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Énergie, Mines et Ressources Canada

Annual Report 1984-1985

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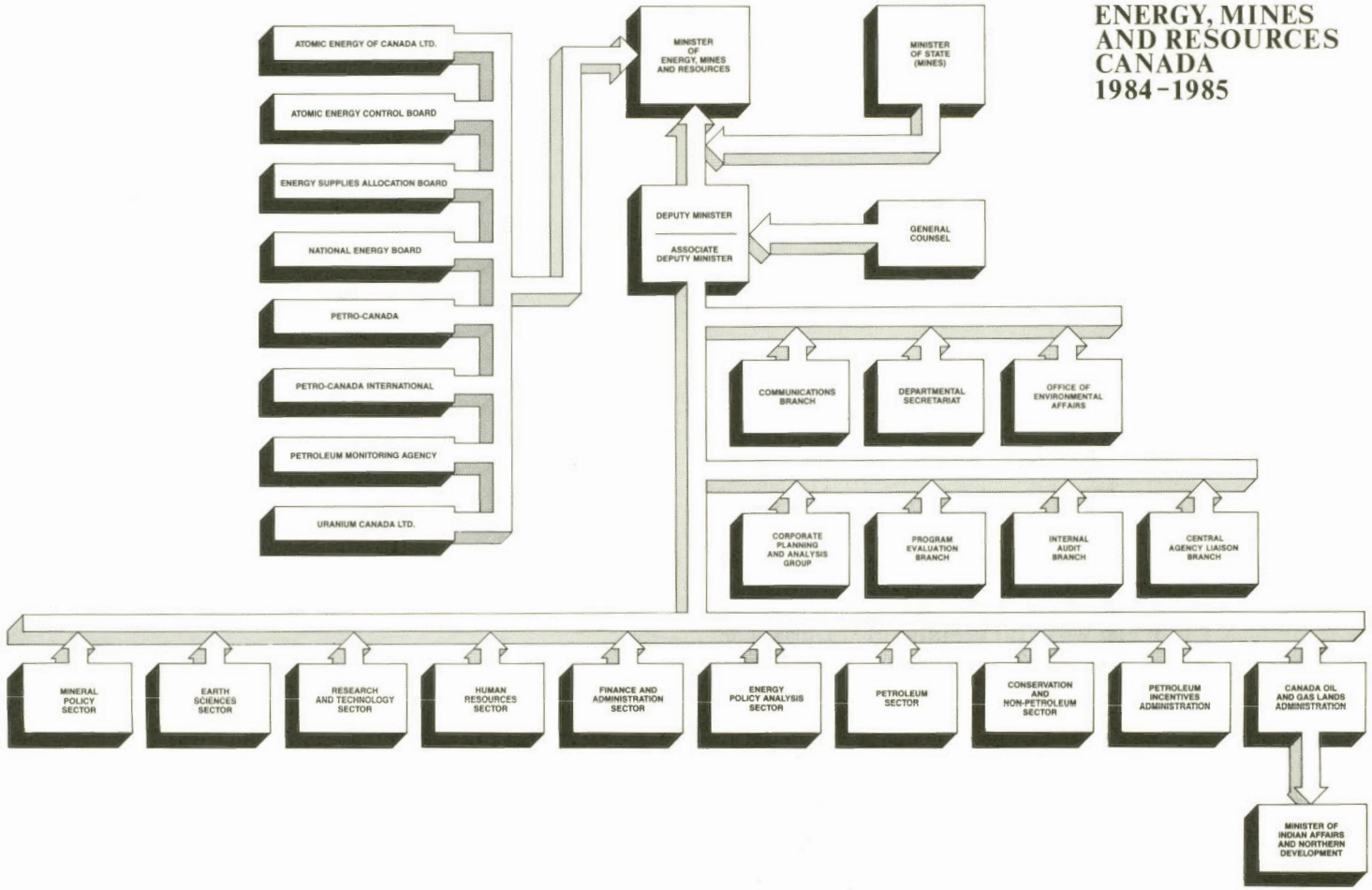
ENERGY, MINES AND RESOURCES CANADA 1984-1985



LETTER FROM THE MINISTER

To Her Excellency the Right Honourable Jeanne Sauvé, 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, 1985.

This report outlines departmental objectives and highlights for the 1984–85 fiscal year and provides a detailed review of operations for the department's three programs — Energy, Minerals and Earth Sciences and Administration.

Respectfully submitted,

Pat Carney
Minister of Energy, Mines
and Resources

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DEPARTMENTAL PROFILE

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

The Energy Program develops appropriate strategies, policies and programs to ensure that Canadians are supplied with and use their energy resources efficiently in the context of other social and economic goals. This year there were five main objectives: economic renewal and growth through the stimulation of the energy sector, energy self-sufficiency and security, enhanced Canadian participation, fair treatment, and a stable planning environment.

To pursue these objectives, the Energy Program deploys three sectors and two administrations: the Energy Policy Analysis, Petroleum, and Conservation and Non-Petroleum sectors; and the Petroleum Incentives Administration and Canada Oil and Gas Lands Administration. The Petroleum Monitoring Agency and the Energy Supplies Allocation Board, both independent advisory bodies, are provided with resources and support within the Energy Policy Analysis and Petroleum sectors, respectively.

Together their activities embrace both policy and program functions, including:

- adjusting energy policies and programs to achieve the five main objectives;
- recommending changes to domestic pricing and taxation systems, to new oil supply initiatives and demand reduction, and to incentives for enhanced Canadian participation in the energy sector;
- implementing programs to ensure that petroleum and nonpetroleum resources are developed, and that all energy sources are used and conserved effectively;
- administering policies and programs to ensure the vigorous and responsible development of oil and gas resources on the Canada Lands;
- administering policies and programs to increase Canadian ownership and control of the petroleum industry;
- monitoring and analyzing the petroleum industry;
- planning policies and programs to ensure equitable distribution of energy supplies in a national emergency;
- implementing strategies and initiatives to ensure that energy research capabilities are adequate to support broader energy objectives.

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 conducts national surveying and mapping programs. 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 effectiveness to the economy of Canada;
- ensuring that adequate technology is available to extract, process, use and conserve energy and mineral resources;
- ensuring that reliable information on mineral and energy technology is available;
- coordinating 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 on the configuration and evolution of the solid earth;

- ensuring the availability of geodetic, topographic and selected geographic information;
- ensuring public and industrial safety through implementation of the Explosives Act.

ADMINISTRATION PROGRAM

The Administration Program ensures that departmental programs are effectively managed and accounted for and maintains central support services. The Administration Program includes two sectors (Finance and Administration, and Human Resources), Communications Branch, and six executive offices. Activities include:

- ensuring that the department makes the best use of its allocated human and monetary 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 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.

Six executive offices are also part of the Administration Program. 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 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 Central Agency Liaison Branch coordinates the department's response to the demands of central agencies. The Office of Environmental Affairs participates in the development of broad environmental policies relating to energy and mineral strategies. The Departmental Secretariat prepares and coordinates ministerial and executive correspondence, and provides parliamentary and executive documents services to the ministers and senior managers of the department.

EMR 1984–85: THE YEAR AT A GLANCE

- EMR negotiated the Western Accord with the provinces of Alberta, Saskatchewan and British Columbia, establishing a market-sensitive pricing regime for oil, a fiscal system designed to spur investment in the petroleum industry, and a task force to develop the means to move towards market-sensitive pricing for domestic natural gas.
- EMR negotiated the Atlantic Accord with the province of Newfoundland and Labrador, establishing a joint management and revenue-sharing regime for the development of the oil and gas resources in the offshore area.
- The legislation implementing the agreement between Canada and Nova Scotia for the development of offshore resources was proclaimed into law.
- Discussions took place with project proponents and the governments of Alberta and Saskatchewan concerning the Husky Oil Ltd. Bi-provincial heavy oil upgrader and field development project and the Federated Co-operatives Ltd. NewGrade upgrader project.
- Canada and Alberta negotiated fiscal arrangements for Shell's $200 million oil sands project at Peace River.
- EMR announced a federal fiscal package to facilitate construction of the $300 million Dome Lindbergh oil sands project near Lloydminster.
- The Canada–U.S. Energy Consultative Mechanism met to discuss particular problems and ways of furthering energy trade between the two countries.
- An independent review was undertaken of the 1981 purchase by Petro-Canada of Petrofina Canada Inc.
- A discussion paper entitled *The Canadian Minerals and Metals Sector: A Framework for Discussion and Consultation* was developed and released in February, as part of the government's consultative thrust.
- The Economic Statement in November included the announcement of termination dates for the Canadian Home Insulation Program and the Canada Oil Substitution Program, as well as the end of Petro-Canada's subsidiary, Canertech, and reductions in energy research and development funding.
- Mineral Development Agreements with Manitoba, Saskatchewan, New Brunswick, Nova Scotia and Newfoundland were implemented, and negotiations continued with British Columbia, Ontario and Quebec.
- Establishment of the Asbestos Institute in Montreal, for product and health research, market development, and the dissemination of information on the safe uses of asbestos was announced in April.
- The first report on nickel and copper smelting was issued by a consultative working group from industry, labour, the provinces, and the federal government. Work progressed on a second report on the lead and zinc industries.
- Through improved energy efficiency and reduced oil consumption, the Canadian Industry Program for Energy Conservation reported annual savings equivalent to 9 680 540 cubic metres of oil.
- The Canada Energy Audit Program analyzed approximately $320 million in energy bills, and identified potential energy savings of approximately $65 million. CEAP made approximately 100 financial contributions valued at $1 million for energy conservation consulting services.
- The Federal Energy Management Program resulted in savings to the federal government of more than $150 million.
- Funding was announced for the construction of a $33 million circulating fluidized bed boiler at New Brunswick Electric Power Commission's 22 megawatt Chatham generating station to demonstrate that circulating fluidized bed technology for the concurrent combustion of high-sulphur coal and oil shale is economical and environmentally acceptable. With this technology, approximately 90 per cent of the sulphur dioxide emissions are reduced and captured in the furnace through a reaction with the oil shale.

