

THE MINERAL INDUSTRY OF VENEZUELA

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Venezuela's gross domestic product (GDP) based on purchasing power parity was \$110.8 billion¹ (International Monetary Fund, 2004§²). The GDP decreased for the second consecutive year despite an increase in the price of petroleum. Venezuela continued to suffer from the effects of the general strike that began at the end of 2002 and remained in effect until February 2003 (U.S. Central Intelligence Agency, 2004§). At constant prices, the GDP decrease was 9.4% compared with that of 2002 after an 8.9% decrease in 2002 compared with that of 2001. Venezuela's petroleum activity, which was the country's most important economic sector and represented 25% of Venezuela's GDP, decreased by almost 11%; this level was lower than that achieved in 1995. Construction decreased by 38% after a decrease of 20% in 2001. The manufacturing and mining sectors decreased by 11% and 8%, respectively (Banco Central de Venezuela, 2004b§). In the second half of 2002 (the last period for which information was available), unemployment reached 16.5%. During this period, the construction sector had the highest unemployment rate at 27%; the manufacturing sector, 15%; and the petroleum and mining and quarrying sector, 12.5% (Banco Central de Venezuela, 2003§). Inflation (in the Caracas metropolitan area) increased to 24.3% after an increase of 27.6% (revised) in 2002 (Banco Central de Venezuela, 2004c§).

Government Policies and Programs

The current mining law Decree No. 295 of September 5, 1999, established the rules for all mines and minerals (except hydrocarbons and some industrial minerals not found in Government lands) within Venezuelan territory; exploration, production, beneficiation, storage, lease, distribution, transportation, and internal and external marketing of extracted substances not included in other laws are included. Under Venezuelan law, the country's mineral and hydrocarbon resources belong to the State. Under the decree, the Ministerio de Energía y Minas (MEM) is the Government institution responsible for all matters related to mining activity. Mining is permitted only through direct participation of the Government, concessions, and production authorization to artisanal miners, mining cooperatives, and the small mining sector.

The 1999 Mining Law establishes a combined 20-year exploration and production concession renewable for a period not to exceed 20 years. The exploration period for the concession is limited to 3 years with a possible extension of 1 year. The size of a concession is not to exceed 6,156 hectares (ha). An environmental, financial, and technical feasibility study must be presented to the MEM during the exploration

period of the concession. With permission from the MEM, the concessions may be rented, subcontracted, or transferred.

The 1999 Mining Law established the mining cooperative and regulated the artisanal mining sector for the first time. It defines the small mining sector in reference to the production of diamond and gold as areas that are not to exceed 10 ha and not to be worked by more than 30 individuals with a nonrenewable, nontransferrable permit unless transferred to a social fund to form a mining cooperative. The maximum production period is 10 years.

A permanent interministerial commission, which was integrated by the ministries that deal with defense, energy, environment, finances, mining, and natural resources, was created to coordinate all aspects that affect the mining sector. The law proposes a one-stop office to deal with all associated permits related to mining concessions.

The surface tax that must be paid beginning in the fourth year of the concession eliminates the exploration tax. At the production phase of the concession, the production tax will be reduced from the surface tax. For gold, silver, and platinum-group metals, the production tax is 3% of the Caracas commercial value of the refined "mineral." Diamond and precious stones are taxed at 4% of the Caracas commercial value. Other minerals are taxed at a calculated 3% of commercial value at the mine. At the discretion of the Executive, the production tax may be reduced to 1% as merited by economic conditions.

The Executive also reserves the option of exempting mining entities of import taxation of items indispensable to mining that are not produced in Venezuela. With permission from the Executive, equipment exempted from the import tax may be sold to a third party; the third party pays the import tax.

With the exception of precious materials, industrial minerals not found in Government lands continue to be governed by Articles 7 through 10 of the derogated Mining Law of 1945 until the individual States establish regulations.

At the expiration of the mining rights, all equipment and installations related to the mining activity will become the property of Venezuela without compensation to the concession holder.

The Instituto Nacional de Geología y Minería (INGEOMIN) was established as an independent agency ascribed to the MEM under the Decree. The INGEOMIN was charged with interdisciplinary research in geosciences, planning, execution, and coordination of all geoscience-related programs. The agency was also given the responsibility for evaluating Venezuela's mineral and nonconventional energy resources, providing technical advice to other Government entities and the private sector, and disseminating technical and scientific information.

The new General Regulation of the Mining Law (Decree No. 1,234) was published on March 9, 2001. The Regulation establishes the terms, conditions, and administrative procedures in support of the Decree No. 295.

In 1975, the Government of Venezuela nationalized the petroleum sector. The new hydrocarbon law Decree No. 1,510

¹Where necessary, values have been converted from Venezuelan Bolivars (Bs) to U.S. dollars (US\$) at the rate of Bs1,614.06=US\$1.00.

²References that include a section mark (§) are found in the Internet References Cited section.

was passed in November 2001 and became effective on January 1, 2002. Under the decree, all hydrocarbon deposits belong to the nation. In agreement with article 302 of the Constitution of 1999, all primary hydrocarbon activities are reserved for the Government. Refining and marketing of hydrocarbons (secondary activities) can be by the Government and the private sector jointly or separately.

Primary activities will be carried out by the Executive, the Government directly, companies owned by it, or companies in which the Government owns more than a 50% interest (mixed enterprises). Companies engaged in hydrocarbon production are denominated operating companies. The maximum area assigned to an operating company is 100 square kilometers.

