THE MINERAL INDUSTRY OF

BOLIVIA

By Pablo Velasco

According to the National Statistical Institute (NIS), the gross domestic product of Bolivia grew by 4.0% to about $16 billion[1] in 1996, higher than the 3.7% growth registered in 1995.

Bolivia's foreign debt as of December 31, 1996, was $4.37 billion compared with $4.52 billion as of December 31, 1995. Export revenues increased by about 12.3% to about $1.33 billion owing to increases in the combined mineral exports of gold, silver, tin, zinc, crude oil, and natural gas. These revenues, including crude oil and natural gas, represented about 54% of Bolivia's total export earnings. NIS reported that the 1996 inflation rate was 7.95%, Bolivia's lowest since 1976, meeting the Government's annual inflation goal of 8%. Gold, silver, tin, and zinc outputs are currently the mineral base sustaining Bolivia's mineral industry. In 1996, crude oil, natural gas and liquefied natural gas exports, and domestic sales contributed 33% of the national treasury's consolidated revenues.

Government Policies and Programs

In 1996, the Government in 1996 submitted to Congress a new mining code aimed at providing a more comprehensive legal framework for the mining sector. This code will provide benefits to investors, including reduced time for the approval of new mining concessions, improved delineation of concession boundaries, and new guaranties (the investor can only lose the concession for a failure to pay taxes). The code also proposes an additional tax regime for the sector. Mining enterprises in gold, silver, and tin would pay a royalty (between 1% and 5%) that varies according to the market price of the mineral produced.

Owners of private mining enterprises have complained that the proposed mining code would increase taxes and threaten the mining sector's competitiveness. The code would not only increase the maximum royalty, but it would also assess the royalty based on revenues and not profits. In addition, royalties are not creditable internationally, which means foreign mining enterprises would be taxed twice (in Bolivia and in country of origin) and have to pay royalties, amounting to three separate taxes. The code is likely to undergo considerable debate and amendment before its final approval (U.S. Embassy, La Paz, Bolivia, 1997 b, p. 3-4).

Through a combination of capitalization and joint-venture transfers to private sector control, the Government of Bolivia intends to reduce not only its size overall but also the role of the state in the Bolivian economy, especially in its mining sector. In support of the transfer program, the Government has enacted a series of legal, regulatory, and tax simplification measures as well as environmental law and regulations that have created a favorable and competitive foreign investment framework.

In January 1996, the Government unveiled Yacimientos Petrolíferos Fiscales Bolivianos' (YPFB's), the state oil and gas company, latest capitalization plan. Five new companies were established to cover the main industry activities: two for explorating and producing, and one each for refining, transporting, and marketing. Oilfields and exploration blocks also were to be divided between exploration and development companies. Indefinite concession contracts given to international oil companies would be administered by the General Directorate of Hydrocarbons, a new organization within the Government's Energy Secretariat. The contracts would allow for winning bidders to exploit fields without violating the Bolivian Constitution, which states that oil and gas reserves are property of the State and therefore cannot be given to a third party. Under the plan two of YPFB's refineries, as well as the marketing companies, could not be capitalized, but sold directly to the highest bidder. Forty companies were prequalified to bid on the YPFB units, including several Latin American firms. The Capitalization Minister stated that opening of bids would be in May (Energy Information Administration, 1996).

On April 30, 1996, the new Ley de Hidrocarburos (Ley No. 1689) hydrocarbon's law was enacted. The law allows for full participation of foreign companies in the exploration, production, transport, and sale of hydrocarbons. It also establishes a clear-cut tax structure, including departmental royalties. It allows for arbitration of disputes and grants producers a 40-year term for exploration, production, and sale under joint-venture projects.

On December 5, 1996, Bolivia completed the capitalization of YPFB. This was only possible after the new Ley No. 1689. U.S.-based Amoco and Argentine YPF/Perez Companc consortium won bidding for the two exploration and production blocks, while the consortium of U.S.-based Enron and Shell won the transport unit (which included the gas pipeline project to Brazil). The bids totaled almost $835 million (more than double the book value), money that will be invested directly into the companies' operations. The winners acquired a 50% share of the firms and long-term exclusive management control. They will also assume approximately $447 million worth of debt. Official transfer of the enterprises is scheduled for February 1997 (U.S. Embassy, La Paz, Bolivia, 1997 a, p. 2).

[1]Where necessary, values have been converted from bolivianos ($b) to U.S. dollars at the rate of $b5.19=US$1.00.