- Canada's participation in the nine-year international Ocean Drilling Program began in 1985, with EMR's Earth Sciences Sector providing national coordination for this multidisciplinary research initiative to gather information on the geology of deep oceans and continental margins.
- Results from seismic surveys carried out 20 km beneath Vancouver Island under the first phase of Lithoprobe — a national program of deep-earth studies — have shed new light on how Vancouver Island was formed.
- Oil- and gas-related investigations in the Arctic and offshore regions began under the Frontier Geoscience Program, and a long-term scientific research facility was established on an ice island in the Arctic Ocean.
- Studies of hydrothermal metalliferous deposits on the ocean floor off Canada's west coast provided scientists with a better understanding of their formation, which can be applied to finding economic mineral deposits on land.
- Several publications by Geological Survey of Canada scientists contributed to significantly changing previously held scientific concepts on the origin and evolution of the Canadian Shield; models now being developed confirm that plate tectonic processes can be applied to old rocks such as those in the Precambrian Shield, Canada's storehouse of minerals.
- Memoranda of cooperation were signed between the Surveys and Mapping Branch and the surveying and mapping agencies of Ontario and British Columbia, enhancing opportunities for federal-provincial program coordination, exchange of information and development of national standards.
- Under the 1984–85 External Research Agreements Program, awards totalling $1 398 000 were made to 158 Canadian researchers in the fields of energy, minerals and the earth sciences.
- Canada's largest solar project was opened February 5, 1985, providing hot water to the Maclaren Pulp and Paper Mill at Masson, Quebec.
- The CANMET hydrocracking process has been integrated into Petro-Canada's Montreal East refinery and will be commissioned in 1985.
- The fluidized bed boilers at Canadian Forces Base Summerside in Prince Edward Island were demonstrated to be reliable and efficient.
- The second and final year of the Short Term Assistance in Research and Technology program ended with the completion of 21 R&D projects involving 18 companies and 34 technology transfer projects. This program involved more than 90 companies.
- The CANMET mobile foundry laboratory visited more than 60 industrial foundries, providing assistance in quality control and production economics.
- Mobile test units developed by the Edmonton Coal Research Laboratory provided research opportunities under actual plant conditions. The mobile water treatment plant was used in field work at two coal washeries. Construction of a mobile coal dewatering plant was completed and preliminary field tests conducted.
- R&D programs were aimed at ameliorating or resolving rock burst problems in underground mines, in cooperation with the Ontario government and several mining companies.
- The Canada Centre for Remote Sensing participated in the predesign and preconstruction phase of a European Space Agency Earth Resources Satellite, and will participate in the design and construction phase which will lead to a launch in 1989.
- Program definition and cost studies of a Canadian remote sensing satellite, RADARSAT, were initiated.
- A new satellite receiving station to be constructed in Gatineau, Quebec will receive high-resolution data from France's SPOT satellite due to be launched in October 1985.
- The Technology Enhancement Program in Manitoba was successfully completed, and a cooperative program to transfer remote sensing technology to provincial resource management agencies was started with the province of Saskatchewan.

ENERGY PROGRAM

ENERGY POLICY ANALYSIS SECTOR

During 1984–85 the Energy Policy Analysis Sector was occupied principally with negotiations for the Atlantic Accord and Western Accord.

Following extension of the deadline for the 1981 amended agreements with the western producing provinces, interim adjustments were made to pricing and marketing policies, including negotiated natural gas export prices, flexible oil export prices, and a preliminary review of domestic natural gas prices and marketing.

The government's Economic Statement in November increased the Petroleum Compensation Charge; implemented the Petroleum Levy Offset Program; announced the termination dates of demand-side programs such as the Canadian Home Insulation Program and the Canada Oil Substitution Program; reduced Petroleum Incentives Program and energy R&D expenditures; and deferred further natural gas pipeline extensions in Quebec. All of these resulted from adjustments to energy policy.

The Atlantic Accord, signed on February 11, 1985 by the Government of Canada and the Government of Newfoundland and Labrador, provides a joint management and revenue-sharing regime that allows Newfoundland to establish and collect royalties and provincial-type revenues and taxes for its offshore petroleum resources as if these were on land. It establishes the Canada-Newfoundland Offshore Petroleum Board and a $300 million development fund, and provides for constitutional entrenchment of the Accord. Both governments are committed to introducing enabling legislation by February 1986.

The Western Accord, a comprehensive oil and gas agreement between the Government of Canada and the governments of Alberta, Saskatchewan and British Columbia, was announced March 28, 1985. This agreement deregulated Canadian crude oil pricing and marketing, took steps to move the natural gas industry towards a system of market-oriented pricing, and eliminated or phased out some federal oil and gas taxes or charges, including the Petroleum and Gas Revenue Tax, the Petroleum Compensation Charge and the Canadian Ownership Special Charge.

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 comprehensive or strategic impact. The branch forecasts Canada's energy supply-demand balance and monitors federal, provincial, territorial and industrial activities.

In 1984–85 the branch played an integral part in advising on major energy policy changes in response to the government's new policy directions and changes in domestic and international oil supply and pricing. This involved extensive discussion with industry and with provincial governments, and culminated in two major energy-related agreements, the Atlantic Accord and the Western Accord.

The branch advised the Canada–Nova Scotia Offshore Oil and Gas Board, and the Policy Review Committee of the Canada Oil and Gas Lands Administration on policy implementation, and provided advice 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. In July 1984 a revised supply-demand forecast was published to complement the department's long-term energy planning role. In addition, the branch has established an extensive automated data base on energy supply and demand (ENERSTAT), from which it publishes its monthly *Energy Statistics Handbook*.

Financial and Fiscal Analysis Branch

The branch analyzes and recommends energy policies concerning revenue sharing, industry investment and rates of return, project evaluation and energy taxation and incentives. It also maintains an information system on provincial and international energy fiscal regimes.

In 1984–85 the branch studied alternative federal incentive regimes as replacements for the Petroleum Incentives Program and reviewed the federal energy tax system, including alternatives to the Petroleum and Gas Revenue Tax. It analyzed and advised on the implications of no longer applying the Incremental Oil Revenue Tax to the last project in Canada subject to it. The branch provided the fiscal and revenue sharing analyses underlying the negotiations that culminated in the Atlantic and Western accords. It does ongoing financial and economic analyses of major upstream petroleum projects and is developing an associated project databank. The branch participated in negotiations that led to a Memorandum of Understanding on the Husky Bi-provincial heavy oil upgrader and field development project on the Saskatchewan-Alberta border. The branch is also the principal federal contact on the Board of Directors of the Canadian Energy Research Institute.

Corporate Development and Economic Analysis Branch

The branch provides 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 energy expenditures funded through the economic development envelope, and existing and proposed departmental programs and initiatives.

In 1984–85 the branch processed the Petro-Canada corporate plan in accordance with the requirements of new Crown corporations legislation and participated in negotiations leading to the resolution by Cabinet in the FIRA cases arising from the indirect acquisition of Gulf Canada by Chevron and of Canadian Reserve Oil and Gas by Texaco. It acted as government contact for Co-enerco, an oil and gas company joint venture between the Canadian government and an association of cooperative financial and marketing institutions. It studied proposals to export firm power to the United States and to sell nuclear reactors abroad and coordinated economic and financial analyses of certain segments of the petrochemical industry. The branch produces *Economic Indicators and Analysis*, a quarterly publication that provides current analysis and information on the Canadian economy and the energy sector in particular. It is assessing the economic effects of the deregulation of petroleum prices and changes in the fiscal regime and is conducting a major review of the department's demand-side energy programs.

International Energy Relations Branch

This branch has two divisions: Multilateral and Bilateral Energy Relations, and Special International Projects. In cooperation with the Department of External Affairs, they ensure the effective management and coordination of Canada's energy relations with other countries and international organizations.

Activities in 1984–85 included participation in such bodies as the International Energy Agency and preparations for other multilateral forums, and meetings of the Energy Consultative Mechanism with the United States. There were ministerial visits to Mexico and from Sweden. The branch prepared several special studies of energy policy and industry developments in other countries of interest to Canada, and special studies on market opportunities for Canadian energy exporters. It administered a contribution agreement between EMR and the Canadian National Committee, World Energy Conference; the contribution supported CANWEC's Seventh National Energy Forum in Vancouver, B.C.

The branch worked closely with Petro-Canada International Assistance Corporation in providing advice on corporate plans and budget proposals, and facilitated the exchange of information with the corporation on geological prospects among developing countries.

Energy Policy Coordination Branch

The branch identifies energy issues of the day, follows trends, and provides material for tabling of energy bills, and required briefing for appearances before parliamentary committees. It coordinates activities related to access to information and privacy, strategic

policy planning and program evaluation, and prepares a monthly summary of energy developments in Canada and abroad. After the change in government in September 1984, the branch was involved in redefining energy policy objectives and reflecting them in corporate planning and evaluation documents.

PETROLEUM SECTOR

The Petroleum Sector is concerned particularly with problems of oil and gas production, transportation and marketing both at home and abroad. Its operating units provide technical and policy advice on issues as they affect the petroleum industry, and administer programs that have major impacts on the industry and Canadians as consumers of energy.

Natural Gas Branch

The branch administers programs and policies designed to substitute natural gas for oil. Natural gas sales reached record levels in Canada in 1984 because of the attractiveness of natural gas as a competitively priced, convenient and clean-burning fuel.

