



2006 Minerals Yearbook

CANADA

THE MINERAL INDUSTRY OF CANADA

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Canada is a federation of 10 Provinces and 3 Territories, a nation rich in mineral resources, and one of the leading mining countries in the world. In 2006, the country continued to supply minerals to satisfy global demand, producing more than 60 minerals and metals. In 2006, high metal prices boosted Canada's mineral industry, which ranked among the top five global producers for more than 10 major minerals and metals. As a result, the value of mineral production increased to a record \$29.6 billion (CAN\$33.6 billion¹) compared with \$24.1 billion (CAN\$27.4 billion) in 2005. In 2006, 70% of the total value was contributed by Ontario (28%), British Columbia (17%), Quebec (14%), and Saskatchewan (11%). Canada had a mining presence in every Province and Territory (Birchfield, 2007; Natural Resources Canada, 2007b).

The country continued to be the world leader in the production, by volume, of potash followed by Russia, Belarus, and Germany, and in the production of uranium followed by Australia and Kazakhstan. The country ranked in the top five countries for the production of aluminum after China and Russia; cobalt after Congo (Kinshasa), Zambia, and Australia; gypsum after the United States, Iran, and Spain; nickel after Russia; and zinc after China, Australia, and Peru. Canada ranked fourth in the world in the value of diamond (gemstone) production after Botswana, Australia, and Russia (Vance, 2006; Founie, 2007; Jasinski, 2007; Kostick, 2007; Kuck, 2007; Olson, 2007; Plunkert, 2007; Shedd, 2007). The influence of the Canadian dollar's strength and crude oil prices, however, pushed down prices for raw materials. For primary metal products and, to a lesser extent, for chemical, petroleum, and coal products, there was a trend toward higher prices.

Minerals in the National Economy

In 2006, minerals contributed to an upturn in Canada's economic growth. In spite of the appreciation of Canada's currency relative to the U.S. dollar, the consumer price inflation remained subdued at 2.2% owing to higher world demand for Canadian mineral exports and higher mineral commodity prices. For 2006 as a whole, Canada's real gross domestic product (GDP) increased by 2.8%, down from 2.9% in 2005 (Department of Finance Canada, 2007). The mining and mineral processing industries represented 3.7% of the GDP in 2006. Canada had a population of more than 32.5 million in 2006; total direct employment in the mineral industry was more than 388,000, or 2.4% of Canada's total employment. About 45,000 were employed in mining; 84,000 in smelting and refining; and 259,000 in the mineral processing and manufacturing industries. The unemployment rate decreased to 6.3% compared with 6.8% in 2005 (Department of Finance Canada, 2007; Natural Resources Canada, 2007b).

¹Where necessary, values have been converted from Canadian dollars (CAN\$) to U.S. dollars (US\$) at the rate of CAN\$1.135 = US\$1.00.

Government Policies and Programs

In Canada, the authority to make laws is divided between the Parliament of Canada and the Provincial legislatures. The Federal Parliament can make laws for the entire country with respect to matters assigned to it by the Canadian Constitution, and it has responsibility for the three Territories as well. In a similar way, a Provincial legislature can make laws relative to the subject matters over which it has been assigned jurisdiction. Local or municipal governments can make bylaws on local matters, such as zoning regulations and the issuance of construction permits. Specific arrangements have been developed for Aboriginal governments so that they can exercise a range of governmental powers over reserve lands and other territories. In 1982, amendments to the Constitution explicitly recognized the constitutional right of the Provinces to manage their electrical energy, forestry resources, and nonrenewable natural resources. Thus, in each Province, the legislature may exclusively make laws in relation to exploration, development, production, and conservation and management of nonrenewable natural resources and forestry resources in the Province (Natural Resources Canada, 2007c).

Renewable energy sources, such as water, biomass, wind, solar, geothermal, and energy from wastes generate electrical, thermal, or mechanical energy without depleting the source. Renewable energy case studies were developed by Natural Resources Canada to illustrate the importance of renewable energy and provide information on (1) the cost-effectiveness of the projects, (2) energy and technical statistics, and (3) information on the environmental impacts of the projects. The projects were meant to serve as examples of how renewable energy could be implemented into the Canadian energy market (Natural Resources Canada, 2007h).

The Canadian Environmental Protection Act, 1992, c. 37, sets standards for pollution prevention. The Government of Canada has indicated that it is committed to implementing pollution prevention as a national goal and as the priority approach to environmental protection. Canada ratified the Kyoto Accord in 2002 despite concern among business groups and others that compliance would place Canada's economy at a lasting competitive disadvantage in relation to the United States. However, the Canadian Government announced in 2006 that Canada would not be able to meet its original Kyoto Protocol commitments. The Government announced a new regulatory framework for air emissions that, when implemented, could lead to significant decreases in emissions of greenhouse gases and air pollutants as early as 2010 (Department of Justice Canada, 2006; Natural Resources Canada, 2007g).

To encourage exploration investment and stimulate Canada's exploration for minerals other than oil and gas, two types of flowthrough shares (FTS) investment options were available. The regular flowthrough option offers a 100% Federal tax deduction for eligible exploration expenditures. The Investment

Tax Credit for Exploration (ITCE), or the super flowthrough option, provides the 100% deduction plus an additional Federal tax credit for grassroots exploration, for the equivalent of a 136.7% exploration expense deduction. Additional Provincial and Territorial deductions are also available (Canadian Intergovernmental Working Group on the Mineral Industry, 2006, p. 44).

Federal, Provincial, and Territorial policies are generally stable and have traditionally supported the research and information services that relate to the mining industry. The Federal Government has negotiated multiyear Mineral Development Agreements with Provincial governments to fund initiatives intended to strengthen the mining industry in Canada. The Canadian Securities Administrators' National Instrument 43-101, which pertains to the "Standards of Disclosure for Mineral Projects," was enacted into law in early 2001. This instrument continued to be applied to all technical public disclosure on mineral projects and to require that all technical disclosure be based on the work of a qualified person (Canadian Intergovernmental Working Group on the Mineral Industry, 2006, p. 1-2, 180, 183-187). The Canadian Environmental Assessment Act (CEAA) is a Federal environmental assessment process that provides means for integrating environmental factors into planning and decisionmaking processes. The Government of Canada, through CEAA, seeks to achieve sustainable development and to promote economic development while conserving and enhancing environmental quality. The Government of Canada has expressed its commitment to ensuring that the administration of the CEAA results in a timely and predictable environmental assessment process that produces high-quality environmental assessments so Federal decisions about projects safeguard the environment and promote sustainability. In Canada, based on the CEAA results, the Provincial and Territorial governments support and promote exploration and deposit appraisal activities in their respective jurisdictions through various initiatives, such as fiscal incentives, resolution of land access issues, and the provision of state-of-the-art geoscientific data (Canadian Environmental Assessment Agency, 2006; Department of Justice Canada, 2006).

Environmental concerns continued to influence mineral exploration and development activities throughout Canada, and mineral exploration criteria seem to have become increasingly subject to community and legal influences. Land use has become an important issue. For instance, First Nation rights were receiving much consideration. Although environmental assessment legislation was passed in 1992, the Federal Government has been deliberate in producing regulations to implement such laws. One subsequent measure was the tax deductibility for funds set aside for the cleanup of closed mine sites; this complemented emerging Provincial environmental restoration requirements (Canadian Environmental Assessment Agency, 2006).

According to Foreign Affairs and International Trade Canada, as measured by the Environmental Performance Index (EPI), Canada was the second ranked country in the G-7 and eighth among 133 countries studied in terms of effectively reducing the environmental effect on human health and promoting ecosystem vitality and sound natural resources management. A perfect EPI

score is equivalent to 100 based on such indicators as air quality, biodiversity and habitat, environmental health, productive natural resources, sustainable development of minerals (metals, industrial minerals, and fuels), and water resources (Canadian Intergovernmental Working Group on the Mineral Industry, 2006, p. 150; Foreign Affairs and International Trade Canada, 2006).

Production

Canada was one of the leading mining countries in the world, and the increase in metal prices provided a boost to the mining sector in 2006. In 2006, the value of metallic mineral production totaled \$21.2 billion, which was 45.2% higher than that of 2005 (\$14.6 billion). The value of industrial minerals production decreased by 2.7% to \$10.2 billion from \$10.5 billion in 2005. The value of coal production also decreased to \$2.2 billion in 2006 from \$2.3 billion in 2005, which was a 5.3% decrease (Natural Resources Canada, 2007d).

Ontario's mineral output amounted to 27.9% of the total value followed by British Columbia, 16.7%; Quebec, 14.1%; Saskatchewan, 11.4%; Newfoundland and Labrador, 9.3%; Manitoba, 6.2%; the Northwest Territories, 4.8%; New Brunswick, 4.4%; Alberta, 3.9%; Nova Scotia, 0.9%; and the Yukon and the Nunavut Territories, 0.1% each. Although the production of fuels tended to be concentrated in the Western Plains Provinces, the output of nonfuel mineral commodities was characterized by a much wider distribution throughout Canada (Natural Resources Canada, 2007d).

Some remarkable changes in the value of mineral production in 2006 compared with 2005 were as follows: nickel ore output increased by 17%, and its value increased by 75.9%; copper ore output increased by 3.1%, and its value increased by 78.8%; diamond output increased by 7.2%, and its value decreased by 9.7%; potash (K₂O content) decreased by almost 16%, and its value decreased by 9.2%; and zinc ore output decreased by 4%, and its value increased by 101.5%. In terms of value, the leading mineral commodities produced were nickel, the value of which increased to \$5.5 billion in 2006 from \$2.9 billion in 2005; copper, to \$4.1 billion from \$2.2 billion; iron ore, to \$2.3 billion from \$1.3 billion; gold, to \$1.9 billion from \$1.7 billion; zinc, to \$1.9 billion from \$960 million; sand and gravel, to \$1.1 billion from \$1 billion; and stone, to \$1.1 billion from \$960 million (Natural Resources Canada, 2007b, d).

Mining plays an important role in meeting the electrical needs of the country. Coal and uranium provide one-third of Canada's electrical requirements every day. Canada continued to be the world's leading producer of uranium, exporting about 85% of what is produced to nuclear electric utility customers in, in order of value, Japan, Europe, and the United States. Alberta, meanwhile, which produced almost one-half of the coal mined in Canada, relied on coal for 84% of its electric power (Natural Resources Canada, 2007b, d).

Structure of the Mineral Industry

The Canadian mineral industry comprised about 3,000 domestic and perhaps 200 foreign companies; more than 9%

of these companies were actively engaged in actual mining. Major and junior companies were engaged in exploration, some of which were in advanced stages of mine development and expansions. Companies whose corporate voting rights were at least 50% non-Canadian were considered to be foreign, although other distinctions could apply in some large companies. More than 2,500 mine sites, which included coal, were active (Giancola, 2007, p. 9-16). Another 3,000 mines and quarries produced sand and gravel and other construction materials. About 40 smelters and refineries and other processing plants were operating in the cement, sodium chlorate, and sulfuric acid industries. Foreign companies were subject to the same taxes as domestic companies, and repatriation of earnings was allowed. Inco Ltd. was acquired by the Brazilian Companhia Vale do Rio Doce (CVRD) in October 2006, and emerged from this transaction as the second ranked mining company in the world, in terms of market capitalization. CVRD Inco Ltd. (CVRD Inco) was the new company made up of the combination of Inco Ltd. Canada and CVRD Brazil. CVRD Inco's nickel sector is to be managed from Toronto, as well as its marketing and metal sales. It was expected that an integrated management could synergize its mineral operations worldwide (Ferreira, 2007, p. 5).

