health and safety training. It provides logistics support to field projects through its Technical Field Support Services group, and financial administrative services to Geomatics Canada and the ESS Corporate Services group. These financial services include procurement, accounts payable and receivable processing, and the administration of field and travel accounts.

The Branch provides corporate support to the Earth Sciences Sector in the areas of strategic direction, policy development, analysis and coordination, intergovernmental relations and program coordination. The Branch is also responsible for recommending strategic directions and policy options for ESS, including the preparation of input to planning and reporting documents for NRCan, the Treasury Board and Parliament. PPISB is charged with the management of Sector stakeholder liaison mechanisms, including the Canadian Council on Geomatics and the Minister's National Advisory Board on Earth Sciences. It maintains the Northern Secretariat and the Cabinet and Parliamentary Affairs Secretariat, and is coordinating the Sector's initiative to document and communicate the impact and value of its programs. The Branch also carries the responsibility for implementing the Sector Project System and for developing a Sector-wide, systematic approach to management.

The Branch represents ESS on departmental committees established to review corporate, administrative, and human resources policies and issues, including accommodation, fleet management and re-engineering initiatives. PPISB is working closely with the Sector Financial Advisor Office and Human Resources Services to ensure that processes are in place to identify and address Sector priorities and operational concerns. Sector finance and human resources committees have been established for this purpose and play a key role in ESS strategic planning, the preparation of competency profiles for staff, and the development of training and recruitment plans.

PPISB is responsible for the ongoing leadership, coordination, monitoring and reporting of the ESS ResSources initiative, which involves the creation of a strategic, operational and coordination framework for the Sector's scientific and technical information so that it is all available, compatible, and of uniform standard and quality. The initiative is also the catalyst and driver of a culture change across the organization to a more open sharing of knowledge, both internally and externally with our clients.

Human Resources Services

Human Resources Operations Unit

The Human Resources Operations Unit (HROU) is assigned by the NRCan Corporate Services Sector to assist in and provide advice and guidance concerning classification, staffing, staff relations, official languages and workforce adjustment.

The HROU is responsible for ensuring a coherent approach to staffing and classification and providing support for employer-employee relations.

During the reporting period, the HROU will concentrate its efforts on implementing the Universal Classification Standard, which is a priority for the entire federal public service, and on recruiting new employees to fill gaps identified in the ESS S&T capacities study.

Human Resources Planning, Development and Renewal Unit

The ESS Human Resources Planning, Development and Renewal Unit, part of the ESS Division of Management and Administration Services, offers services related to planning, training, renewal of human resources and professional training programs.

The priority of the Unit is to assist Sector managers in leading, motivating, developing and empowering their employees to realize their full potential in the delivery of services.

During the planning period, the Unit will report regularly to the ESS management team on the progress of specific strategic human resources issues, including performance management, staff and management development, ESS strategic vision support, and implementation of the ESS recruiting strategy, including the Geomatics Professional Development Program which is part of the WINS initiative.

Business Development

The Sector's Business Development group was established to provide business support to ESS and the Canadian earth sciences community by providing a common framework for consistent business practices for the effective and efficient management of Sector programs, and by promoting Canada's earth sciences capability internationally.

The Business Development group is composed of three teams.

- The Business Planning team plans and coordinates the preparation of Sector business plans in a framework consistent with other Sector and Departmental plans, and directs the management of the GC Revolving Fund.
- The Business Policy team develops and administers Sector business policies and guidelines, including those pertaining to service standards, working with industry, and revenue generation, and provides advice related to agreements, contracts and MOUs.
- The Business Relations team plans and implements domestic and international business development, and promotes and coordinates international business development. The team provides advice to the Canadian earth sciences industry on international market access and business development opportunities, and coordinates domestic business relations activities.

Chief Geoscientist Office

The Chief Geoscientist Office provides leadership and advice to the Sector on matters related to the quality and integrity of ESS science, and is the principal interface with external scientific organizations and scientific programs. The Office remains abreast of both national and international geoscience trends and developments; looks for issues, opportunities, synergies and cooperation; and provides the voice of the Sector's science community at the management table.

The Chief Geoscientist Office has implemented a system to review ESS's science activities to ensure their excellence and relevance in a national context. These reviews, which began in 1998/1999 with reviews of the Marine Geoscience and Environmental Monitoring Programs, use external agencies, operating under terms of reference that ensure credibility and consistency throughout the process. The GSC Minerals Geoscience Program will be reviewed in 1999/2000.

During the 1999/2000 fiscal year, the Chief Geoscientist Office will work with GSC directors general and provide professional development to science staff through sharing of scientific expertise and short-term transfers of personnel between ESS and external organizations. This program will ensure that ESS scientists remain in the vanguard of the international earth sciences community.

The Chief Geoscientist Office will continue to work with the provincial and territorial geological surveys through the National Geological Surveys Committee (NGSC) to ensure that Sector geoscience programs in the provinces and territories are planned and delivered in accordance with the Intergovernmental Geoscience Accord. In this context, the Chief Geoscientist Office will continue to facilitate, in 1999/2000, the development of a comprehensive CGKN program in collaboration with provincial and territorial surveys, universities and the private sector.

ESS-NSERC Research Partnership agreements were signed in October 1998. This new partnership program is an example of government-university-industry collaboration in areas of priority geoscience interest. The Chief Geoscientist Office's efforts will focus on preparing for the program's launch and awarding the first partnerships in 1999/2000. The Office will also continue to explore ways to increase synergies between GSC and GC programs, with an emphasis on new applications for remote sensing in understanding geological processes and improvements to the level of cooperation between current ESS geodynamics programs.

Quality Management Advisor

The Quality Management Advisor provides leadership and advice to the Sector on quality management and management improvement activities. Working closely with the NRCan Excellence Office, the Advisor remains abreast of trends and developments in quality management practices in the private sector and in government both in Canada and in other countries. This knowledge is used to encourage and assist Sector management in identifying, planning and carrying out management improvement initiatives.

The Quality Advisor uses the ESS management framework to assist Sector managers in analyzing their management activities against an established set of criteria, developing improvement plans and reporting against the framework.

Specific accountabilities include organizing the annual Sector management retreat, where each management team member assesses how the Sector is performing against the criteria. This assessment is analyzed and used to determine Sector priorities and plans for management improvement projects in the coming year. The Advisor shares news of progress with the Sector, the department and the government by posting a triennial report on quality projects on the Internet.

Sector Communications Office

The mandate of the Sector Communications Office is to provide a range of strategic advice and services to the Earth Sciences Sector in support of external public relations activities and internal communications. The Office consists of the GSC Communications Officer, the Geomatics Communications Officer, the Ministerial and Special Events Officer, and the Senior Communications Manager. The Sector Communications Office is closely linked with NRCan's Corporate Communications Branch through the Sector Strategic Communications Committee (STRATCOM), the departmental Millennium and S&T Communications committees, and numerous other ad hoc committees.

The Office is responsible for ensuring that strategies and guidelines exist for the internal communication of governmental priorities and initiatives. It is also responsible for identifying key external audiences and opportunities for communicating the range and value of ESS programs.

Sector Financial Advisor Office

The Sector Financial Advisor Office (SFAO) is assigned by the NRCan Corporate Services Sector to assist in ESS financial management and to provide financial advice and expertise to support the strategic vision and the management framework of ESS.

The SFAO is responsible for ensuring a coherent approach to financial reporting and management and for providing support to the GC Revolving Fund management team. It has also been tasked with introducing a comprehensive approach to costing within ESS.

As a member of the ESS management team, the Sector Financial Advisor is responsible for implementing the Sector's management framework within the SFAO, particularly in the areas of client satisfaction, process improvement and human resources.

During the reporting period, the SFAO will concentrate its effort on:

- providing guidance and assistance towards the implementation of the new comptrollership function within the federal government;
- providing costing information in relation to ESS service standards; and
- increasing its effort in implementing activity base costing for Revolving Fund activities.

Earth Sciences Sector Corporate Services Funding Mechanisms

	1998/1999	1999/2000	2000/2001	2001/2002
Appropriation from Parliament	17 612	18 000	18 054	18 054
Vote netting	230	271	276	278
Revolving Fund	0	0	0	0
Joint projects with external parties	0	0	0	0
Joint projects with other federal departments	0	0	0	0
Total ($000)	**17 842**	**18 271**	**18 330**	**18 332**

(Corporate Services includes the ADM's Office; Policy, Planning, Information and Services; Business Development; Quality Management Advisor; Chief Geoscientist Office; Human Resources Services; Senior Advisors, Sector Communications and the Sector Financial Advisor Office.)

3 Earth Sciences Sector: Policy Goals, Objectives and Deliverables

The ESS Business Plan outlines what the Sector intends to achieve during the three-year planning period and how it will assess its performance.

Goals and Objectives

The following section of the Business Plan links Sector objectives, key deliverables and performance indicators to NRCan policy goals and objectives. The goals and objectives below are those described in the NRCan 1999/2000 Estimates (Part III – Report on Plans and Priorities).

NRCan Policy Goal 1: To enable Canadians to make balanced decisions regarding natural resources.

Sustainable development is ultimately about making better decisions. This requires open and balanced debate about the social, economic and environmental impacts of development. People need to base their decisions on the best available scientific and community-based knowledge, accessible in an easily understood format. Sharing knowledge and expertise will improve the dialogue among all parties and lead to better decision-making.

NRCan's role is to contribute to the resource development decisions of federal and provincial governments as well as industry and consumers. It does so by providing balanced information and the latest scientific knowledge, by promoting consensus on key issues and actions, and by supporting innovative policies that actively promote sustainable development.

- Objective 1.1: Creating easily accessible and integrated knowledge on the state of Canada's landmass and natural resources, and the economic, environmental and social dimensions of their use.
- Objective 1.2: Promoting greater national and international cooperation and consensus on sustainable development issues, policies, goals and actions.
- Objective 1.3: Developing and promoting fiscal, regulatory and voluntary approaches that encourage the sustainable development of natural resources. *(There are no ESS program activities to be reported under this objective at the present time.)*

NRCan Policy Goal 2: To sustain the economic and social benefits derived from natural resources for present and future generations.

The resource sector is a cornerstone of the Canadian economy, integral to job creation and community development. To maintain a healthy economy while protecting the environment, we must make the most efficient use of natural resources. Sustainable development should result in resource-based industries that make fewer demands on the environment, create new economic opportunities and provide greater stability to Canadian communities. Sustainable development is also grounded in the reality that we must maintain our ability to compete on world markets and have assured access to those markets if Canadians are to continue to enjoy a high standard of living.

- Objective 2.1: Creating economic opportunities and encouraging investment in innovative and higher-value uses of natural resources.
- Objective 2.2: Maintaining and expanding access to international markets for Canadian resource-based products, knowledge, technologies and services.
- Objective 2.3: Building the capacity of Aboriginal, rural and northern communities to generate sustainable economic activities based on natural resources.

NRCan Policy Goal 3: To minimize the environmental impacts of natural resource development and use.

The environment is constantly undergoing change—some of it as a result of natural processes, some caused by human activity. The environment can adjust to human and natural stresses, provided these stresses remain within the ecosystem's ability to adapt and renew itself. It is imperative that natural resources be developed and used in a way that respects and protects the integrity of natural ecosystems.

- Objective 3.1: Helping limit and adapt to climate change.
- Objective 3.2: Promoting science, technology and stewardship practices that reduce environmental impacts, conserve biodiversity, and increase the efficiency of resource development and use.
- Objective 3.3: Safeguarding Canadians from the risks associated with natural resource development and use.

NRCan Policy Goal 4: To contribute to the safety and security of Canadians.

ESS has a primary role to play in acquiring, maintaining and distributing information and knowledge about the earth. This includes information on seismic activity and other natural hazards, national and international boundaries, the system of land and geodetic surveys, and aeronautical charting to support the safe and efficient operation of the Canadian aviation industry. This information helps ensure the safety of Canadians and constitutes a powerful tool for the Canadian resource sector, and is also essential to other knowledge-based industries in the Canadian economy.

- Objective 4.1: Safeguarding Canadians from natural hazards.
- Objective 4.2: Maintaining a national framework for spatial positioning, mapping and boundary maintenance.
- Objective 4:3: Promoting the safe use of explosives and pyrotechnics. *(ESS does not report on Objective 4.3 in the Business Plan.)*

NRCan Policy Goal 5: To manage the department efficiently and effectively.

NRCan is committed to good governance and the sustainable development of Canada's natural resources. To implement this agenda, we must make flexibility an integral part of our corporate culture and structures. Today's dynamic of continual change gives rise to management and organizational challenges and issues that need to be identified and properly managed. The way the department deals with its employees, its accountability and its own performance must continue to be strengthened.

- Objective 5.1: Managing NRCan's resources responsibly.
- Objective 5.2: Continuously improving NRCan's products, services and operations.
- Objective 5.3: Using leading-edge environmental management tools and practices for NRCan operations.
- Objective 5.4: Reducing wastes from NRCan operations.
- Objective 5.5: Increasing the efficiency of energy and other resource use in NRCan operations.
- Objective 5.6: Promoting the use of goods and services that are eco-efficient.

(ESS does not report on Objectives 5.3, 5.4, 5.5 and 5.6 in the Business Plan.)

Business Lines

The Earth Sciences Sector reports on its activities against four business lines: science and technology, knowledge infrastructure, development of federal policy and regulations, and the promotion of Canada's international interests.

Science and Technology

Science and technology (S&T) are essential if Canada's resource-based industries are to succeed in a world market that is increasingly competitive and responsive to environmental issues. NRCan participates actively in scientific and technological research and information dissemination, and in the transfer of its knowledge to the private sector. Discoveries and new technologies resulting from these activities help Canadians create new products and services that have the potential to improve our standard of living. Our S&T contributes to the wise and efficient use of resources, innovation and protection of the environment.

Examples of Earth Sciences Sector S&T activities include the following.

- Working with the Canadian Space Agency, ESS develops and transfers technology to Canadian industry for the acquisition, manipulation and storage of remotely sensed data, such as the information collected by Canada's RADARSAT program, supporting a high-growth industry in international markets.
- The Exploration Science and Technology Program (EXTECH) develops and applies new ideas and technologies to help extend Canada's base metal reserves.
- The National Geoscience Mapping Program (NATMAP), a multidisciplinary and multi-agency program, is designed to improve our geoscience database, both for resource industries and for environmental concerns.

Knowledge Infrastructure

To make informed decisions, Canadians need information about our land, the networks that connect us and the resources available for our use. In partnership with provincial governments, universities and the private sector, NRCan continues to build a national knowledge infrastructure for Canada that provides, in turn, a rich database of technical, scientific and economic information that the public can use. This knowledge infrastructure is just as important as our physical road, rail and air transportation infrastructure. Knowledge is key to this nation's economic progress. The building of a natural resource knowledge infrastructure in Canada will improve our prospects for economic and social growth in the global knowledge-based economy.

Earth Sciences Sector initiatives in this area include:

- the National Atlas Information Service (NAIS), which provides online access to information about Canada's landmass and people;
- the ESS-initiated Intergovernmental Geoscience Accord (IGA) which improves collaboration in the geosciences across Canada;
- the Sector's aeronautical charting program, which promotes safety and efficiency in the Canadian aviation industry;
- the Canadian Active Control System (CACS), a national infrastructure for spatially related data for a multitude of disciplines, which contributes directly to studies of earth dynamics for global change and to the International Global Positioning System Service to ensure global consistency; and
- the Canadian Geoscience Knowledge Network (CGKN), a partnership initiative which will create geoscience information and knowledge within a consistent national framework.

Development of Federal Policy and Regulations

NRCan's work in policy and regulations depends on close cooperation with stakeholders and with other government departments with related mandates. The aim of our work is to increase the contribution of natural resource industries to Canada's economy while protecting the environment and the health and safety of Canadians. ESS plays an active role in this activity.

For example, the Sector:

- provides for the management of the Canada Lands Survey System by the Surveyor General of Canada;
- advises Indian and Northern Affairs Canada (INAC) on northern resource, environmental hazard and Aboriginal matters, including land claim issues; and
- contributes significantly to the Federal S&T Strategy led by Industry Canada.

Promotion of Canada's International Interests

NRCan promotes Canada's international interests through participation in international agencies. NRCan is helping Canada meet its international commitments and ensure that Canada's products, technologies and services have access to the global market. Our participation is vital, because this market is becoming steadily more competitive and because environmental issues increasingly influence natural resource policies and access to markets.

Examples of ESS activities in this area include the following.

