

# THE MINERAL INDUSTRIES OF LATIN AMERICA AND CANADA

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## Introduction

This chapter summarizes the recent mineral production and consumption of countries in Latin America and Canada. Together with the United States of America, these countries make up most of the Western Hemisphere, which constitutes a total area of 40.2 million square kilometers, or almost 27% of the world's land area (149 million square kilometers). In 2004, it had a combined population of about 872 million, which was almost 14% of the world's population of about 6.35 billion (table 1) (World Bank Group, The, 2005; U.S. Central Intelligence Agency, 2004<sup>§</sup>). This chapter also discusses the outlook for mineral production from these countries through 2011.

Canada and several Latin American countries, in particular Argentina, Brazil, Chile, Mexico, Peru, and Venezuela, are endowed with a wealth of mineral resources that include ferrous and nonferrous metals, a wide variety of industrial minerals, and all forms of fossil fuels. The Americas supply mineral commodities, such as bauxite, copper, diamond, gold, iron ore, manganese, nickel, silver, tin, and zinc, and mineral fuels, such as coal, oil and gas, and uranium, to the world. For the Latin American countries, the minerals sector was a significant factor in their economies based on earning export revenues, gaining foreign exchange reserves, and offering business opportunities by way of, in order of economic impact, privatization, joint ventures, and foreign direct investment (FDI) processes.

In 2004, Latin America's economic growth was impacted by a number of factors. These included the improvement of the international financing market, better prices for mineral exports, the end of the Argentine financial crisis, and civil unrest in Colombia and Venezuela.

## Acknowledgments

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organizations for providing mineral-production statistics, basic economic data, and other information related to mineral policies, laws, and economics:

- Argentina—Dirección de Economía Minera y Desarrollo;
- Barbados—Ministry of Energy and Public Utilities;
- Belize—Geology and Petroleum Department;
- Bolivia—Viceministerio de Minería y Metalurgia (VMM) and Asociación Nacional de Mineros Medianos (ANMM);
- Brazil—Departamento Nacional de Produção Mineral;
- Canada—Natural Resources Canada;
- Chile—Corporación Nacional del Cobre de Chile (CODELCO), Comisión Chilena de Cobre (COCHILCO), and Servicio Nacional de Geología y Minería (SERNAGEOMIN);
- Colombia—Unidad de Planeación Minero Energética;
- Dominican Republic—Dirección General de Minería;
- Ecuador—Ministerio de Energía y Minas, Dirección Nacional de Minería;
- El Salvador—Dirección de Hidrocarburos y Minas;
- Guatemala—Ministerio de Energía y Minas, Dirección General de Minería, and Departamento de Desarrollo Minero;
- Honduras—Dirección Ejecutiva de Fomento a la Minería;
- Jamaica—Mines and Geology Division;
- Mexico—Consejo de Recursos Minerales;
- Nicaragua—Administración de Recursos Geológicos, Dirección de Minas;
- Peru—Ministerio de Energía y Minas;
- Trinidad and Tobago—Ministry of Energy & Energy Industries; and
- Venezuela—Dirección de Planificación y Economía Minera.

## General Economic Conditions

In 2004, the Americas had a combined gross domestic product (GDP) based on purchasing power parity of \$16.9 trillion. From 1995 to 2004, the Americas' GDP growth averaged 2.7% per year. During the same period, population growth averaged 2.1% per year. The GDP of the Americas grew by 3.0% in 2004 compared with 2.8% in 2003. Latin America's GDP growth improved because of an overall increase in exports to such major markets as China, the European Union (EU), Japan, and the United States. Inflation remained low, and currency devaluations helped moderate the economic growth during 2004. Economic growth in 2005 and beyond is likely to continue if expansion in the demand for mineral exports and fabricated steel goods continues (table 2; World Bank Group, The, 2005; Economic Commission for Latin America and the Caribbean, 2005<sup>§</sup>; International Monetary Fund, 2004<sup>§</sup>).

Argentina's economy grew by 9% in 2004, reaching prerecession levels after similar strong growth in 2003. The

<sup>§</sup>References that include a section mark (§) are found in the Internet References Cited section.

GDP based on purchasing power parity was \$482.2 billion, with a per capita GDP of \$12,468, which was the highest in South America (table 2). The country's external debt, however, continued to increase and was higher than the nominal GDP. Efforts to negotiate the debt began at yearend. Despite the economic growth and strong prices, the value of mineral production remained at about the same level as that of 2003. Domestic mineral consumption and investment in the mining sector increased significantly.

Brazil has become the center of an increasingly rapid process of energy integration in South America owing to the country's gas market, which has an unsatisfied energy demand and a great potential for growth. Although Brazil produced some natural gas, it imported much more than it produced domestically. Brazil invested in neighboring countries, such as Bolivia, to develop its gasfields and export pipeline network to supply its energy needs and those of neighboring countries, such as Argentina. In Argentina, the network of pipelines was expanded to increase direct imports of natural gas from Bolivia and exports to Chile, which imported most of its natural gas from Argentina. Brazil was also heavily involved in the development of energy networks between itself and neighboring countries, such as Peru and Venezuela. These new energy networks have led to dramatic changes in the natural gas and power markets for South America and to increased cross-border energy investment opportunities, domestic gas consumption, and internationalization of the energy sector (Petróleo Brasileiro S.A., 2005, p. 1; Banco Central do Brasil, 2005§). Brazil will continue to be a strong economy in Latin America and one of the world's most important producers of, in order of trade value, metals, industrial minerals, and mineral fuels. Future hydroelectric and thermoelectric powerplants coming onstream during the next decade will help supply Brazil's growing energy needs (International Monetary Fund, 2006§).

Chile's total exports accounted for about 40% of its GDP in 2004, and copper contributed about 34% to the country's total exports. Chile has a market-oriented economy with the second highest annual per capita GDP based on purchasing power parity in South America after Argentina. The per capita GDP grew by about 3.1% in 2004 and was projected to grow by about 3.5% in 2005 (table 2).

Colombia's GDP based on purchasing power parity was \$315.5 billion. The economy increased by 4.1% in real terms in part because of the significant increase in construction (table 2). Mining increased modestly, and total direct investment almost doubled. The country's exports totaled \$16.7 billion; this represented 18% of the real GDP. Petroleum and coal (which included coke) were the two main export earners and accounted for 25% and 11%, respectively, of total exports in 2004.

Mexico's GDP based on purchasing power parity was \$1,005 billion, which was the third largest in the Americas after Brazil and Canada. Its real GDP was \$676.5 billion, which was an increase of 4.6% compared with that of 2003 and the highest increase in 4 years (table 2). Higher metal prices resulted in a significant increase (59%) in new companies registered in the country and a 30% increase in the value of nonfuel mineral production (including coal). The country's total exports increased to \$186.6 billion, which was almost 30% of the real

GDP. Exports of petroleum represented about 12% of Mexico's total, and mineral exports, less than 3%.

Peru's GDP based on purchasing power parity was \$153.1 billion, which was the fifth largest in South America after Brazil, Argentina, Colombia, and Chile in 2004 (table 2). The country's economy experienced renewed growth, especially in the mineral sector. The energy, mining, and related industries continued to attract significant capital inflow from foreign investors, which was expected to provide long-term benefits to Peru (Banco Central de Reserva del Perú, 2005§).

Venezuela's economy improved significantly in 2004. In real terms, its GDP increased by 17.9%. After 2 years of considerable decreases, the GDP based on purchasing power parity (\$144.3 billion) increased to the level achieved in 2001 (table 2). This increase was owing to higher petroleum prices and strong performances of the construction, manufacturing, and mining sectors. The country had a trade surplus of \$17.8 billion. Total exports (goods and services) increased by more than 40% to \$39.8 billion. Petroleum accounted for 80% of the total.

Canada continued to be a net exporter of, in order of trade value, metals, industrial minerals, and mineral fuels. If Canada's stronger dollar continues, then presumably this could discourage exports, but it also could assist imports of certain necessary commodities, specialized equipment, and professional expertise needed to enhance the Canadian mineral industry (Department of Finance Canada, 2005§; Government of Canada, 2005§; Statistics Canada, 2005§).

## Investment Data and Political Risk

The energy, mining, and related industries of Latin America attracted significant capital inflows from foreign investors; these inflows were expected to provide long-term benefits to the region. Foreign investors were required to implement an increasingly wider approach to investing in community development and environmental protection based on evolving sustainable development principles that were being adopted by the region's Governments.

In 2004, average domestic and foreign investment increased in many Latin American countries and Canada and higher prices for major mineral exports influenced these increases. The increase in investment was expected to continue. China Minmetals Company, for example, planned to invest in metals and minerals mainly in Brazil, Chile, and Peru. In Peru, additional investments (\$4.1 billion) were expected in projects with advanced exploration and environmental assessment work, such as Las Bambas (\$1.5 billion) and Los Chancas (\$1.1 billion) copper deposits, which are located in the Department of Apurimac and owned by Xstrata Plc. of Switzerland and Southern Peru Copper Corp. (SPCC) (a subsidiary of Grupo Mexico S.A. de C.V.), respectively (Banco Central de Reserva del Perú, 2005§; Comisión Nacional de Inversiones y Tecnologías Extranjeras, 2005§).

In 2004, the financial system in Latin America benefited from foreign direct investment (FDI) inflows, high capitalization, and the strengthening of fiscal and monetary discipline, which helped moderate the downturn in economic growth from 2003. South America's and the Caribbean's FDI inflows increased

to \$56.4 billion from \$39.1 billion in 2003. Of this total, the FDI inflows into South America increased to \$34.1 billion from \$23.4 billion in 2003. In the Andean Community, inflows decreased to \$6.2 billion from \$7.5 billion in 2003. This downturn mainly reflected declines in flows to Bolivia and Venezuela caused by political upheaval and to Ecuador because of the completion of its hydrocarbon projects in 2002. Peru's hydrocarbon sector received \$1.8 billion in FDI compared with \$1.4 billion in 2003. FDI inflows in the countries of the Mercado Común del Cono Sur (the Southern Cone Common Market) (MERCOSUR) increased to \$20.3 billion from \$11.5 billion in 2003, but the steepest increase was in Brazil, to \$18.2 billion from \$10.1 billion in 2003 (Banco Central do Brasil, 2005§; Economic Commission for Latin America and the Caribbean, 2005§).

Investment opportunities for U.S. and some foreign companies in Latin America increased between 1990 and 2004 because of the liberalization of the Andean Community and the MERCOSUR countries' economies and privatization efforts within many Latin American infrastructure, mineral, oil and gas, and utilities sectors. Privatization and FDI were changing the industrial operating mode in many countries to a privately owned/state-regulated regime from a state-owned/state-operated regime. The establishment of joint ventures, such as in the construction and management of infrastructure, energy and mining projects, and deregulated industries (gas, electricity, telecommunications), was a common practice in the region. These changes and the growing awareness of environmental protection also led to the establishment of increasingly effective environmental regulations and controls for all Latin American industries.

In 2004, the Governments of Latin American and Caribbean countries continued to encourage privatization and FDI to achieve more economic growth. Privatization, however, has historically resulted in lower employment and not achieved higher productivity and as great a level of global competitiveness as expected. The compromises required from labor often have not appeared to be sufficiently rewarded or the rewards have appeared to be redistributed mostly outside of the region. A special case was Cuba, where the Government increasingly allowed foreign companies to participate in prospecting and exploring, production of raw mineral commodities, and refining of metals and crude oil in the interest of obtaining sources of hard currency for its economy.

In 2004, FDI inflows varied across countries (mostly owing to differences in country-specific risk characteristics, including political risk). FDI in the region as a whole was completing a cyclical upturn for international prices of most of the mineral resources that are found in abundance in many of these countries. In Mexico and some of the Caribbean Basin (Central America and the Caribbean countries), capital inflows have been relatively stable. Average annual FDI in these countries more than doubled between 1995 and 1999 (\$15.4 billion) compared with 1990 and 1994 (\$6.8 billion) but then remained at about \$15.5 billion through 2004. As a result of significant production and processing of petroleum and natural gas facilities, the region benefited from significant price increases in 2004 (Economic Commission for Latin America and the Caribbean, 2005§).

In contrast, South America's FDI inflows were more responsive to the price fluctuations of major nonfuel mineral commodities than of mineral fuels through 2004, although mineral fuels were also a very important component of production for the economies of many South American countries. Inflows to the Andean Community, where the mineral industries rely proportionally more on the production of mineral fuels than on nonfuel minerals, were more stable than those to Chile and the MERCOSUR countries. The mineral industry of Chile, especially, was one of the leading mineral industries in South America but relied most heavily on copper, the annual average price of which increased to a historic high in 2004 (Economic Commission for Latin America and the Caribbean, 2005§).

Argentina's total FDI inflows increased to \$1.1 billion in 2004 from \$775 million in 2002; this was still quite a bit lower than that of 2000 when FDI totaled \$10.4 billion. Investment in Argentina's mining sector is projected to increase to \$1.34 billion in 2006 and \$900 million in 2004 from \$220 million in 2003.

In the near term, Ecuador's mining sector expects \$400 million in FDI (Business News Americas Ltd., 2004a§, b§). About 85% of this projected expenditure was to be allocated for the expansion of the Alumbra and the Cerro Vanguardia gold-silver deposits and the development of the Pascua Lama and the Veladero gold-silver deposits (highlighted in previous annual summaries). Much of this capital is coming from foreign investors (Economic Commission for Latin America and the Caribbean, 2005§).

Transnational corporations (TNCs) were very active in Latin America in recent years. Significant investments in oil and natural gas projects in Latin America were made or committed by ChevronTexaco Corporation, Mitsubishi Corporation, Royal Dutch Shell plc, Statoil ASA, and Total S.A. in Venezuela; Repsol YPF S.A. in Argentina; and a group led by EnCana Corporation in Ecuador. Hunt Oil Company and others invested heavily in the Camisea natural gas project in Peru. BHP Billiton plc and Rio Tinto plc continued to invest in an expansion of the Escondida copper mine in Chile, and increases in production at the mine were expected to coincide with higher copper prices in 2004. Barrick Gold Corporation continued its major investment commitments in gold mines in Argentina and Peru, as did Meridian Gold Inc. in Peru. The Governments of these host countries expected that the expanded operations of TNCs would create more jobs and generate more tax revenues and royalties (Economic Commission for Latin America and the Caribbean, 2005§).

In the mineral industry, Latin American firms such as Companhia Vale do Rio Doce (CVRD) in Brazil, Compañía de Minas Buenaventura S.A.A. in Peru, and others were able to continue to finance investment projects with borrowed U.S. dollars and expected to be able to meet such financial commitments through increasing export revenue in 2004 and beyond. For example, CVRD planned to invest about \$6 billion in mineral project developments and acquisitions through 2007 and to continue to expand and diversify the company's exports of mineral commodities (Banco Central do Brasil, 2005§).

Canada continued to be a very important trading partner of the United States; this partnership enhanced investment and

trade among the members of the North America Free Trade Agreement (NAFTA). The United States absorbed more than 85% of Canadian exports, which benefited the Canadian economy. The continued economic recovery in the United States and increased metal prices gave a boost to the Canadian mining industry and the probability of sustained economic growth in 2005 and beyond. Canada's continuous challenge will be to face the realities of globalization and internationalization and 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 (Canadian Intergovernmental Working Group on the Mineral Industry, 2004, p. 25, 30).

## Legislation

In Canada, Federal and Provincial policies (although not entirely consistent among Provinces) are generally stable and have traditionally favored 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 country's mining industry. Although environmental assessment legislation was passed in 1992, the Federal Government has been deliberate in producing regulations to implement such laws. Funds set aside for the cleanup of closed mine sites were tax deductible; this complemented emerging Provincial environmental restoration requirements (Canadian Intergovernmental Working Group on the Mineral Industry, 2004, p. 30-31).

The Argentine Government continued to strengthen ties with potential foreign investors in the mining sector. An agreement for the exploration and mining of precious stones was reported between the Argentine Chamber of Marble, Stone, and Granite and the Italian Chamber of Foreign Trade. The Government made progress reviewing protocols on various Argentine-Chilean-Bolivian mining projects. Meetings with the Venezuelan mining ministry about fuel minerals were ongoing (Business News Americas Ltd., 2004a§).

The Brazilian Government passed legislation suspending mineral exploration and controlling mining activity on territories that host indigenous peoples (Mining Policy Research Initiative, 2004b§; Departamento Nacional de Produção Mineral, 2005§). Brazil was expected to overhaul and implement new regulations for diamond certifications to export and import diamond in accordance with the Kimberly Process Certification Scheme (Innocenti and Wheatley, 2006).

The Chilean Government continued to seek to pass legislation for taxing mining activities. Legislation that was sent to the Chilean Congress on December 15, 2004, would establish a 5% tax on income derived from the sale of mineral products (Mining Policy Research Initiative, 2004d§).

The Congress of Peru approved a plan to charge a royalty of from 1% to 3% of mineral concentrate sales. The royalty took effect on November 15, 2004 (Mining Policy Research Initiative, 2004c§).

## Exploration

Investments in Latin America and particularly in the Brazilian mining industry were expected to continue to enhance exploration and mine development activities in, in order of importance, iron ore, gold, copper, diamond, and emeralds. This trend was expected to continue because several TNCs have been forming consortiums and acquiring exploration properties, mining prospects, and permits particularly for, in order of importance, oil and gas, iron ore, gold, diamond, and base metals. Gold production could increase significantly in the foreseeable future because of the growth of Brazilian, Chilean, and Peruvian copper production and increased interest by domestic and foreign investors in largely unexplored areas. In the Amazon region alone, there are more than 2,500 gold occurrences, which are mostly Precambrian vein deposits and alluvial placers (Departamento Nacional de Produção Mineral, 2005, p. 101).

According to Metals Economics Group (MEG), Latin America maintained its top position as a destination for proposed exploration capital, although its share of the world exploration budget dropped slightly to 21.8% in 2004 from more than 23% in 2003, followed by Canada (with 19.6%), Africa (16.1%), Australia (14.7%), the United States (8%), the Pacific and Southeast Asia (4.4%), and the rest of the world (15.4%) (Metals Economics Group, 2004). Peru, Mexico, Brazil, and Chile, in order of highest to lowest, were ranked among MEG's top 10 countries for 2004 exploration based on the amount of the proposed exploration budget (Metals Economics Group, 2004). Similarly, an annual survey of executives from leading international mining companies conducted by the Fraser Institute (2004§) ranked the Latin American countries of Chile (5th), Peru (7th), Mexico (8th), and Brazil (10th) among the top 10 countries for mineral exploration based on their financial attractiveness for investment in 2004. Investment appeal is reportedly based on the geologic potential, property value, ease of doing business, and political stability of the countries.