The creation of a mixed enterprise for primary production of hydrocarbons requires the approval of the Asamblea Nacional. The duration of the mixed company will be 25 years with a possible extension of 15 years. The extension must be applied for between 12½ and 20 years of the granting of the original permit. The lands and permanent works, which include accessories, equipment, and installations, must be maintained in good working order so that when they are relinquished to Venezuela, their future use or activity cessation with minimal environmental damage can be guaranteed.

The Government has the right to 30% of production from any hydrocarbon deposit as a royalty payment. The rate can be decreased to 20% if the economics of production are affected by the higher rate. The production royalty for mixed bitumen from the Orinoco Belt can be reduced to 16% if the projects are not viable at the 30% rate. In both cases, the higher royalty rate can be reestablished when necessary. Natural gas is excluded from this law; it is regulated by the Organic Law of Gaseous Hydrocarbons.

Decree No. 1,257 of 1996, Norms of Environmental Evaluation of Activities Susceptible to Degrade the Environment, established the Ministerio del Ambiente y de los Recursos Naturales. The law requires an environmental impact study for projects and programs in the areas of mining and hydrocarbons.

Production

In 2003, Venezuela was an important producer of nonfuel mineral commodities in the Latin American region, although it held modest rankings in terms of world output (table 1).

According to U.S. Geological Survey data, Venezuela was the world's 7th ranked producer of bauxite, the 9th ranked producer of alumina, the 10th ranked producer of aluminum, and the 11th ranked producer of iron ore. In Latin America, it was the second ranked producer of primary aluminum, iron ore, and phosphate rock (after Brazil), the third ranked producer of bauxite and alumina (after Jamaica and Brazil), and the fourth ranked producer of cement (after Brazil, Mexico, and Colombia) and steel (after Brazil, Mexico, and Argentina).

In the Americas, Venezuela was the third ranked producer of bauxite (after Brazil and Jamaica) and phosphate rock (after the United States and Brazil), the fourth ranked producer of primary aluminum (after the United States, Canada, and Brazil) and iron ore (after Brazil, the United States, and Canada) and the fifth ranked producer of alumina (after the United States, Brazil, Jamaica, and Suriname).

Performance of the nonfuel mineral production in 2003 was mixed when compared with that of 2002 (table 1). Output of alumina, which was one of Venezuela's traditional nonfuel mineral commodities, decreased by less than 1%. Production of bauxite and iron ore, which were two other traditional mineral commodities, increased by about 4.9% and 7.6%, respectively. Production of primary aluminum decreased by less than 1% compared with that of 2002. Official production of diamond decreased by 67% compared with that of 2002 after more than doubling in 2002 compared with that of 2001. Gold production decreased by 13.5% after 3 years of consecutive increases. Statistics for industrial minerals were incomplete. The Government of Venezuela does not require companies to report industrial mineral production. On the basis of available data, production of most industrial minerals changed little or decreased slightly from that of 2002. Cement production was estimated to have stayed at the same level of 2002.

Trade

In 2003, Venezuela's exports totaled \$27.7 billion; of this, \$22.2 billion was from petroleum. In current (2003)-dollar prices, this was about the same level (revised) as that of 2002. Total imports decreased significantly to \$11.8 billion, which was a 22% decrease from the revised figure for 2002 (Banco Central de Venezuela, 2004a\$).

In 2002 (the last year for which information was available), exports of metals in all forms were valued at \$611.4 million, and imports, \$57.6 million. More than 95% of this total was from aluminum. The value of exports of iron ore (not included in the previous figure) totaled \$123 million. The value of exports of industrial minerals, which included cement and lime, totaled \$63.4 million. Of this total, cement exports were \$55.2 million, or 87% of the total. Imports of industrial minerals were \$40.3 million; of that, cement accounted for \$1.9 million. In addition, exports of ferroalloys were valued at \$128.5 million, and their imports, only \$11.2 million. Exports of coal were valued at \$278 million. In terms of value, the United States received 39% of Venezuela's coal (Ministerio de Energía y Minas, 2004a\$).

In 2003, Venezuela's net exports of crude petroleum totaled 821.3 million barrels (Mbbbl), of which 67% was exported to the United States. When including crude petroleum and refinery products, Venezuela was the fourth ranked supplier to the United States after Canada, Saudi Arabia, and Mexico. The United States received slightly more than 11% of its import requirements from Venezuela. This was, however, a decrease from 1997 when Venezuela was the leading U.S. import source of crude and refinery products at the time providing more than 17% of total U.S. imports (U.S. Energy Information Administration, 2004\$). Venezuela also exported a significant amount of its crude petroleum to Canada; Curacao where Petróleos de Venezuela S.A. (PDVSA) operates a refinery; and Spain. Other major destinations for Venezuela's refinery products were Brazil, Canada, Costa Rica, Curacao, and Puerto Rico (Ministerio de Energía y Minas, 2004b\$).

Structure of the Mineral Industry

The private sector participated in the production of nonfuel minerals in Venezuela; Government companies, however, controlled either a varying portion or the entire production of bauxite and alumina, aluminum, diamond, gold, and iron ore (table 2). Bauxite, alumina, and aluminum production was controlled by the Government through Corporación Venezolana de Guayana (C.V.G.). Private international companies held small interests in alumina and aluminum.

A large portion of gold was produced by C.V.G. or by its subsidiary C.V.G. Compañía General de Minería de Venezuela C.A. (Minerven).

Production of iron ore was nationalized in 1975; the only producer was C.V.G. Ferrominera Orinoco C.A. Steel production became totally private in 1997 when Siderúrgica del Orinoco C.A. (SIDOR), which was the leading steel producer in Venezuela and the Andean region, was privatized. The ferrosilicon producer Ferroatlántica de Venezuela S.A. was privatized in 1998.

