THE MINERAL INDUSTRY OF

VENEZUELA

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The relatively good years, economically, of 1990, 1991, and 1992 for Venezuela turned out otherwise in 1993, and continued through 1994 into a deepening recession. A financial crisis, not improved by significant flight of capital out of the country, proved difficult to overcome. Although there were individual gains, mineral production was generally less robust than in the preceding "good" years. Prices for petroleum crude recovered somewhat from their weakness of 1993, but eased again before they could provide a substantial boost to the economy.

In real terms, the gross domestic product (GDP) fell 3.3% in 1994, according to the Central Bank of Venezuela, and inflation reached almost 71%. The fiscal deficit for the year was about 7% of GDP and could reach 8% in 1995 if the Government does not (or cannot) cut spending. Preliminary indications were that exports of crude and refined products, normally 80% of Venezuela's foreign-exchange earnings, declined to about 75% for 1994. Although the average exchange rate for 1994 was Bs163=US$1.00,[2] the 1995 budget was predicated on a rate of Bs180=US$1.00, which was still less than black-market rates exceeding 210 Bolivars to the U.S. dollar. Real wages have declined 50% throughout the past 10 years in a country that believed its petroleum resources would carry the economy virtually forever.

Petroleos de Venezuela SA (PDVSA), the Government-owned petroleum company, turned out a production performance better than that of 1993, and which translated into a 5.7% increase in revenue. Petroleum's contribution to Venezuela's total tax revenues was between 52% and 53% in 1994, a conspicuous reminder of the importance of this sector of the ecomomy. Total net earnings for PDVSA's operations amounted to $1.65 billion. Also on the plus side, exports of major mineral commodities increased between 35% and 40% compared with those of the previous year. More countries have expressed interest in PDVSA's Orimulsion liquid fuel for thermal power generation, and privatization continued to attract interest in mineral exploration.

Government Policies and Programs

The previous Government liberalized foreign investment rules, including those for the mining sector, that eliminated obstacles to dividend and capital repatriation. In July 1994, however, the Government established strict exchange controls, generating apprehension among existing as well as potential investment sources. Although declared to be only temporary, the controls remained in full force at the end of the year. Mining policy has been controlled by Venezuela's 1945 mining law, of late thought to have been good in its time, but in need of revision if Venezuela were to maintain interest in its mining potential, particularly from foreign sources. The Venezuelan Congress nearly passed a new mining law in 1993, but adjourned for the year before the two houses could reconcile their respective versions. Although the proposed law was intended to encourage mining investment, it was criticized for not going far enough in modernizing rules and procedures.

In 1994, the Congress started again, with help from interest groups, to devise a totaly new law that would lay out simple, transparent, and flexible rules for the mining sector that would promote responsible mining activity and stimulate foreign investment.

In 1993, a petition had been filed with the Venezuela Supreme Court by a local group questioning the legality of a decree that formed the basis of Placer Dome Inc.'s ownership of rights to the Las Cristinas property at Kilometre 88 in southeastern Bolivar State. This action was not so much intended to frustrate Placer Dome as to clarify the ownership of rights to other properties thrown into question by the action of Corporacion Venezolana de Guayana (CVG), the State-owned holding company for basic industries, in granting mineral rights. The petitioners claimed that only the Ministry of Energy and Mines could grant mineral rights, even though CVG has granted more than 400 work contracts to private interests in Venezuela. Although the foreign media reported[3] this situation as if it were aimed at Placer Dome, the fact remained that it had all the earmarks of an internal dispute prompted by private Venezuelan citizens determined to protect other unrelated mining interests.

Environmental Issues

Notwithstanding the fact that the new mining law was not passed, the so-called Criminal Environmental Law of 1992 was in full swing. This law contains provisions mandating environmental safeguards and restoration of areas disturbed by mining activity. Before a mining project can be started, an investor or company must submit an environmental impact study to the Ministry of the Environment for review

and approval. With serious penalties for violators, the environmental law is notably strict in the form promulgated. Uncertainty about how closely the law will be enforced has resulted in hesitation by some companies that are not clear on all the requirements. In particular, questions have arisen as to the likelihood of selective or arbitrary enforcement. Excessive delays have been experienced in securing approval for projects from the Ministry of the Environment.

As Venezuela struggled toward an orderly political system and a viable economy, environmental problems were seemingly of secondary concern in the media. The fact remained, however, that *garimpeiros* (illegal miners) had caused cumulative environmental damage in southeast Venezuela where they used mercury for gold amalgamation. Upon heating to drive off mercury and retrieve gold, gaseous mercury is released to the atmosphere and then precipitates to fall with the rain. Not only were soils and streams poisoned but aboriginal settlements were put at risk.