Based on data compiled by the USGS for this review, Latin American countries with selected significant exploration activity in 2004 were, in descending order by number of reported sites, Mexico, Peru, Argentina, Brazil, and Chile. Gold attracted about 65% of total exploration activity; interest in base metals reached 20%; and silver, about 13% of the total. Investment in 2004 was primarily used to further define newly discovered resources (79%) and conduct feasibility studies of promising deposits (10%) (table 3).

In Latin America, Argentina has become the most important investment destination for Chilean capital since the Mining Integration and Complementarity Treaty ratification in 2000, which deals with trade issues related to mining and exploration projects in these two countries. In 2004, exploration projects of note based on the level of drilling included Aquiline Resources Incorporated's Calcatreu gold-silver deposit, Viceroy Exploration Limited's Gualcamayo gold deposit, and Coeur d'Alene Mines Corporation's Martha silver project.

The Brazilian company CVRD approved a \$78 million exploration budget, 77% of which was allocated to the search for aluminum-, copper-, diamond-, gold-, iron-, and nickel-bearing deposits in Brazil. CVRD also increased its

international exploration effort in 2004, with activities planned for Africa, other Latin American countries, and the Middle East (Skillings Mining Review, 2004). Projects that had reached the feasibility stage of exploration in Brazil included Desert Sun Mining Corporation's Jacobina gold project and Yamaha Resources Incorporated's Sao Francisco gold project. Yamaha announced plans to develop this site by the end of 2005 (Mining Policy Research Initiative, 2004b§; Departamento Nacional de Produção Mineral, 2005§).

Exploration in Chile remained high in 2004 as a result of the planned development of a number of potential copper or gold projects, and exploration drilling revealed significant potential for other projects. Development plans were approved for BHP Billiton plc's Spence copper deposit and for expansion of Meridian Gold Incorporated's El Peñon gold-silver deposit. Exploration activity of note for 2004 based on the level of drilling included drilling near Coeur d'Alene Mines Corporation's Cerro Bayo gold-silver mine and at Lumina Copper Corporation's Regalito copper deposit. China Minmetals Company, a Chinese Government-controlled company, signed a preliminary agreement with Codelco Chile Inc. for the purpose of investing as much as \$2 billion in the Chilean mining sector during the next 20 years. The immediate focus was to develop the Gaby copper project (Mining Policy Research Initiative, 2004d§).

China's President Hu Jintao signed 16 economic cooperation agreements with President Fidel Castro of Cuba. Several of these agreements involve mineral exploration (Mining Journal, 2004).

Ecuador's mining sector was expected to receive some \$400 million in foreign investment in 2004. Most of this investment was expected to go toward prospecting for and developing gold-silver projects in southeastern Ecuador, such as Iamgold Corporation's Quimsacocha deposit and International Minerals Corporation's Rio Blanco/Alejandra project (Business News Americas, 2004b§).

As has been the pattern for many years, exploration activity in Mexico focused on gold and silver. Minefinders Corporation Limited continued to advance its Dolores gold-silver project in Chihuahua State. Production began at Glamis Gold Corporation's El Sauzal gold property. Gammon Lake Resources Incorporated continued to expand resources at its Ocampo gold-silver project. Large-scale drilling for gold and silver was conducted at several other properties in 2004.

The discovery of several large gold deposits in Peru beginning in the late 1990s [Minas Conga (1995), Yanacocha (1995-96), and Alto Chicama (2001)] has been followed by aggressive exploration in the country. Barrick Gold budgeted \$7.3 million in 2004 for regional exploration near Alto Chicama (Northern Miner, 2004a). Newmont Mining Corporation budgeted \$18 million in 2004 for regional drilling and feasibility studies near Minas Conga and from \$5 million to \$6 million at Yanacocha (Mining Record, 2004). A large exploration drilling program was also conducted at Monterrico Metals plc.'s Rio Blanco deposit (Monterrico Metals plc, 2004§).

The Venezuelan Government took steps to restructure the Government entity responsible for mining oversight by creating the Basic Industries and Mining Ministry, which is one of three

entities created from the former Industry and Trade Ministry. The entity is responsible for supporting the small mining sector within Venezuela (Mining Policy Research Initiative, 2005§).

Over time, Canada has become a focus of global minerals exploration. In spite of declining exploration budgets for Canadian companies, from a high of \$4.6 billion in 1997 to \$3.4 billion in 2004, exploration and deposit appraisal spending rebounded and gained momentum since 2001 from \$366.4 million to \$752.4 million in 2004. Statistics as of August 2004 released by the Canadian Government show anticipated 2004 exploration spending at \$750 million (C\$979 million), which is up by 43% from an expenditure of \$490 million (C\$687 million) for 2003. MEG reported budgeted exploration spending in Canada for 2004 at \$696 million, or about 20% of the estimated overall worldwide exploration budget (Metals Economics Group, 2004; Natural Resources Canada, 2004§; 2005b§, e§). Variation in the two sets of statistics can be attributed to survey characteristics, such as the date of data collection, the exchange rate used, and the sample size.

Exploration budget allocations for 2004 as reported by the Canadian Government were greatest in Ontario (about 25% of the Canadian total exploration budget), Quebec (18%), the Nunavut Territory (16%), and British Columbia and the Northwest Territories (11% each). Canadian Provinces or Territories with more than a 50% increase in exploration activity in 2004 from 2003 based on reported estimates were British Columbia, New Brunswick, the Northwest Territories, Nova Scotia, the Nunavut Territory, and the Yukon Territory. The only Province with an estimated reduction in exploration budget was Alberta. In 2004, approximately 79% of the Canadian exploration budget for nonproducing sites was allocated for initial exploration (up to and including the first delineation of a mineral deposit). Budgets of junior companies were expected to increase to \$380 million (C\$488 million) in 2004 from \$220 million (C\$284 million) in 2003, and budgets of senior exploration companies were expected to increase to \$380 million (C\$491 million) in 2004 from \$310 million (C\$403 million) in 2003. During the period 2001-04, the junior company budget share increased to almost 50% from 35%. Based upon these data, about 46% of the total Canadian estimated spending intention for mineral exploration in 2004 was for precious metals (predominantly gold); 24%, diamond; and 20%, base metals. These spending intentions were basically unchanged from 2003 (Natural Resources Canada, 2004§).

Canadian Provinces and Territories with the greatest exploration activity were, in descending order by number of sites as compiled by the USGS, Ontario, British Columbia, Quebec, the Nunavut Territory, Labrador and Newfoundland, and the Northwest Territories. Based on the site data, exploration for gold accounted for approximately 52% of Canadian exploration; copper and diamond, 14% each; nickel, 7%; and lead and zinc, about 4%. Approximately 95% of all reported exploration sites were considered early-stage sites.

Canadian gold exploration activity based on the number of sites in 2004 focused primarily on British Columbia, Ontario, and Quebec; diamond exploration focused on the Northwest Territories, the Nunavut Territory, Quebec, and Saskatchewan. Developing diamond projects such as Gahcho Kue (the

Northwest Territories), Jericho (the Nunavut Territory), Snap Lake (the Northwest Territories), and Victor (Ontario), have stimulated further exploration for diamond. The Indian and Northern Affairs recorders office in the Nunavut Territory, which issued 190 prospecting permits in 2003, had received approximately 2,500 prospecting permit applications by February 2004 (Carter, 2004). Drilling continued to define additional resources at many deposits (table 3). Development continued at the Voisey's Bay nickel-copper deposit in Newfoundland, where production from open pit mining was scheduled for 2005.

The Canadian Government extended its 15% nonrefundable Investment Tax Credit for Exploration (ITCE) to the end of 2004 because this program had been effective in stimulating minerals investment in Canada during its previous 3-year term. A number of Provinces and Territories also introduced their own measures to further encourage mineral exploration. British Columbia, Manitoba, Ontario, and Saskatchewan created their tax credits within the structure of the federal ITCE. Quebec continued its refundable tax credit at the corporate level and the Yukon Territory increased the rate of its refundable corporate and personal income tax credit (Canadian Intergovernmental Working Group on the Mineral Industry, 2004, p. 28). In its 2004 report on the effects of these taxation schemes on the mineral industry, the Intergovernmental Working Group on the Mineral Industry (IGWG) reported that flow-through share financings in 2003 (after the legislation was enacted) were more than \$230 million (C\$300 million) compared with \$38 million (C\$50 million) in 2000. Virtually all of the expenditures resulting from these flow-through financings were incurred for work that qualified for ITCE tax credits (Canadian Intergovernmental Working Group on the Mineral Industry, 2004, p. 28; Northern Miner, 2004b).

An effort to develop a Canadian national strategy for the development and administration of the diamond industry was ongoing. In March 2004, the Governments of the Northwest Territories and the Nunavut Territory, the Mining Association of Canada, and the Prospectors and Developers Association of Canada issued a paper entitled "National Diamond Strategy: An Industry Response," which outlined the general direction that the Government and industry planned to take in guiding diamond industry development (Carter, 2004). The outcome of these discussions was the formulation of guidelines for reporting diamond exploration results.

The Cooperative Geological Mapping across Canada (CGMS) initiative is a collaborative effort among several Canadian Federal and Provincial entities that calls for the investment of \$380 million (C\$500 million) during a period of 10 years to improve mapping relevant to minerals exploration. The British Columbia and the Yukon Territory Chambers of Mines, the Council of Tourism Associations of British Columbia, and the Mining Association of British Columbia signed a joint agreement in 2004 to cooperate on land-use issues in the Province (Canadian Intergovernmental Working Group on the Mineral Industry, 2004, p. 28, 31).

## Commodity Overview

This section summarizes the potential developments and production and consumption trends for leading mineral commodities in Canada, Latin America, and, where appropriate, the United States. Each country's share of world production is listed by mineral commodity in table 4.

Estimates for production of major mineral commodities for 2007 and beyond have been based upon supply-side assumptions, such as announced plans for increased production and new capacity construction and bankable studies. The outlook tables in this summary chapter show historic and projected production trends; therefore, no indication is made about whether the data are estimated or reported and revisions are not identified. Data on individual mineral commodities in tables in the individual country chapters are labeled to indicate estimates and revisions. The outlook segments of the mineral commodity tables are based on projected trends that could affect current (2004) producing facilities and on planned new facilities that operating companies, consortia, or Governments have projected to come online within indicated timeframes. Forward looking information, which includes estimates of future exploration, mine development, production, cost of capital projects, and lead-times to start operations, are subject to a variety of risks and uncertainties that could cause actual events or results to differ significantly from expected outcomes. Projects listed in the following section are presented as an indication of industry plans and are not a USGS prediction of what will occur.

## Metals

For most base metals in 2004, better prices toward the end of the year ignited investment globally, which could allow the supply of metals from Latin America and Canada to rebound through 2005 and 2006. Better prices, however, encourage investment in the research and development of substitutes, not just in increasing the capacity to produce more minerals; thus, investment flows could be redirected more toward substitutes for base metals, such as optical cable and plastics, because demand for those commodities was expected to grow along with consumption of metals through at least 2010 (Rowley, 2005).

Prices for metal commodities and their substitutes were highly volatile. Price uncertainty combined with regional uncertainties that concerned new or revised mining laws, shifting free trade alliances, and the uncertain process of economic development in many countries can certainly be expected to deter some investments in the base-metals sector of the economies of Latin America, thereby lengthening projected USGS timelines for many of the projects in development that are mentioned in the commodity summaries. Mining and mineral processing firms that operate in Canada annually have higher labor costs than firms that operate in less-developed countries, as well as higher production costs than most firms that operate in developing or emerging economies. Despite Canada's rich endowment of raw minerals, the higher exploration and production costs combined with uncertainty about proposed changes to policies regarding pensions and subsidization of energy expenditures could cause Canada to delay development of some minerals projects longer

than might be the case for other mineral-rich countries, such as those in Latin America.

**Aluminum and Bauxite and Alumina.—Production.—**About 12 countries had internationally significant production levels of bauxite, and 5 of them were in Latin America; Brazil and Jamaica were the second and fifth ranked producers in the world, respectively. Since 1990, bauxite production in Latin America has increased by about 70% to account for about 30% of world production in 2004 compared with 23% in 1990 (table 4). This improvement was primarily owing to considerable increases in bauxite output in Brazil, Jamaica, and Venezuela during this time. Primary aluminum metal production in Latin America increased by 32% since 1990 (tables 5, 6).

In 2004, Canada's production of primary aluminum was about 2.6 million metric tons (Mt), which was a decrease of 7.2% compared with that of 2003. Alcan Inc.'s output was reduced because of the closure of Söderberg capacity at the Arvida smelter and a strike at the 25% owned Aluminerie Bécancour smelter, both of which are located in Quebec. This reduced output placed Canada third, after China and Russia, in the world in volume of production and first, after Russia and Venezuela, in volume of exports to the United States (Plunkert, 2005a; Wagner, 2005, p. 9.1, 9.29; Alcan Inc., 2005§; Natural Resources Canada, 2005a§, c§, d§).

Since 1990, the countries of Latin America and Canada have annually produced about 18% per year of the world's primary aluminum, but Argentina, Brazil, and Canada had considerably increased primary metal production by 2004 (tables 4, 6; Plunkert, 2005a). In 2004, Canada and Brazil were ranked third and sixth in the world, respectively, in terms of primary aluminum metal output (Plunkert, 2005a).

With advanced aluminum metal production capacity, the aluminum sector in Brazil exhibited the highest degree of vertical integration amongst the countries of Latin America and Canada. The four major aluminum smelters—Albras-Alumínio Brasileiro S.A., Alcoa Alumínio S.A., Billiton Metais S.A., and Companhia Brasileira de Alumínio—produced 85.9% of the primary aluminum production of 1.4 Mt in 2004. The most significant remaining obstacle to increasing Brazilian aluminum metal production further was the lack of a sufficiently consistent source of electrical power (ALBRAS-Alumínio Brasileiro S.A., 2005, p. 15-16; Instituto Brasileiro de Mineração, 2005, p. 33; Associação Brasileira do Alumínio, 2005d§).

In 2004, primary aluminum production in Brazil and Canada accounted for about 82% of that of Latin America and Canada. Primary and secondary aluminum production has increased in Brazil, Canada, and Mexico, which comprised about 84% of total production of aluminum metal in Latin America and Canada; and secondary aluminum production accounted for about 12% of the total regional aluminum metal output (tables 6, 7). Increased installation of more-advanced recycling facilities has improved these countries' shares of global secondary aluminum metal production. In 2004, the countries of Latin America and Canada accounted for more than 9% of the world's secondary production of the metal compared with about 4% in 1990; the United States accounted for more than 39% of global secondary aluminum production in 2004 (table 4; World Bureau of Metal Statistics, 2005, p. 10).

*Consumption.*—Latin America and Canada's share of global refined aluminum consumption in 2004 amounted to about 6.5%; the United States alone accounted for almost 20% (World Bureau of Metal Statistics, 2005, p. 9). Since 1990, U.S. apparent consumption of aluminum has increased by 16.5%, but U.S. imports for consumption have increased by about 37%. Especially since 2000, this has reflected the trend in the U.S. market for aluminum to be more dependent on imports and, therefore, to be an even more important market for the neighboring countries of Latin America and Canada. In 2004, U.S. imports of aluminum came from Canada (58%), Russia (17%), Venezuela (5%), and Brazil (3%), and imports of bauxite came from Jamaica (37%), Guinea (32%), Brazil (12%), and Guyana (11%) (Plunkert, 2005a, b).

In 2004, Latin America and Canada's consumption of primary aluminum was at basically the same level as that of 2000 and amounted to more than 1.9 Mt, of which Canada and Brazil were the dominant consumers. In 2004, the level of consumption of primary aluminum for Latin America and Canada was almost 64% higher than it was in 1990 and more than 4% higher than that of 2003, which was mostly owing to the increased capacity to fabricate consumer products out of aluminum in Brazil (World Bureau of Metal Statistics, 2005, p. 9).

*Outlook.*—In 2004, Brazil, Guyana, Jamaica, Suriname, and Venezuela together contained about 22% of the global reserves of bauxite (Plunkert, 2005b). Brazil continued to increase its global significance as a primary aluminum metal producer. Mineração Rio do Norte S.A. (MRN) planned to open its new mine, which has bauxite reserves of 800 Mt and a capacity of 2 million metric tons per year (Mt/yr), in the Papagalo plateau, Trombetas, State of Para. The Papagalo Mine will maintain MRN's total bauxite ore production capacity at about 6.5 Mt/yr. CVRD was planning to invest \$320 million in the Paragominas bauxite mine, which contains 878 Mt of reserves, to produce 4.5 Mt/yr by 2006. The Albras facility at Vila do Conde, State of Para (CVRD, 51%, and Nippon Amazon, 49%), produced 346,000 metric tons (t) of primary metal in 2004, and was to be expanded to 440,000 metric tons per year (t/yr) capacity at a cost of about \$100 million in the near future. Alcan invested \$370 million in expansions of its complex facility at Laminacao de Pindamonhangaba in the State of Sao Paulo to increase its production capacity to 280,000 t/yr of aluminum from 120,000 t/yr. Alcoa was planning a new operating hub in Juruti, State of Para, where it is carrying out a geologic study in a bauxite resource of 350 Mt with an investment of \$1.6 billion. The production would be 4 Mt of bauxite and 1 Mt of aluminum. To implement this hub, Alcoa may invest an additional \$1.0 billion in the construction of the required hydroelectric plant to produce aluminum in Belomonte, State of Para.

Alcan expanded its aluminum sheet production capacity to 120,000 t/yr from 100,000 t/yr in 2004 as a part of a \$380 million investment program and increased its primary capacity to 150,000 t/yr. Investments in the aluminum sector could reach up to \$1.6 billion within the next few years. Latapack-Ball S.A., which produced aluminum cans, invested \$5 million to increase its plant capacity in Jacarei, State of Sao Paulo, to 2 billion aluminum cans from 1.7 billion. Brazil recycled 89%

of all the aluminum cans, which was equivalent to 123,900 t of aluminum, or about 9.2 billion units; this was an increase of 2.3% compared with that of 2003. China MinMetals and Aluminum Corp. of China are planning to invest \$3 billion in the Brazilian aluminum industry during 2004-05 (Companhia Vale do Rio Doce, 2004, p. 2, 15; Departamento Nacional de Produção Mineral, 2005, p. 29-30; Instituto Brasileiro de Mineração, 2005, p. 33-34; Associação Brasileira do Alumínio, 2005a§-d§).

In Jamaica, new investment in the production of bauxite was increasing in 2004 as a result of the Government agreeing to remove a nearly 30-year-old levy on bauxite production in 2002 (Alcoa Inc., 2005§). As a result, Jamaican production of bauxite was expected to increase by at least 9% by 2007 compared with that of 2004 (table 5).