Five private companies produced cement in Venezuela. CEMEX Venezuela S.A.C.A., which was the largest producer in Venezuela, was owned by Cementos Mexicanos S.A. de C.V. (CEMEX), which was the world's third ranked cement company. The Holcim Group and the Lafarge Group, which were the other world-ranked cement companies, held interests in Holcim Venezuela C.A. (formerly Consolidada de Cementos C.A.) and C.A. Fábrica Nacional de Cementos and Cementos, which were the second and third ranked cement-producing companies, respectively, in Venezuela.

Venezuela was a founding member of the Organization of the Petroleum Exporting Countries (OPEC). Following Venezuela's nationalization of the petroleum sector, PDVSA was formed in 1976 as the Government company responsible for the exploration and production of all hydrocarbons. PDVSA also has the responsibility for crude refining and petrochemical manufacturing. Storing, transporting, and domestic and international marketing of hydrocarbons and their products are also the responsibility of PDVSA. Since the early 1990s, however, Corporación Venezolana de Petróleos (CVP) (a subsidiary of PDVSA) began to open opportunities to the private sector through a number of production agreements. The early program involved the production of inactive wells. CVP also entered into association with the private sector to explore new areas and to develop the extra-heavy crude in the Orinoco Belt.

Commodity Review

Metals

Aluminum and Bauxite and Alumina.—Venezuela's entire bauxite production was from Los Pijiguaos Mine in the State of Bolívar. The mine was owned by C.V.G. Bauxilum C.A., which was owned by the Venezuelan Government [through C.V.G. (99%)] and Aluisse Lonza Holding (1%). Bauxilum was also the sole producer of alumina in Venezuela. Bauxite production from Los Pijiguaos fed the alumina refinery owned by Bauxilum. Venezuela's bauxite production capacity was 6

million metric tons (Mt) (table 2). In 2003, bauxite production, which has been increasing steadily since 1997, increased by almost 5% to 5.4 Mt. Production of alumina decreased by about 1% to 1.88 Mt (table 1).

In 2003, production of aluminum decreased slightly to 601,290 metric tons (t). Production of aluminum in Venezuela was by two primary smelters with majority ownership by C.V.G. The largest was C.V.G. Venezolana de Aluminio C.A. (Venalum) with a nominal capacity of 430,000 metric tons per year (t/yr). In 2003, Venalum produced 433,350 t. This was about the same level of production achieved in 2002. The other smelter, C.V.G. Aluminio del Caroní, S.A. (Alcasa), had a design capacity of 210,000 t/yr of aluminum. Production from Alacasa was 167,950 t, which was a decrease of 1.5% compared with that of 2002. Venezuela exported 76% of its aluminum production.

Gold.—Official production of gold in Venezuela decreased by 13.5% to 8,190 kilograms (kg) in 2003 compared with that of 2002. The largest producer was Hecla Mining Company through its subsidiary Minera Hecla Venezolana C.A., which operated La Camorra underground mine in the State of Bolívar and produced about 3,840 kg (reported as 123,549 troy ounces), or 47% of Venezuela's official gold output. La Camorra Mill also processed ore that it purchased from nearby artisanal miners; this ore yielded about 94 kg of gold. Production from La Camorra decreased by 24% compared with that of 2002 at an average total cash cost of \$154 per troy ounce (12.4% higher when compared with that of 2002). The decrease in production was due to a decrease in ore grade. Total cash cost increased as the result of higher production taxes on higher gold prices and land purchase and cost of integration of this land to the Isidora property (formerly known as the Chile Mine). At yearend 2003, La Camorra Mine's proven and probable reserves totaled about 743,000 t with an average grade of 19.5 grams per metric ton (g/t) gold (reported as 318,644 short tons with an average grade of 0.69 troy ounce per short ton) (Hecla Mining Company, 2004, p. 15).

Hecla began to produce gold from La Camorra in 1999. Ore production in 2003 was more than 500 metric tons per day (t/d). Production was mostly by longhole stoping, and the ore was hauled to the surface by truck. In the processing plant after a three-step crushing process, the ore was ground. Gold was then recovered by using the conventional carbon-in-leach process; the plant had a recovery rate of more than 95%. Gold bars were then sent to a refinery.

During the year, Hecla's board of directors approved a \$12 million investment in a new production shaft for La Camorra Mine. The shaft was scheduled to begin operating in late 2004 (Hecla Mining Company, 2004, p. 14).

Hecla also acquired the exploration and mining lease for block B in El Callao gold mining district from Minerven in 2002. The term of the lease will expire in 2023. The 1,795-ha block included the Chile, the Laguna, and the Panama Mines, which had been in production from 1921 to 1946. In May 2003, Hecla's board of directors approved \$5.6 million for a prefeasibility study of and detail drilling in the Isidora Mine. The company expected to present a development plan for approval by the board of directors in 2004. Early estimates for Isidora's development totaled \$25 million. Isidora's proven and probable reserves at yearend 2003 were about 453,500 t with

an average grade of 18.62 g/t (reported as 500,011 short tons with an average grade of 0.66 troy ounce per short ton) (Hecla Mining Company, 2003, p. 5, 17; 2004, p. 16).

Another gold producer in Venezuela was Crystallex International Corporation of Vancouver, British Columbia, Canada, through its subsidiary Crystallex de Venezuela C.A. The company produced from three deposits in the Tomi concession (Charlie Richards, Mackenzie, and Milagrato) and from an open pit in La Victoria Mine in Lo Increible concession (through its 80% ownership of El Callao Mining Corp.). Production from Tomi was about 840 kg (reported as 27,113 troy ounces), and total production from La Victoria was about 170 kg (reported as 5,564 troy ounces). In addition, Crystallex's Revemin Mill produced about 80 kg (reported as 2,567 troy ounces) from purchased material (Crystallex International Corporation, 2004, p. 26).