- Working through NRCan, the Sector provides strategic advice regarding Canadian sustainable development resource-related technology to the United Nations Commission on Sustainable Development (UNCSD) in order to enhance international cooperation and to improve intergovernmental decision-making;
- Collaborating with the Geomatics Industry Association of Canada (GIAC), the Sector is furthering a coordinated Canadian industrial approach to attaining major international projects by promoting the Canadian business network recently incorporated as GeoCan Information Solutions Inc.
- Geomatics Canada, Business Development and a multidepartmental committee will host up to 2 000 international delegates at the International Cartographic Association Conference and General Assembly to be held in Ottawa in August 1999. Geomatics Canada and the Geological Survey of Canada will conduct tours and set up bilateral meetings throughout the NRCan Booth Street complex for cartographic representatives of the 87 member nations.
- The Sector is collecting and analyzing seismic data as part of Canada's contribution to the Comprehensive Test Ban Treaty (CTBT). As part of the International Monitoring System (IMS), stations in NRCan's National Seismic Network provide data to determine the location and yield of nuclear explosions.
- Contributing to maintenance of the International Terrestrial Reference Frame (ITRF), Canada's contribution to the ITRF is assured through the success of Geodetic Survey Division's international programs. NRCan's Algonquin and Yellowknife radio observatories were accepted into the newly formed International VLBI Service (IVS). In addition, GSD, the Centre for Research for Earth and Space Technology (CRESTech) and the National Research Council of Canada (NRC) are collaborating as an IVS technical development centre. The Division also contributes as a data centre and an international analysis centre, and now has a new role as Reference Frame Coordinator for the International GPS Service (IGS).

Earth Sciences Sector Funding by Business Line

	1998/1999	1999/2000	2000/2001	2001/2002
Science and Technology	28 044	29 040	29 374	29 587
Knowledge Infrastructure	138 246	141 977	144 142	143 513
Policy and Regulations	7 524	7 800	7 869	7 923
International	3 658	3 626	3 620	3 659
Total ($000)	**177 472**	**182 443**	**185 005**	**184 682**

Responsibility for Deliverables

1. GSC Atlantic
2. GSC Quebec
3. GSC Calgary
4. GSC Pacific
5. Terrain Sciences
6. Continental Geoscience
7. Mineral Resources
8. Geodetic Survey
9. Legal Surveys and International Boundary Commission
10. Canada Centre for Remote Sensing
11. Mapping Services
12. Polar Continental Shelf Project
13. Business Development
14. Policy, Planning and Coordination
15. Geoscience Information Division
16. Quality Management Advisor
17. Human Resources Advisor
18. Management and Administrative Services
19. ESS Communications

In the following tables, numbers in parentheses—for example, (7)—indicate ESS branches, centres or divisions responsible for ESS Business Plan deliverables.

NRCan Policy Goal 1:

To enable Canadians to make balanced decisions regarding natural resources.

Strategies

- Create knowledge networks.
- Make efficient policies and regulations.
- Ensure easy access to information.
- Create innovative voluntary programs.
- Build consensus and cooperation.
- Report progress.

NRCan Objective 1.1: Creating easily accessible and integrated knowledge on the state of Canada's landmass and natural resources, and the economic, environmental and social dimensions of their use.

Business Line: Science and Technology

ESS Objective	Deliverables: Year 1	Deliverables: Years 2 & 3	Performance Indicators
To provide fundamental knowledge of the composition, structure and evolutionary history of the bedrock underlying Canada, required to foster potential sustainable energy and mineral resource development.	Release maps, reports and modelling studies from current bedrock geoscience studies, including NATMAP projects, in the Grenville, Superior, western Churchill and Slave provinces of the Canadian Shield (2,6); the Appalachian and St. Lawrence basin of eastern Canada (1,2,3,6); the Western Canada Sedimentary Basin (WCSB) (3); the Cordillera of western Canada (3,4); and the Arctic islands and northern mainland sedimentary basins. (3,6) Initiate new NATMAP on western edge of ancestral North America. (4) Develop a new NATMAP project on the architecture of the Appalachians foreland and platform. (2)	Release maps, reports and Open Files from current bedrock geoscience studies, including NATMAP projects, in the Grenville, Superior, western Churchill and Slave provinces of the Canadian Shield (2,6); the Appalachian and St. Lawrence basin of eastern Canada (1,2,3,6); the WCSB (3); the Cordillera of western Canada (3,4); and the Arctic islands and northern mainland sedimentary basins. (3,6) Release annual reports of activities and continue mapping on western edge of ancestral North America (4); and continue the development of a new NATMAP project on the architecture of the Appalachians foreland and platform. (2)	Increased scientific understanding of the geological evolution of Canada. Increased level of mineral and energy exploration stimulated by research results. Knowledge transfer via client/stakeholder requests for information, workshops, etc. Cost-sharing joint ventures with private industry and promotion of exploration activity; emulation of GSC database methods by provincial and territorial agencies and universities. Partner/client satisfaction with design and delivery of cost-shared and collaborative projects.

Business Line: Science and Technology (cont.)

ESS Objective	Deliverables: Year 1	Deliverables: Years 2 & 3	Performance Indicators
To provide fundamental knowledge of the composition, structure and evolutionary history of the bedrock underlying Canada, required to foster potential sustainable energy and mineral resource development. *(cont.)*	Release maps, reports and modelling studies from investigations of the subsurface structure and its physical rock properties, including Lithoprobe partnership projects, in parts of the Canadian Shield (western Superior, western Churchill, Alberta Basement, trans-Hudson orogen, Sudbury) and the Cordillera (Slave-Northern Cordillera Lithosphere Evolution, or SNORCLE). (3,4,6)	Release maps, reports and modelling studies from investigations of the subsurface structure and its physical rock properties, including Lithoprobe partnership projects, in parts of the Canadian Shield (western Superior, western Churchill, Alberta Basement, trans-Hudson orogen, Sudbury) and the Cordillera (SNORCLE). (3,4,6)	Increased level of mineral and energy exploration stimulated by research results.
	Release maps and reports for Gulf of St. Lawrence Maritimes Basin Geoscience compilation. (1)	Continue release of Maritimes Basin electronic compilation products. Update and revise release timetable. (1)	Increased understanding of the geological evolution of Canada.
	Establish framework and timetable of planned Maritimes Basin electronic compilation. (1)	Expand slope geoscience work plan in conjunction with industry partners. (1)	
	Initiate investigations of subsurface geoscience of the slope portion of the continental margin of offshore eastern Canada. (1)	Produce geophysical maps of the Labrador Sea/Davis Strait study area. (1)	
	Compile baseline geophysical data for area encompassing part of the Labrador Sea/ Davis Strait area. (1)	Conduct and publish results from geochronological and isotopic tracer studies associated with GSC geoscience projects. (6)	
	Conduct and publish results from geochronological and isotopic tracer studies associated with GSC geoscience projects. (6)		
To increase knowledge and understanding of the hydro-geology of the Canadian landmass, required for sustainable development.	Complete report for Laurentian Piedmont project. (2) Complete development of the methodology for mapping granular aquifers. (2,5)	Complete final reports and models for southern Manitoba and southern Quebec projects. (2,3,5,7)	Improved decision-making for sustainable development of aquifers. Increased cost-sharing with provinces and municipalities.

Business Line: Science and Technology (cont.)

ESS Objective	Deliverables: Year 1	Deliverables: Years 2 & 3	Performance Indicators
To increase knowledge and understanding of the hydrogeology of the Canadian landmass, required for sustainable development. *(cont.)*	Complete field work and data collection for southern Manitoba hydrogeology projects. (2,3,5,7) Initiate a hydrogeological study in southern Quebec. (2)		Successful technology transfers and outreach. Mitigation of adverse effects of anthropogenic and geologic processes on aquifers.
	Develop Prairie Groundwater initiative with Agriculture and Agri-Food Canada (AAFC) and provincial partners. (5,3) Complete final report on Greater Toronto Area hydrogeology project. (5)	Implement Prairie Groundwater initiative with partners. (5,3)	Impact on groundwater policy-makers and regulatory agencies.
	Complete interpretations for final report on the Lake Winnipeg project. (4,5)		Improved decision-making for sustainable development of aquifers.
	Publish preliminary rates of crustal rebound from ongoing GPS and absolute gravity surveys in Manitoba. (4)	Publish map of crustal tilt in Manitoba. (4)	Impact of research on groundwater policy-makers, regulatory agencies, hydro-electric utilities and the public. Successful technology transfers and outreach. Increased demand for surficial geology information and collaboration.
To increase knowledge and understanding of the surficial geology of the Canadian landmass, required for sustainable development.	Complete maps and interim reports from surficial geology mapping and NATMAP projects in southern and northern Quebec, Ontario, western Churchill, Winnipeg region, Yukon, Nova Scotia, Newfoundland, Arctic Islands, northeastern British Columbia and Alberta-Saskatchewan border area. (2,3,5,6)	Complete maps and interim reports from surficial geology mapping and NATMAP projects in St. Lawrence Valley, northern Quebec, western Churchill, Winnipeg region, Yukon, Nova Scotia, Newfoundland, Arctic Islands, northeastern British Columbia and Alberta-Saskatchewan border area. (2,5) Release maps and synthesis reports from surficial geology mapping across Canada. (2,5)	Increased scientific understanding of the geological evolution of the Canadian landmass. Increased levels of cooperation, in-kind support and cost-sharing with industry, provinces, universities and other government departments. Increased level of mineral exploration stimulated by research results.

Business Line: Science and Technology (cont.)

ESS Objective	Deliverables: Year 1	Deliverables: Years 2 & 3	Performance Indicators
To provide assessment of mineral and energy resource potential as part of the process of establishing National Parks and Marine Conservation Areas (NPMCAs).	Develop work plan and initiate Mineral Review and Assessment (MERA) for possible national park in Natural Region 7, with INAC, NATMAP, Parks Canada (PC) and the Yukon Territorial Government (YTG). (7,4,3,5) Complete assessments for proposed NMCAs in Atlantic Canada. (1,7) Report on offshore aggregate assessment for Scotian Shelf. (1)	Carry out mineral and energy resource assessments for proposed protected natural regions as identified by Senior MERA Committee. (3,7) Report on offshore resource assessment for Bonavista-Funk, Newfoundland and carry out additional assessments as required. (1) Carry out offshore resource assessments for marine conservation areas as requested. (1)	Consideration by communities and MERA committees of geoscience studies and mineral resource assessments; impact on park boundaries. Community requests for MERA reports and consultations.
To develop research and development (R&D) capabilities to lead or participate in initiatives in mapping with support from external stakeholders.	Based on the S&T program and management framework, continue development in high-resolution imaging and additional R&D projects, such as maps for special users, airborne digital cameras, validation of radar imagery for terrain mapping in partnership with the Canada Centre for Remote Sensing (CCRS), academia and the private sector. (11)	Expand the number of fields of research, such as automation in change detection and feature extraction, Internet mapping, and an object-oriented relational Data Base Management System (DBMS) for the National Topographic Data Base (NTDB), consistent with R&D agenda. Utilize partnership mechanisms with special emphasis on the Geomatics for Informed Decisions Network (GEOIDE). (11)	Inclusion of R&D results in operations.
To enhance and maintain the Canadian Spatial Reference System (CSRS) as a globally consistent national standard using active control technologies, gravimetry and advanced geodetic concepts.	Improve the accuracy and delivery of CACS services to facilitate global geodetic surveying and mapping, and precise real time georeferencing and navigation for the Canadian landmass and adjacent regions. (8)	Research and develop new techniques and applications related to satellite-based positioning, geoid modelling and Very Long Baseline Interferometry (VLBI) to advance the science and maximize the benefits of geodesy to society. (8)	Efficient 3D positioning over Canada with accuracy of less than one metre in real time and less than three centimetres globally for post-processing, by the end of 1999. Increased accuracy and productivity in the private sector.

Business Line: Science and Technology (cont.)

ESS Objective	Deliverables: Year 1	Deliverables: Years 2 & 3	Performance Indicators
To enhance and maintain the CSRS as a globally consistent national standard using active control technologies, gravimetry and advanced geodetic concepts. *(cont.)*	Increase coverage in Canada of monuments and active control points to provide reference information for precise positioning and gravity measurements linked to international standards. (8)	Implement real time operations interfaces. (8) Put Canada-wide integrated networks in place for precise applications. (8)	Integration of horizontal, vertical and gravity control networks and databases, to be 90 percent complete by year 2000.
	Carry out testing and performance evaluation of the transportable Canadian Geodetic Long Baseline Interferometry (CGLBI) system. (8)		Transportable CGLBI system to start field observations in 1999. Information on horizontal, vertical and gravity changes and their relation to geodynamics and natural hazards.
	Improve the Canadian Geodetic Information System (CGIS) for client access. (8)		Upgraded calibration standards and specifications for geodetic and gravity surveys.

Business Line: Knowledge Infrastructure

ESS Objective	Deliverables: Year 1	Deliverables: Years 2 & 3	Performance Indicators
To provide an economical, specialized, rapid response cartographic imaging and printing facility for the aeronautical, hydrographic, topographic, geological, geographic and other charts and maps published by the Government of Canada.	Publish clients' maps in accordance with agreed client requirements. (11)	Ongoing. (11)	Number and percentage of client maps delivered, per agreed client requirements. Amount and percentage of costs recovered.
	In response to recommendations of the May 1998 Activity-based Costing Study, establish measures and year 1 baseline utilization rates for large capital assets and for specialized teams. (11)	Bring utilization rates in line with printing industry benchmarks (70 percent). (11)	Savings in pre-press and printing costs passed on to clients. Percent utilization rates for major equipment and for highly specialized teams.
	Maintain the existing ISO 9001 quality management system registration by passing annual third party audit. (11)	Maintain the existing ISO 9001 quality management system registration by passing annual third party audits. (11)	Client satisfaction.

Business Line: Knowledge Infrastructure (cont.)

ESS Objective	Deliverables: Year 1	Deliverables: Years 2 & 3	Performance Indicators
To facilitate access to, and integration of, data relevant to the Canadian landmass in support of the sustainable development of natural resources.	Continue to develop and maintain the land parcel and jurisdictional boundary databases of the property infrastructure on Canada Lands. (9)	Through the CGDI, and regional offices, provide national access to the land parcel and jurisdictional boundary databases of the property infrastructure on Canada Lands. (9)	Up-to-date databases that are accessible online.
	Ensure Legal Surveys Division (LSD) and the International Boundary Commission (IBC) digital data are compatible with, and available to, the Canadian Geospatial Data Infrastructure (CGDI). (9)	Ongoing. (9)	Contribution to improving good governance.
	Bring principal federal spatial databases online so that orders may be placed for delivery over the network. (9,10,11)	Through the CGDI, provide national access to all geographic information from NRCan. (9,10,11)	Databases online and being used.
	In support of the four natural resource (4NR) departments' MOU, plus Health Canada, help these departments work together, share data, and communicate science and technology to the public. (10,15)		
	Expand 4NR departments' MOU to include Health Canada and hold a workshop to discuss tools for cooperation amongst all 5NR partners. (15)		Increased information activities of the 5NR departments.
	Improve upon data discovery and access components of the CGDI, by adding 5NR specific metadata, organizational views and tools. (10,15)	Ensure that the data discovery and access components of the CGDI are operational. (10)	Increased awareness and support of natural resource issues discerned through client feedback.
	Incorporate access to key databases held by other sectors, such as the Minerals and Metals Sector, into the CGKN. (10,15)	Incorporate key views from databases held by the Energy Sector and the Minerals Statistics Branch into the Geological Atlas of Canada. (15)	

Business Line: Knowledge Infrastructure (cont.)

ESS Objective	Deliverables: Year 1	Deliverables: Years 2 & 3	Performance Indicators
To facilitate access to, and integration of, data relevant to the Canadian landmass in support of the sustainable development of natural resources. *(cont.)*	Continue to work with the Canadian Forest Service to develop thematic layers of data that are significant in their criteria and indicators of sustainable management of Canada's forests. (10)		
	Make new tools available in the National Atlas of Canada to permit fusion of earth observation data with other geo-information. (10)	Complete development of imagery and grid data standards to meet inter-operability requirements. (10)	Easy access to tools for integrating data from diverse sources.
	Through the CGDI, provide national access to all digital geographic information from NRCan. (10)	Ongoing. (10)	Databases online and being used.
		Bring the CCRS archive of raw earth observation data online. (10)	More efficient system, ease of access and price decrease.
	Help other federal, provincial and municipal agencies to transfer their data into the Data Alignment Layer. (11)	Help other federal, provincial and municipal agencies to transfer their data into the Data Alignment Layer. (11)	Increased awareness and support of natural resource issues discerned through client feedback.
	Market Department of National Defence (DND) raster products, such as Arc Digitized Raster Graphics (ADRG) and Digital Chart of the World (DCW). (11)	Investigate the establishment of image/raster-based Data Alignment Layer. (11)	
	Develop mechanisms to make digital topographic information available via the Internet. (11)		Databases online and being used. Exceeded revenue targets for the sale of data.
	Develop system that will use the NTDB as the basic framework for supporting emergency response. (11)		Better tools to help save lives and protect assets.
	Develop prototype of a seamless digital topographic database in conformity with international standards ISO TC 211 and Open GIS Consortium. (11)	Develop links between databases in the context of distributed databases and inter-operability. (11)	Better access and synergy between all participants and efficiency gains. Direct linking of external agencies to the topographic database.

Business Line: Knowledge Infrastructure (cont.)

