

BOLIVIA

By Pablo Velasco

According to the National Statistical Institute of Bolivia, the gross domestic product (GDP) grew by 4.75% to about \$8.6 billion¹ in 1998 compared with 4.19% in 1997. Bolivia's 4.75% GDP growth was the fastest in South America and Bolivia's best performance in recent times. In addition, Bolivia reduced its inflation rate to 4.4%. Despite this encouraging performance, 1999 and 2000 were expected to be more difficult for Bolivia as a result of a decrease in investment levels, infrastructure damage caused by natural disasters, and a decrease in demand from its traditional trading partners, specially Argentina and Brazil (Instituto Nacional de Estadísticas de Bolivia, 1998, Resumen estadístico—Indicadores económicos, accessed February 3, 2000, at URL <http://www.ine.gov.bo/iwd0201.html>).

As a result of agreements signed with the International Monetary Fund, fiscal austerity programs also could prevent public sector expenditures from aiding GDP growth in 1999. Investment also was expected to decrease owing to the completion of the Bolivian portion of the Bolivia-to-Brazil natural gas pipeline. This extremely capital-intensive project accounted for a significant portion of Bolivia's investment for 1998.

Another concern for Bolivia was its high account deficit that was estimated to be \$680 million in 1998; this deficit would be offset by a capital account surplus of about \$890 million, which was, for the most part, the result of direct investment.

Export revenues increased by about 1.13% to about \$1.29 billion owing to increases in the exports of crude oil, natural gas, gold, silver, tin, and zinc. These revenues represented about 54% of Bolivia's total export earnings. The contribution of mining to Bolivian exports trade was more significant than that of natural gas and crude oil. In 1998, gold, silver, tin, and zinc outputs were the mineral production that sustained Bolivia's mineral industry (U.S. Energy Information Administration, July, 1999, Background—Bolivia, Country Analysis Briefs at a Glance, accessed November 18, 1999, at URL <http://www.eia.doe.gov/emeu/cabs/bolivia.html>).

Government Policies and Programs

As of the end of May 1998, Bolivia faced bilateral and multilateral debts totaling \$4.1 billion. In 1998, disbursements from the Insurance Freight Investments equaled only one-third of their respective debt amortization payments. The strain of

this basic imbalance will be lessened when Bolivia becomes the second country to benefit from the Heavily Indebted Poor Country Debt Relief Program; this will result in debt relief equal to about \$450 million if the program's requirement to improvements many fundamental social indicators are met within the coming 5 years.

The three major sectors of the Bolivian economy—energy, mining, and agriculture—should enjoy significant growth in 1998 and beyond for several reasons. The hydrocarbon sector in particular was considered to have very solid future prospects owing to the near-term completion of a gas pipeline to Brazil, which had a growing economy whose potential and demand for energy seemed unlimited. "Companies from the United States, Brazil and Argentina are actively exploring for hydrocarbons throughout the country, investing a total of \$130 million in 1995, \$116 million in 1996 and approximately \$250 million in 1997 in exploration and development activities. Petroleum companies already operating in Bolivia have announced investments totaling \$2 billion through 2002. There will also be new investments made in new concessions to be awarded by the government in 1998-99 in 11 new areas.

"The mining sector is also expected to see an upturn in investment in the coming years, a result of active prospecting by several companies and announcements of dramatic finds. New drilling projects continue to discover and upgrade ore reserves. An on-going project to define mining claims using Global Positioning System coordinates will also help encourage new investment in the sector" (U.S. Embassy, La Paz, July 1998, Bolivia—Principal growth sectors in Chapter I—Executive summary, FY 1999 Country Commercial Guide, accessed on December 9, 1999, via URL http://www.state.gov/www/about_state/business/com_guides/1999/wha/bolivia99.html).

"The Government created the Sectoral Regulatory System (SIRESE) partly in order to balance the potential market power of these monopolies. SIRESE is an autonomous regulatory body made up of a general superintendent and five superintendents which regulates many aspects of business in the telecommunications, electricity, transport, hydrocarbons, and water sectors" (U.S. Embassy, La Paz, July 1998, Bolivia—Openness to foreign investment, in Chapter VII—Investment climate, FY 1999 Country Commercial Guide, accessed on December 9, 1999, via URL http://www.state.gov/www/about_state/business/com_guides/1999/wha/wbolivia99.html).

"All future oil exploration activity will be carried out via joint venture contracts, which Yacimientos Petrolíferos Fiscales Bolivianos (YPFB) administers. Although most of the mines currently owned by Corporación Minera de Bolivia (COMIBOL) the state-owned mining company cannot be purchased, outright, they can be operated in joint venture or under a leasing contract with COMIBOL" (U.S. Embassy, La

¹ Where necessary, values have been converted from bolivianos (\$b) to U.S. dollars at the rate of \$b5.82=US\$1.00.

Paz, July 1998, Bolivia—Openness to foreign investment, in Chapter VII—Investment climate FY 1999 Country Commercial Guide, accessed on December 9, 1999, via URL http://www.state.gov/www/about_state/business/com_guides/1999/wha/bolivia99.html).