Production from the Tomi concession was by open pit and underground methods. Underground production was from the Charlie Richards deposit, which began in 2003. Tomi's estimated probable reserves at yearend 2003 were 300,000 t with an average grade of 4.6 g/t gold in the open pit deposits and 140,000 t with an average grade of 15.2 g/t gold in the underground mine for a total of 3,490 kg. The open pit reserves of the Tomi deposits were expected to be depleted by 2005 (Crystallex International Corporation, 2004, p. 12, 43).

Production from La Victoria Mine, which began in 2001 with a recovery rate of 90%, was suspended during the third quarter of 2003 as a result of a low recovery rate that had decreased to 68% in 2003. This was one of the reasons why Crystallex's total cash cost per troy ounce was \$378. The company began the process of evaluating the use of bio-oxidation to improve the recovery of the mine. At yearend, however, because of limited reserves, Crystallex wrote down La Victoria's value but continued to explore the deposit. At yearend, total probable reserves of La Victoria were 1.215 Mt with an average grade of 5.2 g/t gold (Crystallex International Corporation, 2004, p. 12, 26, 28).

Another property for which Crystallex had rights was the Albino concession, which was adjacent to Las Cristinas and also in the State of Bolivar. After a feasibility study in 2001 and a reevaluation of reserves in 2003, Crystallex planned to begin development of an underground mine in 2004 with commercial production beginning in 2005. On the basis of the 2003 studies, at \$325 per ounce, the Albino's proven and probable reserves were 270,000 t with an average grade of 12.04 g/t gold. Production plans called for an output that ranged from 470 to 620 kilograms per year (kg/yr) (15,000 to 20,000 ounces per year) of gold for a period of 5 years (Crystallex International Corporation, 2004, p. 29).

After years of legal battles over the right of ownership, Crystallex signed an operation agreement for Las Cristinas with C.V.G. in 2002. The feasibility study for Las Cristinas was completed in September 2003 and submitted to C.V.G. Crystallex planned to begin commercial production at Las Cristinas in 2006. An open pit and carbon-in-leach gold recovery with an initial processing rate of 20,000 t/d of ore was anticipated with the potential to be expanded to 40,000 t/d. Early stages of construction were slated for 2004. For the first 5 years of operation, production was planned to be about

9,700 kg/yr (reported as 311,000 troy ounces per year) of gold with an average production of about 8,300 kg/yr (reported as 266,000 troy ounces per year) for the life of the mine at a cash cost of \$196 per troy ounce, which included royalties. The mine life was estimated to be 34 years. At \$325 per troy ounce, proven and probable reserves were estimated to be 246 Mt of ore with a grade of 1.29 g/t gold for a total of almost 320,000 kg (reported as 10.2 million troy ounces). The capital cost of the project was estimated to be \$282 million. Detailed engineering was programmed for 2004 and 2005; construction of the processing plant was planned for the third quarter of 2004 (Crystallex International Corporation, 2004, p. 16-20).

Iron and Steel.—Production of iron ore from Ferrominera's Cerro San Isidro, Los Barrancos, and Las Pailas open pits increased by 7.6% to about 18 Mt. This was the highest production level since 1997 when production was 18.5 Mt. Venezuelan reserves totaled 14.657 billion metric tons (Gt) of iron ore, of which 4.184 Gt was proven. Of the 1.708 Gt of high-grade iron ore, Los Barrancos had 318 Mt; San Isidro, 214 Mt; Cerro Bolivar, 182 Mt; Grupo Redondo, 165 Mt; and Altamira, 163 Mt (C.V.G. Ferrominera Orinoco C.A., 2002§). Ferrominera planned to produce 20 Mt of iron ore in 2004 and to increase production to 31 Mt by 2009. As part of the plan, the company was to invest \$460 million in a concentration plant, which was scheduled for completion by 2007 (Portal Minero, 2004§). The plans to construct the concentration plant were conceived as high-grade reserves were nearing depletion. At the end of 2003, the company began the process of reactivating the Altamira Mine. The mine had 230 Mt of reserves, of which 100 Mt was high grade (C.V.G. Ferrominera Orinoco C.A., 2003a). The low-grade reserves from Altamira were planned to be processed at the concentration plant. According to Ferrominera, Venezuela's high-grade ore would be depleted in 7 years. Another reason for constructing the plant was to reduce the phosphorus content of the low-grade ore to meet technical requirements of the iron pellet producers (C.V.G. Ferrominera Orinoco C.A., 2003b, c).

Production of raw steel and direct-reduced iron decreased by about 6% and 3%, respectively. The two leading producers were SIDOR and Siderúrgica Venezolana Sivensa S.A. through its subsidiary Siderurgia del Turbio C.A.

Nickel.—In 2000, Venezuela began producing nickel and ferronickel from its Loma de Niquel Mine and ferronickel plant located along the boundaries of the States of Aragua and Miranda. The mine and plant were operated by Loma de Niquel C.A. (majority owned by Anglo American plc). Nickel mine production in 2003 was about 20,700 t, which was an 11% increase compared with that of 2002. The nickel content of the ferronickel produced was 17,200 t, which was about 96% of the company's production capacity (tables 1, 2).

Industrial Minerals

Cement.—Venezuela was the fourth ranked cement producer in Latin America after Brazil, Mexico, and Colombia. Production of cement in 2003 was estimated to have remained at the level of 2002 (7 Mt) despite the significant decrease in construction activity in Venezuela that persisted for most of

the year. Venezuela was a net exporter of cement. CEMEX Venezuela was the leading producer with more than 50% of the country's production capacity. Although CEMEX Venezuela's domestic sales decreased, the company's exports increased by 17%, which brought the company's Venezuelan sales up by 5% (CEMEX S.A. de C.V., 2004, p. 25; 2004§).

