

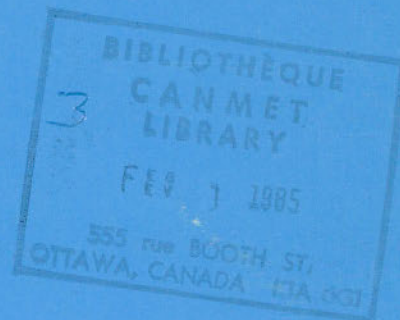
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Energy, Mines and  
Resources Canada

Énergie, Mines et  
Ressources Canada

# Annual Report 1983~1984

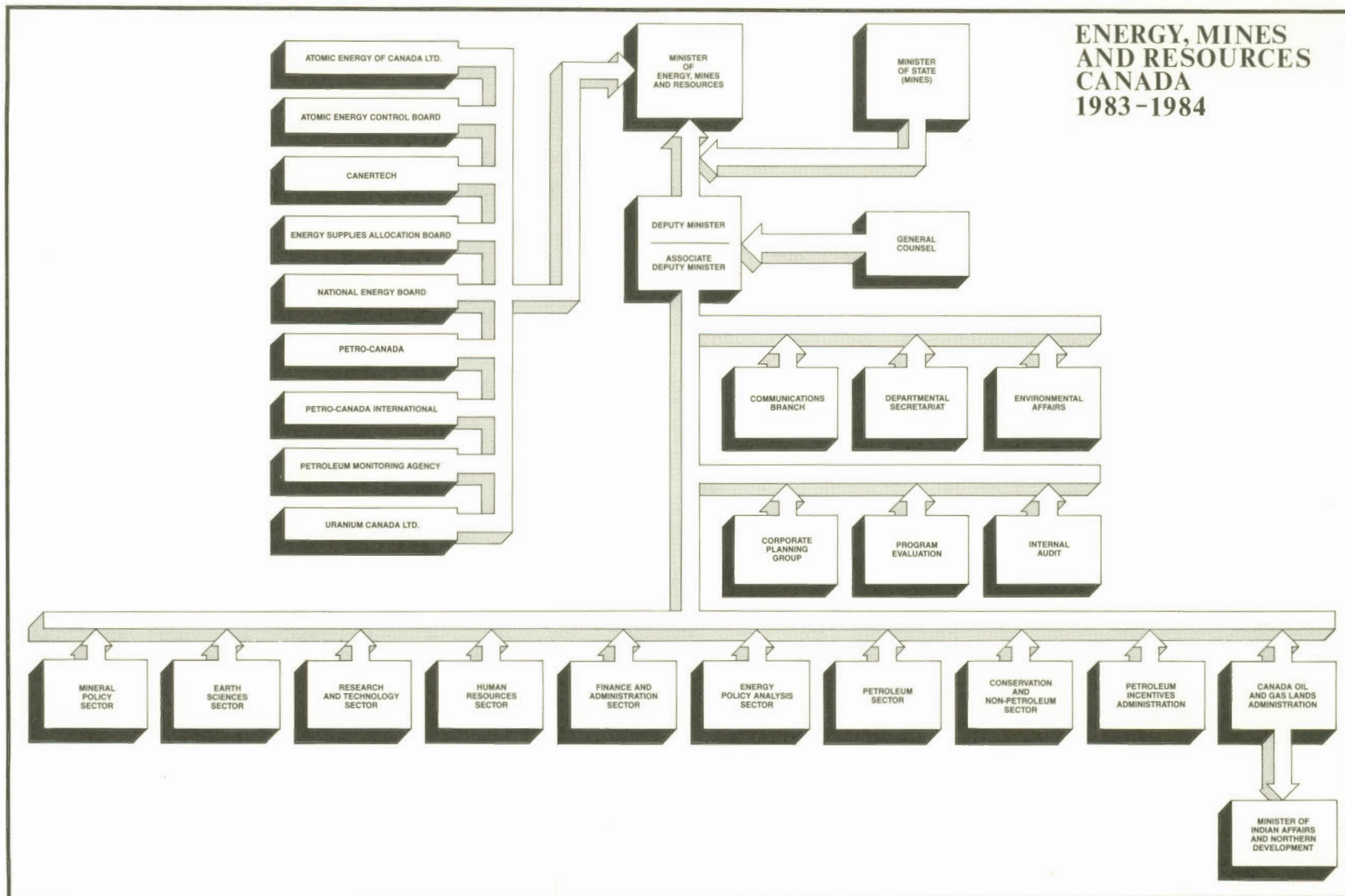


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Canada

# ENERGY, MINES AND RESOURCES CANADA 1983-1984





## **LETTER FROM THE MINISTER**

To Her Excellency the Right Honourable Jeanne Sauv , Governor General  
of Canada:

MAY IT PLEASE YOUR EXCELLENCY:

I have the honour to present to Your Excellency the Annual Report of the  
Department of Energy, Mines and Resources for the fiscal year ended  
March 31, 1984.

This report outlines departmental objectives and highlights for the  
1983-84 fiscal year and provides a detailed review of operations for  
the department's three programs – Energy, Minerals and Earth Sciences and  
Administration.

Respectfully submitted,

A handwritten signature in cursive script that reads "Pat Carney". The signature is written in dark ink and is positioned above the printed name and title.

Pat Carney  
Minister of Energy, Mines  
and Resources

# ***CONTENTS***

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Departmental Profile	1
EMR 1983–1984: The Year at a Glance	2
Energy Program	4
Minerals and Earth Sciences Program	11
Administration Program	19
Crown Corporations and Agencies	21
Financial Summary	22
Regional Information Offices	23



## DEPARTMENTAL PROFILE

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The Department of Energy, Mines and Resources consists of three major programs: one covers the field of energy; another deals with matters relating to minerals and earth sciences; the third, administration, provides common services to the department.

### Energy Program

In working towards the goal of self-sufficiency, the Energy Program divides its work into three sectors and two administrations: Energy Policy Analysis, Petroleum, and Conservation and Non-Petroleum Sectors; and Petroleum Incentives Administration and Canada Oil and Gas Lands Administration. This program recommends, coordinates and implements energy policies and programs covering the development, production, transportation and processing of resources, and their conservation and use. Activities of the Energy Program include:

- establishing federal energy policies, strategies and activities with regard to their impact on Canadians and Canada's international energy relations;
- ensuring that sources of petroleum are developed;
- administering programs that implement the policy of a single national oil price;
- planning policies and programs for distributing energy supplies equitably in a national emergency;
- ensuring that sources of nonpetroleum energy are developed;
- maintaining effective policies and programs to use and conserve energy effectively;
- monitoring and analyzing developments affecting the petroleum industry;
- contributing to increased Canadian ownership and control of the petroleum industry;
- ensuring that the Canadian public obtains maximum benefit from mineral, oil and gas rights on Canada Lands, and that Canada has the research capabilities to support energy strategies;

- increasing public awareness and understanding of federal energy policies and programs and their social and economic effects.

### Minerals and Earth Sciences Program

The Minerals and Earth Sciences Program develops mineral policies and strategies, assesses the structure and properties of Canada's landmass, and is involved in surveying and mapping. The program is divided into three sectors: Mineral Policy, Earth Sciences, and Research and Technology. Activities of this program include:

- establishing policies and strategies to ensure that the minerals and metals sector contributes with maximum effect to the economy of Canada;
- ensuring that adequate technology is available to extract, process, use and conserve energy and mineral resources;
- contributing to the scientific investigation of Canada's Polar Continental Shelf;
- improving technologies of remote sensing;
- ensuring that technology, expertise and geophysical data are available on the geology of Canada, and the configuration and evolution of the solid earth;
- ensuring the availability of geodetic, topographic and selected geographic information;
- increasing public awareness and understanding of federal mineral and earth science programs.

### Administration Program

The Administration Program ensures that departmental programs are effectively managed and accounted for and maintains a central support service. The Administration Program includes two sectors: Finance and Administration and Human Resources. Activities include:

- ensuring that the department makes the best use of its allocated resources;
- providing advice and support in personnel management, finance, general administration and electronic data processing;
- advising on departmental plans to achieve equality of opportunity for women, natives and handicapped persons.

The Communications Branch, which reports to the Deputy Minister, provides broad communications and public relations support to all sectors. Its activities include:

- providing communications advice and marketing services to departmental programs;
- analyzing public information requirements;
- publishing material for program support, education and public relations, and scientific reports and books;
- providing audiovisual and advertising support for departmental programs;
- supplying information to the media;
- arranging exhibitions.

Four executive offices report to the Associate Deputy Minister. The Corporate Planning and Analysis Group develops the planning process, structure and timetable for the department in response to internal requirements and the demands of central agencies. The Program

## EMR 1983-84: THE YEAR AT A GLANCE

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Evaluation Branch examines and reports on the relevance of program component objectives and the effectiveness in achieving them. The Internal Audit Branch provides an independent review and appraisal of all departmental operations. The Office of Environmental Affairs participates in the development of broad environmental policies relating to energy and mineral strategies.