The Canadian mineral industry was privately owned with shares trading publicly on various exchanges in Canada and, in many cases, Brazil and the United States. Overall, the mineral industry in Canada consisted of underground and open pit mines, leaching operations, concentrators, smelters, and refineries, as well as drilling and production operations characteristic of the petroleum industry. Table 2 lists the structure of the Canadian mineral industry by principal mineral commodities and major operating companies.

Mineral Trade

As the world's leading exporter of minerals and metals, Canada enjoyed economic benefits from its mineral industry that included a significant contribution to its trade balance. In 2006, Canada's total exports, imports, and trade balance amounted to \$398.5 billion, \$352.5 billion, and \$56.5 billion, respectively, compared with those of 2005, which were \$395.1 billion, \$338.5 billion, and \$46 billion, respectively (Statistics Canada, 2007b).

In 2006, Canada exported energy products (\$76 billion), which included crude petroleum (\$33.7 billion), natural gas (\$24.3 billion), and coal and others (\$18 billion); industrial goods and materials (\$82.2 billion), which included crude minerals and ores (\$10 billion), chemicals and fertilizers (\$27.1 billion), metals and alloys (\$29.3 billion), and industrial minerals (\$15.8 billion) (Statistics Canada, 2007a). In 2006, Canada's export partners were the United States (79%), the United Kingdom (2.8%), China (2.1%), and others (16.1%). Canada imported energy products (\$30.2 billion), which included crude petroleum (\$19.7 billion) and others (\$10.5 billion), and industrial goods and materials (\$73.4 billion), which included crude minerals and ores (\$24.6 billion), chemicals (\$26 billion), and industrial minerals (\$22.8 billion). In 2006, Canada's import partners were the United States (55.1%), China (9.4%), Mexico (4.2%), and others (31.3%) (Statistics Canada, 2007c; U.S. Central Intelligence Agency, 2007). Prominent

among the crude minerals exported in 2006 were iron ore, potash, and sulfur to the United States; copper concentrates to Japan; and iron ore and zinc concentrates to the European Union (EU). Exports of smelted and refined metals included aluminum, copper, gold, iron and steel, nickel, silver, and zinc to the United States; aluminum and gold to Japan; and copper and nickel to the EU. Coal exports went mostly to Japan. Total trade between Canada and the United States exceeded that of any other two countries in the world. In 2006, more than 79% of Canadian exports (\$315.7 billion) and more than 65% of Canadian imports (\$231.6 billion) were with the United States followed by, in order of value, Japan, the United Kingdom, the EU, Mexico, and other countries (Statistics Canada, 2007b).

Commodity Review

Metals

Aluminum.—Production of primary aluminum was almost 3.1 million metric tons (Mt) in 2006, which was an increase of 6.9% compared with that of 2005. This ranked Canada third in the world after China (8.7 Mt) and Russia (3.72 Mt) in the volume of production and first (55%), with Russia second (18%) and Brazil and Venezuela third (4% each), in volume of exports to the United States (Natural Resources Canada, 2007f; Plunkert, 2007).

Alcan owned more than 1.4 million metric tons per year (Mt/yr) (46.4%) of the total Canadian primary aluminum smelter capacity of almost 3.1 Mt/yr followed by Alcoa (22.5%), and others (31.1%). This capacity included Alcan's 277,000-metric-ton-per-year (t/yr) smelter in Kitimat, British Columbia. Alcan continued to follow through with its acquisition of Pechiney and with its strengthening of the new company. It has completed the spinoff from Novelis Inc. (the world's leading aluminum rolled-products company) and has opened a packaging plant and automotive structure plants. It also expanded and modernized its seven smelters in Quebec. Alcan planned in the future to pursue opportunities worldwide (Wagner, 2006, p. 9.2-9.3).

At Alcoa's 255,000 t/yr Lauralco-Deschambault smelter near Quebec City, the redesign and upgrading of pot covers were expected to reduce emissions. In early 2006, Alcoa and the Province of Quebec were negotiating on the upgrade of the Baie-Comeau smelter, which would increase capacity to 547,000 t/yr from 438,000 t/yr by 2010 at an investment of about \$1 billion. The Becancour smelter of Aluminerie de Bécancour Inc., which was owned by Alcoa (75%) and Alcan (25%) and had a capacity of 409,000 t/yr, restarted production at two of the three potlines that were shut down because of a labor strike. Alcoa and Alcan announced that billet production at the smelter would start to produce 234,000 t/yr in 2007. Aluminerie Alouette Inc. [Alcan (40%), Aluminium Austria Metall Québec (20%), Hydro Aluminum (20%), Société générale de financement du Québec (13.33%), and Marubeni Québec Inc. (6.67%)] completed a \$1.4 billion expansion of its Sept-Iles smelter in Quebec from 245,000 t/yr to 550,000 t/yr (Wagner, 2006, p. 9.3; Alcan Inc., 2007; Alcoa Inc., 2007).

Bauxite and Alumina.—Production of alumina (Al_2O_3) totaled almost 1.3 Mt, which was an increase of 8.3% compared with that of 2005, and alumina (hydrate) was about 1.5 Mt,

which was an increase of 7.1% compared with that of 2005 (table 1). In 2006, Alcan owned 100% of the total Canadian alumina refinery capacity of almost 1.2 Mt/yr. This capacity included Alcan's smelter-grade alumina refinery in Vaudreuil, Quebec, and two specialty alumina refineries in Brockville, Ontario (18,000 t/yr) and in Vaudreuil (160,000 t/yr). Canada imported about 2.2 Mt of bauxite from Brazil in 2006. Bauxite ore can be refined into two grades of alumina—smelter grade and specialty chemical grade; the former is used in the production of primary aluminum, and the latter is used in various products, such as absorbents, ceramics, fire retardants, and refractory bricks (Alcan Inc., 2007; Departamento Nacional de Produção Mineral, 2007).

Copper.—Mine output of copper content increased to 606,958 t in 2006 from 595,383 t in 2005. Canada ranked seventh as world producer of copper following, in order of tonnage output, Chile, the United States, Peru, Australia, Indonesia, and Russia (Edelstein, 2007). Refined metal production decreased to 500,463 t from 515,233 t in 2005. However, the world copper price increased, which caused the value of metal production to increase to \$4.1 billion in 2006 from \$2.3 billion in 2005, or by 78.8%. Canada exported \$3.3 billion worth of copper during 2005 (Coulas, 2006, p. 22.20; Natural Resources Canada, 2007d, f).

In Canada, four Provinces accounted for 93% of copper production. In 2006, British Columbia was the leading copper-producing Province. Its share amounted to about 49.1%; Ontario's, 31.6%; Manitoba's, 9.2%; and Quebec's, 3.1% (Coulas, 2006, p. 22.3; Natural Resources Canada, 2007g). CVRD Inco's copper concentrates were produced at its following polymetallic mines: Sudbury mines in Ontario produced 109,000 metric tons (t); Thompson Mine in Manitoba, 6,281 t; and the most significant new mine Voisey's Bay in Newfoundland and Labrador, 28,000 t (Coulas, 2006, p. 22.6-22.7; Companhia Vale do Rio Doce, 2007, p. 4).

Falconbridge Ltd. was the most significant copper producer in Canada. Falconbridge acquired Noranda Inc. in March 2005, and the combined copper producing operations included the Kidd Creek Mine in Timmins, Ontario; the Montcalm and Raglan nickel mines in Quebec and the Sudbury nickel mines, mill, and smelter in Ontario, which produced byproduct copper; the Horne smelter at Rouyn-Noranda in Quebec; the Kidd metallurgical complex, which consisted of a copper smelter and refinery as well as a zinc refinery, acid plant, and recovery facilities for minor metals; and the CCR copper refinery located in Montreal-Est, Quebec (Coulas, 2006, p. 22.4).

The Highland Valley Copper Mine located south of Kamloops, British Columbia, was owned by Teck Cominco Ltd., 97.5%, and Highmont Mining Company, 2.5%. The 136,000-metric-ton-per-day concentrator produced copper and molybdenum concentrates. Ontario owed much of its importance to the Sudbury and the Timmins regions where copper was recovered in conjunction with nickel. Large-scale copper mining in Quebec was centered mostly on Falconbridge Ltd.'s Raglan Mine, Agnico-Eagle Mines Ltd.'s LaRonde Mine, and Aur Resources, Inc., Novicourt Inc., and Teck Cominco's Louvicourt copper mines. Manitoba's importance revolved around CVRD Inco Ltd.'s Thompson and Hudson Bay's Chisel

and Trout Lake copper mines and its smelter in Flin Flon (Coulas, 2006, p. 22.2).

Gold.—Gold output decreased to 103.4 t in 2006 from 119.5 t in 2005, or by more than 13%. The value of gold production, however, increased by 11.8% (\$1.9 billion) in 2006 compared with that of 2005 (\$1.7 billion). The annual average gold prices have increased from \$446 per ounce in 2005 to \$610 per ounce in 2006, which has influenced renewed exploration and development activities at potential new and existing gold mines in Canada. World gold production increased to 2,500 t in 2006 from 2,470 t in 2005 (Chevalier, 2006a, p. 24.1; George, 2007a; Natural Resources Canada, 2007d, f).

Ontario produced more than 55% of Canada's total gold production in 2006, followed by Quebec, 23%; British Columbia, 15%; and other Provinces and Territories, 7%. Operating gold mines accounted for 90.4% of Canada's output, 19 base-metal mines (gold as a byproduct) accounted for 7.8%, and numerous gold placers contributed 1.8%. Canada was the eighth ranked gold producer worldwide following South Africa, Australia, the United States, China, Peru, Russia, and Indonesia. Canada exported \$3.7 billion worth of gold in various forms during 2006 compared with \$3 billion in 2005 (Chevalier, 2006a, p. 24.11-24.13; George, 2007a; Natural Resources Canada, 2007g).

Iron Ore.—Output of iron ore increased to 34.1 Mt from 30.4 Mt in 2005, or by 12.2%, and the value of production increased to \$2.3 billion from \$2.1 billion in 2005, or by almost 10% (Natural Resources Canada, 2007d). The output of iron content was composed of concentrates, pellets, and sinter from hematite and siderite ores. Canada's production came from its major iron ore producing companies, which included Iron Ore Company of Canada [Rio Tinto Ltd. (58.72%), Mitsubishi Corp. (26.18%), and Labrador Iron Ore Royalty Income Fund (15.1%)]; Québec Cartier Mining Company [Dofasco Inc. (98.7%) and others (1.3%)]; and Wabush Mines Ltd. [Stelco Inc. (44.6%), Dofasco Inc. (28.6%), and Cleveland-Cliffs Mining Inc. (26.8%)]. The remaining production was from the byproduct recovery of magnetite from two base-metal smelters in British Columbia. Labrador and Newfoundland produced 59%; Quebec, 40%; and British Columbia, 1% of a total output of iron ore in 2006. Canada exported 29.2 Mt of iron ore from stockpiles; of that amount, 2.6 Mt went to the United States in 2006 (Natural Resources Canada, 2007e, f).

A bidding war for Dofasco Inc. concluded with Dofasco's directors recommending that shareholders accept the \$5 billion (CAN\$5.6 billion) offer from Luxembourg's Arcelor S.A. Germany's ThyssenKrupp AG lost its bid, in spite of a hostile takeover of Arcelor being launched by Mittal Steel Company N.V. In August, Mittal announced that it had acquired 94% of Arcelor's share capital and voting rights and as of November 16, 2006, the Group was integrated as ArcelorMittal SAS (ArcelorMittal SAS, 2006).

