

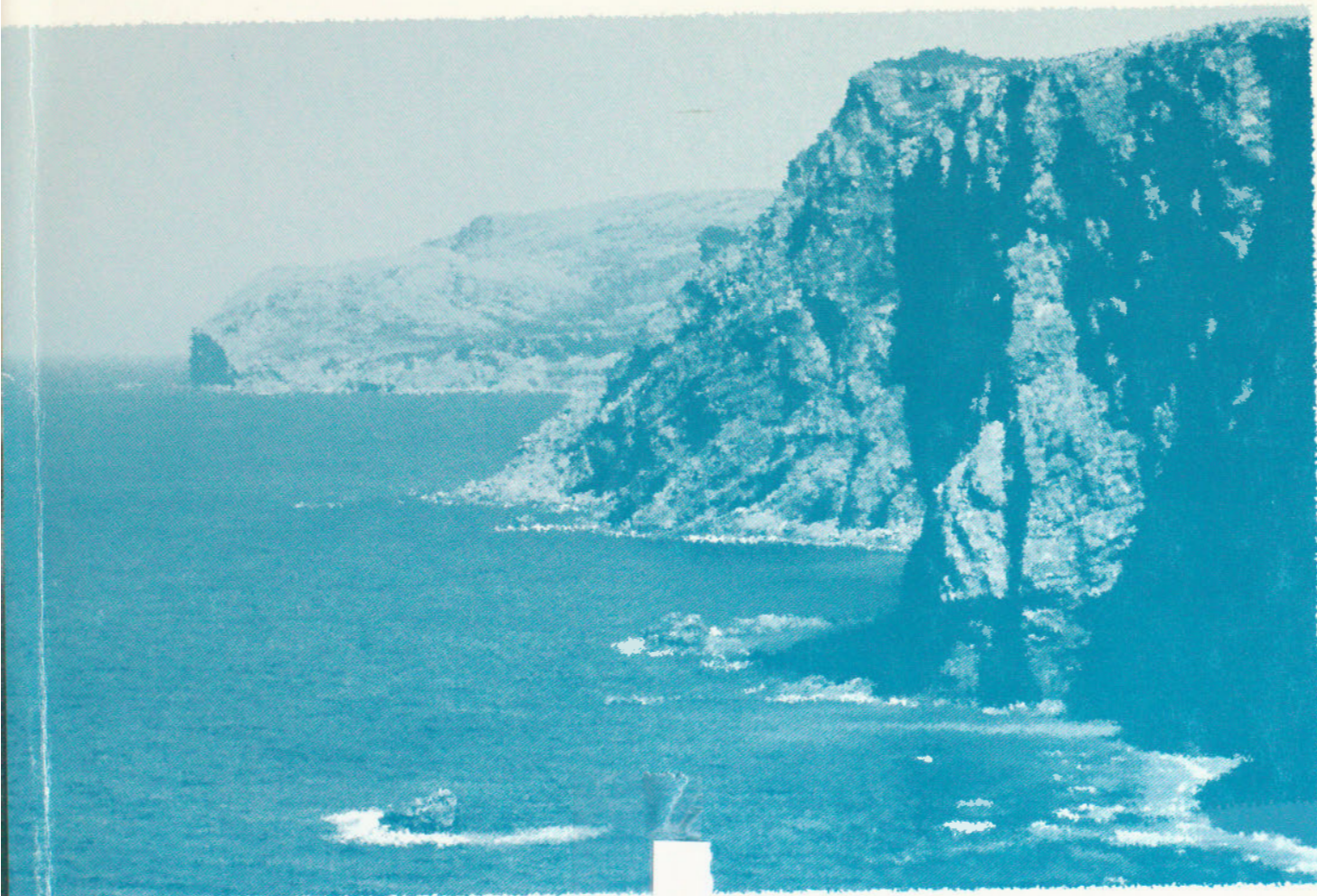
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Natural Resources
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Ressources naturelles
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Earth Sciences Sector Business Plan 1998/2001



Canada

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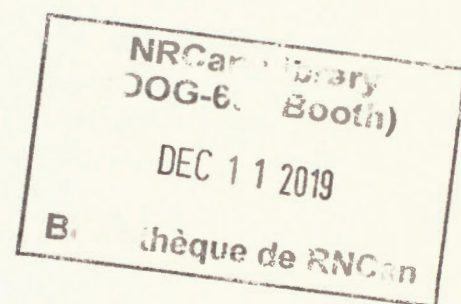
Earth Sciences Sector Success Stories

- The Geological Survey of Canada (GSC) continued to be recognized for its expertise in diamonds, Canada's newest mineral commodity. In the wake of the Bre-X scandal, when the confidence of overseas investors needed rebuilding, NRCan's Minerals and Metals Sector asked GSC to send a scientist to promote Canada's diamond potential at four seminars in Hong Kong and Australia. A scientist from Terrain Sciences Division has been asked by the Canadian Institute of Mining and Metallurgy to be its Distinguished Lecturer for 1998. GSC has also completed the definition of six types of diamonds for legal and regulatory purposes.
- NASA (Goddard Space Flight Center) invited GSD's Algonquin Radio Observatory to participate with other highly regarded radio telescope facilities in the Continuous Observations of the Rotation of the Earth (CORE A) program. These observations will be used, in part, for global change studies by monitoring influences due to atmospheric and oceanic circulation changes.
- GSC assisted the Transportation Safety Board of Canada in its investigations of three 1997 train derailments due to trackbed failure. The derailments (in British Columbia, Ontario, and Quebec) led to major disruptions of the national rail network. Two trainmen were killed in B.C. and a GSC landslide specialist gave expert testimony at the coroner's inquest into their deaths. In related work, the GSC has spearheaded the formation of a research consortium to investigate landslide hazards along the major transportation corridors of the Cordillera. The consortium brings together researchers from the GSC, University of British Columbia, University of Alberta, and Bureau de recherche geologique et minier (France) and is sponsored by CP Rail, CN Rail, BC Rail, and the British Columbia Ministry of Highways and Transportation.
- The Legal Surveys Division (LSD), in their responsibility for maintaining the survey framework on Canada Lands and the offshore, commissioned the firm of Nortech Jacques Whitford, Inc., to position the recently launched Hibernia Production Platform. With the use of Global Positioning System (GPS) technology and the aid of the Canadian Active Control System, the rig was positioned to an accuracy of less than one metre. This production platform will constitute the base from which all other surveys in the area will be derived.
- The Canadian Permanent Committee on Geographical Names (CPCGN) celebrated its 100th anniversary, capped off by a very successful exhibit at the National Archives of Canada.

Earth Sciences Sector

Business Plan

1998/2001





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For additional copies, or to provide your comments, please contact:

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Ce document est aussi disponible en français.

Natural Resources Canada

Vision

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.

Mission

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

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

In the fall of 1997, NRCan adopted operating principles to define the business standards, beliefs and values of the organization and what it is trying to achieve. In turn, the Earth Sciences Sector will employ 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

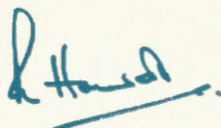
Sharing the NRCan vision, the Earth Sciences Sector, as Canada's principal earth sciences agency, will provide Canadians with timely and reliable geomatics and geoscience knowledge, products and services of the highest standards and in the most cost-effective manner possible.

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.

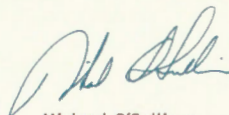
Earth Sciences Sector Management Team



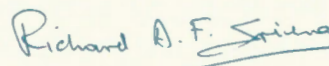
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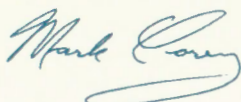
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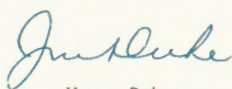
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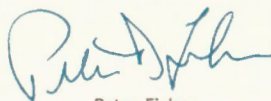
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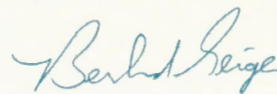
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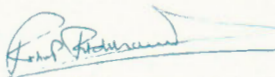
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Geodetic Survey Division



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Senior Advisor



Message from the Assistant Deputy Minister

It gives me great pleasure to introduce the 1998/2001 Business Plan for the Earth Sciences Sector and the outline that it provides of the world-class science and technology that we are committed to delivering to Canadians.

This Plan is linked to the Natural Resources Canada (NRCan) Business Plan and the priorities that it establishes. Of particular importance for the Sector in the next three years are the programs that focus on providing wide access to the expert knowledge that Canadians need for sustainable economic development and sound environmental and land management. In these and many of the Sector's activities, partnerships with other government departments, the provinces and territories, the private sector and our clients will be vitally important.

In terms of human resources and management processes, the Sector will continue to pursue a proactive improvement plan, which is detailed in the following pages. I believe that the achievements made in this area have increased the ability of the Sector to remain flexible and responsive and to adapt to changing priorities and budgets.

As I noted last year, an important element of the Plan is clear links between our objectives and the projects, activities and programs of the organizational units of the Sector. To facilitate these links, the Plan will again be available through the Internet. I hope that this will increase its value.

This Plan outlines the activities that we plan to carry out. Their progress will be followed through a series of mid-year and end-of-year reviews. The highlights of the Sector's achievements will be captured in annual reviews and in the NRCan Performance Report. I encourage you to consult these documents to monitor our activities and follow our progress.

Please contact me directly with any comments that you may have on this Plan. My goal remains that of making it an essential reference tool for both staff and stakeholders. I believe that our science and technology must not only be of the highest quality, but must also be clearly linked to the needs of Canadians.

A handwritten signature in dark ink, appearing to read 'mde', followed by a stylized flourish.

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 1998/2001 planning period, including the use of common departmental policy goals, objectives and business lines.

The Earth Sciences Sector (ESS), which represents approximately 35 percent of the total resource allocation of Natural Resources Canada, was formed in 1995 through the amalgamation of the Geological Survey of Canada (GSC), the 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, 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 September 23, 1997 Speech from the Throne, and the February 1998 Budget. 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.

Objectives for these themes are guiding ESS planning, program directions and management focus for the next three years. A description of each theme and a brief discussion of the implications for ESS follow.

The Geodetic Survey Division (GSD) continues to play a key role in the improvement of Global Positioning System (GPS) positioning accuracy through its participation in the International GPS Service for Geodynamics (IGS). As the coordinator of all analysis centres for the IGS, GSD continues to routinely evaluate and combine worldwide GPS results to produce official IGS products.

Themes for the Mandate

The 1998 Budget reinforces the government's commitment to build a prosperous economy and a strong society through strategic fiscal management. A two-track strategy is now in place for the government to plan on the basis of balanced budgets and a steady decline in the debt burden.

The issue of Canadian unity remains central to the government's agenda. Keeping Canada united will be pursued by way of good, relevant and active government with particular emphasis on partnerships and strategic alliances.

Today's competitive global economy calls for the federal government to pursue new approaches to service delivery and client interaction. As a result, new forms of partnerships with Canadians, the private sector, academia and non-government organizations are being identified and cultivated for the longer term.

There is no scenario for future economic and industrial policy in Canada that does not include a significant, and indeed growing, role for international business development, including trade, investment and technology, particularly in the new knowledge economy. Major priorities will be to take maximum advantage, through improved trade promotion, of market diversification and to attract and retain investment.

Finally, during this mandate, the policy priorities will focus on creating the conditions necessary to transform knowledge; to encourage innovation that will lead to jobs and profitable products and services; and to increase the participation of youth, Aboriginal peoples and rural communities in the new economy.

Implications for the Earth Sciences Sector

It is against this backdrop that the Minister of Natural Resources has expressed the vision for Canada's natural resource and related sectors—specifically, that 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.

In order to realize this vision, the Minister has prepared an action plan in which the Earth Sciences Sector plays a significant role. The Plan includes the following priorities.

Tackling Climate Change

Integral to the federal strategy for tackling climate change is the need to understand what may need to be done to adapt to the impacts of global climate change. Many of these impacts have affected and will continue to affect Canada's land and offshore territory. Research into the earth's geological history is critical to understanding what has happened to climate in the past and provides information to policy and decision-makers about possible future scenarios. The sciences of prediction, modelling and monitoring will help reduce the uncertainties surrounding this issue and ensure that adaptation strategies are well founded in regards to resource and land management.

Resource Innovation

Knowledge, innovation and higher value uses of natural resources are recognized and emphasized as the critical drivers for long-term economic growth, sustainable work opportunities and a stable quality of life. Through strategically focused partnerships with provinces, territories, academia and industry, ESS is well positioned to extend the power and reach of its leading-edge knowledge and technology within the national innovation chain. For example, access to comprehensive geoscience knowledge is vital for the mining and hydrocarbon industries to compete aggressively in global capital markets. New integrated technologies for better decision making in mineral exploration and environmental modelling and monitoring are already on users' desks, with even more precise tools just over the horizon.

In the Speech from the Throne, the government committed itself to making information and knowledge infrastructure accessible to all Canadians, and thus enabling citizens to succeed in the global knowledge-based economy. The development of the Canadian Geospatial Data Infrastructure (CGDI) will make geo-information accessible through the Information Highway for commercial purposes, community development and land-use decisions while stimulating the creation of high-paying knowledge jobs in all regions of Canada. Infrastructure and knowledge assets such as those embodied in CGDI are critical to Canada's pursuit of national and international success and leadership in the knowledge economy.

Resource Trade and Investment

Canada's recognized expertise in earth sciences research and technology development is a significant asset when competing internationally. Many resource-related companies are small to medium-sized enterprises that use federal expertise to strengthen their innovation capacity and trade orientation in order to break into international markets. ESS is committed to providing focused international support to stakeholders in Canada's geoscience and geomatics industries, in such areas as market intelligence, export marketing assistance, trade promotion, government-to-government dialogue and brokering of contracts.

Increasing Work Opportunities

Demand for skilled workers in natural resource and related industries is escalating. Young people, including recent graduates, need relevant and meaningful work experience to facilitate their transition to longer term employment in these industries. ESS and its world-class scientific and technical personnel are committed to providing relevant training and work experience to students and new graduates. ESS also participates actively in several federal programs, including the Federal Student Work Experience Program and Natural Sciences and Engineering Research Council fellowships program, to provide young people with continued training in geoscience field and laboratory studies. In addition, PCSP provides logistical support to students carrying out research in the Canadian north.

ESS is well positioned and prepared to assist local communities in acquiring new knowledge and adapting and using new technology to increase the capacity of communities to manage and benefit from the resources to which they currently have either full or partial access. To achieve these goals, the Sector proposes to launch a new sustainable communities initiative during 1998/1999. Aboriginal and northern communities are the key target client groups.



National Consensus

Integral to the debate about the future of resource development in Canada is a discussion of stewardship of resources and the need to diversify more quickly into value-added goods and services. ESS knowledge—in the form of ideas, concepts, data and information—is the genesis for effective exploration, efficient monitoring of resources and accurate models for decision making. ESS science and technology (S&T) knowledge and information contribute to an informed debate on resource development and sustainability issues.

Market Opportunities

The Canadian earth sciences industry is currently facing one of the biggest opportunities in its history. Borders are opening to Canadian products and services, international demand for Canadian solutions is expanding and Canada's trade reputation is growing steadily. Canada has always been a significant global provider of natural resources. For many years, we have also been leaders in the provision of geomatics and geoscience consulting expertise. We are well positioned to take advantage of significant new opportunities and growth potential in international markets for our earth sciences knowledge and abilities.

In response to the need for a coordinated national approach to competing successfully in international markets, the Earth Sciences Sector has developed an international business strategy that lays out a framework for government-industry cooperation over the next five years. The strategy addresses the issues of gathering foreign market intelligence, acquiring knowledge of international developments and disseminating this information to the Canadian earth sciences industry for exploitation.