- EMR negotiated amendments to oil and natural gas pricing and taxation agreements (originally signed in 1981) with Alberta, Saskatchewan and British Columbia.
- Under the Alberta amendment, the definition of oil qualifying for the New Oil Reference Price (NORP) was extended to provide the international price to certain categories of 'old' oil. At the end of the fiscal year, 44 per cent of domestic production was receiving the world price through NORP.
- Under the natural gas agreement with Alberta, amendments to gas pricing ensured a 65 per cent gas-to-crude oil price ratio until at least January 31, 1985. The Government of Canada moved to reduce the impact of increases in the cost of transporting natural gas to eastern Canada until that date.
- Negotiations continued towards implementing the Canada - Nova Scotia Agreement on the offshore (Sable Island - Venture), which was signed originally in March 1982. The Canada - Nova Scotia Offshore Oil and Gas Board was established to manage the agreement.
- Negotiations and subsequent agreements were completed with sponsors of Wolf Lake, Cold Lake and Elk Point oil sands projects in Alberta, and a heavy oil upgrading plant in Saskatchewan.
- Under the Distribution System Expansion Program (DSEP), almost 700 projects extended gas services to communities in British Columbia, Saskatchewan, Manitoba, Ontario and Quebec.
- To counter the pressure of declining exports, the Government of Canada set up the Volume-Related Incentive Price (VRIP), which allowed natural gas to be exported at two prices.
- The Trans Quebec & Maritimes pipeline began deliveries of gas to Quebec City in the late summer of 1983. The Natural Gas Laterals Program, meanwhile, funded laterals to Bécancour, Shawinigan and several communities in the Eastern Townships.
- Through planning, conservation measures and off-oil conversions, the Canadian Industry Program for Energy Conservation (CIPEC), a network of 16 voluntary energy management task forces, recorded saving the energy equivalent of 9.6 million cubic metres of oil.
- The R-2000 Super Energy Efficient (SEE) home program entered its second phase in 1983 when Cabinet approved a \$50 million, seven-year program extension to ensure that SEE housing becomes self-sustaining by 1990.
- By year-end (March 31, 1984), the conversion or purchase of 32 300 propane vehicles had been supported by government assistance. Propane displaced about 260 million litres of gasoline a year. In addition, considerable support was directed towards the promotion of natural gas as a vehicle fuel.
- The Government of Canada approved a new \$80 million cost-sharing demonstration program aimed at accelerating the commercialization of new alternative energy and conservation technologies.
- Planning began for Lepreau 2, a second 600 MW unit on the same site as New Brunswick's Point Lepreau CANDU reactor.
- During the fiscal year, 73 exploration agreements, ranging from three to five years, were concluded on the Canada Lands. This represented a total financial commitment of about \$4.7 billion. At the same time, 101 new exploration and development wells were authorized on the Canada Lands.

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- Within the context of the Economic and Regional Development Agreements (ERDA), a mineral development sub-agreement was signed with Manitoba, through which the federal and provincial governments are undertaking complementary programs to strengthen and diversify the province's mineral industry. At year-end, negotiations were well advanced on similar sub-agreements with Saskatchewan, New Brunswick, Nova Scotia, Newfoundland, Ontario and British Columbia.
  - Funding was announced to establish an asbestos institute in Montreal, a joint Canada-Quebec-industry project to study the safe use of asbestos.
  - Discussions were held with Canadian nickel producers on the creation of an international nickel institute. Only limited resources have been devoted in recent years to the research and promotion of new uses for nickel.
  - Analysis teams from the Geological Survey of Canada (GSC) were able to determine the ultimate oil and gas potential of the Sverdrup Basin. Similar analysis led to refined assessment of the Beaufort Sea Basin's potential.
  - Cooperative studies began on metalliferous deposits on spreading ocean ridges. University and Government of Canada scientists developed plans for research on those parts of the Juan de Fuca and Explorer ridges that are in Canadian waters.
  - GSC placed increased emphasis in 1983-84 on marine geological work, in keeping with Canada's expanded offshore economic zone and the need for information on offshore nonrenewable resources and the geological constraints and hazards to their development.
  - The Sherbrooke Institute of Cartography was established by EMR to work on further development of digital cartography, computer processing of geographical information, and application of new techniques, such as satellite remote sensing, to mapping.
  - The Topographical Survey Division (Surveys and Mapping Branch) acquired a new Cartographic Data Processing System for the automated digitizing of topographic information. It also started pilot projects to exchange digital topographic data with the Maritimes, Alberta and Ontario.
  - The Canadian Expedition to Study the Alpha Ridge (CESAR) wound up its work. The Earth Physics Branch was the lead scientific organization for the multidisciplinary operation, and the Polar Continental Shelf Project provided coordination and logistical support. (The Alpha Ridge is an extensive undersea formation off the northeast tip of Ellesmere Island.)
  - The Division of Gravity, Geothermics and Geodynamics (Earth Physics Branch) added more than 11 000 new stations to the national gravity database.
  - The Canada Centre for Mineral and Energy Technology (CANMET) implemented the Short Term Assistance in Research and Technology (START) program, which provides increased research and development assistance to the Canadian mineral industry.
  - CANMET continued its emphasis on technologies to improve the processing and use of Canadian coals, heavy oils, tar sands and bitumen. The centre also continued its reassessment of Canadian uranium reserves.
  - The Combustion and Carbonization Research Laboratories (CCRL) carried out research and technology on the direct use of fossil fuels. Included were programs on basic research, pilot plant scale R&D, and commercial scale demonstrations. Other work completed by the laboratories included identifying the gasification characteristics of Canadian coals, and the hydro-treating studies of synthetic crude distillates made from Canadian oils and bitumens.
  - The Synthetic Fuels Research Laboratory continued R&D on the production of synthetic fuels from oil sands bitumens, heavy oil and coal. A pilot plant program was begun to support CANMET's hydrocracking demonstration plant, which is scheduled to open in 1985.
  - The Canada Centre for Remote Sensing (CCRS) completed mission requirements, conceptual design studies and economic assessments of RADARSAT, Canada's remote sensing satellite, scheduled for launching in 1990. CCRS received agreement from the United States and the United Kingdom for collaboration in the program.



# ENERGY PROGRAM

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## Energy Policy Analysis Sector (EPAS)

In its continuing review of the broad energy policy picture, the Energy Policy Analysis Sector focused on the impact of falling world oil prices and softening markets on the government's energy pricing and revenue-sharing policies, and on its wider objectives of energy security, opportunity for Canadian participation and fairness.

Federal-provincial agreements with producing provinces were amended to take account of changed circumstances, including a modification of previously specified price increases and measures to make natural gas a more attractive alternative to oil. Federal and provincial governments reached agreements with industry operators on three oil sands projects in Alberta and a heavy oil upgrader in Saskatchewan. Considerable attention was given to the difficult climate for natural gas exporters, and progress was made towards giving legislative effect to the agreement with Nova Scotia on offshore resources management and a revenue-sharing scheme.

## Energy Strategy Branch

The branch recommends federal energy policies, strategies and activities and keeps the Government of Canada aware of continuing and anticipated energy developments. It provides direction and background analysis for energy policy initiatives that have an overall or strategic impact. The branch forecasts Canada's energy supply-demand balance and monitors federal, provincial, territorial and industry activities.

In 1983-84, Energy Strategy provided advice on and actively participated in:

- negotiations with producing provinces that resulted in amendments to the 1981 agreements covering petroleum pricing (Canada-Alberta Amendment, June 1983; Canada-Saskatchewan Amendment, August 1983; Canada – British Columbia Amendment, April 1984);
- negotiations with Nova Scotia that continued towards the tabling of legislation to implement the Canada – Nova Scotia Agreement on the offshore (signed March 1982).

The branch also provided advice on policy implementation to the Canada – Nova Scotia Offshore Oil and Gas Board, to the Policy Review Committee of the Canada Oil and Gas Lands Administration, on various resource-related aboriginal land claims issues, on new and existing expenditure programs, and on major oil and gas projects in the North and east coast offshore. Energy Strategy completed a new supply-demand forecast in July 1983 as part of the department's long-term energy planning, and continued to maintain the *Energy Statistics Handbook*, a vital historical record of energy use.

## Financial and Fiscal Analysis Branch

The branch analyzes and recommends energy sector policies concerning revenue sharing, industry investment and rates of return, project evaluation, and energy taxation and incentives. It maintains an information system on provincial fiscal regimes and energy corporations. In 1983-84 the branch's activities involved:

- playing a key role in the negotiations and subsequent agreements with the sponsors of Wolf Lake, Cold Lake and Elk Point oil sands projects in Alberta and a heavy oil upgrading plant in Saskatchewan;

- participating in negotiations to amend the 1981 oil pricing and taxation agreements with the provinces of Alberta, Saskatchewan and British Columbia; and
- producing the background paper, *Petroleum Fiscal Systems in Canada — A Summary*.

## Corporate Development and Economic Analysis Branch

The branch provides policy analysis and advice on economic aspects of energy issues, electrical and nuclear policy, Canadianization of the oil and gas industry, energy-related Crown corporations, management of the energy envelope (which represents the resources allocated by Cabinet to energy-related programs), and existing and proposed departmental programs and initiatives. Activities in which the branch was involved in 1983-84 included:

- advising on the proposed Dome Petroleum Limited and Turbo Resources Limited financial restructuring;
- acting as the government contact point for Co-enerco, an oil and gas company joint venture between the Government of Canada and an association of cooperative financial and marketing institutions;
- conducting project evaluations of proposals to export firm power to the United States and to sell nuclear reactors abroad;
- coordinating economic and financial analyses concerning certain segments of the petrochemical industry;
- producing a new quarterly publication entitled *Economic Indicators and Analysis* which provides current analysis and information on the Canadian economy in general and the energy sector in particular;

- conducting studies to assess the economic effects of a disruption of world oil supplies on the Canadian economy, and developing proposals to alleviate economic losses;
- conducting a major review of the department's demand side energy programs; and
- reassessing Canada's policies with respect to oil import security.

### **International Energy Relations Branch**

The branch has two divisions, Multilateral and Bilateral Energy Relations, and Special International Projects. These divisions, in cooperation with the Department of External Affairs, ensure the effective management and coordination of Canada's energy relations with other countries and international organizations. Activities in 1983-84 included:

- participation in such bodies as the International Energy Agency (IEA) and a variety of preparations for other multilateral forums such as the Organization for Economic Cooperation and Development (OECD);
- a working group on energy and raw materials with France;
- two meetings of the Energy Consultative Mechanism which exists with the United States;
- a Canada-Japan economic meeting and a Canada-Mexico economic meeting;
- Canada-European Community semiannual consultations; and
- ministerial visits between Canada and Algeria, China, Mexico, Nicaragua, Pakistan, Portugal, Sweden, United States and Venezuela.

The branch worked closely with Petro-Canada International Assistance Corporation in providing advice on corporate plans and loans policy.