Lead and Zinc.—Canada was the world's fourth ranked mine producer of zinc (637,726 t of zinc) and the world's sixth ranked producer of lead (82,393 t of lead in concentrate). Zinc mine output showed a decrease of more than 4% in 2006 compared with that of 2005, and lead production increased by almost 4% compared with that of 2005. In 2006, although the volume of

output decreased, its value increased to \$1.9 billion from \$943 million in 2005, or by 101.5%. The average price of zinc more than doubled during 2006. There was a shortfall in supply in the markets worldwide as well. Canada with a smelting capacity of about 800,000 t/yr in the following four smelters: Falconbridge's Kidd Creek in Ontario, Hudson Bay's Flin Flon in Manitoba, Noranda's Valleyfield in Quebec, and Teck Cominco's Trail in British Columbia. Together, they produced about 10% of the world's total supply of zinc (Gabby, 2007; Jasinski, 2007; Natural Resources Canada, 2006b; 2007d, f).

Falconbridge's mine and mill operations at the Brunswick Mine near Bathurst, New Brunswick, was the leading lead producer with a capacity of 74,000 t/yr. Teck Cominco's Trail operation in southern British Columbia was the world's leading fully integrated smelter and refinery complex and had a zinc production capacity of 290,000 t/yr. HudBay Minerals was expanding its Chisel North underground zinc mine at Chisel Lake, Manitoba, which is located near Snow Lake. HudBay was planning to invest \$260 million in the 777 zinc deposit, which contains some 14.5 Mt of estimated proven and probable zinc reserves, and an additional \$21 million capital was for the refurbishment of the Snow Lake mill. Snow Lakes' concentrates will be trucked 200 kilometers (km) southwest to the Flin Flon smelter. The 777 deposit was expected to enter into full production by 2007. The construction of a \$65 million electrolytic tankhouse and work on a new zinc tankhouse at the Flin Flon smelter increased capacity by 35% to 115,000 t/yr from 85,000 t/yr. The Kidd Creek complex's zinc production capacity was 145,000 t/yr. The Valley field facility's production capacity near Montreal had increased steadily to 260,000 t/yr from its original 64,000 t/yr in 1962 (Natural Resources Canada, 2006a).

In 2005 (the latest year for which data were available), Canadian exports and imports of lead were 155,612 t valued at \$283.4 million and 125,200 t valued at \$140 million, respectively; exports and imports of zinc were 817,414 t valued at \$1.2 billion and 235,198 t valued at \$300 million, respectively (Natural Resources Canada, 2006a, b).

Nickel.—Canadian nickel mine production increased to 233,461 t of nickel content in 2006 compared with 199,932 t in 2005, or by 11.8%. In 2006, world nickel mine production was at an all time high and was not keeping up with demand. Stainless steel accounted for two-thirds of world nickel consumption. In Canada, higher prices caused the value of nickel to increase by 75.9%, or \$5.5 billion, compared with that of 2005. Nickel was the most valuable mineral commodity produced in Canada during the year followed by, in order of value, potash, copper, coal, gold, cement, diamond, and iron ore (Ferreira, 2007, p. 6; Natural Resources Canada, 2007d, f).

The Sudbury Basin in Ontario, the Thompson nickel belt in Manitoba, and Voisey's Bay were the most significant nickel production areas in Canada. Falconbridge was the third ranked producer of nickel in the world. Falconbridge's operations included the Raglan nickel mines and mill in northern Quebec; four mines, a mill, a smelter, and an acid plant in the Sudbury area of Ontario; a refinery in Norway; and a mine and smelter in the Dominican Republic (McCutcheon, 2006, p. 27; Kuck, 2007).

Falconbridge's Craig, Fraser, and Lindsley underground nickel/copper mines in Sudbury, Ontario, and the Raglan Mine

in Quebec produced 49,500 t of nickel in concentrates, which was smelted in the firm's smelter near Sudbury. The matte, which contained about 60% nickel from the smelter, was shipped to Falconbridge's Nikkelverk refinery in Norway where cobalt, copper, nickel, and precious metals were recovered. The Raglan operation produced concentrates of 24,500 t of nickel and 520 t of copper. Raglan concentrates were shipped from Deception Bay, which is located 100 km north of the mine, to Quebec City to continue by rail to Falconbridge's Sudbury smelter (McCutcheon, 2006, p. 38.2; Falconbridge Ltd., 2006).

In 2006, CVRD Inco operated nine mines; three concentrators; nickel smelters and refineries in Thompson, Manitoba, and Sudbury, Ontario; a mine and concentrator in Newfoundland and Labrador; and a cobalt refinery in Port Colborne, Ontario. CVRD Inco's Sudbury mines produced 93,000 t of nickel concentrate; the Thompson mines, 35,300 t; and the new Voisey's Bay Mine in Newfoundland and Labrador, 35,500 t (Companhia Vale do Rio Doce, 2007, p. 3; McCutcheon, 2006, p. 2, 28).

Sherritt International Corp. and the Cuban Government each owned 50% equity of Metals Enterprise Inc. (MEI), which operated a refinery in Fort Saskatchewan, Alberta, and a laterite mine and leach plant in Cuba. MEI produced 31,900 t of refined nickel and 3,390 t of refined cobalt in 2005 compared with 31,800 t of refined nickel and 3,320 t of refined cobalt in 2004. MEI announced a 50% expansion of its nickel-cobalt production capacity at an estimated cost of \$500 million by 2008 (McCutcheon, 2006, p. 29).

Platinum-Group Metals.—Mine production of platinum-group metals (PGM) increased by almost 1% compared with that of 2005. PGM use increased by almost 7% owing to higher demand in the autocatalyst and the electronic industries in 2006. Platinum alloys tend to be used in jewelry; platinum, palladium, and copper-gold-silver alloys are used in dentistry. North American Palladium Ltd. produced PGM as its main product from the Lac des Iles open pit, which is located west of Thunder Bay in Ontario. Most production of PGM has been as byproducts from CVRD Inco's and Falconbridge's nickel-cobalt operations in Sudbury. Falconbridge also recovered PGM from its Raglan Mine in Quebec. Inco's Sudbury, Ontario, operation accounted for the majority of primary PGM output, with a small amount from its Birchtree and Thompson, Manitoba, operations (Chevalier, 2006b, p. 41.1-3, 41.7-11; Companhia Vale do Rio Doce, 2007, p. 5; Natural Resources Canada, 2007e).

The nickel sulfide ores yield creditable byproducts, such as, in order of value, copper, cobalt, gold, silver, PGM, selenium, tellurium, sulfuric acid, and liquid sulfur dioxide. Falconbridge shipped its PGM, which were contained in copper-nickel matte, to the firm's Nikkelverk refinery. CVRD Inco's PGM refinery in Acton, United Kingdom, processed primary and secondary materials from its Ontario ores. Canada ranked third behind South Africa and Russia in world platinum production and fourth after South Africa, Russia, and the United States in world palladium production (Chevalier, 2006b, p. 41.2; George, 2007b).

Titanium.—Mine production of ilmenite (included in table 1 under "Titanium, Sorel slag") increased by about 10% compared with that of 2005 and ranked third following Australia and South Africa (Gambogi, 2007). QIT-Fer et Titane, Inc. (QIT)

(a wholly owned subsidiary of the British-Australian Rio Tinto Group) operated an ilmenite mine at Lac Tio, which is located near Havre-Saint-Pierre, Quebec (QIT-Fer et Titane, Inc., 2006). In 2006, QIT produced 3 Mt of ilmenite ore, which was crushed on site (Lac Tio) and transported to the QIT metallurgical complex in Sorel-Tracy, Quebec. At this facility, which was the only one of its kind in the world, the crushed ore was mixed with high-quality coal and smelted in electric arc furnaces to produce SORELMETAL™ iron ingots, which is a premium quality iron, and titanium dioxide-rich titanium slag known as SORELSLAG™. The quality iron went to the steelworks to produce SORELSTEEL™ and ATOMET™ as iron and steel powders. The primary product was a titanium dioxide feedstock to make, in order of value added, pigments for paints, surface coatings, plastics and paper, and iron and zircon byproducts. QIT's proprietary process technology had the production capacity to supply sulfate (1.1 Mt/yr of SORELSLAG™ titanium slag) and chloride (250,000 t/yr of UGS titanium slag) pigments. SORELSLAG™ had a titanium dioxide content of about 80% and was sold to pigment producers that used the sulfate process. UGS titanium slag, which was QIT's newest product, contained 94.5% titanium dioxide and was supplied to the growing market of pigment producers that used the chloride process. To meet future potential demand, the UGS titanium slag plant could be expanded to 600,000 t/yr from its current capacity of 250,000 t/yr (QIT-Fer et Titane, Inc., 2006).

Industrial Minerals

Diamond.—Production of diamond increased by about 7.3% to 13.2 million carats from that of 2005 (12.3 million carats) with a corresponding value decrease of 6.7% to \$1.4 billion in 2006 compared with that of 2005 (\$1.5 billion). The decrease in value resulted from the processing of low-grade ores at the Diavik and the Ekati diamond mines as part of their mine plans, and to some extent, the appreciation of the Canadian dollar versus the U.S. dollar in 2006. Canada's diamond mining sector completed its eighth full year of production, and diamond was the country's ninth ranked nonfuel mineral commodity, by value, after nickel, copper, iron ore, gold, potash, coal, zinc, and cement (Perron, 2006, p. 23.12; Natural Resources Canada, 2007d, f).

Canada's first open pit and underground diamond mine and commercial producer of diamond was the Ekati Mine. It was a joint venture between BHP Billiton Diamonds Inc. (80%), which was owned by BHP Billiton Group of Australia, and Charles Fipke and Stewart Blussom (10% each). The Ekati and Panda diamond mines are located near Lac de Gras about 300 km northeast of Yellowknife in the Northwest Territories. The Panda underground mine part of Ekati was expected to produce about 4.7 million carats per year during the next 5 years (Perron, 2006, p. 23.3).

The second Canadian diamond mine, the Diavik Mine, was located about 35 km southeast of Ekati and 300 km northeast of Yellowknife in the Northwest Territories, and was an unincorporated joint venture between Diavik Diamond Mines Inc. (DDMI) (60%) (a wholly owned subsidiary of Rio Tinto plc of the United Kingdom) and Aber Diamond Mines Ltd. (40%)

(a wholly owned subsidiary of Aber Diamond Corp. of Toronto, Ontario); DDMI was the operator of the mines. By yearend 2005, Diavik's reserves included 30 Mt of ore at 3.2 carats per metric ton, and its diamond production in 2006 amounted to 8.4 million carats, which was an 8.4% increase compared with 2005. In 2006, Canada's diamond output contributed almost 11.8% of the world's production of natural rough diamond, which was estimated to be 175.9 million carats valued at about \$11.3 billion, and made Canada the fourth ranked producer by volume following Botswana, Russia, and Australia. However, with the planned opening of the Jericho Mine in 2006, the Snap Lake Mine in 2007, the Victor Mine in 2008, and the Gahcho Kue Mine in 2011, Canada's share of world diamond production was expected to increase to more than 20% from that of 2006 (Diavik Diamond Mines Inc., 2006; Perron, 2006, p. 23.9; Olson, 2007).

BHP Billiton Diamonds reported that the quality of diamond recovered to date from the five kimberlite pipes at their Lac de Gras property compared favorably with the best pipes in other parts of the world. The five pipes were located under, in order of value, the Panda, the Koala, the Misery, the Fox, and the Leslie lakes and would be mined during a 30-year period. The centralized processing plant, which was located southwest of the Koala pit, was to receive 9,000 metric tons per day (t/d) of ore during the first 9 years of operation and 18,000 t/d thereafter. The cutoff grade would be 0.01 carat per metric ton. Processing was expected to involve mainly crushing, scrubbing, and dense-media separation, as well as high-intensity magnetic separation, X-ray concentration, and sorting. Future output was projected to be 4.5 million carats per year, or about 5% of world diamond production. Capital investment was expected to be at least \$4 billion in association with the five pipes (BHP Billiton Diamonds Inc., 2006).