In 1984–85 several programs operated by the branch gave thousands of Canadians access to natural gas. Under the Distribution System Expansion Program, more than 900 new gas distribution lines were constructed to serve communities in British Columbia, Saskatchewan, Manitoba, Ontario and Quebec. The Gas Marketing Assistance Program was expanded to enable Gaz Inter-Cité Québec to enter into its first peak-service gas supply contract. These programs were funded from the Market Development Incentive Payments that were paid to the Government of Canada by the Alberta producers for natural gas market expansion initiatives.

The Chicoutimi and Saguenay regions of Quebec will have natural gas service for the first time as a result of a 235 km lateral pipeline which was constructed and brought into operation under the Natural Gas Laterals Program.

Natural gas prices were stable again in 1984, and in fact have remained at the same level since September 1982. This stability comes from the policy of maintaining the wholesale price of natural gas at 65 per cent of the price of crude oil. Under the Western Accord, a market-sensitive pricing regime will be implemented which will make gas prices more responsive to market conditions. The branch will play a major role in the design and implementation of the new regime by providing support and advice to a task force of senior officials established to propose ways of making natural gas prices more market sensitive. This role will include extensive consultations with all sectors of the industry, including consumers.

Following extensive consultation with the producing provinces and industry, the Government of Canada implemented a new natural gas export pricing policy on November 1, 1984. Under the policy, exporters have the option of negotiating contractual pricing provisions subject to regulatory review and government approval. As of March 31, 1985, ninety-eight per cent of export volumes were flowing under negotiated pricing arangements. With the flexibility to negotiate prices competitive in regional export markets, the industry has successfully reversed the decline in export volume of the previous four years. Export volumes are forecast to reach about 60 per cent of authorized levels during the 1984–85 licence year, compared with 43 per cent during the previous period. In addition, the policy provides Canadian natural gas producers with the opportunity to attach new export loads through short-term sales to industrial customers.

Oil Supply Branch

The branch analyzes Canada's oil supply requirements from domestic and international sources, and provides advice on security of supply and the use of domestic crude oil. It monitors world oil demand and supply, as well as pricing policies of the exporting countries, to determine their potential impact on Canadian oil markets.

The structure of the international oil market changes continually. More oil is being produced in non-OPEC countries and some smaller producers have joined the ranks of oil exporters. As a result, demand for OPEC oil

declined further last year by about 318 000 cubic metres a day to just over 2.7 million cubic metres a day, whereas non-OPEC oil supply increased substantially to almost 4.3 million cubic metres a day. International oil prices also came under pressure again in early 1985 and declined by about US$3.15/m^3 to an average of US$173/m^3.

Although world oil production rose moderately in calendar year 1984, following four successive years of decline, preliminary statistics for the first quarter of 1985 suggest that this increased demand will not be sustained in the short term.

Canadian crude oil production rose 6 per cent in 1984, to 243 000 cubic metres per day, of which about 9 per cent was produced in synthetic plants. Heavy crude oil production increased by 16 per cent over 1983, and light crude oil and equivalent production also increased by almost 8 per cent.

Canadian crude oil exports also continued the upward trend, rising to 50 000 cubic metres per day, 16 per cent above 1983 levels. Almost three quarters of the exports were heavy crude oil. Because of these increases, only a small volume of light crude oil productive capacity was shut in, compared with the 1983 shut-in volume of more than 8000 cubic metres a day.

For the second consecutive year, Canada was a net oil exporter (excluding liquefied petroleum gases). Exports of crude oil and refined products exceeded imports by over 33 000 cubic metres per day, or almost twice last year's position.

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 western Canadian and frontier oil and gas, enhanced oil recovery and oil sands economic studies, 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, or postproduction, sector of the industry and advises on policy to promote efficient utilization of domestic and imported petroleum resources.

Despite continuing competition in the marketplace, combined with increasing operating costs, the refining and marketing sector made a moderate profit in 1984, in contrast to the losses during 1983. The industry continued to improve the efficiency of its operations. Refinery capacity was slightly reduced during 1984 but sufficient capacity remains to provide an adequate supply of petroleum products.

The branch also continued to participate in the policy-making process to encourage upgrading of domestic heavy crude oil resources and to promote the domestic petrochemical industry's access to a necessary range of feedstocks at market-oriented prices.

Oil Pricing and Compensation Programs Branch

The branch administered programs related to the previous system of regulated prices.

The Oil Import Compensation Program compensated importers of foreign petroleum for the difference between their costs and the regulated Canadian price. The New Oil Reference Price Program provided price supplements up to the world price to domestic producers of various categories of conventional new oil and synthetic crude oil. The program was extended to include expanded production at Norman Wells in the Northwest Territories, when the pipeline from Norman Wells to Zama Lake was opened in March 1985. The Domestic Transfer Compensation Program provided Canadian east coast refiners with subsidies to cover costs associated with transporting Canadian crude oil east of Montreal. The Crude Oil Exchange Compensation Program offered financial assistance to eastern Canadian refineries involved in crude oil exchanges with U.S. refineries. These programs were funded by proceeds from the Petroleum Compensation Charge (PCC). The balancing of revenues and expenditures was known as petroleum compensation accounting.

In response to a growing deficit in the Petroleum Compensation Account, the Minister of Finance announced in his November 8 Economic Statement that the PCC would increase by $17.50 per cubic metre on November 10, 1984. To shelter the oil-based petrochemical industry from the impact of that increase, the Petroleum Levy Offset Program was established, effective November 10, 1984. Under the program, compensation was paid on the production and sale of primary petrochemicals in an amount equal to the November 10 PCC increase. The branch administered the program.

In line with the temporary Federal Sales Tax rebate announced in the Economic Statement, the primary industries (farming, fishing, hunting, trapping, logging and mining) were also being protected from the PCC increase. Although the rebates were provided by way of the Energy Administration Act and the Primary Industries Levy Offset Program Regulations, for administrative simplicity, the Department of National Revenue operated the program in conjunction with its own sales tax rebate program.

The branch was active in discussions on oil price deregulation with the provincial governments and members of the oil industry. Negotiations between the governments of Canada and the producing provinces were successfully concluded in late March of 1985, with oil prices scheduled to be decontrolled on June 1, 1985.

Energy Emergency Planning Group

The Energy Emergency Planning Group continued to design an organizational framework for a National Emergency Agency for Energy. This 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 the International Energy Agency.

Energy Supplies Allocation Board

In 1984–85 ESAB was host to a training session for the NATO Wartime Oil Organization. The training session required the 12 country delegations to simulate the movement of oil during wartime. In conjunction with this training session, Canada hosted a meeting of the Petroleum Planning Committee of NATO.

The International Energy Agency began planning for its next test of the Emergency Oil Sharing System and Canada was elected to chair the technical subgroup charged with designing this test.

The Chairman of ESAB represented Canada in Paris when the IEA, as part of its ongoing review of country programs, reviewed the Canadian Mandatory Allocation and Rationing programs. The Canadian programs were highly rated by the IEA Secretariat and other IEA member countries.

Other ESAB activities included fine tuning of the Allocation Program, major steps forward in the development of the Rationing Program, further enhancement of ESAB computer systems, and continuing participation in the Interprovincial Advisory Committee on Energy, Sub-Committee on Demand Restraint.

CONSERVATION AND NON-PETROLEUM SECTOR

The Conservation and Non-Petroleum Sector 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 nonpetroleum energy. CNP has five branches: Energy Conservation and Oil Substitution, Coal and Alternative Energy, Regional Operations, Electrical Energy, and Uranium and Nuclear Energy.

Energy Conservation and Oil Substitution Branch

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

The Canadian Home Insulation Program grants up to $500 for insulating any home built before September 1977 — some 7.3 million housing units are eligible. As of March 31, 1985, CHIP had provided

2.5 million grants, conserving the energy equivalent of 4600 cubic metres of oil per day. In November 1984, the government announced that, in order to reduce federal expenditures, the CHIP grant would be reduced from 60 per cent to 33⅓ per cent of material and labour costs, effective January 1, 1985, and that the program would terminate on March 31, 1986, a year ahead of schedule.

The Canada Oil Substitution Program, which ended on March 31, 1985, contributed half the cost of converting heating systems from oil to other fuels, to a maximum grant of $800 per individually heated unit. From its 1981 inception, the program helped convert 1.1 million housing units and small commercial buildings, reducing oil consumption by about 6650 cubic metres a day.

During 1984–85 about 4 million publications were distributed. The HEATLINE, a toll-free telephone advisory service, helped more than 100 000 callers from across Canada, and the Ener$ave home energy analysis program provided assistance to about 12 000 householders.

The Canadian Industry Program for Energy Conservation, a network of 16 voluntary energy management task forces, saved the energy equivalent of 9.68 million cubic metres of oil during 1984–85. Additional energy conservation task forces have been formed for health care facilities, the distributive trades, office buildings. agriculture, postsecondary schools, and the hospitality industry. Regionalization of task forces was started during this period.

The Canada Energy Audit Program provided free energy audits, financial assistance for consulting services and energy management seminars and workshops to privately owned industrial, commercial and institutional organizations.

The Industry Energy Research and Development program encourages the development of products, processes, equipment or systems that will increase the efficiency of energy use throughout industry. Funding up to 50 per cent of the eligible costs associated with approved research and development projects undertaken by companies established in Canada is available.

The Accelerated Capital Cost Allowance — Class 34 Program is a 'fast write-off' tax program. Since its inception in 1976, investments by industry accepted under this program have saved the equivalent of 793 650 cubic metres of oil annually.