“Bolivia has signed bilateral investment agreements with Argentina, Belgium-Luxembourg, China, France, Germany, Italy, Mexico, the Netherlands, Peru, Romania, Spain, Switzerland, the United Kingdom and the United States” (U.S. Embassy, La Paz, July 1998, Bolivia—Bilateral investment agreements, in Chapter VII—Investment climate, FY 1999 Country Commercial Guide, accessed on December 9, 1999, via URL http://www.state.gov/www/about_state/business/com_guides/1999/wha/bolivia99.html).

“An Investment Insurance Agreement signed in 1985 by Bolivia and the U.S. Overseas Private Investment Corporation (OPIC) provided for a full range of OPIC programs, including insurance, financing and use of OPIC’s opportunity bank. OPIC provides financing assistance through direct loans and through guarantees of loans by private U.S. financial institutions for investments by U.S.-based firms in Bolivia. OPIC has worked with a growing number of new investors—particularly in providing insurance against inconvertibility expropriation and political risk—and is eager to do more business in Bolivia” (U.S. Embassy, La Paz, July 1998, Bolivia—OPIC and other investment insurance plans, in Chapter VII—Investment climate, FY 1999 Country Commercial Guide, accessed on December 9, 1999, via URL http://www.state.gov/www/about_state/business/com_guides/1999/wha/bolivia99.html).

Environmental Issues

Environmental standards are monitored nationally by the Ministry of Sustainable Development and by its Departmental Secretary of Sustainable Development and Environment at the regional or departmental levels. All projects require an environmental license, which can be obtained by a certificate of dispensation, a declaration of environmental impact, or the approval of an environmental manifesto. The license will expire after a fixed period of time or may be revoked if its conditions are violated (Mining Journal, 1998).

Production

In 1998, Bolivia’s production of precious metals rose but that of nonferrous metals declined. These trends reflected the fall in world prices for most of Bolivia’s minerals during the year. Mining prospects were clouded by the downturn in metal prices that delayed or deterred some anticipated investments. Consequently investment in mining decreased to \$48 million from \$64 million in 1997 and \$115 million in 1995.

The generally depressed conditions of 1998 showed few signs of alleviating what many Bolivian miners viewed as a growing crisis within the industry. In contrast, the petroleum industry will no doubt benefit from the opening of the 557-kilometer (km)-long natural gas pipeline to the Brazilian border in 1999 (Mining Journal, 1999).

The medium mining sector (the privately owned commercial mines) continued to be the dominant producer and was responsible for about 59% of the value of mine production in 1998, followed by the small mining sector with 36%;

COMIBOL had 5%. In 1998, zinc production was the largest money earner for the country’s mining industry, followed by gold, silver, and tin.

Crude oil and natural gas produced in Bolivia in 1998 were about 13 million barrels per year and 6.8 billion cubic meters per year, respectively. (*See table 1.*)

Large and small mining companies were involved in an increasing level of exploration activity in each of the four principal regions of the country—Altiplano, Brazilian Shield, Cordillera, and the Northeast. The most promising prospects were the gold properties of Cashi Laguna, Don Mario, and Escala, each with a good possibility of becoming an open pit mine. Corporación Minera del Sur S.A.’s (COMSUR) El Puquico Norte gold-copper project also had considerable potential.

Bolivia’s gold reserves, which were estimated to be between 373 and 404 metric tons (t), were the main reason for the presence of 38 major mining firms in Bolivia. According to Mintec S.A. officials, the key to this increase in investments can be summed up by opportunity, stability, guaranteed monetary exchange, and competitive tax legislation. Renison Goldfields’ exploration official for Latin America indicated that besides the political stability, Renison had decided to come to Bolivia for the favorable geology and the lack of much previous exploration in the country. Other large mining companies such as Barrick Gold Corp., Rio Tinto Zinc Corp. Plc., Battle Mountain Gold Co. (BMG), and Broken Hill Proprietary Company Ltd., shared the same motivations. The mining community expected that the policy set by the Government will continue.

Trade

The United States remained Bolivia’s largest provider of foreign aid, its principal trading partner, and the largest source of foreign investment. Both countries share a strong commitment to foster and strengthen democracy and to maintain sustainable economic growth. The true importance of minerals in the national economy lay in their contribution to Bolivia’s export earnings—43% in 1998 and 48% in 1997; the fall was a consequence of lower commodity prices, which was part of a wider deterioration in Bolivia’s terms of trade. In 1998, natural gas exports represented 26% of Bolivia total exports. With the 1998 completion of the \$2.1 billion Bolivia-to-Brazil Pipeline, this figure should significantly increase despite a current fall in demand in Brazil. The first stage of the Bolivia-to-Brazil Pipeline project was to be completed in February 1999 and was scheduled to become operational in July 1999 with deliveries to Sao Paulo, Brazil (U.S. Energy Information Administration, July 15 1999, Bolivia—Natural gas, Country Analysis Briefs at a Glance, accessed November 18, 1999, at (URL <http://www.eia.doe.gov/emeu/cabs/bolivia.html>)).