Diamond.—Official production of diamond, which had increased almost threefold in 2002 to 106,767 carats, decreased by 67% in 2003 to 34,790 carats (table 1). Traditionally, diamond in Venezuela has been produced by the small-scale producers either through cooperatives or under contract with C.V.G. The main producing areas were Aza Karon, Guaniamo, Icabaru, Santa Elena, and San Salvador de Paul (Gray, 1993; Gray and Orris, 1993).

Mineral Fuels

Coal.—Production of coal in Venezuela decreased by about 13% to 7 Mt. Most of the production was from the State of Zulia where PDVSA produced coal through its subsidiary Carbozulia S.A. in two joint ventures with the private sector Carbones de Guasare, S.A. and Carbones de la Guajira S.A. At the end of the year, PDVSA left the coal business when it transferred Carbozulia to Corporación de Desarrollo de la Región Zuliana (Corpozulia).

Orimulsión®.—Orimulsión is a PDVSA-patented boiler fuel (a mix of natural bitumen and water) that is used in power generation. Commercial production of Orimulsión began in 1991, and the only producer in the world was Venezuela. The country's production capacity of Orimulsión was 6.2 million metric tons per year. The producing company was Bitúmenes de Orinoco, C.A. (Bitor) (a subsidiary of PDVSA). Orimulsión was exported to Barbados, Canada, China, Denmark, Finland, Germany, Italy, Japan, and Lithuania. In 2003, PDVSA denied that it was closing Bitor and indicated that the company was going to be administered from PDVSA's eastern division. Despite denials, Bitor was closed in early 2004. Venezuela had, however, licensed its technology to the Chinese company Orifuels Sinoven S.A. The Orimulsión supply contracts with Italy and Japan, which expired in 2003, were not renewed (CoalTrans International, 2003§, 2004§; Soberanía, 2004a§, b§).

Petroleum.—Venezuela produced 964.7 Mbbbl of crude petroleum in 2003. Production was mainly from the Maracaibo and the Oriental Basins. Part of the Venezuelan production was from the Government in joint venture with the private sector through operation contracts or strategic associations. The strategic associations were formed to expand Venezuela's production by developing the extra-heavy crude in the Orinoco Belt. In 2003, the Government of Venezuela began efforts to restructure PDVSA. In August, the MEM transferred the responsibility of the operations contracts and the strategic associations to Corporación Venezolana de Petróleos (U.S. Energy Information Administration, 2004§).

Refinery Products.—PDVSA operated six petroleum refineries in Venezuela. In 2003, production of refined products decreased by about 19%. The Amuay refinery in the State of Falcon was the leading producer. Cardon, which is also located in the State of Falcon, was the second ranked refinery in Venezuela.

References Cited

- CEMEX S.A. de C.V., 2004, Company annual report 2003: Mexico City, Mexico, CEMEX S.A. de C.V., 75 p.
- Crystallex International Corporation, 2004, Company annual report 2003: Toronto, Ontario, Canada, Crystallex International Corporation, May, 96 p.
- C.V.G. Ferrominera Orinoco C.A., 2003a, Después de 21 años CVG Ferrominera reactiva mina Altamira [After 21 years, CVG Ferrominera reactivates Altamira Mine]: Puerto Ordaz, Venezuela, C.V.G. Ferrominera C.A. press release, December 15, 1 p.
- C.V.G. Ferrominera Orinoco C.A., 2003b, En construcción de obras conexas, CVG Ferrominera invierte 20.6 Millones de dólares en planta de concentración [CVG Ferrominera invests U.S. \$20.6 million in areas related to the concentration plant]: Puerto Ordaz, Venezuela, C.V.G. Ferrominera C.A. press release, May 7, 1 p.
- C.V.G. Ferrominera Orinoco C.A., 2003c, Ferrominera espera financiamiento para arrancar proyecto de concentración [Ferrominera awaits financing to begin concentration project]: Puerto Ordaz, Venezuela, C.V.G. Ferrominera C.A. press release, May, 19, 1 p.
- Gray, Floyd, 1993, Diamond-bearing kimberlite pipes, *in* U.S. Geological Survey and Corporación Venezolana de Guyana, Técnica, C.S., aus. Geological and mineral resource assessment of the Venezuela Guayana Shield: U.S. Geological Survey Bulletin 2062, p. 72-77.
- Gray, Floyd, and Orris, G.R., 1993, Placer diamond, *in* U.S. Geological Survey and Corporación Venezolana de Guyana, Técnica, C.S., aus. Geological and mineral resource assessment of the Venezuela Guayana Shield: U.S. Geological Survey Bulletin 2062, p. 86-90.
- Hecla Mining Company, 2003, Company annual report 2002: Coeur d'Alene, Idaho, Hecla Mining Company, March 18, 73 p.
- Hecla Mining Company, 2004, Company annual report 2003: Coeur d'Alene, Idaho, Hecla Mining Company, March 3, 86 p.