Most, if not all, of the *garimpeiros* are thought to be Brazilians who have little idea of the location of the unmarked border in the tropical wilderness.

Production

The mineral sector's principal products in 1994 were aluminum, bauxite, diamond, ferroalloys, gold, iron ore, iron and steel, petroleum crude and natural gas, and petroleum products. (See *table 1*.) Bauxite output, 64% greater than that of 1993, led the list of metals and metallic ores in terms of increased production during the year. Gold was in second place with an increase of 12% from the previous year. Production of iron ore gained 9%, and output of secondary refined lead climbed 7%, over corresponding totals for 1993. Output of aluminum and steel both rose 5%, and direct-reduced iron 4%, compared with the previous year.

Among the industrial minerals, production of diamond climbed sharply. Gem-quality diamond output increased 32%, and industrial diamond yield was up 26%, compared with that of the previous year. Production rose for cement, 1%; common clay, 13%; dolomite, 20%; feldspar, 25%; granite, 79%; limestone, 5%; and sand and gravel, 30%. Output declined for kaolin, 27%. industrial nitrogen, 6%; and silica sand, 87%. Production of gypsum remained essentially unchanged.

Production of coal in 1994 increased by 17% on top of a solid 37% increase in 1993, signaling impressive growth in engineering and mining. Output of petroleum crude climbed more than 10% compared with 1993. Output of refinery products is estimated to have been up slightly, probably proportionate to production of crude, compared with that of the previous year.

Because the mining sector traditionally played a minor role in the Venezuelan economy, particularly by comparison with the petroleum industry, the Government has been encouraging increased mining activity. It seemed reasonably clear that metals and mineral fuels responded to world market prices, while many of the industrial minerals reflected the domestic requirements of a country that has been growing in spite of political and economic problems. Although showing negative growth in the early 1980's, mining as a whole grew to achieve earnings approximating at least 2% of GDP.

Trade

Total value of Venezuela's exports amounted to $15 billion in 1994, while total imports were valued at about $9 billion. The country continued its transition from a closed economic system to an open, export-oriented economy. Its principal export was petroleum crude, and its biggest customer was the United States. Typically, full-year statistics show that slightly more than 65% of Venezuela's total exports of crude and refined products have been going to the United States. In turn, the imported crude and products have amounted to about 90% of all U.S. imports from Venezuela.

In order of tonnage (but not value), the major metal mineral commodities recently exported by Venezuela to the world were fabricated steel, pig iron, unwrought aluminum, rolled steel, steel bars, primary steel, coated steels, aluminum oxides, aluminum semimanufactures, and manganese oxides. Industrial mineral exports were nitrogenous fertilizer materials, ammonia, gypsum, gravel and crushed rock, sand, elemental sulfur, and carbon black. About $1 million worth of precious and semiprecious stone dusts and powders also were marketed abroad.

Foreign-exchange controls, instituted in midyear, posed challenges to the import system, in that Venezuelan purchasers were required to obtain administrative approval for obtaining foreign currencies for payments.

Mexico, Venezuela, and Colombia concluded negotiations on a free-trade pact that took effect in the first half of 1994. Tariffs were to be phased out rather than abolished immediately.

Structure of the Mineral Industry

Traditionally, the major mineral producers have been essentially State-owned. Beginning in 1989, however, the Government worked to privatize Venezuela's mineral industry, which comprised more than 450 separate companies. The industry anticipated increasing private investment in aluminum, coal, and petrochemicals and later, presumably, in steel and petroleum, the latter having been opened to private investment for the first time during 1993.

Major investment of new capital throughout the mineral sector was courted, but the main interest in 1992-94 seemed to be in gold. In 1990, the mineral labor force totaled 47,000 in petroleum, 29,000 in iron and steel, and 26,000 in mining and quarrying. This was approximately 6% of the 1.7 million in the industrial sector of a labor force totaling 7.4 million overall. (See *table 2*.)

Commodity Review

Metals

Alumina, Aluminum, and Bauxite.— With production of bauxite in 1994 up 64% compared with that of the previous year, which itself represented more than a doubling of the output of 1992, the bauxite mining industry signaled that it was on the way to becoming a major factor in the economy of Venezuela. Although output of alumina dipped about 13% compared with that of the previous year, production of metallic aluminum increased by 5% compared with that of 1993. Next to petroleum and petroleum products, aluminum was the most important export, commonly exceeding $500,000 per year in value.