The Snap Lake Project, which was 100% owned by De Beers Canada Inc. (part of the De Beers Group, which is headquartered in South Africa), is located 220 km northeast of Yellowknife in the Northwest Territories. On June 1, 2004, De Beers Canada was granted its final permit to proceed with the development and full construction of the Snap Lake underground mine at a cost of about \$560 million. This project would be De Beers' first mine outside of Africa in a kimberlite dike (tabular-shaped structure) and would be mined on a large scale. The Snap Lake Project contains more than 18.3 Mt at an average grade of 1.46 carats per metric ton of diamond as defined (minable) reserves. The Snap Lake Project was expected to produce about 1.5 million carats per year by early 2007 and to have a mine life of more than 20 years with an investment of \$1 billion. The average value per carat was estimated to be \$76. In October 2005, De Beers received final environmental approval for the development and full construction (at a cost of about \$860 million) of its Victor Project in northern Ontario. At the end of 2008, at full capacity, Victor was expected to produce about 600,000 carats per year during a 12-year open pit mine life (Perron, 2006, p. 18; De Beers Canada, 2006).

The Jericho diamond project, which is located in the Nunavut Territory about 420 km northeast of Yellowknife, was wholly owned by Tahera Diamond Corp., which was based in Toronto, Ontario. Tahera planned to develop the project as the Nunavut

Territory's first diamond mine. Tahera received Federal approval for its Jericho diamond project, followed by the water license and land lease in 2005. Jericho's open pit development was completed by the end of 2005, and full production started in April 2006 at a rate of 500,000 carats per year. Tahera's base plan indicated that more than 4.7 million carats would be produced during a 9-year mine life. The Jericho Project contains as defined (minable) reserves more than 2.6 Mt at an average grade of 1.2 carats per metric ton; and as total diamond resources, 5.5 Mt at an average grade of 0.84 carat per metric ton. Tahera had a diamond purchasing and marketing agreement with a wholly owned subsidiary of Tiffany & Co. of the United States. Under the agreement, a portion of the production would be used in jewelry and the balance would be sold on behalf of Tahera into the international market for a fee (Perron, 2006, p. 18; Tahera Diamond Corp., 2006).

More than 500 companies, off and on, have been exploring for diamond, especially in the Northwest Territories, but also in Alberta, British Columbia, Labrador, Manitoba, the Nunavut Territory, Ontario, Quebec, and Saskatchewan. The field seemed to be narrowing somewhat as various kimberlite pipes proved disappointing upon testing. BHP Billiton Diamonds supported the establishment of a diamond-sorting-valuation facility in the Northwest Territories, which could lead to more skilled and detailed sorting that would afford sales to qualified manufacturers in the northern region at prices, terms, and conditions similar to BHP Billiton Diamonds' other marketing arrangements in Europe. The First Canadian Diamond Cutting Works in Montreal became Canada's first fully integrated cutting and polishing factory with the aim of handling Canadian diamond production at a lower cost than European factories; artisans were brought over from Belgium (BHP Billiton Diamonds Inc., 2006).

Potash.—The dominant potash product is potassium chlorite (KCl), which is reported as potassium oxide/oxide of potash (K₂O) equivalent. Potash production totaled about 8.5 Mt; this was a decrease of almost 15.8% compared with that of 2005 (10.1 Mt). The value of production decreased to about \$2.2 billion in 2006 from \$2.5 billion in 2005. Most of the output came from mines in Saskatchewan, but about 5% came from New Brunswick. Canada has probably the world's largest identified potash resource, which was estimated to be about 60 billion metric tons, and a reserve base of almost 10 billion metric tons (Stone, 2006b, p. 42.1-42.3; Natural Resources Canada, 2007f).

Canada was the world's leading producer and exporter of potash. Canadian potash exports amounted to 15.7 Mt in 2006 compared with 15.8 Mt in 2005. The United States remained Canada's leading market, with a volume of 9.5 Mt, or a 60.5% share of the total exports, followed by China with 2.5 Mt, or 16%; Brazil with 1.5 Mt, or 9.5%; and others with the remaining 2.2 Mt, or 14%. The outlook for potash demand in 2007 is positive. Globally, growth in potash demand was expected from agriculture and expansion, particularly in developing countries. Canada, Russia, Belarus, Germany, and Israel, in order of tonnage, dominated production with 84% of the world total (Stone, 2006b, p. 31-32; Kostick, 2007).

Potash Corp. of Saskatchewan Inc. (PotashCorp), which was based in Saskatoon, Saskatchewan, was one of the world's

leading publicly owned potash producers. It had the following divisions, in order of production: Allan, Cory, Lanigan, New Brunswick, Rocanville, and Patience Lake. PotashCorp owned 25% of the reserves at Esterhazy, Saskatchewan, which were mined by International Minerals & Chemical Corp. (Canada) Ltd.'s IMC Esterhazy Canada Ltd. Partnership under a long-term agreement. PotashCorp's production capacity of 12.1 Mt/yr of KCl equivalent was equal to about 56.5% of Canada's total potash annual capacity of 21.4 Mt (Stone, 2006b, p. 42.2-42.3).

Mineral Fuels

Coal.—At the end of 2006, Canada's coal reserves amounted to almost 6.6 billion metric tons of which 3.5 billion metric tons accounted for anthracite and bituminous and 3.1 billion metric tons for subbituminous and lignite (table 3; BP p.l.c., 2007a). Canada produced 62.9 Mt of coal in 2006 compared with 65.3 Mt in 2005. Coal production was still declining from the record high of about 78.9 Mt in 1997. The total value of production was \$1.8 billion, which was a decrease of almost 5.33% compared with that of 2005 (\$1.9 billion). In 2006, owing to stable prices and stronger demand, the coal sector in western Canada continued to prosper. For example, in northeastern British Columbia, Western Canadian Coal Corp.'s Wolverine/Perry Creek Mine received the necessary regulatory approvals to start mine development in April 2005; coal production started at a rate of 2.4 Mt/yr in July 2006, and would reach full capacity of 3 Mt/yr by 2007. Northern Energy and Mining Inc. completed construction of its Trend Small Mine at the end of 2005 and production started in January 2006 at a capacity of 1 Mt/yr of coking coal. Twenty-six coal mines were operating in Canada by the end of 2006; most large-scale coal mines were located in western Canada. In 2006, Canada accounted for only about 2% of the world's coal production; it exported less than one-half of that production, thus making it the world's fifth ranked exporter after Australia, the United States, China, and South Africa (Stone, 2006a, p. 20.1-20.11; Natural Resources Canada, 2007d, f).

Canada exported 28.2 Mt of coal, of which 26.7 Mt was coking coal (the country's major export) and 1.5 Mt was thermal coal. Canada's export volume of coal increased by 8% in 2006 compared with 2005. Canada's exports to Asia, the leading market for Canadian coal, increased to 15 Mt in 2006 from 12 Mt in 2005; exports to Japan increased to 7.5 Mt in 2006 from 5.4 Mt in 2005, and exports to South Korea increased to 4.9 Mt from 3.6 Mt; exports to Europe increased to 8.8 Mt from 8.3 Mt; and exports to Latin America increased to 2.3 Mt from 2.0 Mt. Exports to the members of the North America Free Trade Agreement (NAFTA), however, declined by 40% in 2006 owing mostly to a decline in domestic supplies in Mexico and the United States. Canada imported 21 Mt of coal in 2006 compared with 19 Mt in 2005, or almost an 11% increase. Of the total imports, 17 Mt was thermal coal mainly for coal-fired electricity generation in the Provinces of, in order of amount consumed, Ontario, Nova Scotia, and New Brunswick. In 2006, the United States supplied 18 Mt of coal, which was 1.8 Mt more than in 2005, and Colombia supplied 2.6 Mt compared with 1.5 Mt in 2005. Domestic coal consumption remained

high at about 60 Mt, and much of the eastern Canadian demand was supplied by imports. Electricity generation consumed about 56 Mt of thermal coal, of which 39 Mt was supplied domestically and 17 Mt was imported. Canada's cement, steel, and other sectors consumed 4 Mt (Stone, 2006a, p. 20-12; Statistics Canada, 2007a, c).

In 2006, Elk Valley Coal Partnership operated the Coal Mountain, the Elkview, the Fording River, the Greenhills, and the Line Creek mines in British Columbia and the Cardinal River Mine in Alberta. The Elk Valley, which was the second ranked metallurgical coal operating unit in the world, was established by a joint venture of Consol Energy Inc., Fording Inc., and the Luscar Energy Partnership (59%) and Teck Cominco (41%). Luscar Coal Ltd., which was owned by the Luscar Energy Partnership (Canada's leading coal producer) operated, in order of tonnage, the Coal Valley, the Obed Mountain, the Highvale, the Paintearth, the Sheerness, the Whitewood, and the Genesee surface mines in Alberta and the Poplar River, the Boundary Dam, and the Bienfait surface mines in Saskatchewan. These coal mines have a combined production capacity of 40 Mt/yr of bituminous, subbituminous, and lignite thermal coal used mainly for domestic electric power generation. In eastern Canada, the Nova Scotia Government selected Xtrata plc in December 2005 to develop coal resources at the Donkin Mine on Cape Breton Island (Elk Valley Coal Partnership, 2006; Stone, 2006a, p. 20.4; Teck Cominco Ltd., 2006).

To limit greenhouse gas emissions and the production of particulate associated with the burning of coal, the Government and the private sector invested in the development of "clean coal" technologies. These technologies are designed to enhance both the efficiency and the environmental acceptability of coal development, production, and consumption (Stone, 2006a, p. 20.5-20.6).

Natural Gas.—At the end of 2006, Canada's natural gas reserves amounted to almost 1,670 billion cubic meters (table 3; BP p.l.c., 2007b). Marketable production of natural gas totaled about 171,641 million cubic meters; this was an increase of almost 1% compared with that of 2005 (170,335 million cubic meters). The value of production increased to \$15.2 billion in 2006 from \$14.6 billion in 2005. Natural gas byproducts had a value of \$2.3 billion, which was an increase of 9.5% compared with that of 2005. Both products, however, responded to supply-and-demand imbalances and increased prices. Canada ranked third in the world after Russia and the United States in the output of natural gas. Increasingly, the production of natural gas has played a major role in the mineral economy of Canada and has had a palpable effect on the GDP. Natural gas consumption in the United States, which was the world's leading consumer, decreased to about 619.7 billion cubic meters from 629.8 billion cubic meters in 2005, or by almost 2% because of higher prices and industrial restructuring; this decrease had some effect on the Canadian marketed gas (BP p.l.c., 2007b; Natural Resources Canada, 2007f).

Canada remained the leading foreign supplier of natural gas to the United States. Almost 100 billion cubic meters of natural gas, which was more than 16% of the U.S. consumption, was exported to the United States in 2006. These exports were expected to increase to about 105 billion cubic meters by 2007

in anticipation of the increasing inability of U.S. domestic production to meet demand (BP p.l.c., 2007b; Statistics Canada, 2007a; U.S. Energy Information Administration, 2007).