ESS Objective	Deliverables: Year 1	Deliverables: Years 2 & 3	Performance Indicators
To facilitate access to, and integration of, data relevant to the Canadian landmass in support of the sustainable development of natural resources. *(cont.)*	Modify content of the NTDB to obtain complete homogenous national coverage. (11)	Gear all production to achieving national coverage, in collaboration with other agencies. (11)	Up-to-date, complete and online NTDB. Volume of data downloaded by users.
	Develop, in collaboration with partners, a complete Canadian digital road network with a five-year revision cycle. Complete one-third of network. (11)	Complete remaining two-thirds of network. (11)	Better management in emergencies and opening of new markets to Canadian industry.
	Develop system to allow easy access to the NTDB for all Canadians. (11)	Enhance access with simple GIS tools, in conjunction with NTDB data, to generate customized products. (11)	Exceeded revenue targets for sale of topographic products to other government departments.
	Have a full range of eight to 10 capacity-building pilot projects underway, in cooperation with representative communities across Canada, NRCan sectors, federal Sustainable Communities Initiative (SCI) partner departments, and provincial and territorial governments. (15)	Document and place online the best practices, experiences, results and lessons learned from the pilot phase, to allow consultation by all interested communities in Canada and abroad. (15)	Positive client feedback. Increased coordination between levels of government in making information more accessible to communities.
	In cooperation with industry and partner departments, place online a suite of desktop tools for the non-specialist, to facilitate the use of natural resources, environmental and socio-economic data of interest to communities. (15)	Continued enhancement of the site (new tools and additional data).(15)	Sustainable Communities model in Canada.
	Use the lessons learned from the pilots, as well as related initiatives of SCI partner departments, to begin the interdepartmental development of a discussion paper outlining a national capacity-building program for Canadian communities wishing to increase their capability to use available spatial and related information for planning and decision-making. (15)	Seek support for national program based on options in community capacity-building discussion paper.(15)	Increased activity of Canadian value-added companies in global markets.

Business Line: Knowledge Infrastructure (cont.)

ESS Objective	Deliverables: Year 1	Deliverables: Years 2 & 3	Performance Indicators
To facilitate access to, and integration of, data relevant to the Canadian landmass in support of the sustainable development of natural resources. *(cont.)*	Based on the success of the pilots, promote the applications of the technology and approach to domestic and global markets. (15)	Ongoing. (15)	Take-up and adoption by domestic and foreign clients.
To improve performance, reception, processing and archiving of EO data provided to key clients.	Acquire, process and archive RADARSAT, LANDSAT, Satellite pour observation de la terre (SPOT), National Oceanographic and Atmosphere Agency (NOAA) and Earth Resources Satellite (ERS) data for research and commercial requirements, including global change, landmass mapping, resource monitoring for clients, RADARSAT International, SPOT Image Corporation (SICORP) and European Space Agency (ESA). (10) Put agreements in place with satellite operators for reception of optical imagery to replace LANDSAT 5. (10)	Distribute EO data. (10) Develop and implement a data archive network and distribution processes for EO data to give the user fast, cost-effective access. (10)	Measurement of client satisfaction. Measurement of process performance. Increasing provision and use of data. Number of agreements signed.
To increase knowledge and understanding of the Canadian landmass, required for sustainable development.	Release comprehensive regional geoscience synthesis from current and archived studies for Labrador (6), Swayze NODA project (6), Manitoba (6), Appalachian (2), WCSB and Cordillera regions. (3,4) Development of comprehensive Lithoprobe database. (6)	Release regional and targeted digital geoscience databases for priority areas of the Canadian Shield, Appalachian and WCSB/Cordillera regions. (2,3,4,6)	Increased levels of cooperation, in-kind support and cost-sharing with industry, provinces, universities and other government departments.

Business Line: Knowledge Infrastructure (cont.)

ESS Objective	Deliverables: Year 1	Deliverables: Years 2 & 3	Performance Indicators
To increase knowledge and understanding of the Canadian landmass, required for sustainable development. *(cont.)*	Conduct aeromagnetic/ multi-parameter geo-physical surveys (Mackenzie Corridor phase II, targeted gravity surveys); release databases, and magnetic and/or gravity maps for Alberta, Manitoba, North-west Territories, Yukon and Arctic margins. (6)	Conduct aeromagnetic and gravity surveys in association with major bedrock and surficial geoscience maps and databases of multiparameter airborne geophysical surveys for regional and targeted mining area studies. (6)	Increased exploration and job creation through transfer of knowledge base to the private sector.
	Release geochronology database for Rae-Hern and Superior regions of the Canadian Shield. (6)		
	Publish province-scale, integrated geophysical and geological interpretations of onshore and offshore major structural units. (6)	Publish province-scale, integrated geophysical and geological interpretations of onshore and offshore major structural units. (6)	Focused exploration activities in accordance with GSC research.
	Publish maps, CD-ROMs and reports to complete the Metamorphic Map of Canada project. (6)		
	Complete Geoscape posters for southern Saskatchewan, Winnipeg region and National Capital region. (1,3,4,5,7)	Complete Geoscape posters for other urban centres. (1-7)	Value provided to clients.
To provide National Topographic Series (NTS) maps in digital or hard-copy format.	Seek new agreements with public and private sector agencies for change detection and data acquisition. (11)	Continue to seek new agreements with public and private sector agencies. (11)	Number of new or extended agreements signed.
	Increase output capabilities for on-demand printing of maps. (11)		Increase in the number of data resellers and distributors.
			Product acceptance by clients, as demonstrated by sales.
			Reduction in production, storage and distribution costs.
	Initiate implementation of the Toponymy Updating System for the NTDB. (11)	Fully implement and train operators on the Toponymy Updating System for the NTDB. (11)	Processing of all client requirements for new data.

Business Line: Knowledge Infrastructure (cont.)

ESS Objective	Deliverables: Year 1	Deliverables: Years 2 & 3	Performance Indicators
To provide National Topographic Series (NTS) maps in digital or hard-copy format. *(cont.)*	Initiate raster (soft-copy) map production program. (11)	Deliver new products (raster maps) to meet changing client requirements for digital information. (11)	Meeting of client requirements and schedule.
	Complete study on single-window access for clients to conventional topographic products. (11)	Implement single-window access study recommendations. (11)	Increase in products sold.
	Develop more efficient process for rapid creation of maps from the NTDB and ancillary data. (11)		
	Produce deliverables for 1999/2000: (11) • 150 paper maps; • 150 new or revised raster maps; • 350 raster maps converted from hard copy; • 300 new NTDB files; and • Upgrade 400 NTDB files.	Produce deliverables for 2000/2001: (11) • 300 paper maps • 300 new or revised raster maps • 500 raster maps converted from hard copy • 300 new NTDB files; • Upgrade 600 NTDB files.	Meeting of production targets.
To coordinate geographic names activities in Canada.	Continue to provide secretariat services to the Canadian Permanent Committee on Geographical Names (CPCGN). (11)	Ongoing. (11)	Increased public awareness of the CPCGN and public use of Canadian Geographical Names Data Base (CGNDB) data, as measured by Internet access. Successful annual fora of the CPCGN and its advisory committees that are actively supported by provincial and territorial naming agencies.
To deliver federal aerial photography to clients.	Develop phase II of an online automated retrieval system with Internet access for clients for ordering aerial photography. (11)	Pursue data sharing agreements with provincial agencies. (11)	Completion of phase II by the end of 1999/2000. Signed agreement in place with at least one provincial agency for data sharing by the end of 1999/2000.

Business Line: Knowledge Infrastructure (cont.)

ESS Objective	Deliverables: Year 1	Deliverables: Years 2 & 3	Performance Indicators
To develop an integrated, comprehensive geoscience information base providing digital access to the national geoscience infrastructure.	Continue to develop national standards for compilation and release of surficial and bedrock geological, geochronological, hydrogeological and urban geological data in digital format, in cooperation with Canadian and international stakeholders, partners, and clients. (2,4,5,6,15)	Implement and test national standards for digital geoscience data, in collaboration with Canadian and international partners and clients. (2,4,5,6,15)	Successful technology transfer and outreach. Emulation of GSC database methods by provincial and territorial agencies and universities.
	Continue major role in development of GSC-United States Geological Survey (USGS) geological data model. (6)	Design and implement geoscience knowledge infrastructure methodology in GSC. (6)	Successful transfer of GSC FieldLog software and GIS/data management methods to industry, and to provincial, territorial and foreign geological surveys.
	Provide on-demand aeromagnetic and gravity data and interpretation to internal and external clients from the Geophysical Data Centre. (6)	Provide on-demand aeromagnetic and gravity data and interpretation to internal and external clients from the Geophysical Data Centre. (6)	
	Extend prototype projects and develop second phase of the CGKN initiative. (1-7,15)	Continue to implement and develop partnerships in the CGKN initiative. (1-7,15)	Emulation of GSC database methods by provincial and territorial agencies and universities.
	Initiate implementation of contributions to the GEOIDE network. (2,3) Develop Web sites on Canadian mineral deposit databases and models, a comprehensive GIS for the EXTECH II Bathurst Camp, and surficial geochemistry databases. (7)	Participate in GEOIDE projects, produce project deliverables and manage network. (15)	
	Create Cordillera Link (CORDLink) with British Columbia and Yukon—a Web-based digital library for single access to integrated geoscience data for Canadian Cordillera. (4)	Continue development and expansion of CORDLink digital library collection. (4)	Establishment of new partnerships with data providers. Client realization of benefits of connected data holdings. Extent to which the library is used in educational curriculum development.

Business Line: Knowledge Infrastructure (cont.)

ESS Objective	Deliverables: Year 1	Deliverables: Years 2 & 3	Performance Indicators
To develop an integrated, comprehensive geoscience information base providing digital access to the national geoscience infrastructure. *(cont.)*	Continue the digitization of the Earth Sciences Information Centre (ESIC) photo collection. (15) Ensure archived publications are readily accessible to clients by providing access to various software with viewing capabilities. (15)	Update software to provide continuing access. (15)	Increased use of collections.
To make the results of the ESS scientific programs available to clients.	Manage a comprehensive publication program. This includes producing corporate projects by preparing publications (e.g. GSC current research volumes) on demand or by offset printing means; marketing ESS publications through the production of the *Monthly Information Circular;* publishing a variety of scientific material in various formats (CD-ROM, HTML for Internet, diskette, paper, etc.); releasing an average of 7 500 pages of scientific data in 30-35 formal GSC series releases; and releasing approximately 6 000 pages in Open File format, accompanied by some 400-500 map sheets. Work increasingly in partnership with author divisions to produce timely releases on such topical subjects as climate change and gas hydrates. Establish a secure electronic commerce link for Sector products and create opportunities to extend electronic commerce applications, in the future, by working with experienced partners such as the GeoAccess Division. (15)	Continue to produce publications based on manuscripts received. (15) Continue to adopt alternative publishing technologies to increase productivity and reduce costs. (15) Continue evaluating and developing alternative possibilities for map production (digital technologies) to increase productivity and reduce costs. (15)	Meeting of projected publishing release output targets. Meeting of revenue targets of $200 000. Increase in sales received electronically over the Internet, which will open new market avenues for products. Recognition as a world-class map production unit by science and cartography organizations worldwide. Fast turnaround map output to stimulate mineral exploration and other government and industry activities.

Business Line: Knowledge Infrastructure (cont.)

ESS Objective	Deliverables: Year 1	Deliverables: Years 2 & 3	Performance Indicators
To make the results of the ESS scientific programs available to clients. *(cont.)*	Lead a Futures Publishing Workshop involving a cross-section of the major contributors to the publishing program. (15)		Client satisfaction in Vancouver and Quebec, where there is a Carto/GIS specialist on site.
	Manage the programs to ensure that Year 2000 problems do not compromise program delivery. (15)		
	Improve communication with clients through the launching of Internet and intranet Web sites dedicated to publishing and sales. (15)		
	Manage a comprehensive digital imaging program for GSC that includes the production of 60 maps; 250 presentation graphics; 1 250 publication figures; 2 000 downloaded prints from digital files; 1 200 laminated maps, charts and posters; 10 000 colour electrostatic plots; and 6 000 B&W and colour negatives, slides and prints. (15)	Ongoing. (15)	Meeting of production targets.
To contribute to the ESS and NRCan ResSources Initiative.	Strengthen and influence the direction of the NRCan ResSources Initiative to incorporate clear, strong information management policies, particularly in relation to metadata production, data management and archiving. (15)	Ongoing. (15) Communicate and encourage use across NRCan of core metadata, developed by the Inventory of Information Assets Working Group, ResSources. (15)	A knowledge initiative that is applicable and acceptable across the Sector and throughout the department. Improved access by internal and external clients to the information resources available in ESS and NRCan. Increased number of NRCan databases online that are relevant and useful to Canadians.
	Co-manage the implementation of the CGKN. (1-7,15)		Successful implementation of CGKN, including buy-in within GSC and by provincial partners.

Business Line: Policy and Regulation

ESS Objective	Deliverables: Year 1	Deliverables: Years 2 & 3	Performance Indicators
To contribute to the development of the CGDI.	Participate in securing Cabinet approval and funding. (10,14)		Approval of funding.
	Assist in the development of the CGKN, and lead the development of the SCI, as key components of the CGDI. (10,14)	Ongoing. (10,14)	Contribution to improving good governance.

NRCan Objective 1.2: Promoting greater national and international cooperation and consensus on sustainable development issues, policies, goals and actions.

Business Line: Science and Technology

ESS Objective	Deliverables: Year 1	Deliverables: Years 2 & 3	Performance Indicators
To maintain linkages with international services and foreign government institutions in geomatics and global geodynamics.	Participate in the International GPS Service (IGS), International VLBI Service (IVS), International Earth Rotation Service (IERS), International Geoid Service (IgeS), International Gravity Bureau (IGB) and Global Geodynamics Project (GGP), to maintain and enhance international terrestrial reference system standards and global geodynamics. (8)	Continue active participation in international agencies and enhance related products. (8)	Acceptance of GPS, VLBI and gravity data from Canadian stations by international programs.

Business Line: Knowledge Infrastructure

ESS Objective	Deliverables: Year 1	Deliverables: Years 2 & 3	Performance Indicators
To meet Canada's geoscience needs through effective and efficient federal-provincial cooperation.	Finalize formal agreements on geoscience program coordination with Ontario, Alberta, Saskatchewan and Nunavut. Develop specific arrangements with Quebec. Renew formal agreement with Northwest Territories. (2,3,6)	Investigate MOU with Yukon as devolution progresses. (4) Implement federal-provincial-territorial coordination agreements. (1-7)	Successful development of partnerships with provinces and territories under bilateral geoscience accords. Elimination of overlap and duplication of federal and provincial programs.
To provide geoscientific input to support decisions on Canada's claim to the Continental Shelf.	Update and revise synthesis documentation of current status and knowledge of data supporting Canada's potential claim under the UN Law of the Sea Convention. (1)	Continue activities, contingent upon ratification of the Law of the Sea Convention by Canada. (1)	Extension of jurisdiction resulting from acceptance of Canada's proposal by the United Nations Commission.

Business Line: International

ESS Objective	Deliverables: Year 1	Deliverables: Years 2 & 3	Performance Indicators
To increase revenues generated by the Polar Continental Shelf Project (PCSP) from non-Canadian sources.	Increase foreign revenues to a minimum of 15 percent of total revenue. (12)	Maintain foreign revenues at a minimum of 15 percent of total revenue. (12)	Achievement of revenue targets.

NRCan Policy Goal 2:

To sustain the economic and social benefits derived from natural resources for present and future generations.

Strategies

- Encourage resource development.
- Promote exports.
- Develop innovative products and processes.
- Foster economic opportunities for rural, Aboriginal and northern communities.

NRCan Objective 2.1: Creating economic opportunities and encouraging investment in innovative and higher value uses of natural resources.

Business Line: Science and Technology

ESS Objective	Deliverables: Year 1	Deliverables: Years 2 & 3	Performance Indicators
To develop new methods, algorithms and applications for information-rich high spatial resolution and hyperspectral Earth Observation (EO) data.	Demonstrate the use of hyperspectral data for precision farming and forestry. (10)	Develop industrial capability to use EO data for land-use change mapping and environmental assessment. (10)	Use of high spatial resolution data for large-scale cartographic applications. CCRS participation in future international hyperspectral programs. Use of high spatial resolution satellite data by Canadian industry.
To develop systems for extraction of information from EO data.		Develop hyperspectral image processor system. (10)	Increased data sales. Integration of processor by industry into existing image analysis systems.
To enhance geoscientific knowledge of Canada's sedimentary basins and elucidate disposition and quality of hosted hydrocarbon endowments.	Finalize and release an assessment of the natural gas potential of the WCSB mid-Cretaceous and the Rocky Mountain Foothills. (3)	Complete a basin analysis of the Gulf of St. Lawrence, in support of renewed oil and gas exploration activity in the region. (1,2,3)	Increased exploration efficiency in the petroleum industry.
	Release reports on the geology of selected Canadian coal fields and on Canadian coalbed methane (CBM) potential. (3)	Complete and release a petroleum assessment of the Intermontane Cordilleran basins. (3)	Increased understanding of deformed and underformed sedimentary rocks in western and northern Canada, leading to increased hydrocarbon exploration in these areas and, where related, to land claims issues.

Business Line: Science and Technology (cont.)