Current world earth sciences markets are highly competitive and Canada is a significant player in many of these markets. For example, in 1996 Canada possessed more than an 18 percent share of the estimated \$10 billion annual global geomatics market. In addition, growth in the global geomatics market is estimated at 15 to 20 percent per year. Factors affecting the development of the entire earth sciences market are not only of a technical nature. Regulatory and business issues are important considerations as well. It is critical for ESS to remain informed about these factors and to share this information with industry.

During the 1998/2001 planning period, the Sector will continue to work closely with its industry partners to maximize access to global earth sciences markets. For example, Geomatics Canada will play an active role in initiatives of the recently formed GeoCan International Incorporated. GeoCan International Inc. is composed of a number of export-oriented companies from across Canada, with complementary geomatics skills, experiences and an interest in doing business in Latin American and the Asia-Pacific region. Together these companies will be proactive in developing and pursuing large international projects that exceed the capacities of individual members. GeoCan International Inc. represents a new concept in marketing the Canadian capacity in geomatics.



Eastern European countries, as well as other developed and developing nations, are looking to countries such as Canada for delivery of their geoscience and geomatics solutions. Canada is a world leader in many of these technologies. To maintain this position it is important for ESS to continue to: collect and disseminate export information; build trans-border relationships; network with foreign governments and industries; organize incoming and outgoing trade missions; negotiate agreements with foreign governments; identify market opportunities; and assist foreign governments in establishing and advancing their national geoscience agencies and expertise.

The Science and Technology Agenda

The Government of Canada's science and technology strategy, as presented in *Science and Technology for a New Century*, provides the general directions for ESS science programs. The strategy underscores the importance of innovation to productivity and well-being. The federal science and technology strategy is also reflected in five-year strategic plans released in 1997 by the Geological Survey of Canada and Geomatics Canada. These strategic plans are the basis for the Sector's continued, long-term, broad-scale research efforts. ESS is also implementing a review process that will ensure the excellence of its research programs.

Today, knowledge is the single most important factor affecting economic growth, employment opportunities and quality of life. Knowledge is becoming the primary economic driving force, in large measure due to recent rapid advances in science and technology. Advances in information and communication technology, for example, have created new industries and transformed traditional ones. Moreover, Canadians, as they prepare to begin the next century and millennium, are well aware that their health, wealth and prosperity depend on their ability to generate, acquire, transmit and use knowledge, particularly knowledge which has its origins in science and technology.

The Earth Sciences Sector's S&T agenda for the planning period has two complementary themes: the creation of new knowledge in support of policy deliberations and economic and social objectives; and the sharing of the Sector's knowledge by making it relevant and accessible. During the planning period, several ESS flagship initiatives that support these themes will be undertaken.

- ESS will build, with its partners, the Canadian Geospatial Data Infrastructure (CGDI) and the Canadian Geoscience Knowledge Network (CGKN). Both will be assessed according to how well they allow the Sector and other contributors to share knowledge and information, and whether they meet the needs of partners and clients. It is through such flows and networks of knowledge that the innovation system in Canada will evolve and respond to the challenges of the global knowledge-based economy.
- ESS will initiate, in collaboration with the Canadian Forest Service and Environment Canada, an accelerated and enhanced climate change science program. This program will seek a predictive understanding of the implications of potential changes in global climate and introduce national strategies for adapting to a changing climate.
- ESS proposes to launch a targeted geoscience initiative comprising geoscience mapping and resource studies in primarily northern areas that have mineral and energy potential of economic significance. This initiative is designed to encourage mining and energy companies to invest in exploration and development activities.

The Nechako NATMAP project covers a large area of the central Canadian Cordillera, British Columbia. It aims to rapidly bring outdated maps of this poorly known area into a modern framework and, in particular, to examine the role of tertiary crustal extension and volcanism in controlling topography, rock and mineral distribution. The area contains the Babine porphyry copper belt, where a thick mantle of glacial deposits and young volcanics has made exploration of the underlying bedrock difficult. Mineral exploration interest has been rekindled, however, with significant advances in understanding the geological framework of the area (e.g. the number of claims staked has increased 23 percent since the release of the lake geochemistry survey).

- ESS will integrate a suite of geographic information system (GIS), Global Positioning System (GPS) and remote sensing technologies to create new tools and applications for resource and resource-related management activities in forestry, mining, and emergency response and preparedness. This client-focused effort will emphasize the development and use of superior technologies for industrial competitive advantage.

ESS partnership initiatives with the provinces, territories, private sector, universities and other federal government departments will continue to be dynamic and strategic. In particular, Geomatics Canada, together with other government departments and industry, is participating in the development of the Network of Centres of Excellence in Geomatics. The Network will be led by Université Laval with participants across Canada. Through these partnerships, the Sector intends to contribute to the networking of earth sciences knowledge and information nationally and internationally and to influence the development of Canada's science and innovation culture.

The quality of ESS work is fundamentally dependent on the Sector's highly skilled workforce. ESS is taking steps to ensure that its science and technology personnel have opportunities to learn and to continue to make the best use of their abilities. ESS is also making efforts to preserve skills that will be required in the future and is investing in training of undergraduate and graduate students to rejuvenate its workforce. This investment includes participation in the Natural Resources Canada Science and Technology Internship Program; the hiring and training of summer, co-op and post-graduate students; thesis supervision; and the provision of adjunct professors.

The Sector is actively involved in a number of initiatives to attract and retain high quality people at all levels. One of these initiatives is the Geomatics Professional Development Program. Under this program, geomatics graduates from the University of Toronto, Université Laval, Université de Sherbrooke, the University of New Brunswick and the University of Calgary join ESS for an intensive two-year training and work regime to facilitate their entry into jobs or further education in the earth sciences. The Sector is actively involved in the Science Horizons initiative, which emphasizes hands-on training to help participants acquire technical skills and practical knowledge in geoscience and geomatics. ESS emeritus scientists help maintain continuity in major scientific studies and are mentors for young scientists. In addition, ESS exposes the public to its science and technology through its Volunteers Program, which offers short-term, specific work assignments to interested laypeople.

Science and Technology Capacities for the Next Decade

The Sector has begun a review of the S&T capacities that it will need in the next five to 10 years. The fundamental challenge will be to determine what Canada will want of ESS, in terms of S&T capacities, over that period. The process to address this challenge will include:

- trying to foresee the major issues that will drive our S&T activities;
- making our best estimate of the kinds of capacities that will be needed to effectively address those issues;
- determining the gaps with respect to our current capacities; and
- developing strategies to eliminate those gaps.

Earth Sciences Sector Initiatives

Targeted Geoscience

The Geological Survey of Canada (GSC) is proposing a targeted geoscience initiative to promote investment in mineral and energy exploration in rural and northern areas of Canada where the geoscience knowledge base is insufficient. Discussions will be undertaken with provincial and territorial agencies, universities and, where appropriate, industry. The initiative will use integrated geoscience mapping and resource studies to fill knowledge gaps, provide key training opportunities for geoscience students, and produce digital, Internet-accessible information bases. The resulting geoscience knowledge bases will have diverse applications, from sustainable resource development and effective land use decision making to capacity building in northern and rural communities.

Canadian Geospatial Data Infrastructure

The Canadian Geospatial Data Infrastructure (CGDI) initiative will build the geographic information component of the Information Highway. With the Canadian Spatial Reference System (CSRS) as the fundamental layer, the CGDI project is an intergovernmental (federal, provincial and territorial), private sector and academic effort to provide easy, consistent and harmonized access to geographic information and services. The initiative has the following five thrusts.

- Access: national electronic access to digital geographic information held by public agencies.
- Data framework: a common national framework for geographic information.
- Standards: adoption of international standards.
- Partnerships: federal-provincial partnerships to improve efficiencies in cost-shared activities.
- Supportive policy environment: fostering of a policy environment that promotes the broadest use of government information.

Current efforts to develop the CGDI are coordinated by the Inter-Agency Committee on Geomatics (IACG) and the Canadian Council on Geomatics (CCOG). CGDI has been driven by a need to provide access to government information in a supportive policy environment to accelerate rapid development of knowledge-based economic activities. Central to the initiative is government's need to ensure that information is readily available in support of the development of the knowledge economy.

Development of CGDI has stressed partnerships between the federal, provincial and territorial governments, the private sector and academia. In advancing the initiative, the partners are considering a range of possible new programs to accelerate development of CGDI. These programs focus on working across governments, and with stakeholders and the private sector to: advance the amount of information accessible through 'clearinghouse' systems; develop data frameworks to ease data integration; foster advanced technology and application development; and build supportive policies to speed industry's growth.

One program currently underway, the Canadian Earth Observation Network (CEONet), is a key component of CGDI. It will provide the data discovery and access infrastructure for earth observation and other spatial databases, as well as a means to advertise and distribute geomatics information products and services available through CGDI. It is intended to eventually become an independent commercial enterprise. Stakeholders will be consulted through workshops across Canada throughout the CEONet system development phase so that CEONet features will facilitate access to data and promote improved system integration.

CGDI supports many different groups and applications, including:

- the Canadian geomatics industry, a knowledge-based high growth sector employing 21 000 Canadians, by encouraging support for domestic and international business initiatives;
- federal, provincial and territorial governments, by improving efficiencies;
- the academic sector and students, by providing easier access to government information for research and teaching, and partnered research and development;
- the public and other users of geographic information, by providing easier and more coordinated access to geographic information;
- rural and remote communities, by breaking barriers of location by improving access to government information;
- the environment, by providing access to critical information for assessments, modelling and monitoring of environmental effects;
- resource industries, by providing access to information for exploration, business operations and reporting; and
- public safety and disaster management, by providing coordinated access and standardized information for emergency response and disaster relief.

Geoscience Knowledge Network

GSC is developing the Geoscience Knowledge Network project to provide access to digital geoscience information and knowledge through a network of sources, that will link the Canadian Geospatial Data Infrastructure (CGDI) initiative and related NRCan and interdepartmental knowledge network initiatives. As well, discussions and workshops are planned for 1998/1999 with the provincial and territorial geoscience surveys through the National Geological Surveys Committee (NGSC), and with other public and private sector partners and stakeholders, regarding a broader Canadian Geoscience Knowledge Network (CGKN) initiative. These consultations will build on successful partnerships and interagency activities, such as the Canadian Geoscience Publications Directory (an NGSC initiative), the Geological Association of Canada's (GAC) Standards for Digital Geological Maps initiative, and GSC's involvement in the United States Geological Survey's Geologic Map Database initiative. As well, the importance of effective management and dissemination of digital geoscience information to the Canadian geoscience community has been emphasized repeatedly by federal and provincial agencies, university researchers, industry and organizations such as the Canadian Geoscience Council (CGC) in its 1995 report, *Future Challenges and Trends in the Geosciences in Canada*.



The overall goal of the GSC Geoscience Knowledge Network initiative is to provide Internet access to interoperable, multidimensional digital geoscience information in a client-focused manner through a network of linked sources within the GSC and with external partners. Key attributes include the following:

- client focus, to facilitate access and broad usage by both traditional and non-traditional clients;
- partnerships, to foster the development of an alliance of geoscience information sources within the GSC and with NGSC, GAC and CGC, guided by a set of widely accepted principles that foster collective decision making, and national and international standards that facilitate interoperability;
- networked approach, to create interfaces between distributed sources that permit interoperability while preserving the unique character of individual sources, which will be locally maintained; and
- 'smart' approach, to deliver information that is customized to meet the needs of specific user groups (e.g. mineral and energy exploration and development industries, public policy and regulation decision-makers, community organizations, and educational institutions, etc.).

Legal Surveys Division Strategic Direction

A study is currently being carried out to review the legislated mandate of the Legal Surveys Division (LSD), its current delivery mechanisms and the associated risks to a sustainable property infrastructure on Canada Lands, and of the current technology alternatives, to demonstrate that resources available to LSD are used in an effective and efficient manner.

The objective of this project is to respond to external concerns by providing an outside assessment of the role and technology alternatives for the Division in meeting the Minister of Natural Resources' responsibility for a cadastral structure to support sustainable economic development on Canada Lands, outlining inherent risk factors and providing various options.

The study will:

- review the requirements of the sustainable property infrastructure on Canada Lands;
- review the legislated mandate of LSD and its role as the corporate surveyor for the Government of Canada in order to assess options, including possible changes to the legislation, that would reduce the mandate to allow LSD to manage within appropriate resource levels;
- assess the current delivery mechanism of LSD in order to determine options for the most cost-effective ways of carrying out the Division's operations over the next 10 years, taking into account the large increase in work due to land claim settlements and economic development on Canada Lands; and
- determine the options available to the Minister of NRCan and to the Government of Canada of
 - responding less quickly to requests for new surveys,
 - providing various levels of enforcement of legislation and corresponding security in the Canada Lands Survey system, and
 - considering partnerships with Indian and Northern Affairs Canada, provincial and territorial governments, and the private sector, and restructuring internally to improve service delivery.

Memorandum of Understanding (4NR)

The momentum continues to increase in the Memorandum of Understanding (MOU) among the four federal natural resource departments (4NR): Natural Resources Canada, Agriculture and Agri-Food Canada, Fisheries and Oceans, and Environment Canada. Health Canada will join these four departments in this activity in 1998/1999.

As planning continues for the future of the MOU, it is anticipated that work will centre on three major areas.

- Science/policy issues: By emphasizing specific sustainable development issues of interdepartmental interest, NRCan will create more synergy for reaching an understanding, especially on issues that affect national policy. As some or all of the participating departments have to report periodically on water, air and biodiversity, working groups may be established to address such issues. In other cases, new policy dimensions may be added to the work of current groups, such as those working on metals in the environment and climate change.
- Issues related to the federal S&T strategy: The MOU provides a means to promote cooperation among the MOU departments in implementing the federal S&T strategy.
- Management issues: The MOU's ADM and DG Steering Committees intend to share and implement best practices related to the management of S&T. Communicating the value of science related to sustainable development represents another opportunity for departments to learn from each other.

Northern S&T Strategy

The Earth Sciences Sector is a key participant in the ADMs' Interdepartmental Committee on Northern S&T. Under the auspices of this committee, an interdepartmental working group has proposed a strategy to address the need for the government to give specific attention to the adequacy of scientific and technical knowledge capacity relating to issues, opportunities and responsibilities in northern Canada. That proposal was expressed in the November 1997, *Federal Strategy on Northern S&T* and

- provides a framework for a cooperative approach by all federal departments involved in science and technology in northern Canada and the Arctic;
- focuses on the provision of science and technological development to support and implement existing and emerging policies;
- sets up a federal framework through which the most effective science programs and work plans may be developed;
- supports the mandates and responsibilities of federal departments and agencies, and improves the ability of the collective federal scientific capacity to help departments discharge their responsibilities; and
- provides a means of using available funds and scientific expertise most efficiently and effectively to meet departmental and federal objectives and the needs of northern Canada.

As one of the first steps in implementing the strategy, ESS representatives participated in a workshop held in February 1998 to bring together northern science practitioners, to discuss an understanding of the state of coordination within and between their fields of responsibility, and to identify priority areas for coordinated action. One of the overriding issues coming out of the workshop was concern regarding growing funding pressures related to research logistics and facilities including PCSP, Coast Guard ships, and Arctic research stations. Participants noted that reduced funding for logistics and facilities will impinge on the ability of the research community, including ESS, to carry out priority research in the North, and is also affecting Canada's ability to deliver on its international commitments.

This workshop presented an opportunity for the Sector to take a lead role in working with other federal departments in developing a northern research program promoting sustainable economic development. Though the workshop represented a good first step towards more collaborative government science in the North, much work remains to be done.