The Federal Energy Management Program consists of initiatives that among them have contributed to a reduction of 22 per cent in federal energy consumption over the past eight years. This reduction resulted in a cost avoidance of $165 million in 1984–85 alone and accumulated savings of some $680 million since 1975–76. FEMP's major initiatives consist of upgrading facilities to make buildings more energy efficient; off-oil investments that to date have displaced more than a million barrels of oil in federal operations; building surveys to identify areas of waste; and training programs.

In 1984, the Technology Transfer and Demonstration Programs Division, in cooperation with the Canadian Home Builders' Association, began to implement the second phase of the Super Energy Efficient Home Program, the R-2000 Program. The objective is to ensure that the construction of housing incorporating standards of airtightness and insulation capable of reducing energy consumption by up to 75 per cent becomes self-sustaining by 1990.

The Buildings Energy Technology Transfer Program disseminates practical know-how on energy-efficient building construction, operation and retrofit, to building professionals, contractors, tradespeople and owners. The program is implemented in cooperation with the Canadian building industry and a range of trade and professional associations.

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 safe use of coal. A demonstration of fluidized bed combustion of coal and

wood chips at the Canadian Forces Base in Summerside, P.E.I., has been initiated, and the final 3000 hours of a 10 000-hour materials-testing program for bubbling fluidized bed combustion at Point Tupper, N.S., is now under way. Engineering designs have been completed for a $33 million 22 MWe circulating fluidized bed combustion unit at Chatham, N.B., using New Brunswick oil shale to capture sulphur in high-sulphur Atlantic coals, and construction is to start in April 1985. The unit should be ready for commissioning in the fall of 1986. Funds provided to the Canadian Electrical Association to evaluate flue gas desulphurization technologies have resulted in demonstration with private industry of advanced combustion technology to reduce emissions of both sulphur dioxide and nitrogen oxides. A program to examine optimum coal beneficiation techniques for high-sulphur Atlantic coals was also initiated in 1984–85.

The combustion of coal-water mixture fuels in boilers designed originally for coal has been successful. A demonstration of the combustion of coal-water fuels in an oil-designed boiler at Charlottetown, P.E.I. is planned for 1985–86.

The branch and the Province of Nova Scotia continued to examine the potential for liquefaction of Cape Breton coals.

The federal-provincial Conservation and Renewable Energy Demonstration Agreements (CREDAs) concluded with a federal expenditure of $11 million in the final year. In total, over 350 projects in some 1300 locations were supported, at a cost of more than $210 million, with federal support of $40 million.

ENERDEMO Canada, a new $80 million cost-sharing program, replaced the CREDAs and encompasses the previous demonstration programs for Quebec and P.E.I., as well as the continuing Remote Community Demonstration Program (RCDP). Under ENERDEMO Canada $7 million has been committed to 48 alternative energy projects and $3 million to 15 projects in energy conservation. Under the RCDP, 72 community energy option studies were completed at a cost of $2 million in 1984–85. Planning, development and consultations were undertaken to begin the four-year demonstration phase of RCDP.

Under the solar energy demonstration programs, EMR supported about 2000 domestic hot water systems and 30 commercial-industrial hot water applications in 1984–85. Costs have come down to $270 per gigajoule of delivered energy per year in domestic applications and $180 for commercial applications. One large industrial application was built at a cost of only $80 per annual gigajoule capacity. Total EMR expenditures for solar energy in 1984–85 were $5 million.

The Forest Industry Renewable Energy program, which provides incentives for bioenergy systems, approved 42 new projects during 1984–85 and contributed $25.6 million. The program has been effective in generating private sector investments of more than $640 million, with $85.8 million of EMR funds. When completed, these will displace the equivalent of 1.4 million cubic metres of oil per year.

As part of an Economic and Regional Development Agreements subagreement for Prince Edward Island the Alternative Energy Development Program, a joint federal-provincial initiative, became operational this year. Seven projects have received $1.1 million for biomass conversion. When completed, they will displace the equivalent of 3.6 thousand cubic metres of oil per year and generate $3 million of private sector investments.

Departmental studies have shown remarkable achievements and potential in automotive fuel efficiency. Since the establishment of the voluntary program of fuel consumption standards in 1977, average new vehicle fuel efficiency has improved by more than 30 per cent. This was the first full year of operation of the Government-Industry Motor Vehicle Energy Committee, in which federal departments and vehicle manufacturers meet under EMR chairmanship to discuss energy matters.

The branch also encourages conservation by promoting ridesharing. Many carpools and vanpools have been established by employers, municipalities and individuals across Canada. EMR has directly assisted the Montreal Ridesharing Centre.

To encourage the use of alternative fuels in Canada, the branch manages programs for propane and natural gas. By March 31, 1985, when the propane program terminated, the conversion or purchase of nearly 71 000 propane vehicles had been assisted at a cost of $28.3 million. This meant the displacement of about 600 million litres of gasoline in a year. Since 1983 support has been provided to 2500 natural gas vehicles and 63 natural gas refuelling stations have been approved to receive grants of $50 000. A total of $1 200 750 was spent in 1984–85 on support to natural gas as a vehicle fuel. The natural gas programs terminate March 31, 1987.

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

Regional Operations Branch

Regional Operations, previously a division of the Energy Conservation and Oil Substitution Branch, became a full-fledged branch during the year. It manages the regional delivery of a variety of sector programs through Conservation and Renewable Energy Offices (CREOs) located in each province and territory, and contributes to departmental policy formulation and program development by providing regionally specific information.

New responsibilities for ENERDEMO Canada and the Super Energy Efficient Housing programs as well as the Prince Edward Island–Economic and Regional Development Agreement subagreement were assigned to the branch for regional delivery.

Since their inception in 1981, the CREOs have established close association with provincial and territorial governments, regional offices of other federal departments, the industrial, commercial and institutional sectors and the general public.

The volume of public enquiries answered by CREOs increased to 309 000 in 1984–85, from 257 000 in 1983–84.

Electrical Energy Branch

The 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 industrial organizations. The branch also 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 1984–85 included the Churchill Falls power contract, electricity prices on Prince Edward Island, and electricity exports.

The branch was involved in administering a research and development program and participated in an electricity export study undertaken by the International Energy Agency. Agreements managed by the branch included Lepreau 1 financing, the Coleson Cove (New Brunswick) Compensation Agreement, the Coleson Cove Conversion Study, and the Nelson River Transmission Agreement.

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

Uranium and Nuclear Energy 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 regularly assesses Canadian uranium resource and production capability levels, publishing a formal report every second year. The interim year 1983 assessment was completed during 1984 and critical data made available to the industry by an EMR communiqué later in the year.

The branch has a leading role in the Uranium Exports Review Panel, which reviews export contracts and advises ministers whether these are consistent with the government's uranium export policy.

Policies on the further processing of uranium and on foreign ownership of uranium mining properties were reviewed in 1984, and recommendations made to ministers.

The branch represented Canada internationally in the activities of the Nuclear Energy Agency of the Organization for Economic Cooperation and Development and in the International Atomic Energy Agency in Vienna. A branch member became chairman of the joint effort of these agencies to assess world uranium resources.

The branch worked closely with Atomic Energy of Canada Limited to develop a rationalization plan for making AECL and the nuclear industry more efficient, while preserving the CANDU nuclear reactor option for Canada. The outstanding performance of the Point Lepreau 1 CANDU reactor in New Brunswick increased the interest in building Point Lepreau 2, a second 600 MW unit on the same site intended to be a fully commercial project based on export contracts to U.S. utilities. The branch coordinated the federal government's approach to the project.

The branch led discussions with the provinces on jurisdiction over low-level radioactive wastes, secured agreements on joint cleanup efforts for low-level wastes in several provinces and worked closely with Eldorado Resources and AECL on resolving the problem of wastes in the Port Hope area.

PETROLEUM INCENTIVES ADMINISTRATION

The Western Accord sets out the following fiscal measures regarding the Petroleum Incentives Program: PIP will continue in force until March 31, 1986; and after March 31, 1986, certain eligible frontier wells will be grandfathered so as to continue to qualify for PIP for an additional period extending to December 31, 1987.

As a result of the accord, the Petroleum Incentives Administration will be gradually reduced during the next three years.

In the meantime, PIA continues to administer the Canadian Ownership and Control Determination Act and the Petroleum Incentives Program Act. The COCD program provides for the issuance of certificates stating the Canadian Ownership Rate and Control Status of applicants. PIP provides cash incentives for exploration and development expenses on a scale linked, among other factors, to Canadian Ownership Rate and Control Status.

Revised COCD regulations promulgated on June 1, 1984 made it easier for large public companies to measure their Canadian Ownership Rates.

A total of 3312 PIP applications from 1312 applicants was received. The COCD program issued 4696 certificates.

About 93 per cent of PIP expenditures were paid to companies with the highest COR levels. Regional distribution of the federal PIP budget is estimated at 39.5 per cent for activities on the east coast, 48.8 per cent in the Beaufort Sea and Arctic Islands, 5.2 per cent on other Canada Lands (including the Gulf of St. Lawrence, Bay of Fundy, and the Yukon), and 6.5 per cent on provincial lands (other than Alberta, which has its own PIP).

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

CANADA OIL AND GAS LANDS ADMINISTRATION

The Canada Oil and Gas Lands Administration encourages the oil and gas industry to discover, develop and, ultimately, to produce oil and gas on the Canada Lands. Equally important is ensuring that oil and gas activity is safe and environmentally acceptable, and provides a full and fair opportunity for Canadians to enjoy industrial, employment and other socioeconomic benefits.

North of 60°, COGLA reports to the Minister of Indian and Northern Affairs; south of 60°, including the offshore lands, COGLA reports to the Minister of Energy, Mines and Resources.