ESS Objective	Deliverables: Year 1	Deliverables: Years 2 & 3	Performance Indicators
To enhance scientific knowledge of Canada's mineral deposits and develop new concepts and guidelines for exploration and resource assessment.	Complete and publish comprehensive study of Sullivan Massive Sulphide deposit (7) and of epithermal gold deposits. (2)		Documentation by industry and consultants of their use of mineral deposits research in exploration investments, strategies and discoveries.
	Publish thematic research papers on representative Canadian deposit types. (7) Initiate gold metallogenic study in the Red Lake district, Ontario. (2)	Define and refine deposit models for representative Canadian deposit types. (2,7)	Maintenance of a high proportion of cost-shared research with industry and other agencies, despite economic downturn and reduced institutional funding.
	Complete EXTECH II program in the Bathurst Mining Camp and release data compilations and interpretations. (6,7)		Demand for more research projects, including EXTECH.
	Complete needs analysis and initiate Yellowknife EXTECH project, contingent on funding. (6,7)	Continue Yellowknife EXTECH project. (6,7)	
To develop, test and use new technology for the acquisition, processing and interpretation of geoscience data, required to foster sustainable energy and mineral resource development.	Lead Downhole Seismic Imaging (DSI) consortium with industry and universities to expand capabilities for exploration in established mining camps.(6,7) Continue tests of multiparameter borehole probes in mining camp sites provided by industry partners. (6,7)	Develop and evaluate innovative geophysical instrumentation technologies, and data processing and interpretation techniques, for determining earth structure and location of ore deposits. (6,7)	Technology transfer to industry and provincial and territorial governments. Identification of ore bodies at depths of up to 3 km.
	Develop potential field processing and analysis software and new modelling approaches to aid in mineral exploration. (6)	Continue development of potential field processing and analysis software and new modelling approaches to aid in mineral exploration. (6)	
	Establish new Sensitive High Resolution Ion Microprobe (SHRIMP) dating techniques and new argon isotope laser/thermoprobe technology to study of ore deposits. (6)	Apply new SHRIMP dating techniques and new argon isotope laser/thermoprobe technology to studies of ore deposits. (6)	

Business Line: Science and Technology (cont.)

ESS Objective	Deliverables: Year 1	Deliverables: Years 2 & 3	Performance Indicators
To provide fundamental information on the nature and distribution of bedrock and surficial deposits across Canada, to foster mineral exploration.	Finalize reports on drift prospecting in Nova Scotia, New Brunswick, Newfoundland, Ontario, northern Quebec, British Columbia and the Prairies. (2,5)	Release synthesis report on drift prospecting. (2) Release reports on development and testing of new geochemical exploration methods in northern Quebec and the Abitibi clay belt, Ontario. (2,5,7)	Increased levels of cooperation, in-kind support, information uptake, and cost-sharing with industry, provinces, universities and other government departments.
	Complete report on exploration methods for diamonds in the Slave province. (5)	Release reports on developing exploration methods for diamonds near Haileybury, Ontario. (5,7)	Increased mineral exploration and job creation through transfer of knowledge to the private sector.
To transfer earth science technologies to industry.	Transfer digital ocean mapping and bottom characterization technologies to east coast fishing and other development industries. (1)	Continue refining analysis methods and techniques; transfer improved sampling survey and laboratory instrumentation to Canadian industry. (1,4,6)	Client satisfaction with GSC products.
	Assist and advise national marine survey consulting sector regarding commercial opportunities for Law of the Sea-related activities. (1)	Continue activities contingent on Canada's decision about the Law of the Sea. (1)	
	Develop partnerships with marine sector to transfer bottom characterization techniques. Establish and perform calibration tests. (1)	Continue calibrations and refine techniques. (1)	Contracts awarded to Canadian private sector.
	Provide unique marine geoscience equipment to industry to enhance international competitiveness. (1)	Provide advice to Canadian marine industry to enhance international competitiveness. (1)	Delivery of products on time and within budget.
	Transfer Downhole Seismic Imaging (DSI) knowledge to industrial partners. (6)		
	Sea-test new digital marine electromagnetic system (MEM) and conduct survey cruise with client. (4)	Collaborate with clients in conducting MEM survey cruises. (4)	Client requests for MEM surveys.

Business Line: Science and Technology (cont.)

ESS Objective	Deliverables: Year 1	Deliverables: Years 2 & 3	Performance Indicators
To improve knowledge and understanding of gas hydrates for resource development, hazard mitigation and climate change impact evaluation.	Release final reports on gas hydrates from the Mallik research well. (5)	Release joint publications with Japan and NRC on gas hydrate occurrence in the Mackenzie/Beaufort area. (5)	Recognition of Canada's role and expertise in the sustainable development of gas hydrates.
	Continue regional studies and evaluation of the interrelationship of gas hydrates and climate change. (5)	Evaluate stability of shallow gas hydrates with regard to climate change. (5)	
	Initiate collaborative laboratory research projects with Japan Geological Survey and NRC. (5)		
	Release reports on distribution and formation processes of gas hydrates on the Atlantic and Pacific Continental Shelves. (1,4)	Complete and document site surveys and studies prior to proposed Ocean Drilling Program (ODP) gas hydrate leg in 2001 or 2002. (4)	
To foster the development of spatial reference infrastructure technologies and their applications and thereby help Canadian industries use and commercialize these technologies in Canada and abroad.	Transfer technology to industry and government agencies for active control products and gravimetry systems. (8)	Continue technology transfer for active control and gravimetry systems and promotion of international standards. (8)	Acceptance and wider use of CACS products by the Canadian geomatics industry by 2000.
			Increasing use of CACS for precise georeferencing and navigation outside the traditional geomatics community.
	Create or enhance applications and products based on the active control system. (8)		CACS applications development in support of atmospheric monitoring.
			Addition of active control and gravimetry technologies to current private sector products.
	Promote international standards in the global marketplace. (8)		Increased global market penetration and development of valued-added products and services by Canadian industry.
			Promotion of international standards.

Business Line: Knowledge Infrastructure

ESS Objective	Deliverables: Year 1	Deliverables: Years 2 & 3	Performance Indicators
To provide fundamental information on the nature and distribution of bedrock and surficial deposits across Canada to foster sustainable development.	Publish metallogenic maps as part of Slave and western Churchill NATMAP projects. (6,7) Publish geochemical compilations and survey data for areas of Labrador, Ontario, New Brunswick, Bathurst Island (MERA) and Baffin Island. (7) Release airborne, multiparameter gamma-ray, magnetic and very low frequency survey data for priority areas chosen by partners. (7)	Initiate new or follow-up regional geochemical studies in New Brunswick, western Ontario, Saskatchewan and Baffin Island. (7) Publish regional multi-element geochemical distribution maps and geochemical survey data for New Brunswick. (7) Continue to conduct airborne surveys through NATGAM. (7)	Increased level of mineral exploration in areas covered by recently released regional geochemical surveys. Increased requests from mineral exploration industry for geochemical data. Increased requests from other government departments for geochemical data, knowledge and expertise. Increased requests from exploration companies to provide geochemical expertise in projects managed by GSC and funded largely by industry. Continued cooperation and funding from external sources for NATGAM activities.
To provide new technologies to improve visualization and manipulation of geoscience data in three dimensions and over time.	Develop 3D visualization tools and apply them to mining camp structural problems (e.g. Thompson Nickel Belt). (6,7)	Continue to develop 3D visualization tools and apply to mining camp structural problems. (6,7)	Expansion of new technology to other geoscience problems. Transfer of new software to industry. Promotion of Canadian technology internationally.

NRCan Objective 2.2: Maintaining and expanding access to international markets for Canadian resource-based products, knowledge, technologies and services.

Business Line: Science and Technology

ESS Objective	Deliverables: Year 1	Deliverables: Years 2 & 3	Performance Indicators
To provide financial and technical contributions to projects proposed by the Canadian geomatics industry, that meet program criteria.	Provide Geomatics Development Program (GDP) funding for six projects proposed by Canadian industry. (10)	Ongoing. (10)	Commercial success.

Business Line: International

ESS Objective	Deliverables: Year 1	Deliverables: Years 2 & 3	Performance Indicators
To effectively promote Canada's earth science technologies, expertise and industries internationally.	Demonstrate multipurpose role of ocean mapping technologies merged with geological and geophysical attributes as tools for assessing sea-level histories, aggregate distribution, offshore dumping control, sediment distribution and dynamics. (1)	Apply ocean mapping and potential field analysis technology to nearshore projects, as opportunity permits. (1)	Client satisfaction with GSC input. Renewed or additional partnerships with Canadian industry in international contracts.
	Generate $10 million worth of projects annually through marketing internationally with Canadian industry. (13)	Ongoing. (13)	Number and value of contracts won by Canadian industry.
	Support five outgoing and 20 incoming trade missions. (13)	Ongoing. (13)	Number of delegations supported.
	Direct the National Organizing Committee and execute the Ottawa ICA 1999 International Conference and General Assembly of the International Cartographic Association (ICA). (13)	Prepare and circulate written reports of conference activities. (13)	Increased international awareness of Canadian cartographic and geomatic technologies.
	Showcase Canadian EO capability at the GlobeSAR 2 final meeting in Buenos Aires, Argentina. (10)	Develop a GlobeSAR follow-up program in South America for the use of RADARSAT data for resource management. (1)	Increased RADARSAT data sales and Canadian commercial presence in South America.

Business Line: International (cont.)

ESS Objective	Deliverables: Year 1	Deliverables: Years 2 & 3	Performance Indicators
To effectively promote Canada's earth science technologies, expertise and industries internationally. *(cont.)*	Perform onshore-offshore correlations in offshore western Newfoundland and offshore Gaspé utilizing high-resolution multibeam and magnetic surveys.(1)	Monitor and calibrate surveys and reports for offshore dump site test area. (1)	Adoption of GSC best practices by foreign geoscience agencies.
	Establish baseline data set for repeat high-resolution mapping of offshore dump sites. (1)		
	Release reports on mineral potential and exploration guides. (2,7)		
	Complete four-year technology transfer program with Brazil on sustainable development in the minerals sector. (6,7)	Provide training in, and transfer of, Canadian exploration and mapping techniques to developing nations, in collaboration with Canadian firms. (6,7)	Technical success of Canadian industry in international ventures.
	Complete publication of results from Phase I and develop and initiate Phase II of Assistencia Tecnica Para El Desanolle del Sector Minero Argentino (PASMA) project with the Government of Argentina. (2,7)	Continue Phase II of PASMA project with Canadian industry and provincial government partners. (2,7)	Agreement on development of PASMA Phase II. Exposure of Canadian geoscience companies' capabilities to South American markets, leading to further contracts and increased market share.
	Develop a new Canadian International Development Agency (CIDA)-funded cooperative project with Brazil on potable groundwater. (2,7)	Implement Brazil-CIDA groundwater project. (2,7)	Improved social and environmental conditions in developing nations.
	Demonstrate and promote Canadian hardware and software technology to the European community via a seismic refraction survey in the Ukraine under the auspices of Europrobe. (6)		Exposure of Canadian geoscience companies' capabilities to the European market, leading to further contracts and increased market share.
	Complete delivery and publication of Phase I of the World Map Project, mineral deposit and gold databases. (7)		New and renewed partnerships.

Business Line: International (cont.)

ESS Objective	Deliverables: Year 1	Deliverables: Years 2 & 3	Performance Indicators
To effectively promote Canada's earth science technologies, expertise and industries internationally. *(cont.)*	Complete year 2 of Phase III of the World Minerals Data Base Project (formerly the World Map Project). (7)	Continue years 3 and 4 of Phase III of the World Minerals Data Base Project, contingent on renewed partnerships and cost-shared agreements. (2,7)	Documented traffic on private and public World Minerals Data Base Project Web site by industry partners and public, respectively.
	Collaborate with USGS to publish results of Metallogenesis and Tectonics of the Russian Far East, Alaska and Canadian Cordillera Project. (7)		
	Complete quality assurance in the production of large-scale maps for the City of Riyadh, Saudi Arabia (projected revenue $500 000). (11)		Commercial success of participating companies.
	Provide project management services for a CIDA-funded project for digital mapping and technology transfer. (Projected revenue $400 000.) (11)	Continue project management and provision of expertise for international projects in 2000/2001. (11)	Contracts awarded to Canadian private sector firms.
	Provide assistance to Carleton University in support of a project funded by the International Development Bank (IDB), CIDA and United States Aid in Development (USAid) on digital mapping and GIS carried out in Argentina, Brazil, Chile, Columbia, El Salvador, Panama, Mexico and Venezuela. (11)		Increased cooperation with Canadian universities. Increased cooperation within the participating countries of the Americas, with possible future business opportunities for Canadian private sector firms.

Business Line: International (cont.)

ESS Objective	Deliverables: Year 1	Deliverables: Years 2 & 3	Performance Indicators
To effectively promote Canada's earth science technologies, expertise and industries internationally. *(cont.)*	Implement 10 actions from the ESS International Business Strategy, including the following. • Initiate linking of ESS to the World Bank and other international funding institutions. (13) • Conduct inventory of technologies to determine their marketability. (13) • Provide guidance for the international component of the division business plans. (13) • Develop an annual ESS International Activities Report based on input from year-end reviews. (13)	Implement 10 actions from the ESS International Business Strategy. (13)	Number of actions from ESS International Business Strategy implemented. Dollar value of projects obtained by Canadian industry as a result of ESS participation.
To enhance the capabilities of geoscience agencies in emerging nations.	Demonstrate Canadian marine geoscience leadership through participation in international regional geoscience activities, such as the Coordinating Committee for Coastal and Offshore Geoscience Programs in East and Southeast Asia (CCOP) and the South Pacific Applied Geoscience Commission (SOPAC) in the South Pacific. (1) Provide workshops, training in geoscience data acquisition and interpretation, and geochronological data to governments participating in the Multinational Andean Project (MAP). (4,6,7)	Ongoing. (1) Provide geochronological data to augment mapping and the geophysical programs of Canadian-based industry and government partners, primarily for South American projects. (6) Release final report and maps summarizing accomplishments of MAP. (4,6,7)	Successful transfer of Canadian technology and expertise. International recognition of Canada's role and expertise in coastal zone management.

Business Line: International (cont.)

ESS Objective	Deliverables: Year 1	Deliverables: Years 2 & 3	Performance Indicators
To enhance the capabilities of geoscience agencies in emerging nations. *(cont.)*	Maintain joint projects with the China National Petroleum Company (CNPC) and related institutes to improve China's organic geochemistry capacity. (3)	Continue to improve China's organic geochemistry capacity through joint projects. (3)	Expanded opportunities for Canadian business in China.
	Complete work under the scope of a World Bank international contract to provide expert advice and training to the Government of Guinea for geoscience data acquisition. (2,5,6)		Adoption of selected GSC best practices by foreign geoscience agencies.
	Initiate joint work with the Geological Survey of Algeria to modernize its mapping capabilities. (5)	Complete digital versions of geological maps of Algeria. (5)	Increased international cooperation, with possible future business opportunities for Canadian private sector firms.
	Advise the Government of Mexico on planning, conducting and archiving airborne geophysical surveys. (6)		

NRCan Objective 2.3: Building the capacity of Aboriginal, rural and northern communities to generate sustainable economic activity based on natural resources.

Business Line: Knowledge Infrastructure

ESS Objective	Deliverables: Year 1	Deliverables: Years 2 & 3	Performance Indicators
To help Aboriginal communities manage their natural resources.	Establish infrastructure for natural resource management based on EO data in selected communities. (10,14,15)	Ongoing. (10,14,15)	Adaptation of operational use of EO data in reserve management practices.
	Establish a Legal Surveys Division Client Liaison Unit in Nunavut to provide the full range of client services to the Government of Nunavut and all stakeholders. (9)	Increase the staffing level of Inuit to reflect the demographics of Nunavut. (9)	Increased cooperation with the territorial government. Achievement of an 82 percent Inuit staffing level.

Business Line: Knowledge Infrastructure

ESS Objective	Deliverables: Year 1	Deliverables: Years 2 & 3	Performance Indicators
To provide learning opportunities for Aboriginal people in land management.	Facilitate learning through participation in training workshops and seminars, partnership with academic institutions, internship and co-op study programs, secondments and full-time employment, scholarships, and practical experience through the contracting process. (9)	Ongoing. (9)	Increased Aboriginal capacity in land management on Aboriginal lands. Percentage of Aboriginal groups with self-government agreements that adopt the Canada Lands Survey (CLS) system for their land management practices.
	Visit Aboriginal bands taking on new land management responsibilities under self-government agreements. (9)	Ongoing. (9)	
To contribute to the northern economy by seeking contractual opportunities with Aboriginal suppliers in the Canadian North.	Purchase supplies and services from northern companies, including Aboriginal suppliers, in keeping with the Federal Aboriginal Procurement Strategy. (12)	Ongoing. (12)	Financial benefits to northern suppliers, including Aboriginal companies.
	Participate in northern development workshops to assist Aboriginal groups and communities in understanding and developing their natural resources. (3,4,5,6,7)	Ongoing. (3,4,5,6,7)	Development of new geoscience partnerships linked to Aboriginal capacity-building.
	Provide advice to Aboriginal communities on coastal stability. (1)	Ongoing.(1)	Invitations to northern and Aboriginal workshops.