Earth Sciences Sector Funding Sources

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 heavily 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 projects. The following tables summarize the funding received from those alternative sources on a cash basis and indicate appropriation funding by expenditure category. Except for appropriations from Parliament, figures represent targets to be met by ESS managers.

Earth Sciences Sector Funding Mechanisms

| | 1997/1998 | 1998/1999 | 1999/2000 | 2000/2001 |
|---|----------------|----------------|----------------|----------------|
| Appropriation from Parliament | 142 292 | 138 879 | 139 532 | 139 790 |
| Net voting | 2 000 | 2 281 | 2 253 | 2 253 |
| Revolving Fund | 17 194 | 16 812 | 15 409 | 16 387 |
| Joint projects with external parties | 5 000 | 5 500 | 6 000 | 6 500 |
| Joint projects with other federal departments | 13 000 | 14 000 | 15 000 | 15 500 |
| Total (\$000) | 179 486 | 177 472 | 178 194 | 180 430 |

Earth Sciences Sector Appropriation by Major Category of Expenditure

| | 1997/1998 | 1998/1999 | 1999/2000 | 2000/2001 |
|---------------------------------------|----------------|----------------|----------------|----------------|
| Salaries | 68 642 | 67 639 | 68 178 | 68 178 |
| Employee benefits plan | 11 669 | 14 203 | 14 317 | 14 317 |
| Operating expenses, including capital | 60 877 | 55 773 | 55 933 | 56 191 |
| Grants and contributions | 1 104 | 1 264 | 1 104 | 1 104 |
| Total (\$000) | 142 292 | 138 879 | 139 532 | 139 790 |
| FTEs (full-time equivalent employees) | 1 309 | 1 281 | 1 281 | 1 281 |

The Polar Continental Shelf Project (PCSP), in partnership with the Canadian Antarctic Research Program, initiated the Canadian Arctic-Antarctic Exchange Program which is designed to encourage closer scientific collaboration between Canadian Arctic scientists and their Antarctic counterparts. In the program's first year, PCSP supported two such projects in the Canadian Arctic; in turn, the Canadian project leaders will be sponsored by their southern polar colleagues to conduct follow-up work in the Antarctic.

Major new models for Precambrian tectonic history and mineral potential, as well as the evolution of the Keewatin Ice Divide during the last Ice Age, are among the results of the western Churchill NATMAP project encompassing Rankin Inlet, Arviat and Baker Lake (Kiavalliq region, Nunavut/NWT). Geoscientists from several GSC divisions, the Government of the Northwest Territories and Indian and Northern Affairs Canada, as well as representatives of the mineral exploration industry active in this region of growing potential, conducted an innovative field workshop in the isolated tundra conditions at the end of the field season.

2 Earth Sciences Sector: Major Components

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

Earth Sciences Sector Funding by Major Components

| | 1997/1998 | 1998/1999 | 1999/2000 | 2000/2001 |
|---------------------------------|----------------|----------------|----------------|----------------|
| Geomatics Canada | 92 080 | 90 404 | 90 363 | 92 033 |
| Geological Survey of Canada | 66 222 | 65 645 | 66 439 | 66 961 |
| Polar Continental Shelf Project | 3 675 | 3 581 | 3 607 | 3 615 |
| ESS Corporate services | 17 509 | 17 842 | 17 785 | 17 821 |
| Total (\$000) | 179 486 | 177 472 | 178 194 | 180 430 |

(Corporate services includes the ADM's Office; Policy, Planning, Information and Services; Business Development; Quality Management Advisor; Office of the Chief Geoscientist; Human Resource Advisor; Senior Advisor and Sector Financial Advisor Office)

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 and mapping fabric; developing national scale maps depicting issues of the day; and collecting and managing a growing volume of digital data to provide leadership in the use of topographic map information, 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 profit maximization, the RF's target is to achieve a zero balance. A separate Geomatics Canada Revolving Fund Business Plan is available describing RF activities for the 1998/2001 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. For topics 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 the CGDI. Through international collaboration in Very Long Baseline Interferometry (VLBI), active control system and gravity technologies, the Division ensures that the CSRS will be consistent with the global reference framework.

Legal Surveys and 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, regulating Canada Lands surveyors, surveying Canada Lands (including native 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 the United States and Canada.

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 the 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 geospatial information applications. CCRS is developing the Canadian Earth Observation Network component of the Canadian Geospatial Data infrastructure to provide users with real-time access to remote sensing satellite and other spatial databases, both land and ocean, through the Internet.

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 Database, 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 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, the MSB is the custodian of the federal aerial photography archives and offers aerial photography 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 Database.

Geomatics Canada Funding Mechanisms

| | 1997/1998 | 1998/1999 | 1999/2000 | 2000/2001 |
|---|---------------|---------------|---------------|---------------|
| Appropriation from Parliament | 62 186 | 59 892 | 60 254 | 60 346 |
| Net voting | — | — | — | — |
| Revolving Fund | 17 194 | 16 812 | 15 409 | 16 387 |
| Joint projects with external parties | 1 000 | 1 100 | 1 200 | 1 300 |
| Joint projects with other federal departments | 11 700 | 12 600 | 13 500 | 14 000 |
| Total (\$000) | 92 080 | 90 404 | 90 363 | 92 033 |

Geological Survey of Canada

The Geological Survey of Canada (GSC) is Canada's premier agency for geoscientific information and research, with world-class expertise focusing on research that contributes to sustainable development of Canada's resources, environmental protection, reduction of risk from natural hazards, technology innovation and key government policy objectives.

GSC delivers its research under five broad programs: Bedrock and Surficial Geoscience; Marine Geoscience; Hydrocarbon Geoscience; Minerals Geoscience; and Geological Hazards and Environmental Geoscience. The Bedrock and Surficial 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 three 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. In addition, GSC summary program plans will be available in 1998/1999.

The Bedrock and Surficial Geoscience Program provides 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 parks. The Geological Hazards and Environmental Geoscience Program seeks, through research and monitoring, to reduce risk 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. The three divisions headquartered in Ottawa are each primarily associated with a specific science program component carried out on a national scale (e.g. minerals). Responsibilities of the four regional divisions may span several of the science program components as they apply to that geographical region, or may be geared primarily toward a science program component that is largely focused in that region (e.g. marine geoscience).

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 multi-parameter 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.

The Mapping Services Branch was the recipient of a reproduction of a rare historic map from one of Canada's leading geomatics firms. The Branch received this gift in appreciation of its innovative approach to meeting the requirements of this company on a major international contract.

Terrain Sciences Division

The Terrain Sciences Division provides comprehensive knowledge of the surficial geology and geomorphic processes of the Canadian landmass. Current activities include surficial geology mapping, 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 which 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.

GSC Atlantic

GSC Atlantic carries out coastal and offshore geoscientific surveys and provides expert geological, geochemical and geophysical 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 relates to the delineation of Canada's offshore boundaries under the United Nations Convention on the Law of the Sea.

GSC Quebec

The Quebec Geoscience Centre is a joint research centre founded in 1988 following an agreement signed between the Institut national de la recherche scientifique (INRS), a branch of the Université du Québec, and the GSC. The Centre brings together scientists from GSC Quebec and INRS Géoressources, along with researchers from universities, provincial governments and private corporations, to collaborate on projects spanning the many disciplines of earth sciences. This collaboration among people with different geoscientific backgrounds contributes to a more thorough understanding of the geological processes under study. GSC Quebec contributes by providing a comprehensive knowledge of the geology and geochemistry of the earth's crust, mineralization and surficial deposits, with an emphasis on eastern Canada and, in particular, the Appalachian and Grenville geological provinces.

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. In addition, its director leads the GSC hydrogeology initiative.

Geological Survey of Canada Funding Mechanisms

| | 1997/1998 | 1998/1999 | 1999/2000 | 2000/2001 |
|---|---------------|---------------|---------------|---------------|
| Appropriation from Parliament | 59 122 | 57 794 | 58 111 | 58 233 |
| Net voting | 1 800 | 2 051 | 2 028 | 2 028 |
| Revolving Fund | — | — | — | — |
| Joint projects with external parties | 4 000 | 4 400 | 4 800 | 5 200 |
| Joint projects with other federal departments | 1 300 | 1 400 | 1 500 | 1 500 |
| Total (\$000) | 66 222 | 65 645 | 66 439 | 66 961 |

Polar Continental Shelf Project

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 to develop a national knowledge base related to more than one-third of the Canadian landmass and 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 development of a northern science and technology strategy to more effectively coordinate research priorities and programs, PCSP serves as a practical example of the cost-effectiveness and efficiencies of horizontal management of a program portfolio across departments and client agencies. As chair of the logistics sub-group of the Interdepartmental Working Committee on Northern S&T, PCSP is working in partnership with other government agencies, including the Department of National Defence (DND) and the Canadian Coast Guard, to maximize the use of 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 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 support to clients has become significantly constrained due to a budget reduction of 47 percent over the past three fiscal years. PCSP support to clients totalled \$3.3 million during the 1997 field season; in the 1998 season, support will drop to an estimated \$2.3 million and in 1999, to approximately \$1.3 million. To date, PCSP has, in a large part, been able to offset the impact of its reduced budget upon its clients by effectively cash managing carry-forward funds, deferring capital purchases, and reducing field schedules at its western Arctic base (PCSP Tuktoyaktuk will not open during the 1998 field season) in order to trim operating and salary costs, thereby dedicating the largest portion of resources possible to provide direct support to clients. As well, the transfer from DND of large quantities of free aircraft fuel to PCSP has cut operating costs by about \$750K per year in the last several years. Given that carry-forward funds and fuel stocks have now been depleted, PCSP must dedicate more resources to meeting basic operational requirements.



Clients that share the costs of services provided by PCSP are largely federal and territorial government users. Overall, these client groups reimburse PCSP for approximately one-half of logistics expenditures made on their behalf while foreign user groups are charged full cost recovery for services provided.

Polar Continental Shelf Project Funding Mechanisms

| | 1997/1998 | 1998/1999 | 1999/2000 | 2000/2001 |
|--|--------------|--------------|--------------|--------------|
| Appropriation from Parliament | 3 675 | 3 581 | 3 607 | 3 615 |
| Net voting | – | – | – | – |
| Revolving Fund | – | – | – | – |
| Joint projects with external parties | – | – | – | – |
| Joint projects with other federal departments | – | – | – | – |
| Total (\$000) | 3 675 | 3 581 | 3 607 | 3 615 |
| Recoverable expenditures from partners and clients | 2 000 | 1 500 | 1 000 | 500 |

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; oversees the management of Sector human and financial resources; and communicates the value of ESS programs and services to both internal and external audiences.

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 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. The Branch is also responsible for the development and implementation of a new project management information system for ESS.

The Branch provides corporate support to the Sector in the areas of strategic direction, policy analysis and development, and program coordination with other levels of government and other federal departments. It is responsible for the management of Sector client liaison mechanisms, including the Minister's National Advisory Board on Earth Sciences. In cooperation with program managers, it is also responsible for federal/provincial/territorial liaison for the geoscience and geomatics components of the Sector.

The Branch 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.

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.

In addition to the key deliverables described in the following chapter, during the planning period PPISB will:

- implement the departmental classification re-engineering initiative; and
- ensure internal priority-setting and resource allocation to meet both internal and external funding pressures.

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 development of Sector business plans and reports in a framework consistent with other Sector and Departmental plans, and directs the management of the Geomatics Canada Revolving Fund.
- The Business Policy team develops and administers Sector business policies and guidelines including those pertaining to service standards, competition, pricing and the negotiation of agreements and contracts.
- 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.

In addition to the key outputs detailed in the following chapter, the group's deliverables for the planning period include the following:

- coordinating and preparing the ESS products and services price list;
- managing ESS service standards and intellectual property, maintaining MOUs, and coordinating GSC collaborative research projects;
- preparing and disseminating the Sector's annual *Business Opportunities Bulletin* (formerly the *Contracting-Out Bulletin*);
- implementing the ESS International Business Strategy;
- chairing the Canadian International Business Strategy National Sector Team on Information Technology and Telecommunications (IT&T) and leading the geomatics strategy; and
- hosting at least 30 foreign incoming earth sciences trade delegations.



Quality Management Advisor

The Quality Management Advisor provides leadership and advice to the Sector on quality management and management improvement activities. The Advisor remains abreast of trends and developments in quality management practices in the private sector, in government and internationally. 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 the Sector in analyzing its 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 Sector managers assess 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. Improvement projects in 1998/1999 will include organizing client feedback workshops in research divisions, conducting assessments against the management framework, and encouraging divisions to obtain or broaden ISO 9000 registration. 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.

Office of the Chief Geoscientist

The Chief Geoscientist 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 Chief Geoscientist 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 is developing and implementing a system that will review ESS's science activities to ensure their excellence and relevance and confirm ESS's national leadership. These reviews, which will begin in 1998/1999, will use external agencies operating under stringent terms of reference, that will ensure credibility and consistency throughout the process. Programs will be reviewed on a regular, cyclical basis, with at least one program assessed annually.

During 1998/1999, the Chief Geoscientist's Office will work with the directors general of the science divisions of the Geological Survey of Canada and Geomatics Canada to develop a program that will provide professional development of science staff in the context of strategic needs through sharing of scientific expertise and transfers of technology 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's Office will continue to work with the provincial and territorial geological surveys through the National Geological Surveys Committee 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 will facilitate, in 1998/1999, the development of a comprehensive CGKN program in collaboration with the provincial and territorial surveys, universities and the private sector. This program will use the geospatial infrastructure of the CGDI initiative being undertaken in partnership with Geomatics Canada.

The Chief Geoscientist will also continue to explore ways to increase synergies between the programs of the Geological Survey of Canada and Geomatics Canada. Special emphasis will be placed on developing new applications for remote sensing in monitoring and understanding geological processes, and on improving the level of cooperation between current ESS geodynamics programs.

Human Resources Services

The Human Resources Services (HRS) team was established to support the strategic vision of the Sector and to work in partnership with the Human Resources Branch of NRCan Corporate Services. The team delivers operational HR services including classification, staffing, staff relations and workforce adjustment, as well as assistance in human resources planning, training, and rejuvenation and professional development programs.

The priorities of HRS are to assist Sector managers in recruiting, leading, motivating, developing and empowering their employees to realize their full potential in the delivery of services.

During the planning period, the HRS manager will report regularly to the Sector Management Team on the progress of specific strategic human resource issues, including the following.

- Performance management: assist managers and employees to develop regular feedback mechanisms to improve performance on a continuous basis; establish learning strategies and training and development plans to keep the workforce on the leading edge of science and technology.
- People development: assist management in identifying competencies required to achieve organizational goals and to develop the workforce of the future in the spirit of the La Relève philosophy.
- Management development: assist management in development plans for current and potential managers, including succession planning and the La Relève initiatives.
- ESS strategic vision support: address both ongoing and transitional human resources priorities by developing strategies to address HR initiatives, through such mechanisms as S&T training and development, the Geomatics Professional Development Program (GPDP), and new recruitment and rejuvenation programs.

Other initiatives will include the need to improve:

- people development and management development in the context of the La Relève philosophy by identifying required competencies, developing individual learning plans and implementing a management development plan;

- performance management by developing regular feedback mechanisms and training managers and employees to communicate on performance results; and
- the recruitment and rejuvenation of the workforce by taking advantage of new federal programs, improving ESS professional development programs and developing innovative HR strategies.

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 area of client satisfaction, process improvement and human resources.