### **Energy Policy Coordination Branch**

The branch identifies energy issues of the day in preparation for the Minister's responses in Question Period and provides documentation for parliamentary debates and committees. On an ongoing basis it evaluates programs in the context of trends in the domestic and international economies, and coordinates strategic policy planning activities. In 1983-84 the branch continued to conduct a monthly survey of energy developments in Canada and abroad to assist in program planning and evaluation. New policies and programs, initiated by eight energy bills approved by Parliament in 1982, were fully implemented in the Energy Program and a number of regulations were made by Governor-in-Council.

### **Petroleum Sector**

The Petroleum Sector was concerned particularly with problems of oil and gas markets. A Volume-Related Incentive Price (VRIP) for export gas was implemented and, towards year-end, a Domestic Incentive Plan, applicable to large gas consumers east of Alberta, was in the final negotiating stages. In both cases, close consultation was maintained with provincial governments.

Utilization of developed Canadian crude oil resources was at an exceptionally high level, despite weak international markets.

In the area of petroleum utilization, analysis and advice relative to questions of feedstock supply and price for the petrochemicals industry were major preoccupations.

### **Natural Gas Branch**

The Natural Gas Branch encourages substitution from oil to Canada's abundant natural gas supplies. Under the Distribution System Expansion Program (DSEP), almost 700 projects extended gas service to communities in British

Columbia, Saskatchewan, Manitoba, Ontario and Quebec.

In Quebec, Trans Quebec & Maritimes Pipeline Inc. began deliveries of gas to Quebec City in the late summer. The Natural Gas Laterals Program enabled Gaz Inter-Cité Québec Inc. to construct laterals to Bécancour, Shawinigan and several communities in the Eastern Townships. The Gas Marketing Assistance Program (GMAP) helped Quebec distributors reduce the contracting risks associated with the rapid expansion of gas markets.

The 1981 energy pricing agreement with Alberta was amended in June 1983. The new provisions for domestic gas pricing ensure maintenance of the 65 per cent gas-to-crude oil price ratio until at least January 31, 1985. As part of its obligation to maintain that objective, the Government of Canada undertook to reduce the impact of increases in the cost of transporting natural gas to eastern Canada until that time. The required Transportation Assistance Program was implemented February 1, 1984.

The Government of Canada received, from the Government of Alberta, Market Development Incentive Payments, which are used to fund several gas expansion initiatives in provinces east of Alberta, including GMAP and DSEP.

Because of a lower world crude oil price, the Government of Canada reduced the gas export border price to \$US 4.10 per gigajoule on April 11, 1983. Further, to counter the pressure of declining exports and after consultations with the producing provinces and industry, VRIP was established effective July 6, 1983. This program allows gas to be exported at two prices, a base price of \$US 4.10 per gigajoule for the prescribed base quantity and an incentive price of \$US 3.17 per gigajoule for volumes above the base quantity. Consultations continued with a view to determining the best gas export

pricing strategy for Canada following the expiry of VRIP on October 31, 1984.

### **Oil Supply Branch**

The branch analyzes Canada's oil supply requirements from domestic and international sources, and provides policy advice to enhance security of supply and to maximize use of domestic resources.

World oil price reduction resulted in much lower Canadian oil import costs in 1983-84, despite a marginal increase in the volume imported.

Canadian crude oil production rose 6.3 per cent over the year. This performance in the face of a continued decline in Canadian consumption (down 1.5 per cent), was the result of increased heavy crude oil exports, a resumption of light crude oil exports and a significant drop in shut-in crude oil productive capacity. As a result, Canada became a net oil exporter (excluding liquefied petroleum gases) for the first time since 1974. Exports of crude oil and refined products exceeded imports by 19 200 cubic metres per day over the year.

### **Petroleum Resources Branch**

The Petroleum Resources Branch supplies information, analysis and advice on all aspects of the upstream oil industry from land tenure, geology, geophysics, exploration and development drilling to reserves and production of oil and gas in Canada and in foreign countries. Major activities during the year included resource assessments of conventional and frontier oil and gas, enhanced oil recovery and oil sands analyses, engineering and supply costing of future oil and gas developments, and management of federal research programs for oil and gas.

### **Petroleum Utilization Branch**

The Petroleum Utilization Branch monitors the operational and economic performance of the downstream sector of the industry and advises on policy to

ensure efficient utilization of domestic and imported petroleum resources.

A continuing decline in demand for petroleum products, intense marketplace competition and increasing operating costs resulted in actual financial losses for the refining/marketing sector in 1983. This forced the industry in Canada to reduce further this refining capacity and improve the efficiency of its operations. Sufficient capacity remains to provide an adequate supply of petroleum products.

The branch also participated in the policy-making process to encourage upgrading of domestic heavy crude oil resources and to improve the viability of the petrochemical industry.

### **Oil Pricing and Compensation Programs Branch**

The Oil Pricing and Compensation Programs Branch administers the programs central to a made-in-Canada oil price policy.

The Oil Import Compensation Program was established in 1974 to protect the Canadian consumer from the impact of the rapid increase in imported crude oil prices. Compensation is based on the difference between importers' costs and the regulated Canadian oil price.

The New Oil Reference Price (NORP) was introduced in January 1982 and extended the international price to domestic producers of high-cost conventional and synthetic crude oil. The definition of oil qualifying for NORP has been expanded since the original Memorandum of Agreement between the Government of Canada and the Government of Alberta Relating to Energy Pricing and Taxation of September 1, 1981. To improve industry cash flow, the Special Old Oil Price (SOOP), was introduced July 1, 1982 and provided 75 per cent of the international price to certain categories of oil. This oil qualified for NORP when the Amendment to the

Memorandum of Agreement was signed in June 1983. At the end of the fiscal year, 44 per cent of domestic production was receiving world price through NORP.

In response to the problem of shut-in crude oil, the branch administers the Domestic Transfer Compensation Program, under which the transportation costs associated with moving Canadian crude east of Montreal are subsidized. This increased the utilization of Canadian crude and also cut back on more costly imported oil. A related program aimed at maximizing domestic crude oil production is the Crude Oil Exchange Compensation Program, under which financial assistance is available for crude exchanges between eastern Canadian and US refineries. The aforementioned programs are financed through revenue generated by the Petroleum Compensation Charge (PCC), which is applied on all petroleum consumed in Canada. Through the Petroleum Compensation Account, the PCC is established at a level intended to achieve a balance between revenues and expenditures over the term of the Memorandum of Agreement (to December 31, 1986).

### **Energy Emergency Planning Group**

The Energy Emergency Planning Group began designing an organization framework for a National Emergency Agency for Energy. The group also provided staff support for the Energy Supplies Allocation Board and Canadian representatives to groups concerned with energy emergency planning in the North Atlantic Treaty Organization and International Energy Agency (IEA).

### **Energy Supplies Allocation Board (ESAB)**

The major activity for ESAB in 1983-84 was participation in the fourth

international test of the IEA Emergency Oil Sharing System.

Canada was a member of a small group comprising representatives of seven governments and six petroleum companies who worked out procedural details and wrote the test guide.

The test imagined that political disturbances caused shortages of certain international crude oil supplies. The impact of this disruption varied from country to country, with the average monthly shortage in Canada being 2 per cent compared with 16 per cent for the entire IEA.

Under these circumstances, Canada had an obligation to give up crude oil and petroleum products to the IEA pool so that the shortage in all countries would be no more than 10 per cent of the base period consumption.

The five oil-producing provinces and 23 Canadian oil companies took part in the test led by ESAB staff.

The exercise provided a good test of the mechanics of the Emergency Sharing System and demonstrated Canada's ability to participate fully in it.

Other ESAB activities were a review and redrafting of Allocation Program manuals, the development of the ration coupon distribution system, and continued participation in the Interprovincial Advisory Committee on Energy, Subcommittee on Demand Restraint.

## **Conservation and Non-Petroleum Sector**

The Conservation and Non-Petroleum Sector (CNP) contributes to the security-of-supply objective of national energy policies by improving efficiency in the end use of all sources of energy and by enhancing the sources and uses of non-petroleum energy. CNP has four branches: Energy Conservation and Oil

Substitution, Coal and Alternative Energy, Electrical Energy, and Uranium and Nuclear Energy.

### **Energy Conservation and Oil Substitution Branch**

The branch provides information, analysis and policy advice, and delivers several programs relating to energy conservation and oil substitution in home and industry, federal energy management, and technology transfer and demonstration.

Conservation and Renewable Energy Offices (CREOs) in each province and territory assist in program delivery.

Two of the branch's most familiar programs are the Canadian Home Insulation Program (CHIP) and the Canada Oil Substitution Program (COSP), which help Canadian homeowners to reduce costs by insulating and by switching from oil to alternative fuels.

CHIP grants of up to \$500 are available to all homes built before September 1977 — some 7.3 million housing units. About one third of these homes received grants to March 31, 1984, conserving the energy equivalent of 1.4 million cubic metres of oil per year.

COSP contributes half the cost of converting from oil to other fuels to a maximum grant of \$800 per individually heated unit. The program began in 1981, and has contributed towards conversion of almost 750 000 housing units, displacing 2.4 million cubic metres of oil per year.

The branch helps industry and commerce to plan and implement conservation measures and to convert from oil fuels. The Canadian Industry Program for Energy Conservation (CIPEC), a network of 16 voluntary energy management task forces, saved the energy equivalent of 9.6 million cubic metres of oil during 1983-84. Additional energy conservation task forces have been formed for health care facilities, the

distributive trades, office buildings, agriculture, postsecondary education, and the hospitality industry.

In 1983-84, the former National Energy Audit Program (NEAP), which was administered under federal-provincial agreements, was replaced by the federally delivered Canada Energy Audit Program (CEAP). This new program provides energy audits, financial assistance for consulting services, and energy management seminars and workshops.

The amount of energy, especially oil, consumed by federal buildings and institutions is lessening. The Internal Energy Conservation Program has, since its inception in 1975, realized an overall 22 per cent reduction in energy use, far surpassing its original target of 10 per cent below the 1975 base year. The Federal Internal Off-Oil Program in its first three years of operation achieved more than half of its oil reduction goal. The program, begun in 1981 and scheduled to run until 1991, funds promising projects to convert energy systems from oil to less costly and more abundant fuels. Finally, the Federal Internal Retrofit Program, announced in 1980, continues to fund projects whose payback in terms of energy saved is less than five years.

