



Earth Sciences Sector Business Plan 1997/2000



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Earth Sciences Sector Success Stories

- The Canada Centre for Remote Sensing's Earth Observation Ground Stations have maintained an excellent performance indicator of over 99%. This has been a key factor in the continuing services that the stations provide under the Geomatics Canada Revolving Fund to SICORP (USA) and the European Space Agency, the services being fully funded by these external agencies.
- The Centre for Topographic Information (Sherbrooke) has obtained ISO 9001 accreditation for its quality assurance system used in the production of the National Topographic Data Base. CTI Sherbrooke is the first public sector geomatics agency in North America to achieve this accreditation.
- The Canada Centre for Remote Sensing was awarded a consulting contract with the Government of Malaysia, following a world-wide competitive procedure. The three-year contract, related to the development of the Malaysian Centre for Remote Sensing, and the design and construction of the first ground station in Malaysia, has already led to contracts awarded to Canadian industry in the first year, with potential for significant opportunities for industry in future years.
- The Geological Survey of Canada's new publication entitled *Geology of Canadian Mineral Deposit Types* has received high commendation from the Canadian exploration community for its comprehensive, yet succinct treatment of the topic. "The volume bears the Geological Survey of Canada's stamp of excellence on every page" (*The Northern Miner*).
- The joint international GlobeSAR project (with 10 other countries in South East Asia, Africa and the Middle East) demonstrates the ability of RADARSAT to meet resource-monitoring requirements. Technology transfer was a significant project component. As a result of this program, countries such as China have agreed to receive RADARSAT data. Several other countries are expressing interest, with a possibility of subsequent Canadian industry contracts.
- The National Atlas of Canada World Wide Web site presents Canadian geography from several viewpoints and the geographic element of current Canadian issues in a way that appeals to students and the general public. The National Atlas, the first interactive map-making site on the World Wide Web, has won many awards for both its technology and content.
- The Geological Survey of Canada assisted Emergency Preparedness Canada and Quebec provincial authorities in analyzing the extent and cause of flood damage caused by torrential rainfall in the Saguenay region.
- At the time of its initial application to Treasury Board for approval to operate a Revolving Fund, Geomatics Canada forecast an accumulated deficit of nearly \$1.285M after the first two years of operation. In fact, 1995/96 financial statements indicated an accumulated deficit of only \$285K with a positive financial performance of more than \$1M. The accumulated deficit should be eliminated by the end of FY 1996/97. This rapid deficit reduction is a significant accomplishment and one that has been rarely achieved in RF operations.
- Geomatics Canada played a major role in assisting the Canadian Institute of Geomatics and the Canadian Cartographic Association in securing the bid for the International Cartographic Association Conference (ICA) to be held in Ottawa in August 1999.
- The Geological Survey of Canada published the new *Geological Map of Canada*, only the third such map since Sir William Logan's map of 1863. The new map is the first digital geological map of Canada and the associated CD-ROM contains a complete bilingual GIS spatial data base from which a variety of thematic geological maps can be created.

Earth Sciences Sector
Business Plan
1997/2000

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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

Natural Resources Canada provides the leading-edge science, knowledge and expertise required to position Canada as a world leader in the sustainable development of its land, energy, forest and mineral resources and as a quality producer of resource-related products, technologies, services and research.

Earth Sciences Sector

Vision Statement

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



ADM's Message

It is a pleasure to introduce the 1997/2000 edition of the Earth Sciences Sector (ESS) Business Plan.

Last year's version was the first for the new Earth Sciences Sector and built upon the structure and strategies of its component organizations: Geomatics Canada, the Geological Survey of Canada and the Polar Continental Shelf Project. The 1997/2000 Plan begins the work of describing the alignment of the business of ESS more directly with that of Natural Resources Canada (NRCan) as a whole.

This Plan is an implementation of one of the guiding principles introduced in the Science and Technology Management Framework adopted by NRCan in 1996 — that of ensuring that there is a clear link between government priorities and the planning and activity that occur at all levels in the organization.

In this case the 1997/2000 ESS Business Plan clearly shows how we will contribute to the government goals of sustainable development and good governance through activities under the four NRCan business lines of policies and regulation, science and technology, knowledge infrastructure and international activities.

For ESS, the largest single business line is that of activities that help build a knowledge infrastructure. As with the 1996/1999 Plan, this remains a central theme for almost all components of the Sector. Second in importance is science and technology, followed by policies and regulations and then international activities.

In constructing the text of this Plan we have linked individual objectives to the component parts of the organization. In subsequent years we intend to refine this approach. My goal is that of creating a Business Plan that will be the essential reference document that shows what the Earth Sciences Sector is doing, why it is doing it, what it will achieve and how it will evaluate those achievements.

I would be interested to receive any comments on either the substance or approach of this Plan. In many ways the extent to which this Plan can be read and used, both inside and outside the Sector, is a measure of the extent to which it is a constructive management tool.

A handwritten signature in black ink, appearing to read 'mde', written in a cursive style.

Marc Denis Everell
Assistant Deputy Minister
Earth Sciences Sector

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1 Earth Sciences Sector: The Context

This Earth Sciences Sector (ESS) Business Plan is one in a series of Natural Resources Canada (NRCan) planning documents. The series also includes the NRCan Business Plan and ESS branch and division business plans. These various plans are linked together by reference to a consistent planning framework for the 1997/2000 planning period, including the use of common departmental priorities, policy goals 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 Geomatics Canada, the Geological Survey of Canada and the Polar Continental Shelf Project. As a predominantly science and technology-based line sector of NRCan, ESS is the principal national agency for earth science knowledge and innovation. Geomatics Canada provides a reliable system of surveys, maps, remotely sensed data and geographically referenced information describing the Canadian landmass; the Geological Survey of Canada is a principal contributor to a comprehensive geoscience knowledge base of Canada; and, the Polar Continental Shelf Project contributes to the exercise of Canada's sovereignty over its Arctic regions by providing a comprehensive logistics support organization. An ESS corporate services group assists these three line organizations in their work.

Public Policy

Strategic directions for the Earth Sciences Sector are set in the context of current Government of Canada priorities. The country is now managing its way through major fiscal pressures, and has constrained public spending to reduce the federal deficit and stabilize the debt load. The Sector's FY 1997/98 budget will be at least 30 percent less than in FY 1994/95 as a consequence of Program Review of the public service. Further reductions will take place during the three-year planning period of this Business Plan. Program Review has significantly reduced the Sector's resource levels. Under the new Expenditure Management System, the ongoing challenge is the need to continually balance new pressures and existing commitments with decreasing resources.

The Federal Minister of Finance has articulated the government's top priority as follows: "...to ensure strong and sustained job creation and economic growth, while protecting the most vulnerable in Canada." For ESS, this means aligning scientific and technical activities to support sustainable natural resource development and good governance.

Over the planning period, Canada will continue as a global leader in the community of nations. Changes in technology and the liberalization of trading rules will drive greater globalization of issues including competitiveness. All departments of government are learning about the implications of a knowledge-based economy. In this context, ESS excellence offers tremendous opportunity, both through the export of Canada's rapidly growing geomatics expertise, and by building in partnership with industry on Canada's solid international reputation in the earth sciences.

Governments across Canada are contributing to profound change in Canadian society. This change includes forging new relationships among governments, laying the basis for new partnerships with other sectors of society, and strengthening the relationship between government and citizen. The Sector's clients, especially those in the areas of minerals, metals and energy, make a significant contribution to the Canadian economy. The Earth Sciences Sector, through the provision of timely and authoritative geoscience and geomatic information, provides a competitive advantage to companies exploring and developing resources in Canada and by doing so, stimulates the economy and promotes job creation. In addition, Canadians insist more than ever on the effective use of their tax dollars. All agencies of government, including ESS, have assigned top priority to client service and good governance. ESS will increasingly measure the results of its activities in these priority areas and report to Parliament on the specific outcomes of its scientific and technical investments. The Sector has established a comprehensive five-year quality management framework to assist it in this undertaking.

The Science Agenda

In March 1996, the Government of Canada released its new science and technology strategy. The strategy underscores the importance of innovation to productivity and well being. It identifies three drivers for federal science: sustainable development and job creation, improved quality of life, and the advancement of knowledge. ESS will contribute in each of these areas. In particular, the Geological Survey of Canada (GSC) has recently released its *Strategic Plan for Geoscience 1996-2001* which outlines the priorities for the GSC within these general directions. As well, Geomatics Canada, in the spring of 1997, will release its five-year strategic plan entitled *Geomatics for the New Millennium*.

The Aeronautical Charts Service has signed five-year contracts, each worth approximately \$5M, with NAV CANADA and with the United States National Imagery and Mapping Agency, to supply aeronautical products. The signing of these two contracts represents a major milestone for the program, providing a stable program base for the next five years.

The Geological Survey of Canada was awarded competitive contracts from the World Bank to work with the governments of Argentina and Guinea in developing their national geoscience programs, and will be assisted by Canadian private industry in these projects.

The quality of Sector work is fundamentally dependent on its highly skilled workforce. ESS is taking steps to ensure that science and technology (S&T) personnel have opportunities to learn and to make the best use of their abilities. The Sector is doing this in concert with other S&T-based federal organizations, under the umbrella of the government framework for the human resources management of the federal S&T community. In order to ensure the continued provision of well-trained earth scientists, the Sector is making investments in training at both the undergraduate and post-graduate levels. 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 that address the issue of attracting and retaining high quality people at all levels. These initiatives include the Sector's Geomatics Professional Development Program, and involvement in the Young Scientist Program. In addition, the Sector is an active participant in La Relève, a coordinated government-wide strategy intended to ensure successful Public Service of Canada renewal and revitalization.

Meeting Client Needs

The Earth Sciences Sector participates actively with other NRCan sectors in a range of joint, client-driven projects. These initiatives include addressing such major issues as metals in the environment, in conjunction with the Minerals and Metals Sector, and climate change, in cooperation with the Energy Sector.

In order to ensure the comprehensive representation of client requirements, ESS has recently established the Minister's National Advisory Board on Earth Sciences. The Board will advise the Minister of Natural Resources on the scientific and program directions of the Sector.

Strategic alliances with other governments and partners are essential in the current operating environment. Through the National Geological Surveys Committee, the Geological Survey of Canada is implementing the Inter-governmental Geoscience Accord with provinces and territories to ensure effective use of scarce public geoscience funds. The Earth Sciences Sector will collaborate with other governments, through the Inter-Agency Committee on Geomatics and the Canadian Council on Geomatics, to build the Canadian Geospatial Data Infrastructure (CGDI). Once implemented, CGDI will form a national network providing simplified, consistent and effective access to geographical information maintained by public agencies throughout Canada. It will provide and promote the use of geographical information in support of political, economic, social and personal decision-making by Canadians. For example, GeoExpress, a CGDI component developed within NRCan, provides easy access to geo-referenced data and will be proposed to other departments as a model for easy access to federally held data. Several provinces have already confirmed their interest in GeoExpress and CGDI.

Geomatics Canada has already signed Memoranda of Understanding with seven provinces in the cooperative development of satellite-based positioning. Other mechanisms at the federal level are being developed to help ensure earth sciences input to key questions of the day. For example, a northern S&T strategy is being written to guide the federal science presence in northern Canada, and the science challenges of sustainable development are being addressed in the context of a Memorandum of Understanding between the four federal natural resource departments, specifically NRCan, Agriculture and Agri-food, Environment, and Fisheries and Oceans.

The Canadian geomatics industry has enjoyed rapid growth and strong, collaborative relations with Geomatics Canada. This relationship was formalized in 1994 with the adoption of a series of guidelines that clearly define the role of Geomatics Canada in supporting its industry partners. Each year, Geomatics Canada contracts-out more than \$32M of its surveying, mapping and remote sensing requirements to industry. Despite the need to meet Program Review resource reduction requirements, contracting-out, as a major method of program delivery, remains a Sector strategic objective. In FY 1997/98, the Sector's annual Contracting-Out Bulletin, in addition to providing information regarding Geomatics Canada contracting-out requirements, will, for the first time, include contracting-out information concerning the Geological Survey of Canada, the Polar Continental Shelf Project and the ESS Policy, Planning, Information and Services Branch. The Sector's FY 1997/98 contracting-out commitment will total more than \$44M.

The Earth Sciences Sector recognizes the importance of maintaining strong relations with northern communities. The GSC, for example, is reaching out to northern residents to explain its science program and, in turn, to better understand northern geoscience needs. The Polar Continental Shelf Project (PCSP) will continue to provide logistical support to Canadian and international researchers in Canada's north, maintaining close links to its clients and to northern communities.

Market Opportunities

Canada has a significant natural resource advantage. It is recognized as a world leader in hydrocarbon, mineral, and forest development.

From this strong domestic base, Canadian resource-related industries are capturing major shares of growing world markets. The geoscience consulting and survey industry and the geomatics industry are primary clients of ESS. The Sector plays a major role in assisting these industrial sectors to expand globally. An ESS International Business Strategy is being developed that will support this activity. Key components include the showcasing of Canadian earth sciences technology at major world conferences and trade shows including those of the Fédération Internationale des Géomètres (FIG), the International Cartographic Association (ICA) and the International Society for Photogrammetry and Remote Sensing (ISPRS), as well as support to trade missions both to and from client nations, the provision of training and support regarding technology transfer, and potential partnering with a new Canadian geomatics business network consortium. Sector support also includes chairing the National Sector Team on Information Technology and Transfer, a component of the Canadian International Business Strategy.



Like many other federal organizations, ESS is taking a more business-like approach to its activities. This approach is reflected in increased collaboration with private sector partners. Current Sector contributions to the Foreign Direct Investment Program include initiatives such as promoting investment in the search for hydrocarbon and new mineral resources in Canada by highlighting the latest geoscience results at important meetings of the exploration industry; for example, those held by the Prospectors and Developers Association of Canada, Canadian Society of Petroleum Geologists/Canadian Society of Exploration Geologists annual meetings, and the Cordilleran Roundup. In addition, the Sector contributes a geological perspective on exploration opportunities in Canada to investment promotion seminars organized by NRCan's Minerals and Metals Sector.

Funding Sources

In its 1995 and 1996 Budget Speeches, the Government of Canada announced significant reductions in public spending. In order to meet client requirements and government priorities and because of the need to create new market opportunities, the Sector fosters a strong relationship with its stakeholders through the signing of cost-sharing agreements and joint project development. The following table summarizes the funding the Sector receives through appropriation, the sale of goods and services (through either the Revolving Fund or vote netting) and from other government departments or external clients in support of joint projects. Except for appropriation from Parliament for the three-year planning period, the following financial figures represent targets for Sector managers to achieve, and are presented on a cash basis.

Earth Sciences Sector Funding Mechanisms

	1996/97	1997/98	1998/99	1999/00
Appropriation from Parliament	163 773	142 292	136 243	137 008
Vote netting	1 120	2 000	2 200	2 500
Revolving Fund	17 120	17 194	16 812	15 409
Joint projects with external parties	6 700	5 000	5 500	6 000
Joint projects with other federal departments	14 400	13 000	14 000	15 000
Total (\$ 000)	203 113	179 486	174 755	175 917

Earth Sciences Sector Appropriation by Major Category of Expenditures

	1996/97	1997/98	1998/99	1999/00
Salary	77 893	68 642	67 701	68 224
Employee Benefit Plan	11 294	11 669	11 509	11 597
Operating & Maintenance	58 623	46 691	42 345	42 499
Capital	14 843	14 186	13 584	13 584
Grants & Contributions	1 120	1 104	1 104	1 104
Total (\$ 000)	163 773	142 292	136 243	137 008
Full Time Equivalent (FTE) Employees	1 503	1 309	1 263	1 263

NRCan Priorities and Policy Goals

The Sector develops and delivers its programs in response to its mandate from government and the needs of its clients. The following NRCan priorities and policy goals, as outlined in the Department's 1996/1999 Business Plan, respond to the challenges of implementing the government's priorities of sustainable development and good governance.