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

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

Earth Sciences Sector Corporate Services Funding Mechanisms

| | 1997/1998 | 1998/1999 | 1999/2000 | 2000/2001 |
|---|---------------|---------------|---------------|---------------|
| Appropriation from Parliament | 17 309 | 17 612 | 17 560 | 17 596 |
| Net voting | 200 | 230 | 225 | 225 |
| Revolving Fund | – | – | – | – |
| Joint projects with external parties | – | – | – | – |
| Joint projects with other federal departments | – | – | – | – |
| Total (\$000) | 17 509 | 17 842 | 17 785 | 17 821 |

(Corporate services includes the ADM's Office; Policy, Planning, Information and Services; Business Development; Quality Management Advisor; Office of the Chief Geoscientist; Human Resources Advisor; Senior Advisor and 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.

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

The following section of the Business Plan links Sector objectives, key deliverables and performance indicators to NRCan policy goals, objectives and business lines.

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 access to the best available scientific and community-based knowledge—in an easily understood format—on which to base their decisions. 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 (Knowledge): 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 (Cooperation): Promoting greater national and international cooperation and consensus on sustainable development issues, policies, goals and actions.
- Objective 1.3 (Policy Climate): 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 our economy, integral to job creation and community development. To maintain a healthy economy while protecting the environment means 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 (Growth and Investment): Creating economic opportunities and encouraging investment in innovative and higher value uses of natural resources.
- Objective 2.2 (Trade and Markets): Maintaining and expanding access to international markets for Canadian resource-based products, knowledge, technologies and services.
- Objective 2.3 (Communities): 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. We know the environment can adjust to human and natural stresses, provided these stresses remain within the ecosystem's ability to adapt and renew itself. This puts the onus on us to develop natural resources in a way that respects and protects the integrity of natural ecosystems.

- Objective 3.1 (Climate Change): Helping Canadians limit and adapt to climate change.
- Objective 3.2 (Reduce Environmental Impacts): Promoting technologies and stewardship practices that reduce environmental impacts, conserve biodiversity, and increase the efficiency of resource development and use.
- Objective 3.3 (Safety and Well being): Safeguarding Canadians from natural hazards and the risks associated with natural resource development and use.

NRCan Policy Goal 4: To effectively deliver federal responsibilities for surveys and mapping, and explosives.

ESS has a primary role to play in acquiring, maintaining and distributing information and knowledge about the Earth. This includes information on 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 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: Maintaining a national framework for geospatial positioning, mapping and boundary maintenance.
- Objective 4.2: Promoting the safe use of explosives and pyrotechnics. (There are no ESS program activities to be reported under this objective.)

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. Flexibility also requires a sound management and employee culture. The way the department deals with its employees, its accountability and its own performance must continue to be strengthened.

- Objective 5.1: Managing resources responsibly.
- Objective 5.2: Continuously improving NRCan's products, services and operations.
- Objective 5.3: Strengthening partnerships and transferring knowledge.
- Objective 5.4: Continuously improving S&T management.
- Objective 5.5: Promoting a stronger science culture.
- Objective 5.6: Using leading-edge environmental management tools and practices for NRCan operations.
- Objective 5.7: Reducing wastes from NRCan operations.
- Objective 5.8: Increasing the efficiency of energy and other resource use in NRCan operations.
- Objective 5.9: Promoting the use of goods and services that are eco-efficient.

(ESS reports on Objectives 5.6 to 5.9 in the NRCan Sustainable Development Strategy.)

Polar Continental Shelf Project (PCSP) contributed \$1.5 million to the northern economy by contracting supplies and services from northern- and/or aboriginal-owned companies. PCSP also coordinated logistics for community traditional knowledge studies involving elders and youth in a number of northern hamlets, including Igloolik and Resolute.

Business Lines

As a principal component of NRCan, ESS has a responsibility to bring strengths in science, technology and policy to bear on the sustainable development of Canada's natural resources. Furthermore, ESS is committed to good governance, to the delivery of high-quality products and services, to partnerships with the private and public sector organizations, and to protecting the health and safety of Canadians. It also has statutory responsibility for regulating all legal survey work on federal lands, including territories affected by Aboriginal land claims.

NRCan and ESS operations involve four principal business lines.

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 both 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 goal is to contribute to the wise and efficient use of our resources, contribute to innovation, and protect the environment.

Examples of Sector S&T activities include the following.

- Working with the Canadian Space Agency, we develop and transfer 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) is a multi-disciplinary and multi-agency program 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 which 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 any nation's economic progress. Our goal is to build a natural resource knowledge infrastructure in Canada to 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 on-line access to information about Canada's landmass and people;
- the ESS initiated Inter-Governmental Geoscience Accord (IGA), signed by federal, provincial and territorial ministers at the 1996 Mines Ministers' conference, 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
- the Canadian Geoscience Knowledge Network (CGKN), a partnership initiative to 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 science and technology strategy led by Industry Canada.

Promotion of Canada's International Interests

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

Examples of ESS initiatives in this area include:

- 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; and
- collaborating with the Geomatics Industry Association of Canada (GIAC), the Sector is furthering a coordinated Canadian industrial approach to attaining major international projects by participating in the creation of GeoCan International Inc.

Earth Sciences Sector Funding by Business Line

| | 1997/1998 | 1998/1999 | 1999/2000 | 2000/2001 |
|--------------------------|----------------|----------------|----------------|----------------|
| Science and Technology | 31 231 | 30 880 | 31 036 | 31 426 |
| Knowledge Infrastructure | 124 902 | 123 499 | 123 918 | 125 470 |
| Policy and Regulations | 21 063 | 20 827 | 20 963 | 21 229 |
| International | 2 290 | 2 266 | 2 277 | 2 305 |
| Total (\$000) | 179 486 | 177 472 | 178 194 | 180 430 |

Responsibility for Deliverables

In the following tables, numbers in parentheses—for example, (7)—indicate ESS branches/centres/divisions responsible 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, Information and Services (PPIS) (Policy Group)
15. PPIS (Geoscience Information Division)
16. PPIS (Communications)
17. PPIS (DG)
18. Quality Management Advisor



NRCan — Policy Goal 1:

To enable Canadians to make balanced decisions regarding natural resources.

Strategies

- Create knowledge networks.
- Ensure easy access to information.
- Build consensus and cooperation.
- Make efficient policies and regulations.
- Create innovative voluntary programs.
- 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 enhance and maintain the Canadian Spatial Reference System (CSRS) as a globally consistent national standard using active control technologies, gravimetry and advanced geodetic concepts. | <p>Improve the accuracy and delivery of Canadian Active Control System (CACS) services to facilitate global geodetic surveying and mapping, and precise real-time georeferencing and navigation for the Canadian landmass and adjacent regions. (8)</p> <p>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)</p> <p>Improve the Canadian Geodetic Information System (CGIS) for client access. (8)</p> <p>Carry out testing and performance evaluation of the transportable Canadian Geodetic Long Baseline Interferometry (CGLBI) system. (8)</p> | <p>Implement global real-time operations interfaces. (8)</p> <p>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)</p> <p>Put Canada-wide integrated networks in place for precise applications. (8)</p> | <p>Efficient three-dimensional 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 1998.</p> <p>Increased accuracy and productivity in the private sector.</p> <p>Integration of horizontal, vertical and gravity control networks and databases to be 90 percent complete by year 2000.</p> <p>Information on horizontal, vertical and gravity changes and their relation to geodynamics and natural hazards.</p> <p>Upgraded calibration standards and specifications for geodetic and gravity surveys.</p> <p>Transportable CGLBI system ready to start field observations in 1998.</p> |

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. | <p>Investigate the lithospheric structure and physical rock properties in parts of the Canadian Shield including Lithoprobe (partnerships in western Superior, western Churchill) and Cordillera (SNORCLE). (3,4,6)</p> <p>Implement a new client-focused project in southern Quebec. (2)</p> <p>Release maps, reports and modelling studies from current bedrock geoscience studies, including National Geoscience Mapping Program (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) and the Cordillera of western Canada (3,4); and the Arctic islands and northern mainland sedimentary basins. (3,6)</p> <p>Release maps and reports on the geology and crustal structure of the northwest trans-Hudson orogen of northern Saskatchewan and Manitoba. (6)</p> | <p>Investigate the lithospheric structure and physical rock properties in parts of the Canadian Shield (including Lithoprobe partnerships in western Superior, western Churchill) and Cordillera (SNORCLE). (3,4,6)</p> <p>Continue work on the thematic project in southern Quebec. (2)</p> <p>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); WCSB (3), and the Cordillera of western Canada (3,4); and the Arctic islands and northern mainland sedimentary basins. (3,6)</p> <p>Provision of geochronology-isotope components of major geoscience mapping projects. (6)</p> | <p>Increased scientific understanding of the geological evolution of Canada.</p> <p>Increased level of mineral and energy exploration stimulated by research results.</p> <p>Knowledge transfer via client/stakeholder requests for information, workshops, etc.</p> <p>Cost-sharing joint ventures with private industry and promotion of exploration activity; emulation of GSC database methods by provincial and territorial agencies and universities.</p> |

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. | <p>Continue data collection and modelling for Laurentian Piedmont and southern Manitoba hydrogeology projects. (2,3,5,7)</p> <p>Initiate a hydrogeological study in southern Quebec. (2)</p> <p>Complete report on Greater Toronto Area hydrogeology project. (5)</p> | <p>Complete report for Laurentian Piedmont and continue data collection for southern Manitoba projects. (2,3,5,7)</p> <p>Complete the development of the methodology for mapping aquifers. (2,5)</p> <p>Continue data collection and modelling for the southern Quebec hydro project. (2)</p> | <p>Improved decision making for sustainable development of aquifers.</p> <p>Successful technology transfers and outreach.</p> <p>Mitigation of adverse effects of anthropogenic and geologic processes on aquifers.</p> <p>Impact on groundwater policy-makers and regulatory agencies.</p> |
| To increase knowledge and understanding of the surficial geology of the Canadian landmass required for sustainable development. | <p>Implement surficial geoscience components of new NATMAP projects in southern Quebec, western Superior, western Churchill and Winnipeg regions, and design projects for Yukon and Alberta–Saskatchewan border. (2,5)</p> <p>Evaluate the potential for GSC/provincial NATMAP-style projects in Nova Scotia (5) and in the Canadian prairies. (3,5,6)</p> <p>Complete interpretations for final report on the Lake Winnipeg project. (1,4,5)</p> <p>Complete interpretations for maps and synthesis reports from surficial geology and NATMAP projects in southern Manitoba, central B.C. to improve decision making for sustainable development and resources. (2,5)</p> | <p>Complete maps and synthesis reports from surficial geology mapping and NATMAP projects in: southern Quebec, western Superior, western Churchill and Winnipeg regions, and design projects for Yukon and Alberta–Saskatchewan border area. (2,5)</p> <p>Release maps and synthesis reports from surficial geology mapping across Canada. (2,5)</p> | <p>Increased scientific understanding of the geological evolution of the Canadian landmass.</p> <p>Increased levels of cooperation, in-kind support and cost-sharing with industry, provinces, universities and other government departments.</p> <p>Increased level of mineral exploration stimulated by research results.</p> <p>Improved decision making for sustainable development of aquifers.</p> <p>Impact on groundwater policy makers and regulatory agencies.</p> <p>Successful technology transfers and outreach.</p> <p>Increased demand for surficial geology information and collaboration.</p> |

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 to support MERA and national marine conservation areas (NMCA) processes on proposed national parks. | <p>Finalize and publish MERA for the proposed national park on Bathurst Island. (3,7)</p> <p>Complete assessments for proposed NMCA's in Atlantic Canada. (1,7)</p> | <p>Carry out mineral resource assessments for proposed protected natural regions as identified. (3,7)</p> <p>Report on offshore resource assessment for Bonavista-Funk, Newfoundland and carry out additional assessments as required. (1)</p> | Consideration of geo-science and mineral resource MERA studies; impact on park boundaries. |
| To develop R&D capabilities to lead or participate in initiatives in mapping with support from external stakeholders. | Implement a strategy and develop an agenda, including areas such as high-resolution imagery for mapping, map generalization, data warehousing and automated mapping. (11) | <p>Continue development in high-resolution imaging and additional R&D projects, such as digital elevation models in the Canadian north and air-borne digital cameras. (11)</p> <p>Augment in-house R&D capability by adding engineers to CTI(0). (11)</p> | <p>Inclusion of R&D results in operations.</p> <p>Development of additional research skills.</p> |



Business Line: Knowledge Infrastructure

| 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. | <p>In support of the four natural resource (4NR) departments' MOU, help the 4NR departments work together, share data, and communicate science and technology to the public. (10,15)</p> <p>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)</p> <p>Bring principal federal geospatial databases on-line so that orders may be placed for delivery over the network. (10,11)</p> <p>Put tools in place to allow metadata in the Land Information Network for Canada (LINC) projects to come on-line. (10)</p> <p>Develop and implement the CGDI Data Alignment Layer and the system that will enable the distribution of information through Information Highway. (11)</p> <p>Develop system that will permit a distribution of digital topographic information on behalf of other federal agencies. Market DND raster products such as Arc Digitized Raster Graphics (ARDG) and Digital Chart of the World (DCW). (11)</p> | <p>Ensure that the data discovery and access components of the CGDI are operational. (10)</p> <p>Incorporate key views from databases held by the Energy Sector and the Minerals Statistics Branch into the Geological Atlas of Canada. (15)</p> <p>Make new tools available in the National Atlas of Canada to permit fusion of earth observation data with other geo-information. (10)</p> <p>Through the CGDI, provide national access to all geographic information from NRCan. (10,11)</p> <p>Bring the CCRS archive of raw earth observation data on-line. (10)</p> <p>Help other federal, provincial and municipal agencies to transfer their data into the Data Alignment Layer. (11)</p> | <p>Participation of all NRCan sectors and other government departments.</p> <p>Support of value-added industry.</p> <p>Increased awareness and support of natural resource issues through client feedback.</p> <p>Increased information activities of the four natural resource departments.</p> <p>Databases on-line and used.</p> <p>Revenue targets for the sale of data exceeded.</p> <p>Volume of data downloaded by users.</p> <p>Exceed revenue targets for sale of topographic products to other government departments.</p> |

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.) | <p>Secure agreements with federal agencies, provinces, territories and communities to initiate two to three pilot projects under the Sustainable Communities Initiative (SCI). (15)</p> <p>Showcase one of the SCI pilot projects at the May 1998 Conference on Northern Sustainable Development in Whitehorse, demonstrating the benefits to northern, native and rural communities of integrating natural resource knowledge with other economic, social and environmental information. (15)</p> | <p>Complete the two to three initial projects and bring two more projects on-line. Use the lessons learned from these pilots to begin discussions on the development of a national program. (15)</p> <p>Based on the success of the initial demo, promote the applications of the technology and approach to domestic and global markets. (15)</p> | <p>Increased use of earth observation data in Canada.</p> <p>Increased activity of Canadian value-added companies in global markets.</p> <p>Positive client feedback.</p> <p>Increased coordination between levels of government in making information more accessible to communities.</p> <p>Increased use of the sustainable communities model in Canada and abroad.</p> |
| To provide the National Topographic Database (NTDB) in digital or hard-copy format, as National Topographic Series (NTS) maps. | <p>In conjunction with the Canadian Forestry Service, produce remaining 500 Digital Elevation Models (DEMs). (11)</p> <p>Seek new agreements, including alternative service delivery mechanisms, with public and private sector agencies for change detection and data acquisition. (11)</p> <p>Complete implementation of on-demand colour printing of maps. (11)</p> <p>Produce deliverables for FY 1998/1999:</p> <p>250 paper maps (11);</p> <p>400 NTDB files. (11);</p> <p>Upgrade 350 NTDB files. (11)</p> | <p>Continue to seek new agreements, including alternative service delivery mechanisms, with public and private sector agencies. (11)</p> <p>Increase output capabilities for on-demand printing of maps. (11)</p> <p>Produce deliverables for 1999/2000:</p> <p>300 paper maps (11);</p> <p>300 NTDB files. (11);</p> <p>Upgrade 400 NTDB files. (11)</p> | <p>Complete coverage of Canada available by end of 1998/1999.</p> <p>Number of new or extended agreements signed.</p> <p>Increase in the number of data resellers and distributors.</p> <p>Product acceptance by clients, as demonstrated by sales.</p> <p>Reduction in production costs.</p> <p>Meeting of production targets.</p> <p>Processing of all client requirements for new data.</p> <p>Meeting of client requirements and schedule.</p> |