The Technology, Transfer and Demonstration Division, in cooperation with the Canadian Home Builders Association established the second phase of the Super Energy Efficient (SEE) home program in 1983. The initial program funded the construction of 300 demonstration homes incorporating standards of airtightness and insulation that can reduce energy consumption by 75 per cent. In 1983, Cabinet approved a \$50 million, seven-year extension of the program to ensure that the construction of SEE housing becomes self-sustaining by 1990.



The Buildings Energy Technology Transfer Program (BETT) disseminates practical knowhow on energy-conscious building construction, operation and retrofit to Canadian businesses. The current emphasis is on the residential, retail, office, warehouse and restaurant sectors.

### **Coal and Alternative Energy Branch**

This branch provides information, analysis and policy advice, and delivers several programs relating to coal, renewable energy and transportation energy.

The Coal Utilization Program, introduced in 1980, supports demonstration projects to encourage the commercialization of technologies for the efficient and environmentally sound use of coal. One of the program's earliest ventures was the fluidized-bed combustion of coal and wood chips at the Canadian Forces base in Summerside, PEI, now nearing completion of the commissioning trials. Materials testing for bubbling fluidized-bed combustion is under way at Point Tupper, NS, as is a study of the potential for circulating fluidized-bed combustion in utilizing New Brunswick oil shale to capture sulphur in high-sulphur Atlantic coals. Funds have also been provided to the Canadian Electrical Association to assist in the development of flue gas desulphurization technologies suited to Canadian utility plants.

The largest demonstration, worldwide, of coal-water mixture fuels was achieved at Chatham, NB, using fuel manufactured at Sydney, NS. Extensive evaluation of burning and handling technology has brought coal-water fuels much closer to commercialization.

Under the federal-provincial Conservation and Renewable Energy Demonstration Agreements (CREDAs),

the Government of Canada committed \$15 million to cofund more than 350 demonstration projects during 1983-84. The ENERDEMO program for Quebec approved six projects and a similar demonstration program for Prince Edward Island approved five projects. Also, 50 community energy studies were initiated under the Remote Community Demonstration Program (RCDP).

In 1984, the Government of Canada approved a new \$80 million cost-sharing demonstration program aimed at accelerating the commercialization of new alternative energy and conservation technologies. This five-year national program will replace the federal-provincial CREDAs and encompass activities under ENERDEMO-Quebec, RCDP, and the PEI demonstration program.

The Forest Industry Renewable Energy (FIRE) program offers financial incentives to businesses and industries to utilize biomass as a source of fuel. During 1983-84, \$5 million was approved to fund 30 projects. Since the program began in 1978, EMR has committed \$77.2 million to projects, while industry has invested more than \$400 million. When all projects have been completed, the equivalent of 1.3 million cubic metres of oil per year will be displaced.

In 1983, the ministers of Energy, Mines and Resources and Transport informed the motor vehicle industry of their intention to continue the voluntary program of fuel consumption standards for new vehicles. Legislation passed in 1982 empowers the Governor-in-Council, acting on the ministers' recommendations, to make the program mandatory if necessary. Since the program was established in 1978, the average fuel efficiency of new vehicles sold in Canada has improved by about 30 per cent.

The branch also encourages conservation by promoting ridesharing.

Many carpools and vanpools have been established by employers, municipalities and individuals across Canada. EMR has provided direct assistance for the establishment of the Montreal Ridesharing Centre.

To encourage the use of alternative fuels in Canada, the branch manages programs for propane and natural gas. By April 1, 1984, the conversion or purchase of 32 300 propane vehicles had been assisted at a cost of \$13.19 million. This meant the displacement of about 260 million litres of gasoline in a year. In addition, support was provided to 300 natural gas vehicles and 29 natural gas refueling stations. A total of \$651 850 was spent in 1983-84 on support to natural gas as a vehicle fuel.

Federally supported demonstrations on the use of alcohol fuels, alone and in blends with gasoline, are under way in Manitoba and Ontario as part of a major effort to assess the potential of these fuels.

### **Electrical Energy Branch**

The Electrical Energy Branch provides policy advice, information and analysis on the electrical industry in Canada. Advice is complemented by developing, negotiating and managing agreements with electrical utilities, provinces and industry organizations. Also, the branch provides policy advice on the role of electricity in the context of total energy supply, and considers priorities to develop domestic and export markets and to improve the efficient use of electricity, which continues to expand its share of total energy supply.

Major issues in 1983-84 included the Churchill Falls power contract, electricity supply to Prince Edward Island, the Skagit Valley Treaty, the Alberta Slave River Project and the Manitoba Port of Churchill transmission extension.



The branch was involved in administering a Canadian Electrical Association research and development program, particularly with reference to electricity utilization. It also participated in an electricity study undertaken by the International Energy Agency. Agreements managed by the branch included Lepreau 1 financing, the Coleson Cove (New Brunswick) Compensation Agreement and the Coleson Cove Conversion Study. The latter item involves consideration of conversion of this modern oil-fired plant to coal fueling.

The branch collects and distributes information on industry activities and future plans and publishes *Electric Power in Canada* annually.

## Uranium and Nuclear Branch

This branch provides policy advice, information and analysis on the nuclear industry, the uranium industry and radioactive waste management. It coordinates the activities of the Uranium Resource Appraisal Group, which assesses Canadian uranium resource and production capability levels.

During the year, the branch published its biennial review, *Uranium in Canada: 1982 Assessment of Supply and Requirements*. The branch has a lead role in the Uranium Exports Review Panel, which reviews export contracts and advises ministers whether the contracts are consistent with the government's uranium export policy.

Ministers completed a review of uranium export policy and concluded that uranium supply for Canada's nuclear program was reasonably secure. Minor modifications were made to the criteria for assessing the commercial terms in export contracts. The policy on further processing of uranium was reaffirmed, as was the overall policy objective of maintaining Canada's role as a reliable, long-term supplier of uranium.

In the nuclear power area, the outstanding performance of Lepreau 1 increased the interest in building Lepreau 2, a second 600 MW unit on the same site. It is intended to be a fully commercial project based on export contracts to US utilities. The branch coordinated the federal government's approach to the project.

The branch continued discussion with the provinces on jurisdiction over low level radioactive wastes, and secured agreements on joint cleanup efforts for low level wastes in several provinces.

## Petroleum Incentives Administration

Petroleum Incentives Administration (PIA) administers the Canadian Ownership and Control Determination (COCD) Act and the Petroleum Incentives Program (PIP) Act. The two Acts aim to increase Canadian ownership and control of the petroleum industry and strengthen Canada's energy security. The COCD program issues certificates stating Canadian Ownership Rate (COR) and Control Status (CS) of applicants. PIP provides cash incentives for exploration and development expenses on a scale linked, among other factors, to the applicant's COR and CS.

Several amendments were made to PIP and COCD regulations. To assist industry cash flow, restrictions were removed on the number of applications that may be filed in any one year with respect to expenditures on Canada Lands. To ensure reasonable drilling costs in the Canada Lands for purposes of determining their eligibility for PIP, the following amendments were made:

- A system of prior approval by the Minister was instituted on the terms of contractual arrangements for drilling equipment to be used on wells in the Canada Lands where the wells are expected to cost more than \$50 million.

- In granting approval of such arrangements, the Minister must be satisfied that the prices charged in the arrangement and for specified equipment are the lowest reasonable prices available.
- In general, frontier drilling equipment charges were to be eligible for incentives only when the equipment was being used actively in drilling.

In consultation with the industry, the COCD rules were revised so that most firms may now use simpler procedures to determine their Canadian Ownership Rate (COR). In addition, the measurement process was simplified for the largest firms that still have to measure their COR.

A total of 2577 PIP applications from 1273 applicants was received. The COCD program issued 3125 certificates.

About 92 per cent of PIP expenditures went to companies with the highest COR levels. Regional distribution of the federal PIP budget was 48 per cent for exploration activities on the east coast, 45 per cent in the Beaufort Sea and Arctic Islands, and the remainder on provincial lands (other than Alberta, which funds and administers a Petroleum Incentives Program within its borders).

In recognition of the special needs of small and medium-size applicants, PIA opened a regional office in Calgary. The Calgary office began processing applications for applicants located west of Ontario who incurred expenses for activity on provincial lands only. During this first year of operation, the regional office processed 860 PIP applications and 848 requests for COCD certificates.

PIA publishes a separate annual report on its program and activities.

## Canada Oil and Gas Lands Administration

The Canada Oil and Gas Lands Administration (COGLA) administers

and regulates exploration, development and production of oil and gas in the Canada Lands. It reports to the ministers of Energy, Mines and Resources and Indian Affairs and Northern Development. COGLA conducts its work through six branches: Land Management, Resource Evaluation, Engineering, Policy Analysis and Coordination, Environmental Protection, and Canada Benefits.

In 1983, seventy-three exploration agreements — ranging from three to five years — were concluded with a total financial commitment of about \$4.7 billion. A total of 101 new exploration and development wells was authorized, which resulted in a revised estimated potential of 479 million cubic metres of oil and 926 billion cubic metres of natural gas.

Detailed development planning continued for the Venture gas field off the coast of Nova Scotia; this included market surveys and public discussion of the environmental and socioeconomic impact of the project. Delineation drilling and technical studies progressed at the Hibernia oil field on the Newfoundland offshore.

The Canada – Nova Scotia Offshore Oil and Gas Board was established to manage oil and gas resource activity under the terms of the Canada – Nova Scotia Offshore Agreement of March 1982.

Two federal-provincial committees were established: the Environmental Coordinating Committee, which deals with environmental policies, procedures, regulations and guidelines; and the Fisheries Advisory Committee, which advises on the impact of oil and gas activity on fishing in the offshore area.

COGLA issued revised safety guidelines for east coast operators. The governments of Canada and British Columbia initiated a public, environmental review on the effects of petroleum drilling in coastal waters between the northern shore of Vancouver Island and the International Boundary of the Alaska Panhandle. This review will provide the basis for a decision on whether exploration, which is under a moratorium, will be resumed in these waters.