In 2004, 34% of total investment in the mining industry of Venezuela continued to go toward the development of bauxite production; this level of investment was expected to continue through 2008. The investment was expected to have its first real impact on bauxite production in 2007 (table 5). In anticipation of producing more bauxite in Venezuela, CVG Aluminio del Caroní S.A. received financing in 2004 for expansion of its primary aluminum metal smelter's capacity to 450,000 t/yr from 210,000 t/yr in 2003. The company expected to complete the project by the end of 2007.

Alcoa expected its majority-owned affiliate Suriname Aluminum Company, L.L.C. (Suralco) to expand domestic production of bauxite to feed the Paranam refinery expansion. Together with the Government of Suriname, Suralco had also developed the necessary hydropower capability to use fully the additional alumina refining capacity at Paranam.

In 2004, Aluminio Argentino S.A.I.C. (Aluar) decided to postpone plans to expand the primary aluminum metal production capacity of the Puerto Madryn smelter in Argentina to about 400,000 t/yr from about 275,000 t/yr. This project was rescheduled to start in 2007 (Aluminio Argentino S.A.I.C., 2004§).

In Chile, Noranda Inc. has been promoting its 440,000-t/yr Alumysa project since the 1980s, but the project was the subject of numerous environmental complaints in 2003. Consequently, no clear timeline for its development had been set.

Alcan's 405,000-t/yr Alma smelter in Quebec Province, Canada, required 620 megawatts (MW) of power; 270 MW came from Alcan's own grid, and 350 MW, from Provincial utility Hydro-Quebec. The company had negotiated a projected 22-year power-exchange project with Hydro-Quebec for additional power that Alcan may need for expansion and modernization of its seven smelters in Quebec Province (Wagner, 2005, p. 9.3; Alcan Inc., 2005§).

Alcoa was planning to expand its Lauralco-Deschambault smelter near Quebec City to 570,000 t/yr from 250,000 t/yr. Construction was scheduled to start in 2006; initial production would begin in 2008 and full capacity would be reached in 2013. In early 2004, Alcoa and the Province of Quebec were negotiating on the capacity upgrade of the Baie-Comeau smelter, which would increase production capacity to 547,000 t/yr from 437,000 t/yr by 2010 with an investment of about \$1 billion (Wagner, 2005, p. 9.11; Alcoa Inc., 2005§).

Aluminerie Alouette Inc. [Alcan (40%), Aluminium Austria Metall Quebec (20%), Hydro Aluminum (20%), Société Générale de Financement du Quebec (13.33%), and Marubeni Quebec Inc. (6.67%)] continued with the \$1.1 billion expansion of its smelter in Quebec Province from 245,000 t/yr to 550,000 t/yr in 2005 (Wagner, 2005, p. 9.5-9.6; Alcan Inc., 2005§; Alcoa Inc., 2005§).

**Copper.**—*Production.*—Mine production of copper in Latin America and Canada increased by 21.6% compared with that of 2000 (table 8). In 2004, metal prices were driven upwards because of the higher demands associated with increased world economic activity in such countries as, in order of increased activity, China, the United States, and other Asian countries. In the Americas, the world's leading copper producer, Chile, had an increase in production in 2004 mostly owing to production strategies initiated in 2002 by at least two of the leading producers in the country to reduce output by mining lower grades and/or stockpiling. Such policies were discontinued by BHP Billiton plc at its majority-owned Escondida Mine and by Corporación Nacional del Cobre (CODELCO) by the end of 2003 (Comisión Chilena del Cobre, 2005, p. 82-84). Elsewhere, Peruvian copper production increased because of higher demand and higher content of ores processed by the Antamina Mine, the reopening of the Tintaya Mine by BHP Billiton Tintaya S.A. (a Peruvian subsidiary of BHP Billiton plc) in October 2003, and increased processing capacity at the Southern Peru Copper Corporation's Toquepala plant (Ministerio de Energía y Minas, 2005, p. 17-18).

In 1990, Chile and the United States mined about the same amount of copper, but U.S. production had decreased by 29% by 2004, and Chilean production had increased by about 210% during the same time period (Edelstein, 1996; table 8). Endowed with the world's leading reserves of copper, Chile is expected to supply copper to the United States and many other countries of the world through at least 2011. In 2004, the countries of Latin America and Canada were responsible for more than one-half of the world's copper mine output (table 4).

From 2000 through 2004, production of refined copper in the countries of Latin America and Canada followed a similar pattern as mine production and increases in metal production were registered in Chile, Mexico, and Peru. Chile accounted for about 61% of all refined copper production in Latin America and Canada and about 18% of world refined copper production in 2004, which meant that Chile was the leading producer of refined copper in the world. In 2004, Peru was the 8th ranked producer in the world, and accounted for about 3.2% of global production, and Canada was the 11th ranked producer and accounted for about 3.0% (table 9; Edelstein, 2005; World Bureau of Metal Statistics, 2005, p. 40).

*Consumption.*—Increased world demand for refined copper was owing to the dominant usage by China (20%) and the United States (14%), which was a very important consideration for producers in Latin America and Canada where a vast majority of U.S. copper imports originated. In 2004, 28% of U.S. imports of unmanufactured copper was supplied by Canada; Chile, 26%; Peru, 23%; Mexico, 9%; and others, 14% (Edelstein, 2005). As technology and substitutes for copper, such as optical fiber, have been developed, U.S. copper

consumption since 2000 has decreased. In 2004, Mexico (3% of world copper consumption) and Brazil (2%) were the leading consumers of refined copper among the countries of Latin America and Canada. The combined consumption of Latin America and Canada was less than an 8% share of world copper consumption (Edelstein, 2005; World Bureau of Metal Statistics, 2005, p. 41).

*Outlook.*—Between 2004 and 2007, copper mine production in the countries of Latin America and Canada is expected to increase owing to expected startups, restarts, and expansions of production of copper from mines that have been put back into full production because of price increases in the international markets. Copper prices in 2004 remained robust and averaged \$1.30 per pound, which was up from \$0.81 per pound in 2003. The prices increased to new record highs into 2005 because of strong demand and increased economic activity in copper user countries in Asia, Europe, and the United States, and because lower copper inventories owing to the release of strategic stockpiles of Chile's Corporación Nacional del Cobre and China's State Reserve Bureau affected the supply/demand balance in 2005. In Canada, for example, the price recovery in 2004 led to decisions to restart operations at Copper Rand in Quebec Province and at Mt. Polley and Gibraltar in British Columbia. In 2004, Inco Limited announced that the Voisey's Bay Mine will produce copper as a byproduct of nickel-cobalt ore starting in late 2005, which suggests that mine production of copper in the country will exceed its 2000 level by early 2007, and that copper output will continue to increase to 2009 (Voisey's Bay Nickel Company Ltd., 2005§).

In Chile, the Escondida Mine's sulfide leach project will start operations during the second half of 2006; the Spence solvent extraction-electrowon (SX-EW) project in northern Chile will produce cathode during the fourth quarter of 2006; and Codelco may begin developing a full-scale bioleaching plant at its Mansa Mine by 2005. In 2004, about 30% of the world's copper reserves were located in Chile (Edelstein, 2005).

In Peru, Phelps Dodge announced the expansion of its Cerro Verde SX-EW operation, which will be completed in mid-2007 (Coulas, 2005, p. 22.12-22.13). In addition to the Tintaya Mine remaining operational through 2005, capacity expansion and mining of higher grades is expected at the Antamina Mine; increased production at the Toquepala Mine is also expected. Restructuring and modernization at other copper mines in Peru is expected to combine with these main expansions to rank Peru among the top three copper producers in the world by 2005. A successful prefeasibility study was completed on the Rio Blanco copper project in Peru, and production of about 100,000 t/yr of copper was expected to begin by 2008 (Monterrico Metals plc, 2004§). Also in Peru, Minera Yanacocha SRL (MYS) planned to finish the environmental impact assessment for the copper-gold project at Minas Conga by 2006, and operations were expected to start by 2011 (InfoMine Inc., 2005§).

Growth in global demand for refined copper, led by China, was expected to exceed growth in supply in the next few years (Warwick-Ching, 2005). In Chile, Alliance Copper Ltd. planned to begin copper production in 2004 at a prototype plant at Chuquicamata where a new bioleaching process to treat copper concentrates that contain from 2% to 4% arsenic is planned.

Southern Perú Copper Corporation (SPCC) planned to build a new copper smelter in Ilo, Peru, which will produce anodes instead of blister by the end of 2006. This plant was expected to process 1.83 Mt of copper concentrates from SPCC's newly expanded Toquepala Mine. In Brazil, Caraiba Metais S.A. (CMSA) planned to increase production of copper metal to 500,000 t/yr by 2010 from about 173,000 in 2003. CMSA imports most of the copper cathode it refines from Chile and Peru. Led by Chile, the countries of Canada and Latin America are expected to play a leading role in ramping up the growth rate in global supply to catch up with that of global demand, possibly by 2007 (Warwick-Ching, 2005).

In 2004, CVRD's copper project portfolio in the mineral province of Carajas, State of Para, included the sulfide ore resources of, in order of value, Sossego, Salobo, Alemão, and Cristalino and the oxidized ore deposit of Corpo 118. The Sossego copper mine, with 200 Mt of sulfide ore containing 1.0% copper, started operations in January 2004 at an annual rate of 140,000 t in concentrates. The feasibility studies for the Salobo, which was Brazil's leading copper project, estimated copper resources to be 986 Mt at a grade of 0.82% copper and 0.49 grams per metric ton (g/t) of gold at a cutoff grade of 0.5% copper. The Cobre Salobo, which is located in Marabá, State of Para, could support a mill of 140,000-t/yr capacity. The Alemão deposit contained 161 Mt of sulfide ore containing 1.3% copper and 0.86 g/t gold. A prefeasibility study for Cristalino estimated reserves of 312 Mt of sulfide ore containing 0.77% copper and 0.13 g/t gold. CVRD continued conducting intensive geologic work to identify new copper areas in the Carajas region. Also, a feasibility study on Mineração Maracá S.A.'s Chapada copper-gold project in Alto Horizonte, State of Goiás, estimated that its ore reserves were 434.5 Mt and contained 1.3 Mt of copper and 9.6 t of gold. CVRD's Corpo 118 could start to produce 6.7 Mt of oxidized copper ore in mid-2007, with the possibility to produce 45,000 t/yr of cathode. According to CVRD, the Chapada and the Corpo 118 projects will start full operations in 2008 (Companhia Vale do Rio Doce, 2005, p. 16; Departamento Nacional de Produção Mineral, 2005, p. 55; Instituto Brasileiro de Mineração, 2005, p. 32).

Brazil's refined copper production was used primarily in the automobile and construction industries. Brazilian copper exports amounted to 229,300 t of copper content in concentrates valued at \$171.5 million, which was exported to, in order of value, India, the Republic of Korea, China, and Bulgaria. Refined copper (primary + secondary) exports amounted to 85,200 t valued at \$243.7 million, which went to the United States (64%), and Argentina and Chile (18% each). By 2010, should positive market conditions continue, Brazil could become self-sufficient and diminish its external dependency (Departamento Nacional de Produção Mineral, 2005, p. 54-55; Instituto Brasileiro de Mineração, 2005, 36).

Considering China's increasing demand for metals and minerals, such as copper, which was expected to increase to 6 Mt by 2010 from 4 Mt in 2004 and 2 Mt in 2003 to satisfy this consumption, two Chinese companies, Aluminum Corporation of China Limited (Chalco) and Baosteel Co., Ltd. (Baosteel) were planning to set up joint ventures with Latin America's leading copper mining companies, including CVRD of Brazil,

CODELCO of Chile, and Phelps Dodge's subsidiary Sociedad Minera Cerro Verde S.A.A. of Peru (Latin Trade, 2004).

**Gold.**—*Production.*—In Latin America and Canada, mine production of gold has increased by almost 41% since 1990. In terms of volume, Canada and Brazil were the leading producers in 1990, and Peru and Canada were the leading producers in 2004. Between 1990 and 2004, gold production in Brazil has declined drastically, in Canada it has decreased gradually, and in Peru it has increased dramatically (table 10).

In 1990, Peru was ranked about 20th internationally in terms of the country's mine output of gold. Since then, the Yanacocha Mine has grown to become the world's second ranked gold mine. MYS increased its annual production by making technological improvements to increase gold recovery and by increasing output at the La Quinua Mine by mining higher grades (Compañía de Minas Buenaventura S.A.A., 2004; Newmont Mining Corporation, 2004, p. 84).

In Canada, annual gold production continued to decrease owing to mine closures, such as those of the Con Mine and the Lupin Mines; temporary suspensions of production; and some depletion of gold reserves (Kinross Gold Corporation, 2004§). Production of gold as a byproduct has also been decreasing since 2000 in Canada owing to the decreasing annual average prices of frequently coexisting metals. In Latin America and Canada, gold production decreased in 2004 compared with that of 2003, and lower cost operations were more responsive to the higher average annual gold price in 2004 (table 10, Chevalier, 2005a).

In Brazil, annual gold production increased to 47,600 kilograms (kg) in 2004 from 40,420 kg in 2003, but mine output of gold was still about 94% of that of 2000 and about 47% of the production level in 1990 (table 10). Garimpeiros produced 19.1 t in 2004, which was an increase of 33% compared with that of 2003 (Departamento Nacional de Produção Mineral, 2005, p. 54-55).

In 2004, Colombia achieved a historically high level of mine production of gold, although most of Colombia's gold production was still from small- and medium-sized alluvial operations that used artisanal methods for gold extraction, which were similar to the methods used by the garimpeiros in Brazil. Some of the additional production came from these types of artisanal operations that had moved into mines that previously had been abandoned because of high operating costs, but higher cost production using modern methods in vein-type mines also increased. Gold output was almost 2% higher than that of 2000 and more than 28% higher than that of 1990 (table 10).

About 40% of all gold output in Chile was byproduct from mines that predominantly produced copper. Fluctuations in Chilean mine production of gold has recently depended heavily on trends in copper production. Annual total gold production from all gold-producing mines in Chile was no longer declining in 2004 compared with 2003 and 2002 gold outputs, although gold production in 2004 was only almost 74% of the country's gold output in 2000 (table 10). Higher gold production at the Escondida copper mine and Cía. Minera Mantos de Oro's La Coipa gold mine was sufficient to offset reductions at Cía. Minera Meridian's El Peñon gold mine, among others.

In 2004, substantial progress was made on new gold developments in Central America; Guatemala and Honduras

have accounted for most of the new production of gold since 1995. In Mexico, Industrias Peñoles, S.A. de C.V. closed its Las Torres gold-silver mining unit in 2003. The Korri Kollo Mine in Bolivia, which at times during the past 15 years was the leading gold mine in South America, closed its operations in 2003 (Fox, 2004). The countries of Latin America and Canada accounted for about 22% of global mine production of gold; Peru accounted for about 7.5% and was the fifth ranked producer of gold in the world, and Canada accounted for about 5.7% and was the seventh ranked producer (table 4; World Bureau of Metal Statistics, 2005, p. 79).

*Outlook.*—Among the countries of Latin America and Canada, Peru had the highest percentage of global gold reserves in 2004 (8.3%), and Canada held about 3.1% of the world's reserves (Amey, 2005). Although Canada was the second ranked producer in 2004, Peru's annual mine production of gold may exceed the 180 t range by 2011, assuming that the price of gold remains high enough to cover the higher costs of production in Peru. Total gold production in Latin America and Canada is expected to increase in 2005 primarily owing to the planned restarts of mining projects that had been temporarily suspended.

In Peru, additional gold as co- and/or by-products are expected through 2007-2011 owing to the mining of copper-gold veins in the Antamina, the Atacocha, the Yanacocha, and other mines elsewhere in the country. Yanacocha's increased gold production capacity in 2004, which was primarily owing to projects in La Quinua Basin, is expected to maintain the company's gold production at the high 2004 levels. New projects, such as the Minas Conga gold-copper project, are not expected to enter production until after 2007 (Newmont Mining Corporation, 2004, p. 84; Ministerio de Energía y Minas, 2005).

The Peruvian Minera Barrick Misquichilca S.A. plans to start gold production at its Alto Chicama Mine in the latter half of 2005, but production at the company's Pierina Mine is expected to drop to about 20 t/yr in 2004 from about 28 t/yr from 2000 through 2003 because lower grades were being mined (Barrick Gold Corporation, 2005, p. 12, 16; 2004§).

One example of a mine that is expected to restart operations in the near future is the Refugio Mine in Chile; production capacity could total about 3.6 t of gold in 2005 and rise to 7.5 t/yr starting in 2006. In Central America, higher gold prices in 2004 caused renewed interest in many projects that had raised expectations for gold production in Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, and Panama. Overcoming the dearth of gold mining investment in this region during the past 10 years, the lack of trained labor, and environmental concerns, especially in Costa Rica, may continue to delay many of these projects until 2006 or 2007. The Costa Rican Government, however, granted preliminary environmental approval for gold production to begin at Bellavista in 2005 and at Cerro Crucitas in 2009.

Although gold prospects in Latin America will continue to be the focus of many mineral exploration firms, the expected effects on production from these ventures are uncertain. The Dominican Republic and Panama did not report much official production of gold in 2004 (table 10) but have historically been significant gold producers and appeared to be approaching advanced development after extended exploration efforts. In

the Dominican Republic, Corporación Minera Dominicana continued to develop the Cerro de Maimón deposit and initially expected to commission the mine and mill in late 2006. By the end of 2004, however, this timeline had been indefinitely postponed. In Ecuador, a feasibility study (not yet considered to be bankable) at the Rio Blanco deposit was begun at the end of 2004, and completion of that stage of drilling is not expected until sometime in 2006.

Through 2007, output of gold is expected to rise with further development of the gold deposits associated with the Veladero Breccia system in Argentina and the Mundo Novo Greenstone Belt in Brazil. In Argentina, the Agua Rica Mine achieved bankable feasibility by the end of 2004 and is expected to enter production by the end of 2008. Also in Argentina, Barrick Gold Corporation's Veladero gold mine is expected to begin production in 2005, and its Pascua Lama project is expected to begin gold production in 2009.

By 2007, production is expected to increase in Mexico owing to the completion of two gold projects, which will include Metallica Resources Inc.'s Cerro San Pedro gold and silver project. In 2004, the company updated the mineral reserves at Cerro San Pedro and estimated that the mine could operate for 8.5 years at a production rate of about 2,800 kilograms per year (kg/yr) of gold. Conditional upon mining permits being obtained in the expected manner, Metallica expected production to begin in 2005. Venezuela is expected to achieve annual rates of gold production close to previously recorded high levels (about 20 t in 1997) by 2009 through development of Las Cristinas gold project. In Bolivia, gold mine production by medium-scale mining companies is expected to decrease steadily through 2009, except for production of gold as a byproduct of new silver or other metal mining operations; gold production, therefore, is expected to rely increasingly on the less technological (artisanal) sector, for which reliable estimates of production are generally unavailable.