However, after the capitalizing of significant expansions in alumina and bauxite production during the 1992-93 market disturbance resulting from Russian dumping, all was not well with the financial side of the industry, particularly after a loss of $168 million in 1993 and the expectation of a bigger loss in 1994.[4] Venalum, the biggest aluminum smelter, owned 80% by the Government and 20% by Japanese groups, as well as Interalumina and Bauxiven, were put on the market for privatization by CVG, which merged the administrative operations of the three companies. The hope was that the profit picture could be turned around, sooner rather than later, in that Venalum already has one of the world's lowest production costs for primary aluminum.

Interalumina itself had been setting up a third alumina production line, intended to be ready in the first half of 1996 for utilization of Alusuisse technology. Production was targeted to increase from 2 million metric tons per year (Mmt/a) to 3 Mmt/a at that time.

Meanwhile, Aluminos del Caroni (Alcasa), owned 92% by the Government and 8% by Reynolds International, operating a primary aluminum smelter and two rolling mills, posed perhaps a bigger financial problem. Based in Puerto Ordaz, Alcasa had only two of its four reduction lines operating and a fifth still under construction. Alcasa was not to be included in the Bauxiven-Interalumina-Venalum package, but instead was offered separately for privatization.

With good supplies of bauxite, plentiful labor, and low energy costs, Venezuela boded well to cure its financial problems and become a serious competitor in world aluminum markets.

Chromium.— The Ministry of Energy and Mines reported chromite mineralization in two places. About 10,000 Million metic tons (Mmt) grading 40% Cr_2O_3 was located in Falcon State, east of Lake Maracaibo. Another 38 Mmt grading 2.73% Cr_2O_3 was projected in Aragua State, west and south of Caracas.

Gold.— Output of gold in Venezuela continued climbing, showing a 12% increase in 1994 compared with production in 1993. Data represented only reported production and did not include output by *garimpeiros*, known to be widespread in their small operations in the less accessible parts of eastern and southeastern Venezuela along the border with Brazil. The Government estimated that there may be 16,000 of these illegal miners and that they smuggle an estimated 25 metric tons (mt) of gold out of Venezuela yearly.

Monarch Resources, of Bermuda registry, opened the first new underground gold mine, La Camorra, in Venezuela in 50 years. Situated in Bolivar State in the El Dorado region (but not at Kilometre 88), the mine began pouring gold in midyear.

As in previous years, the bulk of the news of gold exploration and discovery during 1994 centered on the so-called Kilometre 88 district of southeastern Bolivar State in the Precambrian shield, where the geology is very similar to that of the greenstone belts of the Canadian Shield. So named because of its location along Highway 10 south of the zero marker near El Dorado on the Cuyuni River, the area was worked illegally for years by unlicensed miners, including *garimpeiros* from Brazil, who were thought to have removed more than 62 mt of gold from surface operations using primitive mining techniques. In 1990-92, the Government largely closed down illegal mining, relocated the *garimpeiros* and, in conjunction with the liberalization of its mining laws, made the region accessible to large-scale exploration fueled by foreign investment. Issues relating to title needed clarification, but reportedly could be resolved by expert Venezuelan legal advice.

Many Canadian junior and senior companies were greatly involved in what could only be called a true gold rush at Kilometre 88, and exploration service organizations were active, particularly geophysical and drilling companies. Increased attention was attracted by Placer Dome's (owned 70%, Government 30%) apparent major discovery at Las Cristinas, and concessions have been established virtually throughout an area of roughly 30 kilometers (km) by 45 km. Placer Dome announced that their Conductora and Cuatro Muertos zone contained a resource comprising about 124 Mmt grading 12.3 grams per metric ton (g/mt) of gold at a 0.7 g/mt cutoff, amounting to 4.8 million troy ounces (1,543 kilograms (kg), worth more than $1.8 billion at a projected price of $380 per troy ounce.

Iron Ore.— Production of iron ore climbed about 9% compared with that of 1993, a year that represented a 5-year low in mining of iron ore. Although not matching the 21 Mmt range of output in 1991, prior to the current economic troubles, the industry did seem headed for recovery.

C.V.G. Ferrominera Orinoco C.A. (Ferrominera), Venezuela's only producer of iron ore, operated the San Isidro, Cerro Bolivar, El Pao, and Los Barrancos mines. Ferrominera announced that it planned to increase its installed mining capacity from the current 20 Mmt/a to 40 Mmt/a by the year 2000, after having operated essentially at

or slightly above installed capacity in previous years, particularly in 1991. It was estimated that the ultimate cost of doubling capacity with ancillary infrastructural upgrades would reach $1.3 billion by 2000. The program would include construction of new facilities for expansion of pellet production. Overall, plans aimed at adapting new iron and steel technologies to reduce production costs, cope with environmental requirements, increase competitiveness, and generate a reasonable return on investment.