During 1984 exploration activity resulted in 11 new discoveries, more than double that of 1983. Forty-seven new exploration agreements were concluded, for a total of 167 agreements negotiated under the requirements of the Canada Oil and Gas Act.

The Altantic Accord, signed in February 1985, was a major step towards eventual development of the Hibernia oil field on the Grand Banks offshore Newfoundland.

In addition, there were positive developments on the Nova Scotia offshore. Legislation enacting the 1982 Canada–Nova Scotia Agreement was promulgated in 1984, giving legal status to the Canada–Nova Scotia Offshore Oil and Gas Board. The first projects under the terms of the $200 million development fund were announced in November 1984. A Call for Proposals was also published in the *Canada Gazette* in January 1985, for two parcels of land on the Scotian Shelf.

On the west coast, the Environmental Review Panel was established to study the possibilities of oil and gas exploration and development. A moratorium on activity on the British Columbia offshore remains in effect.

Safety continues to be an important priority of COGLA. Drilling rigs and production sites are inspected regularly and the Canadian Coast Guard inspects drilling rigs and supply vessels. COGLA, in conjunction with other federal and provincial agencies, implemented 55 of the 66 recommendations published in Report One of the Royal Commission investigating the sinking of the *Ocean Ranger.* Many of these had been incorporated into COGLA's safety guidelines before the report was published.

New diving regulations have been developed and were to become law in 1985.

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

MINERALS AND EARTH SCIENCES PROGRAM

MINERAL POLICY SECTOR

The major rationalization and restructuring of Canada's minerals and metals sector continued throughout 1984-85. Productivity increased and mineral markets continued to stabilize, so that some of the major integrated Canadian mining companies recovered somewhat and showed small profits for the first time in some years.

Mineral Policy Sector focused on both the international situation and domestic concerns. New initiatives were developed to improve market access and knowledge. The change in direction of the new government called for extensive consultation and the development of a major mineral discussion paper. Work also continued on other domestic issues.

Discussion Paper and the Consultation Process

Mineral Policy Sector developed a discussion paper entitled *The Canadian Minerals and Metals Sector: A Framework for Discussion and Consultation*, which was released by the Minister of State for Mines in February. The objective of this document was discussion between governments, industry and labour on how to achieve the national economic goals identified in the Finance Minister's economic statement and on the appropriate roles of the various groups. It aimed at developing an awareness and appreciation of the issues concerning the minerals and metals sector so that appropriate policies and programs can be formulated and choices made by consensus. Response to the document was very positive and consultations were continuing at year-end.

The sector assembled a directory of all government programs, federal and provincial, that may be of direct use to the mineral industry. The information was compiled following a request at the Federal-Provincial Mines Ministers' Conference in May 1984. Contact persons and telephone numbers are listed to allow follow-up.

The Mineral Outlook '84 Conference was held in Ottawa in May and focused on the changing international scene and the specific outlook for many of Canada's mineral commodities. Representatives from industry and both levels of government presented papers.

International Developments

Mineral Policy Sector organized four missions to leading mineral-producing and mineral-consuming regions of the world. The focus was on iron ore, asbestos and potash, three mineral commodities for which enhanced knowledge on international supply-demand factors would benefit the Canadian industry. Participants were from industry, labour, provincial governments and the federal government. The sector also undertook a study of international copper markets. Input from producing companies, governments and related institutions was complemented by on-site visits.

As part of the work of the Mining Association of Canada–EMR Subgroup Task Force on Mineral Markets, a regional forum on mineral policy was held in Vancouver in October. Under the joint sponsorship of EMR, Energy, Mines and Petroleum Resources of B.C., the Mining Association of Canada, and the Mining Association of British Columbia, representatives of governments, industry and labour explored the international minerals economy, with the theme Meeting the Competition.

In 1984 the United Nations Conference on Trade and Development (UNCTAD) attempted to reach agreement on a series of measures to give preferential treatment for the processing, marketing and distribution of Third World exports, including minerals. Mineral Policy Sector participated in the fifteenth session of the UNCTAD Committee on Tungsten, at which the terms of reference and operating procedures of a newly formed sessional working group of the committee were adopted. The sector was also active at the UNCTAD Third Preparatory Meeting on Iron Ore, which examined international measures on iron ore, including future alternative forms of cooperation between exporting and importing countries.

The sector continued to give priority to the establishment of the Intergovernmental Nickel Discussion Group. Representatives from interested countries met in October. The encouraging results of this

meeting led the federal government to organize a preparatory meeting in early 1985.

The General Agreement on Tariffs and Trade has direct impact on Canada's ability to export its mineral commodities. The GATT Working Party on Resources in 1984 examined the tariff and nontariff barriers facing international trade in nonferrous minerals and metals. The sector's work on this subject will be important to a future round of multilateral trade negotiations and in identifying areas of economic benefit to Canada.

Mineral Development Agreements

During 1984–85 mineral development agreements subsidiary to Economic and Regional Development Agreements were being implemented with Manitoba, Saskatchewan, New Brunswick, Nova Scotia and Newfoundland. These were characterized mainly by parallel delivery of cooperatively planned, complementary federal and provincial programs, designed to strengthen and diversify the mineral industry in each province. During a series of provincial 'open houses' in November showing the results of the 1984 field work, the industry generally reflected satisfaction with these programs and their results. By the end of the year, discussions on programs for agreements were being resumed with Quebec, British Columbia and Ontario, with a greater stress on provincial initiatives and delivery.

Asbestos Institute

In April the Minister of Energy, Mines and Resources announced the establishment of the Asbestos Institute in Montreal. The institute is being funded by equal contributions from the governments of Canada and Quebec and the asbestos industry. Its primary concerns include product and health research, market development and the dissemination of information on the safe uses of asbestos.

Nonferrous Smelters

EMR coordinated a consultative working group of industry, labour and federal and provincial governments to complete a comprehensive study of Canada's nonferrous metals industry. The objective was to identify the elements of a Canadian strategy that would foster an internationally viable and growing nonferrous metals industry, consistent with long-standing economic development and environmental goals. It was also intended to provide information and analyses to various interest groups to aid future policy analyses and development. *Canada's Non-ferrous Metals Industry: Nickel and Copper* was published in 1984. A second report dealing with lead and zinc is being prepared for publication in 1985.

Mining Industry Employment Update

Consistent with the spirit of freedom of information guidelines, the sector has begun to distribute publicly a quarterly report, *The Mining Industry Employment Update*. Representatives of provincial governments and industry regularly contribute information to the report. The *Update* outlined employment opportunities created in new mines and expanding facilities, reduced employment in closed and restructured operations, and expiry dates of collective agreements.

EARTH SCIENCES SECTOR

Headquarters staff provides management direction to the sectors, coordinates sector-wide programs, plans, policies and administration, improves communications and administers the department's Research Agreements Program.

Geological Survey of Canada

The Geological Survey of Canada ensures the availability of comprehensive knowledge, technology and expertise pertaining to the geology of the Canadian landmass and offshore areas. Included are mineral and energy resources and conditions affecting land and seabed use, as required to exploit mineral and energy resources effectively, use land efficiently, estimate Canada's resource base and formulate policies.

Major achievements included new assessments of the remaining oil potential of western Canada and of the Scotian Shelf's gas and oil potential. Deep-earth studies were expanded and important new information obtained. Major

geophysical surveys were carried out in offshore areas and marine geoscience work expanded, partly in response to offshore bilateral boundary disputes. Studies were continued of hydrothermal mineral deposits now forming at ocean depths of 2000 m or more along active volcanic vents off the west coast, and work under federal-provincial mineral development subagreements accelerated.

In 1984–85 GSC comprised eight divisions; three of these, with about 40 per cent of the staff, are outside the National Capital Region.

Atlantic Geoscience Centre, Dartmouth, N.S., carries out geological, geophysical and geochemical studies in the Atlantic and Arctic offshore areas and obtains data used in the search for hydrocarbon resources, in resource evaluations, in the protection of the marine environment, and in improving the safety of coastal and offshore engineering structures.

Cordilleran Geology Division, with offices in Vancouver and at the Pacific Geoscience Centre, Sidney, B.C., studies the geology of the Cordilleran region and the adjacent Pacific Continental Shelf and margin. Results are used to assess mineral and hydrocarbon potential, and aid in land use and environmental protection.

Economic Geology and Mineralogy Division conducts geological studies of metallic and other mineral deposits to determine their distribution, origin and potential abundance, thereby facilitating resource exploration and policy formulation. The division provides analyses of rocks, minerals and ores needed by other GSC divisions.

Geological Information Division communicates the results of the GSC's scientific programs by publishing maps and reports, maintains Canada's largest earth science library, and provides a public information system.

Institute of Sedimentary and Petroleum Geology, Calgary, collects information on the sedimentary basins of western and northern mainland Canada and the Arctic regions, which contain much of our oil, natural gas and coal resources. Estimates of Canadian potential oil and gas resources are prepared in cooperation with other federal agencies and a repository is maintained of samples, cores and other data derived from work done by the petroleum industry on Canada Lands.

Precambrian Geology Division studies the bedrock geology of the mineral-rich Precambrian Shield to provide data used by industry in searching for mineral deposits and by government in developing mineral policies. The division provides isotopic age and paleomagnetic determinations and petrological information for all parts of Canada.

Resource Geophysics and Geochemistry Division serves as a national centre for research and development into geophysical and geochemical methods used to interpret geology and to search for mineral resources, and conducts systematic geophysical and geochemical surveys. Technologies developed are tested and made available to the private sector as well as to government.

Terrain Sciences Division studies the geology of the unconsolidated materials of the landmass, processes that modify the landscape, and hazards that may affect our use of the land. Studies concerned with nuclear fuel waste management are coordinated by this division.