Bolivia exported natural gas to Argentina and had major plans to export gas to Brazil, Chile, and Paraguay in the near future. Minerals and hydrocarbons contributed more than 50% of Government revenues. Zinc produced an income of about \$156 million, which was a decrease of 22% compared with that of 1997. It was followed by gold with \$137 million, which was a decrease of 3.2% compared with that of 1997; silver with about \$72 million, which was an increase of 17.1%; and tin, which about \$63 million, which was a decrease of 14.1%. Exports of metallic tin by Vinto decreased in volume to 11,799 t and

decreased in value by 19% to \$65 million from \$81 million in 1997 (Bolivian Instituto Nacional de Estadísticas de Bolivia, 1998, Resumen estadístico—Indicadores económicos, accessed February 3, 2000, at URL <http://www.ine.gov.bo/iwd0201.htm>).

In 1998, Bolivia continued to be a modest source of minerals to the United States. The value of mineral exports to the United States decreased by 18% to about \$57 million.

On December 17, 1997, Bolivia and the four (MERCOSUR) countries (Argentina, Brazil, Paraguay, and Uruguay) signed the final Free Trade Agreement in Brazil. The Agreement included a list of 7,000 products that will reach a zero tariff rate within a period of 18 years. The vast majority of the products will be tariff-free within 10 years. The Government of Bolivia viewed the Agreement as an opportunity to increase exports and to integrate with its Southern Cone neighbors, although Bolivia will remain an Andean Pact member and not a formal MERCOSUR member (U.S. Embassy, La Paz, Bolivia, 1997).

Structure of the Mineral Industry

The Vice Ministry of Mining and Metallurgy, which is a branch of the Ministry of Economic Development, is legally responsible for formulating mining policy and orienting the promotion of the sector's development. It also provides investors with the necessary information regarding the rights and guarantees of mining concession holders, current tax and mining laws, and mining environmental regulations. It controls and participates in the mineral industry through Servicio Geológico y Minero de Bolivia, the Instituto de Investigaciones Minero-Metalúrgicas de Oruro, and the Sistema Nacional de Información Minera. The Servicio Nacional de Catastro Minero and COMIBOL are autonomous entities.

In accordance with the provisions established in Supreme Decree 23230-A of July 30, 1992, the Government of Bolivia sought to transfer to private sector interests in several mining, metallurgical, and infrastructural assets held by COMIBOL, which included joint ventures, leases, and optional arrangements, to promote private investment in the mining sector.

The private mining sector, which comprised medium- and small-scale mining entities and cooperatives, maintained its position as the leading producer of antimony, gold, lead, tin, tungsten, and zinc in the country. In 1998, the private Medium-Size Miners Association comprised 15 affiliated mining companies, which were Andean Silver Resources, Arisur BAREMSA, Borrosquira Ltda. Empresa Minera Bernal, Cia. Minera Concepción, COMSUR, Empresa Minera Unificada S.A. (EMUSA), Empresa Minera Inti Raymi S.A., Cía. Minera "La Rosa," L & M Mining, Cía. Minera "La Solución," Empresa Minera Paitití, Empresa Santa Lucía, and Vista Gold Corp.

The Small-Size Miners Association, which was grouped under the Cámara Nacional de Minería, included 600 small mines operating in the country. Mining cooperatives were organized under the Federación Nacional de Cooperativas Mineras and included most of the gold mining cooperatives of Gonzata, Guanay, Mapirí, and Tipuani. According to the National Institute of Cooperatives, more than 320 mining cooperatives in the country were grouped under the Federación Regional de Cooperativas, of which about 40% were mining gold in 1998 mainly in the Tipuani area in the Province of Larecaja, La Paz Department.

Commodity Review

Metals

Antimony.—Bolivia's antimony output which decreased by 21% in 1998 compared with that of 1997, amounted to about 4,700 t for a total value of \$6.5 million. Its production was entirely in the hands of the private sector. Approximately 54% was produced by the medium-sized group of mines, and 46%, by the small-sized group and cooperatives. With its Caracota, Chilcobija, and Espiritu Santo mines, EMUSA remained by far the largest Bolivian antimony producers in the country, followed by Compañía Minera Salinas S.A. Their entire output was sold to U.S. trioxide producer Laurel Industries of the United States under a toll contract. EMUSA produced 8 t of antimony metal in 1998; 80% of the country's total output was antimony trioxide; 19%, antimony concentrate, and 19% metallic and antimony alloy.