Canada Benefits plans are negotiated with operators of exploration agreements before work programs begin. Each plan contains specific, and often innovative, programs designed to enhance employment, industrial activity and socioeconomic benefits.

Thirty Canada Benefits plans were finalized during the year. Regional offices, supply bases, storage areas, and supply and service firms geared to the oil and gas industry were established in Yellowknife, Halifax, Mulgrave (NS) and St. John's. Two offshore supply and standby vessels were constructed in Marystown, Nfld. In Labrador, several communities were involved in shore base or staging activities.

As a result of training and recruitment almost all the labour force in oil and gas drilling in the Beaufort Sea – Mackenzie Delta region was Canadian in 1983. In the east coast offshore, 84 per cent was Canadian, up from the previous year. In May, Canterra Energy Limited held an orientation program on offshore drilling for 40 persons, mostly without offshore drilling experience. All course participants were hired by the industry that drilling season.

All exploration companies undertook programs of community consultation, meeting with native and civic leaders, fisheries organizations, provincial and territorial government officials, trade

associations and other concerned groups to discuss proposed activities, to identify opportunities for local and regional residents, and to minimize potential conflicts.

COGLA publishes a separate annual report on its programs and activities.

# MINERALS AND EARTH SCIENCES PROGRAM

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## Mineral Policy Sector

With an improvement in the economies of western industrial nations in 1983-84, the Canadian mineral industry began to show signs of recovery. Nevertheless, progress was uneven. Some minerals and metals recorded significant improvement; others remained close to a historically low level of demand and price. Major structural changes in the global industry that have emerged during the past decade, in terms of both mineral and metal supply and markets, aggravated the downturn in the general economic cycle, and are largely responsible for the slow recovery in the minerals industry.

Mineral Policy Sector activities in 1983-84 shifted towards addressing the problems and opportunities arising from these structural changes, but continued to focus on urgent matters such as mine closures, unemployment, taxation issues and financial problems in the industry.

## Mineral Development Agreements

Early in the year, the Cabinet Committee on Economic and Regional Development considered a proposed regional mineral strategy and directed the department to discuss mineral development agreements with the provinces. Discussions were held with several provinces in the context of a new series of umbrella agreements, called Economic and Regional Development Agreements (ERDAs), which identified priorities and strategies for economic agreements. By year-end, a sub-agreement had been signed with Manitoba and was ready for implementation, and negotiations were well advanced on sub-agreements with Saskatchewan, New Brunswick, Nova Scotia and Newfoundland. Discussions were also under way with Ontario and British Columbia. These sub-agreements are characterized mainly by parallel delivery of cooperatively planned, complementary federal and provincial programs.

The agreements mainly aim to strengthen and diversify the mineral industry sector in each province to help industry respond to both structural change in international markets and the effects of economic cycles. The sub-agreements have three main thrusts:

- geoscientific activities, designed to provide new and more detailed information on selected areas where discoveries seem most promising — these are the best measures for stimulating mineral exploration by industry;
- the application of mining and mineral technology to new developments or to existing operations to help producers improve their productivity and enhance their competitiveness;
- studies, such as market assessments and economic feasibility studies, to identify new development opportunities, and to promote identified opportunities.

## Reassessing the state of the industry

A number of projects were undertaken to foster discussion between government, industry, and labour organizations about the outlook for minerals, and how Canada could best respond to the changes of the past decade to remain competitive.

A Mineral Outlook Conference was held in Ottawa in May. It brought together many key decision-makers to discuss prospects for the mineral industry and how best to adapt to world market conditions.

A report entitled *The Medium Term Outlook* was widely distributed to government, industry and labour. It assessed structural changes in world mineral markets and their likely impact on the mineral industry. The paper is being developed into a fuller discussion of the issues.

## Commodity-specific projects

The Government of Canada is promoting the approach that asbestos regulation and control should be based on objective scientific evidence. The government's position is that asbestos is one of many hazardous substances that require proper control to avoid undue risks; in this case, from airborne asbestos dust during processing and use. Sector activities are aimed at developing an international consensus on asbestos regulations and standards promoting controlled use rather than a ban.

Funding was announced to establish an industry-managed asbestos institute directed towards health and product research and dissemination of information on the safe uses of asbestos. Operating funds for the institute will be provided in equal shares by the Government of Canada, the Government of Quebec, and the asbestos industry.

The Consultative Work Group on Nonferrous Smelters, comprising representatives of industry, labour and senior levels of governments, was established in May 1983. It examined the international competitive position of Canada's nonferrous metals industry and the need for new policies and programs to foster an internationally viable and growing nonferrous smelting industry in line with economic development and environmental objectives. Because nonferrous smelters are major sources of sulphur dioxide emissions in eastern Canada, the need for new, more stringent environmental control regulation to rectify the acid rain problem was a major factor underlying this initiative.

A report on Canada's nickel and copper industries has also been completed and made public. The sector initiated discussions with Canadian nickel producers on this subject and, in late March, the industry invited all western world nickel producers to attend a

meeting to discuss the creation of an international nickel institute.

An EMR – Mining Association of Canada task force completed a discussion paper, *International Market Problems and Opportunities for Canada's Copper Industry*. The task force concluded that while there were no immediate and easy solutions to the industry's problems, there were some key issues requiring further in-depth analysis.

## Earth Sciences Sector

The Earth Sciences Sector is composed of the Geological Survey of Canada, Surveys and Mapping Branch, Earth Physics Branch, and the Polar Continental Shelf Project.

### Geological Survey of Canada

The Geological Survey of Canada (GSC) ensures that comprehensive knowledge, technology and expertise pertaining to the geology of the Canadian landmass and offshore areas are available. The subject areas include mineral and energy resources and conditions affecting land and seabed use for exploitation of mineral and energy resources, effective land use, estimation of Canada's resource base and policy formulation.

Major achievements include evaluating oil and gas resources, initiating studies of the deep earth, developing three-dimensional models for evaluating potential oil- and gas-bearing basins, studying the environments under which present-day hydrothermal sulphide mineral deposits are forming, deep earth geology, technology transfer, federal-provincial mineral development sub-agreements, offshore bilateral boundary disputes and offshore geoscience.

In 1983-84 the GSC had nine divisions, of which three are in regional centres outside Ottawa.

### Cordilleran Geology Division

This division, with offices in Vancouver and at the Pacific Geoscience Centre in Sidney, BC, studies the composition, age, distribution and origin of the rocks of most parts of British Columbia and the Yukon, to help assess mineral and hydrocarbon potential, guide mineral exploration and aid in land-use development. The Sidney unit studies the Pacific Continental Shelf and adjacent areas.

### Institute of Sedimentary and Petroleum Geology (ISPG)

The ISPG in Calgary collects information on the sedimentary basins of the western plains and Arctic Canada, which contain most of Canada's oil, natural gas and coal resources. The institute staff estimates Canada's oil and natural gas resources, develops methods for making such estimates and maintains a repository of samples, cores and other data derived from the industry's work in the Canada Lands.

### Precambrian Geology Division

This division, located in Ottawa, studies the bedrock geology of the mineral-rich Canadian Shield and carries out geochronological, petrological and paleomagnetic studies that are used by industry in the search for mineral resources, and by government in evaluating resource potential.

### Atlantic Geoscience Centre (AGC)

AGC is located at the Bedford Institute of Oceanography in Dartmouth, NS. It carries out geological and geophysical studies of offshore areas along the east coast and in the Arctic.

### Economic Geology Division

The division investigates how mineral deposits form and the relationships of mineral deposits to the geological characteristics of Canada's principal geographical and geological regions.

Such work is used to integrate regional geology, mineral deposit data and concepts to determine the probable distribution and potential abundance of Canada's nonhydrocarbon mineral resources.

### Resource Geophysics and Geochemistry Division

This division serves as a national centre for research and development into geophysical and geochemical methods relating to metallic mineral exploration and economic, regional, engineering and environmental geology. Technologies developed are tested and applications demonstrated to make the procedures available to the public as well as government.

### Terrain Sciences Division

This division studies the geology of the unconsolidated materials of the Canadian landmass, the processes that modify the landscape, and natural terrain hazards that may affect our use of the land. Studies concerned with nuclear fuel waste management are also centred in the division.

### Geological Information Division

This division communicates the results of the GSC's scientific programs to other government agencies, industry, and the general public, and operates Canada's largest earth science library.

### Central Laboratories and Technical Services Division

The division provides analytical services and mineralogical expertise needed by other divisions of the GSC, and conducts related research.

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### **GSC activities during 1983-84**