Priority: Sustainable development: a prosperous economy, a healthy environment, stable communities, and a sustainable future.

Policy Goals:

- To integrate economic, environmental and social factors into Canadians' decisions regarding natural resources;
- To extend the potential for economic growth and job creation based on the sustainable development of Canada's natural resources;
- To encourage efficient resource development and use, and to minimize the environmental impacts of resource development;
- To work with Canadians to achieve Canada's international climate change commitments; and
- To maintain and expand access to foreign markets for resource-based products, technologies, and services.

Priority: Good governance: supporting the economic and social union and stakeholders.

Policy Goals:

- To deliver federal responsibilities in partnership with provincial and territorial governments, and stakeholders;
- To help Aboriginal communities manage their natural resources;
- To protect the health and safety of Canadians; and
- To provide information on the Canadian land and resources needed for informed decision making.

NRCan Business Lines

The Earth Sciences Sector provides service to Canadians through NRCan's four key business lines.

Policies and Regulations

Ensure that federal policies and regulations will foster resource-based contributions to Canada's economy, while protecting the environment and the health and safety of Canadians.

Science and Technology

Conduct leading-edge science to generate and transfer the ideas, knowledge, and technologies that Canada needs to use its resources wisely and efficiently, reduce costs, protect the environment, and help Canadians create new products and services.

The Geological Survey of Canada led a multi-million dollar international gas hydrates program involving several Japanese institutions, the United States and the University of Alaska.

Knowledge Infrastructure

Build a national knowledge infrastructure on Canada's land and resources, providing Canadians with easy access to the latest economic, environmental, and scientific information from a variety of sources.

International Activity

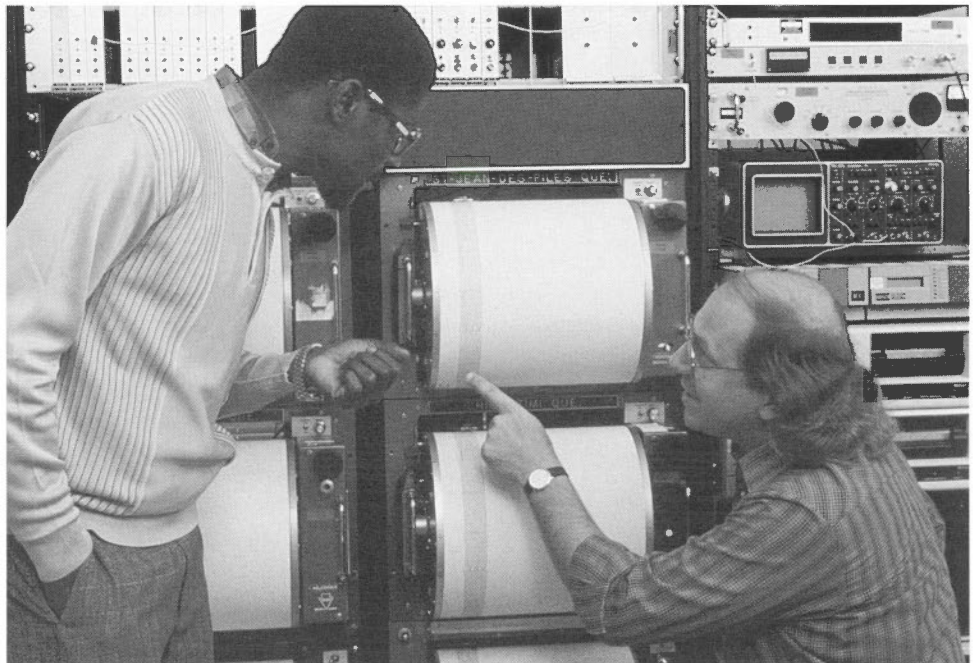
Promote Canada's international interests, in cooperation with international agencies and other nations, in order to meet Canada's commitments regarding natural resources and to maintain access to global markets for Canadian products, technologies, research, and services.

It should be noted that for administrative and accountability purposes, there are three additional business lines in the department: specifically, Corporate Management and Administration, Geomatics Canada Revolving Fund (addressed in more detail in Section 3 of this Business Plan) and Sunset/Special Programs.

The following table presents ESS funding by business lines:

Earth Sciences Sector Funding by NRCan Business Lines

	1996/97	1997/98	1998/99	1999/00
Policies and Regulations	12 096	10 562	10 470	10 675
Science and Technology	58 617	48 591	47 929	48 957
Knowledge Infrastructure	128 223	116 340	112 491	112 634
International Activities	4 177	3 993	3 865	3 651
Total (\$ 000)	203 113	179 486	174 755	175 917



2 Earth Sciences Sector: Objectives, Deliverables and Performance Measures

The following financial tables present funding for the four major Earth Sciences Sector organizational components:

Earth Sciences Sector Funding by Major Component

	1996/97	1997/98	1998/99	1999/00
Geomatics Canada	103 630	92 080	89 407	89 328
Geological Survey of Canada	77 051	66 222	64 680	65 768
Polar Continental Shelf Project	4 673	3 675	3 569	3 594
Corporate Services	17 759	17 509	17 099	17 227
Total (\$ 000)	203 113	179 486	174 755	175 917

Line Branches and Divisions

Geomatics Canada

Geomatics Canada programs play an integral role in underpinning federal government key policy objectives, including knowledge infrastructure, promotion of jobs, support of sustainable development, and health and safety issues. They provide support to a wide range of activities of national interest, including the maintenance of 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, Global Positioning System (GPS) technology and remote sensing applications.

Geomatics Canada's programs are delivered by:

- **Geodetic Survey Division**

The primary role of the Geodetic Survey Division is to establish the Canadian Spatial Reference System (CSRS), and to maintain and improve it in accordance with changing client needs and as surveying and positioning technologies evolve. This national infrastructure and related standards are fundamental for ensuring the compatibility of spatially referenced information from various federal, provincial, municipal and private sources. From geomatics and navigation to natural resource management and the environment, they allow spatial information to be exchanged and merged in a seamless manner.

- **Legal Surveys and International Boundary Commission**

Under the Canada Lands Surveys Act and other related legislation, the Surveyor General and the Legal Surveys Division are responsible for the Canada Lands Survey System. This 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 Legal Surveys Division, under international treaties and legislation through the International Boundary Commission, is responsible for maintaining the boundary between Canada and the United States, in partnership with its American counterparts.

- **Canada Centre for Remote Sensing**

The Canada Centre for Remote Sensing (CCRS) is responsible for the provision of a national service for the reception, processing, archiving and dissemination of remotely sensed data for Canada and, in conjunction with the private sector, for the development of remote sensing technology and applications. CCRS is participating, in partnership with other departments, in the development of the Canadian Geospatial Data Infrastructure (CGDI) for network distribution of remote sensing and other geographical data bases. CCRS is also working with industry to develop geographic information systems (GIS) applications. The Centre's National Atlas team provides an authoritative national summary of integrated Canadian geographical information for decision-makers, educational institutions and the general public.

- **Mapping Services Branch**

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

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

In addition to these principal activities the Mapping Services Branch 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.

Geomatics Canada is assisting Canadian firms in the pursuit of over \$4 billion in international projects in the Middle East, South East Asia, South America and Eastern Europe with the assistance of the Sector's Business Development team. Geomatics Canada provided support to a Canadian consortium led by Terra Surveys Limited in winning a contract to prepare digital maps of Riyadh, the capital city of the Kingdom of Saudi Arabia.

Geomatics Canada Funding Mechanism

	1996/97	1997/98	1998/99	1999/00
Appropriation from Parliament	72 110	62 186	58 895	59 219
Vote netting	0	0	0	0
Revolving fund	17 120	17 194	16 812	15 409
Joint projects with external parties	1 300	1 000	1 100	1 200
Joint projects with other federal departments	13 100	11 700	12 600	13 500
Total (\$ 000)	103 630	92 080	89 407	89 328

The Geological Survey of Canada

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

GSC delivers its research under five broad programs: Bedrock and Surficial Geoscience, Marine Geoscience, Hydrocarbon Geoscience, Minerals Geoscience, and Geological Hazards and Environmental Geoscience. 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.

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 (Ontario), and GSC Pacific with offices in Sidney and Vancouver (British Columbia), and in Ottawa.

- **Continental Geoscience Division**

The Continental Geoscience Division provides comprehensive knowledge on 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, as well as geochronology and paleomagnetism studies to unravel time and space dimensions of earth history. The Division also contributes to the national geoscience infrastructure through developing methodology 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 that constitute the National Geochemical Reconnaissance, and multi-parameter airborne geophysical surveys. As well, it provides information relating to the natural distribution of environmentally significant elements.

The Polar Continental Shelf Project has received high marks for providing quality service to its clients. In the first of what will be an annual client survey, scientists from federal and territorial government agencies, universities and foreign research organizations that used PCSP's logistics services in 1996 expressed an overall high degree of satisfaction with virtually all services provided.

- **GSC Pacific**

GSC Pacific is responsible for investigating and reporting on geoscience data for the Canadian Cordillera. Within the Energy Program, GSC Pacific leads an initiative to evaluate the resource potential of off shore gas hydrates. The Division is also responsible for the national seismological and geomagnetic observatories, as well as for research on earthquakes, magnetic hazards, and west coast seabed natural hazards.

Sedimentary and Marine Geoscience Branch

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

- **Terrain Sciences Division**

The Terrain Sciences Division provides comprehensive knowledge of the surficial deposits and landforms of the Canadian landmass. Current activities include the hydrogeological study of key Canadian aquifers, research on permafrost, and environmental geochemistry. The Division also provides geoscience information on natural and human-induced geological processes and hazards that affect the Canadian landmass, and which may adversely affect public health and safety, resource development, or the environment.

Additionally, by monitoring contemporary 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, which may affect the Canadian landmass.

- **GSC Atlantic**

GSC Atlantic carries out coastal and off shore geoscientific surveys and provides expert geological, geochemical and geophysical information on the coastal zone, seabed, off shore 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 off shore 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 to collaborate on projects, spanning the many disciplines of the earth sciences, together with researchers from universities, provincial governments and private corporations. This collaboration among the 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, its 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 on the geology and resource potential of the sedimentary basins of western and northern mainland Canada, the Arctic Islands and adjacent off shore 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, it leads the Survey's hydrogeology initiative.

Geological Survey of Canada Funding Mechanism

	1996/97	1997/98	1998/99	1999/00
Appropriation from Parliament	69 341	59 122	56 900	57 218
Vote netting	1 010	1 800	1 980	2 250
Revolving fund	0	0	0	0
Joint projects with external parties	5 400	4 000	4 400	4 800
Joint projects with other federal departments	1 300	1 300	1 400	1 500
Total (\$ 000)	77 051	66 222	64 680	65 768

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 contributes 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, including the assessment of fish stocks and migration patterns of mammals that affect hunting and fishing economies.

As government agencies move toward development of a *Northern Science and Technology Strategy* to more effectively coordinate research priorities and programs, PCSP serves as an excellent example of the cost-effectiveness and efficiencies resulting from coordinating efforts in northern research. It does this as chair of the logistics sub-group of the Interdepartmental Working Committee on Northern S&T, and through its ongoing leadership in the delivery of coordinated logistics support for northern research groups.

PCSP supports not only government and university research in the Arctic, but also community-based traditional knowledge studies, research programs that integrate a component of traditional aboriginal knowledge, and programs conducted by resource co-management boards established under land claims agreements. PCSP also provides services to non-Canadian research groups on a cost-recovery basis.

New procedures to utilize RADARSAT data for ice monitoring have been developed jointly between the Canada Centre for Remote Sensing and the Canadian Ice Centre of Environment Canada. This has allowed the Ice Centre to radically change how it acquires information on ice conditions in Canadian waterways. The use of these data has resulted in savings of approximately \$6M per year.

PCSP contributes an average of \$1.5 million annually to the northern economy by contracting-out services and purchasing supplies from northern companies, many of which are aboriginal-owned and operated.

PCSP promotes partnerships with its scientific client groups through formal and informal joint venture activities, and seeks to maximize use of its resources by extending its services through recovery of expenditures from partners and clients.

Polar Continental Shelf Project Funding Mechanism

	1996/97	1997/98	1998/99	1999/00
Appropriation from Parliament	4 673	3 675	3 569	3 594
Vote netting	0	0	0	0
Revolving fund	0	0	0	0
Joint projects with external parties	0	0	0	0
Joint projects with other federal departments	0	0	0	0
Total (\$ 000)	4 673	3 675	3 569	3 594
Recoverable expenditures from partners & clients	2 700	2 000	2 200	1 700

Objectives, Deliverables and Performance Measures

This section of the Business Plan describes Earth Sciences Sector objectives, deliverables and performance measures as they relate to government priorities and to NRCAN policy goals and business lines. Numbers in parentheses e.g. (7) in the following tables indicate ESS branches/divisions/centres 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
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)

Sustainable Development — Policy Goal 1:

to integrate economic, environmental and social factors into Canadians' decisions regarding natural resources.

The sustainable development of Canada's natural resources requires a comprehensive decision-making process capable of integrating economic, environmental and social dimensions based on the best scientific advice. The Earth Sciences Sector provides an earth sciences knowledge base which is an integral part of this decision-making process.

Strategy

The Earth Sciences Sector's strategy to achieve this goal is to:

- Conduct comprehensive geoscience mapping programs;
- Interpret the environmental impact of resource development on environmentally sensitive areas;
- Support initiatives in Canada's northern regions; and
- Create an easily accessible knowledge base.

Business Line: Knowledge Infrastructure

Objective	Deliverables: Year 1	Deliverables: Years 2 & 3	Performance Measurements
To improve knowledge of resources, the environment and northern cultures in the Arctic.	The provision of support to research into determining the environmental impacts and effects on northern cultures of economic development of northern renewable and non-renewable resources, carried out by OGDs and universities. (12)	The provision of support to research into determining the environmental impacts and effects on northern cultures of economic development of northern renewable and non-renewable resources, carried out by OGDs and universities. (12)	Cost-shared joint projects with clients. Recognition of the impact of development on northern culture.