Business Line: Knowledge Infrastructure (cont.)

| ESS Objective | Deliverables: Year 1 | Deliverables: Years 2 & 3 | Performance Indicators |
|--|---|---|--|
| To improve performance, reception, processing and archiving of earth observation data provided to key clients. | <p>Acquire, process and archive RADARSAT, LANDSAT, SPOT, NOAA and Earth Resources Satellite (ERS) data for research and commercial requirements, including global change, landmass mapping, resource monitoring for clients, RADARSAT International, SICORP and European Space Agency (ESA). (10)</p> <p>Put agreements in place with satellite operators for reception of optical imagery to replace LANDSAT 5. (10)</p> | Develop and implement data archive network and distribution processes for earth observation (EO) data to give the user fast, cost-effective access. (10) | <p>Measurement of client satisfaction.</p> <p>Measurement of process performance.</p> <p>Increasing provision and use of data.</p> |
| To increase knowledge and understanding of the Canadian landmass required for sustainable development. | <p>Release comprehensive regional geoscience synthesis from current and archived studies for Yukon Territory (4), Labrador (6), Grenville province NODA project (6), Appalachian (2,5) and Cordillera regions. (3)</p> <p>Carry out aeromagnetic survey in association with Mackenzie Corridor geoscience mapping project; release database of magnetic parameters over entire Yukon Territory (6).</p> <p>Release geochronology database for Rae-Hern and Superior regions of the Canadian Shield. (6)</p> | <p>Release regional and targeted digital geoscience databases for priority areas of the Canadian Shield, Appalachian and Cordillera regions. (2,3,4,6)</p> <p>Carry out aeromagnetic and gravity surveys in association with major bedrock and surficial geoscience mapping projects, and release maps and databases of multi-parameter airborne geophysical surveys for regional and targeted mining area studies. (6)</p> | <p>Increased levels of cooperation, in-kind support and cost-sharing with industry, provinces, universities and other government departments.</p> <p>Increased exploration and job creation through transfer of knowledge base to the private sector.</p> <p>Focus exploration activities in accordance with GSC research.</p> |

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. | <p>Manage a comprehensive publication program. This includes producing corporate projects by preparing publications (e.g. GSC current research volumes); marketing our publications through the production of the <i>Monthly Information Circular</i>; publishing a variety of scientific material in various formats (CD-ROM, HTML for Internet, diskette, paper, etc.); releasing an average of 5 000 pages of scientific data in 25-30 formal GSC series releases; and releasing 8 000-9 000 pages in Open File format, accompanied by 800-1 000 map sheets. A highlight this year will be the completion of our final volume (Volume 7) of <i>Geology of Canada</i> on the Precambrian region. (15)</p> <p>Manage a comprehensive digital imaging program for GSC that includes the production of 72 maps; 765 presentation graphics; 5 000 publication figures; 3 100 prints from digital files; 13 500 colour electrostatic plots; 1 100 laminated maps, charts and posters; and 8 600 B&W and colour negatives, slides and prints. (15)</p> | <p>Continue to produce publications based on manuscripts received. (15)</p> <p>Continue to adopt new technologies to increase productivity and reduce costs. (15)</p> <p>Continue to produce maps based on manuscripts received. (15)</p> <p>Continue to adopt digital technologies to increase productivity and reduce costs. (15)</p> | <p>Meeting of projected publishing release output target.</p> <p>Meeting revenue targets of \$230 thousand.</p> <p>Increase in sales received electronically over the Internet, which will open new market avenues for our products.</p> <p>Recognition as a world-class map production unit by science and cartography organizations worldwide.</p> <p>Fast turnaround map output to stimulate mineral exploration and other government and industry activities.</p> |

Business Line: Knowledge Infrastructure (cont.)

| ESS Objective | Deliverables: Year 1 | Deliverables: Years 2 & 3 | Performance Indicators |
|---|--|---------------------------|---|
| 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) Support the Sector's Internet presence. (15) | Ongoing. (15) | Cost savings. Client feedback. Increased awareness of and donations to the Logan Legacy Fund. Increased availability of electronic publications. Improved links to key earth science resources on the Internet. Increased use of Internet resources. Increased level of client satisfaction. A current, up-to-date and enhanced Sector home page. Improved site management and information retrieval. |
| To contribute to the ESS and NRCan Knowledge Initiative (KI). | Strengthen and influence the direction of the NRCan KI to incorporate clear, strong information management policies, particularly in relation to metadata standards. (15) Contribute expertise and/or data to the development of a KI inventory of information assets and a directory of expertise. (15) Contribute to Sector and departmental initiatives in support of the integration of the 4NR departments' Internet resources and services. (15) Co-manage the implementation of the Geoscience Knowledge Network (GKN). (15) | Ongoing. (15) | A KI 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. Creation of a framework for the development of new products and services in the years to come. Successful implementation of GKN, including buy-in within GSC and by provincial partners. |

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. | <p>Develop national standards for compilation and release of surficial and bedrock geological, geochronological, hydrogeological and urban geological data in digital format. (4,5,6,15)</p> <p>Develop ESS contributions to the Canadian Geoscience Knowledge Network (CGKN) initiative. (1-7,15)</p> <p>Implement laboratories business plan and Laboratory Information Management System (LIMS) for data management and distribution. (7)</p> | <p>Implement and test national standards for digital geoscience data in collaboration with Canadian and international partners and clients. (2,4,5,6)</p> <p>Continue to implement and develop partnerships in the CGKN initiative. (1-7)</p> <p>Evaluate laboratories business plan and effectiveness of LIMS for data management and distribution. (7)</p> | <p>Successful technology transfer and outreach.</p> <p>Emulation of GSC database methods by provincial and territorial agencies and universities.</p> <p>Successful transfer of GSC FieldLog software and GIS/data management methods to industry, and to provincial, territorial and foreign geological surveys.</p> |



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 IGS, IERS, IGeS, IGB and 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: International

| ESS Objective | Deliverables: Year 1 | Deliverables: Years 2 & 3 | Performance Indicators |
|---|--|--|--|
| To encourage bi-polar scientific research between Canadian Arctic researchers and their Antarctic counterparts. | Manage and provide logistics support to the Canadian Arctic-Antarctic Exchange Program in partnership with the Canadian Antarctic Research Program. (12) | Increase bi-polar scientific exchanges between Canadian Arctic scientists and their Antarctic counterparts. (12) | New opportunities for Canadian Arctic research scientists to undertake research in Antarctica. |
| To increase revenues generated by PCSP from non-Canadian research groups. | Increase foreign revenues to a minimum of 15 percent of total revenue. (12) | Ongoing. (12) | Achievement of revenue targets. |

Business Line: Policy and Regulation

| ESS Objective | Deliverables: Year 1 | Deliverables: Years 2 & 3 | Performance Indicators |
|--|---|---|--|
| To deliver Canada's geoscience needs through effective and efficient federal-provincial cooperation. | Finalize formal agreements on geoscience program coordination with Ontario, Newfoundland, Alberta, Saskatchewan, NWT and INAC. Develop specific arrangements with Quebec. (2,3,6) | Develop formal agreement on geoscience program coordination with Yukon. (4) | Successful development of partnerships with provinces and territories under bilateral geoscience accords. |
| To provide geoscientific input to support decisions on Canada's claim to the continental shelf. | Develop a long-term plan to establish the boundaries of the Canadian continental shelf to substantiate Canada's claim under the United Nations 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. |

NRCan — Policy Goal 2:

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

Strategies

- Encourage resource development.
- Develop innovative products and processes.
- Promote rules-based global trading.
- Promote exports.
- 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 the information-rich high spatial resolution and hyperspectral EO data. | Demonstrate the use of hyperspectral data for mineral exploration in Canada's Arctic in partnership with 10 mining companies. (10) Transfer tools for data generalization, abstraction and multi-scale representation to industry and operational users. (10) | Develop industrial capability to use EO data for land-use change mapping, precision farming and environmental assessment. (10) | Use of high spatial resolution 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 and deliver a desktop processor to allow ready user access to corrected EO imagery. (10) | Develop and deliver a geomatic correction processor for EO imagery to produce wide-area composite imagery. (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 conventional oil potential for the WCSB. (3) Complete a comprehensive collaborative assessment of Devonian petroleum systems in the WCSB and southwest NWT. (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. Increased understanding of deformed sedimentary rocks in western and northern Canada, leading to increased hydrocarbon exploration in these areas and, where related, to land claim issues in Nunavut and the western Arctic. |

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. | <p>Develop, complete and publish comprehensive studies of Kidd Creek (Ont.) massive sulphide deposit, and Mississippi Valley-type (Nanisivik, Polaris) lead-zinc deposits. (2,7)</p> <p>Complete EXTECH II program in the Bathurst Mining Camp and release data compilations and interpretations. (6,7)</p> <p>Evaluate prospective areas for new EXTECH projects. (7)</p> | <p>Define and refine deposit models for types of base metal deposits. Complete study of Sullivan (B.C.) deposit. (7)</p> <p>Initiate EXTECH III project. (7)</p> | <p>Use by industry of new concepts and techniques for mineral exploration.</p> <p>Enhanced collaboration and cost-sharing between other government departments, provincial and territorial agencies, and industry for future EXTECH projects.</p> |
| To develop, test and use new technology for the acquisition, processing and interpretation of geo-science data required to foster sustainable energy and mineral resource development. | <p>Initiate tests of downhole seismic imaging and multiparameter borehole probes in mining camp sites provided by industry partners. (6,7)</p> | <p>Develop and evaluate innovative geophysical instrumentation technologies, and data processing and interpretation techniques, for determining earth structure and location of ore deposits. (6,7)</p> | <p>Technology transfer to industry and provincial and territorial governments.</p> <p>Identification of ore bodies at depths up to 3 km.</p> |
| To provide fundamental information on the nature and distribution of bedrock and surficial deposits across Canada to foster mineral exploration. | <p>Complete reports on drift prospecting in Nova Scotia, New Brunswick, Newfoundland, Ontario, Quebec, British Columbia and the Prairies. (2,5)</p> <p>Complete report on exploration methods for diamonds in the Slave province. (5)</p> <p>Complete reports related to the eastern Canada mineral development agreements (MDAs). (5)</p> | <p>Release synthesis report on drift prospecting. (2)</p> <p>Release reports on development and testing of new geochemical exploration methods in the Abitibi clay belt, Ontario. (5,7)</p> <p>Release reports on developing exploration methods for diamonds near Haileybury, Ontario. (5,7)</p> | <p>Increased levels of cooperation, in-kind support and cost-sharing with industry, provinces, universities and other government departments.</p> <p>Increased mineral exploration and job creation through transfer of knowledge to the private sector.</p> |

Business Line: Science and Technology (cont.)

| ESS Objective | Deliverables: Year 1 | Deliverables: Years 2 & 3 | Performance Indicators |
|--|--|--|--|
| 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 field/ocean, sampling survey and laboratory instrumentation to Canadian industry. (1,4,6) | Client satisfaction with GSC products. |
| | Transfer geological/geophysical attribute prediction using artificial intelligence techniques to the global petroleum industry. (1) | | Contracts awarded to Canadian private sector. |
| | Transfer techniques and strategies for compiling information in support of Article 76 Law of the Sea convention to Canadian marine consulting interests. (1) | | |
| | In partnership with industry, develop true 3-D GIS and visualization software for seismic reflection data (6). | | |
| | Completion of digital marine electromagnetic (MEM) system in consultation with clients. (4) | | Delivery of products on time and within budget. Enhanced NRCan profile. |
| To improve knowledge and understanding of gas hydrates for resource development, hazard mitigation and climate change impact evaluation. | Produce CD-ROM on preliminary results of field and laboratory studies associated with the 1998 gas hydrate well drilled in the Mackenzie Delta (joint GSC/Japan/United States Geological Survey/industry project). (5) | Release reports on geological controls on gas hydrate occurrence and distribution related to energy development. (5) | Recognition of Canada's role and expertise in the sustainable development of gas hydrates. |
| | Release reports on distribution of gas hydrates on the Pacific Continental Shelf. (5) | Complete analysis and reporting on gas hydrate test well and continue collaborative laboratory investigation. (5) | International recognition of Canada's role and expertise in the sustainable development of gas hydrates. |

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 mineral exploration. | <p>Publish regional metallogenic maps as part of Slave province NATMAP project. (7,15)</p> <p>Release compilations of stream sediment geochemical surveys of Bathurst Island, Victoria Island and central N.B. (7)</p> <p>Carry out regional gamma-ray airborne surveys over regions of priority to industry partners and clients. (7)</p> <p>Release airborne radiometric survey data compilation of Yukon Territory. (7)</p> | <p>Publish regional metallogenic maps in association with bedrock mapping projects in NWT. (7)</p> <p>Release maps and reports from regional geochemical surveys of lakes, streams and vegetation to assist in mineral exploration. (7)</p> <p>Carry out the national gamma-ray program in partnership with industry and governments. (7)</p> | Increased demand for geoscience information. |
| To enhance geoscientific knowledge of Canada's sedimentary basins and elucidate disposition and quality of hosted hydrocarbon endowments. | <p>Publish reports on the quality of selected Canadian coal deposits and the coal-bed methane potential of selected sub-surface resources. (3,15)</p> | <p>Finalize and release the Phase I database of Canadian coal resources. (3)</p> <p>Establish the prospectiveness of selected CBN targets with industry, focusing on gas utilization in northern communities. (3)</p> | <p>Improved mining efficiency and emissions management in the coal industry.</p> <p>Diversified coal use in Canada.</p> <p>Increased understanding of deformed sedimentary rocks in western and northern Canada, leading to increased hydrocarbon exploration.</p> |
| To provide new technologies to improve visualization and manipulation of geoscience data in three dimensions and over time. | <p>Develop 3-D visualization tools and apply to mining camp structural problems. (e.g. Thompson nickel belt). (6)</p> | <p>Develop 3-D visualization tools and apply to mining camp structural problems. (6)</p> | Expansion of new technology to other geoscience problems. |

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 Professional Development Program (GPDP) funding for five to seven projects proposed by Canadian industry. (10) | Provide GPDP funding for 12 to 15 projects proposed by Canadian industry. (10) | Commercial success. |
| To foster the development of spatial reference infrastructure technologies and their applications and help Canadian industry use and commercialize these technologies in Canada and abroad. | <p>Transfer technology to industry and government agencies for active control products and gravimetry systems. (8)</p> <p>Create new applications and products based on the active control system. (8)</p> <p>Promote international standards in the global marketplace. (8)</p> | Continue technology transfer for active control and gravimetry systems and promotion of international standards. (8) | <p>Acceptance and wide use of CACS products by the Canadian geomatics industry by 1999.</p> <p>Increasing use of CACS for precise georeferencing and navigation outside the traditional geomatics community.</p> <p>Develop CACS applications in support of atmospheric monitoring.</p> <p>Addition of active control and gravimetry technologies to current private sector products.</p> <p>Increased global market penetration and development of valued-added products and services by Canadian industry.</p> <p>Promotion of international standards.</p> |