As of 1991, Ferrominera had proven iron ore reserves of 1.96 billion mt grading 60% and estimated reserves of 11.7 billion mt of lower-grade ore averaging about 44% iron. Most of these reserves are in Bolivar State of southern Venezuela in the 50,000-kilometers km² Imataca region. At presently projected rates of production, Venezuela's proven iron ore reserves should last for more than 100 years.

Iron and Steel.—Venezuela enjoyed continuing success in 1994 with its direct-reduced iron (DRI) production, but after operating above capacity in 1993 for output of hot briqueted iron (HBI), its Minarales Ordaz CA (Minorca) plant at Porto Ordaz had to be shut down for repairs and maintenance. Having produced 900,000 mt in 1993, versus 830,000 mt rated, the plant took advantage of price buoyancy for HBI in world markets and postponed periodic upkeep into 1994.

Not far from the Minorca operation, a new $381-million iron pellet plant built for C.V.G. Ferrominera Orinoco (FMO) went into production. Although capacity was rated at 3.3 Mmt/a, the first year of operation was expected to yield a more modest output of perhaps 1 Mmt of pellets, with full rated output achieved in about 2 years. Some of FMO's pellet production was expected to be taken by Minorca for direct reduction.

FMO or ferrominera ratified a project to begin construction of the Comsigua Direct Reduction Plant in Ciudad Guayana, Bolivar State, to be jointly owned with Japanese and American companies. Kobe Steel was selected to build and operate the plant.

C.V.G. Siderurgica del Orinoco C.A. (Sidor) was to be at least partly privatized, with the private sector taking over services to, and management of, the 3 Mmt/a raw steel producer. Services to be privatized included oxygen, gas, and infrastructure supply. It was disclosed that 51% of Sidor's seamless pipe mill had been purchased for $116 million by Finalven, a domestic company, and Iritecna, a subsidiary of the Italian company, Instituzione Per La Ricostruzione Industriale (IRI). Furthermore, no World Bank money was to be involved. The joint venture would be called Tubos Del Orinoco, or Tuborca. The only seamless pipe mill in Venezuela, its construction had been initiated by Sidor in 1986 with help from another IRI subsidiary, but lack of funds had caused suspension of the project in 1989. When completed, the mill would have a capacity of 250,000 mt/a. Sidor was to retain 40% ownership, with 9% going to the Tuborca workers. Demand for seamless steel pipe has grown steadily from the State-owned PDVSA for oil and gas operations.

Nickel.—The Loma de Hierro laterite deposit in Miranda State, that includes a projected 35.7 Mmt of material grading 1.57% nickel (1.2% cutoff) and 0.05% cobalt, attracted outside interest on the part of Anglo-American Corp. of South America (AMSA). By the end of the year, AMSA had bought in on 10% of the project and earned the right to purchase an additional 60% for a reported $27.5 million. The deposit had been valued at $43.5 million as it lay. Owners were Jordex Resources Inc., a Canadian company based in Vancouver, in a 50-50 joint venture with the Venezuelan company Caracas Corporation, called Corporacion Federal de Minas (COFEMINAS), which has been carrying out exploration drilling prior to an analysis of mining feasibility. Nickel grades at Loma de Hierro were similar to those of Falconbridge Ltd.'s Falcondo in the Dominican Republic, or P.T. Inco in Indonesia, but energy costs would be significantly lower for the Venezuelan operation.

Industrial Minerals

Cement.—Output of hydraulic cement, at 6,927 Mmt, was up between 3% and 2% compared with that of the previous year, sustaining a steady climb in output for more than 6 years. Demand for cement had followed suit overall, but experienced uncertainties from month to month as the result of political and economic instabilities as they affected major construction, which was down sharply during 1994.

Venezuela's largest cement producer, Venezolana de Cementos, (Vencemos) agreed to sell a controlling block of equity to Cementos Mexicanos (Cemex), the leading producer of Mexico, for approximately $300 million, but the quid pro quo was not yet worked out. Vencemos had 50% of the domestic cement market and 25% to 30% of the concrete market.

The Government also sold its 19% share of Cementos Catatumbo, most of it to the French company LaFarge Copee, for $6.2 million. LaFarge previously held 12% of the company and, by this purchase, increased its share to 24%, the remainder having gone to other buyers including Zuliano Inversiones and Proyecto Catatumbo. Cementos Catatumbo, with an output capacity of 657,000 mt, held about 8% of the domestic market with yearly sales of $18 million.

Exports of cement to all purchasers were encouraged during the year in order to earn financial credits; offshore demand remained firm.