Business Line: Knowledge Infrastructure (cont.)

ESS Objective	Deliverables: Year 1	Deliverables: Years 2 & 3	Performance Indicators
To contribute to the northern economy by seeking contractual opportunities with Aboriginal suppliers in the Canadian north. *(cont.)*	Develop new northern geoscience partnerships with Northwest Territories, Nunavut and northerners. (6,7)	Develop new northern geoscience partnership initiatives. (6,7)	Increased use and understanding of geoscience information by communities in land management.
	Enter formal agreements with other agencies to ensure collaborative delivery of logistics to Arctic research scientists. (12)	Ensure coordinated delivery of full line of logistics services to clients, in partnership with other service providers. (12)	Total of funds and in-kind support leveraged by ESS from shared S&T projects.
	Release maps, database and final report on the Northern Baffin Project. (5,6,7,15)		
To improve knowledge of the resources, environment and cultures of the Arctic.	Provide an estimated $1.8 million in logistics support to approximately 135 research programs conducted by government departments (federal, territorial) and universities into resource and environmental issues. (12)	Provide an estimated $1.5 million in logistics support per year to research programs related to sustainable development and environmental programs and policies. (12)	Cost-shared projects with clients and partners. (Recoveries in Year 1 projected to exceed $1.5 million.)
	Support research into the sustainable development of renewable resources in the Arctic. (12)		Ability to meet research needs of client departments and agencies for logistics support to help them fulfil their national and international policy and program commitments.

NRCan Policy Goal 3:

To minimize the environmental impacts of natural resource development and use.

Strategies

- Minimize environmental impacts.
- Disseminate information on natural hazards.
- Understand climate and act on climate change.
- Promote safe use of resources.
- Foster international consensus on climate change.
- Provide geoscience information on hazards due to human activities.

NRCan Objective 3.1: Helping limit and adapt to climate change.

Business Line: Science and Technology

ESS Objective	Deliverables: Year 1	Deliverables: Years 2 & 3	Performance Indicators
To develop new approaches for applying spaceborne medium-resolution EO data to the sustainable development of natural resources and the monitoring of global climate change.	Conduct basic studies on the role of clouds and aerosols in the earth's climate. (10)		Use of information derived from EO data as indicators for forest land management and national reporting, as well as improved general circulation models.
	Demonstrate the use of EO data in solar radiation budget studies. (10)	Integrate EO-based climate change information into CGDI and the National Atlas of Canada. (10)	
	Demonstrate the role of EO data in forest fire monitoring with the Canadian Forest Service (CFS). (10)	Develop an integrated operational system. (10)	Operational use of EO data by industry and provincial forest fire centres.
To make informed decisions on climate change issues through the assessment of the impact of global warming.	Develop and publish high-resolution models of the Holocene climate in Saanich Inlet, reconstructed from ODP cores. (1,4)	Adopt models for predicting climate change and strategies to adapt. (1)	Influence, both within and outside the department, on policy development issues related to GHG emissions.
	Release interdepartmental poster to increase public awareness of scientific basis for adaptation strategies. (3,4)	Characterize the time-space dynamics of terrestrial systems. (2)	Greater public support for adaptation strategies.

Business Line: Science and Technology (cont.)

ESS Objective	Deliverables: Year 1	Deliverables: Years 2 & 3	Performance Indicators
To make informed decisions on climate change issues through the assessment of the impact of global warming. *(cont.)*	Continue the monitoring of modern geological processes in terrestrial environments in the Hudson Bay area. (2)	Collaborate in international digital compilations of geoclimatic data. (5)	Leadership role in defining follow-up studies with federal and university partners.
	Complete study on the history and recurrence of catastrophic events (floods and landslides) in the Saguenay area. (2)		
	Demonstrate the use of remote-sensing techniques for modelling and assessing the impact of climate change on ecosystems. (10)	Map the ability of Canada's forests to absorb carbon from the atmosphere. (10)	Use of EO data to report on GHG cycles and forest ecosystem trends.
	Release reports on the magnitude and frequency of prairie drought under past and future climate change. (5)	Characterize the time-space dynamics of terrestrial systems. (2)	Influence, both within and outside the department, on policy development related to GHG emissions.
	Continue studies on slope movements resulting from scenarios of increased precipitation under climate change and the resulting effect on oil and gas infrastructure in southern Canada. (5)	Collaborate in international digital compilations of geoclimatic data. (5)	
		Develop global models to predict the rate of climate change-related slope movement and its effects on infrastructure in southern Canada. (5)	Leadership role in defining follow-up studies with federal and university partners.
	Continue studies of permafrost-climate relationships through a network of study sites in the Mackenzie Valley. (5)	Release reports on permafrost and climate change studies. (5)	Outputs used to test general circulation models and assess future impacts.
		Improve research on response of permafrost to climate change by applying regional climate change scenarios to enhanced GIS-based permafrost models. (5)	

Business Line: Knowledge Infrastructure

ESS Objective	Deliverables: Year 1	Deliverables: Years 2 & 3	Performance Indicators
To make informed decisions on climate change issues through the assessment of the impact of global warming. *(cont.)*	Release report on pilot study of impact of permafrost warming on northern community infrastructure. (5)	Release reports on spatial and temporal record of environmental change and pollutants in the Arctic, based on analyses of ice cap cores. (5) Conduct drilling program on Mt. Logan to provide Holocene record of climate change in western Arctic and Pacific Ocean. (5)	Provision of geoscience knowledge to help formulate adaptation and mitigation strategies.
To help make informed decisions on climate change issues through the provision of geoscience knowledge bases and assessments of the impact of global warming.	Release maps and data analysis of vulnerable shorelines on the Prince Edward Island and Beaufort Sea coasts. (1) Complete interactive CD-ROM and bulletin on the impact of climate change in the Palliser Triangle. (5,15)	Release maps and data on paleo-shorelines in Atlantic Canada. (1) Release reports on impacts of climate change on geological processes. (5)	Influence, both within and outside the department, policy development related to GHG emissions. Improved integrated coastal zone management (ICZM) in Atlantic Canada. Provision of geoscience knowledge to help formulate adaptation and mitigation strategies.

NRCan Objective 3.2: Promoting science, technology and stewardship practices that reduce environmental impacts, conserve biodiversity, and increase the efficiency of resource development and use.

Business Line: Science and Technology

ESS Objective	Deliverables: Year 1	Deliverables: Years 2 & 3	Performance Indicators
To develop applications and systems for the extraction of EO data, emphasizing RADARSAT data, directed toward sustainable development and environmental management.	Demonstrate interferometric Synthetic Aperture Radar (SAR) for the extraction of spatial dynamic and thematic information. (10) Demonstrate the role of EO data in disaster monitoring, in conjunction with industry and university partners. (10)	Implement operational information systems using RADARSAT and EO satellite data. (10) Transfer disaster monitoring methodology to industry. (10)	Examples of RADARSAT applications available on the CCRS Web site. Transfer of new advanced technology to Canadian industry. Enhanced industrial training competence and capability in radar. Increased use of RADARSAT data in disaster monitoring.
To increase the use of geoscience information in environmental impact reviews.	Complete reviews of environmental impact assessments for NRCan, as required. (1-7)	Ongoing. (1-7)	Use of ESS expertise by the Office of Environmental Affairs (OEA) and other government departments to improve engineering design and environmental mitigation.
To promote understanding and accessibility of GSD products, services and operations for sustainable development and environmental applications.	Improve CSRS and division visibility and accessibility through promotional activities, World Wide Web presence and enhanced online data access. (8)	Continue initiatives to explain GSD's role to external audiences. (8)	Increased use of GSD products and services.

NRCan Objective 3.3: Safeguarding Canadians from the risks associated with natural resource development and use.

Business Line: Science and Technology

ESS Objective	Deliverables: Year 1	Deliverables: Years 2 & 3	Performance Indicators
To support initiatives related to toxic substances and the understanding of their natural sources and processes.	Participate in year 3 of the Metals in the Environment (MITE) initiative, which will include point-source, smelter-centred studies; comparison of Arctic records; mercury cycling; and natural source and dispersal studies. (1,2,3,5,7) Publish collaborative studies on cycling of mercury and other elements. (7)	Complete field studies associated with MITE initiative. (1,2,3,5,7) Complete source apportionment studies of mercury in southwest Nova Scotia to support eco-system risk management strategies. (7) Review progress and determine need to continue MITE initiative. (1,2,3,5,7)	An improved understanding of the roles of natural and anthropogenic sources of toxins and contaminants. Implementation of suitable measures to maintain biodiversity while ensuring sustainable development of natural resources.
To elucidate the fate of heavy metals, CO_2 and organics from combusted coals and petroleum, and heavy metals from smelters.	Produce final reports on power plant emissions in Nova Scotia and selected Alberta sites and initiate emissions monitoring at Noranda-Rouyn. (3)	Finalize emissions research at selected Alberta and Saskatchewan sites, and Trail, British Columbia, and initiate monitoring at Thompson, Manitoba. (3)	An improved understanding of emissions from coal-fired utilities and mine smelters and their downwind dispersal.
To provide reliable geoscientific expertise to minimize health and safety risks linked to human activities.	Develop infrasound capabilities, in conjunction with seismic monitoring of underground nuclear explosions in support of Canada's agreement under the CTBT (4) Acquire and test mobile gamma-ray spectrometry equipment to maintain capabilities to support the Federal Emergency Nuclear Response Plan (FNERP). (7)	Analyze data from seismic and infrasound monitoring to meet Canada's CTBT commitments. (4) Conduct field tests of mobile gamma-ray spectrometry equipment (7).	Co-funding by Treasury Board. Continued major role in international monitoring systems (IMS) for CTBT. Demonstrated ability to conduct effective emergency surveys.

Business Line: Policy and Regulations

ESS Objective	Deliverables: Year 1	Deliverables: Years 2 & 3	Performance Indicators
To support initiatives related to toxic substances and their relevance to federal policies.	Provide expert advice and information in the field of environmental geochemistry. (1,2,3,5,7)	Report on biogeochemical cycling of metals under MITE program to understand its relevance to federal policy development. (1,2,3,5,7)	Advice and information used in policy development.
	Contribute geoscience perspective to NAFTA North American Action Plan (NARAP) for mercury and *Canadian Environmental Protection Act—Priority Substances List 2* (CEPA PSL-2) assessments. (7)	Contribute geoscience perspective to NARAP for mercury and CEPA PSL-2 assessments. (7)	Acceptance of geoscientific results by policy-makers.
	Collaborate with federal departments and universities under the 5NR MOU, MITE Research Network, and Toxic Substances Research initiative to prioritize research relevant to federal science requirements. (7)	Ongoing. (7)	
	Review expert panel reports on nuclear waste storage feasibility for Atomic Energy of Canada Ltd. (AECL). (7)	Continue to review expert panel reports on nuclear waste storage feasibility for AECL. (7)	Incorporation of reviewers' input to decisions on long-term storage of nuclear waste.

NRCan Policy Goal 4:

To contribute to the safety and security of Canadians.

Strategies

- Safeguarding Canadians from natural hazards
- Maintaining a national spatial and aeronautical charting framework.
- Maintaining the integrity of the international, provincial and territorial boundary framework, including property rights.

NRCan Objective 4.1: Safeguarding Canadians from natural hazards.

Business Line: Science and Technology

ESS Objective	Deliverables: Year 1	Deliverables: Years 2 & 3	Performance Indicators
To analyze and apply precise geodetic techniques (VLBI, GPS, gravimetry) to studies of global and crustal dynamics to advance understanding of interactions and evolution of the earth's system environment.	Release information on crustal motion and deformation and their relation to seismic and volcanic activity, and related natural hazards. (4,8) Release information on post-glacial vertical movements and mean sea-level changes, required for coastal zone environmental studies and climate change studies. (4,8)	Improve information on crustal motion, post-glacial rebound and sea-level changes. (4,8)	Incorporation of strain accumulation data in earthquake hazard determinations.
To provide reliable geoscientific and land-use data to reduce risk and minimize the impact of geological processes and natural disasters.	In collaboration with Ontario Hydro, publish new aeromagnetic data for Ontario and northern New York; publish interpretation of marine seismic and magnetic data from Lake Ontario for earthquake hazard assessment. (6)		Provision of geoscience knowledge to help formulate adaptation and mitigation strategies.
	Through a collaborative research program with industry, monitor and forecast the occurrence of magnetic storms. (4) Release reports on geomagnetic hazards to pipelines and hydroelectric power systems. (4)	With industry partners, develop mitigation measures using magnetic forecast information. (4)	Leadership role in defining follow-up studies with federal and university partners.

Business Line: Science and Technology (cont.)

ESS Objective	Deliverables: Year 1	Deliverables: Years 2 & 3	Performance Indicators
To provide reliable geoscientific and land-use data to reduce risk and minimize the impact of geological processes and natural disasters. *(cont.)*	Establish a 10-year plan for space weather research with industry, universities and the Canadian Space Agency. (4)	Initiate integrated, multi-agency space weather research and operational programs. (4)	Use of outputs to test general circulation models and assess impacts of future changes.
	Analyze stability data and release reports from the Georgia Basin, the Fraser Delta and Saanich Inlet for infrastructure development. (4,5)	Continue regional study of geohazards in the Georgia Basin. (4)	Timely development of appropriate models.
	Contribute to natural hazard prediction through 3D modelling and GIS maps of landslide hazards. (5, 7)	Ongoing. (7)	International requests for technology transfer, contracts, and uptake of software developments by international and provincial agencies.
	Continue studies and reports on permafrost characterization in areas under mineral or hydrocarbon exploration and development. (5)	Complete studies on frozen soil-pipeline interactions and on permafrost distribution in Shield areas. (5) Develop models to quantify the risk to oil and gas infrastructure associated with permafrost degradation and slope movement. (5)	Influence on northern policy initiatives and environmental protection. Better design and mitigation procedures for northern infrastructure.
	Continue studies and release reports on landslide hazards in eastern and western Canada. (2,5)	Ongoing. (2,5)	Adoption of report results.
	Publish results of work conducted under the Federal Environmental Action Plan in response to the Saguenay and Red River floods. (2,5,10)	In collaboration with provincial agencies, initiate a study on the impact of climate on landslides and earth flows in eastern Canada. (2)	Incorporation of findings into the Federal Environmental Action Plan.
	Pursue, in collaboration with provincial agencies, the development of a database on landslides in southern Quebec and Saguenay. (2)	Conduct stability analyses by studying water seepage in slopes. (2) Complete synthesis of geological hazards in Canada. (5)	Uptake of report results.
	Release report on contaminant movement in the active layer and permafrost in Mackenzie Delta area. (5)	Report on mechanisms that transport contaminants from industrial waste sites in permafrost. (5)	Use of information by clients to mitigate potential damage to essential services and infrastructure.

Business Line: Knowledge Infrastructure

ESS Objective	Deliverables: Year 1	Deliverables: Years 2 & 3	Performance Indicators
To produce the maps required by other government departments in case of emergencies (e.g. Manitoba and Saguenay floods, ice storm, Swissair crash, Year 2000).	Develop an Emergency Mapping Response Plan. (11)	Implement, test and, when needed, deploy Emergency Mapping Response Plan. (11)	Response in simulated and real emergencies.
	With other government departments, re-establish an emergency response plan to deal with natural disasters. (7)	Document GSC role in multi-agency emergency response plan. (7)	Adoption of GSC contribution by FNERP lead agency.
To provide reliable geoscientific and land-use data to reduce risk and minimize the impact of natural disasters.	Determine the location and magnitude of Canadian earthquakes and provide rapid notification to clients. (4)	Ongoing. (4)	
	Monitor the daily and longer term variations of the earth's magnetic field to provide information on magnetic declination and magnetic field intensity across Canada. (4)	Ongoing. (4)	Increased awareness and understanding of geological hazards by policy-makers, regulatory agencies and industry.
	Release maps and reports on geohazards to offshore development, including ice scouring on the Grand Banks and sediment transport and coastal erosion on the Scotian Shelf. (1)	Release maps and reports on marine landslides, sediment transport, coastal erosion and ice scouring affecting offshore structures. (1)	Continued reliance by news media on ESS sources to provide timely and accurate information on natural disasters.
	Conduct argon isotope dating to provide improved framework for periodicity of recent volcanism. (6)	Ongoing. (6)	
	Release reports on geohazards. (2,5)		Continued level of client use of magnetic field data.
	Continue provision of expert advice on geohazards and natural disasters to federal and provincial agencies and regulatory bodies (e.g. National Energy Board, Emergency Preparedness Canada, and Transportation Safety Board of Canada). (4,5)	Ongoing. (4,5)	Increased awareness and understanding of geological hazards by policy-makers, regulatory agencies and industry.

Business Line: Knowledge Infrastructure (cont.)

ESS Objective	Deliverables: Year 1	Deliverables: Years 2 & 3	Performance Indicators
To provide reliable geoscientific and land-use data to reduce risk and minimize the impact of natural disasters. *(cont.)*	Incorporate results of engineering trials of seismic data to provide improved hazard assessments. (4)	Prepare seismic hazard assessments for incorporation in the 2002 edition of the National Building Code. (4)	Acceptance of results by engineering community and adoption of results in the National Building Code. Partnership programs with insurance industry.