During 1998, the Vinto tin and antimony smelter processed 4,735 t of antimony in concentrates received from Laurel Industries to produce about 2,992 t of antimony trioxide. The Chilcobija antimony mine was placed on care and maintenance owing to a continued decline in antimony prices. The mine had the capacity to produce 12,000 metric tons per year (t/yr) of antimony concentrate, but had not operated at this level of production for some time. During the past couple of years, it had typically produced from 4,000 to 5,000 t/yr of antimony-in-concentrate. The closure of the mine brought into question the future of the Vinto antimony smelter, which was owned by COMIBOL, because it had been supplied primarily by the mine. This mine had little chance of being profitable at 1998 antimony prices, which were below \$1,700 to \$1,800 per metric ton. EMUSA, which had a wide variety of other mining assets, had been subsidizing Chilcobija since the antimony price slipped below the mine's loss-making level (Metals & Minerals Latin America, 1999).

Bismuth.—Canada's Corriente Resources Inc., which was a joint venture partner with COMIBOL at the Tasna bismuth mine in southern Bolivia, was changing its strategy to develop the mine. Under the terms of its contract, Corriente Resources was to have had the mine in production by the end of 1997, but the poor bismuth market prevented this.

"The mine represents a multimillion dollar investment, and we are trying to find other ways to make a return on that investment for our shareholders, Corriente's Resources official indicated. The mine reserves also contain quantities of gold, copper and tungsten, and the company is now studying alternative ways of developing the mine that does not prioritize bismuth. The mine's mineral credits other than bismuth have previously been estimated to be worth about 40% of the value of any eventual output. Also, recent production of tungsten and gold has been used for metallurgical testing purposes" (Metals & Minerals Latin America, 1998c).

The results of the latest study were to give the company a better understanding of Tasna's structure and to provide a route that will put the mine back into production faster than waiting for a stable bismuth price above \$4 per pound.

Gold.—In 1998, official gold production in Bolivia, which increased by 8.7% from that of 1997, amounted to 14.4 t for a value of \$137 million. The success of the Kori Kollo gold and silver mine, in the Altiplano north of Oruro, which was operated by Empresa Minera Inti Raymi S.A., and in which BMG held an 88% interest, continued to be Bolivia's most productive operation. BMG's share of Kori Kollo production in 1998 was 9,176 kilograms (kg) (295,000 ounces) at an average cash cost of \$175 per ounce sold (\$51.6 million) despite falling prices, grade, a drop in mill recovery, and a higher stripping ratio adversely affected production. This mine, however, stimulated much of the recent foreign interest in the Bolivian mining sector. At the nearby Llallagua deposit, Empresa Minera Inti Raymi S.A. had good success with the testing of a heap-leach bio-oxidation process; recovery rates from early tests averaged more than 65%. A year-long 200,000-t pilot-plant test of the bio-oxidation heap leach project will be initiated in the first quarter of 1999. If proven successful, this technology was expected to be adaptable to other refractory deposits now under evaluation by BMG. In 1998, Llallagua was estimated to contain more than 31.1 million kilograms (1 million ounces) of gold mineralization (Battle Mountain Gold Company, 1998-1999).

Canada's Jordex Resources Ltd. decided to abandon further exploration of the company's concessions in eastern Bolivia. Following disappointing results from the latest round of drilling at two anomalies on the San Javier property, Jordex closed its Santa Cruz-based offices. Bolivia's Jordex's various holdings total some 40,000 hectares in eastern pre-Cambrian belt.

Orvana Minerals Corporation of Vancouver, Canada was completing the final stages of its feasibility study of the Don Mario gold-copper project in eastern Bolivia's Precambrian gold district; the study was on schedule, according to the company. The Winters Company, which was an engineering consulting firm, completed a mine plan and ore production schedule for both the underground and open pit sections of the mine.

The 1998 underground mine plan reduced the scale of the original operation proposed in 1997 and was based on the processing of 1.43 million metric tons (Mt) of ore grading 11 to 13 grams per metric ton (g/t) gold. The total estimated production of gold was correspondingly down to 6.1 t (14,000 ounces) from 9.4 t (24,000 ounces). Orvana planned to construct a 750-metric-ton-per-day-(t/d) mill and processing plant to be completed in 2000. Orvana had reported production costs of \$100 to \$120 per ounce of gold recovered. (Metals & Minerals Latin America, 1998d).

Orvana and EMUSA finalized the terms of an exploration agreement with BHP Minerals Proprietary Ltd. to earn rights over the joint venture's 10 western Bolivia properties. The principal property of interest in the deal was the disseminated gold prospect of San Bernardino in Challapata (Pederson prospect) in the Altiplano, which was classified as containing from 31 to 62 t (1 million to 2 million ounces) of gold. Mineralization extending over several kilometers was identified, and wide spaced drilling within the potential extension zones of the deposit began in October.

BHP can earn up to a 60% interest at Pederson and up to 70% in the other properties. From the end of the second year of the agreement, BHP will make annual option payments of \$200,000. Also, on the second and third anniversaries of the

agreement, BHP will take a \$1 million private placement in Orvana's shares or, in lieu of this, a \$1 million cash payment.

The richest and most productive alluvial gold deposits in Bolivia are located in the northern area of Department of La Paz in the Challana, the Kaka, the Mapiří, and the Tipuani River valleys where Golden Eagle International, Inc., held mining rights to concessions in the Cangalli gold deposit. The second most important alluvial mining is in the Araras area, in the northeastern part of the country on the border with Brazil, where gold has been recovered from the Madera and the Madre de Dios Rivers.