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. | Continue to support international cadastral reform projects in response to requests from international bodies such as the World Bank. (9) | Continue to support international cadastral reform projects in response to requests from international bodies such as the World Bank. (9) | Enhanced NRCan profile. |
| | Provide project management services to the GlobeSAR 2 program funded by the Canadian International Development Agency (CIDA), to develop RADARSAT applications in 10 Latin American countries. (10) | Provide advisory services to Latin American countries to establish operational use of RADARSAT data. (10) | Commercial success of participating companies. |
| | Provide quality assurance in the production of large-scale maps for the city of Riyadh, Saudi Arabia (projected revenue \$600 thousand). (11) | Continue quality assurance checks for large-scale mapping of the city of Riyadh (projected revenue \$500 thousand). (11) | Contracts awarded to Canadian private sector firms. |
| | Provide project management services for a CIDA-funded project in Russia for digital mapping and technology transfer (projected revenue \$111 thousand). (11) | Continue project management for international projects in FY 1999/2000. (11) | |
| | Manage a map revision contract for 47 Joint Operations Graphic (JOG) charts for the United States National Imagery and Mapping Agency (USNIMA) (projected revenue \$500 thousand). (11) | | |



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.) | In collaboration with Canadian firms, advise Governments of Brazil and Argentina on conducting geological, geochemical, airborne and ground-based geophysical surveys, and on producing maps and related products. (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 Phase I of Asistencia Tecnica Para El Desanolle del Sector Minero Argentino (PASMA) project with the Government of Argentina. (2,7) | Develop and initiate Phase II of PASMA project with Canadian industry and provincial government partners. (2,7) | Enhanced NRCan profile. Exposure of Canadian remote sensing companies' capabilities to South American markets leading to further contracts and increased market share. |
| | Provide comparisons of Canadian and overseas mineral deposits through the GSC's World Map and CD-ROM releases. (7,15) | Provide comparisons of Canadian and overseas mineral deposits through the GSC's World Map and CD-ROM releases. (7) | Develop partnerships to expand World Map project. |
| | Publish results of the Alconsult/CIDA mapping and resource characterization initiative in eight east African countries. (3) | | |
| | Continue collaboration with Moroccan companies. (2) | | |
| | Generate \$10 million worth of projects annually through marketing internationally with GeoCan International; support five outgoing and 30 incoming trade missions. (13) | Generate \$10 million worth of projects annually through marketing internationally with GeoCan International; support five outgoing and 30 incoming trade missions. (13) | Number of delegations supported. |

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.) | <p>Release results of combined high resolution bathymetry and potential field surveys as tools to determine structural continuity onshore (western Newfoundland) and offshore (eastern Canada). 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)</p> <p>Implement 10 actions from the ESS International Business Strategy including</p> <ul style="list-style-type: none"> • forming a team of divisional representatives to coordinate activities and prepare plans; • providing international business development information on the Internet and the Intranet; • exhibiting international business development information at trade shows and conferences; and • inventorying ESS centres' and divisions' capabilities related to international projects, including human, financial, technical and managerial. (13) | <p>Apply ocean mapping and potential field analysis technology to nearshore projects, as opportunity permits. (1)</p> <p>Release reports on mineral potential and exploration guides. (2,7)</p> <p>Implement 10 selected actions from the ESS International Business Strategy. (13)</p> | <p>Client satisfaction with GSC input.</p> <p>Renewed/additional partnerships with Canadian industry in international contracts.</p> <p>Agreement on and development of PASMA Phase II.</p> <p>Number of actions from ESS International Business Strategy implemented.</p> <p>Dollar value of projects obtained by GeoCan International.</p> |

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. | Transfer Canadian mapping technology to the Coordinating Committee for Coastal and Offshore Geoscience Programs in East and Southeast Asia (CCOP) COASTPLAN; implement demonstration case study with input from Canadian industry and member countries. (1) | Continue to demonstrate Canadian marine geoscience leadership through participation in international research projects with countries such as Sri Lanka, Japan and Italy. (1) | Successful transfer of Canadian technology and expertise. Delivery of products on time and within budget. |
| | Provide workshops and training in geoscience data acquisition and interpretation to governments participating in the Multinational Andean Project (MAP). (4,6,7) | Provide workshops and training in geoscience data acquisition and interpretation to governments participating in MAP. (4,6,7) | |
| | Carry out a joint project with Brazil to upgrade its sustainable development capabilities. (6,7) | Transfer technology to Brazilian federal agencies, industry and universities; pursue new initiatives after evaluation of original program. (7) | International recognition of Canada's role and expertise in coastal zone management. |
| | Continue China exchange program through D&S Consultants. Expand the joint project with the Chinese 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. International recognition of Canada's role and expertise in coastal zone management. |
| | Continue work under the scope of a World Bank international contract to provide expert advice and training to the Government of Guinée for geoscience data acquisition. (2,3,5,6) | Provide expert advice and training to the Government of Guinée for geoscience data acquisition. (2,3,5,6) | Adoption of some of GSC's best practices by foreign geoscience agencies. |
| | | | |

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 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. (9,12) | Purchase supplies and services from northern companies, including Aboriginal suppliers, in keeping with the Federal Aboriginal Procurement Strategy. (9,12) | Financial benefits to northern suppliers, including Aboriginal companies. |
| To fulfill NRCan's legal survey responsibilities for the implementation of specific native land claims and treaty land entitlements. | Issue and manage \$7 million of survey contracts in support of specific native land claim settlements. (9) | Issue and manage \$10 million of survey contracts in support of specific native land claim settlements. (9) | Fulfillment of the government's responsibilities as defined under existing agreements and legislation. Sound financial and contract management. Meeting of milestones. |
| To transfer technology, create jobs and provide economic opportunities for Aboriginal peoples in northern Canada. | Ensure that at least 12 percent of the total value of survey contracts awarded directly benefits Aboriginal firms and people. (9) | Ensure that at least 15 percent of the total value of survey contracts awarded directly benefits Aboriginal firms and people. (9) | Demonstrated job creation and financial benefits to northern suppliers, including Aboriginal companies. |
| To facilitate training opportunities in the geomatics profession for Aboriginal students. | Provide on-the-job training to at least 10 Aboriginal students. (9) | Provide on-the-job training to at least 10 Aboriginal students. (9) | Stakeholder satisfaction. |
| To help Aboriginal communities manage their natural resources. | Demonstrate the use of EO data and GIS for use by Aboriginal communities. (10) Contribute to departmental policy initiatives in support of the Minister's priorities for Aboriginal and rural development. (14) Develop effective working relationships and collaborative mechanisms with the new territory of Nunavut. (14) | Establish infrastructure for natural resource management information in selected communities. (10,14,15) | Adaptation of operational use of EO data in reserve management practices. |

Business Line: Knowledge Infrastructure (cont.)

| ESS Objective | Deliverables: Year 1 | Deliverables: Years 2 & 3 | Performance Indicators |
|--|---|---|---|
| To contribute to the northern economy by providing Aboriginal peoples with the knowledge base to make informed decisions on exploration and development. | <p>Release maps, database and final report on the Northern Baffin Project. (5,6,7,15)</p> <p>Participate in northern development workshops to assist Aboriginal groups and communities in understanding and developing their natural resources. (3,4,6,7)</p> | <p>Develop new northern geoscience partnership initiatives. (6)</p> <p>Participate in northern development workshops to assist Aboriginal groups and communities in understanding and developing their natural resources. (3,4,6,7)</p> | <p>Development of new geoscience partnerships.</p> <p>Invitations to northern and aboriginal workshops.</p> |
| To improve knowledge of the resources, environment and cultures of the Arctic. | <p>Provide an estimated \$2.3 million in logistics support to approximately 140 research programs conducted by other government departments (federal, territorial) and universities involving resource assessments. Conduct research into the sustainable development of renewable and non-renewable resources in the Arctic. Research the environment's impact upon infrastructure development in a northern climate. (12)</p> | <p>Provide an estimated \$1.3 million in logistics support per year to research programs related to sustainable development and environmental protection programs and policies. (12)</p> | <p>Cost-shared projects with clients and partners (recoveries in Year 1 projected to exceed \$1 million).</p> <p>Meet research clients' needs in providing logistics support to help client departments and agencies to fulfill national and international policy and program commitments and objectives.</p> |



NRCan — Policy Goal 3:

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

Strategies

- Minimize environmental impacts.
- Understand climate and act on climate change.
- Foster international consensus on climate change.
- Disseminate information on natural hazards.
- Promote safe use of resources.

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. | <p>Map ice movement and coastal changes in Antarctica using RADARSAT data in collaboration with NASA to better understand the impact of global climate change. (10)</p> <p>Conduct basic studies on the role of clouds and aerosols in the earth's climate. (10)</p> <p>Demonstrate the use of EO data in solar radiation budget studies. (10)</p> | <p>Demonstrate the use of remote-sensing techniques for modelling and assessing the impact of climate change on ecosystems. (10)</p> <p>Integrate EO-based climate change information into CGDI and National Atlas. (10)</p> <p>Map the ability of Canada's forests to absorb carbon from the atmosphere. (10)</p> | <p>Use of information derived from EO data as indicators for forest land management and national reporting, as well as improved general circulation models.</p> <p>Use of EO data to report on greenhouse gas cycles and forest ecosystem trends.</p> |

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. | Contribute to reports on Holocene climate change in Saanich Inlet, which has been reconstructed after analysis of Ocean Drilling Program (ODP) cores. (1,2,4,5) | Develop high-resolution models of Holocene climate in Saanich Inlet, reconstructed from ODP cores. (1,4) | Influence, both within and outside the department, policy development related to greenhouse gas emissions. |
| | Continue the monitoring of modern geological processes in terrestrial and coastal environments in the Hudson Bay area. (2) | Characterize the time-space dynamics of terrestrial systems. (2) | Leadership role in defining follow-up studies with federal and university partners. |
| | Continue the study on the history and recurrence of catastrophic events (floods and landslides) in the Saguenay area. (2) | Continue the study on the history and recurrence of catastrophic events (floods and landslides) in the Saguenay area. (2) | Improved Integrated Coastal Zone Management (ICZM) in Atlantic Canada. |
| | Initiate studies on the magnitude and frequency of Prairie drought and on permafrost slope stability under conditions of climate change. (5) | Release maps and data analysis of vulnerable shorelines on the north coast of Prince Edward Island. (1) | Influence, both within and outside the department, policy development related to greenhouse gas emissions. |
| | Initiate studies of effects on northern infrastructure of permafrost response to climate change. (5) | Collaborate in international digital compilations of geoclimatic data. (5) | Leadership role in defining follow-up studies with federal and university partners. |
| | Initiate studies on slope movements resulting from scenarios of increased participation under climate change audits and the resulting effect on oil and gas infrastructure in southern Canada. (5) | Develop global models to predict the rate of climate change-related slope movement and its effects on infrastructure in southern Canada. (5) | Improved ICZM in Atlantic Canada. |
| | Continue monitoring permafrost-climate relationships through a network of study sites in the Mackenzie Valley. (5) | Release reports on spatial and temporal record of environmental change and pollutants in the Arctic based on analyses of ice cap cores. (5) | Outputs used to test general circulation models and assess impacts of future changes. |
| | Drill surface to bedrock ice core on Devon Ice Cap to analyze environmental change over last 100 000 years. | | |
| | Share costs with Japanese, Canadian, American and French agencies. (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 provision of geoscience knowledge bases and assessment of the impact of global warming. | <p>Complete maps of vulnerable shorelines on the north coast of Prince Edward Island. (1)</p> <p>Report on effects of increased storminess on shorelines of Atlantic Canada. (1)</p> <p>Complete interactive CD-ROM and bulletin on the impact of climate change in the Palliser Triangle. (5,15)</p> | <p>Release reports on the impacts of sea level rise on Prince Edward Island and the Beaufort Sea coast. (1)</p> <p>Release reports on impacts of climate change on geological processes. (5)</p> | <p>Influence, both within and outside the department, policy development related to greenhouse gas emissions.</p> <p>Provision of geoscience knowledge to help formulate adaptation and mitigation strategies.</p> |

NRCan Objective 3.2: Promoting technologies and stewardship practices that reduce the environmental impacts of resource development and land use, 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. | <p>Complete pilot projects with end users demonstrating the value of RADARSAT data for improved mapping and monitoring of water resources. (10)</p> <p>Demonstrate RADARSAT for tropical forest applications and transfer technology to industry. (10)</p> <p>Demonstrate interferometric SAR for the extraction of spatial dynamic and thematic information. (10)</p> | <p>Demonstrate interferometric technology for rice crop monitoring and mitigation of natural disasters. (10)</p> <p>Start implementation of operational information systems with RADARSAT and EO satellite data. (10)</p> | <p>Examples of RADARSAT applications available on the CCRS web site.</p> <p>Transfer of new advanced technology to Canadian industry.</p> <p>An enhanced industrial training competence and capability in radar.</p> |
| To increase the use of geoscience information in environmental impact reviews. | Complete reviews of environmental impact assessments for NRCan as required. (1-7) | Complete reviews of environmental impact assessments for NRCan as required. (1-7) | ESS expertise sought by OEA and other government departments and used to improve engineering design and environmental mitigation. |

NRCan Objective 3.3: Safeguarding Canadians from natural hazards and 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 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. | <p>Release information on crustal motion and deformation and their relation to seismic and volcanic activity and related natural hazards. (4,8)</p> <p>Release information on post-glacial vertical movements and mean sea-level changes required for coastal zone environmental studies and climatic changes. (4,8)</p> | Improve information on crustal motion, post-glacial rebound and sea-level changes. (4,8) | Incorporation of strain accumulation data in earthquake hazard determinations. |
| To support initiatives related to toxic substances and an understanding of natural sources and processes. | Implement the Metals in the Environment (MITE) initiative, which includes point source studies; comparison with Arctic records; mercury recycling; and natural source and dispersal studies. (7) | Complete source apportionment studies of mercury in southwest N.S. to support eco-system risk management strategies. (7) | <p>An improved understanding of the roles of natural and anthropogenic sources of toxics and contaminants.</p> <p>Suitable measures to maintain biodiversity while ensuring sustainable development of natural resources.</p> |
| To provide reliable geoscientific and land-use data to reduce risk and minimize the impact of geological processes and natural disasters. | <p>Release reports on geomagnetic hazards to pipelines and hydroelectric power systems. (4)</p> <p>Analyze stability data and release reports from Georgia Strait, Fraser Delta and Saanich Inlet for infrastructure development. (4,5)</p> <p>Contribute to natural hazard prediction through 3-D modelling of landslide hazards. (7)</p> <p>Provide analysis of nuclear waste storage feasibility studies for Atomic Energy of Canada Limited (AECL). (7)</p> | <p>Continue regional study of geohazards in Georgia Strait. (4)</p> <p>Contribute to natural hazard prediction through 3-D modelling of landslide hazards. (7)</p> <p>Provide analysis of nuclear waste storage feasibility studies for AECL. (7)</p> | <p>Provision of geoscience knowledge to help formulate adaptation and mitigation strategies.</p> <p>Influence, both within and outside the department, policy development related to greenhouse gas emissions.</p> <p>Leadership role in defining follow-up studies with federal and university partners.</p> <p>Outputs used to test general circulation models and assess impacts of future changes.</p> |