Internet References Cited

- Banco Central de Venezuela, 2003, Tasas de desocupación por rama de actividad económica [Unemployment rate by economic sector], accessed March 23, 2004, at URL http://bcv.org.ve/excel/6_1_1.xls?id=100.
- Banco Central de Venezuela, 2004a, Exportaciones e importaciones de bienes y servicios según sectores [Exports and imports of goods and services by sector], accessed November 18, 2004, at URL http://www.bcv.org/excel/2_4_9.xls?id=325.
- Banco Central de Venezuela, 2004b, Producto interno bruto a precios constantes [Gross domestic product at constant prices], accessed November 18, 2004, at URL http://www.bcv.org/excel/7_1_1.xls?id=108.
- Banco Central de Venezuela, 2004c, Series de precios al consumidor del área metropolitana de Caracas [Series of consumer price index for the Caracas metropolitan area], accessed on November 18, 2004, at URL <http://bcv.org/excel/4/417.asp?id=55>.
- CEMEX S.A. de C.V., 2004, CEMEX worldwide—Venezuela, accessed December 1, 2004, at URL http://www.cementos.com/gl/gl_ve.asp.
- CoalTrans International, 2003 (September/October), Orimulsión “has future,” accessed January 11, 2005, at URL <http://www.coaltrans.com>.
- CoalTrans International, 2004 (March/April), Orimulsión dropped, accessed January 11, 2005, at URL <http://www.coaltrans.com>.
- C.V.G. Ferrominera Orinoco C.A., 2002, Reservas del mineral de hierro [Iron ore reserves], accessed August 22, 2002, via URL <http://www.ferrominera.com>.
- International Monetary Fund, 2004 (September), Gross domestic product based on purchasing power parity (PPP) of country valuation, World Economic Outlook Database, accessed November 18, 2004, via URL <http://www.imf.org/external/pubs/ft/weo/2004/02/data/index.htm>.
- Ministerio de Energía y Minas, 2004a, Anuario estadístico 2002 [Statistical mining yearbook 2002], accessed November 18, 2004, at URL <http://www.mem.gov.ve/vmminas/publicaciones/anuarios/pdf/anuario.pdf>.
- Ministerio de Energía y Minas, 2004b, Petróleo y otros datos estadísticos 2002 [Statistical yearbook of petroleum and other statistical data 2002], accessed November 15, 2004, at URL http://www.mem.gov.ve/vmhidrocarburos/publicaciones/anuarios/pode_presentacion.pdf.
- Portal Minero, 2004, Venezuela prevé producir 31 millones/ton de hierro en cinco años [Venezuela Foresees 31 million tons of iron (ore) in 5 years], accessed December 3, 2004, at URL http://www.portalminero.com/noti/noticias_ver.php?codigo=1298.

Soberanía, 2004a (March 18), PDVSA entregó a China negocio de la Orimulsión [PDVSA handed over orimulsion business to China], accessed January 18, at URL http://www.soberania.info/Articulos/articulo_880.htm.

Soberanía, 2004b (March 28), Venezuela vende tecnología de orimulsión a China [Venezuela sells orimulsion technology to China], accessed January 18, 2005, at URL http://www.soberania.info/Articulos/articulo_915.htm.

U.S. Central Intelligence Agency, 2004, Venezuela, World Factbook 2004, accessed November 18, 2004, at URL <http://www.cia.gov/cia/publications/factbook/geos/ve.html#Econ>.

U.S. Energy Information Administration, 2004, Venezuela, Country Analysis Brief, accessed December 10, 2004, at URL <http://www.eia.doe.gov/emeu/cabs/venez.html>.

Major Sources of Information

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TABLE 1
VENEZUELA: PRODUCTION OF MINERAL COMMODITIES¹

(Thousand metric tons unless otherwise specified)

Commodity	1999	2000	2001	2002	2003	
METALS						
Aluminum:						
Alumina	1,469	1,755	1,833	1,901 ^r	1,882	
Bauxite	4,166	4,361	4,585 ^r	5,191	5,446	
Metal, primary, unalloyed	metric tons	570,321	570,870 ^r	570,580 ^r	605,290 ^r	601,290
Gold, mine output, Au content	kilograms	5,946	7,332	9,076	9,465	8,190
Iron and steel:						
Iron ore and concentrate, gross weight		14,051	17,350	16,902	16,684 ^r	17,954
Iron ore and concentrate, metal content		9,292	11,092	10,817	11,092 ^r	11,936
Metal, direct-reduced iron		5,071	6,401	5,903 ^r	6,824 ^r	6,645
Ferroalloys:						
Ferromanganese		10,694	15,655	12,715	-- ^r	--
Ferronickel		--	133	32,300	51,700 ^r	57,300
Silicomanganese		47,635	69,735	56,640	36,794 ^r	30,632
Ferrosilicon ²		38,886	56,926	46,236	99,576 ^r	90,543
Total		97,215	142,449	147,891	188,070 ^r	178,475
Steel, crude		3,261	3,835	3,814	4,164 ^r	3,930
Semimanufactures, hot-rolled		2,599	2,858	2,797	3,000 ^e	2,900 ^e
Lead, secondary, refined ^c	metric tons	25,000	30,000	30,000	30,000	30,000
Nickel:						
Mine output, Ni content	do.	--	2,540	13,600	18,600 ^r	20,700
Ferronickel, Ni content	do.	--	40	9,700	15,500 ^r	17,200
INDUSTRIAL MINERALS						
Amphibolite		--	--	14,230	18,610 ^r	3,520
Cement, hydraulic		8,500	8,600	8,700 ^e	7,000	7,000
Clays:						
Kaolin		12	--	--	--	--
Other		2,180	2,319	4,664	2,643 ^r	2,600 ^e
Diamond:						
Gem	carats	59,446	29,280	14,321	45,707	11,080
Industrial	do.	35,698	80,317	27,826 ^r	61,060	23,710
Total	do.	95,144	109,597	42,147	106,767	34,790
Feldspar		125	130	142	147	149
Gypsum		42	25	5	-- ^r	
Lime		400 ³	400 ³	400 ^e	400 ^e	400
Nitrogen, N content of ammonia		522	423	808	666	650 ^e
Phosphate rock:						
Gross weight		366	389	399	390 ^r	260
Content of P ₂ O ₅		99	105	114	111	75
Pyrophyllite ^e		32	32	32	32	32
Salt, evaporated ^e	metric tons	350,000	350,000	350,000	350,000	350,000
Serpentinite, crushed ^c		550	550	550	550	550
Stone, sand and gravel:						
Stone:						
Dolomite		--	12	66 ^r	92	100 ^e
Granite		1,151	581	796	750 ^e	750 ^e
Limestone ⁴		13,735	11,302	18,158	13,434	13,500 ^e
Sand and gravel		5,431	3,106	8,601	4,677	4,700 ^e
Silica sand ⁴		295	422	627	690	700 ^e
Sulfur, petroleum byproduct		68	328	322	283	300
MINERAL FUELS AND RELATED MATERIALS						
Carbon black ^c		60	60	60	60	60
Coal, bituminous		6,593	7,910	7,685	8,097	7,034
Gas, natural:						
Gross	million cubic meters	57,062 ^r	61,878 ^r	62,941 ^r	61,982	61,657
Marketed	do.	34,148 ^r	36,597	35,347 ^r	33,124	26,060
Natural gas liquids:						
Natural gasoline	thousand 42-gallon barrels	12,379 ^r	10,281 ^r	10,619 ^r	11,619	11,500 ^e
Liquid petroleum gas	do.	56,629	53,649 ^r	54,360 ^r	57,206	55,000 ^e
Total	do.	69,008 ^r	63,930 ^r	64,979 ^r	68,825	66,500 ^e