Business Line: Knowledge Infrastructure (cont'd)

Objective	Deliverables: Year 1	Deliverables: Years 2 & 3	Performance Measurements
To facilitate the access and integration of data relevant to the Canadian land-mass in support of the sustainable development of natural resources.	<p>GeoExpress (CGDI) becomes fully operational with links to relevant data suppliers. (10,15)</p> <p>In support of the four natural resource (4NR) departments' MOU, facilitate the 4NR departments' working together, sharing data, and communicating 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. (10,15)</p> <p>Complete bilateral Memoranda of Understanding with provincial geomatics agencies. (14)</p>	<p>Ongoing activity. (14)</p> <p>Complete bilateral Memoranda of Understanding with provincial geomatics agencies. (14)</p> <p>Key views from data bases held by the Energy Sector and the Minerals Statistics Branch will be incorporated into the Geological Atlas of Canada. (10)</p> <p>New spatial models will be developed for energy consumption in Canada. (10)</p>	<p>Participation of all NRCan sectors and other government departments.</p> <p>Endorsement of Inter-Agency Committee of Geomatics (IACG), Canadian Council of Geomatics (CCOG) and National Geological Surveys Committee (NGSC).</p> <p>Support of value-added industry.</p> <p>Increased awareness and support of natural resource issues through client feedback.</p> <p>Increased joint information activities of the four natural resource departments.</p>

Business Line: Knowledge Infrastructure (cont'd)

Objective	Deliverables: Year 1	Deliverables: Years 2 & 3	Performance Measurements
To increase knowledge and understanding of the surficial geology of the Canadian landmass required for sustainable development.	<p>Develop national standards for compilation and release of surficial geology, geo-chronological, hydrogeological and urban geological data. (4,5,6,15)</p> <p>Complete final report on the Lake Winnipeg project. (1,4,5)</p> <p>Complete reporting on Greater Toronto Area hydrogeology project. (5)</p> <p>Continue data collection and modelling for Laurentian Piedmont and southern Manitoba hydrogeology projects. (2,5)</p> <p>Maps and synthesis reports from surficial geology mapping. (2,5)</p> <p>Implement surficial geoscience components of new NATMAP projects: Western Superior, Western Churchill and Winnipeg Region, and design Yukon project. (5)</p>	<p>Continue data collection and modelling for Laurentian Piedmont and southern Manitoba projects. (2,5)</p> <p>Development of a methodology for mapping aquifers. (2,5)</p> <p>Maps and synthesis reports from surficial geology mapping and NATMAP projects across Canada. (2,5)</p> <p>Continue to develop national standards for compilation and release of geoscience data, in cooperation with other divisions and clients. (4,5,6)</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 base to the private sector.</p> <p>Increased understanding of deformed sedimentary rocks in western and northern Canada, leading to increased hydrocarbon exploration in these areas, and land claim issues in Nunavut and the western Arctic.</p> <p>Increased demand for surficial geology information and collaboration.</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>

Sustainable Development — Policy Goal 2:

to expand the potential for economic growth and job creation based on sustainable development of Canada's natural resources.

The minerals and energy resource sectors contribute approximately 10 percent of Canada's Gross National Product (GNP), and employ some 400 000 Canadians. The sustainability of these industries is only possible by identifying future areas for development in order to attract the investment required to support them.

Strategy

The Earth Sciences Sector's strategy to achieve this goal is to:

- Conduct comprehensive and targeted geoscience mapping programs;
- Produce assessments of mineral and hydrocarbon potential;
- Provide information on potential resource prospects;
- Develop applications using remote sensing and geoscience technologies; and
- Provide a sound modern geospatial reference system including a consistent survey framework.

Business Line: Science and Technology

Objective	Deliverables: Year 1	Deliverables: Years 2 & 3	Performance Measurements
To develop, test and use new technology for the acquisition, processing and interpretation of geoscience data required to foster sustainable energy and mineral development.	Develop innovative geophysical instrumentation technologies, data processing and interpretation techniques for determining earth structures. (6,7)	Evaluate, in selected mining camp experiments, new instrumentation to assist in the detection of ore bodies. (6,7)	Technology transfer to industry and provincial and territorial governments. Identification of ore bodies at depths up to 3 km.
To develop new methods, algorithms and applications for the information-rich high spatial resolution and hyperspectral earth observation (EO) data.	Transfer of geometric correction capability for high resolution data to industry. (10) Demonstration of the use of high spatial resolution and hyperspectral data for local environment management and monitoring, and for precision farming applications. (10)	Development of an industrial capability to use EO data for land-use change mapping, precision farming and environment assessment. (10) Transfer of tools for data generalization, abstraction and multi-scale representation to industry and operational users. (10)	Use of high spatial resolution data for large scale cartographic applications. CCRD participation in future international hyperspectral programs. Use of high spatial resolution satellite data by Canadian industry.

Business Line: Science and Technology (cont'd)

Objective	Deliverables: Year 1	Deliverables: Years 2 & 3	Performance Measurements
To develop systems for extraction of information from earth information data.	Design and specifications of prototype processor for general desk-top use to allow ready user access to corrected earth observation imagery. (10) Development and delivery of precision processors for RADARSAT data. (10)	Development and delivery of desk-top processor for earth observation imagery. (10)	Increased data sales. Integration of processor by industry into existing image analysis systems on the market.
To provide financial and technical contributions to projects proposed by the Canadian geomatics industry.	Provide funding for five to seven projects proposed by Canadian industry. (10)	Funding of five to seven projects proposed by Canadian industry. (10)	Commercial success.
To develop and operate a modern spatial reference infrastructure using active control technologies and advanced geodetic concepts.	Complete the Canadian Active Control System (CACS) incorporating GSD's most advanced geodetic concepts to facilitate global geodetic surveying and mapping, and precise real-time georeferencing and navigation for the Canadian landmass and adjacent regions. (8)	Improve the accuracy and delivery of CACS services, and implement global real-time operations interfaces. (8)	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 1997. Increased accuracy and productivity by private sector.



Business Line: Knowledge Infrastructure

Objective	Deliverables: Year 1	Deliverables: Years 2 & 3	Performance Measurements
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>Release maps and reports from current bedrock geoscience studies, including NATMAP projects, in the Grenville, Superior, Churchill and Slave Provinces of the Canadian Shield. (2,6)</p> <p>Appalachians and St. Lawrence Basin of eastern Canada (1,2,3,6); Western Canada Sedimentary Basin (WCSB) and the Cordillera of western Canada. (3,4)</p> <p>Define the deep structure and physical properties of the earth's crust along the Alberta Basement, ECSOOT and SNORCLE Lithoprobe transects. (1,3,6)</p> <p>Release of a geochronology-isotope data base for the Canadian Shield. (6)</p> <p>Release maps and data of multi-parameter airborne geophysical surveys for regional and targeted mining area studies. (6,7,4)</p> <p>Provide chemical and mineral analyses as an essential component of geological mapping and mineral exploration research. (7)</p>	<p>Release maps and reports from current bedrock geoscience studies, including NATMAP projects, in the Grenville, Superior, Churchill and Slave Provinces of the Canadian Shield. (2,6)</p> <p>Appalachians and St. Lawrence Basin of eastern Canada (1,2,3,6); Western Canada Sedimentary Basin (3); Cordillera of western Canada (3,4); Arctic Islands. (3)</p> <p>Investigate the deep lithospheric structure and physical rock properties in parts of the Canadian Shield (W. Superior) and Cordillera (SNORCLE). (3,4,6)</p> <p>Release of geochronology-isotope data base for all of Canada. (6)</p> <p>Release additional maps and data bases of magnetic and gravity parameters over selected regions of Canada. (6)</p> <p>Release provincial-scale compilations of airborne radiometric survey data. (7)</p>	<p>Increased scientific understanding of the geological evolution of Canada.</p> <p>Increased level of mineral exploration stimulated by research results.</p> <p>Successful development of partnerships with provinces and territories under bilateral geoscience accords.</p> <p>Knowledge transfer by client/stakeholder requests for information, workshops, etc.</p> <p>Cost-sharing joint ventures with private industry and promotion of exploration activity, emulation of GSC data base methods by provincial and territorial agencies and universities.</p> <p>Successful transfer of GSC field log software and GIS/data management methods to industry and foreign geological survey agencies.</p>

Business Line: Knowledge Infrastructure (cont'd)

Objective	Deliverables: Year 1	Deliverables: Years 2 & 3	Performance Measurements
To provide fundamental knowledge of the composition, structure and evolutionary history of the bedrock underlying Canada, required to foster potential sustainable energy and mineral resource development. (cont'd)	<p>Develop national standards for compilation and release of geoscience data in digital format. (6,15)</p> <p>Publish regional metallogenic maps in association with bedrock mapping projects in NWT. (7)</p> <p>Release of comprehensive regional digital geoscience data bases, compiled from current and archived information for parts of the Canadian Shield and Cordillera. (4,6)</p>	<p>Implement new laboratories business plan to ensure cost effective provision of data. (7)</p> <p>Improve digital data compatibility between GSC field parties and cartography unit. (6,15)</p> <p>Carry out gravity surveys in association with major bedrock and surficial geoscience mapping programs. (6)</p> <p>Release of comprehensive regional digital geoscience data bases for parts of the Canadian Shield, Appalachians and Cordillera Regions. (3,4,6)</p>	Focus of exploration activities in accordance with GSC research.
To provide fundamental information on the nature and distribution of surficial deposits across Canada to foster mineral exploration.	<p>Reports on advances in mineral exploration methods during the last decade. (5)</p> <p>Reports on drift prospecting in Nova Scotia, Newfoundland, Ontario, Quebec, British Columbia and the Prairies. (2,5)</p> <p>Report on exploration methods for diamonds in the Slave Province. (5)</p> <p>Finalize outputs related to the eastern Canada Mineral Development Agreements. (MDAs) (2)</p> <p>Release maps and reports from regional geochemical surveys of lakes, streams and vegetation to assist in mineral exploration. (7)</p>	<p>Synthesis report on drift prospecting methods for diamonds. (2,5)</p> <p>Release maps and reports from regional geochemical surveys, hydrography, and vegetation to assist in mineral exploration. (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 base to the private sector.</p> <p>Increased understanding of deformed sedimentary rocks in western and northern Canada, leading to increased hydrocarbon exploration and land use and claims issues in Nunavut and the western Arctic.</p> <p>Increased demand for surficial geology information.</p>

Business Line: Knowledge Infrastructure (cont'd)

Objective	Deliverables: Year 1	Deliverables: Years 2 & 3	Performance Measurements
To enhance geoscientific knowledge of Canada's sedimentary basins and elucidate disposition and quality of hosted hydrocarbon endowments.	<p>Release natural gas assessment reports for the mid-Cretaceous and Foothills realms of the Western Canada Sedimentary Basin. (WCSB) (3)</p> <p>Publish initial reports on the quality of selected Canadian coal deposits and the coal-bed methane potential of selected sub-surface resources. (3)</p>	<p>Finalize and release an assessment of the conventional oil potential for the WCSB. (3)</p> <p>Finalize and release the Phase 1 data base of Canadian coal resources. (3)</p> <p>Establish the prospectiveness of selected CBM targets, with industry, focusing on gas utilization for northern communities. (3)</p>	<p>Increased exploration efficiency in the petroleum industry.</p> <p>Improved mining efficiency and emissions management in the coal industry.</p> <p>Diversified coal use in Canada.</p>
To enhance scientific knowledge of Canada's mineral deposits, and to develop new concepts and guidelines for exploration.	<p>Continue EXTECH II project to enhance exploration in Bathurst mining district. (6,7)</p> <p>Publish new models and data bases on type mineral deposits in Canada. (2,7)</p>	<p>Complete the EXTECH II project to contribute to the sustained development of the Bathurst Mining Camp, New Brunswick. (6,7)</p>	<p>Enhanced collaboration and cost-sharing between OGDs, provincial and territorial agencies, industry and academia.</p>
To maintain the integrity of the survey framework to an acceptable level on Canada Lands.	<p>Issue of contracts to repair the survey framework based on the available level of resources. (9)</p>	<p>Issue of contracts to repair the framework, based on the available level of resources. (9)</p>	<p>Surveys can continue to be carried out in a timely and cost-effective manner.</p>
To develop new applications and help Canadian industry utilize and commercialize active control technologies in Canada, and abroad.	<p>Technology transfer to industry and government agencies for utilization of the active control products and user support services. (8)</p> <p>New applications and products based on the active control system. (8)</p>	<p>Technology transfer and development of Canadian Active Control System (CACS) applications and products. (8)</p>	<p>Acceptance and wide use of the Canadian Active Control System (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>Development of CACS applications in support of atmospheric monitoring.</p>

Sustainable Development — Policy Goal 3:

to encourage efficient resource development and use, and to minimize the environmental impacts of resource development.

New processes, practices, products and energy sources that generate fewer pollutants and waste products need to be developed, thereby creating new business opportunities based on sustainable development in order to reduce environmental impact.

These new practices not only reduce environmental risks and conserve resources, but also reinforce economic benefits by reducing costs and creating market potential through the development of “green products.”

Strategy

The Earth Sciences Sector strategy to achieve this goal is to:

- Develop remote sensing technologies directed toward environmental management; and
- Use geoscience in environmental impact assessment.

Business Line: Science and Technology

Objective	Deliverables: Year 1	Deliverables: Years 2 & 3	Performance Measurements
To develop applications and systems for the extraction of earth observation data, emphasizing RADARSAT data, directed toward sustainable development and environmental management.	<p>Completion of pilot projects with end-users demonstrating the value of RADARSAT data for improved mapping and monitoring of land and water resources, and mineral and hydrocarbon exploration. (10)</p> <p>Training material developed and delivered in cooperation with industry, promoting the operational use of RADARSAT. (10)</p> <p>Demonstration of RADARSAT for ship detection. (10)</p> <p>Develop an international project with NASA, ESA and NASDA to monitor global deforestation. (10)</p>	<p>Demonstration of RADARSAT for tropical forest applications and technology transferred to the value-added industry. (10)</p> <p>Demonstration of RADARSAT for rice crop monitoring and mitigation of natural disasters. (10)</p> <p>Demonstration of interferometric SAR for the extraction of spatial dynamic and thematic information. (10)</p> <p>Start implementation with RADARSAT and EO satellite data. (10)</p>	<p>Examples of RADARSAT applications available on the CCRS WWW site.</p> <p>Transfer of new advanced technology to Canadian industry.</p> <p>An enhanced industrial training competence and capability in radar.</p> <p>Export of industrial radar capability to new foreign markets.</p> <p>Global statistics in forest cover partnership with the Canadian Forest Service.</p>

Business Line: Knowledge Infrastructure

Objective	Deliverables: Year 1	Deliverables: Years 2 & 3	Performance Measurements
To increase the use of geoscience information in environmental impact reviews.	Complete reviews of environmental impact assessments for NRCan. (1-7)	Complete reviews of environmental impact assessments for NRCan. (1-7)	Earth Sciences Sector expertise recognized and funded by OEA.



Sustainable Development — Policy Goal 4:

to work with Canadians to achieve our international climate change commitments.

Climate change is an important Canadian issue. An estimated 87 percent of Canada's anthropogenic releases of greenhouse gases are energy related.

Canada, along with 152 other nations, is a signatory to the international convention on climate change. The convention commits these nations to the stabilization of their greenhouse emissions at 1990 levels by the year 2000.

The Sector must work in cooperation with federal, provincial and local governments in providing the knowledge base needed to develop a coordinated response to climate change issues.

Strategy

The Earth Sciences Sector strategy to achieve this goal is to:

- Provide, in partnership with other agencies, the knowledge base needed to support research to increase the understanding of climate change and its potential impact.