In 1998, Golden Eagle International announced a major gold discovery at Cangalli, south of La Paz, with reserves of (6.4 million ounces). Another significant if more modest but more concrete addition to Bolivia's mines is in prospect with the completion of a feasibility study of the Don Mario gold/copper deposit (Orvana) in eastern Bolivia.

Lead, Silver, and Zinc.—Production of lead concentrates and metallic lead decreased by 15% and increased by 15.6%, respectively, from the already depressed level of 1997. Output of metallic silver decreased by 4% to 1,158 kg. The medium-sized mining sector was the dominant lead and zinc producer, with 81.1% of total lead and 65% of total zinc. In this sector, the major producer of lead, silver, and zinc was COMSUR.

In 1998, Apex Silver Mines Ltd. of Canada's drilling program finalized a bankable feasibility study at the San Crisobal silver-zinc-lead prospect in southern Bolivia. Despite this, the company decided on another round of widely spaced exploratory drill holes to try to prove a further 100 Mt of probable ore reserves. The drilling of additional reserves anticipates the difficult market conditions that are likely to prevail when the company attempts to raise the bulk of the project's estimated \$260 million initial capital investment in February 1999. The feasibility study had already proven reserves of 314 Mt on results from 169,500 meters (m) of diamond and reverse circulation drilling. The bulk of the ore reserves have contained mineralization grading 62 g/t silver, 1.57% zinc, and 0.55% lead. Apex was confident that the further undisclosed quantity of new drilling will expand resources to more than of 400 Mt (Metal & Minerals Latin America, 1998a).

Tin.—To attract investors to the Vinto smelter, COMIBOL must boost local tin mine production. Vinto took about 45% of its feed from its own mines and cooperatives working COMIBOL properties. Some 2,000 cooperatives miners worked in Huanuni and produced around 50 to 100 metric tons per month (t/mo) of tin. As part of the privatization and investment process, the cooperatives were asked to organize themselves into a limited partnership company to work the upper part of the deposit, the Pozoconi zone. With some technical investment, production could reach 200 to 500 t/mo. Overall, COMIBOL projected that tin output in the short term could recover to 14,000 t/yr and rise to 20,000 t/yr within 3 years, as a result of investment and efficiency improvements. The smelter had a capacity of 30,000 t of tin (Metals & Minerals Latin America, 1998b).

Tin production in 1998 decreased by about 12.3% to 11,308 t from that of 1997, and the tin output value decreased by 14.1% of the country's total mineral-export value. The largest

production increase in the private sector was by the small-sized mines and cooperatives. For the 12th consecutive year, they replaced COMIBOL as the leading tin producer, with an output of about 66% of Bolivia's tin production in 1998. The mines produced about 30% of the country's total tin mining output (Viceministerio de Minería y Metalurgia, 1998).

COMIBOL signed 13 new joint-venture exploration contracts with local and foreign mining companies to explore its own mines and ore bodies in Northern Lipez and Southern Lipez in Potosí Department. COMIBOL's Huanuni Mine continued to be the largest tin mine in the country since its reopening in September 1988. The Vinto tin smelter, which was formerly operated by Empresa Nacional de Fundiciones, exported 10,382 t of metallic tin and 1,417 t of tin concentrate in 1998. About 83% of Bolivia's metallic tin was exported to the United States, and the rest, to Latin American countries, Spain, and Holland (Viceministerio de Minería y Metalurgia, 1998).

Tungsten.—Bolivia's production of tungsten concentrate, which was heavily dependent on international prices, decreased by about 3.1% to 497 t from 513 t in 1997. Production came from the small miners and cooperatives that had small deposits with high ore grades and low labor costs.

Industrial Minerals

Cement.—Traditionally, Bolivia's cement industry has been able to match its cement production to the requirements of the market. Small shortages were noted in 1996 when the 26% growth in consumption took producers somewhat by surprise. Although another shortage was predicted by some sources for 1998, these discrepancies generally stayed under 100,000 t. According to recent national output figures, cement production grew by an average 12% per year in 1997-98 after a 5% drop in 1996. National production for 1998 was 1.166 Mt, or about 80% of industry capacity. Individual companies varied from 50% to 102% of capacity utilization. The Soboce Kilns accounted for a considerable share of production, or some 36% of the national total; the Fancesa Kilns, 29%; the Coboce Kilns, 19%; Itacamba, 9%; and Emisa, about 6%.

Bolivia did not export any cement or clinker. Trade was based mainly on clinker imports with material coming from Brazil and smaller tonnages coming from Juan Minetti and Corcemar in Argentina. With local producers unable to match clinker output levels with such market gains, imports of clinker were a necessity. This resulted in clinker imports trebling to 9,000 t.