GSC Activities during 1984–85

- Seismic surveys to determine deep geological structures beneath Vancouver Island and the Kapuskasing region of Ontario were carried out as part of Lithoprobe, a multidisciplinary program launched in 1983–84 with GSC, Earth Physics Branch and a consortium of Canadian universities participating. The Vancouver Island profiles have given some of the best data ever recorded in North America and are providing extensive and exciting new insights into the nature of the continental lithosphere and the oceanic rocks of the Juan de Fuca Plate that have been thrust beneath it. Additional seismic profiles and associated geological investigations are planned for the Kapuskasing region in 1985–86.

- Additional oil and gas-related geological investigations in offshore and Arctic regions were started using resources available through the Frontier Geoscience Program approved by government in June 1984 as part of EMR's Mineral and Earth Sciences Program. Principal aims of FGP are to study sedimentary basins in frontier areas systematically and to develop new techniques and concepts. Current GSC activities include investigations of the deep structures and processes that gave rise to basins, the internal characteristics of the basins and their sediments, and the geological conditions relating to petroleum occurrence and estimation of petroleum potential.
- New geoscientific investigations in support of regional mineral programs were planned and field work initiated under mineral development subagreements negotiated early in the fiscal year under newly implemented Economic and Regional Development Agreements with Newfoundland, Nova Scotia, New Brunswick, Manitoba and Saskatchewan. These studies complement work undertaken by the provinces under the same agreements and involve mainly geological and mineral deposit studies, airborne geophysics, regional geochemistry, glacial geology and mineral tracing. Similar investigations were continued in Gaspé under a federal initiative, making extensive use of contract services from universities and commercial firms, and in the Eastern Townships where a three-year program was initiated to identify areas favourable for the discovery of tungsten, copper and gold.
- Full Canadian participation, coordinated by EMR, in the Ocean Drilling Program has created new opportunities for the Geological Survey. Planning began for a member of the Atlantic Geoscience Centre to act as chief scientist on a traverse of the Labrador Sea in September 1985. The nine-year ODP is expected to provide Canada with numerous benefits, including better geoscience information for use by the oil, gas and mineral exploration industries. The planned 1985 cruises should enhance our capabilities in seismic interpretation and stratigraphic correlation, and in understanding the geological history and structure of the deeper offshore and ocean depths.
- A number of hydrothermal metalliferous deposits associated with modern volcanic activity were discovered during the year on the ocean floor off Canada's west coast. These discoveries in water depths of 2000 m or more were made using Canadian ships and Canadian and American submersibles. Although these deposits are unlikely to be exploited in the near future their study offers a chance to make preliminary assessments of their mineral potential, and to observe orebodies in the making, observations that can be applied to finding economic mineral deposits on land. Multibeam high-resolution bathymetric (SEABEAM) and long-range side-scan sonar (SeaMARC II) data sets from the northern Juan de Fuca Ridge system were essential to the discovery of these occurrences.
- Studies of mineralized felsic intrusions in the Yukon and northern British Columbia suggest that molybdenum-tungsten-tin deposits are associated with granitic bodies related to colliding plates of the crust, whereas copper-rich deposits occur in granodiorite bodies related to subducting plates.
- Resource assessment studies were conducted in the Northwest Territories in Artillery Lake, parts of Banks Island and western Victoria Island in connection with the establishment of northern national parks. During this work, new lead-zinc-copper occurrences were found in the Artillery Lake Basin.
- As part of the Geological Survey's national responsibility to provide information on conditions affecting land and seabed use, studies were made on the impact that construction of the pipeline from Norman Wells to Zama Lake will have on the permafrost environment of the upper Mackenzie Valley. Within the Beaufort Sea coastal zone, a drilling program was conducted to test specialized equipment to be used in studying the geophysical and geotechnical properties of

seabottom sediments and subsea permafrost. Studies of terrain hazards such as landslides and outburst floods were continued. A major report describing the hazards and management of destructive mass movements was published, and the effects of the disastrous flood caused by the outburst of Ape Lake into Noeick River near Bella Coola, B.C. were documented.

- Correlation of rock units from one area to another is important in making resource assessments, and knowledge of the age of different units is one of the most important tools in correlation. GSC recently opened new geochronology (age-dating) laboratories which provide some of the best clean-air facilities in the world and place Canada at the forefront of uranium-lead geochronology.

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 1984–85, the branch signed memoranda of cooperation with the surveying and mapping agencies of Ontario and British Columbia to optimize opportunities for program coordination, exchange of information and development of national standards. An arrangement was negotiated with the Institut Géographique National, France, concerning scientific and technical cooperation in the field of mapping, with emphasis on the development of remote sensing applications for mapping, automatic correlation of stereoscopic space imagery and geocoded space data.

During the year, the branch reviewed offshore activities regarding legal and geodetic surveys and the conversion of boundaries to the 1983 North American Datum. Scientific and technological advice was provided to federal and provincial government agencies, and consulting services in surveys and mapping for international development programs through the Canadian International Development Agency (CIDA).

The Sherbrooke Institute of Cartography training centre was opened. Human resources plans, organization frameworks and operational specifications for the new building were developed.

Geodetic Survey

The division provides a network of geodetic surveys, which constitute a national survey reference system. 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.

The division progressed significantly in adapting new satellite technology to high-precision three-dimensional positioning suitable for geodetic application. Other highlights include participation in the NASA Crustal Dynamics Project involving Long Baseline Interferometric (LBI) measurements, and the high-accuracy surveys necessary to monitor the stability of selected LBI sites. This is part of an EMR–United States initiative undertaken to study North American crustal movements. Data were obtained at four Canadian LBI sites in 1984: Algonquin, Yellowknife, Whitehorse and Penticton.

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 920 maps sheets. At 1:50 000, a larger scale, 350 first-edition maps were produced, bringing the total published to 76 per cent, and 570 maps were revised. Satellite imagery was used to acquire revision information for maps of the 1:250 000 series and to detect changes on maps of the 1:50 000 series.

Other highlights include the implementation of the Cartographic Data Processing System for the automated digitizing of the 1:250 000 series; installation of a new digital stereocompilation system in Sherbrooke and a topographic data edit system in Ottawa; completion of the program to convert the 1680 maps of Quebec into bilingual format; continuation of projects to exchange digital topographic data with provinces; participation in the

technical management of programs for federal-provincial flood damage reduction; and the provision of technical advice and inspection services on surveying and mapping projects under the auspices of CIDA in Cameroon, Egypt, Indonesia, Tanzania and Zimbabwe.

Legal Surveys
The division manages and regulates all surveys of Canada Lands and maintains a parcel framework for the registration of interests in Canada Lands. These lands comprise national parks, the Yukon and Northwest Territories, the offshore and 2300 Indian reserves. Divisional initiatives to increase the accessibility of Legal Survey information include producing regional catalogues, implementing and maintaining a coherent property mapping system relating to the parcel framework, and initiating automation of the Canada Lands Information System.

Preparatory work relating to the survey of several large native land claim settlements is under way. Work continued on projects to safeguard the interests of holders of land rights and to supply survey-related information required for the management of Canada Lands.

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, British Columbia–Washington sections of the boundary for a total of 130 km. A special report was published showing the geographical positions, adjusted to the 1927 North American Datum, of all boundary monuments and turning points along the International Boundary from the St. Francis River in New Brunswick to the St. Lawrence River.

Geographical Services
This division uses the maps produced by 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; seven *National Atlas* maps on the subjects of time zones, oil and gas pipelines, road, rail and air transportation and solar radiation were published.

More than 1300 aeronautical charts and related flight information publications were produced for navigation and control of air traffic in Canada. The division provided cartographic support and advice to EMR and other government departments that do not have cartographic expertise. For example, it completed an electoral mapping project for the Chief Electoral Officer.

In response to a growing demand for digital geographical information, the division has begun to assess the potential of digital technology for application to *National Atlas* information.

Reproduction and Distribution
On a cost-recovery basis, this division publishes data compiled by other Surveys and Mapping Branch divisions 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 installation of a pile-fed, large-format map-folding machine, and the computerized and integrated order entry/inventory control/accounting system for product distribution operations. Other highlights include 2400 map titles printed, 3 500 000 maps distributed, and 550 000 aerial photographs reproduced.

Earth Physics Branch

The branch provides geophysical knowledge on the framework, dynamic processes and hazards of the Canadian landmass and its offshore, operates national networks of geophysical observatories and contributes to the definition of international geophysical standards. During the year, the branch was involved in multidisciplinary studies such as geophysical surveys contributing to the delineation of Canada's offshore boundaries, geothermal energy studies and

geophysical research in the Canadian Nuclear Fuel Waste Management Program.

Highlights include major components of the Lithoprobe program: seismic reflection and magnetotelluric profiles across Vancouver Island, and a seismic refraction survey near Kapuskasing, Ontario; the Canada–Federal Republic of Germany investigations of the Haughton structure on Devon Island, N.W.T.; and the production of a series of highly detailed bathymetric and side-scan maps of the offshore Juan de Fuca Ridge system.

Division of Seismology and Geomagnetism

The division operates several seismographic networks across Canada to monitor earthquakes and determine seismic risk, and a network of geomagnetic observatories to monitor the earth's magnetism and to forecast magnetic conditions. Deep structures of the Canadian landmass and its offshore are probed using seismic and geomagnetic surveys. Research is undertaken on the detection and identification of nuclear explosions.

Highlights include the new seismic hazard maps in the 1985 edition of the National Building Code; the survey that located the North Magnetic Pole near Lougheed Island, N.W.T.; the production of the new magnetic declination chart for Canada; and participation in an international seismic data exchange experiment under the auspices of the Conference on Disarmament at Geneva.