Business Line: Science and Technology

Objective	Deliverables: Year 1	Deliverables: Years 2 & 3	Performance Measurements
To develop new approaches to apply spaceborne medium resolution EO data for the sustainable development of natural resources and the monitoring of global climate change.	<p>Demonstration of techniques for the characterization of regional and national ecosystems in collaboration with CFS. (10)</p> <p>Basic studies on the role of clouds and aerosols in the earth's climate. (10)</p> <p>Development of advanced inversion algorithms for developing high level geophysical, geological and geochemical products for use in climate and ecosystem models. (10)</p>	<p>Demonstration of the use of remote sensing techniques for modelling and assessing the impact of climate change on ecosystems. (10)</p> <p>Demonstrations of the use of EO data in solar radiation budget studies. (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 GHG cycles and forest ecosystem trends.</p>

Business Line: Knowledge Infrastructure

Objective	Deliverables: Year 1	Deliverables: Years 2 & 3	Performance Measurements
To make informed decisions on climate change issues through the assessment of the impact of global warming.	<p>The provision of surficial and marine knowledge bases by:</p> <p>Contributing to reports describing environmental conditions in Canada at 1000-year intervals through the late Pleistocene and Holocene. (1,5)</p> <p>Reports on Saanich Inlet drilling to determine paleoclimates. (4)</p> <p>Reports on distribution of gas hydrates on the Pacific Continental Shelf. (4)</p> <p>Complete reports on the impact of climate change in the Mackenzie River Basin and High Arctic. (5)</p> <p>Preliminary models to predict impact of storms, storm surge and sea-level rise on Canada's east coast. (1)</p>	<p>Develop high resolution models of Holocene climate in Saanich Inlet, reconstructed from Ocean Drilling Program (ODP) cores. (1)</p> <p>Maps and data analysis of vulnerable shorelines on the north coast of Prince Edward Island. (1)</p> <p>Complete interactive CD-ROM on the impact of climate change in the Palliser Triangle. (5)</p>	<p>Outputs used to test general circulation models and assess impacts of future changes.</p> <p>Improved Integrated Coastal Zone Management (ICZM) in Atlantic Canada.</p> <p>Leadership role in defining follow-up studies with federal and university partners.</p> <p>Influence both within and outside the department on policy development related to greenhouse gas emissions.</p>

Sustainable Development — Policy Goal 5:

to maintain and expand access to foreign markets for resources-based products, technologies and services.

Canada's geoscience and geomatics industries can benefit from unfettered access to international markets. The Sector is working with other international development departments and agencies to provide the necessary expertise to support this market sector.

Strategy

The Earth Sciences Sector's strategy to achieve this goal is to:

- Promote the export of Canadian earth sciences products and capabilities through the Canadian International Business Strategy; and
- Work with foreign and domestic agencies to market Canadian expertise.

Business Line: Science and Technology

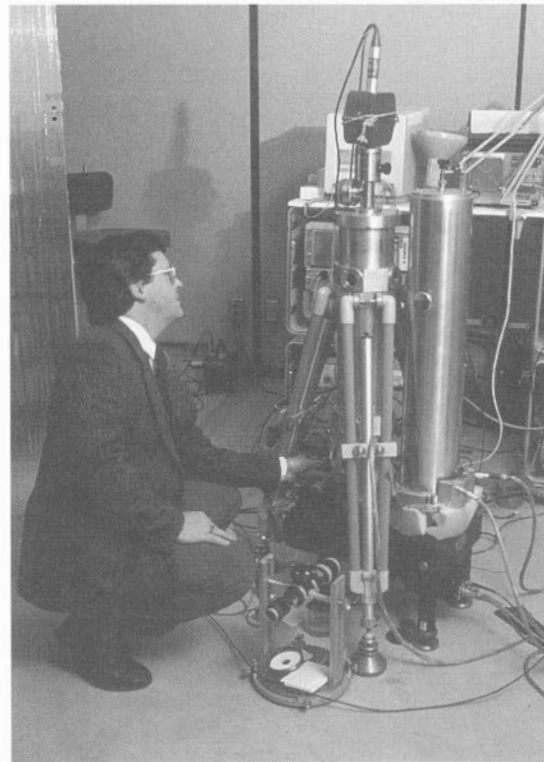
Objective	Deliverables: Year 1	Deliverables: Years 2 & 3	Performance Measurements
To maintain linkages with international services (IGS, IERS, IGeS and IGB) and foreign government institutions in geomatics and global geodynamics.	Active participation in the IGS, IERS, IGeS and IGB to maintain and enhance international terrestrial reference system standards. (8)	Continue active participation in international agencies and enhance related products. (8)	Contribute GPS, VLBI and gravity data from Canadian stations. Coordinate IGS Analysis Centres.

Business Line: International

Objective	Deliverables: Year 1	Deliverables: Years 2 & 3	Performance Measurements
To enhance the capabilities of geoscience agencies in emerging nations.	<p>Implement the Multi-national Andean Project (MAP) to provide fundamental geoscience data over parts of Argentina, Bolivia, Chile and Peru. (4)</p> <p>Carry out a joint project with the government of Brazil to upgrade its sustainable development capabilities. (7)</p> <p>Develop COASTPLAN case studies for ICZM in South East Asia through participation in CCOP and its COASTPLAN roving seminars and task force activities. (1)</p> <p>Continue China exchange program through D&S Consultants, and initiate new subcontracted joint project with the Chinese National Petroleum Company (CNPC) and related institutes. (3)</p> <p>Drilling of joint GSC-USGS-Japan gas hydrates test wells and continued multi-partnered lab investigations. (5)</p>	<p>Provide workshops and training for geoscience data acquisition and interpretation to governments participating in MAP. (6,7)</p> <p>Complete transfer of technology to Brazilian federal agencies, industry and universities. (7)</p> <p>Transfer Canadian Coastal Information Mapping System to CCOP COASTPLAN, implement demonstration case study with Canadian industry and member country input. (1)</p> <p>Perpetuate China joint projects. (3)</p> <p>Complete final reports on test wells. (5)</p>	<p>Successful transfer of Canadian technology and expertise.</p> <p>Adoption of some of GSC's best practices by MAP participants.</p> <p>Delivery of products on time and within budget.</p> <p>Expanded opportunities for Canadian business in China.</p> <p>International recognition of Canada's role and expertise in coastal zone management and sustainable development of gas hydrates.</p>

Business Line: International (cont'd)

Objective	Deliverables: Year 1	Deliverables: Years 2 & 3	Performance Measurements
To help Canadian industry develop global markets for active control technologies and gravity survey infrastructure and standards, which can significantly increase their overseas market penetration.	Active control technology transfer to Canadian industry. (8) Promotion of international standards in the global market place. (8)	Continue transfer of active control technology and promotion of international standards. (8)	Addition of active control technologies to current private sector products. Increased global market penetration and development of value-added products and services by Canadian industry. Promotion of international standards.



Business Line: International (cont'd)

Objective	Deliverables: Year 1	Deliverables: Years 2 & 3	Performance Measurements
To effectively promote Canada's earth science industries internationally.	<p>Release of ocean mapping and potential analysis GIS methods and software. (1)</p> <p>Transfer of improved field, ocean survey, sampling and laboratory instrumentation to Canadian industry. (1)</p> <p>Complete input into the Alconsult/CIDA mapping and resource characterization initiative in eight east African countries. (3)</p> <p>In collaboration with Canadian firms, advise developing nations on conducting geological, geochemical and airborne and ground-based geophysical surveys and producing maps and related products. (6,7,15)</p> <p>To benefit Canadian companies active in northern Pacific Rim, eastern Russia and Alaska, release metallogenic maps of these areas. (7)</p> <p>Provide quality assurance in the production of large scale maps for the city of Riyadh, Saudi Arabia, with projected revenues of \$450K. (11)</p> <p>Provide project management services for a CIDA funded project in Russia for digital mapping and technology transfer worth approximately \$1M. (11)</p>	<p>Application of ocean mapping and potential field analysis technology to key demonstration projects. (1)</p> <p>Continued refinement and improvement of analysis methods and techniques. (1)</p> <p>Finalize and publish east Africa study results. (3)</p> <p>Provide training in, and transfer of, use of Canadian exploration techniques to developing nations, in collaboration with Canadian firms. (6,7)</p> <p>Provide comparisons of Canadian and overseas mineral deposits through the GSC's World Map and CD ROM releases. (7)</p> <p>Continue quality assurance checks with projected revenues to be \$600K in FY 1998/99 and a further \$500K in 1999/2000. (11)</p> <p>Continue project management services in FY 1998/99 with projected revenues of \$200K. (11)</p>	<p>Client satisfaction with GSC input to the east African initiative.</p> <p>Contracts to Canadian private sector firms.</p> <p>Technical success of Canadian industry in international ventures.</p> <p>Delivery of products on time and within budget.</p> <p>Enhanced NRCan profile.</p> <p>Increased international visibility and revenues for the Canadian geomatics industry.</p>

Business Line: International (cont'd)

Objective	Deliverables: Year 1	Deliverables: Years 2 & 3	Performance Measurements
To effectively promote Canada's earth science industries internationally. (cont'd)	Providing consulting services to the government of Malaysia for the design, development and construction of Malaysia's first ground station. (10)	Complete construction of ground station and commencement station operation. (10)	Completion of the ground station on time and within budget. Exposure of Canadian RS companies' capabilities to SE Asian market leading to further contracts and increased market share.
To increase revenues generated by PCSP from non-Canadian research groups.	Increase foreign revenues to 10 percent of total revenues. (12)	Increase foreign revenues to a minimum of 15 percent of total revenues. (12)	Meeting project revenue targets.
To encourage bipolar scientific research between Canadian Arctic researchers and their Antarctic counterparts.	Implement the Canadian Arctic-Antarctic Exchange Program in partnership with the Canadian Antarctic Research Program. (12)	Increased bipolar scientific research exchanges between Canadian Arctic scientists and their Antarctic colleagues. (12)	New opportunities opened for Canadian Arctic scientists to undertake research in Antarctica.

Good Governance — Policy Goal 6:

to deliver federal responsibilities in partnership with provincial and territorial governments and stakeholders.

Cooperation between governments and stakeholders is the most efficient way to address earth science-related issues. The Earth Sciences Sector will continue to build on its strong record in working with its partners, both to coordinate policy and planning in areas of shared interest and to identify issues for joint resolution.

Strategy

The Earth Sciences Sector strategy to achieve this goal is to:

- Establish common frameworks for action with its partners, including other federal government departments; and
- Develop cooperative mechanisms to address high-priority issues.

Business Line: Policies and Regulations

Objective	Deliverables: Year 1	Deliverables: Years 2 & 3	Performance Measurements
To deliver federal responsibilities in partnership with provincial and territorial governments and stakeholders.	Establish Minister's National Advisory Board on the Earth Sciences (MNABES). (14)	Ongoing. (14)	Strengthened coordination in geoscience programs. Improved federal decision making.
To ensure the effective and efficient operation of the Board of Examiners.	Support for the passing of legislation to transfer authority for commissioning Canada Lands Surveyors to the Association of Canada Lands Surveyors. (9) Appropriate examinations and examination centres for candidates. (9)	Authority transferred to the Association of Canada Lands Surveyors. (9)	Passing of legislation transferring authority for commissioning of Canada Lands Surveyors to the Association of Canada Lands Surveyors. Acceptance of examination process by the profession as demonstrated by its support and lack of complaints.
To deliver Canada's geoscience needs through effective and efficient federal-provincial cooperation.	Finalize formal agreements on geoscience program coordination with Ontario, Newfoundland and Saskatchewan. (2,3,6)	Finalize formal agreements on geoscience program coordination with Yukon, NWT and DIAND. (4,6)	Agreement by federal and provincial agencies.

Business Line: Policies and Regulations (cont'd)

Objective	Deliverables: Year 1	Deliverables: Years 2 & 3	Performance Measurements
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. (1-7,15)	Implement extended collaboration arrangements. (1-7,15)	Increased collaboration with provincial counterparts. Elimination of overlap and duplication of federal and provincial programs. Partner satisfaction and client feedback attesting to the effectiveness of the cooperation.
To ensure that the Canadian Council on Geomatics (CCOG) provides an effective forum for federal-provincial collaboration in geomatics.	PPISB, as secretariat, to provide a mid-term (June) report on the outcomes from the October 1996 meeting. (14) Support the chair, CCOG, in conducting the 1997 meeting in Regina, including reports on outcomes from 1996 resolutions. (14)	Ongoing. (14)	Closer collaboration with provinces in planning and delivering coordinated products and services.

Business Line: Science and Technology

Objective	Deliverables: Year 1	Deliverables: Years 2 & 3	Performance Measurements
To establish and operate the Canadian Active Control (CACS) system in partnership with provincial and territorial government and stakeholders.	Bilateral MOUs with the provinces on the establishment and maintenance of the Canadian Active Control System (CACS) and the Canadian Base Network (CBN) for geodetic surveys and their use by the private sector. (8) Easily accessible, accurate and consistent national spatial reference frame. (8) Develop a transformation product to improve GPS heightening capacity. (8)	Continued cooperation agreements. (8) Improved 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 heightening. Increased productivity due to improved accuracy of real-time CACS products and their efficient distribution.

Good Governance — Policy Goal 7:

to help Aboriginal communities manage their natural resources.

Aboriginal communities are increasingly involved in the management and development of their natural resources. The Earth Sciences Sector is working in partnership with Aboriginal groups on issues related to resource development and land information.

Strategy

The Earth Sciences Sector strategy to achieve this goal is to:

- Provide Aboriginal communities with the skills and training they need to manage their land and natural resources; and
- Transfer to Aboriginal communities the technologies that are related to resource management and respond to their specific needs.

Business Line: Knowledge Infrastructure

Objective	Deliverables: Year 1	Deliverables: Years 2 & 3	Performance Measurements
<p>To fulfill NRCan's survey responsibilities for the implementation of comprehensive native land claim settlements.</p> <p>To transfer technology, create jobs and provide economic opportunities for Aboriginal peoples in northern Canada.</p> <p>To contribute to the northern economy by seeking contractual opportunities with suppliers, including Aboriginal suppliers, in the Canadian North.</p>	<p>The management and monitoring of \$9M of survey contracts in support of comprehensive native land claim settlements. (9)</p> <p>Establish targets for technology transfer and job creation, including approximately 10 percent of the total value of contracts awarded for survey contracts. (9)</p> <p>The purchase of supplies and services from northern companies, including Aboriginal suppliers. (12)</p>	<p>The management and monitoring of \$9M of survey contracts in support of comprehensive native land claim settlements. (9)</p> <p>Establish targets for technology transfer and job creation, including approximately 10 percent of the total value of contracts awarded for survey contracts. (9)</p> <p>The purchase of supplies and services from northern companies, including Aboriginal suppliers. (12)</p>	<p>Fulfilment of the government's responsibilities as defined under existing agreements and legislation.</p> <p>Meeting established targets for technology transfer and job creation.</p> <p>Demonstrated financial benefits to northern suppliers, including Aboriginal companies.</p>

Good Governance — Policy Goal 8: to protect the health and safety of Canadians.

Earth Sciences Sector programs and expertise address a wide range of health and safety issues. ESS knowledge of the landmass includes an understanding of hazards such as earthquakes and volcanic activity and expertise in the detection of nuclear weapons testing. In addition, the Sector's aeronautical charting program is critical to the safety of civilian and military aviation in Canada. While natural hazards can seldom be prevented, the Sector provides the knowledge base to help understand and mitigate them.

Strategy

The Earth Sciences Sector strategy to achieve this goal is to:

- Provide information on dynamic natural events such as earthquakes and landslides;
- Play a principal international role in the detection and reporting of nuclear weapons tests;
- Ensure the safety of navigation for both civil and military aviation through aeronautical charting; and
- Provide information and a forecasting service on geomagnetic storms.