In the past 3 years, Bolivia's cement market has grown, albeit with varying success. Cement consumption has grown to 1.157 million metric tons year (Mt/yr) in 1998 from 0.558 Mt/yr in 1990; this represented an increase of 207% during this 8-year period. In 1997, the Bolivian cement sector was able to note a healthy 11% increase in its sale, which could again be maintained this year although some slow-down may take place in 2000.

When examining the geographical spread of cement sales in 1998 across Bolivia's nine Departments, the Santa Cruz region in the east clearly dominated and accounted for a 37% share in national sales. Centrally located Cochabamba and La Paz in the west accounted for an additional 23% each. Bolivia had five cement producers, a joint clinker production capacity of 943,000

t/yr, and a combined cement production capacity of 1.456 Mt/yr installed in seven cement works (five full production facilities and two additional grinding plants).

Sociedad Boliviana de Cemento S.A. (Soboce) which was the only private cement company in Bolivia, had its own unit at Viacha and Warnes and the former Tarija works of Cemento El Puente. Collectively, these totaled some 300,000 t/yr of clinker production capacity and 600,000 t/yr of cement capacity.

The Viacha works, which is southwest of La Paz and some 4,000 m above sea-level, produced about 200,000 t/yr of clinker capacity and 300,000 t/yr of cement capacity. A new production line was due to come on-stream by the end of 1998. This new 1,000-t/d line represented a capital investment of \$60 million. This will increase the nationwide clinker capacity to as much as 1.2 Mt/yr.

The United Kingdom-based CDC Group (the Commonwealth Development Corporation) invested about \$20 million in a loan package to Soboce as part of this present upgrade program. CDC intended to build up a number of cement clients in the developing world (International Cement Review, 1999).

According to the evaluation made by Soboce, total cement production during 1998 was 1.17 Mt, which was an increase of 12.7% compared with that of 1997; the evaluation was made, however, without considering production data from Emisa S.A., a small cement factory. Cement was produced by six plants in different regions of the country and had a total production capacity of about 1.46 Mt/yr. (International Cement Review, 1999).

After becoming the majority share holder of Emisa in 1996, New Zealand's Fletcher Challenge Limited continued trying to become a principal player in the country's cement industry. The company announced the expansion of its plant in Oruro to meet the ever-growing national and international demand and pledged to invest \$3 million to raise production by 50%.

Mineral Fuels

At yearend 1998, Bolivia's total oil reserves amounted to an estimated 132 million barrels (Mbbl) of oil proven and an estimated 60 Mbbl of oil probable. Bolivia which was self-sufficient in oil, consumed an estimated 35,000 barrels per day (bbl/d) in 1998. Almost all crude oil produced in Bolivia was for domestic consumption, except for a small amount that was exported to Chile. The Government continued with the capitalization of YPF.

During its second round of licensing in mid-September 1998, the Government's hydrocarbons department awarded six operating blocks to five different oil companies. These companies signed joint-venture contracts with YPF in which they were required to explore for oil and gas in low-output fields in the southeastern Santa Cruz region. The winners included four international firms—Maxus of Canada, which won the Cambeiti block; France's Total, which took the Bereti block, Argentina's Pluspetrol, which was awarded the Colibir and the Parapeti blocks; and state-owned Petrobras of Brazil, which acquired the Canada block. One domestic firm, RTB Gamma Colanzi, was awarded the Tatarenda block. Nonetheless, the September 1998 round brought the amount of investments committed by upstream private companies since the partial privatization of YPF to \$1.1 billion (U.S. Energy Information Administration, July 1999, Bolivia—Oil, Country analysis

Briefs at a Glance, accessed November 18, 1999, at URL <http://www.eia.doe.gov/emeu/cabs/bolivia.html>).

Bolivia possesses significant reserves of oil and gas and has had an active petroleum industry since the 1950's, but these reserves have never been properly evaluated because of the lack of basic infrastructure, inadequate road network, out-of-date production techniques, inability to set up major industrial projects despite financing from international funds, and absence of economically viable outlets for production.

In 1998, Bolivia with 40,000 bbl/d of oil was the ninth largest oil producer in South America, far behind Venezuela with 3.3 million barrels per day. Bolivia was the fifth largest gas producer [19 million cubic meters per day (Gm^3/d)] on the continent, far behind the leader Venezuela (112 Gm^3/d). Bolivia reinjected a third of its gas production. Most of Bolivia's oil production was valued on the domestic market, and the bulk of gas production was exported to Argentina. The current (1999) export agreement between the two countries provided for exports of 6 million cubic meters per day until the end of 1999.

After remaining more or less static for the past 20 years, Bolivia's petroleum industry may get a boost with the completion of the Bolivia-to-Brazil natural gas pipeline, which was due to go into operation in July 1999. The pipeline will transport gas some 3,050 km from the city of Santa Cruz, Bolivia to Sao Paulo, Brazil. It will later be extended to the coastal city of Porto Alegre. Construction of the pipeline, which has cost \$2.3 billion, was financed, in part, by the World Bank and Petrobras. During the next 3 years, gas exports to Brazil will be increased from 18 Gm^3/d to 30 Gm^3/d . To meet the terms of the 20-year sales contract between the Bolivian and the Brazilian Governments, Bolivia will have to develop reserves of 205 billion cubic meters (Gm^3) to meet this obligation and the expected domestic gas demand of some 6 Gm^3/d , the total amount of gas reserves that must be produced during the next 20 years will need to amount to 260 Gm^3 .