Division of Gravity, Geothermics and Geodynamics

The division conducts gravity surveys over the Canadian landmass and its offshore and maintains national standards for gravity measurements. It conducts regional geothermal studies, evaluates the potential for geothermal energy in Canada and investigates the distribution and physical properties of permafrost. It operates global dynamics observatories near Ottawa and Calgary, which contribute data to international agencies on earth rotation, polar motion, earth tides and crustal stability by measuring surface deformation and changes in gravity and groundwater levels.

Highlights include the addition of 39 000 new stations to the national gravity data base; a marine gravity survey of St. Pierre Bank in the Atlantic, south of Newfoundland; new 1:10 000 000 colour gravity anomaly maps of Canada; permafrost monitoring along the new Norman Wells–Zama pipeline; feasibility studies for geothermal energy at Edson, Alberta and Moose Jaw, Saskatchewan; highly satisfactory results from the first NASA measurements in Canada using very long baseline interferometry; and successful implementation of an upgraded satellite tracking system at Ottawa and Calgary.

Pacific Geophysics Division

The division is part of the Pacific Geoscience Centre located at the Institute of Ocean Sciences near Sidney, B.C. It is responsible for most branch activities in the Cordillera and its adjacent offshore region.

Highlights include geoscience studies required for bilateral negotiations of offshore boundaries in the Juan de Fuca, Dixon Entrance and Beaufort Sea regions; studies of sulphide mineral deposits in the Juan de Fuca Ridge system; and monitoring of earthquake hazards in the high-risk west coast region.

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 PCSP coordinates and provides support to scientific research groups working in the Arctic Islands and the Arctic Ocean. Facilities at Tuktoyaktuk in the Mackenzie Delta and at Resolute Bay on Cornwallis Island provide logistical support between mid-February and October each year.

In 1984 an additional support facility was established on an ice island in the High Arctic, to serve as a long-term floating camp for scientific parties.

Demand for PCSP support continues to increase at a rate of about 10 per cent a year. In 1984, 218 field parties were supported during the field season. Aircraft, equipment, communications and base camp support were provided to research groups carrying out studies in a wide variety of disciplines ranging from archeology to zoology.

RESEARCH AND TECHNOLOGY SECTOR

Canada Centre for Mineral and Energy Technology

CANMET continued to nurture its close relationship with the Canadian mining and fossil fuel industries. The thrust and direction of CANMET's R&D programs is strongly influenced by consultative process with industry through the National Advisory Committee on Mining and Metallurgical Research, and with research establishments, professional and technical groups and private sector companies.

In its second and final year, the Short Term Assistance in Research and Technology program completed 21 R&D contracts involving 18 companies and 34 technology transfer projects. More than 90 companies have been involved in the START program.

Minerals

CANMET continued to research, develop and evaluate technology for mining, processing, metal extraction and physical metallurgy. The use and conservation of Canada's non-energy mineral resources continued to be focal issues in this activity.

Construction of the new building for the Mining Research Laboratory at Elliot Lake was 90 per cent complete by year-end. Serious rock burst problems experienced in the Sudbury–Elliot Lake area mines forced CANMET to expand its role in the rock mechanics field, particularly in microseismic geotechnology. Staff scientists served as experts on technical committees on rock bursts, and made technical presentations to the Ontario Government inquiry on this subject. The Mining Research Laboratory had significant input in several large-scale federal-provincial R&D programs such as underground mine communications and safer underground mining methods.

The Canadian Explosive Atmospheres Laboratory continued to certify materials and equipment for use in coal mines, and began transferring diesel emissions reduction technology to industry.

More than 330 explosive materials were evaluated at the Canadian Explosives Research Laboratory.

R&D work undertaken by the Mineral Sciences Laboratories has resulted in technology which has now obtained support from the Program for Industry Laboratory Projects, valued at $4 million, of which 50 per cent is from industry. Two of the more important projects were the development of a wet method of processing asbestos ores and the biological in-place leaching of low-grade uranium ores. The latter is a major innovation in biotechnology research, in which CANMET plays a leading role with the BIOMINET Association, which coordinates communications between R&D groups and functions as a technology information clearing house for industry.

Mineral Sciences Laboratory staff, with other federal government departments, began to assess the options available for modernizing the nonferrous smelting industry, to improve productivity while achieving long-term environmental benefits.

The Physical Metallurgy Research Laboratories undertook a series of demonstrations at nonferrous foundries to show that additions of trace amounts of elements, such as sodium and calcium, greatly improve the quality and marketability of zinc-aluminum alloys.

In a two-pronged approach aimed at stimulating applications of the newly emerging rapid solidification technology, CANMET has funded contracts with Canadian industry and is evaluating the Canadian potential for commercial development of this important advanced materials technology.

The CANMET Mobile Foundry Laboratory visited more than 60 industrial foundries across Canada to provide technical assistance and give consultation on problems related to quality control and production economics.

The National Uranium Tailings Program has reached the midpoint of its five-year program. During 1984–85 it has been principally concerned with two major studies of tailings disposal sites in Ontario and Saskatchewan, and with the development of a long-term model of uranium tailings sites.

Energy

The Synthetic Fuels Research Laboratory of the Energy Research Laboratories has led in the development of a single-stage hydrogen-addition process for coprocessing heavy oil or refinery distillation residues together with significant quantities of coal, to produce crude oil which may be refined in existing oil refineries. This coprocessing of coal and oil together uses two abundant Canadian energy resources.

The CANMET hydrocracking process will move closer to commercial reality when an 800 cubic metre per day upgrader, integrated into Petro-Canada's Montreal East refinery, is commissioned in mid-1985. This $100 million project is on schedule, with over 90 per cent Canadian content.

The Hydrocarbon Processing Research Laboratories continued to focus on the conversion and upgrading of conventional and nonconventional gaseous, liquid and solid hydrocarbon fuels as well as their associated products and residues.

The Combustion and Carbonization Research Laboratory completed the development of a retrofit device for conventional gas furnaces that would improve their efficiency by 20 to 30 per cent. The Canadian Gas Association adopted a standard for the measurement of seasonal efficiency of gas furnaces, based largely on CCRL work. Under the ENERSOLVE program, twelve feasibility studies of fuel conservation technologies were completed.

The fluidized bed boilers at CFB Summerside successfully supplied the steam required for the 1984–85 heating season, and CCRL was able to monitor and advise on this major demonstration program.

Health, safety and productivity — primary concerns of the coal mining industry — are the focus of activities at CANMET's Coal Research Laboratories. Scientists continued efforts to assess Canadian coal reserves and to develop technology which increases the efficiency of mining and processing coal while protecting the environment and the health and safety of the workers.

Spontaneous combustion and methane ignition pose severe problems for the coal industry. Staff at the Cape Breton Coal Research Laboratory assisted in the design of a high-turbulence cutting head ventilation system, which was installed on a full-face rock tunnel boring machine. With this system the machine was able to bore safely through methane-bearing strata without allowing dangerous levels of methane to accumulate. CBCRL provided technical expertise and advice to the Cape Breton Development Corporation during the major fire at No. 26 Colliery in Glace Bay. The Calgary Coal Research Laboratory identified a number of causes and alternative remedial measures for spontaneous combustion fires in coal storage facilities.

The Edmonton Coal Research Laboratory investigated the beneficiation potential of Maritime coals at its pilot plant facilities, which are unique in Canada. These facilities were installed during the year in a new building at Devon, Alberta. Mobile test units developed by ECRL provided research opportunities under actual plant conditions. The mobile water treatment plant was used in field work at two coal washeries. Construction of a mobile coal dewatering plant was completed and preliminary field tests conducted.

Office of Energy Research and Development

The Office of Energy Research and Development coordinates Government of Canada energy research and development. It acts as secretariat to the Interdepartmental Panel on Energy Research and Development and is the primary energy R&D contact with 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.

Canada participated in energy 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 and the strategic grants of the Natural Sciences and Engineering Research Council.

The scope of the program was significantly reduced in the November 1984 financial review. Emphasis will be placed on developments related to fossil fuel which can be directly related to economic growth.

Canada Centre for Remote Sensing

The Canada Centre for Remote Sensing 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 completed the predesign and preconstruction stages in 1984. Continued Canadian participation was approved for the design and construction phases of the ERS-1 satellite, scheduled for launch in 1989. ERS-1 will carry a range of microwave sensors for ice, ocean 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. Program definition and cost studies were initiated in 1984. Canada 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 is preparing to operate a new satellite receiving station in Gatineau, Quebec, which will receive high-resolution data from France's SPOT satellite to be launched in October 1985.

CCRS received and distributed multispectral scanner data from the LANDSAT-4 satellite and high-resolution Thematic Mapper data from LANDSAT-5 at the Prince Albert receiving station in Saskatchewan.

Applications development research activities concentrated on crop and forest monitoring, vegetation and soil moisture assessments, and the application of microwave sensors to sea-ice classification.

Transfer of remote sensing technology to provincial resource management agencies continued in the Maritime Provinces. The Technology Enhancement Program in Manitoba was successfully completed, and a cooperative program was started with the Province of Saskatchewan.

Explosives Branch

The Explosives Branch was responsible in 1984–85 for regulating the manufacture, distribution and transportation of explosives in the interests of safety. No major explosives-related accidents occurred in 1984–85. Ninety-seven factories were licensed to manufacture explosives. The branch licensed 2120 magazines for storage and issued 857 permits to vehicles for transportation. These were supported by more than 1750 inspections. Fireworks supervisor courses were conducted at centres across Canada, and major cities were given help in planning and carrying out Canada Day fireworks celebrations.