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.) | 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) | Timely development of appropriate models. |
| | Continue studies and release reports on landslide hazards in eastern and western Canada. (2,5) | Develop models to quantify the risk to oil and gas infrastructure associated with permafrost degradation and slope movement. (5) | |
| | Continue work under the Federal Environmental Action Plan in response to the Saguenay floods of 1996. (2,5,10) | Continue studies and release reports on landslide hazards in eastern and western Canada. (2,5) | Incorporation of findings in Action Plan. |
| | Develop with MTQ a database on landslides in southern Quebec and Saguenay. (2) | Contribute to the Federal Environmental Action Plan in response to the Saguenay floods of 1996. (2,5,10) | |
| | Collaborate with Canadian, American and Mexican agencies on the compilation of a North American hazard map for publication in <i>National Geographic</i> . (5) | Complete <i>Atlas on Geological Hazards in Canada</i> . (5) | Uptake of report results. |
| | Complete laboratory and field measurements of contaminant movement in permafrost. (5) | Report on mechanisms that transport contaminants from industrial waste sites in permafrost. (5) | |
| | Monitor and forecast the occurrence of magnetic storms, through a collaborative research program with industry. (4) | With industry partners, develop mitigation measures using magnetic forecast information. (4) | 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 provide reliable geoscientific and land-use data to reduce risk and minimize the impact of geological processes and natural disasters. <i>(cont.)</i> | <p>Complete a comprehensive field guide to permafrost in Yellowknife. (5)</p> <p>Release reports on geohazards to offshore development, including ice scouring on the Grand Banks and sediment transport on the Scotian Shelf. (1)</p> <p>Release reports on geohazards. (2,5)</p> <p>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, Transportation Safety Board of Canada). (4,5)</p> <p>Determine the location and magnitude of Canadian earthquakes and provide rapid notification to clients. (4)</p> <p>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)</p> | <p>Release maps and reports on marine landslides, sediment transport, coastal erosion and ice scour affecting offshore structures. (1)</p> <p>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, Transportation Safety Board of Canada). (4,5)</p> <p>Determine the location and magnitude of Canadian earthquakes and provide rapid notification to clients. (4)</p> <p>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)</p> | <p>Enhanced understanding and prediction of coastal erosion and landslide processes.</p> <p>Increased awareness and understanding of geological hazards by policy-makers, regulatory agencies and industry.</p> <p>Influence on northern policy initiatives and environmental protection.</p> <p>Better design and mitigation procedures for northern infrastructure.</p> <p>Continued reliance by news media on Canadian sources to provide timely and accurate information on natural disasters.</p> <p>Continued level of client use of magnetic field data.</p> |

Business Line: Policy and Regulations

| ESS Objective | Deliverables: Year 1 | Deliverables: Years 2 & 3 | Performance Indicators |
|---|--|--|--|
| To provide reliable geoscientific and land-use data to reduce investment risk and minimize the impact of natural disasters. | Incorporate results of engineering trials of seismic data to provide improved hazard assessments. (4) | Prepare seismic hazard assessments for incorporation in the 2001 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. |
| 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) Contribute geoscience perspective under MITE program to North American Action Plan (NARAP) for mercury. (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. Acceptance of geoscientific results by policy makers. |
| To provide reliable geoscientific data to support Canada's commitments to the Comprehensive Test Ban Treaty (CTBT). | Develop hydroacoustic and infrasound capabilities in conjunction with seismic monitoring of underground nuclear explosions. (4) | Analyze data from seismic hydroacoustic and infrasound monitoring to meet Canada's CTBT commitments. (4) | Co-funding by Treasury Board. Continued major role in international monitoring systems for CTBT. |



NRCan — Policy Goal 4:

To effectively deliver federal responsibilities for surveys and mapping, and explosives.

Strategies

- Maintaining the integrity of the international, provincial and territorial boundary framework, including property rights.
- Maintaining a national geospatial and aeronautical charting framework.

NRCan Objective 4.1: *Maintaining a national framework for geospatial positioning, mapping and boundary maintenance.*

Business Line: Knowledge Infrastructure

| 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 the CACS and the CBN for geodetic surveys and use by the private sector. (8) Maintain an easily accessible, accurate and consistent national spatial reference framework. (8) | Continue cooperation agreements. (8) Improve geoid to facilitate use of GPS for height determination particularly in remote regions of Canada. (8) | Close cooperation with provinces and stakeholders in the operation and maintenance of the CACS and CBN. Acceptance and increasing use of GPS for elevations above sea level. |
| To supply aeronautical charts and publications to meet the needs of the aviation industry and help ensure the safety and efficiency of aviation in Canada. | Deliver revised or amended charts and publications to civil and military clients on an internationally agreed 56-day cycle. (11) Revise visual flight rules (VFR) and other aeronautical charts within four months of a change that affects aviation. (11) | Deliver revised or amended charts and publications to civil and military clients on an internationally agreed 56-day cycle. (11) Revise other aeronautical charts within four months of a change that affects aviation. (11) | Meeting of deadlines 100 percent of the time. |

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 27 km of vista, inspecting 450 monuments, inspecting 15 control stations, establishing five new control stations and establishing 70 control points by GPS. (9) | Inspect and maintain the boundary, which includes clearing 70 km of vista, inspecting 200 monuments, inspecting 20 control stations, establishing 10 new control stations and establishing 50 control points by GPS. (9) | Stakeholder satisfaction. Accomplishment of annual objectives. Successful resolution of any boundary-related issues. |

Business Line: Policy and Regulations

| ESS Objective | Deliverables: Year 1 | Deliverables: Years 2 & 3 | Performance Indicators |
|---|--|--|---|
| To maintain the integrity of the survey framework to an acceptable level on Canada Lands. | Issue contracts to repair the survey framework, based on the available level of resources. (9) | Issue contracts to repair the survey framework, based on the available level of resources. (9) | Surveys conducted in a timely and cost-effective manner. |
| To establish and maintain the integrity of the Canada Land Surveys Records (CLSR). | Carry out ongoing records management, research and safeguarding of CLSR. (9) | Carry out ongoing records management, research and safeguarding of CLSR. (9) | Integrity of archival records management. Precision and timeliness in responding to research requests. |



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

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

NRCan Objective 5.1: Managing resources responsibly.**Business Line: Knowledge Infrastructure**

| ESS Objective | Deliverables: Year 1 | Deliverables: Years 2 & 3 | Performance Indicators |
|---|---|---|--|
| To manage Sector resources responsibly. | Implement a new Sector project management system to support project management and reporting. (14,15) | Monitor and adjust systems as required. (14,15) | User acceptance and utilization of system. |

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 |
|---|--|--|---|
| To continuously improve GSD products, services, and operations. | Co-sponsor nationwide seminar series with the Geomatics Industry Association of Canada (GIAC), the Canadian Institute of Geomatics (CIG) and provinces focusing on CACS and other GSD products and services. (8) | Launch initiatives to explain GSD's role to external audience. (8) | Increased use of GSD products and services. |

Business Line: Knowledge Infrastructure

| 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. | Conduct an audit to determine the level of compliance with ESS external service standards. (13) | Develop strategies to improve compliance. (13) | Increased staff awareness of, and compliance with, external service standards. |
| | In conjunction with the ESS Financial Advisor Office, revise and implement an updated GSC costing model. (13) | Revise model as required. (13) | Revised costing model used by GSC staff on cost-recovery projects. |
| | Coordinate the preparation of the annual ESS Business Plan. (13) | Coordinate the preparation of the annual ESS Business Plan. (13) | Timely publication and positive client feedback. |
| | 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. (18) | Ongoing. (18) | Improved employee and client satisfaction; success in applying for a quality award. |
| To obtain ISO 9000 accreditation for Ottawa-based activities. | Complete ISO 9001 tiers III and IV and document all processes at CTI(O). (11) | Complete ISO 9001 external audit and certification; CTI(S) and ATS to pass annual ISO 9001 renewal. (11) | Quality management system in place at CTI(O) by end of 1998/1999. Certification received for CTI(O) by end of 1999/2000; and success in yearly renewal process at CTI(S) and ATS. |
| | Successfully pass annual renewal of existing ISO 9001 at CTI(S) and Aeronautical and Technical Services (ATS). (11) | | |

NRCan Objective 5.3: Strengthening partnerships and transferring knowledge.**Business Line: Knowledge Infrastructure**

| ESS Objective | Deliverables: Year 1 | Deliverables: Years 2 & 3 | Performance Indicators |
|--|---|---|---|
| To coordinate geographic names activities in Canada. | Continue to provide secretariat services to CPCGN. (11) | Ongoing. (11) | Increased public awareness of CPCGN and public use of CGNDB data, as measured by Internet access. Successful annual fora of CPCGN and its advisory committees that are actively supported by provincial and territorial naming agencies. |
| To deliver logistics support to clients, in partnership with other service agencies. | 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) | Demonstrated delivery of coordinated logistics services in concert with other service providers. |
| To strengthen Geomatics Canada project work through collaborations with universities. | Participate with universities in workshops on geoid model development. (8) Support universities to create the Network of Centres of Excellence (NCE) in Geomatics. (8,10) | Continue collaboration on geoid model development and on a geomatics research network within the Geodesy node of the NCE, if successful. (8,10) | Total of funds and in-kind support leveraged by ESS from shared S&T projects. |
| To improve the delivery of federal mapping requirements through the integration of services. | Offer client-driven, cost-effective printing services. (11) Implement plan for sharing specialized cartographic imaging and printing services with other government agencies. (11) | Continue to offer client-driven, cost-effective printing services. (11) | Increased use of imaging services by other federal agencies. |
| To deliver federal aerial photography to clients. | Develop Phase II of an on-line 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 1998/1999. Signed agreement in place with at least one provincial agency for data sharing by the end of 1998/1999. |

Business Line: Policy and Regulation

| ESS Objective | Deliverables: Year 1 | Deliverables: Years 2 & 3 | Performance Indicators |
|--|--|--|--|
| To deliver federal responsibilities in partnership with provincial and territorial governments and stakeholders. | Reflect the advice of the Minister's National Advisory Board on Earth Sciences (MNABES) in Sector planning and priority-setting. (14) | Ongoing. (14) | Strengthened coordination on geoscience programs. Improved federal decision making. |
| To improve federal-provincial cooperation in geoscience and geomatics through identification of areas of collaboration. | Develop and carry out collaborative projects with provincial geoscience agencies as determined through joint planning agreements. (1-7,14) With the Ontario Ministry of Natural Resources, extend the Canada/Ontario MOU to capture CGDI and Land Information Ontario synergies. (14) Conduct stakeholder workshops to develop a commercially viable CEONet component of the CGDI. (11) Coordinate geomatics joint projects with the Government of Quebec. (14) | Implement extended collaboration arrangements. (1-7,14) Ongoing. (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. Commercial success of data providers and system integrators. Increased collaboration with provincial counterparts. |
| To ensure that the Canadian Council on Geomatics (CCOG) provides an effective forum for federal-provincial collaboration in geomatics. | Provide secretariat service to CCOG and contribute to joint work on CCOG resolutions. Provide a mid-term report on outcomes of 1997 Regina meeting, and assist the chair in planning for the 1998 meeting in Calgary. (14) Work with Ontario to follow through on the 1997 resolution to strengthen partnerships and governance. (14) | Ongoing. (14) | Closer collaboration with provinces in planning and delivering coordinated products and services. Improved governance on a broader scale. |
| To contribute to the development of the CGDI. | Participate in securing Cabinet approval and funding. (11,14) Assist in the development of the CGKB, and lead the development of the SCI, as key components of the CGDI. (11,14) | Ongoing (11,14) | Approval of funding. Contribute to improving good governance on a broader scale. |

NRCan Objective 5.4: Continuously improving S&T management.**Business Line: Knowledge and Infrastructure**

| ESS Objective | Deliverables: Year 1 | Deliverables: Years 2 & 3 | Performance Indicators |
|--|---|--|---|
| To align Sector products and services to government priorities and client needs. | Complete Strategic Overview Document (SOD) and mid-year update. (14) Coordinate annual review of ESS priorities within context of government and NRCan priorities. (14) | Ongoing. (14) | Use of SOD in the Sector planning exercise. Confirmation of priorities by the Sector Management Team. |
| To improve horizontal linkages of the Sector and other federal agencies. | Based on an approved strategy to strengthen ESS relations with other federal departments, target key departments for high-level meetings on issues of common concern. (14) | Ongoing. (14) | Improved understanding of Sector service. Improved federal decision making. |
| To build better linkages between science and technology and delivery of NRCan programs and services. | Lead the review of the Sector's science capacity to respond to issues identified within a 10-year time frame. (17) Coordinate this effort with similar initiatives in the 4NR departments. (17) | Develop strategies to respond to gaps or areas of perceived weakness. (17) | Recognition by the Minister of the need for, and strength of, the Sector's science capacity. |
| To provide the technical infrastructure required to support Sector programs. | Provide client service as specified in the ESS IT service delivery framework. Coordinate Sector services per the Common Office Environment (COE) Service Level Agreement (SLA). (15) Negotiate and coordinate the implementation of new departmental IT-based services in ESS, including any COE enhancements. (15) Improve Sector Internet and Intranet presentations and technology use. (15) Maintain and deliver reliable network-based Sector services. (15) Cooperatively define and implement integrated Sector systems and technological improvements. (15) | Ongoing. (15) | Delivery of services described in the framework; helpdesk usage reports. Degree of success in delivering on negotiated plans. Better accessibility of Sector Internet and Intranet systems and services. Availability statistics and client feedback reports. Value of changes implemented. Satisfaction of clients. Ability to operate with reduced resources. |

Business Line: Knowledge and 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. | Complete general training initiative for CTI(0) to help staff acquire skills in geomatics and informatics to meet work requirements. (11) | Continue specific training where necessary to increase skill levels in such areas as data acquisition and client services. (11) | Employees with skills relevant to operational requirements. |
| | Increase the number of professional staff by three in CTI(0) through assignments, retention of GPDP graduates, educational leave for technologists and relocation of professionals from Sherbrooke. (11) | Increase number of professional staff by two per year for two years. (11) | Increase of seven professionals while remaining within budget. |
| | 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. |
| To operate in an environment of continuous quality improvement. | Implement action plan arising from employee input from the second round of the annual National Quality Institute quality fitness test at Mapping Services Branch (MSB). (11) | Continue annual employee interviews, analysis of input and implementation of action plans. (11) | Employee feedback from interviews indicating continued improvement in the management of MSB. |
| To develop the next generation of senior managers. | Sponsor a management training program. (10) | Sponsor a long-term program to qualify new managers by 2000. (10) | Placement of trainees in management and leadership positions. |

*NRCan Objective 5.5: Promoting a stronger science culture.**Business Line: Knowledge and Infrastructure*

| ESS Objective | Deliverables: Year 1 | Deliverables: Years 2 & 3 | Performance Indicators |
|--|--|--|---|
| To continue to lead and administer the ESS Exhibits Committee. | Support ESS exhibit for up to 10 conferences. (13) | Support ESS exhibit for up to 10 conferences. (13) | Number of conferences supported. |
| To create and promote awareness of ESS S&T activities. | Coordinate and prepare the GC's and GSC's annual reviews. (16) | Ongoing. (16) | Increased awareness of ESS programs among the media and the public. |
| | Develop a comprehensive communication strategy for ESS. (16) | Implement communication strategy. (16) | |
| | Manage and coordinate the Sector's contribution to Science and Technology Week. (16) | Ongoing. (16) | |



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, a better place to work and 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 factual approach to decision making; and
- a responsibility to stakeholders and to society.

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 is composed of these major 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. In order to monitor progress and ensure the relevance of these plans, the following Sector processes have been established.

- 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 1998, 1999 and 2000.

- Each Sector management team (SMT) member presents a semi-annual report on progress made in his or her own area.

Milestones: mid-year and year-end reviews in 1998/1999, 1999/2000 and 2000/2001.