To achieve this, Bolivia's daily gas production will have to almost triple by 2005. The country will have to increase its certified reserves (200 Gm^3 in 1998) by some 30%. The two upstream companies that will have to make these increases are Chaco S.A. and Andina S.A. These two semipublic companies, each inherited 50% of the upstream assets of YPFB when it was privatized in 1998. Chaco was in partnership with Amoco Oil Co., and Andina was in partnership with an Argentinian consortium, YPFB Perez Companac and Pluspetrol. (Energies, 1998-99).

Production of natural gas increased by about 26.3% to 6,756 Gm^3 compared with that of 1997.

Infrastructure

The transportation network of Bolivia comprised 42,815 km of highways. The Pan-American Highway, which links Argentina and Peru, crosses the country from south to northwest. The national railroad system was capitalized in two sections in 1995. Because Cruz Blanca of Chile was the only firm to submit a qualifying bid for both, it owned 50% of these systems. Its hauling capacity was limited by Bolivia's challenging geography and the narrow-gauge track built to British standards at the turn of the 19th century. The rail system consists of two independent lines that are separated by the eastern Andes. The western line connects the cities of La Paz, Cochabamba, and Oruro with northern Argentina and the

Chilean ports of Antofagasta and Arica. The eastern line connects Santa Cruz with northern Argentina and western Brazil. Rolling stock (55 locomotives and 2000 railway cars) can be transferred between systems only through northern Argentina. The lack of adequate rail transport capacity is of special concern to the booming agricultural export industry around Santa Cruz (U.S. Embassy, La Paz, Bolivia, July 1998, FY 1999 Country Commercial Guide: Bolivia, Chapter VII—Investment Climate, Openness to Foreign Investment, accessed on December 9, 1999 at http://www.state.gov/www/about_state/business/com_guides/1999/wha/bolivia99.html).

As a landlocked country, Bolivia has no ocean ports, but does have access to international markets through ports in Antofagasta and Arica Provinces, Chile, and Matarani, Peru.

About 13.5 Mbbl of crude oil and condensates, 5.6 Mbbl of refined oil products, and 1,251 million cubic meters of natural gas were transported between major distribution centers in Bolivia through 5,980 km of pipelines owned and operated by Chaco S.A. and Andina S.A.. All the pipelines were reversible, with the exception of the export pipeline to Arica. The generation, transmission, and distribution of electrical power in Bolivia was carried out by state and private companies. The Government sold its electric company to three United States firms. Bolivia had an installed electrical generating capacity of 787 megawatts (MW), of which 308 MW, or about 55%, was generated by hydroelectric plants; the remainder was generated by thermoelectric plants that were operated by Empresa Nacional de Electricidad S.A. The installed generating capacity was 496.5 MW, or 62% of Bolivia's total.

Outlook

The Bolivian economy will continue to rely heavily on the hydrocarbon sector. Taxes and royalties to be paid on internal sales of finished petroleum products will remain essential revenues for the national treasury. Natural gas exports to neighboring countries will be a significant component of Bolivia's foreign exchange earnings. The Bolivia-to-Brazil natural gas pipeline project is expected to become a major driving force for the Bolivian economy, in addition to transporting natural gas to Brazil, which was the largest South American market. At the same time, the project will help attract private investments for the hydrocarbon sector because the volumes of natural gas to be provided to Brazil will activate exploration and production activities. Once the pipeline is operating, the value of these exports will range from \$125 million for the first year to \$500 million per year after 5 years of operation. If thermoelectric powerplants are included and the pipeline system is expanded, then exports can be doubled.

Other benefits for Bolivia included attraction of private investment needed for natural gas exploration and development, infrastructure development along the pipeline (compression facilities, liquids extraction plants), creation of new employment opportunities, economic integration with Brazil, expansion of the internal natural-gas-gathering transportation system, production and exports of liquids byproducts, improved access of natural gas to Southern Cone markets, and incentive for other private companies to construct more gas pipelines and to invest in gas-transportation activities (Viceministerio do Energia y Hidrocarburos, March 20, 1998, Bolivia-Brazil pipeline,

accessed July 29, 1998, at URL <http://www.energiagov.bo/ingles/GAsDuct.html>).

Future resource development is likely to focus on continued expansion of the hydrocarbon sector, as well as the development of Bolivia's gold industry, the iron ore-steel prospects at the Mutún deposit near the Brazilian border, the development of the lithium and potassium projects from the Uyuni salt flats, the extraction of gold from deposits at Tipuani and Cangalli in La Paz, and the San Cristobal silver-zinc-lead deposit in southern Bolivia.