In 1983 EMR learned of an area near Waterloo, Quebec, where old pyrotechnic bombs had been found on a construction project. Much of the area was cleared but many of them remain in a pile of earth. In 1984 the branch initiated measures to ensure safe disposal of the pyrotechnic pieces or appropriate seal-off of the affected land.

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

Capability of conducting the necessary tests for United Nations shipping classification of all explosives has been established.

ADMINISTRATION PROGRAM

FINANCE AND ADMINISTRATION SECTOR

Financial Management Branch

The department made expenditures of $6022 million for the Energy Program, $290 for the Minerals and Earth Sciences Program and $35 million for the Administration Program. Offsetting revenue totalled $2219 million, including levies of $2208 million collected under the *Energy Administration Act*. The department's total net expenditures were $4128 million.

The department, as required by the office of the Comptroller General, has reformed the information presented in the Main Estimates. Planned results and resource requirements for all three programs were presented in the Expenditure Plan, which was tabled as part of the Estimates.

The department developed, and had approved, an Operational Plan Framework as required under the Policy and Expenditure Management System. This OPF now serves as the base planning document for the department.

A capital acquisition and replacement planning process was developed and approved by Treasury Board. Earth Physics Branch received increased capital funding through this process, which is being extended throughout the rest of the department.

Administration and Computer Science Branch

Considerable progress was made during the year in the updating and development of administrative policies and procedures together with the development of an enhanced Departmental Records Management Program.

A pilot project for the automation of departmental manuals, which had been commenced in 1982–83, was completed.

A pilot project to automate records management and access-to-information processes will be completed in 1985–86.

The branch has begun to analyze departmental computing requirements from 1986 to 1991 based on the study completed in 1984–85.

HUMAN RESOURCES SECTOR

During the year, the sector completed changes to its structure to provide improved personnel management services. The sector also established a senior human resources planning system for better use and development of EMR's senior management group. The Deputy Minister instituted a Departmental Advisory Committee on the Participation of Women in EMR's workforce. A policy, systems and procedural framework was established for the redeployment of surplus employees. The department's bilingual capacity was improved; francophone representation in the scientific and professional category, while showing progress, remains low.

COMMUNICATIONS BRANCH

The Communications Branch continued to inform the public of the activities of the Energy and Minerals and Earth Sciences programs.

Major activities supporting the Energy Program included the announcements of the Western Accord and the Atlantic Accord. The branch assisted in the preparation and distribution of accord documents, and conducted follow-up media monitoring and analysis.

Support was given to the Canada Oil and Gas Lands Administration through information activities associated with Report One of the Royal Commission investigating the sinking of the *Ocean Ranger*; and to the testing and acceptance of a new diving bell for deep-sea workers, through the preparation of the 1984 COGLA annual report and through ongoing media relations work.

The Communications Branch supported the Petroleum Incentives Administration by publishing and distributing PIA reports, preparing and distributing news releases and providing writing and editorial assistance for speeches by senior PIA officials.

Support for energy conservation programs included ongoing exhibition and publishing activities, a home energy supplement that appeared in 359 weekly newspapers throughout the country, and the promotion of openings of R-2000 Super Energy Efficient Homes.

The branch actively promoted the department's scientific activities. These included a Canada Centre for Remote Sensing experiment to study soil moisture content, in which astronaut Marc Garneau (aboard U.S. space shuttle *Challenger*) and 1000 Saskatchewan students took part. The Earth Sciences Sector was supported by the production of publications such as *The Earth Sciences Annual Review* and *Earth Sciences at EMR*.

Promotion and media relations were arranged for EMR's Mineral Outlook Conference in May, the Mines Ministers' Meeting and the Mining Association of Canada Annual Meeting, and for the release of *Canada's Non-Ferrous Metals Industry: Nickel and Copper*, the first volume in a series. News releases and backgrounders were prepared for mineral development agreements with Newfoundland, Nova Scotia, Saskatchewan and New Brunswick.

The advertising program was limited in 1984–85 because of a government-wide freeze. However, significant campaigns did take place. In addition to the home energy newspaper supplement, radio and television ads promoted natural gas expansion in the province of Quebec, and newspaper, radio and television ads publicized CHIP, COSP and the HEATLINE. Several small ads, placed countrywide in newspapers, magazines and trade journals, featured the Canada Centre for Mineral and Energy Technology, mineral policy activities, the National Mineral Inventory, the Geological Survey of Canada, and the Canada Centre for Remote Sensing.

The department took part in 147 national, provincial, regional and local exhibitions. The Exhibits group was involved in the production of six new displays.

The branch distributed 132 press releases and produced 103 publications — 72 new ones and 31 reprints. Eight audiovisual programs were completed.

The Editorial Division produced the department's corporate publications: the quarterly magazine *GEOS*, the monthly staff paper *Entre nous* and the *EMR Annual Report*.

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 how well they have been achieved.

In 1984–85 program evaluations of the Forest Industry Renewable Energy Program, the Class 34 Accelerated Capital Cost Allowance Program, the Atlantic Energy Conservation Investment Program and the Earth Physics activity were completed. Plans responding to recommendations made in these evaluations are being implemented. The branch also completed evaluation assessments (the planning phase of the evaluation process) on nine components of the energy program, including the Petroleum Incentives Program and the Natural Gas Program. An evaluation framework (the basis for future evaluation) was also developed for the new Frontier Geoscience Program.

Internal Audit Branch

This branch provides independent reviews and appraisals of all departmental operations. Audits carried out covered a broad spectrum of departmental activities, from administrative areas to a review of a specific element of operations in the Petroleum Incentives Administration. In both the responsibility centre audits and the regular attest audit program, no evidence was found of any major deficiencies in the management and utilization of resources.

The follow-up audit program was expanded to accommodate the growing backlog of work stemming from Internal Audit work and the many recommendations advanced in recent years by the Auditor General. Tardiness or delay in implementing recommendations was noted in some areas, but management has generally responded effectively to the various recommendations.

CROWN CORPORATIONS AND AGENCIES

Central Agency Liaison Branch

The Central Agency Liaison Branch coordinates the department's response to the demands of central agencies, and maintains an overview of the status of the economic development envelope.

Office of Environmental Affairs

Through the Office of Environmental Affairs, 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, automobile emissions, carbon dioxide and climate change, nuclear power and mineral policy strategy.

EMR participates in the Federal Environmental Assessment and Review Process through OEA, by screening departmental initiatives and by coordinating departmental 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

Atomic Energy Control Board
Atomic Energy of Canada Limited
Petro-Canada Limited
Petro-Canada International Assistance Corporation
Uranium Canada Limited

AGENCIES

Board of Examiners for Canada Lands Surveys
Canadian Permanent Committee on Geographical Names
Energy Supplies Allocation Board
National Energy Board
Petroleum Monitoring Agency

FINANCIAL SUMMARY

	Operating Expenditures	Capital Expenditures	Grants and Contributions and Transfer Payments	Total
		(thousands of dollars)		
Administration Program				
Corporate Management	9 158	310	—	9 468
Common Services	20 613	1 988	—	22 601
Employee Benefit Plans	2 714	—	—	2 714
	32 485	2 298	—	34 783
Less: Revenues for Computer Services	7 811	—	—	7 811
TOTAL COSTS OF PROGRAM	24 674	2 298	—	26 972
Energy Program				
Energy Policy	10 725	288	2 515	13 528
Petroleum Sources: supply, demand and substitution	5 383	116	243 271	248 770
Non-Petroleum Sources: supply, demand and substitution	22 131	53	243 018	265 202
Energy Conservation	43 783	567	181 452	225 802
Energy Research and Development	1 894	13	175	2 082
Petroleum Ownership, Control and Incentives	17 302	163	1 735 330	1 752 795
Oil Pricing and Compensation	1 737	—	3 461 989	3 463 726
Administration of Canada Oil and Gas Lands	6 726	133	21 020	27 879
Monitoring of Energy Enterprises	878	14	—	892
Emergency Planning including Energy Supplies Allocation Board	1 364	15	—	1 379
Energy Public Information	9 948	339	—	10 287
Employee Benefit Plans	8 284	—	—	8 284
Environmental Studies Revolving Fund	198	—	1 861	2 059
	130 353	1 701	5 890 631	6 022 685
Less: Receipts pursuant to Environmental Studies Revolving Fund	—	—	3 697	3 697
Receipt of levies pursuant to Section 65 of the Petroleum Administration Act	—	—	2 207 917	2 207 917
TOTAL COSTS OF PROGRAM	130 353	1 701	3 679 017	3 811 071
Minerals and Earth Sciences Program				
Mineral Development	7 555	76	1 880	9 511
Administration of the Canada Explosives Act	1 724	91	—	1 815
Minerals Technology	22 661	5 037	19	27 717
Energy Technology	35 983	7 600	318	43 901
Geological Surveys	61 197	6 824	62	68 083
Earth Physics	14 861	2 729	—	17 590
Polar Continental Shelf	6 573	45	—	6 618
Remote Sensing	17 533	11 496	4 100	33 129
Surveys and Mapping	47 446	6 287	76	53 809
Minerals and Earth Sciences Public Information	3 120	—	—	3 120
Program Management Support	5 500	443	1 758	7 701
Employee Benefit Plans	16 778	—	—	16 778
TOTAL COSTS OF PROGRAM	240 931	40 628	8 213	289 772
TOTAL EXPENDITURES FOR THE DEPARTMENT	395 958	44 627	3 687 230	4 127 815

REGIONAL OFFICES

REGIONAL INFORMATION OFFICES

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Saskatoon, Saskatchewan
S7K 5X2
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Institute of Sedimentary and Petroleum Geology
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EARTH PHYSICS BRANCH

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SURVEYS AND MAPPING BRANCH

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FINANCE AND ADMINISTRATION SECTOR

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