Diamond.—The widespread occurrence of diamond in alluvial deposits in Bolivar State presents, immutably, the case for kimberlite pipes in the region. At least one kimberlite body comprising dikes and sills has been exposed

discontinuously over a length of 7 km along the Quebrada Grande, a stream in the Guaniamo district.[5] Further exploration would be expected to discover many more such kimberlites if the distribution of alluvial diamond through much of Venezuela and Guyana were any indication. During 1994, one U.S. firm and several Canadian companies obtained dredging concessions for working placer deposits.

Refractory Materials.—The principal manufacturer of refractories in Venezuela, Ceramica Carabobo CA, had a capacity of 120,000 mt/a. Although later output was not reported, production in 1992 consisted of 90,000 mt of high and medium alumina bricks, low alumina bricks for insulation, basic refractories, chemically bonded materials, mortars, castables, plastics, rammables, and gunning mixes. Castables included low iron, normal, dense, or extra-dense, and in each case were silica-alumina, high alumina, or basic. The gunning mixes were based on chromites and chrome magnesites. The company also produced light aggregates, alumina cement, and bauxite. Raw materials were mainly imported magnesites from the United States, Austria, the Netherlands, and Brazil; chromite from the Philippines, Africa, and Cuba; aluminas from the United States and Europe; and aluminous cements from France and the United States.

Mineral Fuels

Coal.—Output of bituminous coal climbed 17% as development of Venezuela's coal resources intensified and the Government pushed its plan to diversify the country's mineral production away from almost total reliance on petroleum. The Venezuelan coal-mining company, Carbozulia, a subsidiary of PDVSA, exported about 4 Mmt of coal in 1993, thought to be worth at least $35 million. Smaller volumes also were exported by other sources. The United States was the largest purchaser, followed by the Netherlands and France.

Mined in the north-central part of the country south and east of Caracas, as well as in the northwest part of the country east, west, and south of Lake Maracaibo, Venezuelan coals tend to have low sulfur, in some cases high volatile matter and/or relatively high ash, but generally a high thermal value that, taken together, put much of the coal reserves in the high-rank bituminous category. Production is commonly by open pit operations, affording cost controls leading to very competitive market pricing.

In the Guasare district of Zulia State, a sedimentary basin in the foothills of the Andes virtually on the border with Colombia, Carbozulia aimed for an output of 18 Mmt/a by 1997 and 20 Mmt/a by 2000. Guasare coals are metallurgical, having 51% fixed carbon and a high thermal value, 7.5% ash, and 0.6% sulfur, suitable for direct injection into blast furnaces as a substitute for coke. The resource includes 11 groups of seams, the thickness of individual seams ranging from 1 to 13 meters (m).[9] Recent Guasare development and production have been centered on the Paso Diablo coal mine, operated jointly by Carbozulia and Agipcoal of Italy. Carbozulia was further considering new port and rail facilities capable of handling cape-size (120,000 dead-weight tonnage) vessels, involving a deeper channel in Lake Maracaibo.

The Ministry of Mines approved a long-term permit for the British Young Group PLC to expand the coal reserves of Carbonar, about 300 km east of Caracas near the coast. Mining operations were to be expanded to allow the company to ship 1 Mmt of coal to British electric generating plants.

Natural Gas.—The production of natural gas amounted to 44.6 billion cubic meters (m^3), with an estimated 12 billion m^3 of this having been utilized in the field for reinjection; 17 billion m^3 utilized in other operations and processes; and the remaining 15 billion m^3 (or slightly more) marketed.

Natural gas liquid output was 53.3 million barrels (Mbbl), of which approximately 42 Mbbl would have been liquid petroleum gas and about 11.3 Mbbl would have been natural gasoline, as estimated from past performance.

Most natural gas produced in Venezuela has been associated gas, volatilized from crude as the latter encounters the lower temperatures and pressures within recovery equipment at the surface. Until recently, virtually all gas produced was reinjected, sold for power generation, used for feedstock and power in refineries, or consumed as petrochemical feedstock, introducing an element of confusion as to applicability of the term "marketed."

Starting in 1991, plans were made to develop offshore gas fields in the Gulf of Paria near Venezuela's east coast, culminating in 8 production platforms drilling at least 55 wells. About 50 km of pipeline would carry the gas ashore for processing and export.