Business Line: Policies and Regulations

Objective	Deliverables: Year 1	Deliverables: Years 2 & 3	Performance Measurements
To provide reliable geoscientific data to improve decisions regarding the reduction of investment risk and to minimize the impact of natural disasters.	Analyze results of engineering trials of seismic data to provide improved hazards assessments. (4,5)	Prepare seismic hazard assessments for incorporation in the next edition of the National Building Code. (4)	Acceptance of results by engineering community and adoption of results in the National Building Code.
To support initiatives related to toxic substances to understand natural processes and their relevance to federal policies.	Expert advice and information in the field of environmental geochemistry. (5,7) Implement the MITE initiative. (5,7)	Report on biogeochemical cycling of metals to understand relevance to federal policy development. (5,7)	Advice and information used in the development of policies.

Business Line: Knowledge Infrastructure

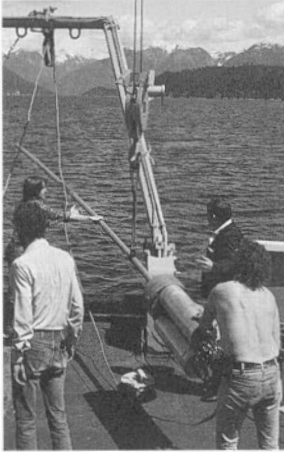
Objective	Deliverables: Year 1	Deliverables: Years 2 & 3	Performance Measurements
To supply aeronautical charts and publications to meet the needs of the aviation industry and help ensure air safety.	<p>Deliver revised or amended Instrument Flight Rules (IFR) charts and publications to civil and military clients on internationally agreed 56-day cycle. (11)</p> <p>Revise other aeronautical charts within four months of a change that affects aviation. (11)</p> <p>Move toward higher level of user pay for aeronautical products. (11)</p> <p>Increase percentage of automation of production program. (11)</p>	<p>Deliver revised or amended Instrument Flight Rules (IFR) charts and publications to civil and military clients on internationally agreed 56-day cycle. (11)</p> <p>Revise other aeronautical charts within four months of a change that affects aviation. (11)</p> <p>Increase percentage of automation of production program. (11)</p>	<p>Meet deadlines 100 percent of the time.</p> <p>Revenue from users: FY 1997/98: \$5.1M FY 1998/99: \$5.3M FY 1999/2000: \$5.5M</p> <p>Increase percentage of automated production: 70 percent by 1997/98 90 percent by 1998/99</p>
To provide reliable geoscientific and land-use data to support reduction of investment risk and minimize the impact of natural disasters.	<p>Determine the location and magnitude of Canadian earthquakes and provide rapid notification to clients. (4)</p> <p>Monitor and forecast the occurrence of magnetic storms. (4)</p> <p>Release reports on the stability of the Fraser Delta and Saanich Inlet related to earthquake hazards. (4,5)</p> <p>Continue studies of permafrost characterization in areas under mineral or hydrocarbon exploration and development. (5)</p> <p>Initiate project on groundwater circulation and contamination in frozen ground. (5)</p> <p>Reports on geohazards. (2,3,5)</p>	<p>Analyze stability data from Georgia Strait for infrastructure development. (4)</p> <p>Release reports on geomagnetic hazard assessments for pipelines and hydroelectric power systems. (4,5)</p> <p>Complete <i>Atlas of Geological Hazards in Canada</i>. (5)</p> <p>Complete studies on frozen soil-pipeline interactions and on permafrost distribution in Shield areas. (5)</p> <p>Continue studies and release reports on landslide hazards in eastern and western Canada. (2,5)</p>	<p>Use by clients of information to mitigate potential damage to essential services.</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 infrastructures.</p>

Business Line: Knowledge Infrastructure (cont'd)

Objective	Deliverables: Year 1	Deliverables: Years 2 & 3	Performance Measurements
To analyze and apply precise geodetic techniques (VLBI, GPS, absolute gravimetry) to studies of global and crustal dynamics to advance understanding of interactions and evolution of the earth's system environment.	Information on crustal motion and deformation and their relation to seismic and volcanic activity and related natural hazards. (8) Information on post-glacial vertical movements and mean sea-level changes required for coastal zone environmental studies. (8)	Improved information on crustal motion, post-glacial rebound and sea-level changes. (8)	Monitoring and determination of the stability and crustal velocity of reference points for the CACS by 1999 and for the CBN by 2005. New definition of vertical datum in Canada by 2000 and improved models for post-glacial uplift for the Great Lakes and Hudson Bay regions.
To complete implementation of the real-time CACS to provide effective GPS navigational accuracy for air, marine and land applications.	Establishment of GPS correction services in partnership with government and industry. (8)	Enhance the CACS by extending coverage and applications served. (8)	Take-up by potential partners. Impact on safety and efficiency of air, marine and land navigation.

Business Line: International

Objective	Deliverables: Year 1	Deliverables: Years 2 & 3	Performance Measurements
To provide reliable geoscientific and land-use data to be used in international studies.	Provide and interpret seismic data in support of nuclear test ban monitoring. (4)	Analyze data from seismic monitoring system to meet Canada's verification requirements. (4)	Recognition of Canada's contribution to monitoring compliance with the test ban treaty.



Good Governance — Policy Goal 9:

to provide information on the Canadian land and resources needed for informed decision making.

The richness and diversity of Canada create a substantial challenge to governments at all levels. Managing the sustainable development of Canada's natural resources, planning land use and exercising good stewardship over these natural resources requires reliable, timely and accessible information on a wide range of issues.

Strategy

The Earth Sciences Sector strategy to achieve this goal is to:

- Develop and maintain a national knowledge infrastructure for natural resources, including geoscience and geomatics data, both onshore and off shore;
- Maintain a reliable survey system for Canada Lands;
- Maintain an effective boundary between Canada and the United States; and
- Strengthen cooperation between other federal and provincial government departments.

Business Line: Policies and Regulations

Objective	Deliverables: Year 1	Deliverables: Years 2 & 3	Performance Measurements
To provide geoscientific input to support decisions on Canada's claim to the continental shelf.	Report analyzing existing off shore data in order to estimate the cost of substantiating Canada's claim to the continental shelf, under the UN Law of the Sea Convention. (1)	Development of a long term plan to establish the boundaries of the Canadian Continental Shelf. (1)	Extension of jurisdiction resulting from acceptance of Canada's proposal by the UN Commission.
To establish and maintain a reliable survey system on Canada Lands.	Review and update of survey standards. (9)	Ongoing review and update of survey standards. (9)	Acceptance of the standards by the survey profession and clients as determined by regular dialogue.

Business Line: Policies and Regulations (cont'd)

Objective	Deliverables: Year 1	Deliverables: Years 2 & 3	Performance Measurements
To maintain an effective international boundary between Canada and the United States.	<p>Inspection and maintenance of the boundary, including clearing 30 km of vista, repairing 150 monuments and re-surveying 200 km of the boundary. (9)</p> <p>Report on the State of Surveys of the Canadian-American Boundary, including recommendations regarding the state of the International Boundary. (9)</p>	<p>Ongoing activity.</p> <p>Implement the recommendations of the report on the state of the boundary. (9)</p>	<p>Successful resolution of any boundary-related issues.</p> <p>Stakeholders' satisfaction.</p>

Business Line: Science and Technology

Objective	Deliverables: Year 1	Deliverables: Years 2 & 3	Performance Measurements
To develop R&D capabilities to lead or participate in R&D initiatives in mapping with support from external stakeholders.	<p>Establish a strategy and develop an R&D agenda that identifies topics and mechanisms to carry out activities. (11)</p> <p>Likely areas of interest include:</p> <p>high resolution imagery/visualizations, generalization, object-oriented technology, Internet technology. (11)</p>	<p>Involvement in additional R&D projects. (11)</p> <p>Augment in-house R&D capability. (11)</p>	<p>Completion of strategy by end of 1997/98.</p> <p>Successful operationalization of R&D results.</p>

Business Line: Knowledge Infrastructure

Objective	Deliverables: Year 1	Deliverables: Years 2 & 3	Performance Measurements
To maintain continuity and reliability of the Canadian Spatial Reference System (CSRS) to satisfy client needs using state-of-the-art technology.	Increase coverage in Canada of monuments and active control points to provide reference information for precise positioning and gravity field measurement, linked to international standards. (8) Canadian Geodetic Information System (CGIS) to provide direct client access to the Geodetic data base via WWW. (8)	Canada-wide integrated networks in place for precise applications. (8) Research and development of new techniques and applications to advance the science and maximize the benefits of geodesy to society. (8)	Integration of horizontal, vertical and gravity control networks and data bases to be completed by 2000. Information on station coordinate and gravity changes and their relation to geodynamics and natural hazards. Upgraded calibration standards and specifications for geodetic and gravity surveys. Testing and performance evaluation of the transportable Canadian Geodetic Long Baseline Interferometry (CGLBI) system to start field observations in 1998.
To provide assessment of mineral and energy resource potential to support MERA process on proposed national parks.	Complete assessment for Region 38 Bathurst Island. (3,7) Complete assessments for proposed National Marine Conservation Areas (NMCA) in Atlantic Canada. (1,7)	Finalize and publish MERA for the proposed National Park on Bathurst Island. (3,7)	Acceptance of MERA studies and impact on park boundary decisions.
To develop an integrated, comprehensive geoscience information base providing digital access to the national geoscience infrastructure.	Release of comprehensive regional digital geoscience data bases compiled from current and archived studies. (4,6,15)	Release of geoscience data base. (3,4,6,15)	Increased use of geoscience information in policy development and land-use planning.

Business Line: Knowledge Infrastructure (cont'd)

Objective	Deliverables: Year 1	Deliverables: Years 2 & 3	Performance Measurements
To provide the National Topographic Data Base to users in digital format and as hardcopy National Topographic System (NTS) map sheets.	<p>Agreements to receive change detection information for the Canadian Road Network. (11)</p> <p>Negotiate agreements with provincial and territorial governments for joint data acquisition or data exchange. (11)</p> <p>Increase market penetration of NTDB through expansion of the existing dealer network by adding three new licensees. (11)</p> <p>Define new map specifications for automated paper map production from the National Topographic Data Base (NTDB). (11)</p> <p>Produce, from NTDB files, 200 softcopy topographic maps suitable for conventional or on-demand printing. (11)</p> <p>Increase the NTDB by 500 data sets. (11)</p> <p>Update 100 NTDB digital map files. (11)</p> <p>Develop a system to upgrade 1:250 000 scale NTDB digital files from 1:50 000 scale NTDB digital map files. (11)</p> <p>Implement on-demand printing for low volume maps. (11)</p> <p>Increase level of map wholesale activities by extending volume discounts to two new wholesalers. (11)</p> <p>Extend bonuses and penalties to Ottawa-based contractors to improve product quality and reduce costs. (11)</p>	<p>Seek new agreements with other agencies. (11)</p> <p>Continue process with other government agencies. (11)</p> <p>Explore other alternate delivery mechanisms. (11)</p> <p>Develop the next generation automated cartographic editing system (CES) by the end of FY 1999/2000. (11)</p> <p>Produce 250 maps in FY 1998/99 and 300 maps in FY 1999/2000. (11)</p> <p>Produce 200 digital files in 1998/99, and another 300 digital files in FY 1999/2000. (11)</p> <p>Subject to partnership agreements, update 200 NTDB digital files in FY 1998/99 and another 300 digital files in FY 1999/2000. (11)</p> <p>Upgrade the 1:250 000 scale component of the NTDB by 250 digital files in year two and by 250 digital files in year three. (11)</p> <p>Complete the implementation of on-demand printing. (11)</p> <p>Expand wholesale dealer channel for map distribution by two additional firms. (11)</p> <p>Complete implementation of bonuses system to contractors. (11)</p>	<p>Signed first agreement by end of FY 1997/98.</p> <p>Signed agreements with three provincial agencies for data exchange.</p> <p>Increase in number of licensed data re-sellers.</p> <p>Revenues of \$1.5M for each of the next three years.</p> <p>Publication of new map specifications.</p> <p>Meet production targets.</p> <p>Systems implemented by end of FY 1997/98 for enhancement, and by end of FY 1999/2000 for CES.</p> <p>Contract-out up to 95 per cent of map production.</p> <p>All client requirements for new data will be processed.</p> <p>Shared road network between 1:50 000 scale map and 1:250 000 scale map data bases.</p> <p>Partnerships implemented as planned and production targets of 600 files reached.</p> <p>Production capability of on-demand colour plots by end of FY 1997/98.</p> <p>Meeting targets established for attracting new wholesalers.</p> <p>Revenues for topo maps for FY 1997/98 \$2.8M; FY 1998/99 \$2.6M; FY 1999/2000 \$2.7M.</p> <p>Incorporation of new provisions into FY 1997/98 contracts.</p>

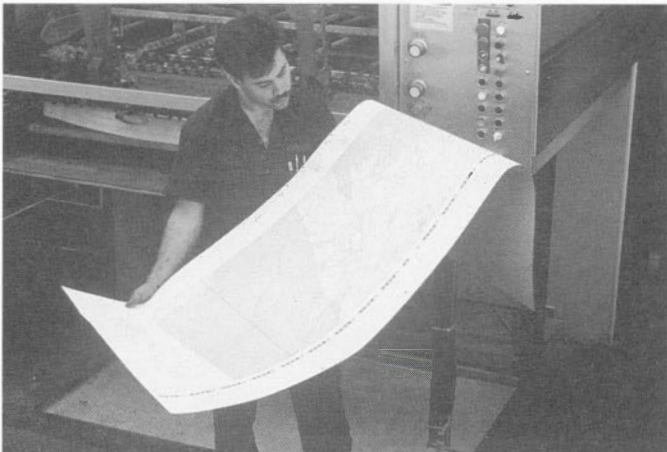
Business Line: Knowledge Infrastructure (cont'd)

Objective	Deliverables: Year 1	Deliverables: Years 2 & 3	Performance Measurements
To develop an on-line retrieval system for aerial photography.	Develop phase one of a retrieval system with Internet access, in conjunction with contributors, by March 1997. (11)	Pursue data exchange agreements with various provincial agencies. (11)	Completion of phase one by end of FY 1997/98. Participation in the development by at least two provincial agencies. Agreements in place with provincial agencies by end of FY 1997/98. Revenue targets achieved; \$475K FY 1997/98, \$525K FY 1998/99.
To develop a national Digital Elevation Model for Canada.	In conjunction with the Canadian Forestry Service, produce 600 Digital Elevation Models (DEMs). (11)	In conjunction with the Canadian Forestry Service, produce 500 Digital Elevation Models (DEMs). (11)	Complete coverage of Canada by end of FY 1998/99.
To obtain ISO 9000 accreditation for Ottawa-based topographic mapping and aeronautical charting activities.	The Centre for Topographic Information (CTI) (Ottawa) ¹ will complete tiers I and II, process documentation. (11) Digital aeronautical charting production will conduct ISO 9001 external audit, May 1997, and obtain certification. (11)	The Centre for Topographic Information (CTI) will complete tiers III and IV, complete documentation of processes by end of FY 1998/99, and receive accreditation by end of FY 1999/2000. (11) Certification will be extended to other production areas within aeronautical charting. (11)	Successful completion of ISO accreditation process. Pass regular audits and yearly renewal process.
To improve the delivery of federal mapping requirements through the integration of services.	Repatriate the printing operations from Canada Communications Group. (11) Develop a plan to share digital imaging services for all federal agencies. (11) Through a feasibility study make recommendation on the appropriate level of consolidation of warehousing and distribution of federal maps. (11)	Continue to offer client-driven cost-effective printing services. (11) Implement plan for sharing digital imaging services. (11) Decision finalized from results of the feasibility study. (11)	Presses returned to the Sector by end of FY 1997/98. Printing staff returned to public service. Increased use of imaging services by other federal agencies. Decision concerning consolidation of warehousing and distribution implemented by the end of FY 1999/2000.