See footnotes at end of table.

TABLE 1--Continued
 VENEZUELA: PRODUCTION OF MINERAL COMMODITIES¹

(Thousand metric tons unless otherwise specified)

Commodity	1999	2000	2001	2002	2003
MINERAL FUELS AND RELATED MATERIALS--Continued					
Petroleum:					
Crude	1,116,705	1,151,436	1,115,075	1,105,793	964,695
thousand 42-gallon barrels					
Refinery products:					
Liquefied petroleum gas	3,679	4,530	4,931 ^r	7,961	6,500 ^e
Gasoline, motor	71,887	73,460	74,128 ^r	68,565	55,000 ^e
Naphtha and other gasolines	70,405	66,350	63,601 ^r	79,461	64,000 ^e
Jet fuel	35,022	34,226	32,233 ^r	32,113	26,000 ^e
Kerosene	146	--	157 ^r	--	125 ^e
Distillate fuel oil	121,465	116,176	110,642 ^r	114,584	92,000 ^e
Lubricants	2,033	1,880	1,814 ^r	1,723	1,350 ^e
Residual fuel oil	73,624	92,046	92,914 ^r	81,475	65,000 ^e
Asphalt	12,990	12,297	11,581 ^r	11,129	9,000 ^e
Petroleum coke	2,869	10,454	11,362 ^r	12,235	9,500 ^e
Parafins	157	193	150	153	125 ^e
For internal consumption	25,032	24,667	28,010 ^r	30,328	24,000 ^e
Unspecified	2,584	2,295	1,447 ^r	1,507	1,200 ^e
Gains and losses	2,807	-281	-3,409 ^r	15,783	16,200 ^e
Total ⁶	424,700	438,293	429,561 ^r	457,017	370,000 ^e

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

¹Table includes data available through September 30, 2004.

²Production of 75% silicon-content ferrosilicon.

³Excludes production under contract with the Government.

⁴Reported figure.

⁵Includes condensate and bitumen for the production of Orimulsión.

⁶Excludes byproduct sulfur, which is reported in the industrial minerals portion of this table, but includes losses.