NRCan Objective 4.2: Maintaining a national framework for spatial positioning, mapping and boundary maintenance.

Business Line: Science and Technology

ESS Objective	Deliverables: Year 1	Deliverables: Years 2 & 3	Performance Indicators
To deliver the CSRS in partnership with provincial and territorial governments and stakeholders.	Continue bilateral agreements with the provinces on the establishment and maintenance of CACS and the Canadian Baseline Network (CBN) for geodetic positioning and surveys and use by the private sector. (8)	Continue cooperation agreements. (8)	Close cooperation with provinces and stakeholders in the operation and maintenance of CACS and CBN.
	Maintain an easily accessible, accurate and consistent national spatial reference framework. (8)	Improve the geoid to facilitate use of GPS for height determination, particularly in remote regions of Canada. (8)	Acceptance and increasing use of GPS for elevations above sea level.

Business Line: International

ESS Objective	Deliverables: Year 1	Deliverables: Years 2 & 3	Performance Indicators
To maintain, in partnership with the Government of the United States, an effective boundary between Canada and the United States, as set out in international treaties.	Inspect and maintain the boundary, which includes clearing 75 km of vista, inspecting 500 monuments, repairing 50 monuments, inspecting 50 control stations, establishing 10 new control points and establishing 100 control points by GPS. (9)	Inspect and maintain the boundary, which includes clearing 100 km of vista, inspecting 600 monuments, repairing 75 monuments, inspecting 70 control stations, establishing five new control points and establishing 75 control points by GPS. (9)	Satisfy stakeholders. Accomplishment of annual objectives. Successful resolution of any boundary-related issues.

Business Line: Knowledge Infrastructure

ESS Objective	Deliverables: Year 1	Deliverables: Years 2 & 3	Performance Indicators
To operate, regulate and maintain the CLS system in support of the property rights infrastructure on Canada Lands.	In partnership with the Association of Canada Lands Surveyors (ACLS), update standards for surveys and survey documentation and the Manual of Instructions for the Survey of Canada Lands. (9)	Ongoing. (9)	Acceptance of standards by clients, stakeholders, and the profession.
	Manage the safe archiving of the Canada Lands Survey Records (CLSR). (9)	Ongoing. (9)	Records maintained to archival standards and retrievable on demand.
	Carry out minimum quality monitoring of all surveys on Canada Lands and on private lands in the northern territories. (9)	Ongoing. (9)	Peaceful occupation of land interests.
	Issue contracts, based on available resources, to the private sector to repair survey frameworks. (9)	Ongoing. (9)	Surveys conducted in a timely and cost-effective manner.
	Transfer responsibility for the Board of Examiners for CLS system to the ACLS. (9)		Successful transfer.
To manage the land survey programs for other government departments having land administering responsibilities on Canada Lands.	Issue and manage $2 million in land survey contracts to the private sector. (9)	Ongoing. (9)	Client satisfaction.
To fulfil NRCan's legal survey responsibilities for the implementation of comprehensive and specific Aboriginal land claims under the Treaty Land Entitlement Program.	Issue and manage $9.5 million in land survey contracts to the private sector. (9)	Ongoing. (9)	Fulfilment of the government's responsibilities as defined under settlement legislation. Sound financial and contract management. Meeting of milestones.

Business Line: Knowledge Infrastructure (cont.)

ESS Objective	Deliverables: Year 1	Deliverables: Years 2 & 3	Performance Indicators
To represent the federal government on inter-provincial and territorial boundary commissions.	Meet and resolve issues as required. (9) Propose new legislation for the Alberta-British Columbia boundary to resolve current issues. (9)	Ongoing. (9)	Client and stakeholder satisfaction.
To provide support to the Chief Electoral Officer for the preparation and verification of riding maps and descriptions.	Provide technical services, as required. (9)	Ongoing. (9)	Services delivered on time and as required.
To supply the aeronautical charts, publications and data that civil and military aviation needs to help ensure the safety and efficiency of aviation in Canada.	Deliver revised or amended instrument flight rules (IFR), charts and publications to civil and military clients on an internationally agreed 56-day cycle. (11)	Ongoing. (11)	Meeting of deadlines 100 percent of the time. Amount and percentage of costs recovered.
	Revise and reissue visual flight rules (VFR) and other aeronautical charts within four months of a change that affects aviation. (11)	Ongoing. (11)	
	Introduce digital versions of the Flight Supplements, issued on the 56-day aeronautical cycle, in parallel with the printed versions. (11)	Gradually introduce and improve digital versions of all charts and publications, as warranted by client demand. (11)	Client satisfaction.
	Sign a first corporate licence with one aviation institution for digital flight supplements. (11)	Sign a corporate licence with one new aviation institution each year for digital products. (11)	Sales of new digital products.

NRCan Policy Goal 5:

To manage the department efficiently and effectively.

Strategies:

- Develop consistent business plans and policies.
- Improve and streamline the provision of administrative and information services to meet client needs.
- Work in partnership with stakeholders and major client groups.

NRCan Objective 5.1: Managing NRCan's resources responsibly.

Business Line: Science and Technology

ESS Objective	Deliverables: Year 1	Deliverables: Years 2 & 3	Performance Indicators
To develop R&D capabilities to lead or participate in initiatives in mapping with support from external stakeholders.	Augment in-house R&D capability by adding two S&T officers to organize and monitor activities. Add engineers and research scientists to the Centre for Topographic Information (Ottawa) [CTI(O)]. (11)	Augment in-house R&D capability by adding engineers and research scientists to CTI(O). (11)	Development of additional research skills.
	Attract a visiting post-doctoral fellow for the Natural Sciences and Engineering Research Council (NSERC) laboratory position. (11)		Levels and types of cooperation with other government departments, academia and industry.

Business Line: Knowledge Infrastructure

ESS Objective	Deliverables: Year 1	Deliverables: Years 2 & 3	Performance Indicators
To manage Sector resources responsibly.	Implement the Sector Project System (SPS) to support project management and reporting. (14,15)	Monitor and adjust SPS as required. (14,15)	User acceptance of SPS.
	Coordinate the development of a systematic approach to project management in ESS, including process mapping the SPS and surveying project management practices. (14)	Develop and implement an action plan for building a project management tool kit for ESS and identifying criteria for project management practices. (14)	User acceptance and utilization of SPS. Identification of project management criteria and best practices.

Business Line: Knowledge Infrastructure (cont.)

ESS Objective	Deliverables: Year 1	Deliverables: Years 2 & 3	Performance Indicators
To manage Sector resources responsibly. *(cont.)*	Adopt and utilize the SPS to support project management and reporting. (14) + ESS	Utilize the SPS to support project management and reporting. (14) + ESS	Completion of process maps for project management practices across ESS.
	Implement improved project management practices to address project development, approval, resource planning and, post-project review. (14) + ESS	Continue to improve and utilize project management practices. (14) + ESS	Ability to extract project data from SPS. Uniform practices.
To provide the technical infrastructure required to support Sector programs.	Provide client service as specified in the ESS Information Technology (IT) service delivery framework. Coordinate external services provided to the Sector. (15)	Ongoing. (15)	Delivery of services described in the framework. Help desk usage reports. Degree of success in delivering on negotiated plans.
	Negotiate and coordinate the implementation of new departmental IT-based services in ESS. (15)		Better accessibility of Sector Internet and Intranet systems and services.
	Improve Sector Internet and Intranet presentations and technology use. (15)		Availability statistics and client feedback reports.
	Maintain and deliver reliable network-based Sector services. (15)		Value of changes implemented. Client satisfaction.
	Cooperatively define and implement integrated Sector systems and technological improvements. (15)		Ability to operate with reduced resources.
	Implement MOU between Mineral Resources Division (MRD) and the Canada Centre for Mineral and Energy Technology (CANMET) to share analytical laboratory facilities as required to effectively manage analytical demands. (7)	Review MRD/CANMET shared laboratory agreement to ensure optimum use of analytical facilities. (7)	Improved analytical productivity, reduced turnaround, greater number of samples processed.

Business Line: Knowledge Infrastructure (cont.)

ESS Objective	Deliverables: Year 1	Deliverables: Years 2 & 3	Performance Indicators
To operate in an environment of continuous quality improvement.	Implement action plans arising from LSD's 1999 client satisfaction survey. (9)	Ongoing. (9)	Improved client satisfaction.
	Conduct and/or participate in impact assessment studies of bedrock mapping and earthquake seismology activities, as well as the Minerals Geoscience and Hydrocarbon Geoscience Programs (1,3,4,6,7)	Analyze impact assessment study reports, and implement recommendations. (1,3,4,6,7)	Review reports from consultants.
	Implement recommendations, as appropriate, from EXTECH II Impact Assessment and Marine Geoscience Review. (1,4,7)		
To rejuvenate and enhance Sector human resources to create an effective, flexible and motivated workforce.	Continue specific training to increase knowledge and skill levels in such areas as data acquisition, human resource management and client services. (11)	Continue specific training where necessary to increase knowledge and skill levels in core and complementary areas. (11)	Increased number of employees with skills relevant to operational requirements.
	Continue directed training to maintain or increase knowledge and skill levels in such areas as data acquisition, manipulation, interpretation and visualization; in scientific concepts, techniques and technology applications; and in human resource and financial management. (1-7)	Ongoing. (1-7)	Reduced capacity gaps and reduced knowledge gaps.
	Allocate at least 1 percent of budget to new recruitment in strategic areas. (1-7)	Ongoing. (1-7)	

Business Line: Knowledge Infrastructure (cont.)

ESS Objective	Deliverables: Year 1	Deliverables: Years 2 & 3	Performance Indicators
To rejuvenate and enhance Sector human resources to create an effective, flexible and motivated workforce. *(cont.)*	Increase the number of professionals and research scientists by two in CTI(O) through assignments. Retain Geomatics Professional Development Program (GPDP) graduates. (11)	Ongoing. (11)	Increase of seven professionals on staff while remaining within budget.
	Provide educational leave for technologists and relocation for professionals from Sherbrooke. (11)		
	Create greater synergy between the Ottawa and Sherbrooke offices through joint projects and reallocation of responsibilities. (11)	Continue joint system (Ottawa/Sherbrooke) for the development of projects and cross-divisional support. (11)	Expanded knowledge base of CTI processes and products.
	Ensure all ESS employees have an annual training plan. (17) + ESS	Ongoing. (17) + ESS	Employees with knowledge and skills relevant to ESS requirements and who are flexible and mobile.
	Ensure all ESS employees receive annual performance feedback report. (17) + ESS	Ongoing. (17) + ESS	Employees who are aware of their performance and how to improve it.
To develop the next generation of senior managers.	Sponsor a management training program. (1-7,10)	Sponsor a long-term program to qualify new managers by 2000. (1-7,10)	Placement of trainees in management and leadership positions.
	Implement GSC Management Development Program. Eight candidates to begin program. (1-7)	Assessment of 10 additional candidates. (1-7)	Successful completion of program.
	Design set of exercises for self-identified managerial candidates to aid in career path planning. (4)		

Business Line: Knowledge Infrastructure (cont.)

ESS Objective	Deliverables: Year 1	Deliverables: Years 2 & 3	Performance Indicators
To recruit, renew and retain human resources according to the ESS S&T Capacities Study for the future decade.	Hire 22 junior employees in targeted science and technology fields. (17) + ESS	Hire at least 44 junior employees in targeted science and technology fields. (17) + ESS	Increase of at least 66 S&T employees who will fill the gaps identified by the Study.
	Recruit 10 post-doctoral fellows through the new NSERC partnership. (17)	Ongoing. (17)	Synergy in the R&D activities of the Sector.
	Provide 10 staff exchange opportunities with external organizations. (17)	Ongoing. (17)	Synergy with other external organizations, which allows ESS staff to learn and experiment in a new work environment.
	Recruit 10 candidates for the GPDP. (17)	Recruit 12 candidates for the GPDP. (17)	Contribution to filling the gaps identified by the Study on a permanent basis.
	Sponsor a Sector management training program. (17)	Refine the management training program and ensure that all divisions participate. (17)	Placement of trainees in management and leadership positions to fill the gaps identified in the Study.
To provide the administrative infrastructure required to support Sector programs.	Define a management and administrative services delivery framework according to the 1999 client satisfaction survey results. (18)	Provide client service as specified in the ESS management and administrative services delivery framework. (18)	Delivery of services described in the framework. Satisfaction of clients.
	Improve the ESS occupational health and safety environment, per the audit report. (18) + ESS	Ongoing. (18) + ESS	Good performance on the ESS occupational health and safety report card.
	Negotiate and coordinate the implementation of the new Interdepartmental Procurement and Purchasing System (IPPS). (18)	Ongoing. (18)	
	Negotiate and coordinate the implementation of a new departmental records management system. (18)	Ongoing. (18)	Value of changes implemented. Satisfaction of clients.
	Negotiate and coordinate the participation of the Sector in the departmental initiative regarding modernization of comptrollership. (16,18)	Ongoing. (18)	

NRCan Objective 5.2: Continuously improving NRCan products, services and operations.

Business Line: Science and Technology

ESS Objective	Deliverables: Year 1	Deliverables: Years 2 & 3	Performance Indicators
Improve access to LSD products through a dedicated Internet download site.	Launch pilot site with base level information available. (9)	Expand data access to a comprehensive range of LSD products. (9)	Increased sales of LSD digital products.
	Perfect pilot file transfer protocol site for contractor information. (9)	Complete development of Internet site.	Improved stakeholder satisfaction.

Business Line: Knowledge Infrastructure

ESS Objective	Deliverables: Year 1	Deliverables: Years 2 & 3	Performance Indicators
To obtain and maintain ISO 9000 accreditation for Mapping Services Branch (MSB).	Complete ISO 9001 external audit and certification for CTI(O). The Centre for Topographic Information (Sherbrooke) [CTI(S)] and Aeronautical and Technical Services (ATS) to pass annual ISO 9001 renewal process. (11)	Maintain certification. (11)	Certification for CTI(O) by the end of 1999/2000, and success of yearly renewal process at CTI(S) and ATS.
To operate in an environment of continuous quality improvement.	Implement action plan arising from the third round of the annual National Quality Institute quality fitness test at MSB. (11)	Continue annual analysis of input and implementation of action plans. (11)	Feedback from interviews and other evidence indicating continued organizational improvement in MSB.
To provide consistent and equitable business practices in a framework that is compliant with NRCan and federal policies.	Review and implement recommendations from the audit of ESS external service standards and develop strategies to improve compliance with service standard commitments. (13) + ESS	Implement strategies to improve compliance with service standard commitments. (13) + ESS	Increased staff awareness of, and compliance with, external service standards.
	In conjunction with the ESS Quality Management Advisor, coordinate training of ESS staff in the area of measuring client satisfaction. (16,13)	Monitor client satisfaction measurement activities in the Sector. (16, 13)	Increased levels and quality of client satisfaction measurement activities in ESS.

Business Line: Knowledge Infrastructure (cont.)

ESS Objective	Deliverables: Year 1	Deliverables: Years 2 & 3	Performance Indicators
To provide consistent and equitable business practices in a framework that is compliant with NRCan and federal policies. *(cont.)*	Coordinate the preparation of the annual ESS Products and Services Price List. (13)	Coordinate the preparation of the annual ESS Products and Services Price List. (13)	Timely publication and positive client feedback.
	Coordinate the preparation of the annual ESS Business Plan. (13)	Coordinate the preparation of the annual ESS Business Plan. (13)	
	Manage the GC Revolving Fund. (13)	Ongoing. (13)	Attainment of planned revenue levels.
	Review ESS management practices against the ESS management framework and identify and carry out management improvement projects. (16) + ESS	Ongoing. (16) + ESS	Improved employee and client satisfaction; success in applying for a quality award.
	Coordinate preparation of the annual ESS Business Opportunity Bulletin. (13)	Coordinate preparation of the annual ESS Business Opportunity Bulletin. (13)	Timely publication and positive client feedback.
	Develop new Internet data delivery mechanisms. (7)	Continue to develop and implement new Internet data delivery mechanisms. (7)	
	Institute Web-based client feedback loops to improve products and delivery. (4,7)	Utilize Web-based client feedback mechanisms to improve products and delivery. (4,7)	
	Conduct bi-annual client satisfaction measurements of Geophysical Data Centre products and services. (6)		
	Report on client logs conducted in last quarter of 1998/1999 as preparation for client satisfaction measurement for Hydrocarbon, Surficial and Marine Geoscience Programs. (1,2,3,5)	Refine products and services to address client needs. (1,2,3,5)	Progressive comparison of client satisfaction responses.

Business Line: Knowledge Infrastructure (cont.)