Petroleum Crude.—Production of crude in 1994 amounted to just less than 900 Mbbl, up 10% compared with output in the previous year. Gross revenues to PDVSA included $11.2 billion from export sales, mostly to the United States. For 1993, by comparison, investment by PDVSA and ancillary entities amounted to $3.4 billion in oil and gas operations; $103 million in petrochemicals; $56 million in bitumen and Orimulsion (see below); and $2 million in coal and fertilizers. With increased production through 1994, PDVSA once again preserved its financial self-sufficiency, retaining the capability of financing its own operations, taxes, and investments, and ending the year with a positive cash balance. PDVSA awarded a number of service contracts to private companies to reactivate marginal oil fields, totaling 13 field units, including 5 to U.S. companies. This program has been reasonably successful, but does not involve equity ownership by any of the

contractors. With total reserves of more than 64 billion barrels (bbl), Venezuela had enough crude for 70 years' production at present rates.[7]

The Orinoco heavy oil belt consists of an estimated 1.2 trillion bbl of bitumen that by itself exceeds the world's total reserves of crude, although this bitumen or tar is not crude. The tar is too thick to refine or burn, but can be extracted from the ground for $3 per bbl versus at least $9 per bbl to mine tar sands or oil shales in various other countries, such as Canada and Russia. One solution reached by PDVSA after 15 years of research has been to convert the tar into an emulsion of 70% oil and 30% water ("Orimulsion"), which flows and can be transported easily. It ignites readily and can be burned in powerplants. PDVSA has amassed contracts to supply power generators in the United States, Europe, and Japan with 10 Mmt of Orimulsion, and other agreements were being negotiated with China.

Reserves

Venezuela has significant reserves of bauxite, coal, gold, iron ore, natural gas, and petroleum, among other ores and mineral commodities, not all of which are being mined. Some, such as nickel, almost certainly will be extracted when feasibility studies are completed. Investors have also applied for concessions to mine such minerals as antimony, copper, lead, mercury, niobium, tantalum, titanium, and zinc. The reserves of the country's major mineral commodities, as projected by officials of the Venezuelan Government or their representatives, are shown in table 3.

Infrastructure

Venezuela's rail system had 542 km of single-track 1.435-m gauge rail, 363 km of which was Government-owned and the remainder privately owned. The country's road system consisted of 31,200 km of paved highway and 24,800 km of gravel-surfaced roadway. An additional 25,000 km was unimproved loose-surface road. The country had 425 airports, 392 of them in usable condition; 139 of them had paved runways. No runway exceeded 3,659 m in length; 15 had runways 2,440 to 3,659 m long; and 92 had runways 1,220 to 2,439 m long. Venezuela's navigable waterways for oceangoing vessels totaled 7,100 km, including the Rio Orinoco and Lago de Maracaibo. The country's hydrocarbon pipeline system consisted of 6,370 km for crude petroleum, 480 km for refined products, and 4,010 km for natural gas.[8] Thirty of the 58 ships in the Venezuelan merchant marine were available for mineral products transportation.

Coal produced in the Guasare coal basin was hauled by highway trucks about 85 km to the Santa Cruz port facilities on Lake Maracaibo and then barged by canal to oceangoing vessels. Plans were being considered for construction of a railroad and new port facilities to expedite coal exports.

Outlook

The tax reform enacted in 1992 was expected to stimulate foreign investment in the hydrocarbon and other mineral industries, but it seemed that more than tax reform might be needed. Venezuela's legal requirements were blocking the very capital investment the country hoped to attract, particularly from other countries. The laws governing prospecting, claiming, and mining were detailed and potentially complex. The succession of Government decrees and resolutions from 1944 through 1990 constituting the present mining law have great potential for manipulation and mischief because of their very complexity. Establishment of a single, uncomplicated, comprehensive mining law could stimulate activity in all sectors of the mineral industry of Venezuela.

Venezuela is endowed with natural resources that could make the country relatively wealthy provided political stability, technology, and infrastructure are encouraged to develop into a strong economic base. The country may be expected to continue its efforts toward diversification of its mineral sector to reduce its heavy dependency on petroleum.

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[1]Text prepared July 1995.
[2]Latin American Economy and Business. June 1995, p. 15.
[3]Mining Journal. V. 321, No. 8232, July 9, 1993, London.
[4]Kepp, Michael. American Metal Market, Sept. 9, 1994.
[5]Nixon and others, 1989, *in* U.S. Geological Survey and Corporacion Venezolana de Guayana, Tecnica minera, C.A. Geology and Mineral Resource Assessment of the Venezuelan Guayana Shield, U.S. Geological Survey Bull. 2062, 1993, p. 77, U.S. Government Printing Office, Washington, DC
[6]Weaver, Jean N. Coal in Latin America: 1992 Uruguay, Argentina, Chile, Peru, Ecuador, Colombia, Venezuela, Brazil, and Bolivia, U.S. Department of the Interior, U.S. Geological Survey, Open-File Report 93-239, Denver, Colorado, 1993, p. 47 et seq.
[7]U.S. Embassy Caracas. Department of State Telegram 02388 of Mar. 23, 1994.
[8]Central Intelligence Agency. The World Factbook, 1993, p. 412.