**Iron Ore and Iron and Steel.**—*Production.*—In 2004 Latin America and Canada's share of global production of iron ore, pig iron and direct-reduced iron (DRI), and crude steel amounted to 24.9%, 9.9%, and 7.7%, respectively. Natural gas-based processes accounted for almost 90% of global production of DRI. The world's leading producers of gas-based DRI were, in order of output value, Venezuela and Mexico; this was owing, in part, to the ample supplies of cheap natural gas in those countries (table 12; Fenton, 2005). In 2004, Argentina and Trinidad and Tobago were also significant producers of gas-based DRI. Trinidad and Tobago enjoyed access to sufficient supplies of natural gas. Argentina, however, was forced to secure natural gas imports from Bolivia and Brazil to meet the country's growing energy demands.

The leading producer of iron ore (in terms of iron content) in the world was Brazil, where CVRD's share of global production was 16.8% in 2004 compared with 17.8% in 2003. After Brazil, which accounted for about 70% of iron ore production by the countries of Latin America and Canada in 2004, the locally significant producers of iron ore were, in order of the value of each country's total output, Canada, Venezuela, and Mexico (table 11). In Peru, Shougang Hierro Perú S.A. (a subsidiary of China's Shougang Corp.) completed a new pellet plant to

increase production capacity to 4 Mt/yr in iron ore content in 2004 from 3 Mt/yr in 2003.

Production of crude steel can be correlated with pig iron production and this has mostly been true for the three major steel-producing countries in Latin America and Canada (Brazil, Canada, and Mexico) from 1990 through 2004. In 2004, Brazil continued to be, by far, the leading producer of pig iron in Latin America and Canada; growth in production in that country has outpaced that of crude steel since 1990. Unlike in Brazil, Canada's production of crude steel has increased more rapidly than the country's output of pig iron, which has remained basically flat since 2000 (table 12). In 2004, Mexico's annual production of pig iron and crude steel began to recover and surpassed the country's 1995 levels for both ferrous metals (tables 12, 13). In 2004, Brazil was the fourth ranked producer of pig iron in the world (Fenton, 2005). Brazil accounted for about 3.2% of the world's crude steel production, and Canada and Mexico, 1.6% each (table 4).

*Consumption.*—Pig iron and DRI production tend to be direct indicators of iron ore consumption; the level of crude steel production is less of an indicator because part of steel production comes from scrap-consuming minimills. Brazil, which was one of the world's dominant exporters of iron ore in 2004, exported about 157.5 Mt compared with about 136.9 Mt in 2003. In 2004, Brazilian iron ore exports were shipped to China (22%), Japan (14%), Germany (12%), and France and the Republic of Korea (6% each) (Departamento Nacional de Produção Mineral, 2005, p. 64). These percentages reflected a recent relative shift towards satisfying Chinese demand and away from satisfying U.S. demand; 5.2% of Brazil's iron ore exports was shipped to the U.S. in 2000 and 9% was shipped to China. In 2004, CVRD was also able to enter into long-term contracts with the firm's newer customers, who included the Chinese, to buy Brazilian iron ore for the foreseeable future; most sales to China had previously been by spot market purchases for delivery during a 12-month period, at most. Meanwhile, imports of iron ore from Brazil as a share of U.S. consumption have increased to 42% in 2004 from 38% in 2000. Canada's share in U.S. iron ore imports for consumption remained relatively constant in the range of 48% during the same period of time (Kirk, 2004; Jorgenson, 2005).

In 2004, the United States imported about 10% of its apparent steel consumption; about 17% of the imports of steel mill products was provided by Canada, and about 12%, by Mexico. In 2004, almost all growth in global consumption occurred in Asia; the Chinese share of global crude steel consumption was more than 35%. China acquired about 30% of its crude steel imports from Latin America (excluding Mexico). Annual consumption of crude steel within Brazil and Mexico increased by about 7% and 5%, respectively, and Canada's annual consumption of steel products decreased by 2.5% (Departamento Nacional de Produção Mineral, 2005, p. 65; Fenton, 2005; International Iron and Steel Institute, 2004a§, b§).

*Outlook.*—Production of iron ore in Canada and Mexico is expected to level off after 2007. Brazil's iron ore output is expected to increase by about 9% during 2004-2011, but Venezuela is expected to increase output and produce only slightly less iron ore than Canada by 2007. The projected

increase is owing to the expected completion of a new 8-Mt/yr concentration plant and the plans to reopen the Altamira Mine in Venezuela. In Peru, Shougang continues to be the only iron ore producer; the company expects to increase output of iron ore through 2007 (table 11). In Brazil, CVRD started up its 12th iron pellet plant in late 2003 and plans to invest about \$6 billion in the Brazilian mining sector through 2007. CVRD, however, plans to focus much of this investment on opening up supply lines and investing in a better infrastructure to bring the iron ore to the markets more efficiently.

Global demand for iron ore is expected to remain strong through 2011, primarily driven by growth in Chinese demand but also owing to rapid growth in demand in India. Therefore, global supplies of iron ore are expected to remain tight until at least 2007 as openings of additional capacity, which includes that in the countries of Latin America and Canada, are expected to continue to lag behind growth in demand (JPMorgan Chase & Co., 2005, p. 3). In 2004, Brazil had about 7.2% of the world's iron ore reserves in terms of iron content; Venezuela, 1.6%; and Canada, 1.1% (Departamento Nacional de Produção Mineral, 2005, p. 64; Jorgenson, 2005). Chile is facing lower grades and diminishing reserves of iron ore through 2009.

A large boost to iron ore production in Latin America could potentially come from the eventual development of El Mutun iron ore deposit in Bolivia. The Brazilian steelmaker, Siderúrgica Sul Catarinense S.A. (SIDERSUL), has made repeated attempts to acquire the rights to develop this resource, which is commonly believed to be one of the largest undeveloped iron ore deposits in the world. The Bolivian state mining entity, Corporación Minera de Bolivia (COMIBOL), however, is entitled by the Bolivian constitution to earn royalties on any future production from El Mutun, which is a resource remotely located within a 50-mile national "strategic zone" near the Brazilian border. Thus, the ongoing obstacles to attracting the necessary investment to develop this resource, which is expected to remain mostly undeveloped and 100% controlled by the Bolivian Government, are many.

In 2004, China was the leading steelmaker and its demand for iron ore was so strong that the technology, which was recently considered to be approaching obsolescence, continued to be operated profitably in many countries to meet Chinese demand. In response to China's recent evolution into a major global importer of iron ore, Brazil appears to be leading the countries of Latin America and Canada in initiating greenfield feasibility studies to generate new iron ore production capacity. In Brazil, the earliest expected date for any new capacity to enter production would be after 2007.

In the future, some analysts expect that new crude steel production capacity will be economical only if it is located close to significant iron ore resources. At the same time, however, expansions of existing capacities at steel production facilities in Latin America and Canada are expected to proceed cautiously through 2011 owing to increased global market strength and strategies to minimize the risk of generating overcapacity by private owners of the steel-producing firms in these countries (JPMorgan Chase & Co., 2005, p. 31-51).

**Lead.—Production.**—Since 1990, Latin America and Canada's overall mine output of lead has been in steady decline;

the major exception was Peru. Canada and Mexico were primarily responsible for this decline. Canada was the leading lead producer in Latin America and Canada in 1990 but had cut mine output of lead by about 68% by 2004. Similarly, Mexico's mine production of lead decreased by almost 37% by 2004 (table 14). Mexico's leading producer of lead and zinc, Industrias Peñoles, S.A. de C.V., shut down its El Monte lead-zinc mine in March 2003 owing to the depletion of reserves. In 2004, Peru, Mexico, and Canada were the fourth, fifth, and sixth ranked mine producers of lead in the world and accounted for about 9.9%, 3.8%, and 2.5% of global mine output, respectively (table 4; Gabby, 2005).

The leading producers of primary refined lead in Latin America and Canada, were in order of global ranking, Mexico (seventh), Canada (eighth), and Peru (ninth), which accounted for about 4.1%, 3.6%, and 3.3% of global production, respectively (table 15; Gabby, 2005). In 2004, Noranda's decision to move the lead smelter at its Brunswick operations to a seasonal 8-month schedule significantly reduced Canadian annual production of the metal (Noranda Inc., 2005, p. 26). In Peru, lower output of lead concentrates from Volcan Compañía Minera S.A.A. resulted in lower annual metal production at Doe Run Peru S.R. Ltda.'s La Oroya smelting complex (Cooper, 2004). In Mexico, the resumption of mining operations at Peñoles' Bismark Mine in early 2003 helped provide more feed to the company's Met-Mex lead-zinc refinery and brought lead metal production close to the refinery's listed capacity in 2004 (Industrias Peñoles S.A. de C.V., 2004b§).

The leading producers of secondary refined lead in Latin America and Canada were Mexico and Canada, which accounted for about 3.6% each of the world's recycled production of the metal (Gabby, 2005). Since 1990, as automobile and battery use has increased in Mexico, so production of secondary (recycled) refined lead has increased from 28% of total refined lead production (including secondary) to about 45% in 2004 in that country (table 16).

**Consumption.**—In 2004, Mexico was the leading consumer of refined lead in Latin America and Canada followed by, in order of volume, Brazil, Canada, and Venezuela, owing to increases in the production of automotive batteries. The lead-acid batteries industry continued to be the dominant use of lead in Latin America and Canada, and use of lead correlated closely with trends in the international automobile industry (Gabby, 2005; World Bureau of Metal Statistics, 2005, p. 82).

**Outlook.**—The expectation of slight increases in Latin America and Canada's mine production of lead through 2007 can be attributed to the cumulative effect of small expected increases in Bolivia, Canada, Honduras, Mexico, and Peru. A long-awaited development in Bolivia—the Apex Silver Mines Limited's San Cristobal lead-silver-zinc project—appears to be approaching the likelihood of production. In 2004, San Cristobal reportedly hosted proven and probable reserves of 210,970 Mt of ore with a grade of 0.61% lead. The Bolivian Government would like for any eventual production of lead and silver from this project to be smelted at the Karachipampa smelter in Bolivia, but this smelter, which was designed and built in 1983 by German and Belgian engineers, was the property of COMIBOL (Mining Policy Research Initiative,

2004a§). It was specifically designed to process feed from a mine at San Cristobal, but such a mine had still not materialized through 2004. Thus, the smelter had never been used and had fallen into disrepair. Consequently, Apex planned to transport the ore through Chile to be smelted elsewhere (Fox, 2004).

By 2007, the production of primary refined lead in Latin America and Canada is expected to increase in, in order of volume, Mexico, Canada, and Peru (table 15). In Canada, many lead-producing mines are on care and maintenance status until metal prices improve even more than in 2004, especially the annual average price of zinc. Most prices for metals that are associated with lead, especially that of zinc, are expected to improve sufficiently by the end of 2005 to cover mine operation costs in Canada, which are much higher than those in Latin America. Therefore, Canadian refineries are expected to be using much more of their available primary lead refining capacity by 2005. Prices of base metals were already high enough by early 2004 to generate expectations for increased use of existing lead refining capacity in Mexico during 2005. Through 2011, the production level of secondary refined lead is expected to remain basically constant in Latin America and Canada, except in Argentina, Brazil, and Canada, where slight increases are expected (table 16).

**Nickel.—Production.**—In 2004, Latin America and Canada's share of global mine production of nickel amounted to almost 32%, and that of refined nickel production, about 23% (table 4; Kuck, 2005). Mine production of nickel in Latin America and Canada increased by 11.3% between 2000 and 2004; production in Brazil increased by 14.6%, and in Canada it decreased by 2.1% during the same period (table 17).

By 2004, mine production of nickel had increased substantially since 1990 in Colombia and Cuba, and production in Venezuela, which began in 2000, continued to expand in 2004. Mine output in the Dominican Republic has increased since 1990, but not steadily, with a production level in 2004 slightly less than that of 1995 (table 17). The Government of Cuba reported refined nickel production on a contained nickel plus cobalt basis mostly for oxide but also for some sulfide precipitate. In 2003, nickel was Cuba's second ranked source of foreign exchange, and in 2004, the Government was very active in seeking financing for a nickel refinery in Punta Gorda and a ferronickel plant at Las Camariocas.

**Consumption.**—In 2004, the United States was the third ranked user of refined nickel in the world after China and Japan; Canada, which was the United States' leading international supplier of nickel supplied about 41% of U.S. imports for consumption. In Latin America, the Dominican Republic was the leading supplier of nickel to the United States and accounted for about 6% of U.S. imports (Kuck, 2005).

Canada's domestic nickel consumption has been decreasing steadily since 2000 and was only about 7% of that of the United States in 2004. Brazil continued to evolve into a globally significant nickel user. The leading stainless steelmaker in Latin America was Brazil's state-run Companhia Aços Especiais Itabira (ACESITA), which was a major consumer of nickel in the country and absorbed 45.2% of Brazil's production of 7,430 t of electrolytic nickel (Departamento Nacional de Produção Mineral, 2005, p. 101; Kuck, 2005). In 2004,

Brazilian nickel consumption was about 19% of that of the United States and almost three times that of Canada. Nickel usage in Mexico was still only almost 20% of Canada's in 2004 (World Bureau of Metal Statistics, 2005, p. 105).

**Outlook.**—Significant nickel sulfide deposits are located in Canada and are expected to continue to provide the United States with much of its imported nickel. Laterite deposits located in Brazil, Colombia, Cuba, the Dominican Republic, and Venezuela are expected to continue to contribute to U.S. and global consumption, mostly in the refined form of ferronickel (Kuck, 2005). Of the reserves present in both types of deposits, Cuba contained about 9% of global nickel reserves; Canada, almost 8%; and Brazil, more than 7% (Kuck, 2005). The Dominican Republic is expected to continue to be a major supplier of nickel to the United States; proven and probable reserves are expected to last about 18 years at existing operating rates. The Cuban Government planned to increase nickel production to 90,000 t, and cobalt, to 10,000 t for a combined production total of 100,000 t during a period of 2 years beginning in 2007; the Government planned to increase production to 150,000 t during the subsequent 7 to 10 years.

Nickel production in Latin America and Canada is expected to increase by 2007 as result of increased investment beyond 2004 in response to higher global demand for stainless steel and higher nickel prices. In Brazil, CVRD plans to increase nickel production capacity to about 40,000 t/yr at its Vermelho project, and Anglo American plc expects to achieve a similar level of nickel production at its Barro Alto nickel project in 2005. In Canada, Inco is expected to start production at Voisey's Bay by 2005, and Canada is expected to increase production by 2007.

The international market for nickel is expected to remain tight through 2011 with firms still reluctant to initiate large high-cost and high-risk greenfield projects, especially in countries where costs are already high, such as Canada. Smaller, brownfield expansions of already existing or previously closed projects, which are located mostly in lower-cost countries, are expected to be the primary contributors to growth in global nickel supply through 2011 (Rae, 2005). In 2004, international nickel market conditions were becoming tight enough that Skye Resources Inc. decided to begin a feasibility study on restarting the Exmibal nickel mining and processing operation in Guatemala, which was closed by Inco in late 1981 owing to high energy prices and low nickel prices.

**Platinum-Group Metals.—Production.**—In 2004, Canada was the only significant international producer of PGM among the countries of Latin America and Canada; its share was more than 3% of world production. Canada ranked third in the world in platinum production and fourth in production of palladium (Hilliard, 2005). In 2004, Colombia produced 1,210 kg of platinum, which was equivalent to more than 75% of that produced in 1990 (table 18). In Brazil, CVRD produced some palladium as a byproduct of gold mining. In Canada, production of PGM increased slightly to 26.4 t in 2004 from 26.1 t in 2000 (table 19; Chevalier, 2005b).

**Outlook.**—North America is expected to continue to be the leading region for palladium demand as it was in 2004, where demand increased to 57.9 t, or by 17%, compared with demand in 2003; the increase was caused primarily by demand

in the autocatalyst sector followed by electrical and dental applications. On a worldwide basis, platinum is the catalyst used by fuel cells to convert hydrogen and oxygen to electricity, and palladium likely could play a similar role in fuel cells. According to Natural Resources Canada, autocatalysts are the leading market for palladium. Canada's share of the global market for palladium could increase through 2007. This is expected primarily because obsolete autocatalysts, industrial catalysts, electronics, telecommunications equipment, and other recyclables that contain PGM could be used to secure supply. Canada's increased mining cost to obtain roughly the same amount of palladium metal from lower grade ore coincides, however, with technological changes that have allowed for a greater substitution of silver and base metals in applications where palladium has traditionally been used (Chevalier, 2005b; Hilliard, 2005).

In 2004, the United States and Canada were the third and fourth ranked producers of primary PGM, respectively, following South Africa and Russia, but their combined output was less than 10% of global PGM production. Canadian production of palladium and platinum is actually expected to increase somewhat by 2007 in response to growing demand (tables 18, 19; Chevalier, 2005b; Hilliard, 2005). Combined with expected increases in other parts of the world, some analysts expect the global supply of palladium to continue to exceed demand through 2006 (Gilmour, 2005). Canada's ability to maintain its market share in production of PGM through 2011, however, will be severely constrained because the country had only about 0.4% of global reserves in 2004 (Chevalier, 2005b; Hilliard, 2005). Production of palladium and platinum is expected to remain basically flat from 2007 through 2011 (tables 18, 19).

**Zinc.—Production.**—In 2004, Peru and Canada were the third and fourth ranked producers in the world, respectively, in terms of mine production of zinc. Mexico was the sixth ranked producer (Plachy, 2005). In 1990, Canada dominated production among the countries of Latin America and Canada, but its mine production of zinc decreased by more than 34% in 2004. In Peru, mine production of zinc increased by more than 102% during 1990-2004 (table 20; Plachy, 2005).