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Major Sources of Information

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Major Publications

Ministerio de Desarrollo Economico:
Viceministerio de Minería y Metalúrgia
Boletín Estadístico 1997
Publicación Oficial No. 182
La Paz-Bolivia

Asociación Nacional de Mineros Medianos:
Memoria e Informe Anual-1997
Noticias Mineras Mensuales-1997

TABLE 1
BOLIVIA: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity 2/ METALS 3/	1994	1995	1996	1997	1998
Antimony:					
Mine output, Sb content	7,050	6,426	6,488	5,999	4,735
Metal including Sb content of trioxide	5,880	4,840	4,909	4,136	3,836
Arsenic, mine output, arsenic trioxide, arsenic sulfide	341	362	255	282	284
Bismuth:					
Mine output, Bi content kilograms	--	121	348	684	550
Metal, smelter do.	36	19	28	55	44
Copper, mine output, Cu content	79	127	92	182	48
Gold, mine output, Au content 4/ kilograms	12,838	14,405	12,634	13,292	14,444
Iron ore: 5/					
Gross weight e/	2,600	--	--	--	--
Fe content	1,650	--	--	--	--
Lead:					
Mine output, Pb content	19,679	20,387	16,538	18,608	15,749
Metal, smelter	597	195	102	77	65
Silver:					
Mine output, Ag content kilograms	352,083	425,053	384,384	387,200	404,000
Refined 6/ do.	82,771	81,322	70,852	1,112,411	1,157,954
Tantalum, tantalite do.	1,820	565	646 r/	727 r/	15,624
Tin:					
Mine output, Sn content	16,169	14,419	14,802	12,898	11,308
Metal, smelter	15,300	17,709	16,733	16,853	11,102
Alloys	100 e/	248	226	123	160
Tungsten, mine output, W content	462	655	582	513	497
Zinc, mine output, Zn content	100,742	146,131	145,092	154,491	152,110
INDUSTRIAL MINERALS					
Arsenic trioxide	341	362	255	282	284
Barite	3,310	10,845	4,745	4,402	2,500
Bentonite	364	252	69	50	50 e/
Calcite e/	100	20	20	20	20 e/
Cement, hydraulic	767,953	891,776	934,303	1,034,800	1,166,512
Gemstone, amethyst:					
Polished kilograms	33	47 e/	36	18	21
Rough do.	220	310	238	122	140
Gypsum, crude	532	1,800	192	20	--
Marble	318	170	242	274	250
Onyx kilograms	56	250	--	--	--
Pumice e/	50	--	--	--	--
Quartz kilograms	400	--	--	39	32
Salt	200 e/	4,924	273	869	4,562
Slate (pizarra)	268	280	393	458	484
Sulfur, native	252	--	--	--	--
Ulexite	10,433	6,891	9,231	12,309 r/	15,929
MINERAL FUELS AND RELATED MATERIALS					
Gas, natural:					
Gross million cubic meters	5,921	5,349	5,281	5,349	6,756
Marketed do.	3,121	3,361	3,259	3,341 r/	3,426
Natural gas liquids:					
Natural gasoline thousand 42-gallon barrels	2,727 r/	2,300 r/	2,456 r/	3,000 r/ e/	3,000 e/
Other (consumption) do.	1,939	2,447	2,450	2,600 e/	2,600 e/
Petroleum:					
Crude including condensate do.	8,249	10,220	11,001	12,826 e/	12,960
Refinery products:					
Liquefied petroleum gas do.	2,522 r/	1,650	602 r/	610 r/ e/	610 e/
Gasoline do.	4,165 r/	3,095 r/	3,665 r/	3,670 r/ e/	3,680 e/
Jet fuel do.	752 r/	701 r/	964 r/	965 r/ e/	960 e/
Kerosene do.	277 r/	299 r/	245 r/	250 r/ e/	250 e/
Distillate fuel oil do.	2,884 r/	2,694 r/	2,978 r/	2,980 r/ e/	2,990 e/
Residual fuel oil do.	303 r/	296 r/	183 r/	185 r/ e/	180 e/

See footnotes at end of table.

TABLE 1--Continued
 BOLIVIA: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity 2/	1994	1995	1996	1997	1998	
MINERAL FUELS AND RELATED MATERIALS--Continued						
Petroleum--Continued:						
Refinery products--Continued:						
Unspecified	thousand 42-gallon barrels	230 r/	3,446 r/	4,993	5,000 r/ e/	5,000 e/
Total	do.	11,133 r/	12,181 r/	13,630 r/	13,660 r/ e/	13,670 e/

e/ Estimated. r/ Revised.

1/ Table includes data available through September 1999.

2/ In addition to the commodities listed, a variety of industrial minerals (clays, crushed and broken stone, dimension stone, and sand and gravel) are produced, but available information is inadequate to make reliable estimates of output levels.

3/ Unless otherwise specified, data represent actual production by Corporación Minera de Bolivia and small and medium-sized mines.

4/ Includes production of metallic gold.

5/ Data represent exports and are regarded as being equal to production.

6/ Includes production of metallic silver.