TABLE 2
VENEZUELA: STRUCTURE OF THE MINERAL INDUSTRY IN 2003

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity
Alumina	C.V.G. Bauxilum C.A. (Corporación Venezolana de Guayana, 99%, and Alusuisse Lonza Holding, 1%)	Ciudad Guayana, Bolivar State	1,800.
Aluminum	C.V.G. Aluminio del Caroní, S.A. (Corporación Venezolana de Guayana, 82%, and Alcoa, 7.3%)	do.	210.
Do.	C.V.G. Venezolana de Aluminio C.A. (Corporación Venezolana de Guayana, 80%, and Showa Denko K.K., Kobe Steel Ltd., Sumitomo Chemical Co. Ltd., Mitsubishi Materials Corp., Mitsubishi Aluminum Co., and Marubeni Corp., 20%)	do.	430.
Bauxite	C.V.G. Bauxilum C.A. (Corporación Venezolana de Guayana, 100%)	Los Pijiguaos, Bolivar State	6,000.
Cement	CEMEX Venezuela, S.A. C.A. (Cementos Mexicanos S.A. de C.V., 100%)	Barquisimeto, Lara State; Maracaibo, Zulia State; Pertigalete, Anzoategui State; San Cristobal, Tachira State	4,600.
Do.	LaFarge Venezuela (LaFarge Group)	La Vega, Miranda State and San Cristobal, Tachira State	1,750.
Do.	Holcim (Venezuela) S.A. (Holcim Group, 50%)	Carupano, Sucre State; San Sebastian de los Reyes, Aragua State	2,200.
Do.	C.A. Fábrica Nacional de Cementos (Lafarge France, 46.13%)	Palmira and Ocumare del Tuy, Miranda State	1,330.
Do.	Cementos Catatumbo (Lafarge France, 23.32%)	Montellano, Zulia State	650.
Do.	Cemento Andino	Curcas, Trujillo State	560.
Coal	Carbones del Guasare, S.A. (Carbozulia S.A., 49%; RAG International Coal AG, 24%; Anglo Coal, 24%; private, 3%)	Paso Diablo, Zulia State, Guasare coal basin	7,000.
Do.	Carbones de la Guajira, S.A. (Carbones del Mar, S.A., 64%, and Carbozulia S.A., 36%)	Mina Norte and Cachiri, Zulia State, Guasare coal basin	1,200.
Ferrosilicon	Ferroatlántica de Venezuela, S.A. (Ferroatlántica S.L., 80%, and Corporación Venezolana de Guayana, 20%)	Ciudad Guayana, Bolivar State	80.
Gold	kilograms	Revevin (Crystallex de Venezuela C.A., 51%, and Corporación Venezolana de Guayana, 49%)	1,500 mill.
Do.	do.	El Callao Mining Corp. (Crystallex de Venezuela C.A., 80%)	La Victoria (Lo Increible), El Callao, Bolivar State
Do.	do.	Crystallex de Venezuela C.A. (Crystallex International Corp., 100%)	Tomi Mine, El Callao, Bolivar State
Do.	do.	Mínera Hecla Venezolana C.A. (Hecla Mining Inc.)	La Camorra, El Callao, Bolivar State
Do.	do.	C.V.G. Compañía General de Minería C.A. (C.V.G. Ferrominera Orinoco C.A., 66.77%, and Corporación Venezolana de Guayana, 33.23%)	Colombia and Unión Mines and Caratal and El Peru plants, El Callao, Bolivar State
Iron ore	C.V.G. Ferrominera Orinoco C.A. (Corporación Venezolana de Guayana, 100%)	Cerro San Isidro, Los Barrancos, and Las Pailas, Bolivar State	25,000.
Iron ore pellets	do.	Ciudad Guayana, Bolivar State	3,600.
Do.	Siderúrgica del Orinoco C.A. (Cosorcio Siderúrgico Amazonia Ltd., 70%, and Corporación Venezolana de Guayana, 30%)	do.	7,000.
Direct-reduced iron	do.	do.	4,600.
Do.	Complejo Siderúrgico de Guayana C.A. (Kobe Steel, 36.7%; C.V.G. Ferrominera, 17.4%; Tubos de Acero de México, S.A., 6.9%; Mitsui and Co. Ltd., Nissho Iwai Corp., Tomen Corp. and Shinsho Corp., 30.3%; International Finance Corp., 8.7%)	do.	1,000.
Do.	Orinoco Iron (International Briquettes Holding, 100%)	Puerto Ordaz, Bolivar State	2,200.
Do.	Venezolana de Prereducidos de Caroní (International Briquettes Holding, 100%)	do.	815.
Lime	C.V.G. Compañía Nacional de Cal (Corporación Venezolana de Guayana, 100%)		500.
Natural gas	million cubic meters	Petróleos de Venezuela S.A. (Government, 100%)	Processing plants in Anzoategui, Monagas, and Zulia States
Nickel		Loma de Níquel C.A. (Anglo American plc, 87.5%; Grupo Federal de Venezuela, 7.9%; International Finance Corp, 3.5%; Jourdex Resources Inc., 1.1%)	Loma de Níquel, Aragua and Miranda States
			22 mine. 18 plant.

TABLE 2--Continued
 VENEZUELA: STRUCTURE OF THE MINERAL INDUSTRY IN 2003

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity
Nitrogen content of ammonia	Fertilizantes Nitrogenados de Oriente S.A. (Pequiven, 35%; Koch Industries, 35%; Snamprogetti International S.A., 20%; Empresas Polar, 10%)	Jose, Anzoategui State	1,070.
Do.	Pequiven (Petróleos de Venezuela S.A., 100%)	Petrochemical complexes in Zulia and Carabobo States	670.
Petroleum:			
Crude million 42-gallon barrels	Petróleos de Venezuela S.A. (Government, 100%)	Fields in Anzoategui, Apure, Falcon, Guarico, Monagas, and Zulia States	1,393.
Crude, synthetic ¹	do. Petrozuata (Conoco Inc., 50.1%, and Petróleos de Venezuela S.A., 49.9%)	José Industrial Complex, Anzoategui State	40.
Do.	do. Cerro Negro (Exxon Mobil Corp., 41.665%; Petróleos de Venezuela S.A., 41.665%; Veba Oil & Gas, 16.67%)	do.	40.
Do.	do. SINCOR (TotalElf, 47%; Petróleos de Venezuela S.A., 38%; and Standard Oil Co., 15%)	do.	67.
Refinery products	do. Petróleos de Venezuela S.A. (Government, 100%)	Refineries in Amuay and Cardon, Falcon State; Puerto La Cruz and San Roque, Anzoategui State; El Palito, Carabobo State; Bajo Grande, Zulia State	366.
Steel	Siderúrgica del Orinoco C.A. (Amazonia Consortium, 70%, and Corporación Venezolana de Guayana, 30%)	Ciudad Guayana, Bolivar State	3,750.
Do.	Siderúrgica del Turbio C.A. (Siderúrgica Venezolana Sivensa S.A., 100%)	Antimano, Miranda State; Barquisimeto, Lara State; Casima, Bolivar State	840.
Sulfur	Petróleos de Venezuela, S.A. (Government, 100%)	Refineries in Amuay and Cardon, Falcon State; El Palito, Carabobo State; San Roque, Anzoategui State	422.
Do.	Petrozuata (Conoco Inc., 50.1%, and Petróleos de Venezuela S.A., 49.9%)	Jose Industrial Complex, Anzoategui State	53.

¹Extra-heavy crude processing, assumed 330 days per year of operation.