In Peru, Compañía Minera Antamina S.A. was the leading mine producer of zinc and produced approximately 400,000 t of zinc concentrate in 2004. Since the startup of the Antamina copper-zinc mine in June 2001, the owners have had difficulty predicting the distribution of ore types that they have encountered on the basis of their original reserve model. Thus, in 2004, annual mine production of zinc was unexpectedly higher, and copper production was unexpectedly lower than predicted (Noranda Inc., 2005, p. 25). Volcan was the second ranked producer of zinc in Peru. In 2004, the mine production of zinc by Volcan was about 224,000 t. Glencore International AG of Switzerland completed its acquisition of the Rosaura lead-zinc mine in September 2003 through one of the company's Peruvian subsidiaries, Perubar S.A. Perubar was also responsible for exporting about 50% of the annual production of zinc concentrate from Rosaura and two other lead-zinc mines, Iscaycruz and Yauliyacu, which were owned by another Glencore subsidiary, Empresa Minera los Quenuales S.A. These

three mines had the capacity to produce about 364,000 t/yr of zinc concentrate (Glencore International AG, 2004§). In 2004, however, Glencore was responsible for only about 189,000 t of mine production of zinc. In Mexico, two companies were responsible for 90% of zinc production during 2004, Grupo México, S.A. de C.V. and Peñoles. Peñoles, which was the leading mine producer of zinc in Mexico, produced about 57% of the country's total. Peñoles closed its El Monte zinc mine owing to a depletion of reserves. During the operating life of the mine, El Monte also produced significant amounts of silver as a byproduct (Industrias Peñoles S.A. de C.V., 2004a§). In Bolivia, zinc was the leading base-metal commodity produced in the country in terms of quantity and value. The leading zinc producer in the country was Compañía Minera del Sur S.A. (COMSUR); after the company's founder was pressured into a resignation of the Bolivian presidency amidst accusations of Government corruption in 2004, COMSUR began seeking foreign investment assistance, which included soliciting investment from Glencore (Barrau, and others, 2004).

The annual average price of zinc increased to \$0.253 per pound in 2004 from \$0.203 per pound in 2003, or by 24.6%, following an increase of about 6.3% from 2002 to 2003; these increases were not large enough to justify restarting or opening any new Canadian and Latin American mines solely to recover zinc. Other metal prices, however, increased by significantly more than the price of zinc. For example, the higher prices for major mineral exports were, in order of value, gold, which increased to \$410.0 per troy ounce from \$363.8 per troy ounce (or by 12.7%) and silver, \$6.7 per troy ounce from \$4.9 per troy ounce in 2003 (36.7%). Similarly, the price of lead increased to \$0.627 per pound from \$0.353 per pound (77.6%); copper \$1.180 per pound from \$0.726 per pound (62.5%); and tin, \$3.937 per pound from \$2.447 per pound (61.0%). Therefore, some polymetallic operations in Canada and Latin America, which included, for example, Companhia Mineira de Metais S.A.'s Vazante Mine (Brazil), Noranda's Brunswick Mine (Canada), and Volcan's San Cristobal base-metal mine (Bolivia), and other zinc mines in the region were able to expand mine production of zinc in 2004 (Departamento Nacional de Produção Mineral, 2005, p. 119; Ministerio de Energía y Minas, 2005, p. 72; Plachy, 2005; Natural Resources Canada, 2005§a-d).

**Consumption.**—The United States imported about 58% of its apparent refined zinc consumption in 2004, and more than one-half of U.S. zinc metal imports were supplied by Canada, followed by Mexico and Peru (Plachy, 2005). Bolivian zinc production was mostly exported to meet consumption needs in, in order of export value, Switzerland, the United Kingdom, and Belgium.

**Outlook.**—Glencore is expected to increase mine production of zinc in Peru after a full year of production of about 34,000 t/yr from the restart of its Rosaura Mine. On December 8, 2003, Volcan entered into a preexport finance agreement with Glencore to borrow about \$40 million in exchange for a mortgage on Volcan's Andaychagua mining operations and an arrangement to sell lead and zinc concentrates to Glencore from 2004 to 2011. This agreement will allow Volcan to continue to finance improvements and expansions at the company's Andaychagua, Carahuacra, Cerro de Pasco, and San Cristobal

Mines. These projects are expected to increase Volcan's production of zinc by about 5% per year through 2009 (Volcan Compañía Minera S.A.A., 2004§). At the Antamina Mine in Peru, a new drill program could be completed by 2005 to determine the relative concentrations and locations of zinc and copper in the ore (Noranda Inc., 2005, p. 25).

An estimated 80% of the idle zinc mines in the Western Hemisphere will be back in production by the end of 2005. Another 436,000 t/yr of output associated with Western projects has been deemed probable. Production of refined zinc is expected to increase by 1.7% to about 10 Mt in 2004, which is slightly below consumption. This imbalance could result in zinc price increases (Plachy, 2005).

In Canada, production is expected to begin increasing by the end of 2005 with production from the Bell-Allard Mine in the Matagami district and the Chisel North Mine at Chisel Lake. Also, a few restarts of zinc mining operations in Canada, such as at the Caribou zinc mine, are expected to proceed in 2004. In Bolivia, if the San Cristobal polymetallic project clears certain bureaucratic hurdles and Apex is able to raise enough capital to complete the project, then it is expected to produce zinc as a byproduct of silver by the end of 2005 with a full potential production capacity of 200,000 t/yr of zinc content the following year. In 2004, Peru contained about 7.3% of global zinc reserves; Canada, 5%; and Mexico, about 3.6% (Plachy, 2005).

In 2004, increasing global demand for zinc was increasingly matched through exploitation of stockpiles that even delved into "hidden" stocks rather than through increased new production of the metal (Roebuck, 2005). Zinc metal production, however, is expected to increase through 2007 in all the countries listed in table 21. In addition, if Apex Silver decides to smelt the ore out of San Cristobal at the lead-zinc Karachipampa smelter in Bolivia, then zinc metal production in Latin America and Canada is likely to increase somewhat more than is shown in table 21. The Karachipampa smelter has a reported production capacity of about 51,000 t/yr of concentrate feed.

### **Industrial Minerals**

**Diamond.**—*Production.*—In 2004, Canada produced 12.6 million carats of diamond, which was less than 8% of the world's diamond production of 162.3 million carats. Ekati Mine, which was Canada's first underground diamond mine, completed 6 years of production in 2004. Production grades and diamond quality began to wane during the year at Ekati. The country's second mine, Diavik, began production in late 2002. Canada was the fourth ranked producer of diamond in the world in 2004 (Olson, 2005; Perron, 2005, p. 23.10).

In Venezuela, alluvial diamond was mined by small-scale producers (garimpeiros) in 2004, often in cooperatives or under contract with Corporación Venezolana de Guayana (CVG). Production from year to year in Venezuela has been very uncertain, but annual production has generally been decreasing since 1990. Similarly, in Brazil, nearly every major river system contains alluvial diamond, and much of the diamond was mined by local garimpeiros. Diamond production in Brazil also has been very uncertain from year to year; production was lower in 1995 than in 1990, picked up in 2000, and was lower again in

2004. Since 2000, Guyana has increased diamond production by almost 450% (table 22). Guyana and Venezuela produced consumer-quality (gemstone) and industrial-quality natural diamond, and Brazil and Canada primarily produced consumer-quality natural diamond (Olson, 2005).

*Consumption.*—In 2004, Guyana was apparently the only country in Latin America and Canada to export any notable amount of natural industrial diamond to the United States (Olson, 2005).

*Outlook.*—Diamond production is expected to increase dramatically in Canada through 2011 (table 22); this projection includes the production of 7.6 million carats per year at the Diavik Mine. De Beers Mining Canada expects to produce 1.5 million carats per year at its Snap Lake project starting in 2007 and to reach full production of 4.5 million carats in early 2008. In spite of dwindling reserves at the Ekati Mine, BHP Billiton Diamonds Inc. expects production of 4.7 million carats per year at its Panda project (an extension of Ekati) to start in 2005. In 2004, diamond exploration appeared to be slowing down in Canada because various kimberlite pipes yielded disappointing test results. New discoveries that are still under feasibility review include the Lac de Gras property and the Jericho and the Victor projects (Perron, 2005, p. 23.3).

In Brazil, some advanced projects are, in order of resources volume, the Juina diamond project, the Chapada alluvial diamond projects, a bulk sampling alluvial project in the Abaete River, the Canastra kimberlite project, and some work on properties in the area of Patos de Minas in the State of Minas Gerais where many kimberlites and lamproites have been found since 1995. BHP Billiton plc and Rio Tinto appeared to have terminated exploration for diamond in Brazil by the end of 2003. In May 2004, Kansai Mining Corp. reported that a custom-built bulk-sampling plant would be in operation at its Natal project in Venezuela, but De Beers announced that it had withdrawn from diamond exploration in Brazil and Venezuela (Janse, 2004).

**Phosphate Rock.**—*Production.*—In Latin America and Canada, Brazil was the only globally significant producer of marketable phosphate rock in 2004 and was the seventh ranked producer in the world. Latin America and Canada shared 6% of world total production and possessed only about 5% of the world's capacity to produce marketable phosphate rock (table 4; Jasinski, 2005). Brazil expanded domestic phosphate fertilizer production in 2004 and produced about 4.9 Mt of phosphate rock. In Canada, Agrium Inc. dealt with unexpected costs in extracting phosphate rock from its Kapuskasing Mine and processing it at the company's Redwater plant; higher costs, however, were absorbed by better productivity (Agrium Inc., 2004§).

*Consumption.*—From 1995 through 2004, South America emerged as the second ranked export market for U.S. producers of phosphate fertilizers (Jasinski, 2005). Consumption in Latin America grew by about 95% since 1990 owing partly to large increases in soybean production, particularly in, in terms of volume, Brazil and Argentina (Mew, 2004). In spite of its increased production of phosphate rock, Brazil increased its imports of phosphate fertilizer from the United States in 2004 compared with those of 2003. During the same timeframe, many other countries in Latin America, such as Argentina and

Peru, significantly increased their imports of phosphate rock for consumption from the United States. Canadian imports of phosphate rock and processed phosphates from the United States also increased in 2004 (Jasinski, 2005).

**Outlook.**—The amount of land under cultivation in Brazil is expected to increase, which will augment the country's agricultural output and its consumption of phosphate fertilizer (Mew, 2004). Production of phosphate rock is expected to remain basically flat in Brazil after 2007 (table 23), however, because the country's domestic plants are expected to be operating at capacity by that time and Brazil was estimated to contain only about 1.4% of global phosphate reserves in 2004 (Jasinski, 2005). Capacity and production levels in the rest of the countries of Latin America and Canada are also expected to remain basically flat through 2011 (table 23).

### **Mineral Fuels**

**Coal.**—**Production.**—In 2004, coal production in Canada increased to 66.0 Mt from 62.2 Mt in 2003, which was an increase of 6.1%. Canada's coal output, however, continued its steady decline from a record high in 1997 (78.8 Mt). In 2004, there were 22 coal producing mines in Canada and the number was expected to increase because four new coal mines will be coming onstream between 2005 and 2008. In 2004, in British Columbia, The Willow Creek Mine of Pine Valley Mining Corporation and the Dillon Mine of Western Canadian Coal Corporation started commercial production in August and November, respectively. In Alberta, the Cheviot Creek Mine of Elk Valley Coal Corporation, the Grande Cache Mines, and the No. 7 underground mine began coal production in September, October, and November, respectively (Stone, 2005, p. 20.1, 20.4; Elk Valley Coal Corporation, 2004§). During the year, exports of metallurgical coal (24 Mt) from western Provinces remained a major export commodity for Canada (Stone, 2005, p. 20.12).

Colombia was the leading producer of coal in Latin America and produced mostly thermal coal for export. In South America, the production trends of coal, such as in Colombia, have been on the increase since 1990; in Mexico production has decreased since 2000; and in Venezuela, production has increased by more than 270% compared with 1990. Venezuela was the third ranked coal producer after Colombia and Mexico in 2004 (table 24). In Chile, the country's leading coal mine closed in 1997, and only two small mines with dwindling reserves remained in operation at the end of 2004.

**Consumption.**—In 2004, Canada remained a significant international consumer of coal, primarily for power generation. Although western Canada primarily exported coal, eastern Canadian coal consumption for electricity and metallurgical purposes was satisfied mostly through imports from the United States and Colombia. The reason for this paradox was the transportation costs between western and eastern Canada (Stone, 2005, p. 20.12). Mexico has traditionally imported relatively small quantities of metallurgical and thermal coal, mainly from the United States. In 2004, however, Mexico increased imports of thermal coal for consumption, mainly from Australia (Knight, 2004). Less than 8% of Colombia's coal production

was consumed domestically, mostly by the industrial sector. In 2004, Brazil imported 13 Mt of coal for the metallurgical industry; about 30% of this coal was supplied by the United States, and an additional 10% was supplied by Canada.

**Outlook.**—Canadian levels of production are expected to recover somewhat by 2007, although closure of EVCC's Luscar mine is expected in 2005 owing to depletion of reserves. EVCC's Cheviot Creek Mine's coking coal production is expected to be 2.8 Mt/yr (Stone, 2005, p. 20.5-20.6). In Venezuela, the new owner of Carbozulia S.A. expects to recover production steadily through 2007 after adjusting to the labor effects of the national strike in the early part of 2004. In Latin America and Canada, Brazil had the largest reserves of coal, which were equivalent to about 930 Mt in 2004 (BP p.l.c., 2005, p. 30).

**Natural Gas.**—**Production.**—With proven natural gas reserves of nearly 9.1 trillion cubic meters, Latin America and Canada accounted for about 5.1% of world total. Venezuela (with 4.29 trillion cubic meters), Canada (1.59 trillion cubic meters), and Trinidad and Tobago (0.53 trillion cubic meters) are by far the leading energy players in Latin America and the Caribbean (BP p.l.c., 2005, p. 22; Moon, 2006). Latin America and Canada accounted for approximately 6.5% and 6.1% of global natural gas production in 2004, respectively. Although Argentina has been the leading producer of natural gas in Latin America since 2000, it still accounted for only about a 1.7% of global production of natural gas in 2004. Brazil and Bolivia have increased natural gas production significantly since 1990. Production in Venezuela had also increased significantly since 1990, but was lower in 2004 than in 2000 owing to public unrest and labor strikes during the intervening years (tables 4, 25; BP p.l.c., 2005, p. 24).

**Consumption.**—In 2004, Canada was the leading consumer in Latin America and Canada but accounted for only about 3.4% of global consumption. Argentina was the second ranked consumer of natural gas in Latin America behind Mexico (BP p.l.c., 2005, p. 27). Natural gas consumption in Brazil continued to outstrip increases in production in the country (BP p.l.c., 2005, p. 24, 27). Consequently, the country has been heavily involved in establishing an extensive network of natural gas pipelines from nearby countries in Latin America. Most of the development of natural gas production capacity in Bolivia took place along with construction of pipelines that would enable a large proportion of Bolivia's production to be easily exported to Brazil, and some, to Argentina. Trinidad and Tobago was a significant supplier of LNG for consumption in the Dominican Republic, Puerto Rico, and the United States and in more distant markets, such as Spain.

**Outlook.**—In 2004, Venezuela contained the largest proven reserves among the countries of Latin America and Canada; the estimated level of reserves was about 78.7% of the U.S. level but was still far below that of the Russian Federation and some of the countries in Africa and the Middle East. Canada had the second highest quantity of reserves among the countries of Latin America and Canada with about 37.1% as much as in Venezuela. The next tier of Latin American countries with significant proven reserves included Argentina, Bolivia, and Trinidad and Tobago (BP p.l.c., 2005, p. 22). The Trinidad and

Tobago and other Caribbean producers have a combined 0.7 trillion cubic meters of proven natural gas reserves (BP p.l.c., 2005, p. 22; U.S. Energy Information Administration, 2006§).

Canada is expected to continue to be the leading producer and exporter of natural gas in Latin America and Canada through 2011. Natural gas production in Trinidad and Tobago and Venezuela is expected to continue to be exported to global markets; Venezuela's production is expected to recover production levels that approach those of 2000 by 2009. Bolivia is also expected to continue to increase production substantially through 2011 (table 25). Peru's Aguaytia and Camisea gasfields are expected to enter into full production by the end of 2005, and an LNG export terminal is expected to be completed soon after that. This new terminal is expected to supply LNG to the United States, Mexico, and Chile.

**Petroleum.**—*Production.*—Latin America and Canada contained 11.2%, and Venezuela, 6.7%, of proven crude oil world reserves, respectively. Venezuela had 59.3% of Latin America and Canada's proven reserves of crude oil, followed by, in order of volume, Canada (12.3%), Mexico (11.0%), and Brazil (8.3%) (BP p.l.c., 2005, p. 6). Latin America and Canada produced 17% of the world's crude petroleum in 2004. Of this amount, Mexico had about a 4.8% share; Canada, 3.8%; Venezuela, 3.7%; and Brazil, 1.9% (tables 4, 26; BP p.l.c., 2005, p. 8). In Ecuador, petroleum was the leading export commodity. Many countries in Latin America produced some petroleum. Barbados, for instance, produced just enough petroleum to ship to Trinidad and Tobago for refining and then reimported the refined products for its own consumption. Together, Argentina, Brazil, Colombia, Ecuador, Mexico, and Trinidad and Tobago had 26.6% of proven crude oil reserves in the Latin America region and were significant hydrocarbon producers in the region (table 26; BP p.l.c., 2005, p. 8; U.S. Energy Information Administration, 2006§).

*Consumption.*—In 2004, Canada led petroleum consumption among the countries of Latin America and Canada with about a 2.8% share of world petroleum consumption followed by Brazil (2.3%) and Mexico (2.2%). Petroleum consumption in Venezuela comprised the next highest share of global consumption among the countries of Latin America and Canada; most remarkable, however, was the country's 9.6% increase in annual consumption of petroleum in 2004 compared with that of 2003 (BP p.l.c., 2005, p. 11). Petroleum was the primary energy source for many of the Caribbean countries, which imported oil from Mexico and Venezuela under favorably negotiated terms. Under the San Jose Pact, Barbados, the Dominican Republic, Haiti, and Jamaica received oil and refined products from those two countries. Cuba received crude oil and petroleum products from Venezuela at a discounted rate in 2004, although shipments were occasionally delayed depending on market fluctuations in the Caribbean (U.S. Energy Information Administration, 2006§).

*Outlook.*—Venezuela controls the largest amount of petroleum reserves in Latin America and Canada; it has more than 2.7 times the proven reserves of the United States and the fifth highest level of reserves in the world after, in order of volume, Saudi Arabia, Iran, Iraq, and Kuwait. For the foreseeable future, Canada, Mexico, and Brazil will follow Venezuela as the countries in Latin America and Canada with the largest

proven reserves of petroleum (BP p.l.c., 2005, p. 6). Barbados, Cuba, and Trinidad and Tobago have a combined 1.74 billion barrels of proven crude oil reserves (U.S. Energy Information Administration, 2006§).

Total U.S. gross petroleum imports are projected to increase by almost 30% from 2004 to 2025, with significant imports of petroleum from Canada and Mexico expected to continue (U.S. Energy Information Administration, 2006§). Petroleum production in Latin America and Canada is expected to increase by 2007 owing mostly to increased production in Mexico and Venezuela. From 2004 through 2011, total production is expected to increase more incrementally owing mostly to continuing increases in production in Ecuador (table 26).

**Uranium.**—*Production.*—In 2004, the only significant production of uranium was from Canada, which retained its position as a world leader in uranium output; Canada's total output for the year was 11,597 t U. Production in Canada increased by 12.1% compared with that of 2000 (table 27; Vance, 2005).