¹ Centre for Topographic Information refers to topographic mapping operations located in Ottawa and Sherbrooke.

Business Line: Knowledge Infrastructure (cont'd)

Objective	Deliverables: Year 1	Deliverables: Years 2 & 3	Performance Measurements
To coordinate geographic names activities in Canada.	<p>Develop and implement a system for continuous updates of geographic names to the National Topographic Data Base (NTDB). (11)</p> <p>Continue to provide secretariat service to the Canadian Permanent Committee on Geographical Names (CPCGN). (11)</p> <p>Conduct promotional activities in relation to the 100th anniversary of the CPCGN, by producing a video, an exhibit and lectures in collaboration with the National Archives and Parks Canada. (11)</p>	<p>Complete the implementation of the update system. (11)</p> <p>Continue to provide secretariat service to the Canadian Permanent Committee on Geographical Names (CPCGN). (11)</p>	<p>Meet client needs for a fully integrated and current geographic names layer on the NTDB.</p> <p>Increase public awareness of geographical names and the coordinating body, measured by increases in Internet access and requests for products.</p> <p>Run successful yearly meetings and be actively supported by provincial and territorial naming agencies.</p>
To attain annual Revolving Fund revenue targets.	<p>Revenue targets for FY 1997/98: NTDB \$1.5M (11)</p> <p>Topographic Maps \$2.8M (11)</p> <p>Aeronautical Charts \$5.1M (11)</p> <p>Air Photos \$475K (11)</p> <p>OGD Services: \$25K (11)</p>	<p>Revenue targets for FY 1998/99 & 1999/2000: NTDB \$1.5M & \$1.5M (11)</p> <p>Topographic Maps \$2.6M & \$2.7M (11)</p> <p>Aeronautical Charts \$5.3M & 5.5M (11)</p> <p>Air Photos \$525K & \$525K (11)</p> <p>OGD Services \$35K & \$50K (11)</p>	Meet Revolving Fund revenue projections.



Business Line: Knowledge Infrastructure (cont'd)

Objective	Deliverables: Year 1	Deliverables: Years 2 & 3	Performance Measurements
To rejuvenate and enhance Sector human resources to create an effective, flexible and motivated work force.	<p>Initiate major retraining in the Centre for Topographic Information (CTI) (Ottawa)¹ to acquire the necessary skills in geomatics and informatics to meet work requirements with a target of 75 percent delivery of training. (11)</p> <p>Increase the number of professional staff by five in the Centre for Topographic Information (CTI) (Ottawa) through assignments, young scientist program, retention of GDPD graduates, educational leave for technologists, and relocation from Sherbrooke. (11)</p> <p>Create greater synergy between Ottawa and Sherbrooke offices through joint projects and reallocation of responsibilities, and provide learning opportunities with Ottawa taking responsibility for four projects. (11)</p>	<p>Completion of 100 percent of training requirements. (11)</p> <p>Increase the number of professional staff by another five over years two and three. (11)</p> <p>Continue joint system (Ottawa/Sherbrooke) for the development of projects and cross-divisional support. (11)</p>	<p>Employees with skills relevant to meet operational requirements of the division.</p> <p>Increase of 10 professionals, while remaining within available budget.</p> <p>Augment knowledge base in CTI processes and products.</p>
To improve performance, reception processing and archiving of earth observation data provided to key clients.	Acquisition and provision and archiving of LANDSAT, SPOT, NOAA and ERS data for research and commercial requirements, including global change, land-mass mapping, resource monitoring for clients, RADARSAT International, SICORP, ESA, etc. (10)	Agreements in place with satellite operators for reception of optical imagery to replace LANDSAT 5. (10)	<p>Measurement of client satisfaction.</p> <p>Measurement of performance.</p> <p>Increasing provision and use of data.</p>

¹ Centre for Topographic Information refers to topographic mapping operations located in Ottawa and Sherbrooke.

Business Line: Knowledge Infrastructure (cont'd)

Objective	Deliverables: Year 1	Deliverables: Years 2 & 3	Performance Measurements
To contribute to the development of the Canadian Geospatial Data Infrastructure (CGDI).	<p>Metadata for seven of the principal geospatial data bases held by the Sector will be brought on-line and made searchable using internationally accepted techniques. (10)</p> <p>Tools in place to allow metadata in the LINC project to come on-line. (10)</p> <p>A commercial server will be commissioned that will permit Canadian organizations to conduct commerce by electronic access. (10)</p> <p>Participation in the project definition. (15)</p> <p>Development of a CD-ROM containing various layers of geoscience data. (15)</p>	<p>Principal geospatial data bases will be brought on-line so that orders may be placed for delivery over the network. (10)</p> <p>More sophisticated searchers will be possible. (10)</p> <p>The CCRS archive of raw earth observation data will be brought on-line. (10)</p>	<p>Data bases on-line and used.</p> <p>Revenue targets for the sale of data exceeded due to ease of access.</p> <p>Increased utilization of earth observation data in Canada.</p> <p>Increased global activity of Canadian value-added companies in global markets.</p> <p>Broad base of participation from GSC divisions.</p> <p>Positive client feedback.</p>
To make the results of the ESS scientific programs available to clients.	An efficient and effective scientific publications program, responsive to client needs, both the changing needs of existing clients and the needs of new ones. (15)	An efficient and effective scientific publications program, responsive to client needs, both the changing needs of existing clients and the needs of new ones. (15)	<p>Timely release of publications.</p> <p>Continued recognition of the quality of ESS scientific outputs.</p> <p>External client satisfaction.</p> <p>Move from offset printing to on-demand printing.</p> <p>Increased revenue generated from sale of GSC products.</p>

Business Line: Knowledge Infrastructure (cont'd)

Objective	Deliverables: Year 1	Deliverables: Years 2 & 3	Performance Measurements
To increase and enhance the delivery of information and services available at the client's desktop.	<p>Provision of access to a comprehensive collection of geoscience documentation, data bases and expertise through the Earth Sciences Information Centre. (15)</p> <p>A more integrated, coordinated and managed Sector presence on the Internet. (15)</p>	<p>Provision of access to a comprehensive collection of geoscience documentation, data bases and expertise through the Earth Sciences Information Centre. (15)</p> <p>A more integrated, coordinated and managed Sector presence on the Internet. (15)</p>	<p>Increased clientele.</p> <p>99 percent success rate at responding to client needs through the Sector's collections or through referrals.</p> <p>Increase the number of documents available to clients.</p> <p>Obtain client feedback.</p> <p>A current up-to-date home page.</p> <p>Profile of client usage.</p> <p>Increased file usage.</p>
To raise the general awareness and external profile of the Earth Sciences Sector.	<p>Production of the Sector Annual Report. (16)</p> <p>Increase media coverage of Sector programs and events, such as the GSC Forum and Geomatics Conference. (16)</p> <p>Increase awareness of the Sector within government, the private sector and the public at large, through effective communication tools. (16)</p>	<p>Production of the Sector Annual Report. (16)</p> <p>Target selected media for delivery mechanism of Sector message. (16)</p> <p>Conduct outreach activities in three key areas to determine effectiveness of Sector communications plan. (16)</p>	<p>Conduct impact analysis to measure the increase in key media indicators.</p> <p>An increased number of events attended by the Minister and Deputy Minister.</p> <p>Increased awareness of Sector program through follow-up after outreach activities.</p>
To align Sector products and services to government priorities and client needs.	Complete Strategic Overview Document and mid-year update. (14)	Annual exercise. (14)	Feedback from Sector senior management.

Business Line: Knowledge Infrastructure (cont'd)

Objective	Deliverables: Year 1	Deliverables: Years 2 & 3	Performance Measurements
To improve horizontal linkages between the Sector and other federal agencies.	Develop a strategy to strengthen Earth Sciences Sector relations with other federal departments. (14)	Implement the strategy to strengthen Earth Sciences Sector relations with other federal departments. (14)	Improved understanding of Sector services. Improved federal decision-making.
To build better linkages of science and technology and delivery of NRCan programs and services.	Coordinate ESS contributions to NRCan policy priorities, including preparations for the transition to the next mandate of the government. (14)	Coordinate ESS contributions to NRCan policy priorities. (14)	Timely advice.



Corporate Services

Office of the Chief Geoscientist

The Chief Geoscientist provides scientific leadership and advice to the Sector on matters related to its geoscience programs, coordinates the planning and development of new and ongoing geoscience program elements, and is accountable for the strategic planning of the GSC's scientific program, including an annual cycle of evaluation of all program elements.

The Chief Geoscientist ensures that the GSC's Science Program Committee provides recommendations to the Assistant Deputy Minister on proposed mechanisms for funding, reallocation, and coordinating new program activities, and for re-balancing the program on an as-needed basis. The Chief Geoscientist represents the Sector on national and international geoscience programs in which ESS is a participant.

Within the context of the Inter-governmental Accord and the bilateral agreements with the provinces and territories, the Chief Geoscientist Office works with the National Geological Surveys Committee to ensure that ESS geoscience programs delivered in the provinces are jointly planned and undertaken, in accordance with national and bilateral agreements, and that opportunities for further cooperation with the provinces are fully exploited.

The Geological Survey of Canada is developing a strong system of governance of its program design and delivery. This system will stress a renewed commitment to excellence and relevance, focused programs, collaboration, national leadership and uniqueness. A document entitled *Managing the Program at the GSC*, to be prepared by the Chief Geoscientist during the planning period, will describe in detail a coordinated, goal-oriented program management mechanism.

The Chief Geoscientist is also tasked with identifying a methodology for measuring the impact of ESS programs, and their benefit to the public good and the economy of Canada. In addition, the Chief Geoscientist is responsible for developing a robust, comprehensive national geoscience program that incorporates the national mandates of the Geological Survey of Canada and Geomatics Canada, the mandates of the provincial and territorial geoscience surveys, geoscience activities within other federal departments and the research programs of Canadian universities.

During FY 1997/98, the Chief Geoscientist will work with the Directors General of the research science-based divisions of the GSC and GC to develop a plan for cyclical evaluation of the directions and efficacy of their programs.

The Chief Geoscientist will continue to facilitate the development of synergy between program elements of the Geological Survey and Geomatics Canada. These will build on the directions provided in the Synergy Report of March 1996, with special emphasis on developing new applications for remote sensing in monitoring and understanding various geological processes, and on improving the level of cooperation between the geodynamics programs that are currently operating in the Sector.

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, it delivers the Geoscience Information Program, it provides strategic direction and policy coordination on behalf of the Sector, it oversees the management of Sector human and financial resources, and it 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 (IT) infrastructure. It delivers general administrative services to the Sector, including logistics support to field projects through Technical Field Support Services, and financial administrative services to Geomatics Canada and ESS Corporate Services. 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 also responsible for the management of Sector client liaison mechanisms, including the Minister's National Advisory Board on Earth Sciences, and in cooperation with program managers, 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, and 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's 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 policy goals and key outputs described in the preceding tables, during the planning period, PPISB will:

- Implement departmental re-engineering initiatives commencing with the Integrated Procurement and Payment System; and
- Implement Project Management Information System tools that will support Sector staff in effectively managing program delivery.

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 comprises three teams:

- The Business Planning team plans and coordinates the development of Sector business plans and strategies, performance evaluations and reports in a framework consistent with other Sector and departmental plans, and directs the management of the Geomatics Canada Revolving Fund. The team also publishes the ESS Contracting-Out Bulletin.
- The Business Policy team develops and administers Sector business policies and guidelines, including those pertaining to service standards and pricing. It administers programs related to clients in the areas of Sector intellectual property, coordinates GSC collaborative research projects, administers Memoranda of Understanding and Letters of Agreement, licences and other contracts, and provides guidance and advice to Sector clients in the negotiation of agreements and contracts.
- The Business Relations team plans and implements domestic and international earth science business development and strategies, and promotes and coordinates international business development. It 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 outputs detailed in the preceding tables, Business Development deliverables for the planning period also include:

- Coordinating and producing the ESS Business Plan;
- Managing the Geomatics Canada Revolving Fund;
- Developing business policies;
- Managing the ESS service standards, ISO 9000, intellectual property management and MOU maintenance, and coordinating the GSC collaborative research projects;
- Preparing and disseminating the Sector's annual Contracting-Out Bulletin;
- Implementing the new ESS International Business Strategy;
- Chairing the Canadian International Business Strategy National Sector Team on IT&T, and leading the geomatics strategy;
- Receiving at least 30 foreign incoming earth sciences trade delegations;
- Assisting in developing effective performance measures within the Sector and incorporating them in branch and division business plans; and
- Assessing Sector methods of measuring client satisfaction in accordance with the ESS Management Plan.

Quality Management Advisor

In support of the Sector's ongoing focus on quality, in both its management style and work practices, the Quality Management Advisor is tasked with influencing, preparing, monitoring and coordinating ESS's quality initiatives. This includes working closely with Sector branches and divisions on the development and implementation of quality management practices and tools, including the ESS Management Framework.

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 NRCan Corporate Services — Human Resources Branch. The team delivers operational HR services including classification, staffing, staff relations and workforce adjustment, as well as assistance in human resources planning and training.

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

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

- **Communication:** establish formal mechanisms to obtain feedback on service to clients and identify key messages to communicate to Sector senior management;
- **People development:** assist management in identifying required competencies to achieve organizational goals;
- **Management development:** assist management in development plans for current managers and potential managers, including succession planning; and
- **Support to the ESS strategic vision:** address both ongoing and transitional human resources priorities by developing strategies to address HR initiatives, through such mechanisms as S&T training and development.

Sector Financial Advisor Office

The Sector Financial Advisor Office (SFAO) is assigned by the NRCan Corporate Services Sector to assist in Sector 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 the provision of support to the Revolving Fund management team, and is tasked with introducing a comprehensive approach to costing within ESS.

The SFAO has three principal policy goals and related deliverables for the planning period:

- To complete the reorganization of the SFAO Appropriation Unit, including publication of a document outlining roles, responsibilities and point of services within the Office;
- To complete the organization of the Revolving Fund Unit within the SFAO, including publication of a document outlining roles and responsibilities of the SFAO vis-à-vis the Fund; and
- To introduce a comprehensive approach to costing for appropriation and the Revolving Fund, including the development of a data base and identification of cost drivers.

Earth Sciences Sector Corporate Services Funding Mechanisms

	1996/97	1997/98	1998/99	1999/00
Appropriation from Parliament	17 649	17 309	16 879	16 977
Vote netting	110	200	220	250
Revolving Fund	0	0	0	0
Joint projects with external parties	0	0	0	0
Joint projects with other federal departments	0	0	0	0
Total (\$ 000)	17 759	17 509	17 099	17 227

3 Earth Sciences Sector: Management Plan

Earth Sciences Sector employees, like other public servants in every department of the Government of Canada, continue to make progress in modernizing work methods and improving the provision of quality service.

Although service delivery in the public sector is, and will remain, different from that in the private sector, the public sector, including ESS, is nevertheless equally committed to service quality and value for money.

To perform well, the public sector must retain, motivate and attract a corps of talented and dedicated public servants. There are indications that this could be the most difficult challenge that the Public Service of Canada will face over the coming years. The Government's response to this challenge is La Relève. La Relève is a challenge and a commitment to develop and maintain a vibrant institution staffed by highly qualified and committed professionals. ESS is an active participant in this process of renewal.