Exploration for new discoveries of natural gas continued in Alberta and Saskatchewan. Exploration activities in both provinces began at least two decades ago. Chevron Canada Resources Ltd. (a subsidiary of Chevron Corp.) had one of the largest natural gas strikes in recent history near Fort Laird, Northwest Territories, where projections by the company showed "between 11 billion and 17 billion cubic meters (400 billion and 600 billion cubic feet) of gas in place in more than 400 meters (1,200 feet) of pay zone" (BP p.l.c., 2007b). Accessing Canada's abundance of fuels, particularly oil in northern Alberta and natural gas in the Northwest Territories, has become economically feasible because of new technology and rising fuel prices (Natural Resources Canada, 2007e).

Opposition to natural gas exploration, production, and transmission, however, has grown in recent years. Environmental groups opposed the construction of proposed pipelines to feed demand in the United States, and the Rocky Mountain Ecosystem Coalition attempted to slow the expansion of natural gas exploration and production activities in northern Alberta. A National Energy Board report, which assessed supplies and demand to 2025, put known natural gas reserves in Canada's northern frontier at 680 billion cubic meters (24 trillion cubic feet) and estimated reserves at 4.8 trillion cubic meters (170 trillion cubic feet) (BP p.l.c., 2007b).

Crude Oil.—Production of crude oil (petroleum) increased to 961.5 million barrels (Mbbbl) in 2006 from a record high of 921 Mbbbl in 2005, or an increase of about 4.4%. The value of the production was \$63 billion in 2006 compared with \$52 billion in 2005; the oil prices in 2006 were the highest of the past 30 years (annual average of \$66.02 per barrel). In 2006, with a projected 17% share, Canada maintained its position as the America's third ranked producer of crude oil after, in order of volume, the United States and Mexico and followed by Venezuela and Brazil. The country remained a leading exporter with a more than 17% share of U.S. crude oil imports of 13.6 million barrels per day (BP p.l.c., 2007c; Statistics Canada, 2007c).

In 2006, petroleum exports and imports increased by 2.5% and 2.4%, respectively, compared with those of 2005. Canadian exports amounted to more than 650 Mbbbl, or almost 68% of the total petroleum production, which was a result of the strong demand from the United States. Canadian imports amounted to 310 Mbbbl; a significant volume (more than 98%) was supplied by the United States and Europe (BP p.l.c., 2007c; Statistics Canada, 2007a, c).

Uranium.—Production of uranium (U content) in 2006 amounted to 9,781 t, which decreased by about 22.4% compared with that of 2005 (12,597 t), mainly owing to the 3-month closure of the McArthur River Mine caused by flooding. Despite the decrease in 2006 production, however, uranium continued to rank among Canada's top 10 metal commodities in terms of output value, which increased by 26.4% (\$1.2 billion) in 2006 compared with that of 2005 (\$950 million). The Key Lake's mill continued processing McArthur River Mine's uranium ore, which was blended to a mill-feed of about 3.4% U. The Cigar Lake deposit contained the world's second largest amount of high-grade

uranium ore discovered to date; its uranium reserves totaled more than 85,000 t at an average grade of more than 17% U (Vance, 2006, p. 58.1-58.5; Natural Resources Canada, 2007d, f).

Concerns about cleaner air and climate change stimulated public debate on energy policy and created a more favorable attitude toward nuclear power. Canada was the world's leading supplier of uranium and was well-placed in terms of resources, reserves, mining labor experience, and technology to maintain this position considering expected improvement in longer term world demand. The main importers of Canadian uranium continued to be, in order of value, the United States, France, and Japan (Vance, 2006, p. 58.9).

As of January 1, 2006, Canada's identified recoverable uranium (U content) resources totaled 420,000 t, or almost a 3% decrease compared with that of January 1, 2005 (432,000 t). In general, Canadian uranium producers in northern Saskatchewan remained well-positioned to capitalize on current market conditions and prospects for further nuclear power development in, for example, France, Japan, and the United States. In Canada, the transition to new production was being centered on tapping high-grade and low-cost uranium deposits with the aim of continued success in bringing environmentally sustainable operations online, such as the Cigar Lake Mine; this could ensure that Canada remains the world's leading uranium supplier. Cigar Lake Min was expected to begin production in 2007, pending the necessary licenses and favorable market conditions (Vance, 2006, p. 58.1, 58.5).

Reserves

Table 3 lists the levels of Canadian reserves of coal, copper, gold, iron ore, lead, molybdenum, natural gas, nickel, crude petroleum, silver, sulfur, zinc, and other selected mineral commodities on or about June 2007. Data are shown in terms of metal contained in ore for the base and precious metals or recoverable quantities of other mineral commodities, which included industrial minerals and mineral fuels. These mineral reserves represent proven and probable categories and exclude quantities reported as possible. Reserves were defined as being well-delineated and economically minable ore from mines committed to production.

Annual changes in assessment of reserves are, in simplest terms, the arithmetic result of additions to reserves, deletions from reserves, and production. A complication is that, in Canada, a large number of mines produce more than one metal, thus necessitating close attention to market price and processing costs for two or possibly several mineral commodities simultaneously to enable production as coproducts to share costs of production and/or byproducts as credits.

Reserves of major metals were distributed unevenly throughout Canada and were the result mostly by mineralization of the Precambrian shield, the Rockies (Cordillera), and the Coast Ranges. Five Provinces dominated the reserves position in terms of proven and probable (minable) reserves of major metals—Ontario had about 58% of the gold, 51% of the nickel, 48% of the copper, 23% of the silver, and 21% of the zinc; British Columbia had 100% of the molybdenum, about 27% of the copper, 22% of the silver, 12% of the gold, and 8% of the

zinc; New Brunswick had 94% of the lead, 28% of the zinc, and 22% of the silver; Quebec had 25% of the zinc, 27% of the silver, 25% of the gold, 12% of the nickel, and 6% of the copper; and Manitoba had 17% of the nickel, 19% of the zinc, 9% of the copper, 6% of the silver, and 5% of the gold. According to the Natural Resources Canada, future discoveries will alter the distribution of reserves among the Canadian Provinces and Territories (Reed, 2006; Natural Resources Canada, 2007d).

Outlook

Canada continued to be a very important trading partner of the United States; this partnership enhanced investment and trade among the members of North America Free Trade Agreement. The United States absorbed more than 68% of Canadian total minerals and mineral product exports valued at \$43.8 billion in 2006. Canada's economic growth in 2007 is likely to remain at about the same level as, or to decline slightly relative to, the 2006 rate of 3%. The combination of favorable factors, such as continued subdued consumer price inflation, high demand for Canadian mineral exports, high mineral commodity prices driven by a strong global economy, and importers' continued economic growth, could sustain the Canadian mining industry in 2007 and into 2008. The duration of the current cycle in mineral commodity prices and continued access to financing will remain essential factors to the success of the Canadian minerals exploration and development operations in 2007 and beyond. Exploration is a key factor to assuring a long-term supply of Canadian minerals (Dillon, 2006; Birchfield, 2007).

Canada's mineral industry is encouraged by the Federal Government to work towards the improvement of the permitting process. The goal is to enable exploration and mining companies to comply with the regulatory requirements in a timely and efficient way and, at the same time, to operate according to high environmental and social standards. The Government and industry are enthusiastic about the concept of a Northern Mines Ministers Conference to be held each year to report on progress, to identify challenges, and to network with all stakeholders to reestablish an attractive investment climate and to reverse any economic difficulties, such as the costs of socioeconomic and impact benefit agreements with local aboriginal groups being deductible from royalties and eligible as exploration investment (Dillon, 2006).

In 2006, major mergers and acquisitions were underway and they were to continue into 2007 and beyond. The merger and acquisition activities of companies producing nickel and diamond highlighted operations in the Canadian minerals sector. The high energy consumption regionally and globally and the high energy prices will continue to encourage new developments, such as the White Rose fields in the Jeanne d'Arc Basin and expansions of the Hibernia and the Terra Nova oilfields in the near future. Comparisons between the Canadian offshore oil resources and the development of the now legendary North Sea fields continue to be heard. Canadian uranium companies are effectively positioning themselves at the forefront of uranium producers worldwide as they seek to discover additional uranium resources to meet the growing domestic and global demand for nuclear energy (Birchfield, 2007).

The concerted effort to reconcile conflicting interests in the formulation of policy concerning ownership, aboriginal issues, mining development, environmental constraints and remediation, social responsibilities, and economic necessity in furthering the concept of sustainable development could continue to be difficult to anticipate, assess, and predict. Active engagement of these issues among the private sector, Government, and communities (stockholders and stakeholders) could probably provide outcomes to support a sustained future for the Canadian mining industry. Canada is expected to continue to be well-positioned in terms of its metals and mineral fuel resources base and its access to the markets of, in order of economic importance, China, Europe, Japan, and other global markets. Canada's mineral industry is primarily export oriented; as much as 98% of the production of some mineral commodities goes to world markets. The United States, by all assessments on hand, is expected to continue to be a major market for Canada's minerals (metals, industrial minerals, and fuel commodities). In this regard, the industry's export capability is enhanced significantly by a lower exchange rate for the Canadian dollar. The upward pressure came obviously from higher prices for primary metal products and, to a lesser extent, increased prices for chemical products and petroleum and coal products. For instance, copper prices remained robust and averaged \$2.77 per pound in 2006, which was up from \$1.57 per pound in 2005. They may increase to new record highs into the near future because of strong demand; increase in economic activity in copper user countries in Asia, Europe, and the United States; and lower copper inventories owing to the release of strategic stockpiles of Chile's Corporación Nacional del Cobre and China's State Reserve Bureau that could affect the supply/demand balance in 2007 (Coulas, 2006, p. 22.13).

Canada's continuing challenges are expected to be facing the realities of globalization and internationalization, especially with respect to developing countries with more competitive mineral resources and that are more avidly open to attract foreign investment. Canada's greatest long-term asset may be the achievement of a popular consensus in support of sustainable development that respects the interests of mining companies, First Nation peoples' rights, and the preservation of the environment (Department of Finance Canada, 2007).

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TABLE 1
CANADA: PRODUCTION OF MINERAL COMMODITIES¹

(Metric tons unless otherwise specified)