*Consumption.*—In 2004, the United States imported about 16.5 million pounds of uranium (U<sub>3</sub>O<sub>8</sub> equivalent) from Canada. In Latin America, use in Argentina and Brazil was inconsequential, internationally. Mexico, however, was a growing consumer of uranium with 2004 levels of consumption higher than that of Argentina (U.S. Energy Information Administration, 2005, p. 3).

*Outlook.*—Production of uranium in Canada is expected to increase by more than 8% by 2007 compared with that of 2004 and then to remain flat between 2007 and 2011. Production in Brazil is expected to remain flat between 2007 and 2011 (table 27). On the demand side, China is expected to emerge as a force in world uranium markets as China turns to overseas suppliers to meet its long-term uranium requirements for its growing nuclear power program (Vance, 2005).

## Trade Review

Canada, Mexico, and the United States, which were members of the NAFTA, composed the largest and wealthiest trading bloc in the world; the NAFTA countries had a combined population of 430 million people and a gross domestic product (GDP) based on purchasing power parity of \$13.7 trillion. NAFTA members were each other's leading trade partners. The leading trading bloc in Latin America was MERCOSUR, which has as full members Argentina, Brazil, Paraguay, and Uruguay, a combined population of more than 251 million people, and a combined GDP based on purchasing power parity of about \$2.9 trillion (table 2). MERCOSUR has associate member countries, which were admitted between 1996 and 2004; Chile was admitted in 1996, Bolivia in 1997, Peru in 2003, and Colombia, Ecuador, and Venezuela in 2004 (Secretaría del MERCOSUR, 2006§). The second leading market in Latin America was the Andean Community (Comunidad Andina); the member countries were Bolivia, Colombia, Ecuador, Peru, and Venezuela, which had a combined population of more than 119 million people and a combined GDP based on purchasing power parity of about \$725 billion. The Mercado Común CentroAmericano (Central American Common Market) (MCCA), whose members were

Costa Rica, El Salvador, Guatemala, Honduras, and Nicaragua, had a combined population of about 36 million people and a combined GDP based on purchasing power parity of about \$160 billion. The Caribbean Community (CARICOM) bloc, whose members were members were Antigua and Barbuda, The Bahamas, Barbados, Belize, Dominica, Grenada, Guyana, Haiti, Jamaica, Montserrat, Saint Lucia, St. Kitts and Nevis, St. Vincent and the Grenadines, Suriname, and Trinidad and Tobago, had a combined population of more than 13 million people and a combined GDP based on purchasing power parity of nearly \$40 billion. The associate members of CARICOM were the British Virgin Islands and Turks and Caicos Islands (1991), Anguilla (1999), Cayman Islands (2002), and Bermuda (2003) (tables 1, 2; World Bank Group, The, 2005; International Monetary Fund, 2004\$; Caribbean Community, 2006\$).

In 2004, Mexico's mineral exports were extended more to markets outside of NAFTA, such as Asia, the EU and Latin America, than to the NAFTA countries. December 2004 marked the 12th anniversary of the signing of NAFTA (Wilson International Center, 2004\$).

Brazil was the leading market and the economic center of MERCOSUR. The country accounted for about 71% of MERCOSUR's population and almost 66% of the trading bloc's combined GDP based on purchasing power parity. In 2004, Brazil sold about 20% of its exports to other MERCOSUR members and 30% to other countries in Latin America. Total bilateral minerals trade between the major players of MERCOSUR (Brazil and Argentina) amounted to almost \$2.6 billion. Total mineral trade between Brazil and the United States was \$7.6 billion. Brazilian mineral exports to the United States were valued at \$6.0 billion, and imports from the United States were valued at \$1.6 billion. Brazil's mineral trade balance with the United States was \$4.4 billion. Brazilian exports to Europe and Japan consisted mostly of raw materials, including, in order of export value, iron ore, manganese, marble, granite, and agricultural commodities.

In 2004, Brazil's Government announced that MERCOSUR had made progress in trade talks with the Andean Community nations, Mexico, and South Africa. The expansion of MERCOSUR has been a strategic objective of Brazil in the planned talks towards the Free Trade Area of the Americas (FTAA).

In 2004, Brazil recorded surpluses in its trade balances with the following countries, in order of value: the United States (\$4.32 billion), China (\$1.36 billion), Japan (\$1.06 billion), the Republic of Korea (\$711 million), Belgium (\$495 million), Italy (\$460 million), and Holland (\$452 million). Brazil and China appeared to be leading into a more formal Sino-Brazilian trade partnership in the foreseeable future (Departamento Nacional de Produção Mineral, 2005, p. 15).

Tariffs for most items, which included most mineral commodities, will not become completely eliminated until 2006 as a result of the free trade agreement (FTA) that has been in effect between Bolivia and MERCOSUR since March 1, 1997. Indeed, tariffs for some goods will still not become completely eliminated until 2011 or 2014, but the average reduction of tariffs in 2004 was already about 70% compared with tariff levels prior to 1997 (Departamento Nacional de Produção Mineral, 2005, p. 23-25).

Chile and the United States entered into a bilateral FTA in mid-2003, which was approved by their respective legislatures; it went into effect in 2004. This FTA was expected to provide greater freedom for mineral trade and, ultimately, greater efficiencies of production. Canada and Chile signed a bilateral trade pact on November 19, 1996. Since 1996, Canadian trade with Chile and FDI in Chile by Canadian-based firms have increased noticeably. In 2004, some Andean Community countries, such as Colombia and Peru, made a great deal of progress in FTA negotiations with the United States, but almost no progress was made to include Bolivia among them (U.S. Trade Representative, 2004\$).

In 2004, Peru's trade balance recorded a surplus of about \$2.8 billion compared with \$836 million in 2003. Peru's trade grew by 36.7% compared with 6.1% in 2003. Mineral and petroleum and derivatives exports in 2004 (about \$7.6 billion) increased by about 43.4% compared with those of 2003 (almost \$5.3 billion) (Ministerio de Energía y Minas, 2005, p. 20-23, 40; Banco Central de Reserva del Perú, 2005\$).

Cuba's principal trading partners in Europe were France, Germany, Italy, Russia, and Spain. These trading partners accounted for almost 50% of Cuba's total commercial exchange, followed in the Americas by Canada, the Netherlands Antilles, Mexico, and Venezuela, which accounted for 40%, and Asia, which accounted for 10% (Investment Promotion Center of the Ministry for Foreign Investment and Economic Cooperation, 2004\$).

## Environment

Joint environmental policies with respect to the Amazon Rain Forest (which is one of the world's most sensitive ecosystems), the Cordillera, and the Guyana Shield, have been established between pairs of affected countries (Amazon Cooperation Treaty Organization, 2004, p. 15-18). Additional information about the environmental laws and regulations of each country in Latin America and Canada as they affect mining and mineral processing are addressed in the ensuing chapters of the Latin America and Canada volume of the Minerals Yearbook for 2004. These chapters also include information on the most recent developments in each country.

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TABLE 1  
THE AMERICAS: AREA AND POPULATION<sup>1</sup>

	Area <sup>2</sup> (square kilometers)	Population (millions)
North America:		
Canada	9,984,670	31.9
Mexico	1,972,550	104
United States	9,631,418	294
Total	21,600,000	430
Central America and the Caribbean:		
Antigua and Barbuda	443	0.080
Aruba	193	0.099
Bahamas, The	13,940	0.320
Barbados	431	0.272
Belize	22,966	0.283
Bermuda	53	0.064
Costa Rica	51,100	4.06
Cuba	110,860	11.4
Dominica	754	0.071
Dominican Republic	48,730	8.86
El Salvador	21,040	6.66
Grenada	344	0.106
Guadeloupe	1,780	0.449
Guatemala	108,890	12.6
Haiti	27,750	8.59
Honduras	112,090	7.14
Jamaica	10,991	2.67
Martinique	1,100	0.433
Montserrat	102	0.009
Netherlands Antilles	960	0.222
Nicaragua	129,494	5.6
Panama	78,200	3.03
Saint Kitts and Nevis	261	0.047
Saint Lucia	616	0.164
Saint Vincent and the Grenadines	389	0.108
Trinidad and Tobago	5,128	1.32
Other <sup>3</sup>	10,393	4.14
Total	759,000	78.8
South America:		
Argentina	2,766,890	38.2
Bolivia	1,098,580	8.99
Brazil	8,511,965	179
Chile	756,950	16.0
Colombia	1,138,910	45.3
Ecuador	283,560	13.2
French Guiana	91,000	0.196
Guyana	214,970	0.772
Paraguay	406,750	5.78
Peru	1,285,220	26.1
Suriname	163,270	0.443
Uruguay	176,220	3.4
Venezuela	912,050	25.9
Total	17,800,000	363
Americas total	40,200,000	872
World total	149,000,000	6,350
Share of world total	27	14

<sup>1</sup>Data updated as of January 31, 2006. Population and totals are rounded to no more than three significant digits.

<sup>2</sup>Includes Anguilla, British Virgin Islands, Cayman Islands, Puerto Rico, Turks and Caicos Islands, and U.S. Virgin Islands.

Sources: U.S. Central Intelligence Agency, World Factbook 2004; World Bank, 2005 World Development Indicators database.

TABLE 2  
THE AMERICAS: GROSS DOMESTIC PRODUCT<sup>1,2</sup>

	GDP per capita	GDP (billions)	Real GDP percentage change
<b>North America:</b>			
Canada	\$32,921	\$1,050,463	2.9
Mexico	9,666	1,005,463	4.4
United States	39,498	11,605,185	4.2
Total	XX	13,700	XX
<b>Central America and the Caribbean:</b>			
Antigua and Barbuda	11,363	0.809	4.1
Aruba	NA	NA	NA
Bahamas, The	17,865	5,729	3.0
Barbados	16,483	4,501	4.4
Belize	7,339	1,929	4.6
Bermuda	NA	NA	NA
Costa Rica	9,887	41,967	4.2
Cuba	NA	NA	NA
Dominica	5,970	0.428	3.7
Dominican Republic	6,767	60,042	2.0
El Salvador	4,379	29,631	1.5
Grenada	7,917	0.823	-3.0
Guadeloupe	NA	NA	NA
Guatemala	4,009	53,619	2.7
Haiti	1,625	13,355	-3.8
Honduras	2,682	19,252	4.6
Jamaica	4,327	11,643	2.5
Martinique	NA	NA	NA
Montserrat	NA	NA	NA
Netherlands Antilles	22,818	4,008	-0.1
Nicaragua	2,677	15,067	5.1
Panama	6,739	21,334	6.0
St. Kitts and Nevis	14,293	0,596	4.0
Saint Lucia	5,350	0,945	4.0
Saint Vincent and the Grenadines	6,650	0,709	4.0
Trinidad and Tobago	12,794	16,468	6.2
Other <sup>3</sup>	NA	NA	NA
Total	XX	303	XX
<b>South America:</b>			
Argentina	12,468	484,232	9.0
Bolivia	2,710	24,140	3.6
Brazil	8,049	1,461,564	4.9
Chile	10,904	173,812	6.1
Colombia	6,962	315,548	4.1
Ecuador	4,083	53,195	6.9
French Guiana	NA	NA	NA
Guyana	4,579	3,450	1.6
Paraguay	4,553	27,581	4
Peru	5,556	153,054	4.8
Suriname	5,539	2,681	4.6
Uruguay	9,107	30,958	12.3
Venezuela	5,571	144,346	17.9
Total	XX	2,870	XX
Americas total	XX	16,900	XX

NA Not available. XX Not applicable.

<sup>1</sup>Data updated as of March 1, 2006.

<sup>2</sup>Gross domestic product (GDP) based on purchasing power parity. Totals rounded to no more than three significant digits.

<sup>3</sup>Includes Anguilla, British Virgin Islands, Cayman Islands, Puerto Rico, Turk and Caicos Islands, and U.S. Virgin Islands.

Source: International Monetary Fund, World Economic Outlook Database, September 2005.

TABLE 3  
SELECTED SIGNIFICANT LATIN AMERICA AND CANADA EXPLORATION IN 2004<sup>1</sup>

Location	Type <sup>2</sup>	Site	Commodity	Company	Resource <sup>3</sup>	Exploration <sup>4</sup>
Argentina	E	Calcatreu	Au, Ag	Aquiline Resources Inc.	602,000 oz Au, 5.6 Moz Ag	Extensive drilling.
Do.	E	Gualcamayo	Au	Viceroy Exploration Ltd.	1.2 Moz Au	Do.
Do.	E	Martha	Ag	Coeur d'Alene Mines Corp.	1.4 Moz Ag	Do.
Bolivia	E	San Simón	Au	Eaglecrest Exploration Ltd.	Data not released	Do.
Brazil	F	Jacobina	Au	Desert Sun Mining Corp.	2.05 Moz Au	Do.
Do.	F	São Francisco	Au	Yamaha Resources Inc.	1.19 Moz Au	Do.
Canada	E	Aviat	Diamond	Stormway Ventures Ltd.	Data not released	Extensive work program.
Do.	F	Beaver Brook	Sb	VVC Exploration Corp.	83,900 t Sb	Extensive drilling.
Do.	E	Black Fox	Au	Apollo Gold Corp.	457,000 oz Au	Do.
Do.	P	Brunswick area	Zn, Pb, Cu, Ag, Au	Noranda Inc.	Data not released	Extensive work program.
Do.	P	Casa Berardi	Au, Cu	Aurizon Mines Ltd.	3.5 Moz Au	Extensive drilling.
Do.	E	Churchill	Diamond	Shear Minerals Ltd.	Data not released	Extensive work program.
Do.	E	Courageous Lake	Au	Seabridge Gold Inc.	3.27 Moz Au	Extensive drilling.
Do.	E	East Amphi	Au	Richmont Mines Inc.	253,000 oz Au	Do.
Do.	E	East Bay	Au	Wolfden Resources Inc.	Data not released	Do.
Do.	E	Ferguson Lake	Cu, Ni, Pd, Pt	Starfield Resources Inc.	61,600 t Cu, 43,500 t Ni, 299,000 oz Pd	Do.
Do.	E	Forest Hill	Au	Acadian Gold Corp.	104,000 oz Au	Do.
Do.	F	Fort à la Corne	Diamond	Kensington Resources Ltd.	Data not released	Extensive work program.
Do.	E	Foxtrot/Renard area	Diamond	Ashton Mining of Canada Inc.	do.	Do.
Do.	F	Gaicho Kue	Diamond	De Beers Canada Exploration Inc.	14 Mt kimberlite	Do.
Do.	E	Galore Creek	Au, Ag	NovaGold Resources Inc.	2.4 Moz Au, 32 Moz Ag	Do.
Do.	E	George Lake/Goose Lake	Au	Miramar Mining Corp.	Data not released	Extensive drilling.
Do.	E	High Lake	Cu, Au, Ag	Wolfden Resources Inc.	334,600 t Cu, 464,000 oz Au, 34.8 Moz Ag	Do.
Do.	F	Hope Bay	Au	Hope Bay Gold Corp.	2.1 Moz Au	Do.
Do.	P	Kirkland Lake area	Au	Kirkland Lake Gold Ltd.	1 Moz Au	Do.
Do.	E	Lapa	Au	Breakwater Resources Ltd.	1.2 Moz Au	Do.
Do.	F	Meadowbank	Au	Cumberland Resources Ltd	3.2 Moz Au	Do.
Do.	E	Monument Bay	Au	Bema Gold Corp.	528,000 oz Au	Do.
Do.	F	Nickel Rim South	Ni, Cu, Co, Au, Pt, Pd	Falconbridge Ltd.	232,000 t Ni, 493,000 t Cu	Do.
Do.	E	River Valley	PGM, Au	Pacific North West Capital Corp.	1.1 Moz PGM plus Au	Do.
Do.	E	Sidace Lake	Au	Planet Exploration Inc.	Data not released	Do.
Do.	E	Timmins	Au	Holmer Gold Mines Ltd.	965,000 oz Au	Do.
Chile	P	Cerro Bayo	Ag, Au	Coeur d'Alene Mines Corp.	6.7 Moz Ag, 95,000 oz Au	Do.
Do.	E	Regalito	Cu	Lumina Copper Corp.	2.7 Mt Cu	Do.
Colombia	F	Angostura	Au, Ag	Greystar Resources Ltd.	2.1 Moz Au, 7.9 Moz Ag	Do.
Ecuador	E	Quimsacocha	Au, Ag	Iamgold Corp.	Data not released	Do.
Do.	E	Rto Blanco/Alejandra	Au, Ag	International Minerals Corp.	592,000 oz Au, 4.5 Moz Ag	Do.
Mexico	E	Conchi-Brujullinas	Au	Antofagasta plc.	Data not released	Do.
Do.	P	El Cubo	Au	Mexgold Resources Inc.	2 Moz Au	Do.
Do.	E	Morelos Norte (El Limon)	Au	Teck Cominco Ltd.	3.2 Moz Au	Do.
Do.	F	Ocampo	Au, Ag	Gannom Lake Resources Inc.	1.35 Moz Au, 56 Moz Ag	Do.
Do.	F	Penasquito	Ag, Au, Pb, Zn	Western Silver Holdings Ltd.	273 Moz Ag, 3.6 Moz Au, 806,000 t Pb, 2 Mt Zn	Do.

See footnotes at end of table.

TABLE 3--Continued  
SELECTED SIGNIFICANT LATIN AMERICA AND CANADA EXPLORATION IN 2004<sup>1</sup>

Location	Type <sup>2</sup>	Site	Commodity	Company	Resource <sup>3</sup>	Exploration <sup>4</sup>
Nicaragua	P	El Limon area	Au	Glencairn Gold Corp.	193,500 oz Au	Do.
Peru	F	Rio Blanco	Cu, Mo	Monterrico Metals plc.	6.8 Mt Cu, 325,000 t Mo	Do.
Do.	P	Yanacocha area	Au	Newmont Mining Corp.	Data not released.	Extensive work program.
Venezuela	F	Brisas	Au, Cu	Gold Reserve Inc.	9.2 Moz Au, 538,000 t Cu	Extensive drilling.
Do.	F	Choco 10	Au	Boliviar Gold Corp.	1.3 Moz Au	Do.

<sup>1</sup>Abbreviations used in this table for commodities are as follows: Au, gold; Ag, silver; Co, cobalt; Cu, copper; Mo, molybdenum; Ni, nickel; Pb, lead; Pd, palladium; PGM, platinum-group metals; Pt, platinum; Sb, antimony; and Zn, zinc. Abbreviations used in this table for units of measurement are as follows: Moz, million troy ounces; Mt, million metric tons; oz, troy ounces; t, metric tons.

<sup>2</sup>E Active exploration; F Feasibility work ongoing/completed; P Exploration at producing site.

<sup>3</sup>Based on 2004 data reported from various sources, values vary from measured reserves to identified resources. Data not verified by U.S. Geological Survey.