The Earth Sciences Sector operates with a quality management philosophy in order to be an effective organization constantly striving to provide better service to clients, a better place to work for all employees, and better 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;
- The contribution of each and every individual;
- A 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 management framework that will help to determine if ESS has the necessary tools and practices to manage itself according to its management principles.

The ESS Management Framework addresses the NRCan S&T Management Framework, and incorporates aspects of the Canada Awards for Excellence, the Xerox Business Model and the Malcolm Baldrige Award Criteria, and comprises six principal elements and related objectives:

Element	Objectives
Leadership Group	Works as a team; Displays a client focus; Defines and exhibits model behaviour; Develops clear long term goals and annual policy goals through the planning process; Establishes strategy direction and priorities; and Provides an empowered environment to achieve efficiency in the delivery of Sector products and services.
Clients	Current, past and potential clients define ESS programs and activities. The Sector recognizes and anticipates needs through client feedback.
Process Improvement	Work processes are designed to be client-driven, cross-functional and value-based.
Human Resources	Management leads, motivates, develops and empowers people to realize their full potential.
Suppliers	ESS focuses on the external relationship with suppliers including other organizations, institutions and alliances that provide critical input to Sector products and services.
Sector Results	The Sector has a balanced set of measures, with results that are leading towards a world-class organization.

Additional details regarding the ESS Management Framework are contained in Annex B of this Business Plan.

Management Improvement Plan

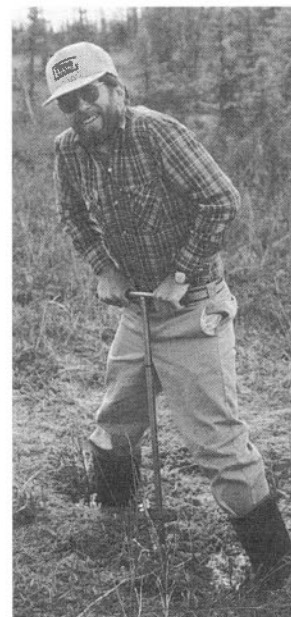
The ESS Management Framework guides the Sector in the development of its annual Management Improvement Plan. In order to monitor progress and ensure the relevancy of these plans, the following process has been established:

- Annual Sector management retreat where data obtained from the Upward Feedback Exercise, NRCan Audit and Evaluation Assessment, organizational self-assessment, and client feedback will be analyzed and used through a self-assessment of the progress made according to the ESS Management Framework, identifying areas for improvement over the next year.
 - Milestones: fall 1997, 1998 and 1999.
- Semi-annual progress report by Sector Management Team (SMT) on progress made in their respective areas at a special SMT meeting.
 - Milestones: mid-year and year-end reviews in 1997/98, 1998/99, 1999/2000.

- Annual forum to encourage exchange of best management practices between divisions and branches.
 - Milestones: spring 1997, 1998, 1999, 2000.
- Bi-annual organizational self-assessment to validate progress and identify potential improvements for the next two years, involving employees at all levels in the Sector.
 - Milestones: January-February 1998, 2000.

Specific management improvement initiatives for 1997/98 include:

- Leadership
 - Improve alignment of policy goals through more frequent meetings of senior managers with staff, better use of business plans, accountability accords, work plans, etc., and stronger linkages between divisional, branch, Sector and departmental priorities, policy goals, strategies, business lines and objectives.
 - Accountability: SMT members and ESS managers.
 - Improve internal communication by establishing a formal employee feedback mechanism, holding cascading meetings, and identifying and publishing key messages from Sector Management Team meetings.
 - Accountability: SMT members and ESS managers.
 - Improve external reporting by developing information on the impact of ESS activities, selecting specific targets for reporting to central agencies and introducing specific performance measures.
 - Accountability: ESS DGs and Directors supported by the Head, Communications, and the Director, Policy, Planning and Coordination.
- Clients
 - Improve measurement of client satisfaction by assessing the present measurement system and by ensuring that the results of client feedback are accessible to employees.
 - Accountability: Directors and Executive Director, Business Development.
- Process Improvement
 - Better information management by implementing and maintaining a Sector Project Management Information System.
 - Accountability: Director General, PPISB.
 - Establish a process and a schedule for external scientific review and assessment.
 - Accountability: Chief Geoscientist and Director General, CCRS.
- Human Resources
 - Improve people development and management development by identifying required competencies, developing individual learning plans, implementing a management development plan (La Relève), and ensuring follow-up to Upward Feedback.
 - Accountability: ESS managers and HR Advisor.



Potential improvements on specific elements of the ESS Management Framework for 1998/99 and 1999/2000 have been identified. These will be confirmed and developed into specific initiatives through the process described above. Identified as potential areas for improvement during the planning period are the following:

- **Leadership:** alignment of objectives, behaviours and values, reporting responsibilities, and fact-based management;
- **Clients:** client communications, client satisfaction management system, client inquiries and complaints system, client groups and market segments;
- **Process Improvement:** continuous improvement, information management, management system, process measures, cost recovery and revenue generation, intellectual property and transfer of S&T outputs, scientific review and assessment, work process ownership and documentation;
- **Human Resources:** selection and recruitment, people development, management skills development, education and training, and performance management process; and
- **Suppliers:** improving relationships.

Performance Measurement

The Earth Sciences Sector is committed to clearly articulating what it is trying to achieve, how it is going to achieve it and what measures it will use to assess its performance and demonstrate accountability to stakeholders. The result of this commitment is the identification of the various Sector strategies, many of them new and innovative, described in Section 2 of this Business Plan.

New strategies require new systems of measurement. They also require acknowledgement of the significant impact that such measures have on performance. No single performance measure can provide a clear performance target or focus attention on the critical areas of performance in the conduct of the Sector's business. For this reason ESS has adopted the "balanced scorecard" approach to performance measurement — a set of measures that gives a comprehensive view of the Sector's business. This scorecard, analyzed in the context of a number of selected success factors, complements financial measures with operational measures of customer satisfaction, internal processes, and ESS innovation and improvement activities.

The Sector, using the balanced scorecard approach, has identified four success factors that determine the set of performance measures that best reflect what ESS must do to be successful in both the short and long term. These success factors are **impact, stakeholders, learning and innovation, and internal processes**.

To measure progress against these success factors, the Sector has selected seven performance measures for implementation in FY 1997/98. These performance measures are:

- **Contribution to departmental objectives:** The impact of selected activities will be assessed to determine their contribution to NRCan objectives.
- **Stakeholder satisfaction:** The level of use of, and satisfaction with, Earth Sciences Sector products and outputs will be determined for stakeholders, including NRCan, other government departments, provincial and territorial governments, industry, universities and international clients and partners.

- **Finance:** Cost sharing with partners and cost recovery from clients will be determined and assessed.
- **External recognition:** The recognition of the Sector's professional stature will be measured based on such criteria as awards and invitations for Sector participation in external projects and related activities.
- **Human resources profile:** The Sector's capability to maintain creativity and innovation will be determined using such criteria as the number of persons wishing to work with the Sector (e.g. visiting scientists), age profiles, loss of key staff and the achievement of training targets.
- **Achievement of milestones:** Initiatives identified in this Sector Business Plan will be tracked and assessed in terms of whether they are on schedule and budget and are meeting expectations. In FY 1997/98, the achievement of milestones will be assessed by the Sector using divisional information systems, while it prepares to address the issue with a new Project Management Information System (PMIS) in FY 1998/99.
- **Employee enthusiasm:** In FY 1997/98 employee enthusiasm will be assessed by analyzing the results of Upward Feedback. In subsequent years, targeted employee surveys will be conducted.

Revenue Generation and Retention

In response to the results of Program Review and to the government's intention to introduce new ways of doing business with clients and stakeholders, the Earth Sciences Sector is emphasizing its innovative client relations initiatives. New working relationships and business arrangements are emerging, including an improved approach to the generation and retention of revenue.

Geomatics Canada Revolving Fund

The Geomatics Canada Revolving Fund (RF) is one example of a Sector mechanism for effective program delivery to ESS partners and clients. The Sector has accumulated a wealth of knowledge and data in the course of fulfilling its mandated activities. While this expertise and information are essential to the Sector in carrying out its appropriation-based activities, external clients have demonstrated considerable interest in accessing these services and data, and are willing to pay for the cost of making them available to them. 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 the implementation of user fees sufficient to recover cost. The Revolving Fund aims at being self-sufficient. Unlike commercial businesses that strive for profit maximization, the RF target is to achieve a zero balance.

Geomatics Canada's branches and divisions are now utilizing the Revolving Fund to respond to the demand for their products and services by external clients. Clients benefit by acquiring goods and services that otherwise would not be available to them.

Since the introduction of the Fund in April 1994, over 75 percent of Sector Revolving Fund projects have been directed toward domestic clients.



The majority of international Revolving Fund activities are carried out by the Canada Centre for Remote Sensing, and Geomatics Canada's Mapping Services Branch. To date, Revolving Fund international projects involve a dozen countries, and since April 1994, these projects have generated nearly \$16M in revenue. One of the most significant benefits of the Revolving Fund is the freedom to charge market prices to international clients. Revenue, above project costs, generated from international Revolving Fund projects is returned to the Fund and is invested in the development of new products and geomatics technology, market research, and bid preparation in response to requests for proposals.

As part of the Sector's commitment to the Canadian geomatics community, ESS ensures, through adherence to a comprehensive set of Revolving Fund guidelines, that Fund activities do not compete with the domestic geomatics industry. For example, the Sector offers quality assurance and inspection services to clients, while contracting-out production work to industry. Bids for international contracts are submitted in collaboration with Canadian geomatics companies and OGDs, whereby the Sector restricts its involvement to the portion of work industry cannot provide.

In accordance with Treasury Board guidelines for the use of a Revolving Fund, the Sector is audited annually to ensure that there is no subsidization of RF activities with appropriation funds, thus guaranteeing that taxpayers are not underwriting activities destined for external clients.

At the time of its initial application to Treasury Board for approval to operate a Revolving Fund, the Sector forecast an accumulated deficit of nearly \$1.285M after the first two years of operation. In fact, the 1995/96 financial statements included in the Public Accounts indicated an accumulated deficit of only \$285 000 with a positive financial performance of more than \$1M. Based on the latest forecast, this accumulated deficit of \$285 000 will have been eliminated by the end of FY 1996/97. This rapid reduction of the accumulated deficit by ESS is a significant accomplishment and one that is rarely achieved so quickly in RF operations. The reduction is due to increases in Sector consulting activity and product sales, and to improvements in the management of expenditures, and represents a trend that the Sector is committed to continuing.

The following table describes Revolving Fund revenues forecast on an accrual basis, by category, for the first two years of the planning period. Estimates for 1999/2000 will be finalized in the fall of 1997.

Geomatics Canada Revolving Fund Revenues, by Category

Revenue Category	1997/98	1998/99
Consulting	2 433	1 810
Product	10 115	10 304
Services	3 491	3 499
Total (\$ 000)	16 039	15 613

Geological Survey of Canada Vote Netting

Vote netting, a revenue retention mechanism used by the GSC, is another example of an agreement between NRCan and Treasury Board that allows the Sector to retain up to 100 percent of earned revenues. The provision of consulting services, primarily to domestic clients, constitutes the largest single contributor of revenues. However, consulting services to foreign clients, the sale of maps and other publications, the sale of digital geological and geophysical data and the provision of laboratory services also contribute revenue. It is estimated that revenues from vote netting will exceed \$2M in FY 1997/98, with forecasts of \$2.2M and \$2.5M for FYs 1998/99 and 1999/2000 respectively.

Alternative Service Delivery

The Sector has implemented a number of alternative service delivery initiatives, including a range of accords and Memoranda of Understanding that help to clarify and streamline program delivery in cooperation with various Sector partners and stakeholders. For example, the Inter-governmental Geoscience Accord that was signed by the Minister and her provincial and territorial counterparts in September 1996 is the basis for a new approach to the delivery of geoscience in Canada. The Accord calls for the creation of bilateral Memoranda of Understanding (MOUs) with the provinces and territories that include an assessment of geoscience needs and how they will be addressed by the partners. MOUs have been signed with Nova Scotia, New Brunswick, Manitoba and Alberta, and others are under discussion.

A Memorandum of Understanding signed in October 1996 with the Ontario Ministry of Natural Resources establishes a framework for cooperation on land-related information and provides a mechanism for cooperation to improve public and inter-governmental access to this information and the delivery of products and services. In addition, during the last several months, subsequent Active Control System MOUs that outline cooperation between the Geodetic Survey Division and provincial agencies for the maintenance and delivery of the geospatial reference systems in Canada have been signed with seven other provinces.

Geomatics Canada's Geodetic Survey Division has established unprecedented access to the national spatial reference system through development of the Canadian Active Control System (CACS). The GPS-based CACS not only allows for efficient access to the national reference system without occupying monumented control, but also improves the effectiveness and accuracy of end user GPS applications, and provides an infrastructure for development of real-time services. GSD is also involved in service delivery that optimizes cost and work sharing arrangements with partners to deliver essential services. A prime example is the Canadian Base Network, where participating provinces not only establish the physical survey monuments but also share in the costs of the program.

The Mapping Services Branch of Geomatics Canada has a number of alternate service delivery mechanisms in place. Conventional topographic mapping production work is contracted-out to the private sector, as is the production of aerial photography and digital topographic files. Distribution of 80 percent of Sector paper topographic maps is handled through a large network of private sector map dealers, and a number of large wholesalers is being encouraged to assume responsibility for the servicing of many of the smaller retailers. Distribution of digital topographic information will increasingly be done through a network of qualified private sector distributors. The Branch is moving towards collecting ever-growing amounts of topographic information in cost-shared partnership arrangements with the provinces, municipalities and the private sector, a trend started in 1988.

The Geological Survey of Canada is involved in a number of alternate service delivery initiatives. For example, GSC's new Sensitive High Resolution Ion Microprobe (SHRIMP) laboratory will be operated as a national facility. This includes provisions, under the SHRIMP Business Plan, for Canadian universities and industries to carry out age-dating projects either in concert with GSC scientists, or independently on a commercial fee basis for laboratory use. In addition, the GSC's Geocryology Laboratory has been moved to Carleton University in Ottawa. This cold region research facility will be jointly maintained and operated by the GSC and Carleton through a newly formed coordinating and advisory group.

The Polar Continental Shelf Project (PCSP) is providing logistics services to its clients on an increasingly cost-shared or cost-recovery basis. In the past two field seasons, PCSP's rate of recoveries has averaged 45 percent of total logistics expenditures. In addition, PCSP achieved its target of increasing foreign revenues to five percent of total revenues in FY 1996/97.

Strong working partnerships represent an effective alternate model for the delivery of science and technology in an era of budgetary constraint. Through collaboration with Canadian industry, universities and federal/provincial/territorial and local governments, the Sector received contributions of \$21.1M during the 1996/97 fiscal year (\$6.7M by GSC and \$14.4M by GC). This external funding plays an important role in achieving the research policy goals of both the Sector and its partners.