ESS Objective	Deliverables: Year 1	Deliverables: Years 2 & 3	Performance Indicators
To create and promote awareness of ESS S&T activities.	Coordinate and prepare the GC's and GSC's annual reviews. (19)	Ongoing. (19)	Increased awareness of ESS programs among the media and the public.
	Produce guidelines for preparation of ministerial briefing books and ministerial events. Make presentations to management and staff. (19)	Revise as needed. (19)	Increased number of ESS ministerial events.
	Develop and implement a comprehensive two-year external communications strategy for ESS that ties in to the departmental communications strategy and ESS Business Plan. (19)	Continue to implement the communications strategy. (19)	Increased awareness of Sector activities by the media and decision-makers.
	Develop and implement a comprehensive two-year ESS internal communications strategy that ensures that processes are established throughout the Sector to inform all staff. (19)	Continue to implement communications strategy. (19)	Bi-annual employee survey.
	Coordinate ESS exhibits for up to 10 Canadian conferences and one foreign conference. (13)	Ongoing. (13)	Number of conferences supported.
To align Sector products and services to government priorities and client needs.	Expand on LSD's 1998/1999 strategic planning workshops. (9)	Implement an ongoing action plan-based strategic planning process. (9)	Confirmation of priorities with Management Board, LSD staff, clients and partners.
	Complete Strategic Overview Document (SOD) and mid-year update. (14)	Ongoing. (14)	Use of SOD in the Sector planning exercise.
	Coordinate annual review of ESS priorities within context of government and NRCan priorities. (14)		Confirmation of priorities by the Sector Management Team.

Business Line: Knowledge Infrastructure (cont.)

ESS Objective	Deliverables: Year 1	Deliverables: Years 2 & 3	Performance Indicators
To improve horizontal linkages of the Sector and other federal agencies.	Based on the strategy to strengthen LSD relations with other federal departments, target INAC, PC, and the Department of Foreign Affairs and International Trade for high-level meetings on issues of common concern. (9)	Ongoing. (9)	Improved federal partnering and decision-making.
	In order to strengthen ESS relations with other federal departments, target key departments and central agencies for high-level meetings on issues of common concern. (14)	Ongoing. (14)	Improved understanding of Sector services. Improved federal decision-making.
	Lead the completion of the Sector's S&T Capacity Study to respond to issues identified within a 10-year time frame. (14) + Chief Geoscientist Office (CGO)		Recognition by the Minister of the need for, and strength of, the Sector's science capacity.
To ensure that ESS has the S&T and policy capacity to effectively deliver its programs and services and address new issues and to priorities.	Coordinate Sector SMT and policy initiatives in conjunction with the NRCan Science Capacities Study and similar initiatives in other government departments. (14) + CGO	Implement strategies to address current and future capacity gaps and seek new funding for recruitment. (14) + ESS	Consensus reached on strategies to effectively deliver Sector S&T.
	Consult with Minister's National Advisory Board on Earth Sciences (MNABES), provinces and territories, National Geological Surveys Committee (NGSC), Canadian Council on Geomatics (CCOG) and other stakeholders on the Sector's S&T Capacities Study and strategies to respond to it. (14)		

Business Line: Knowledge Infrastructure (cont.)

ESS Objective	Deliverables: Year 1	Deliverables: Years 2 & 3	Performance Indicators
To strengthen GC project work through collaborations with universities.	Work with universities within the Networks of Centres of Excellence (NCE) in Geomatics program. (8,10) Participate with universities on geodetic development projects, such as workshops on geoid model development. (8)	Continue collaboration on geoid model development and on a geomatics research network within the Geodesy node of the NCE. (8,10) Release a new gravimetric geoid for Canada by the end of 2000. (8)	Total of funds and in-kind support leveraged by ESS from shared S&T projects.
To increase and enhance the delivery of information services.	Effectively manage the national earth science collection. (15) Increase availability of information services at the client's desktop. (15) Increase the Sector's Internet presence and delivery of electronic information and services. (15) Promote application of common automated systems across NRCan libraries and information centres to facilitate client access to, and use of, NRCan information. (15) Seek common licence for information services and products to make them widely available in NRCan and to obtain volume document prices. (15) Open the Virtual Library by providing access to 33 electronic journals in a trial licence agreement with Elsevier. (15)	Ongoing. (15)	Client feedback denoting increased level of satisfaction. Increased availability of electronic publications. Improved links to, and greater use of, key earth science resources on the Internet. A current, up-to-date and enhanced Sector Home Page. Improved site management and information retrieval.

Business Line: Policy and Regulation

ESS Objective	Deliverables: Year 1	Deliverables: Years 2 & 3	Performance Indicators
To meet federal responsibilities in partnership with provincial and territorial governments, universities and other stakeholders.	Reflect the advice of MNABES in Sector planning and priority-setting. (14) + ESS	Ongoing. (14) + ESS	Strengthened coordination of geoscience and geomatics programs. Improved federal decision-making.
	Develop strategic policy overview of federal-provincial-territorial cooperation in geoscience and geomatics. (14)	Maintain watching briefs. (14)	Number of successful cooperation programs.
	Develop and carry out collaborative projects with provincial and territorial geoscience and geomatics agencies, as determined through joint planning agreements; seek new opportunities for collaboration and formalization of new agreements. (1-7,11,14)	Implement extended collaboration arrangements. (1-7,11,14)	Increased collaboration with provincial counterparts. Identification of, and response to, perceived gaps and weaknesses in federal and provincial programs. Partner satisfaction and client feedback attesting to the effectiveness of the cooperation.
	Conduct stakeholder workshops to develop a commercially viable Canadian Earth Observation Network (CEONet) component of the CGDI. (10)		Commercial success of data providers and system integrators.
	Provide secretariat service to CCOG and contribute to joint work on CCOG resolutions. Provide a mid-term report on outcomes of 1998 St. John's, Newfoundland meeting, and assist the chair in planning for the 1999 meeting in Yellowknife, Northwest Territories. (14)	Ongoing. (14)	Closer collaboration with provinces in planning and delivering coordinated products and services. Improved governance.
	Participate in securing Cabinet approval and funding for the development of CGDI (GeoConnections). (10,14)	Ongoing. (10,14)	Approval of funding.
	Facilitate the development of linkages between CGDI, WINS Resource Innovation Initiative and ResSources. (14)	Ongoing. (14)	Contribution to improving good governance.

4 Earth Sciences Sector: Management Plan

ESS operates with a quality management philosophy in order to be an effective organization striving to provide excellent service to clients, to be a better place to work and to provide good value for the Canadian taxpayer. In accordance with this philosophy, the Sector has adopted the following management principles:

- a primary focus on clients;
- leadership through involvement and example;
- cooperation, teamwork and partnering;
- respect for the individual and encouragement for people to develop to their full potential;
- recognition of the importance of the contribution of each and every individual;
- commitment to process-oriented, prevention-based strategy;
- the continuous improvement of methods and results;
- a fact-based approach to decision-making;
- a responsibility to stakeholders and to society; and
- the application of the principles of modern comptrollership.

Management Framework

The Sector has developed a framework that assists ESS in maintaining and developing the necessary tools and practices to manage itself according to its principles. The framework reflects NRCan's Guide to Good Management and is composed of these principal elements:

- leadership and planning;
- clients and stakeholders;
- process improvement;
- human resources;
- suppliers and partners; and
- Sector results and performance.

Management Improvement Processes

The ESS management framework guides the Sector in the development of its annual Management Improvement Plan. The Sector has implemented a number of processes in order to monitor progress and ensure the relevance of these plans.

These processes include the following events.

- At the annual Sector management retreat, data from many sources—including the strategic overview, departmental priorities, the employee survey, upward feedback, NRCan audit and evaluation assessments, organizational self-evaluation and client feedback—are analyzed and used to assess progress made according to the ESS management framework and to identify areas for improvement.

  Milestones: fall 1999, 2000 and 2001.

- Each Sector Management Team (SMT) member presents a semiannual report on progress made in his or her own area.

  Milestones: mid-year and year-end reviews in 1999/2000, 2000/2001 and 2001/2002.

- Reports on quality projects carried out by each division are posted on the Internet three times per year.

  Milestones: April, August and December 1999, 2000 and 2001.

- An annual forum takes place to encourage the exchange of best management practices among divisions and branches.

  Milestones: spring 1999, 2000 and 2001.

- Organizational self-assessments are conducted to validate progress and identify potential improvements, involving employees at all levels of the organization.

  Milestones: March and April 1999/2000.

- Client and stakeholder assessments and surveys are done to identify levels of satisfaction and opportunities for improvement.

  Milestones: commencing 1999/2000.

Management Improvement Plan Initiatives for 1999/2000

Vision and Strategic Direction

Building on the data gathered from various surveys, as well as the ESS Science and Technology (S&T) Capacities Study, Sector priorities will be analyzed and alignment activities will be undertaken to ensure consistency of Sector vision and activities.

Accountability: All SMT members.

Internal Communications

Internal communications are a priority for ESS management. A communications plan will be developed and implemented to articulate the Sector vision and strategic direction.

Management will continue to meet with staff to communicate departmental management committee and SMT meeting highlights. There will be two Sector management staff meetings and a best practices meeting during the year. The Assistant Deputy Minister will meet with employees in all divisions, including regions, during 1999/2000.

Accountability: All SMT members.

Information Management

The project information system will continue to be an area of development and refinement as the basic system is implemented throughout the Sector. Training and support in project management tools and techniques in support of the Sector Information Plan will continue to be identified, developed and deployed.

Accountability: All SMT members.

Service Standards

During 1998/1999, an NRCan audit of ESS external service standards took place in order to gauge overall Sector compliance. Recommendations from this audit will be reviewed and implemented during 1999/2000. Based on these recommendations, an update of these external service standards will take place during 1999/2000. Following this update, a strategy for development of internal service standards will be prepared.

Accountability: Executive Director, Business Development.

Scientific Review and Assessment

ESS has established a process and a schedule for external scientific review and assessment. The bedrock mapping impact assessment project will be completed in 1999. In 1999/2000, impact studies of GSC's Minerals Program, earthquake seismology activities, and Hydrocarbons Program will be conducted.

Accountability: Chief Geoscientist.

ESS will continue implementation of ISO 9000 quality management systems in the Mapping Services Branch (MSB) and Geodetic Survey Division (GSD).

Accountability: Director General, MSB and Director, GSD.

Management Skills Development

ESS will continue to provide training in management skills development to managers and potential managers. The Sector will continue to offer courses for managers on managing performance and support government-wide and departmental human resource efforts.

Accountability: SMT members.

Client Stakeholder Assessments

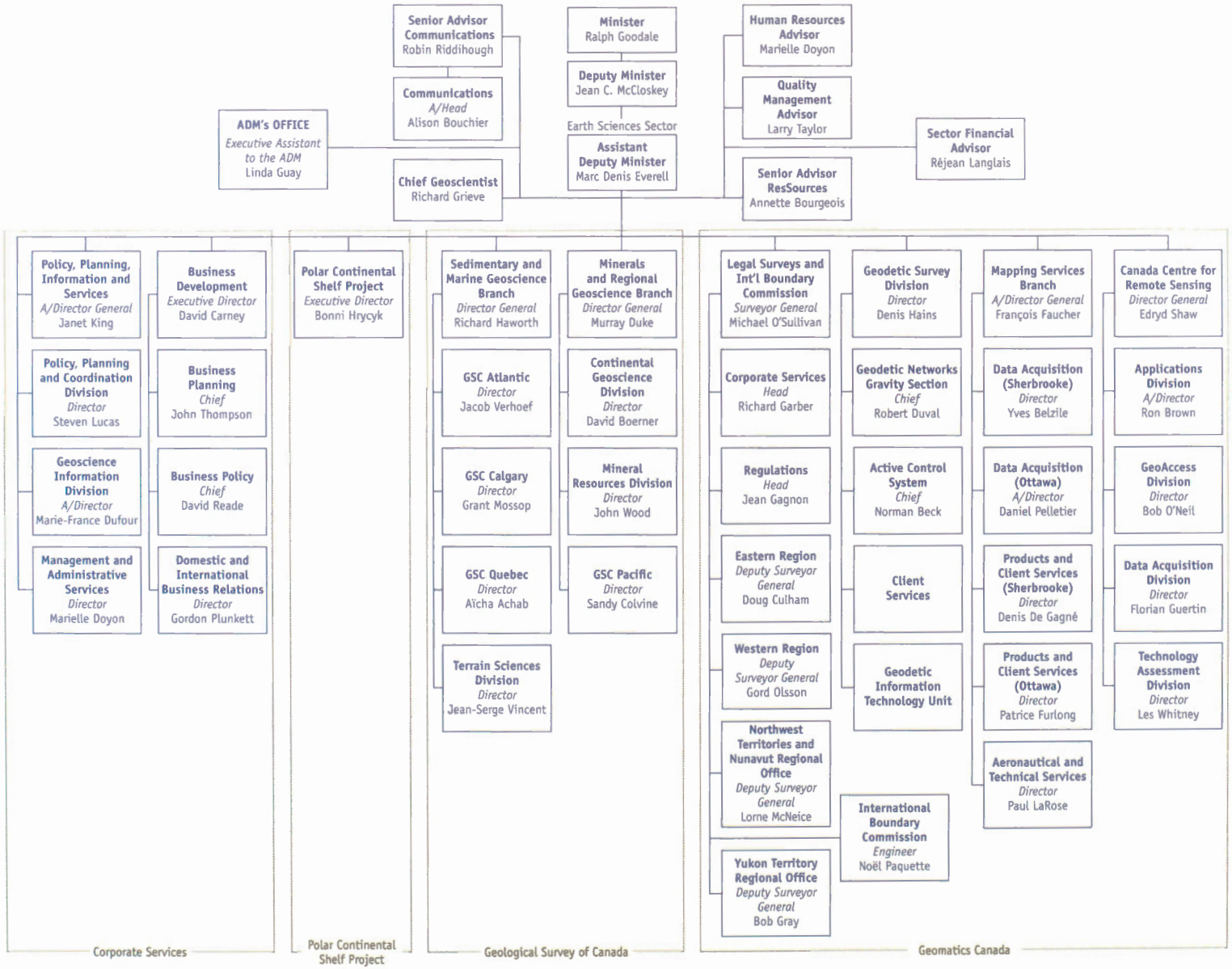
ESS will continue to identify client and stakeholder satisfaction levels and to develop and deploy a more systematic measurement process. The measurement process may identify options and opportunities for improvement to products and processes.

During 1998/1999, Guidelines for Client Satisfaction Measurement Activity in ESS were prepared by ESS Business Development and distributed. Working with Business Development, the Sector Quality Management Advisor (SQMA) will manage training related to the measurement of client satisfaction, which will be conducted during 1999/2000.

Accountability: SQMA and Executive Director, Business Development.

Annex A: Earth Sciences Sector Organization Chart

Natural Resources Canada



Annex B: Directory of Earth Sciences Sector Offices

Geomatics Canada

Geodetic Survey Division
615 Booth Street, 4th Floor
Ottawa, Ontario
K1A 0E9
Telephone: (613) 992-2656
Fax: (613) 947-3602

Legal Surveys Division and the International Boundary Commission

Legal Surveys Division
615 Booth Street, 5th Floor
Ottawa, Ontario
K1A 0E9
Telephone: (613) 995-4341
Fax: (613) 992-1122

International Boundary Commission
615 Booth Street, 5th Floor
Ottawa, Ontario
K1A 0E9
Telephone: (613) 992-1294
Fax: (613) 947-1337

Eastern Regional Operations Centre (EROC)
615 Booth Street, 5th Floor
Ottawa, Ontario
K1A 0E9
Telephone: (613) 995-2604
Fax: (613) 995-2612
Cellular: (613) 851-7115
Conference Room: (613) 995-7606

Atlantic Client Liaison Unit
136 Victoria Street East
Amherst, Nova Scotia
B4H 1Y1
Telephone: (902) 661-6766
Fax: (902) 661-6769
Cellular: (902) 664-8482

Eastern Regional Operations Centre (EROC) *(continued)*

Ontario Client Liaison Unit
55 St. Clair Avenue East,
Suite 606
Toronto, Ontario
M4T 1M2
Telephone: (416) 973-1006
Fax: (416) 973-1004
Cellular: (416) 574-9418

Quebec Client Liaison Unit
320 St. Joseph East
Box 51127 - G. Roy
Quebec, Quebec
G1K 8Z7
Telephone: (418) 648-5725
Fax: (418) 648-5728
Cellular: (418) 655-4656

Northwest Territories and Nunavut Regional Operations Centre

52nd Street, Suite 4920
Box 668
Yellowknife, Northwest Territories
X1A 2N5
Telephone: (867) 669-3949
Fax: (867) 920-6662
Computer: (867) 669-3915
Boardroom: (867) 669-3905

Yukon Territory Regional Office

300 Main Street, Room 225
Whitehorse, Yukon
Y1A 2B5
Telephone: (867) 667-3957
Fax: (867) 393-6709

Nunavut Client Liaison Unit
5102 – 50th Avenue, Room 202
Yellowknife, Northwest Territories
X1A 3S8
Telephone: (867) 669-2901
Fax: (867) 669-2930

Western Regional Operations Centre (WROC)

9700 Jasper Avenue, Suite 605
Edmonton, Alberta
T5J 4C3
Telephone: (780) 495-2138
Fax: (780) 495-4052

Alberta Client Liaison Unit
9700 Jasper Avenue, Suite 605
Edmonton, Alberta
T5J 4C3
Telephone: (780) 495-6174
Fax: (780) 495-4052