<sup>4</sup>Significance of activity defined by either quantity of drilling or investment expenditure for exploration work program.

TABLE 4  
LATIN AMERICA AND CANADA: PRODUCTION OF SELECTED MINERAL COMMODITIES IN 2004<sup>1</sup>  
(Thousand metric tons unless otherwise specified)

Country	Metals																	
	Aluminum		Copper		Gold		Iron ore, and steel		Lead		Nickel		Silver, Ag		Tin		Zinc	
	Bauxite	Metal, primary	Cu content, mine output, Cu content	Au content (kilograms)	Iron ore, gross weight	Steel, crude	mine output, Pb content	Ni content, mine output, Ni content	content (metric tons)	mine output, SN content (metric tons)	mine output, ZN content (metric tons)							
Argentina	--	272	177	28,466	--	5,125	10	172	--	--	172	--	--	--	--	27,220	--	--
Bolivia	--	--	1	6,951	--	--	10	407	--	--	407	--	--	17,569	145,906	--	--	--
Brazil	19,700	1,457	103	47,596	262,029	32,918	15	52	52	12,468	35	158,962	--	--	--	--	--	--
Chile	--	--	5,413	39,986	8,003	1,579 <sup>P</sup>	2	--	--	--	1,360	--	--	--	27,635	--	--	--
Colombia	--	--	2	37,739	643	730	(2) <sup>e</sup>	75	(2) <sup>e</sup>	9	9	40 <sup>e</sup>	--	--	--	--	--	--
Costa Rica	--	--	--	500 <sup>e</sup>	--	--	--	--	--	--	(2)	--	--	--	--	--	--	--
Cuba	--	--	--	550	--	197	--	72	--	--	--	--	--	--	--	--	--	--
Dominican Republic	--	--	--	--	--	61	--	46	--	--	--	--	--	--	--	--	--	--
Ecuador	--	--	--	5,300	--	80 <sup>e</sup>	(2)	--	--	--	(2)	--	--	--	--	--	--	--
El Salvador	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Guatemala	--	--	--	2,000 <sup>e</sup>	3	--	--	--	--	--	--	--	--	--	--	--	--	--
Guyana	1,466	--	--	11,462	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Honduras	--	--	--	7,500	--	--	8	--	--	--	--	--	--	--	--	--	--	46,500
Jamaica	--	--	--	18	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Mexico	--	--	406	21,824	11,483	16,730	118	--	--	--	2,569	2 <sup>e</sup>	426,360	--	--	--	--	--
Nicaragua	--	--	--	3,000 <sup>e</sup>	--	--	--	--	--	--	--	2 <sup>e</sup>	--	--	--	--	--	--
Panama	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Paraguay	--	--	--	--	--	107	--	--	--	--	--	--	--	--	--	--	--	--
Peru	--	--	1,036	173,219	6,439	750	306	--	--	--	3,060	67,675	1,209,006	--	--	--	--	--
Suriname	4,052	--	--	8,513	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Trinidad and Tobago	--	--	--	--	--	783 <sup>e</sup>	--	--	--	--	--	--	--	--	--	--	--	--
Uruguay	--	--	--	1,758	9	55	--	--	--	--	--	--	--	--	--	--	--	--
Venezuela	5,842	624	--	9,690	19,196	4,575	--	20	--	--	--	--	--	--	--	--	--	--
Other <sup>3</sup>	--	--	--	2,564	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total	44,400	2,350	7,140	406,000	308,000	63,700	470	265	7,660	97,700	2,040,000	2,040,000	2,040,000	2,040,000	2,040,000	2,040,000	2,040,000	2,040,000
Share of world total	30.2%	7.8%	49.9%	16.7%	22.8%	6.1%	15.2%	18.5%	39.0%	33.5%	39.0%	33.5%	33.5%	33.5%	33.5%	33.5%	33.5%	33.5%
Canada	--	2,592	563	128,504	28,256	17,000 <sup>e</sup>	77	187	1,336	790,737	790,737	790,737	790,737	790,737	790,737	790,737	790,737	790,737
Share of world total	--	8.6%	3.9%	5.3%	2.1%	1.6%	2.5%	13.0%	6.8%	8.6%	6.8%	8.6%	8.6%	8.6%	8.6%	8.6%	8.6%	8.6%
United States	NA	2,520	1,160	258,000	54,700	99,700	445	--	1,250	739,000	739,000	739,000	739,000	739,000	739,000	739,000	739,000	739,000
Share of world total	NA	8.3%	8.1%	10.6%	4.0%	9.5%	14.4%	--	6.3%	8.1%	6.3%	8.1%	8.1%	8.1%	8.1%	8.1%	8.1%	8.1%
Total Western Hemisphere	44,400	7,460	8,860	792,000	391,000	180,000	991	452	10,200	97,700	3,570,000	3,570,000	3,570,000	3,570,000	3,570,000	3,570,000	3,570,000	3,570,000
Share of world total	30.2%	24.6%	61.9%	32.5%	28.9%	17.3%	32.1%	31.6%	52.2%	33.5%	52.2%	33.5%	33.5%	33.5%	33.5%	33.5%	33.5%	33.5%
World total	147,000	30,300	14,300	2,430,000	1,350,000	1,040,000	3,090	1,430	19,600	292,000	9,140,000	9,140,000	9,140,000	9,140,000	9,140,000	9,140,000	9,140,000	9,140,000

See footnotes at end of table.

TABLE 4—Continued  
LATIN AMERICA AND CANADA: PRODUCTION OF SELECTED COMMODITIES IN 2004<sup>1</sup>  
(Thousand metric tons unless otherwise specified)

Country	Industrial minerals				Mineral fuels and related products					Petroleum	
	Cement, hydraulic	Gypsum	Phosphate rock, P <sub>2</sub> O <sub>5</sub> content	Salt	Coal, all grades	Dry (million cubic meters)	Plant liquids (thousand 42-gallon barrels)	Crude <sup>5</sup> (thousand 42-gallon barrels)	Refinery products (thousand 42-gallon barrels)	Refinery products	
Argentina	6,254	673	--	1,362	--	45,000 <sup>e</sup>	18,000 <sup>e</sup>	254,000	202,000		
Bolivia	1,276 <sup>p</sup>	--	--	1	--	10,257 <sup>p</sup>	4,500 <sup>e</sup>	14,200	9,510 <sup>p</sup>		
Brazil	34,413	1,472	2,181	6,648	6,000 <sup>e</sup>	16,970	4,667	563,000	631,000		
Chile	3,798	630	4	4,939	238	2,106	3,500 <sup>e</sup>	1,290	78,000		
Colombia	7,822	560 <sup>e</sup>	8 <sup>e</sup>	526	53,693	6,404	2,600 <sup>e</sup>	193,000	112,000		
Costa Rica	1,900 <sup>e</sup>	--	--	37 <sup>e</sup>	--	--	--	--	5,400 <sup>e</sup>		
Cuba	1,366	130 <sup>e</sup>	--	188 <sup>e</sup>	--	660 <sup>e</sup>	--	28,500	60,000 <sup>e</sup>		
Dominican Republic	2,636	459	--	50 <sup>e</sup>	--	--	--	--	12,000 <sup>e</sup>		
Ecuador	3,100 <sup>e</sup>	5 <sup>e</sup>	--	90	--	240	542	193,000	54,700		
El Salvador	1	6 <sup>e</sup>	--	31 <sup>e</sup>	--	--	--	--	6,300 <sup>e</sup>		
Guatemala	1,800 <sup>e</sup>	106	--	60 <sup>e</sup>	--	1 <sup>e</sup>	--	7,380	--		
Guyana	--	--	--	--	--	--	--	--	--		
Honduras	1,400 <sup>e</sup>	60 <sup>e</sup>	--	26 <sup>e</sup>	--	--	--	--	--		
Jamaica	808	283	--	19 <sup>e</sup>	--	--	--	--	3,600 <sup>e</sup>		
Mexico	34,992	7,000 <sup>e</sup>	(2)	8,566	11,473	32,499	161,330	1,230,000	497,000		
Nicaragua	590 <sup>e</sup>	30 <sup>e</sup>	--	31 <sup>e</sup>	--	--	--	--	5,700 <sup>e</sup>		
Panama	770 <sup>e</sup>	--	--	22 <sup>e</sup>	--	--	--	--	--		
Paraguay	650 <sup>e</sup>	5 <sup>e</sup>	--	--	--	--	--	--	2,660 <sup>e</sup>		
Peru	4,590	150	14	249	22	857	9,724	34,400	63,500		
Suriname	65 <sup>e</sup>	--	--	--	--	--	--	4,100	2,500		
Trinidad and Tobago	768	--	--	--	--	29,456	10,687	45,000	46,300		
Uruguay	1,050 <sup>e</sup>	1,130 <sup>e</sup>	--	--	--	--	--	--	11,200 <sup>e</sup>		
Venezuela	9,000	--	85	350 <sup>e</sup>	8,107	34,000 <sup>e</sup>	58,400 <sup>e</sup>	1,100,000 <sup>e</sup>	401,000 <sup>e</sup>		
Other <sup>3</sup>	1,125	--	--	2,018	--	13	--	378	165,000		
Total	120,000	12,700	2,290	25,200	79,700	178,000	274,000	3,670,000	2,370,000		
Share of world total	5.6%	11.1%	5.1%	11.0%	1.5%	6.5%	14.7%	13.3%	8.7%		
Canada	14,884	9,249	380 <sup>4</sup>	14,125	65,993	167,021	68,800 <sup>e</sup>	940,000	534,000 <sup>e</sup>		
Share of world total	0.7%	8.1%	0.9%	6.2%	1.2%	6.1%	3.7%	3.5%	2.0%		
United States	99,000	17,200	10,400	46,500	1,010,000	531,000	662,000	1,980,000	6,500,000		
Share of world total	4.6%	15.0%	23.4%	4.3%	18.5%	19.3%	35.5%	7.3%	24.0%		
Total Western Hemisphere	234,000	39,100	13,100	85,800	1,150,000	877,000	1,000,000	6,590,000	9,410,000		
Share of world total	10.9%	34.3%	29.4%	40.5%	21.2%	31.9%	53.8%	24.3%	34.7%		
World total	2,150,000	114,000	44,500	228,000	5,450,000	2,750,000	1,870,000	27,200,000	27,100,000		

See footnotes at end of table.

TABLE 4—Continued  
LATIN AMERICA AND CANADA: PRODUCTION OF SELECTED COMMODITIES IN 2004<sup>1</sup>

<sup>0</sup>Estimated; estimated data, U.S. data, and world totals are rounded to no more than three significant digits. <sup>1</sup>Preliminary. NA Not available. -- Zero or zero percent.

<sup>1</sup>Totals may not add due to independent rounding. Percentages are calculated on unrounded data. Table includes data available as of March 31, 2006.

<sup>2</sup>Less than 1/2 unit.

<sup>3</sup>Includes Aruba, Barbados, Belize, French Guiana, Guadeloupe, Haiti, Martinique, and the Netherlands Antilles.

<sup>4</sup>Source: Jazinski, S.J., 2006, Phosphate rock, *in* Metals and minerals: U.S. Geological Survey Minerals Yearbook 2004, v. I, p. 56.1–56.10; Phosphate rock, gross weight and P<sub>2</sub>O<sub>5</sub> content, not found in table 1 of the Canada chapter of the USGS Minerals Yearbook 2004, v. III, Area Reports: International.

<sup>5</sup>Includes condensate.

TABLE 5  
LATIN AMERICA AND CANADA: HISTORIC AND PROJECTED BAUXITE PRODUCTION, 1990-2011<sup>1</sup>

(Thousand metric tons)

Country	1990	1995	2000	2004	2007 <sup>e</sup>	2009 <sup>e</sup>	2011 <sup>e</sup>
Brazil	9,680	10,200	13,800	19,700	20,000	21,000	21,500
Guyana	1,420	2,020	2,470	1,470	2,800	2,800	2,800
Jamaica	10,900	10,900	11,100	13,300	14,500	14,500	14,500
Suriname	3,280	3,530	3,610	4,050	4,050	4,050	4,050
Venezuela	771	5,020	4,360	5,842	6,000	6,000	6,000
Other	85	--	--	--	--	--	--
Total	26,100	31,700	35,300	44,400	47,000	48,000	49,000

<sup>e</sup>Estimated. --Negligible or no production.

<sup>1</sup>Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 6  
LATIN AMERICA AND CANADA: HISTORIC AND PROJECTED PRIMARY ALUMINUM PRODUCTION, 1990-2011<sup>1</sup>

(Thousand metric tons)

Country	1990	1995	2000	2004	2007 <sup>e</sup>	2009 <sup>e</sup>	2011 <sup>e</sup>
Argentina	166	186	262	272	275	275	275
Brazil	931	1,180	1,280	1,460	1,500	1,800	2,000
Canada	1,570	2,170	2,370	2,590	2,600	3,000	3,500
Mexico	68	10	61	--	--	--	--
Suriname	32	28	--	--	--	--	--
Venezuela	590	630	571	624	630	840	880
Total	3,360	4,200	4,540	4,950	5,000	5,900	6,700

<sup>e</sup>Estimated. -- Negligible or no production.

<sup>1</sup>Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 7  
LATIN AMERICA AND CANADA: HISTORIC AND PROJECTED SECONDARY ALUMINUM PRODUCTION, 1990-2011<sup>1</sup>

(Thousand metric tons)

Country	1990	1995	2000	2004	2007 <sup>e</sup>	2009 <sup>e</sup>	2011 <sup>e</sup>
Argentina	6	10	16	16	16	16	16
Brazil	60	92	210	246	250	250	250
Canada	83	NA	148	50	60	65	70
Mexico	60	129	287	350	350	350	350
Total	209	231	661	662	680	680	690

<sup>e</sup>Estimated. NA Not available.

<sup>1</sup>Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 8  
LATIN AMERICA AND CANADA: HISTORIC AND PROJECTED COPPER MINE PRODUCTION, 1990-2011<sup>1</sup>

(Metal content in thousand metric tons)

Country	1990	1995	2000	2004	2007 <sup>e</sup>	2009 <sup>e</sup>	2011 <sup>e</sup>
Argentina	--	--	145	177	200	200	200
Brazil	36	49	32	103	105	110	115
Canada	794	726	634	563	570	600	630
Chile	1,590	2,490	4,600	5,410	5,500	5,400	5,300
Mexico	294	335	365	406	450	490	500
Peru	318	444	554	1,040	1,050	1,100	1,150
Other	--	2	3	1	2	2	2
Total	3,030	4,050	6,330	7,700	7,900	7,900	7,900

<sup>e</sup>Estimated. -- Negligible or no production.

<sup>1</sup>Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 9  
LATIN AMERICA AND CANADA: HISTORIC AND PROJECTED REFINED COPPER PRODUCTION, 1990-2011<sup>1</sup>

(Thousand metric tons)

Country	1990	1995	2000	2004	2007 <sup>e</sup>	2009 <sup>e</sup>	2011 <sup>e</sup>
Argentina <sup>2</sup>	11	16	16	16	16	16	16
Brazil	199	219	233	232	240	245	250
Canada	516	614	613	554	560	600	610
Chile <sup>3</sup>	1,190	1,490	2,670	2,900	3,100	3,100	3,100
Mexico	153	212	411	428	480	520	530
Peru <sup>3</sup>	318	444	452	653	660	690	700
Total	2,390	3,000	4,400	4,780	5,100	5,200	5,200

<sup>e</sup>Estimated.

<sup>1</sup>Data are rounded to no more than three significant digits; may not add to totals shown.

<sup>2</sup>Secondary only.

<sup>3</sup>Primary only.

TABLE 10  
LATIN AMERICA AND CANADA: HISTORIC AND PROJECTED GOLD MINE PRODUCTION, 1990-2011<sup>1</sup>

(Metal content in kilograms)

Country	1990	1995	2000	2004	2007 <sup>e</sup>	2009 <sup>e</sup>	2011 <sup>e</sup>
Argentina	1,200	837	26,000	28,500	50,000	50,000	50,000
Belize	1	5	7	--	--	--	--
Bolivia	5,200	14,400	12,000	6,950	8,800	6,300	5,300
Brazil	102,000	63,300	50,400	47,600	48,000	50,000	50,500
Canada	169,000	152,000	156,200	129,000	131,000	135,000	146,000
Chile	27,500	44,600	54,100	40,000	43,700	44,000	44,000
Colombia	29,400	21,100	37,000	37,700	40,000	40,000	40,000
Costa Rica	460	400	50	500	1,900	2,900	3,500
Cuba	--	184	1,000	550	500	500	500
Dominican Republic	4,350	3,280	--	--	--	24,900	24,900
Ecuador	10,100	7,410	2,870	5,300	5,300	5,300	5,300
French Guiana	870	3,000	3,470	2,560	2,600	2,600	2,600
Guatemala	62	30	4,500	2,000	7,500	7,700	7,700
Guyana <sup>2</sup>	1,500	9,010	13,500	11,500	4,000	4,000	4,000
Honduras	156	111	878	7,500	7,000	6,900	6,800
Jamaica	--	--	--	18	--	--	--
Mexico	9,680	20,300	26,400	21,800	30,000	30,000	35,000
Nicaragua	1,200	1,320	3,670	3,000	3,000	3,000	3,000
Panama	85	1,100	--	--	--	--	--
Peru	10,400	56,000	139,000	173,000	174,000	174,500	180,000
Suriname	30	300	300	8,520	10,000	10,000	10,000
Uruguay	--	900	2,180	1,760	2,800	2,800	2,800
Venezuela	7,700	7,260	7,330	9,690	15,000	20,000	20,000
Total	381,000	407,000	541,000	537,000	590,000	620,000	640,000

<sup>e</sup>Estimated. -- Negligible or no production.

<sup>1</sup>Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 11  
LATIN AMERICA AND CANADA: HISTORIC AND PROJECTED IRON ORE PRODUCTION, 1990-2011<sup>1</sup>

(Iron content in thousand metric tons)

Country	Iron content	1990	1995	2000	2004	2007 <sup>c</sup>	2009 <sup>c</sup>	2011 <sup>c</sup>
Argentina	68%	680	--	--	--	--	--	--
Bolivia	65%	80	--	--	--	--	--	1,000
Brazil	66%	100,000	113,000	141,000	174,000	180,000	181,000	190,000
Canada	64%	22,000	24,600	22,700	17,800	18,000	18,500	18,600
Chile	61%	5,040	5,200	5,400	4,850	4,700	4,600	4,500
Colombia	55%	283	300	363	353	400	400	400
Guatemala	65%	4	1	10	2	2	1	1
Mexico	60%	7,110	5,630	6,800	6,890	7,000	7,000	7,000
Peru	68%	2,150	3,950	2,810	4,200	4,400	4,450	5,000
Uruguay	65%	3	3	6	9	9	9	9
Venezuela	65%	13,100	12,600	11,100	12,700	15,000	20,000	20,000
Total	XX	150,000	165,000	190,000	221,000	230,000	240,000	250,000

<sup>c</sup>Estimated. -- Negligible or no production. XX Not applicable.