- Basin analysis teams at ISPG refined depositional and stratigraphic models for the main exploration target in the Sverdrup Basin and, by using an evaluation methodology, determined its ultimate oil and gas potential. Similar analysis of Tertiary strata of the Beaufort Sea including geochemical, structural and depositional characteristics led to a refined assessment of the Beaufort Sea Basin's potential.
- Since 1976, when EMR last published an overview of Canada's oil and natural gas resources, much new data, accumulated from our petroleum basins, have been assembled and analyzed by EMR's petroleum resource evaluation group. Estimates of Canada's oil and natural gas resources were published as GSC Paper 83-31. Despite vigorous exploration since 1976, and major new discoveries in frontier areas, actual reserves declined.
- Cooperative studies related to metalliferous deposits on spreading ocean ridges began, following a major workshop at which university and government scientists developed plans for research on those parts of the west coast Juan de Fuca and Explorer ridges that are in Canadian waters. GSC involvement in seafloor programs provided new opportunities for staff to participate in similar American and French studies. The program involved data collection by drilling, bottom sampling and photography (sometimes from submersibles). Understanding present-day seafloor sulphide environments will aid in interpreting ancient economic sulphide deposits on land. Such information can be of direct benefit to the development of mineral exploration strategies.
- Lithoprobe, a multidisciplinary program in which GSC, Earth Physics Branch and a consortium of Canadian universities participate, was launched in 1983-84. Planning was completed for a seismic reflection profile to determine the deep structure beneath Vancouver Island where the North American continental lithosphere overrides the oceanic rocks of the Juan de Fuca Plate. A deep seismic reflection profile was shot from Lake Mégantic southeastward into Maine by the United States Geological Survey in collaboration with scientists of GSC, Earth Physics Branch, several Canadian universities and the Maine Geological Survey.
- Aeromagnetic surveys provide a fast, efficient method for obtaining information on bedrock structure buried beneath various kinds of cover. EMR has sponsored such surveys since 1947. By the mid-1970s the GSC had developed a sensitive system for airborne magnetic surveying that could be used for relatively detailed studies. This proved successful and in 1981 steps were taken to transfer the technology to the private sector in line with GSC policy concerning technological innovations. With financial participation of the governments of Canada and Ontario, a geophysical firm readied the technology for commercial use. Surveys began in mid-1983 and have already demonstrated their value by stimulating mineral exploration.
- Fiscal 1983-84 was the final year for field work under the Nova Scotia and Newfoundland Cooperative Mineral Programs. In both provinces GSC was involved in geological and mineral deposit studies, glacial geology-mineral tracing, geochemical investigations, airborne radiometric and aeromagnetic gradiometer surveys. Initial federal funds through the Gaspé Mineral Program provided a mineral deposit inventory and test flights for helicopter-mounted aeromagnetic gradiometer systems, in preparation for surveys in subsequent years. The Sudbury-Timmins-Algoma Mineral Program, implemented under Section 38 of the Unemployment Insurance Act through a contract with Laurentian University, provided a mineral data bank, glacial geology – mineral dispersion data, and lithogeochemical information relating to gold and other metals in Huronian and older rocks. During the first year of the interim Canada-Manitoba Mineral Agreement, GSC carried out projects on geochronology, mineral deposits, glacial geology – mineral tracing, and lake sediment geochemistry. An aeromagnetic gradiometer survey by GSC in the Lynn Lake area was funded by the province.



- GSC placed increased emphasis on marine geological work, in keeping with Canada's expanded offshore economic zone and the need for information on offshore nonrenewable resources and the geological constraints and hazards to their development. Investigation of geological conditions on the seabed began for the petroleum development areas in the Beaufort Sea and off the east coast, for part of the Atlantic Continental slope, and in the Pacific offshore region. GSC involvement in the Canadian Expedition to Study the Alpha Ridge (CESAR) yielded sediment cores indicating past warm climate in this arctic area. Canadian candidate membership in the International Ocean Drilling Program has resulted in major involvement of GSC marine geoscientists in planning this new program, particularly with regard to research drilling sites in the Labrador Sea and Baffin Bay.

- Final summaries of geological information about Georges Bank were prepared for the Department of External Affairs in connection with the Canada – United States boundary dispute before the International Court in The Hague. The Georges Bank work proved valuable in designing and preparing for geological and geophysical information gathering for External Affairs regarding three additional bilateral boundary disputes: the St. Pierre – Miquelon boundary south of Newfoundland, the Beaufort Sea boundary in the western Arctic, and the Juan de Fuca boundary southwest of Vancouver Island. Funding was approved for two succeeding years of data gathering in these three areas. Initial work, in 1983-84, included Seabeam and Seamarc surveys and resource charting (with Earth Physics Branch) in the Juan de Fuca boundary area, acquisition of marine seismic data in the Beaufort Sea boundary area, a multi-channel seismic survey of part of the St. Pierre Bank, and acquisition of shipboard equipment required for surveys in subsequent years.

### **Surveys and Mapping Branch**

Surveys and maps produced by the branch support national economic development. As the national organization for surveying and mapping, the branch formulates and maintains national standards for surveying and mapping that respond to Canadian needs, reflect changing technology and contribute to the formulation of internationally accepted standards and practices. During 1983-84, the branch signed memoranda of cooperation with the surveying and mapping agencies of Alberta and the Council of Maritime Premiers to optimize opportunities for program coordination, exchange of information and development of national standards. Technological changes were reflected in the acquisition of an

automated digitizing system for topographic information, a lithographic map printing press and an inertial surveying system, and in the approval to acquire a second-generation satellite positioning system.

The creation of the Sherbrooke Institute of Cartography was announced. The institute's mandate includes further development of capabilities in digital cartography, the computer processing of geographical information and the application of new techniques to mapping, such as satellite remote sensing.

The branch provided scientific and technological advice to federal and provincial government agencies, and consulting services in surveys and mapping for international development programs through the Canadian International Development Agency (CIDA).

### **Geodetic Survey**

The division provides a national network of geodetic surveys fundamental to all other forms of surveying. This ensures that surveys done in any part of the country have the same frame of reference, and it defines Canada's territorial limits in a global reference system. National geodetic data are available from the computerized data file.

Acquisition of an inertial surveying system and a second-generation satellite positioning system will enable Geodetic Survey to respond more rapidly to requests for survey control in remote and previously inaccessible regions. Other highlights include the completion of the international Great Lakes datum levelling project, the establishment of 25 new satellite Doppler survey points in the Coronation – Queen Maude Gulf area for network densification and northern mapping, and the completion of high-precision horizontal control surveys for monitoring local earth crustal movement.

### **Topographical Survey**

Topographic maps are accurate visual representations and inventories of the earth's surface and artifacts, portraying relief elevations, natural features and major structures. The entire country has been mapped at the reconnaissance scale of 1:250 000 in 918 map sheets, of which 71 maps were revised. At 1:50 000, a larger scale, 292 first edition maps were produced, bringing the total published to 73 per cent; the remainder are to be published by 1994, for a total of 12 922 maps. As well, 273 of the maps were revised. Satellite imagery is being used to revise the 1:250 000 series and to detect changes on the 1:50 000 series.

Other highlights include the acquisition of a new Cartographic Data Processing System for the automated digitizing of topographic information; conversion of 528 maps of the 1677 maps of Quebec into bilingual format, bringing the total project completion to 99 per cent; participation in the technical management of programs for federal-provincial flood damage reduction; initiation of pilot projects to exchange digital topographic data with the Maritimes, Alberta and Ontario; and the provision of technical advice and inspection services on surveying and mapping projects under the auspices of CIDA in Barbados, Cameroon, Indonesia, Nigeria and Tanzania.

### **Geographical Services**

The division uses maps produced by the Topographical Survey to derive smaller scale base maps on which to portray geographical information on Canada as a whole. Through *The National Atlas of Canada*, information on the physical environment, socioeconomic geography, natural resources and historical development of the nation is researched and brought together in map form. A Canada – Electricity Generation and

Transmission map was produced in cooperation with the Energy Sector.

More than 1300 aeronautical charts with related flight information were produced for navigators and air traffic controllers. Geographical Services also produced small-scale maps of Canada and provided cartographic support and advice to government departments that do not have cartographic expertise. For example, 42 electoral maps were produced for the Chief Electoral Officer.

The National Toponymic Data Base, a computerized data bank of officially approved geographical names of Canada, was restructured. The project to convert small-scale base maps of Quebec into bilingual format was completed.

### **Legal Surveys**

The division manages and regulates all surveys of Canada Lands, including national parks, the Yukon and Northwest Territories, the offshore and 2300 Indian reserves. Work on a property mapping system for Indian Lands continued, and will form the base for a multipurpose land information system to be used for planning, developing and managing Indian Lands. Land-related information was supplied to the Department of Indian and Northern Affairs for the Indian Land Registry. Work continued on projects to safeguard the interests of holders of land rights, and to supply information for the management of land by providing necessary surveys, plans and maps.

### **International Boundary Commission (Canadian Section)**

The International Boundary Commission is a bilateral treaty organization that maintains and regulates the land and water boundary between Canada and the United States. Field maintenance was undertaken on the New Brunswick – Maine, Quebec – Vermont and British Columbia – Washington sections of the boundary for a total of 130 km. The preparation of field

survey data for computation on the new North American datum was completed.

### **Reproduction and Distribution**

On a cost recovery basis, this division publishes data compiled by other Surveys and Mapping Branch divisions and departments and sells it through authorized dealers in Canada and other countries. Custom-made reproductions of aerial photography and satellite imagery are available from the National Air Photo Library.

Technological advances included the acquisition of a new computerized, four-colour, large-format map-printing press; computerization of a monotype camera for increased technical precision and repeatability; and the approval for acquisition of a computerized integrated order entry/inventory control/accounting system for product distribution operations. Other highlights include 3064 map titles printed, 3 304 000 maps distributed, and 585 000 aerial photographs reproduced.

### **Earth Physics Branch**

The branch provides geophysical knowledge on the framework, dynamic processes and hazards of the Canadian landmass and offshore, operates national networks of geophysical observatories, and contributes to the international definition of geophysical standards.

During the year, the branch was involved in multidisciplinary studies, including the geophysical delineation of Canada's offshore boundaries, the search for sources of geothermal energy, and the management of nuclear fuel waste.

Major activities include the prime role in the scientific program on the Canadian Expedition to Study the Alpha Ridge (CESAR), and a series of cooperative geophysical surveys that yielded precise bathymetry and acoustic imagery of the Juan de Fuca Ridge in the Pacific offshore.

### **Division of Seismology and Geomagnetism**

The division operates several seismographic networks across Canada to monitor earthquakes and determine seismic risk. It operates a network of geomagnetic stations to monitor variations in the earth's magnetism and to forecast magnetic disturbance. Seismological and geomagnetic surveys on the structure and tectonics of the earth are conducted.

Highlights include deployment of ocean-bottom seismometers on the Atlantic continental shelf to investigate earthquake hazards for petroleum development, and planning for Lithoprobe Phase 1 deep crustal studies.

### **Division of Gravity, Geothermics and Geodynamics**

The division conducts gravity surveys over the Canadian landmass and offshore, and maintains standards for gravity measurements. It operates geodynamics observatories at Ottawa and Calgary; contributes data to international agencies on the earth's rotation, polar motion and earth tides; investigates crustal stability by measuring changes in gravity, surface deformation and groundwater level variations; examines the distribution and character of permafrost; and evaluates the potential for geothermal energy in Canada.