Commodity	2002	2003	2004	2005	2006 ^p	
METALS						
Aluminum:						
Alumina:						
Al ₂ O ₃	1,125,400	1,108,500	1,169,836	1,214,405	1,280,770	
Hydrate	1,283,000	1,269,600	1,328,842	1,400,340	1,476,959	
Metal:						
Primary	2,708,910	2,791,915	2,592,160	2,894,204	3,051,128	
Secondary	180,000	51,964	49,701	47,657 ^r	47,084	
Total	2,888,910	2,843,879	2,641,861	2,941,861 ^r	3,098,212	
Antimony ²	173	153	105	79 ^r	90	
Bismuth:						
Mine output, Bi content ²	189	145	185	185	184	
Metal, refined ^c	250	250	250	250	250	
Cadmium:						
Mine output, Cd content ²	1,027	814	848	723 ^r	549	
Metal, refined	1,706	1,759	1,880	1,727 ^r	2,094	
Cobalt:						
Mine output, Co content ²	5,148	4,327	5,060	5,767 ^r	6,976	
Metal:						
Shipments ³	2,065	1,842	2,085	2,391 ^r	2,793	
Refined, including oxide	4,625	4,233	5,144	5,090 ^r	5,180	
Copper:						
Mine output, Cu content ²	603,498	557,082	562,795	595,383 ^r	606,958	
Metal:						
Smelter:						
Primary, blister	513,934	430,116	446,209	441,325 ^r	484,675	
Secondary and scrap	24,761	26,789	29,982	30,525	35,826	
Total	538,695	456,905	476,191	471,850 ^r	520,501	
Refined:						
Primary	469,761	428,077	495,835	484,123	469,363	
Secondary	24,761	26,789	31,100	31,100	31,100	
Total	494,522	454,866	526,955	515,223	500,463	
Gold:						
Mine shipments, all forms	kilograms	151,904	140,861	129,478	119,549 ^r	103,980
Mine output, Au content	do.	152,059	141,589	130,727	120,541 ^r	104,234
Iron and steel:						
Iron ore and concentrate:						
Gross weight	thousand metric tons	30,902	33,322	28,596	30,387 ^r	34,094
Fe content	do.	19,684	20,993	17,801	19,333 ^r	21,691
Metal:						
Pig iron	do.	8,800	8,800 ^e	8,800 ^e	8,800	8,800
Direct-reduced iron ^c	do.	920	920	920	920	920
Ferroalloys, electric arc furnace:^e						
Ferrosilicon	do.	56	56	56	56	56
Silicon metal	do.	30	30	30	30	30
Ferrovandium	do.	1	1	1	1	1
Total	do.	87	87	87	87	87
Crude steel ^e	do.	16,300	17,000 ⁴	17,000	17,000	17,000
Lead:						
Mine output, Pb content		97,178	81,264	76,730	79,254 ^r	82,393
Metal, refined:						
Primary		136,896	118,506	131,717	109,996 ^r	115,989
Secondary		114,664	104,927	109,453	120,241 ^r	134,475
Total		251,560	223,433	241,170	230,237 ^r	250,464
Lithium, spodumene ^e		22,500	22,500	22,500	22,500	22,500
Magnesium, metal, primary		90,000 ^r	70,000 ^r	70,000 ^r	65,000 ^r	65,000
Molybdenum, mine out, Mo content		8,043	9,092	9,519	7,935 ^r	7,842

See footnotes at end of table.

TABLE 1--Continued
CANADA: PRODUCTION OF MINERAL COMMODITIES¹

(Metric tons unless otherwise specified)

Commodity	2002	2003	2004	2005	2006 ^p
METAL--Continued					
Nickel:					
Mine output, Ni content ²	189,297	163,244	186,694	199,932 ^r	233,461
Refined ⁵	144,476	124,418	151,518	139,683	153,743
Niobium and tantalum:					
Pyrochlore concentrate:					
Gross weight	7,410	7,270	7,670	7,700	7,700
Nb content	3,333	3,237 ^r	3,599 ^r	3,704 ^r	4,157
Tantalite concentrate:					
Gross weight	232	220	276	300	300
Ta content (Ta ₂ O ₅)	71 ^r	67 ^r	69	77 ^r	68
Nb content	12	11	10	10	10
Platinum-group metals, mine output:					
Palladium kilograms	12,210	12,808	12,000	10,415 ^r	10,493
Platinum do.	9,202	6,990	7,000	6,075 ^r	6,120
Others (irridium/rhodium/ruthenium) do.	2,960	1,730	7,164 ^r	6,219 ^r	6,265
Total do.	24,372	21,528	26,164 ^r	22,709 ^r	22,878
Selenium, refined ⁶ do.	175,000	288,064 ^r	271,073 ^r	216,330 ^r	117,000
Silver:					
Mine output, Ag content do.	1,407,558	1,310,153	1,337,465	1,123,837 ^r	983,474
Refined do.	1,855,979	1,558,105	1,837,724	1,547,326	1,586,537
Tellurium, refined ⁵ do.	39,000	40,000	55,000 ^r	28,000 ^r	11,000
Titanium, Sorel slag ⁷	890,000 ^c	873,000	863,000	860,000	930,000
Tungsten, mine output, W content	2,295	3,636	--	484 ^r	2,561
Uranium oxide, U content	11,607	10,456	11,599	11,627	9,862
Zinc:					
Mine output, Zn content	916,220	788,063	791,373	666,664 ^r	637,726
Metal, refined, primary	793,410	761,199	805,438	724,035 ^r	824,466
INDUSTRIAL MINERALS					
Asbestos	242,241	200,500 ^r	220,000 ^r	185,000 ^{r,c}	185,000 ^c
Barite	17,000	23,000	21,000	21,000	21,000 ^c
Cement, hydraulic ⁸ thousand metric tons	13,079	13,425	14,017	13,928 ^r	13,985
Clay and clay products ⁹ value, thousands	\$233,244	\$234,000	\$229,971	\$232,691 ^r	\$226,496
Diamond carats	4,936,616	10,755,654	12,618,080	12,314,031 ^r	13,242,331
Diatomite ^c	10,000	10,000	10,000	10,000	10,000
Gemstones, amethyst and jade	246	114	105	105	105
Graphite ^c	25,000	25,000	28,000	28,000	28,000
Gypsum and anhydrite thousand metric tons	8,809	8,378	9,339	8,570 ^r	9,082
Lime ⁸ do.	2,248	2,221	2,386 ^r	2,289 ^r	2,185
Magnesite, dolomite, brucite ^c	180,000	180,000	180,000	180,000	180,000
Mica, scrap and flake ^c	17,500	17,500	17,500	17,500	17,500
Nepheline syenite	717,000	697,000	714,000 ^r	745,000 ^r	719,000
Nitrogen, N content of ammonia	3,699,900	3,661,800	4,106,600	4,100,000	4,100,000 ^c
Potash, K ₂ O equivalent thousand metric tons	8,515	9,104	10,100	10,140 ^r	8,535
Pyrite and pyrrhotite, gross weight ^c	5,000	5,000	5,000	5,000	5,000
Salt thousand metric tons	12,736	13,718	14,096 ^r	13,463 ^r	13,338
Sand and gravel do.	238,120	235,574	250,067 ^r	243,440 ^r	236,505
Silica, quartz ¹⁰ do.	1,540	1,581	1,466 ^r	1,807 ^r	1,893
Sodium compounds, n.e.s., sodium sulfate, natural ^{c,11} do.	305	305	305	305	305
Stone ¹² do.	124,746	119,356	135,988 ^r	141,275 ^r	140,840
Sulfur, byproduct:					
Metallurgy do.	703	614	678 ^r	653 ^r	693
Petroleum do.	7,671	7,891	7,834 ^r	7,757 ^r	8,296
Total do.	8,374	8,505	8,512 ^r	8,410 ^r	8,989
Talc, pyrophyllite, soapstone ^c do.	90	90	90	90	90

See footnotes at end of table.

TABLE 1--Continued
CANADA: PRODUCTION OF MINERAL COMMODITIES¹

(Metric tons unless otherwise specified)

Commodity	2002	2003	2004	2005	2006 ^p
MINERAL FUELS AND RELATED MATERIALS					
Carbon black ^c	165,000	165,000	165,000	165,000	165,000
Coal, run-of-mine:					
Bituminous and subbituminous	55,408	50,925 ^r	54,797 ^r	54,141 ^r	51,728
Lignite ^c	11,200	11,200	11,200	11,200	11,200
Total	66,608	62,125 ^r	65,997 ^r	65,341 ^r	62,928
Coke, high-temperature ^c	3,300	3,300	3,300	3,300	3,300
Natural gas:					
Gross (Excluding gas flared or recycled)	187,800 ^r	182,700 ^r	183,600 ^r	185,900 ^r	187,000
Marketed	171,348	166,072	167,360	170,335	171,641
Natural gas liquids: ^c					
Pentanes plus	66,000	66,000	66,000	66,000	66,000
Condensate	2,800	2,800	2,800	2,800	2,800
Total	68,800	68,800	68,800	68,800	68,800
Peat	1,385	1,341	1,347 ^r	1,304 ^r	1,245
Petroleum:					
Crude ¹³	861,730	908,213	940,100	920,881 ^r	961,502
Refinery products:					
Propane, butane, and naphtha	17,231	16,358	15,422	14,954	15,612
Gasoline:					
Aviation	774	722	663	672	702
Motor	296,845	297,704	290,796	281,361	293,741
Petrochemical feedstocks	32,778	32,079	36,613	28,018	29,251
Jet fuel	29,515	31,134	34,496	31,593	32,983
Kerosene	2,862	3,381	3,324	3,560	3,717
Diesel and light fuel oil	218,513	233,913	236,530	236,651	247,064
Lubricants including grease	8,261	8,271	8,885	8,102	8,458
Heavy fuel oil	53,223	56,046	62,560	60,934	63,615
Asphalt	27,600	26,990	29,803	28,021	29,254
Petroleum coke	10,639	11,983	10,206	10,449	10,909
Other petroleum products	14,702	22,183	25,803	30,765	32,119
Refinery fuel and losses ¹⁴	33,690	35,698	39,185	36,117	37,704
Total	746,633	776,462	794,286	771,197	805,129

^cEstimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. ^pPreliminary. ^rRevised. -- Zero.

¹Table includes data available through July 2007.

²Metal content of concentrates produced.

³Cobalt content of all products derived from Canadian ores, which include cobalt oxide shipped to the United Kingdom for further processing and nickel-cobalt matte shipped to Norway for refining.

⁴Reported figure.

⁵Nickel contained in products of smelters and refineries in forms that are ready for use by consumers. Natural Resources Canada has revised all refined nickel figures to conform with International Nickel Study Group (INSG) guidelines.

⁶From all sources, which includes imports and secondary sources. Excludes intermediate products exported for refining.

⁷Refined Sorel slag has been upgraded to 95% titanium oxide.

⁸Producers' shipments and quantities used by producers.

⁹Includes bentonite products from common clay, fire clay, stoneware clay, and other clays. Values are in current Canadian dollars.

¹⁰Producers' shipment of quartz.

¹¹Excludes byproduct production from chemical plants.

¹²Crushed, building, ornamental, paving, and similar stone.

¹³Includes synthetic crude, from oil shale and/or tar sands.

¹⁴Refinery fuel represents total production of still gas, which includes a small amount sold.