<sup>1</sup>Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 12  
LATIN AMERICA AND CANADA: HISTORIC AND PROJECTED PIG IRON AND DIRECT-REDUCED IRON PRODUCTION, 1990-2011<sup>1</sup>

(Thousand metric tons)

Country	1990	1995	2000	2004	2007 <sup>c</sup>	2009 <sup>c</sup>	2011 <sup>c</sup>
Argentina:							
Pig iron	1,930	1,570	2,190	2,390	2,500	2,500	2,500
Direct-reduced iron	1,040	1,330	1,420	1,760	2,000	2,000	2,000
Brazil:							
Pig iron	21,100	25,100	28,000	34,600	35,000	35,500	36,000
Direct-reduced iron	260	288	418	517	523	530	540
Canada:							
Pig iron	7,350	8,460	8,900	8,800	8,850	8,900	8,950
Direct-reduced iron	730	1,010	920	920	925	930	935
Chile	675	855	1,020	1,140	1,200	1,100	1,000
Colombia	323	282	272	316			
Mexico:							
Pig iron	3,670	4,140	4,860	4,280	4,400	4,500	4,500
Direct-reduced iron	2,530	3,700	5,590	6,350	6,500	6,600	6,600
Paraguay	61	103	82	100	100	100	100
Peru:							
Pig iron	93	247	327	330	350	400	450
Direct-reduced iron	29	3	80	80	85	95	110
Trinidad and Tobago <sup>2</sup>	697	1,040	1,530	2,340	2,300	2,300	2,300
Venezuela							
Pig iron	314	--	--	--	--	--	--
Direct-reduced iron	3,130	5,100	6,400	6,800	7,000	7,500	8,000
Total	43,900	53,200	62,000	70,700	72,000	73,000	74,000

<sup>c</sup>Estimated. -- Negligible or no production.

<sup>1</sup>Data are rounded to no more than three significant digits; may not add to totals shown.

<sup>2</sup>Direct-reduced iron.

TABLE 13  
LATIN AMERICA AND CANADA: HISTORIC AND PROJECTED CRUDE STEEL PRODUCTION, 1990-2011<sup>1</sup>

(Thousand metric tons)

Country	1990	1995	2000	2004	2007 <sup>e</sup>	2009 <sup>e</sup>	2011 <sup>e</sup>
Argentina	3,640	3,620	4,470	5,130	5,200	5,200	5,200
Brazil	20,600	25,100	27,900	32,900	36,000	37,500	39,000
Canada	12,300	14,400	15,900	17,000	18,000	19,000	20,000
Chile	800	1,010	1,350	1,580	1,600	1,500	1,400
Colombia	703	792	660	730	750	750	750
Cuba	270	207	327	197	200	200	200
Dominican Republic	36	--	36	61	61	61	61
Ecuador	20	35	58	80	72	72	72
El Salvador	21	28	41	57	60	60	60
Guatemala	21	NA	166	226	220	220	220
Jamaica	24	25	--	--	--	--	--
Mexico	8,710	12,100	15,600	16,700	17,500	17,700	18,000
Paraguay	48	96	77	107	107	107	107
Peru	284 <sup>2</sup>	515 <sup>2</sup>	749	750	750	750	750
Trinidad and Tobago	631	738	753	783	800	800	800
Uruguay	38	40	38	55	55	55	55
Venezuela	2,680	3,630	3,840	4,580	4,600	4,800	5,000
Total	50,800	62,300	72,000	80,900	86,000	89,000	92,000

<sup>e</sup>Estimated. NA Not available. -- Negligible or no production.

<sup>1</sup>Data are rounded to no more than three significant digits; may not add to totals shown.

<sup>2</sup>Ingots and castings.

TABLE 14  
LATIN AMERICA AND CANADA: HISTORIC AND PROJECTED LEAD MINE PRODUCTION, 1990-2011<sup>1</sup>

(Metal content in metric tons)

Country	1990	1995	2000	2004	2007 <sup>e</sup>	2009 <sup>e</sup>	2011 <sup>e</sup>
Argentina	23,400	10,500	14,100	9,550	12,000	12,000	12,000
Bolivia	19,900	20,400	9,520	10,300	40,000	70,000	70,000
Brazil	9,300	11,600	8,830	14,700	15,000	15,500	16,000
Canada	241,000	211,000	149,000	76,700	81,200	85,000	90,000
Chile	1,120	944	785	2,290	2,500	2,520	2,520
Colombia	331	300	226	220	250	250	250
Ecuador	200	200	200	220	--	--	--
Honduras	5,790	2,620	4,810	8,000	8,900	8,800	8,700
Mexico	187,000	164,000	138,000	118,000	140,000	145,000	150,000
Peru	188,000	238,000	271,000	306,000	345,000	360,000	375,000
Total	676,000	660,000	596,000	546,000	640,000	700,000	720,000

<sup>e</sup>Estimated.

<sup>1</sup>Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 15  
LATIN AMERICA AND CANADA: HISTORIC AND PROJECTED PRIMARY REFINED LEAD PRODUCTION, 1990-2011<sup>1</sup>

(Metric tons)

Country	1990	1995	2000	2004	2007 <sup>e</sup>	2009 <sup>e</sup>	2011 <sup>e</sup>
Argentina		2,430	8,700	9,500	11,000	11,500	11,500
Brazil	30,200	14,000	6,500	6,500	6,500	6,500	6,500
Canada	87,200	178,000	159,000	131,000	132,000	133,500	135,000
Mexico	167,000	166,000	143,000	137,000	150,000	150,000	150,000
Peru	69,300	221,000	116,000	119,000	120,000	120,000	120,000
Total	354,000	581,000	433,000	403,000	420,000	420,000	420,000

<sup>e</sup>Estimated. -- Negligible or no production.

<sup>1</sup>Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 16  
LATIN AMERICA AND CANADA: HISTORIC AND PROJECTED SECONDARY REFINED LEAD PRODUCTION, 1990-2011<sup>1</sup>

(Metric tons)

Country	1990	1995	2000	2004	2007 <sup>e</sup>	2009 <sup>e</sup>	2011 <sup>e</sup>
Argentina	14,600	26,300	27,000	39,600	40,000	40,000	40,000
Brazil	45,300	65,000	50,000	52,000	54,000	55,000	60,000
Canada	96,500	103,000	125,000	110,000	115,000	120,000	125,000
Colombia	3,500	8,000	12,000	12,000	15,000	15,000	15,000
Mexico	65,000	10,000	110,000	110,000	110,000	110,000	110,000
Venezuela	14,000	16,000	30,000	30,000	30,000	30,000	30,000
Total	239,000	228,000	354,000	354,000	360,000	370,000	380,000

<sup>e</sup>Estimated.

<sup>1</sup>Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 17  
LATIN AMERICA AND CANADA: HISTORIC AND PROJECTED NICKEL MINE PRODUCTION, 1990-2011<sup>1</sup>

(Metal content in metric tons)

Country	1990	1995	2000	2004	2007 <sup>e</sup>	2009 <sup>e</sup>	2011 <sup>e</sup>
Brazil	22,800	29,100	45,300	51,900	52,000	53,000	54,000
Canada	196,000	182,000	191,000	187,000	190,000	195,000	195,000
Colombia	22,400	24,200	59,000	75,000	75,000	75,000	75,000
Cuba	30,400	41,000	68,100	71,900	76,000	90,000	90,000
Dominican Republic	28,700 <sup>2</sup>	46,500	39,900	46,000	46,000	52,000	52,000
Venezuela	--	--	2,540	20,500	22,000	22,000	22,000
Total	300,000	323,000	406,000	452,000	460,000	490,000	490,000

<sup>e</sup>Estimated. -- Negligible or no production.

<sup>1</sup>Data are rounded to no more than three significant digits; may not add to totals shown.

<sup>2</sup>Nickel content of ferronickel.

TABLE 18  
LATIN AMERICA AND CANADA: HISTORIC AND PROJECTED PLATINUM MINE PRODUCTION, 1990-2011<sup>1</sup>

(Metal content in kilograms)

Country	1990	1995	2000	2004	2007 <sup>e</sup>	2009 <sup>e</sup>	2011 <sup>e</sup>
Canada	5,000	7,000	5,700	7,800	9,000	9,000	9,000
Colombia	1,600	973	339	1,210	1,200	1,200	1,200
Total	6,600	7,970	6,040	9,010	10,000	10,000	10,000

<sup>e</sup>Estimated.

<sup>1</sup>Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 19  
LATIN AMERICA AND CANADA: HISTORIC AND PROJECTED PALLADIUM MINE PRODUCTION, 1990-2011<sup>1</sup>

(Metal content in kilograms)

Country	1990	1995	2000	2004	2007 <sup>e</sup>	2009 <sup>e</sup>	2011 <sup>e</sup>
Canada	6,200	8,900	10,400	18,600	20,000	20,000	20,000
Total	6,200	8,900	10,400	18,600	20,000	20,000	20,000

<sup>e</sup>Estimated.

<sup>1</sup>Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 20  
LATIN AMERICA AND CANADA: HISTORIC AND PROJECTED ZINC MINE PRODUCTION, 1990-2011<sup>1</sup>

(Metal content in metric tons)

Country	1990	1995	2,000	2004	2007 <sup>e</sup>	2009 <sup>e</sup>	2011 <sup>e</sup>
Argentina	38,700	32,100	34,900	27,200	33,000	33,000	33,000
Bolivia	104,000	146,000	149,000	145,900	230,000	310,000	310,000
Brazil	158,000	189,000	100,000	159,000	160,000	165,000	170,000
Canada	1,200,000	1,120,000	1,000,000	790,700	793,000	795,000	800,000
Chile	25,100	35,400	31,400	27,600	29,000	29,000	28,000
Colombia	356	--	40	40	40	40	40
Ecuador	100	100	100	--	--	--	--
Honduras	29,600	27,100	31,200	46,500	41,000	40,000	39,000
Mexico	307,000	364,000	393,000	426,000	430,000	450,000	450,000
Peru	598,000	692,000	910,000	1,210,000	1,250,000	1,300,000	1,370,000
Total	2,460,000	2,610,000	2,650,000	2,830,000	3,000,000	3,100,000	3,200,000

<sup>e</sup>Estimated. -- Negligible or no production.

<sup>1</sup>Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 21  
LATIN AMERICA AND CANADA: HISTORIC AND PROJECTED ZINC METAL PRODUCTION, 1990-2011<sup>1</sup>

(Metric tons)

Country	1990	1995	2000	2004	2007 <sup>e</sup>	2009 <sup>e</sup>	2011 <sup>e</sup>
Argentina	31,500	35,800	39,300	38,300	43,000	45,000	45,000
Brazil	154,000	206,000	199,000	273,000	275,000	280,000	300,000
Canada <sup>2</sup>	592,000	720,000	780,000	805,000	830,000	840,000	850,000
Mexico <sup>2</sup>	199,000	223,000	235,000	325,000	330,000	350,000	350,000
Peru <sup>2</sup>	121,000	159,000	200,000	196,000	205,000	215,000	225,000
Total	1,100,000	1,340,000	1,450,000	1,640,000	1,700,000	1,700,000	1,800,000

<sup>e</sup>Estimated.

<sup>1</sup>Data are rounded to no more than three significant digits; may not add to totals shown.

<sup>2</sup>Primary only.

TABLE 22  
LATIN AMERICA AND CANADA: HISTORIC AND PROJECTED DIAMOND MINE PRODUCTION, 1990-2011<sup>1</sup>

(Thousand carats)

Country	1990	1995	2000	2004	2007 <sup>e</sup>	2009 <sup>e</sup>	2011 <sup>e</sup>
Brazil	1,540	1,280	1,600	900	1,000	1,000	1,000
Canada	--	--	2,530	12,600	15,000	16,000	17,000
Guyana	18	52	82	450	450	450	450
Venezuela	333	296	110	40	100	100	100
Total	1,890	1,630	4,320	14,000	17,000	18,000	19,000

<sup>e</sup>Estimated. -- Negligible or no production.

<sup>1</sup>Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 23  
LATIN AMERICA AND CANADA: HISTORIC AND PROJECTED PHOSPHATE ROCK PRODUCTION, 1990-2011<sup>1</sup>

(P<sub>2</sub>O<sub>5</sub> content in thousand metric tons)

Country	1990	1995	2000	2004	2007 <sup>e</sup>	2009 <sup>e</sup>	2011 <sup>e</sup>
Brazil	625	1,360	1,690	2,180	2,300	2,400	2,500
Canada <sup>2</sup>	NA	NA	125	380	380	380	380
Chile	4	3	4	4	3	3	3
Colombia	10	10	8	8	10	10	10
Mexico	187	187	316	105	--	--	--
Peru	47	89	6	14	15	16	18
Venezuela	34	23	105	85	75	75	75
Total	907	1,670	2,250	2,780	2,800	2,900	3,000

<sup>e</sup>Estimated. NA Not available. -- Negligible or no production.

<sup>1</sup>Data are rounded to no more than three significant digits; may not add to totals shown.

<sup>2</sup>Sources: Natural Resources Canada and U.S. Geological Survey Minerals Yearbook, Volume I.

TABLE 24  
LATIN AMERICA AND CANADA: HISTORIC AND PROJECTED MARKETABLE COAL PRODUCTION, 1990-2011<sup>1</sup>

(Thousand metric tons)

Country	1990	1995	2000	2004	2007 <sup>e</sup>	2009 <sup>e</sup>	2011 <sup>e</sup>
Argentina	270	305	246	120	200	200	200
Brazil	4,170	2,780	6,000	6,000	6,000	6,000	6,000
Canada <sup>2</sup>	68,300	75,000	69,200	66,000	68,000	70,000	75,000
Chile	2,730	1,490	509	238	230	220	210
Colombia	20,500	26,000	38,200	53,700	65,000	75,000	80,000
Mexico <sup>2</sup>	10,000	11,200	14,300	11,500	12,000	12,000	12,000
Peru <sup>2</sup>	175	80	27	22	25	25	25
Venezuela	2,190	4,260	7,910	8,110	12,000	22,000	25,000
Total	108,000	121,000	136,000	146,000	160,000	190,000	200,000

<sup>e</sup>Estimated.

<sup>1</sup>Data are rounded to no more than three significant digits; may not add to totals shown.

<sup>2</sup>Run of mine.

TABLE 25  
LATIN AMERICA AND CANADA: HISTORIC AND PROJECTED DRY NATURAL GAS PRODUCTION, 1990-2011<sup>1</sup>

(Million cubic meters)

Country	1990	1995	2000	2004	2007 <sup>c</sup>	2009 <sup>c</sup>	2011 <sup>c</sup>
Argentina	18,100	27,000	37,400	45,000	45,000	46,000	47,000
Barbados	15	15	15	13	13	13	13
Bolivia	2,200	3,360	3,600	10,300	11,000	11,000	11,000
Brazil	6,500	6,700	13,200	17,000	20,000	25,000	25,000
Canada	98,800	148,000	166,000	167,000	168,000	170,000	170,000
Chile	2,120	1,860	2,700	2,110	2,000	1,900	1,800
Colombia	5,600	7,700	6,000	6,400	6,500	6,500	6,500
Cuba	4	4	574	660	660	660	660
Ecuador	100	119	156	240	250	250	250
Guatemala	1,000	1,250	1	1	1	1	1
Mexico	34,100	30,000	28,900	32,500	43,000	45,000	45,000
Peru	280	267	277	857	870	900	900
Trinidad and Tobago	3,750	6,120	14,200	29,500	30,000	30,000	30,000
Venezuela	15,600	32,100	36,600	34,000	36,000	40,000	45,000
Total	188,000	264,000	310,000	346,000	360,000	380,000	380,000

<sup>c</sup>Estimated.

<sup>1</sup>Dry or marketed gas. Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 26  
LATIN AMERICA AND CANADA: HISTORIC AND PROJECTED PETROLEUM AND CONDENSATE PRODUCTION, 1990-2011<sup>1</sup>

(Thousand 42-gallon barrels)

Country	1990	1995	2000	2004	2007 <sup>c</sup>	2009 <sup>c</sup>	2011 <sup>c</sup>
Argentina	176,000	261,000	282,000	254,000	275,000	280,000	280,000
Barbados	454	475	560	378	400	400	400
Bolivia	7,640	10,200	10,100	14,200	14,000	14,000	14,000
Brazil	238,000	252,000	464,000	563,000	568,000	600,000	650,000
Canada <sup>2</sup>	567,000	662,000	804,000	940,000	950,000	1,000,000	1,000,000
Chile	7,160	4,020	2,050	1,290	1,200	1,100	1,000
Colombia	160,000	213,000	251,000	254,000	250,000	250,000	250,000
Cuba	4,980	10,200	17,400	28,500	34,000	34,000	34,000
Ecuador	104,000	143,000	146,000	193,000	200,000	200,000	200,000
Guatemala	1,440	8,420	7,570	7,380	7,300	7,200	7,100
Mexico	932,000	1,120,000	1,260,000	1,400,000	1,400,000	1,500,000	1,600,000
Peru	47,100	44,400	36,200	34,400	36,000	38,000	40,000
Suriname	--	1,500	4,500	4,100	4,100	4,100	4,100
Trinidad and Tobago	56,000	51,800	43,700	45,000	45,000	45,000	45,000
Venezuela	770,000	1,020,000	1,150,000	1,100,000	1,500,000	1,800,000	1,800,000
Total	3,070,000	3,800,000	4,480,000	4,840,000	5,300,000	5,800,000	5,900,000

<sup>c</sup>Estimated. -- Negligible or no production.

<sup>1</sup>Data are rounded to no more than three significant digits; may not add to totals shown.

<sup>2</sup>Includes synthetic crude.

TABLE 27  
LATIN AMERICA AND CANADA: HISTORIC AND PROJECTED URANIUM PRODUCTION, 1990-2011<sup>1</sup>

(Metal content in metric tons)

Country	1990	1995	2000	2004	2007 <sup>c</sup>	2009 <sup>c</sup>	2011 <sup>c</sup>
Argentina	1	58	--	--	--	--	--
Brazil	--	--	20 <sup>2</sup>	50	310	350	350
Canada	8,730	10,500	10,700	12,000	13,000	14,000	15,000
Total	8,730	10,600	10,700	12,000	13,000	14,000	15,000

<sup>c</sup>Estimated. -- Negligible or no production.

<sup>1</sup>Data are rounded to no more than three significant digits; may not add to totals shown.

<sup>2</sup>Anuário Mineral Brasileiro 2001.