Highlights include the addition of more than 11 000 new stations to the national gravity data base, completion of a new geothermal laboratory, completion of a permafrost map of the Mackenzie Valley and Beaufort Sea, and successful tests of the Macrometer global positioning system.

### **Pacific Geophysics Division**

The division is in the Pacific Geoscience Centre at the Institute of Ocean Sciences near Sidney, BC. It is responsible for west

coast operations in the branch's five geophysical disciplines.

Highlights include a study of the Queen Charlotte Sound area that suggests past geophysical conditions favorable to the maturation of petroleum, and the development of a new electrical technique to probe the seafloor for polymetallic sulphides or permafrost.

### **Polar Continental Shelf Project**

Polar Continental Shelf Project (PCSP) scientists study the paleoclimate and climatology of the Arctic Islands and the modelling of glacier flow and temperature of past and present ice sheets. The logistics arm of the branch coordinates and provides support and advice to scientific research groups working in the Arctic Islands and the Arctic Ocean. Base camps are maintained at Tuktoyaktuk in the Mackenzie Delta and at Resolute on Cornwallis Island to coordinate fieldwork between mid-February and late September of each year.

Demand for PCSP support continues to grow at a rate of 10 per cent a year; 181 parties were supported during the 1983 field season. Aircraft, equipment, communications and base-camp support were provided for studies in disciplines ranging from archeology to zoology.

The Canadian Expedition to Study the Alpha Ridge (CESAR) was highly successful, with PCSP providing and coordinating logistical support. The discovery and exploration of the ship *Breadalbane*, which sank in 1853, was the subject of a *National Geographic* magazine article and a PCSP-supported project. Discoveries included a new source of low-rank coal, 120 previously unknown archeological sites, and two new breeding sites for the rare ivory gull. Work continues on solar-heated greenhouses in the High Arctic, quaternary geology, marine mammals and the environmental impact of increased ship traffic. PCSP helped complete film work for a

documentary study on science in the Arctic. Plans are that a large ice island discovered during the 1983 season will serve as a long-term floating camp for scientific parties as it circulates in the Arctic Ocean.

## **Research and Technology Sector**

### **Canada Centre for Mineral and Energy Technology**

CANMET maintained its role as the principal federal agency for research and development (R&D) in mining, minerals, metals and fossil fuel technologies.

Consultations on R&D continued with industry through the National Advisory Committee on Mining and Metallurgical Research, and with research establishments, professional and technological groups and private sector companies.

R&D supported federal mineral policies, standards and certification programs, health and safety in the workplace, environmental issues, and production technologies to improve industrial productivity and competitiveness.

The Short Term Assistance in Research and Technology (START) program, approved by Cabinet in early 1983, provided increased R&D assistance to the Canadian mineral industry. The program contains five basic components: the one-for-one industry-CANMET personnel exchange attracted eight companies; the reduced cost recovery component has involved 34 companies; selected R&D contracts in biotechnology, hydrometallurgy, potash mining and foundry technology have been signed with 17 companies; the technology transfer component has involved more than 40 projects of diverse technologies; and all items of equipment pertaining to the Special Capital Acquisitions have been acquired.

## Minerals

Developing, evaluating and testing technology for mining, and extracting, using and conserving Canada's nonenergy minerals and metals continued to be focal issues of CANMET's Mineral Technology Activity.

A mobile physical metallurgy laboratory was equipped to assist the diverse Canadian foundry industry, providing on-site modern laboratory facilities to analyze and evaluate the companies' processes and products to help them improve productivity and quality.

Development of a CANMET portable X-ray stress diffractometer — to measure stress in surfaces of engineering structures such as aircraft, ships, pipelines and nuclear reactors — has been completed. A prototype unit is being built.

The Physical Metallurgy Research Laboratories evaluated the performance of alloys in the EMR — Nova Scotia Power Corporation coal-fueled, fluidized-bed combustor at Point Tupper.

More than 180 explosive materials were tested and evaluated at the Canadian Explosives Research Laboratory. Ground control research continued with Canadian mines and the Bells Corners Rock Mechanics Laboratory, including work on proposed underground nuclear waste repositories.

The Canadian Explosive Atmospheres Laboratory programs to certify equipment and materials for coal mines continued. As a result of research on control of toxic emissions from diesel engines in underground operations, codes are being proposed that involve an air quality index. At the Elliot Lake Mining Research Laboratory, construction of a new building was begun. The new building will include a national instrument calibration facility to determine airborne radiation levels.

## Energy

CANMET maintained its emphasis on improving, supplying, processing and using Canadian coals, heavy oils, tar sands and bitumen. Reassessment of Canadian uranium reserves continued.

The Combustion and Carbonization Research Laboratories (CCRL) explored new research opportunities and consolidated programs on technology for the direct utilization of fossil fuels. These programs encompassed a mix of fundamental research investigation, pilot plant scale R&D, and commercial scale demonstrations. The fluidized-bed pilot plant was automated and fitted with a computerized data acquisition system. Work was completed on determining the gasification characteristics of Canadian coals and on the hydro-treating studies of synthetic crude distillates made from Canadian oils and bitumens.

The Synthetic Fuels Research Laboratory continued applied R&D to produce synthetic fuels from oil sands bitumen, heavy oil and coal. An experimental pilot plant program supported the CANMET hydrocracking demonstration plant, scheduled to start in 1985.

Through its Coal Research Laboratories (CRL), CANMET continued to assess Canadian coal reserves and better ways to mine and process them. Environmental protection and the health and safety of workers were important aspects of this work.

Edmonton-based research facilities for coal mining, coal preparation, carbonization and conversion were realigned at a research centre at nearby Devon. The centre houses the Alberta Research Council, the Coal Mining Research Centre facilities, and CRL's coal preparation plant.

Mobile test units developed by CANMET provided research opportunities under actual plant

conditions. A mobile dewatering plant was constructed and a mobile fine coal treatment plant was designed. Tests were conducted at several western Canadian coal washeries using CRL's mobile water treatment plant.

The Calgary Coal Research Laboratory, in cooperation with the University of Calgary, continued efforts to improve coal mining technology, particularly with regard to longwall mining methods. A major study of subsidence associated with an underground mining operation was completed. In conjunction with previous strata control research, the study provided data for advising coal mine operators on technical problems.

The Cape Breton Coal Research Laboratory established its staff and facilities and began R&D projects in conjunction with the Cape Breton Development Corporation.

## Office of Energy Research and Development

The Office of Energy Research and Development (OERD) coordinates Government of Canada energy R&D. It acts as secretariat to the Interdepartmental Panel on Energy Research and Development and is the primary R&D contact with the Ministry of State for Economic and Regional Development and the Treasury Board Secretariat.

The program emphasized projects that help to achieve and sustain domestic energy self-sufficiency, the need for more research and development of alternative liquid fuels, energy conservation and new energy sources, and the need to develop oil and gas resources offshore in the Canada Lands.

Canada participated in R&D under the umbrella of the International Energy Agency. Liaison and coordination with provincial and university programs continued, through participation on governing committees for the Alberta-Canada Energy Resources Research Fund

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and the Strategic Grants of the Natural Sciences and Engineering Research Council.

### **Canada Centre for Remote Sensing**

The Canada Centre for Remote Sensing (CCRS) was established in 1972 to help manage resources and monitor environmental changes.

CCRS participated in the European Space Agency Earth Resources Satellite (ERS-1) Program, which was in the predesign and preconstruction stages in 1983. The ERS-1 satellite will be launched in 1988 and will carry a range of microwave sensors for ice, oceans, and weather applications research. Canadian industry participated in program and technology development contracts for ground system and space telemetry elements.

The Centre is planning for a Canadian remote sensing satellite, RADARSAT, and has completed mission requirements and conceptual design studies, and an economic assessment. It has international agreements with the United States and the United Kingdom for collaboration in the program. CCRS is developing critical radar technology for the space and ground systems, and has conducted aircraft experiments to simulate satellite performance over ice, icebergs and land.

CCRS received and distributed multispectral scanner data from the LANDSAT-4 satellite and successfully began to record the new high-resolution thematic mapper data from LANDSAT-5, launched in March 1984. A state-of-the-art solid state multispectral scanner, developed in Canada, was installed on a CCRS aircraft for operational and research use, featuring a unique stereoscopic imagery capability.

Applications development research activities, concentrating on crop and forest monitoring and the application of

microwave sensors to sea ice classification were continued. Through agreements with Manitoba and with the Council of Maritime Premiers, it continued to transfer remote sensing technology to provincial resource management agencies.

### **Explosives Branch**

The Explosives Branch is responsible for safety by regulating the manufacture, distribution and transportation of explosives. No major explosives-related accidents occurred in 1983-84. Ninety-two factories were licensed to manufacture explosives, 2084 magazines were licensed for storage and 884 permits were issued to vehicles for transportation. These were supported by more than 1800 inspections. Fireworks supervisor courses were conducted at centres across Canada, and 1077 supervisors were qualified.

In 1979, EMR learned of a TNT-contaminated area near an old Trenton, Ontario, munitions plant abandoned in 1918. After local groundwater was found uncontaminated, the affected land was rendered safe by encapsulation under a synthetic fabric, gravel, rock fill and topsoil, and then seeded to grass. Work was completed in 1983.

The Canadian Explosives Research Laboratory determined the characteristics of all explosives submitted so that the Chief Inspector could assess their suitability for manufacture.

A contract was awarded to develop a risk assessment methodology; a final report was received and is being studied. Progress continued on definition of tests for explosives classification by the United Nations system. Improvements were made in computer prediction of explosive after-detonation products; their composition is an element of explosives safety.



# ADMINISTRATION PROGRAM

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## Finance and Administration Sector

### Financial Management Branch

The department made expenditures of \$4488 million\* for the Energy Program, \$246.5 million for the Minerals and Earth Sciences Program, and \$28.5 million for the Administration Program. Offsetting revenue totalled \$1759.8 million, including levies of \$1752.7 million collected under the *Energy Administration Act*. The department's total net expenditures were \$3003.2 million.

Modifications to the managerial accounting and reporting system that were begun in 1982-83 were completed and implemented under the title of Financial and Managerial Information System.