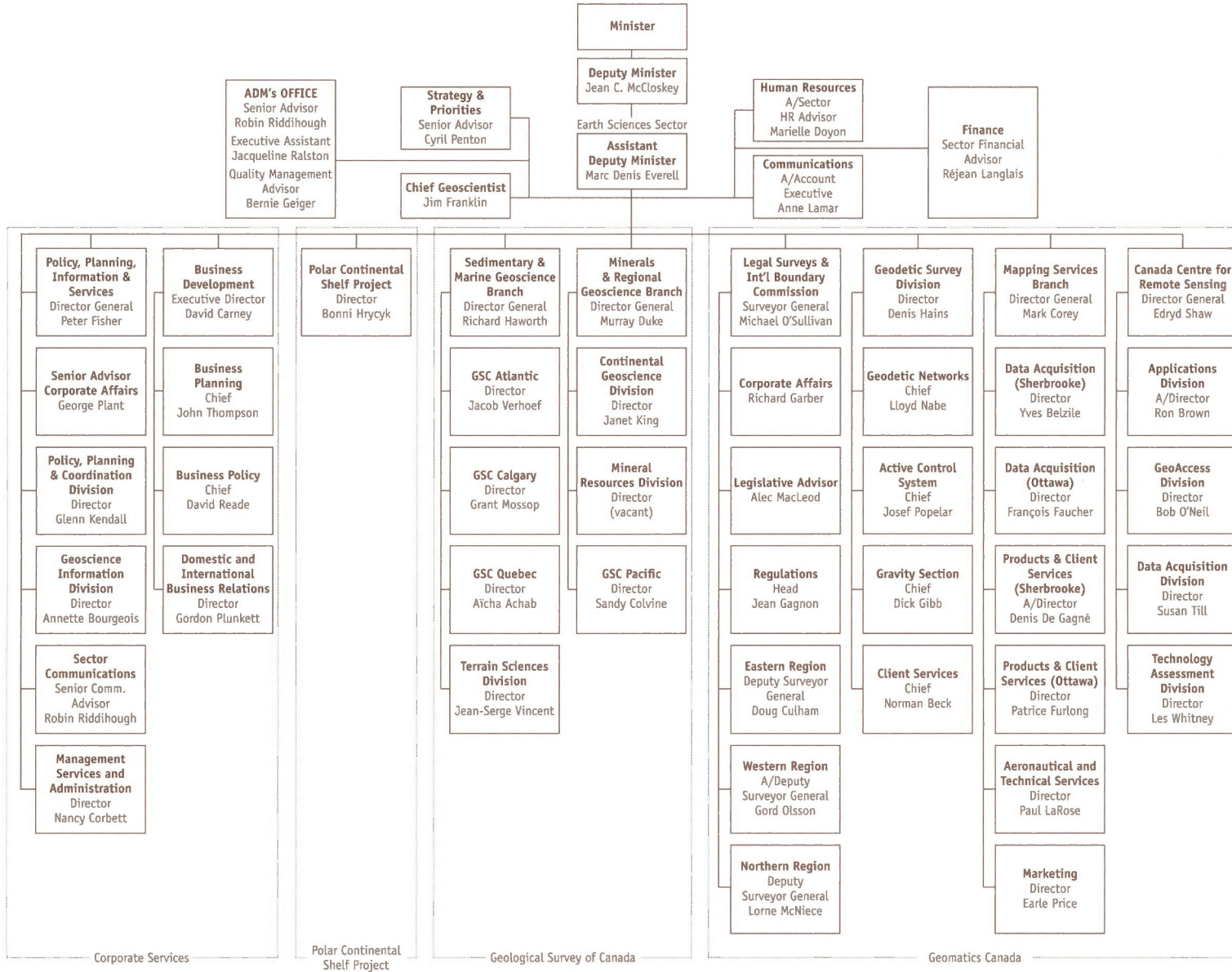
Looking Forward

The public sector environment in Canada is constantly and rapidly changing. Throughout this change, ESS continues to maintain its core values of service to clients and excellence in its scientific and technical programs. In order to strengthen its ongoing commitment to quality service and to better understand and respond to client requirements, ESS has introduced a coordinated communication strategy, including a world-class presence on the Internet. This strategy is complemented by a range of Sector outreach programs and the recognition of the importance of assessing the impact of ESS activities and adjusting those activities, as required, in order to ensure their continued relevance.

The Earth Sciences Sector, through excellence and innovation, the efficient delivery of quality products and services, and a commitment to partnership and team work, is well positioned to continue to contribute significantly to Canada's future.

Annex A: Earth Sciences Sector Organization Chart

Natural Resources Canada



Annex B:

Earth Sciences Sector

Management Framework –

Principal Elements

1.0 Leadership

- | | |
|------------------------------------|----------------------------|
| 1.1 Vision and Strategic Direction | 1.5 Empowerment |
| 1.2 Alignment of Objectives | 1.6 Internal Communication |
| 1.3 Behaviours and Quality Values | 1.7 Federal Responsiveness |
| 1.4 Fact-based Management | 1.8 External Reporting |

2.0 Clients

- 2.1 Client Requirements
- 2.2 Client Data Base
- 2.3 Client Group and Market Segments
- 2.4 Client Communications
- 2.5 Client Inquiries and Complaints
- 2.6 Client Satisfaction Measurement System
- 2.7 Client Commitment

3.0 Process Improvement

- 3.1 Work Process Ownership
- 3.2 Continuous Improvement
- 3.3 Process Breakthrough
- 3.4 Process Measures
- 3.5 Technological Excellence
- 3.6 Improvement Methods and Tools
- 3.7 Information Management
- 3.8 Cost Recovery and Revenue Generation
- 3.9 Intellectual Property and Transfer of S&T Outputs
- 3.10 Scientific Review/Assessment

4.0 Human Resources

- 4.1 Selection and Recruitment
- 4.2 People Development
- 4.3 Education and Training
- 4.4 Management Skills Development
- 4.5 Reward and Recognition
- 4.6 Employee Involvement
- 4.7 Work Environment
- 4.8 Tools to Do the Job
- 4.9 Performance Management

5.0 Suppliers

- 5.1 Supplier Management

6.0 Sector Results

- | | |
|--|--------------------------|
| 6.1 Client Satisfaction | 6.3 Empowerment |
| 6.2 Employee Motivation and Satisfaction | 6.4 Financial Management |

Annex C: Earth Sciences Sector Office Directory

Geomatics Canada

Geodetic Survey Division

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

Legal Surveys and International Boundary Commission

615 Booth Street
Ottawa, Ontario
K1A 0E9
Telephone: (613) 995-4341
Fax: (613) 992-1122

Atlantic Customer Liaison Unit

136 Victoria Street East
Amherst, Nova Scotia
B4H 1Y1
Telephone: (902) 661-6766
Fax: (902) 661-6769

Ontario Customer Liaison Unit

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

Quebec Customer Liaison Unit

320 St. Joseph East
P.O. Box 51127 - G. Roy
Quebec, Quebec
G1K 8Z7
Telephone: (418) 648-5725
Fax: (418) 648-5728

Sherbrooke Office

Telephone: (819) 564-5785
Fax: (819) 564-5698

Western Regional Operations Centre

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

Alberta Customer Liaison Unit

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

Saskatchewan Regional Office

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

Manitoba Customer Liaison Unit

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

Northern Regional Operations Centre

Precambrian Building
52nd Street
Suite 4920
Box 668
X1A 2N5
Yellowknife, Northwest Territories
Telephone: (403) 669-3949
Fax: (403) 873-9949

Canada Centre for Remote Sensing

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

GeoAccess Division

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

Technology Assessment Division

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

**Manitoba Indian and Northern Affairs
Canada Land Claims Customer Liaison Unit**

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

British Columbia Regional Office

Regional Surveyor
1550 Alberni Street
Suite 800
Vancouver, British Columbia
V6G 3C6
Telephone: (604) 666-5320
Fax: (604) 666-0522

Yukon Customer Liaison Unit

Head, Client Services
300 Main Street
Room 225
Whitehorse, Yukon
Y1A 2B5
Telephone: (403) 667-3957
Fax: (403) 393-6709

Applications Division

588 Booth Street
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

Mapping Services Branch

615 Booth Street
Ottawa, Ontario
K1A 0E9
Telephone: (613) 947-0793
Fax: (613) 995-2000

Canada Centre for Topographic Information (Ottawa)

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

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: 1-800-661-2638

Aeronautical and Technical Services

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

Canada Map Office

615 Booth Street
Ottawa, Ontario
K1A 0E9
Telephone: (613) 952-7000
Toll Free Telephone: 1-800-465-6277
Fax: (613) 957-8861
Toll Free Fax: 1-800-661-6277

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Geological Survey of Canada

601 Booth Street
 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
 Ottawa, Ontario
 K1A 0E8
 Telephone: (613) 995-2340
 Fax: (613) 996-6575

GSC Atlantic

Geological Survey of Canada (Atlantic)
 Bedford Institute of Oceanography
 P.O. Box 1006
 Challenger Drive
 Dartmouth, Nova Scotia
 B2Y 4A2
 Telephone: (902) 426-3225
 Fax: (902) 426-1466
 email: agc@agc.bio.ns.ca

Terrain Sciences Division

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 Fax: (613) 992-0190

GSC Quebec

Geological Survey of Canada (Quebec)
 2535 Laurier Boulevard
 P.O. Box 7500
 Sainte-Foy, Quebec
 G1V 4C7
 Telephone: (418) 654-2604
 Fax: (418) 654-2615

GSC Calgary

Geological Survey of Canada (Calgary)
 3303-33rd Street N.W.
 Calgary, Alberta
 T2L 2A7
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 Fax: (403) 292-5377
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Minerals and Geoscience Branch

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 Telephone: (613) 995-4093
 Fax: (613) 996-6575

Continental Geoscience Division

601 Booth Street
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 Telephone: (613) 995-4314
 Fax: (613) 995-7322

Mineral Resources Division

601 Booth Street
 Ottawa, Ontario
 K1A 0E8
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 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

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ADM's Office

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**Policy, Planning, Information and
Services Branch**

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Fax: (613) 943-8296

Business Development

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Fax: (613) 995-8737

Human Resources Services

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Telephone: (613) 995-3377
Fax: (613) 995-0842

Sector Financial Advisor Office

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Quality Management Advisor

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Annex D:

List of Acronyms

CACS	Canadian Active Control System
CBN	Canadian Baseline Network
CCOG	Canadian Council on Geomatics
CCOP	Coordinating Committee for Coastal and Off Shore Geoscience Programs in East and Southeast Asia
CCRD	Canadian Council on Research and Development
CCRS	Canada Centre for Remote Sensing
CES	Cartographic Editing Systems
CFS	Canadian Forestry Service
CGDI	Canadian Geospatial Data Infrastructure
CGIS	Canadian Geodetic Information System
CGLBI	Canadian Geodetic Long Baseline Interferometry
CIDA	Canadian International Development Agency
CLS	Canada Lands Surveyor
CPCGN	Canadian Permanent Committee on Geographical Names
CSRS	Canadian Spatial Reference System
CTI	Centre for Topographic Information
DEM	Digital Elevation Model
DG	Director General
DIAND	Department of Indian Affairs and Northern Development
DND	Department of National Defence
EO	Earth Observation
ESA	European Space Agency
ESS	Earth Sciences Sector
EXTECH	Exploration Science and Technology Program
FIG	Fédération internationale des géomètres
FTE	Full Time Equivalent
FY	Fiscal Year
GHG	Green House Gases
GIS	Geographic Information Systems
GNP	Gross National Product
GPDP	Geomatics Professional Development Program

GPS	Global Positioning System
GSC	Geological Survey of Canada
GSD	Geodetic Survey Division
HRS	Human Resource Services
IACG	Inter-Agency Committee on Geomatics
ICA	International Cartographic Association
ICZM	Integrated Coastal Zone Management
IERS	International Earth Rotation Service
IFR	Instrument Flight Rules
IGB	International Gravimetric Bureau
IGeS	International Geoid Service
IGS	International GPS Service for Geodynamics
INRS	Institut nationale de la recherche scientifique
ISPRS	International Society for Photogrammetry and Remote Sensing
IT	Information Technology
IT&T	Information Telecommunications and Technology
LINC	Land Information Network for Canada
MAP	Multi-national Andean Project
MDA	Mineral Development Agreement
MERA	Mineral Evaluation and Review Assessment
MITE	Metals in the Environment
MNABES	Minister's National Advisory Board on Earth Sciences
MOU	Memorandum of Understanding
NADSA	National Space and Development Agency
NASA	National Aeronautics and Space Administration
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 System
NWT	Northwest Territories
ODP	Ocean Drilling Program
OEA	Office of Economic Adjustments
OGD	Other Government Department
PCSP	Polar Continental Shelf Project
PMIS	Project Management Information System
PPIS	Policy, Planning, Information and Services
R&D	Research and Development
RF	Revolving Fund
S&T	Science and Technology
SAR	Synthetic Aperture Radar
SFAO	Sector Financial Advisor Office
SHRIMP	Sensitive High Resolution Ion Microprobe
SMT	Sector Management Team
UN	United Nations

USGS	United States Geological Survey
VLBI	Very Long Baseline Interferometry
WCSB	Western Canada Sedimentary Basin
WWW	World Wide Web

GSC/CGC OTTAWA



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Earth Sciences Sector Success Stories (Cont'd)

- Scintrex Ltd., of Concord, Ontario, is offering HeliGrav™, a fully integrated, helicopter-borne gravity mapping system for cost effective, long line regional gravity surveys in environmentally sensitive areas, as a commercial service. ESS, through the Geodetic Survey's gravity program, contributed to the development of software for the state-of-the-art GPS point positioning system employed by HeliGrav™.
- A generalized model has been developed at the Canada Centre for Remote Sensing for the geometric correction of remotely sensed data which is applicable to a large number of data types from different satellites. The techniques have been transferred to industry and more than 700 licences have subsequently been sold.
- The Legal Surveys and International Boundary Commission published the Third Edition of the *Manual of Instructions for the Survey of Canada Lands*. The manual streamlines the contracting process for surveys on Canada Lands and updates requirements to meet current legislation and technological advances.
- The Inter-governmental Geoscience Accord was signed at the 1996 Mines Ministers' Conference. The Accord, which was developed by the National Geological Surveys Committee to increase collaboration in geoscience programming across Canada, defines the respective roles and responsibilities of the federal, provincial and territorial governments in planning and delivering geoscience programs, and provides a framework for detailed bilateral agreements between the Geological Survey of Canada and provincial geological surveys.
- The Geological Survey of Canada's reinterpretation of the geology of western Newfoundland generated over \$60M in exploration and drilling in the area.
- The Polar Continental Shelf Project, in partnership with the Department of National Defence and Environment Canada, participated in a major initiative to clean up old scientific field sites scattered throughout the Arctic. More than 10 000 old and unused oil drums have been removed from abandoned sites during the past two years. By sharing resources to undertake the clean-up, the agencies involved have saved hundreds of thousands of dollars.
- The National Working Group on Excellence in Geomatics, managed by ESS Business Development, has provided direct support to competitiveness for Canadian geomatics agencies. It has conducted educational seminars on quality management in 10 Canadian cities, distributed a Quality Charter to more than 200 committed agencies, written and published a geomatics handbook on ISO 9000 and delivered it to more than 900 requesters, and co-funded investigation studies for 35 Canadian agencies interested in ISO 9000 accreditation.
- A significant new massive sulphide discovery in a Bathurst, New Brunswick mining camp resulted from exploration over a geophysical anomaly detected in airborne surveys in the Geological Survey of Canada's EXTECH II program carried out in cooperation with the New Brunswick Geological Surveys Branch to help extend the mining life of this region.
- The Geodetic Survey Division has developed the Canadian Active Control System (CACS), a unique and effective enhancement of the Global Positioning System (GPS), to provide satellite positioning for the Canadian landmass. CACS consists of a network of automated GPS tracking stations and data processing and distribution facilities to satisfy precise navigation and positioning needs.