TABLE 2
CANADA: STRUCTURE OF THE MINERAL INDUSTRY IN 2006

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity ¹
Alumina	Alcan Inc.	Refinery in Vaudreuil, Quebec	1,500 (smelter-grade).
Aluminum	do.	Smelter in Laterriere, Quebec	219.
Do.	do.	Smelter in Beauharnois, Quebec	50.
Do.	do.	Smelter in Shawinigan, Quebec	91.
Do.	do.	Smelter in Grande-Baie, Quebec	198.
Do.	do.	Smelter in Arvida, Jonquiere, Quebec	163.
Do.	do.	Smelter in Kitimat, British Columbia	277
Do.	do.	Smelter in Alma, Quebec	400
Do.	Aluminiere de Bécancour Inc. (Alcoa Inc., 75%, and Alcan Inc., 25%)	Smelter in Beacancour, Quebec	409.
Do.	Canadian Reynolds Metals Co. Ltd. (Alcoa Inc., 100%)	Smelter in Baie-Comeau, Quebec	438.
Do.	Aluminerie Alouette Inc. (Alcan Inc., 40%; Aluminium Austria Metall Québec, 20%; Hydro Aluminium, 20%; Société générale de financement du Québec, 13.33%; Marubeni Québec Inc., 6.67%)	Smelter in Sept-Iles, Quebec	245.
Do.	Aluminerie Lauralco Inc. (Alcoa, 100%)	Deschambault, Quebec	249.
Asbestos	LAB Chrysotile, Inc. (private, 100%)	Lac d' Amiante du Quebec, Ltee, Quebec	160 (fiber).
Do.	do.	Bell Mine, near Thetford Mines, Quebec	70 (fiber).
Do.	Jeffrey Mine Inc.	Jeffrey Mines at Asbestos, Quebec	250 (fiber).
Cement	Lafarge Canada Inc.	Bath, Ontario	1,176 (dry-process).
Do.	do.	Woodstock, Ontario	814 (wet-process).
Do.	do.	Exshaw, Alberta	1,422 (dry-process).
Do.	do.	Kamloops, British Columbia	324 (dry-process).
Do.	do.	Richmond, British Columbia	1,319 (wet-process).
Do.	do.	St. Constant, Quebec	1157 (dry-process).
Do.	do.	Brookfield, Nova Scotia	621 (dry-process).
Do.	St. Lawrence Cement Inc. (Holcim AG of Switzerland)	Joliette, Quebec	1,475 (dry-process).
Do.	do.	Mississauga, Ontario	2,000 (wet and dry).
Do.	Ciment Québec Inc. (ESSROC Group, 50%, and private, 50%)	Saint-Basile, Quebec	1,571 (dry-process).
Do.	ESSROC Canada Inc. (Italcementi Group)	Picton, Ontario	792 (wet and dry).
Do.	Federal White Cement Ltd.	Woodstock, Ontario	544 (dry-process).
Do.	St. Marys Cement (Canada) Inc. (Votarantim Ciment)	Bowmanville, Ontario	1,377 (dry-process).
Do.	do.	St. Marys, Ontario	645 (dry-process).
Do.	Lehigh Inland Cement Ltd. (Heidelberg Cement Group)	Edmonton, Alberta	1,380 (dry-process).
Do.	do.	Delta, British Columbia	1,356 (dry-process).
Coal	Elk Valley Coal Partnership (Consol Energy Inc., Fording Inc., and Luscar Energy Partnership, 59%, and Teck Cominco Ltd., 41%)	Coal Mountain Mine at Sparwood, British Columbia	2,500 (open pit). 3,200 (plant).
Do.	do.	Elkview Mine near Sparwood, British Columbia	6,000 (open pit).
Do.	do.	Fording River Mine near Elkford, British Columbia	10,000 (open pit). 9,500 (plant).
Do.	do.	Greenhills Mine near Elkford, British Columbia	4,500 (open pit). 5,000 (plant).
Do.	do.	Line Creek Mine near Sparwood, British Columbia	9,000 (open pit).
Do.	do.	Cardinal River Mine near Hinton, Alberta	8,000 (open pit).
Do.	Luscar Coal Ltd. (Luscar Energy Partnership, 100%)	Coal Valley, Obed Mountain, Highvale, Paintearth, Sheerness, Whitewood, and Genesse, Alberta	28,000 (open pit).
Do.	do.	Poplar River, Boundary Dam, and Bienfait, Saskatchewan	12,000 (open pit).
Do.	Western Canadian Coal Corp.	Wolverine Creek Mine, British Columbia	3,000 (open pit).

See footnotes at end of table.

TABLE 2--Continued
CANADA: STRUCTURE OF THE MINERAL INDUSTRY IN 2006

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity ¹
Coal--Continued				
Do.		Northern Energy and Mining Inc.	Trend Small Mine, British Columbia	1,000 (open pit).
Columbium (niobium)	metric tons	Cambior Inc.	Niobec Mine, Chicoutimi, Quebec	3,450 Nb content.
Copper		Boliden Westmin (Canada) Ltd.	Myra Falls Mine, British Columbia	9,000.
Do.		Falconbridge Ltd.	Sudbury Division, Sudbury, Ontario	4,250.
Do.		do.	Strathcona and Timmins operations in Timmins, Ontario	4,860.
Do.		do.	Smelter in Timmins, Ontario	440.
Do.		do.	Kidd Creek Mine, Timmins, Ontario	4,000 (ore).
Do.		do.	Montcalm Mine in Timmins, Ontario	2,000 (ore).
Do.		do.	Raglan Mine, Quebec	2,000 (ore).
Do.		do.	Louvicourt Mine, Quebec	2,000 (ore).
Do.		do.	Smelter in Thompson, Manitoba	686 (projected).
Do.		do.	Bell Allard Mine, Murdochville, Quebec	4,000 (ore).
Do.		do.	Horne Smelter in Noranda, Quebec	770.
Do.		do.	CCR Refinery in Montreal-Est, Quebec	550
Do.		Highland Valley Copper (Teck Cominco Ltd., 97.5%, and Highmont Mining Company, 2.5%)	Kamloops, British Columbia	4,500.
Do.		CVRD Inco Ltd.	Thompson Mine, Manitoba	Variable (polymetallic).
Do.		do.	Sudbury mines, Ontario	Variable (polymetallic).
Do.		do.	Voisey's Bay Mine, Newfoundland and Labrador	Variable (polymetallic).
		do.	Smelter in Sudbury, Ontario	500.
Do.		do.	Refinery in Sudbury, Ontario	170.
Do.		Huckleberry Mines Ltd. (Imperial Metals Corp., 50%, and Japanese consortium, 50%)	Huckleberry Mine in Omineca, southeast of Houston, British Columbia	37 (Cu contained).
Do.		HudBay Minerals Inc.	Chisel and Trout Lake mines, Manitoba	Variable (polymetallic).
Do.		do.	Smelter in Flin Flon, Manitoba	500.
Do.		Imperial Metals Corp.	Mount Polley Mine at Williams Lake, British Columbia	17 (Cu contained).
Do.		Northgate Exploration Ltd.	Kermss Mine, British Columbia	28 (Cu contained).
Diamond	carats	BHP Billiton Diamonds Inc., 80% (BHP Billiton Group); Charles Fipke, 10%; Stewart Blussom, 10%)	Ekati Mine in Lac de Gras region, Northwest Territories	5,350,000.
Do.	do.	Diavik Diamond Mines Inc. (DDMI), 60% (Rio Tinto plc); Aber Diamond Mines Ltd., 40% (Aber Diamond Corp.)	Diavik Mine in Yellowknife region, Northwest Territories	8,500,000.
Do.	do.	Tahera Diamond Corp., 75.1%, and Teck Cominco, 24.9%	Jericho Mine, NE of Yellowknife, Nunavut Territory	500,000.
Gold		Barrick Gold Corp.	Holt-McDermott Mine at Harker Township, Ontario	405 (ore).
Do.		do.	Bosquet Mines 1 and 2, northwestern Quebec	954 (ore).
Do.		Kirkland Lake Gold Inc.	Macassa Mine at Teck Township, northern Ontario	473 (ore).
Do.	metric tons	Princeton Mining Corp.	Similco Mine in Princeton, British Columbia (suspended)	450 (metal).
Do.		Kinross Gold Corp.	Lupin Mine in Contwoyo Lake, Northwest Territories (suspended)	612 (ore).
Do.		Miramar Mining Corp.	Giant Mine in Yellowknife, Northwest Territories	407 (ore).
Do.		do.	Giant mill-tailings in Yellowknife, Northwest Territories	3,265 (ore).
Do.		Newmont Canada Ltd.	Golden Giant Mine in Hemlo, Ontario	1,080 (ore).
Do.		Placer Dome Inc.	Campbell Mine in Red Lake, Ontario	584 (ore).
Do.		do.	Detour Lake Mine in Northeast Ontario	1,278 (ore)
Do.	metric tons	do.	Dome Mine in South Porcupine, Ontario	9.8 (metal).
Do.		do.	Sigma and Kiema Mines in Val d'Or, Quebec	730 (ore).
Do.		Teck-Corona Corp. (Teck Corp., 100%)	David Bell Mine in Hemlo, Ontario	456 (ore).

See footnotes at end of table.

TABLE 2--Continued
CANADA: STRUCTURE OF THE MINERAL INDUSTRY IN 2006

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity ¹
Diamond--Continued	kilograms	Huckleberry Mines Ltd. (Imperial Metals Corp., 50%, and Japanese consortium, 50%)	Huckleberry Mine in Omineca, southeast of Houston, British Columbia	250 (metal).
Do.	do.	Imperial Metals Corp.	Mount Polley Mine in Williams Lake, British Columbia	3,100 (metal).
Do.	do.	Northgate Exploration Ltd.	Toodogone River, British Columbia	8,700 (metal).
Graphite		Strategic Exploration Inc.	Kearney Lake, Ontario	W.
Gypsum		Atlantic Gypsum Resources Inc.	Fischell Brook at St. George's, Newfoundland	1,300.
Do.		Georgia-Pacific Corp.	River Denys, Sugar Camp, Nova Scotia	1,460.
Do.		Little Narrows Gypsum Co. Ltd. (USG Corp., 100%)	Little Narrows, Nova Scotia	1,640.
Do.		National Gypsum (Canada) Ltd. (Aancor Holdings Corp., 100%)	Milford, Nova Scotia	3,300.
Do.		Westroc Industries Ltd.	Windermere, British Columbia	1,170.
Iron and steel		Iron Ore Company of Canada (Rio Tinto Ltd., 58.72%; Mitsubishi Corp., 26.18%; Labrador Iron Ore Royalty Income Fund, 15.1%)	Carol Lake, Labrador	16,000 (concentrate), 12,000 (pellets).
Do.		Québec Cartier Mining Company (Dofasco Inc., 98.7%, and others, 1.3%)	Mount Wright, Quebec	16,950 (concentrate), 7,500 (acid pellets), 657 (sinter).
Do.		Wabush Mines Ltd. (Stelco Inc., 44.6%; Dofasco Inc., 28.6%; Cleveland-Cliffs Mining Inc., 26.8%)	Wabush, Labrador, and Pointe Noire, Quebec	6,200 (concentrate).
Do.		ArcelorMittal SAS	Hamilton, Ontario	3,642 (pig iron), 4,500 (crude steel).
Lead		Brunswick Mining and Smelting Corp. Ltd. (Falconbridge Ltd., 100%)	No. 12 Mine in Bathurst and smelter in Belledune, New Brunswick	74 (Pb contained).
Do.		Hudson Bay Mining and Smelting Co., Ltd. (HudBay Minerals Inc., 100%)	Flin Flon and Snow Lake, Manitoba	60 (Pb-Zn contained).
Do.		Teck Cominco Ltd.	Trail, British Columbia	120 (refined lead).
Do.		Breakwater Resources Ltd.	Nanisivik Mine on Baffin Island, Northwest Territories	785 (ore).
Do.		Boliden Ltd.	Myra Falls, British Columbia	800 (ore).
Limestone		Lafarge Canada Inc.	Steep Rock, Manitoba	906 (quarry).
Do.		Atlantic Industrial Minerals Inc.	Iris Cove, Sydney, Nova Scotia	720.
Do.		Inland Cement Ltd. (CBR Materials Corp.)	Cadomin, Alberta	2,160.
Do.		do.	do.	2,160 (quarry).
Do.		Havelock Co. (Kickenson Mines Co., 100%)	Havelock, New Brunswick	864 (limestone).
Do.		Continental Lime Ltd.	Faulkner, Manitoba	1,440 (crushed stone).
Magnesium		Timminco Ltd.	Haley Station, Ottawa, Ontario	6 (smelter).
Do.		Norsk Hydro Canada Inc.	Bécancour, Quebec	48 (smelter).
Molybdenum		Huckleberry Mines Ltd. (Princeton Mines Corp., 60%, and Japanese consortium, 40%)	Southeast of Houston, British Columbia	635 (Mo contained).
Nickel		Falconbridge Ltd. (Noranda Inc., 58.9%, and Falconbridge Ltd., 41.1%)	Craig, Fraser, Lindsley, and Lockerby in Sudbury district, Ontario	54 (metal contained).
Do.		do.	Raglan Mine in Ungave, Quebec	23 (metal contained).
Do.		do.	Smelter in Falconbridge, Ontario	45 (rated capacity).
Do.		do.	Montcalm Mine in Timmins, Ontario	2,000 (ore).
Do.		CVRD Inco Ltd.	Gertrude, Stobie, Creighton, Copper Cliff North and South, Garson-Offsets, McCreedy East and West, Coleman, Crean Hill, and Totten in Sudbury district, Ontario	106 (metal contained).
Do.		do.	Smelter in Sudbury, Ontario	110 (metal contained).
Do.		do.	Refinery in Sudbury, Ontario	57 (metal contained).
Do.		do.	Refinery in Port Colborne, Ontario	30 (metal contained).
Do.		do.	Thompson, Birchtree Mines in Manitoba	62 (metal contained).
Do.		do.	Smelter in Thompson, Manitoba	82 (metal contained).
Do.		Sherritt International Corp.	Refinery in Fort Saskatchewan, Alberta	24 (metal contained).