Major Sources of Information

Dirección General Sectorial de Hidrocarburos
Ministerio de Energía y Minas
Caracas, Venezuela
Dirección General Sectorial de Minas
Ministerio de Energía y Minas
Caracas, Venezuela

Major Publications

U.S. Embassy, Caracas:
Industrial Outlook Report, Iron and Steel (SPR-539), annual.
Industrial Outlook Report, Minerals (SPR-429), annual.
Minerals Questionnaire (SPR-4291), annual.
Venezuelan Petroleum Industry Development and Outlook Report, annual.
Latin American Mining Institute, Washington, D.C.:

The South American Investment and Mining Guide (annual); includes section on Venezuela.
Ministerio de Energía y Minas, Caracas:
Carta Semanal, weekly.
Memoria y Cuenta, annual.
Petróleo y Otros Datos Estadísticos, annual.
Presidencia de la República, Oficina Central de Estadística e Informática, Caracas: Anuario Estadístico de Venezuela, annual.
U.S. Department of Commerce:
Foreign Economic Trends, annual.

TABLE 1
VENEZUELA: PRODUCTION OF MINERAL COMMODITIES 1/ 2/

(Thousand metric tons unless otherwise specified)

Commodity		1990	1991	1992	1993	1994
METALS						
Aluminum:						
Alumina		1,290	1,300	1,310	1,500	1,300
Bauxite	metric tons	771,000	1,990,000	1,050,000	2,910,000	4,790,000
Metal, primary, unalloyed	do.	590,000	601,000	561,000	568,000	595,000
Gold, mine output, Au content	kilograms	7,700	4,220	7,550	8,900 r/	9,990
Iron and steel:						
Iron ore and concentrate		20,100	21,200	18,100	16,900	18,300
Metal:						
Pig iron		314	--	--	--	--
Direct -reduced iron		3,130 r/	4,020 r/	4,300 r/	4,510 r/	4,710
Total		3,440 r/	4,020 r/	4,300 r/	4,510 r/	4,710
Ferroalloys:						
Ferromanganese		--	1	9	-- r/	-- e/
Ferrosilicomanganese		31	31	32	42 r/	40 e/
Ferrosilicon 3/		53	54	40 r/	47 r/	41
Total		84	86	81 r/	89 r/	81 e/
Steel, crude		3,000	3,300	4,260	3,360	3,520
Semimanufactures, hot-rolled		2,340	2,210	2,450	2,560	2,390
Lead, secondary, refined	metric tons	14,000	15,000	15,000 e/	14,000 r/	15,000
INDUSTRIAL MINERALS						
Amphibolite		188	212	200	--	--
Cement, hydraulic		5,230	6,340	6,590	6,840	6,930
Clays:						
Kaolin		12	39	37	22	16
Other		3,060	2,750	1,630	1,920	2,170
Diamond:						
Gem	carats	85,000 e/	102,000	302,000	145,000	192,000
Industrial	do.	248,000	112,000	176,000	155,000	195,000
Total	do.	333,000 e/	214,000	478,000	301,000	387,000
Feldspar		91	138	169	220	275
Gypsum		201	244	175	224	225
Nitrogen, N content of ammonia		557	450	404	535	505
Phosphate rock		165	162	10	--	57
Pyrophyllite e/		32	32	32	32	32
Salt, evaporated	metric tons	439,000	430,000	318,000	370,000 e/	400,000 e/
Serpentinite, crushed e/		550	550	550	550	550
Stone, sand and gravel						
Stone:						
Dolomite		300	300 e/	275	250	300
Granite		262	370	47	195	350
Limestone		12,600	11,400	14,300	14,900	15,700
Marble		--	--	134	--	-- e/
Sand and gravel		5,330	4,610	4,940	5,030	6,570
Silica sand		443	343	703	753	100
Sulfur, petroleum byproduct		125	155	155	135	150 e/
MINERAL FUELS AND RELATED MATERIALS						
Carbon black e/		60	60	60	60	60
Coal, bituminous		2,190	2,500	2,880	3,940	4,630
Gas,natural:						
Gross	million cubic meters	40,500	42,300	43,400	42,500	44,600
Marketed	do.	15,600	15,000 e/	15,000 e/	15,000	15,100 e/
Natural gas liquids: 4/						
Natural gasoline	thousand 42-gallon barrels	7,500 e/	8,190 e/	18,600	7,900	11,300 e/
Liquid petroleum gas	do.	30,000 e/	33,300 e/	74,500	38,800	42,000 e/
Total	do.	37,500 e/	41,500 e/	93,100	46,700	53,300

See footnotes at end of table.