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

Milestones: April, August and December 1998.

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

Milestones: spring 1998, 1999 and 2000.

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

Milestones: March-April 1998/1999.

- Organizational self-assessments, involving employees at all levels, are done for the Sector.

Milestones: during 1999/2000.

Management Improvement Plan Initiatives for 1998/1999

Vision and Strategic Direction

Recent surveys of Sector staff indicate improvements are required in vision and strategic direction. Sector management will continue to make efforts to further develop and communicate our vision. The ESS Science and Technology Capacities project described earlier in this Business Plan will contribute to this objective.

Accountability: All SMT members.

Internal Communications

Internal communications are linked with 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 at all regional offices in all divisions during 1998/1999.

Accountability: All SMT members.

Service Standards

During FY 1997/1998, significant effort was devoted to a study of the client satisfaction measurement mechanisms used in the Sector. During 1998/1999, the recommendations from this study will be analyzed and implemented as appropriate.

ESS external service standards have been in effect throughout the Sector during FY 1997/1998. An audit of compliance with these standards will take place in 1998/1999 and a strategy will be developed for updating external service standards. The Sector will continue with the ongoing process of establishing costs of service to external clients.

During 1998/1999, ESS will address the development of internal service standards in a method and timeframe that is consistent with the overall departmental approach. ESS will continue to play a leadership role on the NRCan Service Standards Committee.

Accountability: Executive Director, Business Development.

Scientific Review and Assessment

ESS will establish a process and a schedule for external scientific review and assessment.

Accountability: Chief Geoscientist and Director General, CCRS.

ESS will continue implementation of ISO 9000 quality management systems in MSB and GSD.

Accountability: Director General, MSB and Director, GSD.

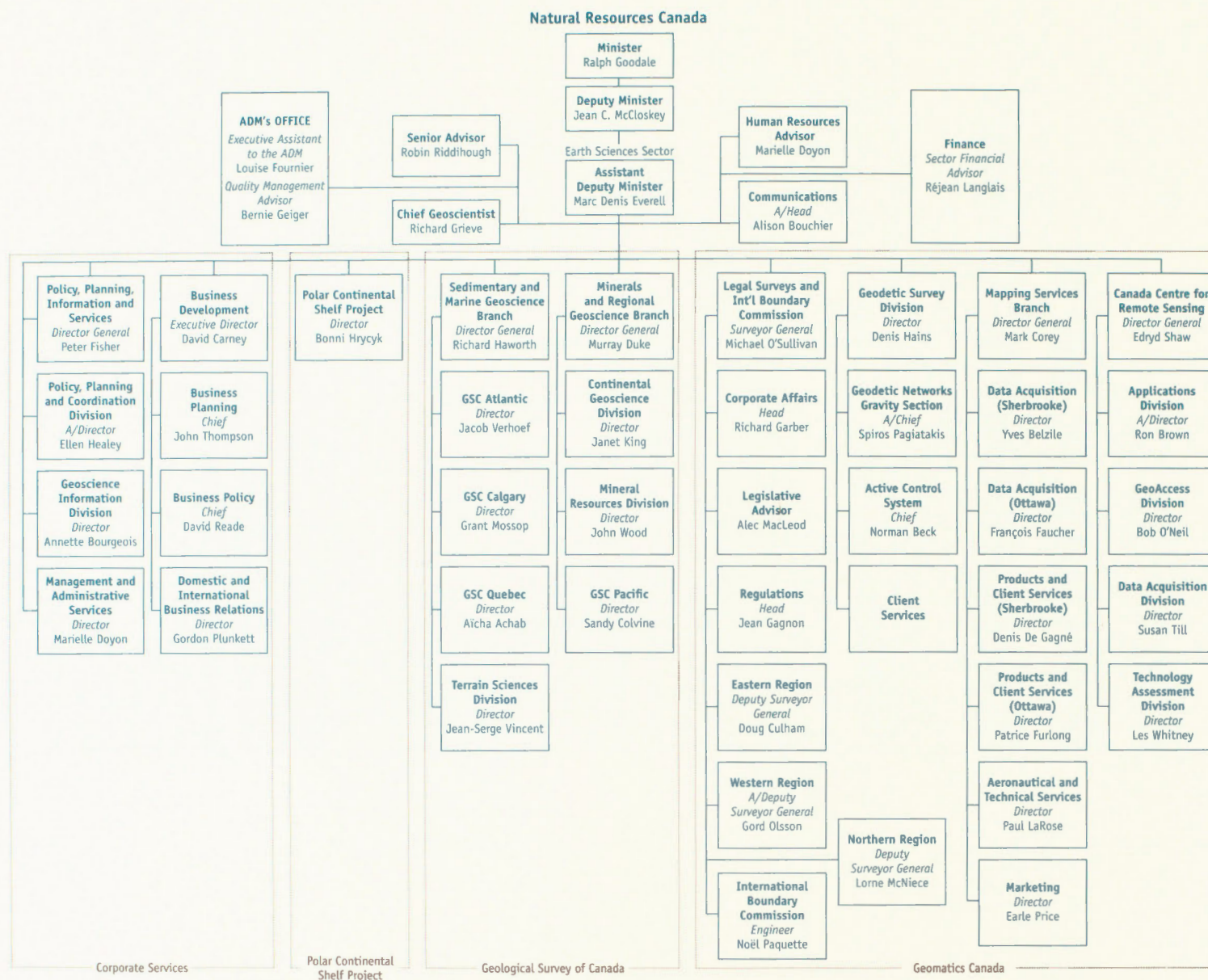
Management Skills Development

ESS will continue to provide training in management skills development to managers and potential managers. The Sector will examine courses for managers on dealing with poor performers, and support the government-wide and departmental La Relève efforts.

Accountability: SMT members.



Annex A: Earth Sciences Sector Organization Chart



Annex B:

Directory of Earth Sciences Sector Offices

Geomatics Canada

Geodetic Survey Division

615 Booth Street, 4th Floor
Ottawa, Ontario
K1A 0E9
Telephone: (613) 995-4282
Fax: (613) 947-3602

Legal Surveys and 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) 851-7116
Conference Room: (613) 995-2612

Atlantic Client Liaison Unit (CLU)

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 (CLU)**

55 St. Clair Avenue East,
Suite 606
Toronto, Ontario
M4T 1M2
Telephone: (416) 973-1006
Fax: (416) 973-6043
Cellular: (416) 575-9418

Quebec Client Liaison Unit (CLU)

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 Regional Operations Centre

52nd Street, Suite 4920
Box 668
Yellowknife, Northwest Territories
X1A 2N5
Telephone: (867) 669-3949
Fax: (867) 873-9949
Computer: (867) 669-3915
Boardroom: (867) 669-3905

Yukon Regional Office

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

Western Regional Operations Centre (WROC)

9700 Jasper Avenue, Suite 605
Edmonton, Alberta
T5J 4C3
Telephone: (403) 495-2138
Fax: (403) 495-4052

Alberta Client Liaison Unit (CLU)

9700 Jasper Avenue, Suite 605
Edmonton, Alberta
T5J 4C3
Telephone: (403) 495-2138
Fax: (403) 495-4052

Manitoba Client Liaison Unit (CLU)

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

Saskatchewan Client Liaison Unit (CLU)

2221 Cornwall Street, Suite 202
Regina, Saskatchewan
S4P 2L1
Telephone: (306) 780-5402
Fax: (306) 780-5191
Comp/Draft/Records: (306) 780-6992

Manitoba INAC Land Claims Client Liaison Unit (CLU)

275 Portage Avenue, Suite 501
Winnipeg, Manitoba
R3B 2B3
Telephone: (204) 983-3623
Fax: (204) 983-0157

British Columbia Regional Office

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

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

Mapping Services Branch**Canada 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) 230-6275

Aeronautical and Technical Services

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

National Air Photo Library

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

Applications Division

588 Booth Street, 3rd Floor
 Ottawa, Ontario
 K1A 0Y7
 Telephone: (613) 947-1356
 Fax: (613) 947-1385

Data Acquisition Division

588 Booth Street, 2nd Floor
 Ottawa, Ontario
 K1A 0Y7
 Telephone: (613) 947-1217
 Fax: (613) 943-8201

Canada 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

615 Booth Street, 1st Floor
 Ottawa, Ontario
 K1A 0E9
 Telephone: (613) 952-7000
 Toll Free: (800) 465-6277
 Fax: (613) 957-8861
 Toll Free: (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

Terrain Sciences Division

601 Booth Street, 3rd Floor
 Ottawa, Ontario
 K1A 0E8
 Telephone: (613) 995-4938
 Fax: (613) 992-0190

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: agc@agc.bio.ns.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: gsc_calgary@gsc.nrcan.gc.ca

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

**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

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

Polar Continental Shelf Project

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

ESS Headquarters and 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

601 Booth Street, 2nd Floor
 Ottawa, Ontario
 K1A 0E8
 Telephone: (613) 995-4482
 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

580 Booth Street, 14th Floor
 Ottawa, Ontario
 K1A 0E4
 Telephone: (613) 947-2789
 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 |
| 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 |
| CBN | Canadian Base Network |
| 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 |
| CGC | Canadian Geoscience Council |
| 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 |
| CIDA | Canadian International Development Agency |
| CIG | Canadian Institute of Geomatics |
| CLSR | Canada Land Surveys Records |
| CNPC | Chinese National Petroleum Company |
| CLU | Client Liaison Unit |
| COE | Common Office Environment |
| CORE | Continuous Observations of the Rotation of the Earth |
| CPCGN | Canadian Permanent Committee on Geographical Names |
| CSRS | Canadian Spatial Reference System |
| CTBT | Comprehensive Test Ban Treaty |
| CTI(O) | Centre for Topographic Information (Ottawa) |
| CTI(S) | Centre for Topographic Information (Sherbrooke) |
| | |
| DCW | Digital Chart of the World |
| DEM | Digital Elevation Models |
| DND | Department of National Defence |

| | |
|--------|--|
| EO | Earth Observation |
| ERS | Earth Resources Satellite |
| ESA | European Space Agency |
| ESS | Earth Sciences Sector |
| EXTECH | Exploration Science and Technology Program |
| FY | Fiscal Year |
| GAC | Geological Association of Canada |
| GGP | Global Geodynamics Project |
| GHG | Greenhouse gases |
| GIAC | Geomatics Industry Association of Canada |
| GID | Geoscience Information Division |
| GPDP | Geomatics Professional Development Program |
| GKN | Geoscience Knowledge Network |
| GPS | Global Positioning System |
| GSC | Geological Survey of Canada |
| GSD | Geodetic Survey Division |
| HRS | Human Resources Services |
| IACG | Inter-Agency Committee on Geomatics |
| ICZM | Integrated Coastal Zone Management |
| IERS | International Earth Rotation Service |
| IGA | Intergovernmental Geoscience Accord |
| IGB | International Gravity Bureau |
| IGeS | International Geoid Service |
| IGS | International GPS Service for Geodynamics |
| IMS | International Monitoring Systems |
| INAC | Indian and Northern Affairs Canada |
| INRS | Institute national de la recherche scientifique |
| IT | Information Technology |
| IT&T | Information Technology and Telecommunication |
| KI | Knowledge Initiative |
| LIMS | Laboratory Information Management System |
| LINC | Land Information Network for Canada |
| LSD | Legal Surveys Division |
| MAP | Multinational Andean Project |
| MDA | Mineral development agreement |
| 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 |
| MTQ | Ministry of Transport, Quebec |
| NAFTA | North American Free Trade Agreement |
| NAIS | National Atlas Information Service |
| NASA | National Aeronautics and Space Administration |
| NATMAP | National Geoscience Mapping Program |
| NCE | Network of Centres of Excellence |
| NGSC | National Geological Surveys Committee |
| NMCA | National Marine Conservation Areas |
| NOAA | National Oceanographic and Atmospheric Agency |
| NRCan | Natural Resources Canada |
| NTDB | National Topographic Data Base |
| NTS | National Topographic Series |
| NARAP | North American Action Plan |
| NWT | Northwest Territories |
| ODP | Ocean Drilling Program |
| OEa | Office of Environmental Affairs |
| OGD | Other government department |
| PASMA | Asistencia Técnica Para El Desarrollo del Sector Minero Argentino |
| PCSP | Polar Continental Shelf Project |
| PPISB | Policy, Planning, Information and Services Branch |
| R&D | Research and Development |
| RF | Revolving Fund |
| SAR | Synthetic Aperture Radar |
| SCI | Sustainable Communities Initiative |
| S&T | Science and Technology |
| SFAO | Sector Financial Advisor Office |
| SICORP | SPOT Image Corporation |
| SLA | Service Level Agreement |
| SMT | Sector Management Team |
| SNORCLE | Slave-Northern Cordillera Lithosphere Evolution |
| SOD | Strategic Overview Document |
| SPOT | Satellite pour Observation de la Terre |
| UNCSD | United Nations Commission on Sustainable Development |
| USNIMA | United States National Imagery and Mapping Agency |
| USGS | United States Geological Survey |
| VFR | Visual Flight Rules |
| VLBI | Very Long Baseline Interferometry |
| WCSB | Western Canada Sedimentary Basin |

GSC/CGC OTTAWA



OOG 02892487

Success Stories *(cont.)*

- Geoscientists in the GSC Pacific Vancouver office have been revolutionizing how we relay geological information to Canadians with no geological training. A colourful poster entitled "Geoscape Vancouver," with many engaging figures and photographs and no technical jargon, summarizes the key earth science relevant and familiar to residents of Vancouver.
- A compilation of Yukon Territory geology at 1:50 000 scale has been completed in a joint project between the Yukon Geology Program and GSC. The resultant wall-sized map, available in paper or digital form, pulls together for the first time a complete and detailed picture of the geology of the Yukon as a single image. The map is sure to be a best seller and end up on the boardroom walls of explorationists active in the Yukon.
- Through Canada's Lithoprobe Program, GSC has obtained unprecedented high-resolution seismic images of the deep lithosphere beneath the Archean Slave province, from close to Yellowknife westward to the eastern front of the Mesozoic Cordillera. GSC collaboration with industry in this venture has grown over the years, culminating recently with the first mining-related three-dimensional (3-D) seismic survey conducted in Canada, jointly funded by GSC and industry. Based on the success of a number of surveys conducted subsequently by industry that identified new ore bodies using 3-D seismic techniques, this technology will become a part of the industry's exploration programs.
- Aeronautical Charts and Technical Services has obtained ISO 9001 certification for its production of digital aeronautical charts. This certification process is currently being extended to imaging and printing services.
- Business Development created a new opportunity in Saudi Arabia for the Canadian geomatics industry by developing a strategic plan for the Ministry of Municipal and Rural Affairs. This project resulted in a partnership with a major Canadian geomatics firm that led to the award of a \$10 million mapping contract.
- In response to two major natural disasters, specifically, the Manitoba flood and the recent ice storm in Eastern Canada, the Mapping Services Branch again demonstrated its ability to contribute to national emergency relief efforts. In support of National Defence, the Branch published 43 map titles totalling more than 46 000 copies, many within a 24-hour time frame.
- Release in January 1998 of three colour maps of the Iqaluit-Kimmirut area represents the final phase of the GSC's three-year bedrock and surficial geology mapping project on the Meta Incognita Peninsula of southern Baffin Island. It provides detailed (1:100 000 scale) coverage of 28 000 km² region that has been poorly understood up until now. Recent and continued mineral exploration activities in southern Baffin Island are a direct result of the publication of maps in 1995 and 1996, following the first two years of field-work, that document the crustal-scale architecture of the current project area and highlight numerous new regions of potential Ni-Cu mineralization.