See footnotes at end of table.

TABLE 2--Continued
CANADA: STRUCTURE OF THE MINERAL INDUSTRY IN 2006

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity ¹
Petroleum: ²				
Gas	million cubic meters	BP Canada Inc. (The British Petroleum Co. plc, 100%)	Noel Area, northern Alberta; Chauvin, Sibbald, North Pembina, Alberta	47.
Crude	million 42-gallon barrels	do.	do.	12.
Gas	billion cubic meters	do.	do.	1.8.
Crude	thousand 42-gallon barrels	Imperial Oil Ltd. (Exxon Mobil Corp., 70%, and others, 30%)	Judy Creek, Cold Lake, Alberta; Mackenzie Delta, Beaufort Sea, Yukon and Northwest Territories	670.
Gas	million cubic meters	do.	do.	36.4.
Crude	million 42-gallon barrels	Mobil Oil Canada Ltd. (Exxon Mobil Corp., 100%)	Hibernia, Grand Banks, southeast of Newfoundland and Sable Island, Nova Scotia, and others in Alberta	26.1.
Gas	billion cubic meters	do.	do.	3.0.
Crude	million 42-gallon barrels	do.	Terra Nova, near to Hibernia, Jeanne d'Arc Basin, Newfoundland	25.0.
Gas	billion cubic meters	do.	do.	2.0.
Crude	million 42-gallon barrels	Norcen Energy Resources Ltd. (Hollinger Inc., 59%, and Hees International, 41%)	Pembina, Bodo, Majorville, Alberta	12.1.
Do.	do.	Oakwood Petroleum Ltd. (Sceptre Resources Ltd., 100%)	Grantham, Hays Ronalane, Peace River, Normandville, Randell, Alberta; and Grizzly Valley, British Columbia	24.6.
Do.	do.	PanCanadian Petroleum Ltd. (Canadian Pacific Enterprises, 87%, and others, 13%)	Rycroft, Wembley, Elk Point, Rio Bravo, Alberta	19.7.
Gas	billion cubic meters	do.	do.	3.53.
Crude	million 42-gallon barrels	Shell Canada Ltd. (Shell Investments, 79%, and others, 21%)	Dimsdale, Little Smoky Lake, Sousa, Alberta; Midale, Benson, Saskatchewan	22.2.
Gas	billion cubic meters	do.	do.	6.53.
Crude	million 42-gallon barrels	Suncor Inc. (Sun Co. Inc., 75%, and Ontario Energy Resources, 25%)	Kidney, Zama Lake, Cosway, Albersun Prevo, and Medicine River, Alberta; and Leitchville, Unwin, Saskatchewan	4.1.
Crude	thousand 42-gallon barrels	Texaco Canada Petroleum Inc. (Texaco Inc., 78%, and others, 22%)	Eaglesham, Virgo, Alberta; and Desan, British Columbia	158.
Gas	million cubic meters	do.	do.	67.3.
Crude	million 42-gallon barrels	UNOCAL Canada Ltd. (UNOCAL Corp., 100%)	Calgary, Alberta	14.7.
Potash (K ₂ O equivalent):		Potash Corp. of Saskatchewan Inc. (PotashCorp) (private, 100%)	Lanigan, near Lanigan, Saskatchewan	3,828 (KCl).
Do.		do.	Rocanville, southeast Saskatchewan	2,295 (KCl).
Do.		do.	Allan Division, Allan, Saskatchewan	1,885 (KCl).
Do.		do.	Cory, near Saskatoon, Saskatchewan	1,361 (KCl).
Do.		do.	Patience, near Saskatoon, Saskatchewan	1,033 (KCl).
Do.		do.	Sussex, New Brunswick	1,068 (KCl).
Do.		International Minerals & Chemical Corp. (Canada) Ltd. [IMC Fertilizer Corp., 75%, and Potash Corp. of Saskatchewan Inc. (PotashCorp.), 25%]	Esterhazy, southeast Saskatchewan	953 (KCl).
Do.		Agrium Products Inc.	Vanscoy, Saskatchewan	1,750 (KCl).
Salt and brine operations		The Canadian Salt Co.	Pugwash, Nova Scotia	1,400 (rock salt and brine salt).
Do.		do.	Iles-de-la-Madeleine, Quebec	1,625 (rock salt).
Do.		do.	Ojibway, Ontario	2,600 (rock salt).
Silver		Prime Resources Group Inc.	Eskay Creek Mine in British Columbia	340.
Do.	metric tons	Breakwater Resources Ltd.	Caribou Mine in Bathurst, New Brunswick	7.5 (mill feed).
Do.		Kirkland Lake Gold Inc.	Macassa Mine in Ontario	438 (mill feed).
Do.		Barrick Gold Inc.	Holt-McDermott Mine in Ontario	876 (mill feed).

See footnotes at end of table.

TABLE 2--Continued
CANADA: STRUCTURE OF THE MINERAL INDUSTRY IN 2006

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity ¹
Sodium chlorate production using salt	Dow Chemical Canada Inc. (Dow Chemical Co., 100%)	Fort Saskatchewan, Alberta	524 (caustic soda).
Do.	do.	Sarnia, Ontario	350 (caustic soda).
Do.	General Chemical Canada Ltd.	Amherstburg, Ontario	363 (sodium carbonate).
Sulfur:			
Petroleum refinery capacities	Consumer's Cooperative Refineries Ltd. (Federated Cooperatives Ltd., 100%)	Regina, Saskatchewan	54.
Do.	Esso Petroleum Canada (Exxon Mobil Corp., 100%)	Sarnia, Ontario	50.
Do.	Sulconam Inc. (Petro Canada, 7.6%)	Montreal, Quebec	108.
Main sulfur extraction plants (sour gas and oil sands)	Amoco Canada Petroleum Co., Ltd. (Amoco Corp., 100%)	East Crossfield-Elkton, Alberta	650.
Do.	Canadian Occidental Petroleum, Ltd.	East Calgary-Crossfield, Alberta	610.
Do.	Chevron Canada Resources Inc. (Chevron Corp., 100%)	Kaybob South III, Alberta	1,281.
Do.	Husky Oil Ltd.	Ram River, Ricinus, Alberta	1,646.
Do.	Shell Canada Ltd.	Waterton, Alberta	1,120.
Principal SO ₂ and H ₂ SO ₄ production capacities	Canadian Electro Zinc Ltd. (CEZ) (Noranda Inc., 90.17%)	Valleyfield, Quebec	430 (H ₂ SO ₄).
Do.	Inco Ltd.	Copper Cliff, Ontario	950 (H ₂ SO ₄).
Do.	Falconbridge Ltd. (Noranda Inc., 50%, and Trelleborg AB, 50%)	Kidd Creek, Ontario	690 (H ₂ SO ₄).
Do.	ESSO Chemical Canada (Exxon Mobil Corp., 100%)	Redwater, Alberta	910 (H ₂ SO ₄).
Titanium slag	QIT-Fer et Titane, Inc. (Rio Tinto Group, 100%).	Sorel-Tracy, Quebec	1,100 (Sorelslag). 250 (UGS slag).
Uranium	metric tons Cameco Corp. (Cameco Corp., 50.025%; COGEMA Resources Inc., 37.1%; Idemitsu Inc., 7.875%; TEPCO Inc., 5.0%).	Cigar Lake, Saskatchewan	6,500 (oxide).
Do.	metric tons do.	Key Lake, Saskatchewan	6,395 (oxide).
Do.	do. do.	McArthur River Mine, Saskatchewan	5,751 (oxide).
Do.	do. do.	Rabbit Lake, Saskatchewan	5,445 (oxide).
Zinc	Breakwater Resources Ltd.	Nanisivik Mine on Baffin Island, Northwest Territories	60 (Zn contained).
Do.	do.	Bathurst, New Brunswick	1,100 (Zn in concentrate).
Do.	Brunswick Mining and Smelting Corp. Ltd. (Noranda Inc., 100%)	Bathurst, New Brunswick	232 (Zn in concentrate).
Do.	Falconbridge Ltd. (Noranda Inc., 49.9%)	Timmins operations and smelter in Timmins, Ontario	212 (Pb-Zn contained), 133 (slab zinc).
Do.	do.	Kidd Creek complex, Ontario	145 (Zn in concentrate).
Do.	Hudson Bay Mining and Smelting Co., Ltd. (HudBay Minerals Inc., 100%)	Snow Lake concentrator, Manitoba	1,125 (Pb-Zn ore).
Do.	do.	Flin Flon Mine and Smelter in Manitoba	115 (slab zinc).
Do.	Teck Cominco Ltd.	Smelter in Trail, British Columbia	290 (slab zinc).
Do.	Boliden Ltd.	Myra Falls Mine in Strathcona Provincial Park, British Columbia	110 (Zn ore).
Do.	Noranda Inc.	Bell Allard Mine in Matagami, Quebec	85 (Pb-Zn ore).
Do.	do.	Valleyfield in Montreal, Quebec	260 (Zn in concentrate).

W Withheld to avoid disclosing company proprietary data.

¹Abbreviations used in this table for commodities include the following: Cu—copper; H₂SO₄—sulfuric acid; KCl—potassium chloride; Mo—molybdenum; Nb—niobium; Pb—lead; and Zn—zinc.

²Projections of annual capacity involve matching decline curves against later discoveries and are generalized extrapolations only based on data presented in the Canadian Oil and Gas Handbook, 2001 and subsequent years. Ownership of various companies and proportionate participation in various leaseblocks and/or joint ventures changes continually. The ownership proportions shown here must be considered to be illustrative only.

TABLE 3
CANADA: RESERVES OF MAJOR MINERALS IN 2006¹

(Thousand metric tons unless otherwise specified)

Commodity	Reserves
Asbestos, fiber	35,700 ^e
Coal (anthracite, bituminous, and lignite)	6,578,000 ²
Copper	10,000
Gold	metric tons 1,500 ³
Gypsum	450,000 ^e
Iron ore	1,700,000 ^e
Lead	1,600
Molybdenum	450
Natural gas	billion cubic meters 1,670 ²
Nickel	6,600
Petroleum crude	million barrels 17,100 ²
Potash, K ₂ O equivalent	million metric tons 4,400 ^e
Salt	thousand short tons 264,000 ^e
Silver	metric tons 47,000
Sodium sulfate	thousand short tons 84,000 ^e
Sulfur	160,000 ^e
Uranium	420 ⁴
Zinc	11,000

^eEstimated; estimated data are rounded to three significant digits; may not add to totals shown.

¹Sources: 2005 and 2006 Canadian Minerals Yearbook, Natural Resource Canada, except for natural gas and petroleum crude; U.S. Geological Survey Mineral Commodity Summaries 2007.

²Source: BP Statistical Review of World Energy June 2007.

³Excludes metal in placer deposits.

⁴Recoverable at prices of \$100 or less per kilogram of uranium.