TABLE 1--Continued
VENEZUELA: PRODUCTION OF MINERAL COMMODITIES 1/ 2/

(Thousand metric tons unless otherwise specified)

Commodity		1990	1991	1992	1993	1994
MINERAL FUELS AND RELATED MATERIALS--Continued						
Petroleum:						
Crude	do.	770,000	872,000	907,000	816,000 r/	899,000
Refinery products:						
Liquified petroleum gas	do.	2,920	3,000 e/	3,500 e/	2,920	3,290
Gasoline:						
Aviation /e	do.	178	350 5/	300	64	-- 5/
Motor	do.	122,000 e/	115,000	105,000 e/	68,900	68,800
Naphtha e/	do.	22,000	6,000	12,000	58,000 5/	50,500
Jet fuel	do.	24,000 e/	28,100	29,000 e/	28,500	27,700
Kerosene	do.	2,330	803	1,000 e/	999	--
Distillate fuel oil	do.	99,900	107,000	100,000 e/	104,000	93,800
Lubricants	do.	2,980	2,950	2,950 e/	3,320	2,750
Residual fuel oil	do.	89,200 e/	107,000	105,000 e/	102,000	96,400
Asphalt and bitumen	do.	12,100	9,040	10,000 e/	8,230	10,300
Refinery fuel gas e/	do.	9,000	9,100	9,000	27,900 5/	9,000
Unspecified e/	do.	1,370	1,210	1,500	1,240	2,320 5/
Total	do.	388,000	390,000	379,000 e/	406,000	365,000

e/ Estimated. r/ Revised.
1/ Table includes data available through July 1995.
2/ Previously published and 1994 data are rounded by the U.S. Bureau of Mines to three significant digits; they may not add to totals shown.
3/ Figures represent combined 45%-silicon-content and 75%-silicon-content production.
4/ From nonassociated gas only.
5/ Reported figure.

TABLE 2
VENEZUELA: STRUCTURE OF THE MINERAL INDUSTRY FOR 1994

(Metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity
Alumina	Interalumina (Government, 88.7%; Aluminio Suizo S. A. , 11.3%	Ciudad Guayana, Bolivar State	1,300
Aluminum	Aluminio del Caroni S. A. (Alcasa) (Government, 82%; Reynolds International, Inc. 8%)	do.	300
Do.	Industria Venezolana de Aluminio C. A. (Venalum) (Government, 80%; Six Japanese companies, 20%)	do.	366
Bauxite	C.V.G. Bauxita Venezolana C. A. (Bauxiven)	Los Pijiguaos, Bolivar State	1,000
Cement	C. A. Venezolana de Cementos	Barquisimeto, Lara State; Maracaibo, Zulia State; Pertigalete, Anzoatequi State	2,750
Coal	Carbones del Guasare S. A. 1/	Paso Diablo, Zulia State Guasare coal basin	1,500
Gold	Revemin II (C.V.G. 49%; Monarch, 49%; Public, 2%)	El Callao, Bolivar State	900
Do.	Las Cristinas (Placer Dome 70%; C.V.G. 30%)	Kilometre 88, Bolivar State	new
Iron ore	C.V.G. Ferrominero del Orinoco C. A. (Government, 100%)	Cerro Bolivar, El Pao, Los Barrancos, and San Isidro mines, Bolivar State	20,000
Iron ore pellets	C.V.G. Ferrominero del Orinoco C. A. (Government, 100%)	Ciudad Guayana, Bolivar State	
Nickel	Jordex Resources, 50%; Corporacion Federal de Minas, 50%)	Loma de Hierro, Miranda State	new
Petroleum crude	Petroleos de Venezuela S.A. (PDVSA) (Government, 100%)	Fields in Anzoatequi, Apara, Falcon, Guarico, Monagas, and Zulia States.	1,822
Petroleum products	do.	Major refineries at Amuay Bay and Cardon, both in Falcon State	1,588
Steel	C.V.G. Siderurgica del Orinoco C.A. (Sidor) (Government, 100%)	Ciudad Guayana, Bolivar State	4,300

1/ Established by Carbonca del Zulia S. A. (Carbozulia), or the operating company for the Guasare coal project.

TABLE 3
VENEZUELA: RESERVES OF MAJOR MINERAL COMMODITIES FOR 1994 1/

(Thousand metric tons unless otherwise specified)

Commodity		Reserves
Bauxite		4,000,000
Coal		10,200,000
Chrome		1,000
Cobalt		6,000
Copper		375
Diamond	carats	"very high"
Gold	metric tons	8
Iron Ore		1,026,000
Natural gas	billion cubic meters	3,950
Nickel		853,000
Petroleum crude	million barrels	64,450
Rare earths		"very high"
Silver	metric tons	533
Titanium dioxide		3,400
Uranium		"important"
Zinc		766

1/ Values and characterizations are by the Government of Venezuela.