### Administration and Computer Science Branch

In 1983-84 the Administration and Computer Science Branch was formed to integrate and manage administration, electronic data processing and departmental support services.

To meet the needs of operational managers in a more effective manner, a start was made on updating and rewriting all administrative policies and procedures. Also initiated were the development of a comprehensive long-term accommodation plan, a small secretariat to administer the *Access to Information and Privacy (ATIP) Acts*, and a pilot project to automate records management and ATIP procedures.

Two additional computers were installed in the Computer Science Centre to meet the continuing increase in workload. Additional personnel were approved to augment the level of systems development services provided.

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\* \$77.8 million payment to Petro-Canada not included.

## Human Resources Sector

The sector's primary focus was to improve the quality of personnel management in the department and the standard of personnel advice and services to all departmental programs. Another focus was improving the senior management cadre and developing personnel policies.

A senior human resources committee, chaired by the Deputy Minister, was established to foster the most efficient and effective utilization of executives, senior managers and equivalent resources. The committee developed a senior human resources plan for executives, which is being implemented. A performance review and employee appraisal policy for senior management was adopted and followed during the year.

The training and development policy was revised to outline management's responsibility and accountability, and to specify the departmental priorities and objectives for it.

A four-year EMR plan was established to increase representation of francophones in the scientific and professional category. A policy was issued on the publication in both official languages of scientific, technical and professional material.

An EMR affirmative action policy, incorporating the goals of the Equal Opportunities Program for women, indigenous and disabled people, was issued. A workforce and system audit was begun to provide information needed to prepare a detailed short and long-term action plan.

The two existing personnel organizations were integrated, and decentralized personnel units were established to improve the quality and speed of personnel services to departmental sectors, including their regional and field offices. Integration of the two personnel branches was reflected primarily in the Personnel Program Operations Branch. Classification,

staffing, training, staff relations and personnel services are now combined with the operations division, providing common personnel services to a workforce of 5200 employees located in 37 centres.

## Communications Branch

Effective July 1, 1983, the branch was reorganized to respond to two important thrusts in departmental activities: first, the November 1982 policy to centralize the management of the communications functions of the department; second, the effort to reflect, more positively, the balance of activities between the energy program and the minerals and earth sciences program.

As a result of the reorganization, the Public Affairs Division was created to carry out liaison with programs and management of the communications activities throughout the department. A Director of Regional Communications was appointed to coordinate the flow of information to and from regional information officers. A Monitoring and Evaluation Division was formed to combine media monitoring and analysis, evaluation and public opinion research functions, and to provide advice on the pretesting of advertising. Support for major activities is provided by three other divisions: Creative Services, Editorial, and Administration Systems and Services.

To complement the functional reorganization, the branch began preparation of a series of policy documents dealing with media relations, advertising, exhibits, audiovisual programs and publishing.

Highlights of branch activities during the year:

- major advertising support for energy conservation, including a fall campaign of print advertising coupled with a home energy planning insert in all major daily newspapers;

- strong promotional support, in cooperation with the Canadian housing construction industry, for the Super Energy Efficient (SEE) home program — the R-2000 house;
- the first major advertising support for the extension into Quebec of natural gas lateral pipelines, providing residents of the province with another alternative to oil for residential, industrial and commercial heating;
- promotional and media relations support for EMR's first Mineral Outlook Conference in May, and for the release of the Geological Survey of Canada's latest estimates of the country's oil and natural gas resources; and provision of extensive information on the Canadian Expedition to Study the Alpha Ridge (CESAR) because of continuing interest by Canadian and international media;
- communications advice and support for two major issues during the year: the announced move of part of Surveys and Mapping Branch to Sherbrooke, Quebec, and the associated establishment of an institute of cartography in that city; and the blowout of a gas well, the Vinland, off Sable Island in February;
- release of two major films: *Beyond the Frontier*, dealing with the challenge of oil and gas exploration in the Beaufort Sea and Arctic Islands, and *The Contour Connection*, which explains the history of mapmaking and the move to computer-assisted cartography; and preparation of a number of shorter films for use in exhibits and as public interest material for television;

- participation in more than 100 exhibitions and fairs, with themes that included home energy planning, minerals, natural gas expansion, transportation fuels, the R-2000 home, and a model of the tidal power turbine at Annapolis Royal, Nova Scotia.

During the year, 37 new publications were released, and more than 920 000 publications were distributed. Public requests for information, serviced through the branch, totalled more than 42 000.

## Executive Offices

### Corporate Planning and Analysis Group

The Corporate Planning and Analysis Group develops the corporate planning process, structure, and timetable for the department, in response to internal requirements and the demands of central agencies. It also maintains an overview of the status of the economic development envelope.

### Program Evaluation Branch

The Program Evaluation Branch examines and reports on the relevance of program component objectives and effectiveness in achieving them.

In 1983-84 program evaluations of the Canadian Home Insulation Program (CHIP), the EMR remote sensing activity, and the mineral development activity (statistics and general information component and the regional mineral affairs function) were completed. Implementation plans responding to recommendations made in these evaluations were developed by the sectors involved and approved by the department. The branch also completed evaluation assessments (the planning phase of the evaluation process) on earth physics activity, the Forest Industry Renewable Energy (FIRE) Program and the Propane Vehicle Grant Program.

Evaluation frameworks (basis for future evaluations) were developed for the Petroleum Incentives Administration, the Canada Oil and Gas Lands Administration (COGLA) and the Industrial Conversion Assistance Program.

Detailed descriptions of program evaluation work are provided in the branch's annual report.

### Internal Audit Branch

This branch provides the Deputy Minister with an independent review and appraisal of all departmental operations. Audits were carried out in seven responsibility centres, including COGLA and CANMET.

Systems and program audits included the Petroleum Incentives Program and a number of programs in the Conservation and Non-Petroleum Sector. Managers have acted positively in response to these and earlier audits, implementing most recommendations.

### Office of Environmental Affairs

Through the Office of Environmental Affairs (OEA), EMR is involved in the development of broad environmental policies affecting (and being affected by) energy and mineral strategies. Current activity focuses on acid rain, lead in gasoline, automobile emissions, carbon dioxide and climate change, nuclear power and mineral policy strategy.

EMR participates in the Federal Environmental Assessment and Review Process (EARP) through OEA, by screening department initiatives and by coordinating department expertise in minerals, energy and earth sciences for the various EARP activities and reviews.

OEA directs departmental research and development on the environmental and public health implications of Canada's energy policies, such as the introduction of new liquid fuels into the marketplace, hydrocarbon development and increased use of coal.

## ***CROWN CORPORATIONS AND AGENCIES***

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### **Crown Corporations**

Atomic Energy Control Board  
Atomic Energy of Canada Limited  
Petro-Canada Limited and its subsidiary Canertech  
Petro-Canada International Assistance Corporation  
Uranium Canada Limited

### **Agencies**

Board of Examiners for Dominion Land Surveys  
Canadian Permanent Committee on Geographical Names  
Energy Supplies Allocation Board  
National Energy Board  
Petroleum Compensation Board  
Petroleum Monitoring Agency

## FINANCIAL SUMMARY

	Operating Expenditures	Capital Expenditures	Grants and Contributions and Transfer Payments	Total
(thousands of dollars)				
<b>Administration Program</b>				
Corporate Management	7 722	84	72	7 878
Common Services	17 949	688		18 637
Employee Benefit Plans	1 990			1 990
	<u>27 661</u>	<u>772</u>	<u>72</u>	<u>28 505</u>
Less: Revenues for Computer Services	7 098			7 098
<b>TOTAL COSTS OF PROGRAM</b>	<u>20 563</u>	<u>772</u>	<u>72</u>	<u>21 407</u>
<b>Energy Program</b>				
Energy Policy	11 921	93	487	12 501
Petroleum sources:				
supply, demand and substitution	4 914	116	114 842	119 872
Non-Petroleum sources:				
supply, demand and substitution	25 669	101	195 241	221 011
Energy Conservation	31 810	101	86 993	118 904
Energy Research and Development	2 096	27	73	2 196
Petroleum ownership, control and incentives	16 167	300	1 729 034	1 745 501
Oil Pricing and Compensation	1 483		2 241 202	2 242 685
Administration of Canada Oil and Gas Lands	5 338	80		5 418
Monitoring of energy enterprises	872			872
Emergency Planning, including Energy Supplies Allocation Board	1 460			1 460
Energy Public Information	9 157	20		9 177
Employee Benefit Plans	8 062			8 062
Environmental Studies Revolving Fund	103		492	595
	<u>119 052</u>	<u>838</u>	<u>4 368 364</u>	<u>4 488 254</u>
Less: Receipts pursuant to Environmental Studies Revolving Fund			2 621	2 621
Receipt of levies pursuant to Section 65 of the Petroleum Administration Act			<u>1 750 143</u>	<u>1 750 143</u>
<b>TOTAL COSTS OF PROGRAM</b>	<u>119 052</u>	<u>838</u>	<u>2 615 600</u>	<u>2 735 490</u>
<b>Minerals and Earth Sciences Program</b>				
Mineral Development	9 664	21	141	9 826
Administration of the Canada Explosives Act	1 723	53		1 776
Minerals Technology	18 617	2 123	6	20 746
Energy Technology	30 544	8 850	150	39 544
Geological Surveys	47 355	3 028	853	51 236
Earth Physics	13 317	727	22	14 066
Polar Continental Shelf	5 762	38		5 800
Remote Sensing	14 976	13 369	1 409	29 754
Surveys and Mapping	45 210	5 161	83	50 454
Minerals and Earth Sciences Public Information	2 398			2 398
Program Management Support	3 632	252	1 398	5 282
Employee Benefit Plans	15 343			15 343
<b>TOTAL COSTS OF PROGRAM</b>	<u>208 541</u>	<u>33 622</u>	<u>4 062</u>	<u>246 225</u>
<b>TOTAL EXPENDITURES FOR THE DEPARTMENT</b>	<u>348 156</u>	<u>35 232</u>	<u>2 619 734</u>	<u>3 003 122</u>

## ***REGIONAL INFORMATION OFFICES***

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