Saskatchewan Client Liaison Unit
100 Central Park Place
2208 Scarth Street
Regina, Saskatchewan
S4P 2J6
Telephone: (306) 780-5402
Fax: (306) 780-5191
Records: (306) 780-6992

British Columbia Client Liaison Unit
1550 Alberni Street, Suite 800
Vancouver, British Columbia
V6G 3C6
Telephone: (604) 666-5326
Fax: (604) 666-0522

Manitoba Client Liaison Unit
275 Portage Avenue, Suite 501
Winnipeg, Manitoba
R3B 2B3
Telephone: (204) 983-3793
Fax: (204) 983-0157

Manitoba Indian and Northern Affairs Canada Land Claims Client Liaison Unit
275 Portage Avenue, Suite 501
Winnipeg, Manitoba
R3B 2B3
Telephone: (204) 983-3623
Fax: (204) 984-5828

Canada Centre for Remote Sensing

588 Booth Street, 3rd Floor
Ottawa, Ontario
K1A 0Y7
Telephone: (613) 947-1222
Fax: (613) 947-1382

GeoAccess Division

615 Booth Street, 6th Floor
Ottawa, Ontario
K1A 0E9
Telephone: (613) 947-1245
Fax: (613) 947-2410

Technology Assessment Division

588 Booth Street, 3rd Floor
Ottawa, Ontario
K1A 0Y7
Telephone: (613) 947-1211
Fax: (613) 947-3125

Applications Division

588 Booth Street, 3rd Floor
Ottawa, Ontario
K1A 0Y7
Telephone: (613) 947-1263
Fax: (613) 947-1385

Data Acquisition Division

588 Booth Street, 2nd Floor
Ottawa, Ontario
K1A 0Y7
Telephone: (613) 947-1356
Fax: (613) 943-8201

Mapping Services Branch

615 Booth Street, 7th Floor
Ottawa, Ontario
K1A 0E9
Telephone: (613) 947-0733
Fax: (613) 995-2000

Centre for Topographic Information (Sherbrooke)

2144 King Street West, Suite 010
Sherbrooke, Quebec
J1J 2E8
Telephone: (819) 564-4801
Fax: (819) 564-5698
Toll Free: (800) 661-2638

National Air Photo Library

615 Booth Street, 1st Floor
Ottawa, Ontario
K1A 0E9
Telephone: (613) 995-4560
Fax: (613) 995-4568
Toll-Free: (800) 230-6275

Aeronautical and Technical Services

615 Booth Street, 1st Floor
Ottawa, Ontario
K1A 0E9
Telephone: (613) 992-4456
Fax: (613) 943-8959

Centre for Topographic Information (Ottawa)

615 Booth Street, 7th Floor
Ottawa, Ontario
K1A 0E9
Telephone: (613) 995-4921
Fax: (613) 947-7948

Canada Map Office

130 Bentley Road
Nepean, Ontario
K2E 6T9
Telephone: (613) 952-7000
Toll-Free Telephone: (800) 465-6277
Fax: (613) 957-8861
Toll-Free Fax: (800) 661-6277

Geological Survey of Canada

601 Booth Street, 2nd Floor
Ottawa, Ontario
K1A 0E8
Telephone: (613) 996-3919
Fax: (613) 996-9990
Email: library@gsc.nrcan.gc.ca

Sedimentary and Marine Geoscience Branch

601 Booth Street, 2nd Floor
Ottawa, Ontario
K1A 0E8
Telephone: (613) 995-2340
Fax: (613) 996-6575
Email: info-ottawa@gsc.nrcan.gc.ca

Terrain Sciences Division

601 Booth Street, 3rd Floor
Ottawa, Ontario
K1A 0E8
Telephone: (613) 995-4938
Fax: (613) 992-0190
Email: info-ottawa@gsc.nrcan.gc.ca

GSC Atlantic

Geological Survey of Canada (Atlantic)
Bedford Institute of Oceanography
Box 1006, Challenger Drive
Dartmouth, Nova Scotia
B2Y 4A2
Telephone: (902) 426-3225
Fax: (902) 426-1466
Email: info-dartmouth@gsc.nrcan.gc.ca

GSC Calgary

Geological Survey of Canada (Calgary)
3303-33rd Street N.W.
Calgary, Alberta
T2L 2A7
Telephone: (403) 292-7000
Fax: (403) 292-5377
Email: info-calgary@gsc.nrcan.gc.ca

Minerals and Regional Geoscience Branch

601 Booth Street, 2nd Floor
Ottawa, Ontario
K1A 0E8
Telephone: (613) 995-4093
Fax: (613) 996-6575

Continental Geoscience Division

601 Booth Street, 4th Floor
Ottawa, Ontario
K1A 0E8
Telephone: (613) 995-4314
Fax: (613) 995-7322

Mineral Resources Division

601 Booth Street, 6th Floor
Ottawa, Ontario
K1A 0E8
Telephone: (613) 996-9223
Fax: (613) 992-5694

GSC Pacific

Geological Survey of Canada (Pacific)
9860 West Saanich Road
Sidney, British Columbia
V8L 4B2
Telephone: (250) 363-6438
Fax: (250) 363-6500

GSC Quebec

Geological Survey of Canada (Quebec)
2535 Laurier Boulevard
Box 7500
Sainte-Foy, Quebec
G1V 4C7
Telephone: (418) 654-2604
Fax: (418) 654-2615
Email: info-stefoy@gsc.nrcan.gc.ca

Polar Continental Shelf Project

615 Booth Street, 4th Floor
Ottawa, Ontario
K1A 0E9
Telephone: (613) 947-1601
Fax: (613) 947-1611

Corporate Services

Assistant Deputy Minister's Office
580 Booth Street, 14th Floor
Ottawa, Ontario
K1A 0E4
Telephone: (613) 992-9983
Fax: (613) 992-8874

Chief Geoscientist Office
601 Booth Street, 2nd Floor
Ottawa, Ontario
K1A 0E8
Telephone: (613) 995-5372
Fax: (613) 996-8059

Policy, Planning, Information and Services Branch
601 Booth Street, 2nd Floor
Ottawa, Ontario
K1A 0E8
Telephone: (613) 996-9551
Fax: (613) 943-8296

Senior Advisor (Communications)
580 Booth Street, 14th Floor
Ottawa, Ontario
K1A 0E4
Telephone: (613) 947-2789
Fax: (613) 992-8874

Senior Advisor (ResSources)
580 Booth Street, 14th Floor
Ottawa, Ontario
K1A 0E4
Telephone: (613) 995-7602
Fax: (613) 992-8874

Senior Communications Manager
601 Booth Street, 2nd Floor
Ottawa, Ontario
K1A 0E8
Telephone: (613) 943-8885
Fax: (613) 995-3082

Human Resources Advisor
601 Booth Street, 1st Floor
Ottawa, Ontario
K1A 0E8
Telephone: (613) 995-4215
Fax: (613) 947-0146

Sector Financial Advisor Office
615 Booth Street, 4th Floor
Ottawa, Ontario
K1A 0E9
Telephone: (613) 995-0842
Fax: (613) 992-3657

Quality Management Advisor
580 Booth Street, 14th Floor
Ottawa, Ontario
K1A 0E4
Telephone: (613) 947-7353
Fax: (613) 992-8874

Business Development
615 Booth Street, 5th Floor
Ottawa, Ontario
K1A 0E9
Telephone: (613) 996-0441
Fax: (613) 995-8737

Earth Sciences Information Centre
601 Booth Street, 3rd Floor
Ottawa, Ontario
K1A 0E8
Telephone: (613) 996-3919
Fax: (613) 943-8742
Email: library@nrcan.gc.ca

Annex C: List of Acronyms

4NR	Four federal natural resource departments: Natural Resources Canada, Agriculture and Agri-Food Canada, Fisheries and Oceans Canada, and Environment Canada
5NR	4NR plus Health Canada
AAFC	Agriculture and Agri-Food Canada
ACLS	Association of Canada Lands Surveyors
ACUNS	Association of Canadian Universities for Northern Studies
ADM	Assistant Deputy Minister
ADRG	Arc Digitized Raster Graphics
AECL	Atomic Energy of Canada Limited
ATS	Aeronautical and Technical Services
CACS	Canadian Active Control System
CANMET	Canada Centre for Mineral and Energy Technology
CBM	Canadian Coalbed Methane
CBN	Canadian Base Network
CCAF	Climate Change Action Fund
CCOG	Canadian Council on Geomatics
CCOP	Coordinating Committee for Coastal and Offshore Geoscience Programs in East and Southeast Asia
CCRS	Canada Centre for Remote Sensing
CEONet	Canadian Earth Observation Network
CEPA PSL-2	*Canadian Environmental Protection Act—Priority Substances List 2*
CGDI	Canadian Geospatial Data Infrastructure
CGIS	Canadian Geodetic Information System
CGKN	Canadian Geoscience Knowledge Network
CGLBI	Canadian Geodetic Long Baseline Interferometry
CGNDB	Canadian Geographical Names Data Base
CGO	Chief Geoscientist Office
CIDA	Canadian International Development Agency
CLS	Canada Lands Survey
CLSR	Canada Land Surveys Records

CLU	Client Liaison Unit
CNPC	Chinese National Petroleum Company
CORDLink	Cordillera Link
CPCGN	Canadian Permanent Committee on Geographical Names
CRESTech	Centre for Research for Earth and Space Technology
CSA	Canadian Space Agency
CSRS	Canadian Spatial Reference System
CSTA	Committee of Science and Technology Advisors
CTBT	Comprehensive Test Ban Treaty
CTI(O)	Centre for Topographic Information (Ottawa)
CTI(S)	Centre for Topographic Information (Sherbrooke)
DBMS	Data Base Management System
DCW	Digital Chart of the World
DFO	Department of Fisheries and Oceans
DND	Department of National Defence
DSI	Downhole Seismic Imaging
EC	Environment Canada
EO	Earth Observation
ERS	Earth Resources Satellite
ESA	European Space Agency
ESS	Earth Sciences Sector
EXTECH	Exploration Science and Technology Program
FNERP	Federal Emergency Nuclear Response Plan
FSWEP	Federal Student Work Experience program
FY	Fiscal Year
GC	Geomatics Canada
GDP	Geomatics Development Program
GEOIDE	Geomatics for Informed Decisions
GGP	Global Geodynamics Project
GHG	Greenhouse gas(es)
GIAC	Geomatics Industry Association of Canada
GID	Geoscience Information Division
GIS	Geographic Information System
GKN	Geoscience Knowledge Network
GPDP	Geomatics Professional Development Program
GPS	Global Positioning System
GSC	Geological Survey of Canada
GSD	Geodetic Survey Division

HROU	Human Resources Operations Unit
IACG	Inter-Agency Committee on Geomatics
IBC	International Boundary Commission
ICA	International Cartographic Association
ICZM	Integrated coastal zone management
IDB	International Development Bank
IERS	International Earth Rotation Service
IFR	Instrument Flight Rules
IGA	Intergovernmental Geoscience Accord
IGB	International Gravity Bureau
IGeS	International Geoid Service
IGS	International GPS Service
IMS	International Monitoring Systems
INAC	Indian and Northern Affairs Canada
INRS	Institute national de la recherche scientifique
IPPS	Interdepartmental Procurement and Purchasing System
IT	Information Technology
IVS	International VLBI Service
KI	Knowledge Initiative
LSD	Legal Surveys Division
LTSP III	Long-term Space Plan III
MAP	Multinational Andean Project
MEM	Digital Marine Electromagnetic System
MERA	Mineral Review and Evaluation Assessment
MITE	Metals in the Environment
MNABES	Minister's National Advisory Board on Earth Sciences
MOU	Memorandum of Understanding
MSB	Mapping Services Branch
MSDT	Management and Scientific Development and Training
NAFTA	North American Free Trade Agreement
NAIS	National Atlas Information Service
NARAP	North American Action Plan
NATGAM	National Gamma-ray Spectrometry Program
NATMAP	National Geoscience Mapping Program
NCE	Network of Centres of Excellence
NGSC	National Geological Surveys Committee

NMCA	National Parks and Marine Conservation Areas
NOAA	National Oceanographic and Atmospheric Agency
NRC	National Research Council
NRCan	Natural Resources Canada
NSERC	Natural Sciences and Engineering Research Council
NSTW	Natural Sciences and Technology Week
NTDB	National Topographic Data Base
NTS	National Topographic Series
ODP	Ocean Drilling Program
OEA	Office of Environmental Affairs
OECD	Organization for Economic Cooperation and Development
PASMA	Assistencia Tecnica Para El Desanolle del Sector Minero Argentino
PC	Parks Canada
PCO	Privy Council Office
PCSP	Polar Continental Shelf Project
PEP	Professional Enhancement Program
PPCD	Policy, Planning and Coordination Division
PPISB	Policy, Planning, Information Services Branch
R&D	Research and development
RF	Revolving Fund
RII	Resource Innovation Initiative
ROC	Regional Operations Centre
SAR	Synthetic Aperture Radar
SCI	Sustainable Communities Initiative
S&T	Science and technology
SFAO	Sector Financial Advisor Office
SHRIMP	Sensitive High-resolution Ion Microprobe
SICORP	SPOT Image Corporation
SMT	Sector Management Team
SNORCLE	Slave-Northern Cordillera Lithosphere Evolution
SOD	Strategic Overview Document
SOPAC	South Pacific Applied Geoscience Commission
SPOT	Satellite pour observation de la terre
SPS	Sector Project System
SQMA	Sector Quality Management Advisor
STRATCOM	Sector Strategic Communications Committee
TPC	Technology Partnerships Canada

UNCSD	United Nations Commission on Sustainable Development
UNFCCC	United Nations Framework Convention on Climate Change
USAid	United States Aid in Development
USGS	United States Geological Survey
VFR	Visual Flight Rules
VLBI	Very Long Baseline Interferometry
WCSB	Western Canada Sedimentary Basin
WG	Working Group
WINS	Winning in the Knowledge-based Economy
YTG	Yukon Territorial Government

Success Stories *(cont.)*

- A funding increase of $430 million over the next three years and stabilized funding of $300 million per year thereafter were announced for the Canadian Space Agency. The Earth Sciences Sector is committed to its continuing partnership with the Agency to deliver satellite observation data of the earth for environmental monitoring and resource management.
- Canada Centre for Remote Sensing (CCRS) ground stations receive data from Canadian satellites such as RADARSAT. Under contracts worth several million dollars annually, they also receive data from foreign satellites. Exploiting the expertise developed through their contracts with CCRS, Canadian companies currently control 70 percent of the world market for ground stations. They have installed stations in the U.S., Sweden, Italy, China, Thailand, Indonesia, Australia, Japan, South Africa, Saudi Arabia, Brazil and Ecuador.
- As part of its trade and investment initiatives, the Earth Sciences Sector is promoting the geomatics industry through ministerial trade missions and the establishment of a Latin American trade post in the Canadian embassy in Buenos Aires, Argentina. These activities will assist the geomatics industry in general, and regional business groups such as le Centre de développement de la géomatique, the Champlain Institute and the Alberta Geomatics Group, as well as the new Canadian international business network now incorporated as GeoCan Information Solutions Inc.
- Natural Sciences and Technology Week, an initiative developed and led by Industry Canada until 1998, provided a cost-effective way for the Earth Sciences Sector (ESS) to celebrate its science and technology. However, in 1998, following Industry Canada's withdrawal from the initiative, ESS expanded the scope of its celebration to lead NRCan's other science sectors in a department-wide offering for S&T Week, both in the National Capital Region and in regional offices.
- In the new spirit of federal-provincial relations, Geomatics Canada has entered into further discussions with seven provinces and several federal departments to establish an accurate digital representation of the Canadian road network. This initiative will make the Sector's digital topographic database the most accurate and current product available. It will have an impact on many applications, including truck routing, 911 emergency response dispatch, mail delivery and elections mapping.
- Geomatics Canada has developed a new technology (GPS·C) necessary to correct Global Positioning System (GPS) signals in real time, thus improving the accuracy of real time horizontal positioning to the metre level or better. Recently, an operational test with the Canadian Hydrographic Service and the Canadian Coast Guard demonstrated convincingly that GPS·C works in a wide range of geographical locations and under varied conditions. As part of the strategy to market this technology, agreements were signed with commercial partners for the delivery of GPS·C to subscribers.
- The Legal Surveys Division has established strong working relationships with most First Nations across Canada. These relationships have resulted in direct economic opportunities for Aboriginal people. In British Columbia, the Legal Surveys Division provided advice on the Nisga'a treaty negotiations. New Indian Reserve Land will be acquired under various agreements in Saskatchewan and Manitoba (2 million and 1.5 million acres, respectively). Other major projects include the largest land-survey program in Canadian history for the implementation phase of land claims settlements.
- Natural Resources Canada has renewed its partnership with the Geomatics Industry Association of Canada (GIAC) with the March 2, 1999 signing by Minister Ralph Goodale and GIAC President Ed Kennedy of a five-year Memorandum of Understanding. Under the MOU, the two organizations will work closely on international business development; improved access to geospatial data; exchange and dissemination of economic, commercial and technical information; research and development; human resources analysis and training programs; transfer of knowledge, skills and technology; and consultation on industry trends and government policies and programs.