YPFB became the fifth of Bolivia's six major parastatals to be capitalized in 1995-96. Capitalization of YPFB brought the total amount of investment pledged through the capitalization process to almost $1.7 billion. The other companies were Empresa Nacional de Telecomunicaciones, Lloyd Aéreo Boliviano, Empresa Nacional de Electricidad, and Empresa Nacional de Ferrocarriles. Only Empresa Metalúrgica de Vinto (formerly Empresa Nacional de Fundiciones), which process tin and antimony, remained to be capitalized at year-end 1996. The postponement of Vinto's capitalization was due to the delay in the enactment of the mining code. The Government hopes that a new mining code will create a more attractive investment climate and induce higher bids from international companies. Vinto's value was estimated at $50 million.

The Government of Bolivia has also signed accords with the World Bank's Multilateral Investment Guarantee Agency and with the Overseas Private Investment Corporation to provide insurance against certain political risks to foreign investors in Bolivia. Bolivia's capitalization plan is an aggressive program designed to bring to the country the benefits of privatization without turning the companies involved completely over to private investors.

Production

Bolivia's mining industry was affected by the general downward trend in mineral prices in 1996, and the value of traditional exports of metallic minerals fell by more than 6% to $449.5 million. Production decreased substantially compared with 1995. (*See table 1.)* The medium mining sector—the privately owned commercial mines—continued as the dominant producer responsible for about 57% of the value of mine production in 1996 followed by the small mining sector with 36%. In 1996, gold production was the largest money earner followed by zinc, tin, and silver for the country's mining industry. The value of production of minerals by Corporación Minera de Bolivia (COMIBOL), the state-owned company, declined 10.2% in 1996 compared with that of 1995.

Crude oil and natural gas produced by YPFB and its contractors represented about 68% and 32% of the total production, respectively. Natural gas output increased 2.9% in 1996 compared with 5,346 million cubic meters (Mm^3) in 1995.

Mining companies, large and small, are involved in an increasing level of exploration activity, with some promising projects underway in 1996. Exploration was taking place in each of the four principal regions of the country: Altiplano, Cordillera, Brazilian Shield, and the Northeast. The most promising prospects are the gold properties of Escala, Cashi Laguna, and Don Mario, each with a good possibility of becoming open pit mines. Cía. Minera del Sur S.A.'s (COMSUR's) El Puquio Norte project also has considerable potential.

Trade

Nonfuel minerals and hydrocarbons (oil and gas) continued to be Bolivia's leading exports; in combination, they contributed more than 50% of Government revenues. Exports of nonfuel minerals in 1996 decreased about 7% in value, compared with those of 1995, to $480.2 million, amounting to less than one-half of total exports. Gold became the most valuable export commodity, producing an income of about $154 million, a decrease of 13% compared with that of 1995; followed by hydrocarbons with $154 million and zinc, which decreased 4% to about $149 million. Hydrocarbons continued in second place in the Bolivian export balance sheet after minerals and nontraditional goods. Exports of petroleum and refined products, valued at about $60 million, were about the same compared with 1995. The value of natural gas exported to Argentina increased from $92.4 million in 1995 to $94 million in 1996. Tin export value, including metallic tin, was down 6.9% to $82.5 million. Exports of metallic tin by Vinto decreased in volume to 11,386 metric tons (t) and decreased in value 13% from $80.4 million in 1995 to $69.9 million.

In 1996, Bolivia continued to be a modest source of minerals to the United States. Bolivian mineral exports to the United States decreased 8.2% in 1996 to about $80.0 million.

On December 17, Bolivia and the four Mercosur countries signed the final version of the Free Trade Agreement in Brazil. The Agreement includes a list of 7,000 products that, over a phase in period of 18 years, will reach a zero tariff rate. Approximately 30% of the products will become tariff-free when the accord goes into effect March 1, 1997. The vast majority of the products will be tariff-free within 10 years. The Government of Bolivia views 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 a, p. 3).

Structure of the Mineral Industry

The National Secretary of Mining (NSM), a branch of the Ministry of Economic Development, is legally responsible for formulating mining policy and orienting the promotion of the sector's development. NSM also has the function of providing investors with all of the necessary information regarding the rights and guarantees of mining concession holders, current tax laws, mining laws, and mining environmental regulations. NSM controlled and participated in the mineral industry through a renovated and more efficient state mining agency, Servicio Nacional de Geología y Minería, formerly the Servicio Geológico de Bolivia, the Instituto de Investigaciones Minero-Metalúrgicas de Oruro, and the Sistema Nacional de Información Minera de la Secretaría Nacional de Minería. 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, for the purpose of promoting private investment in the mining sector, was seeking to transfer to private sector initiative interests in several mining, metallurgical, and infra- structural assets held by COMIBOL, including joint ventures, leases, and optional arrangements. According to COMIBOL's officials,

the plan to transform COMIBOL was just beginning to be implemented. The first step of the plan was administrative, the second the closing of unprofitable mines that generate losses, and the third, the transference of mineral deposits to the private sector by means of an international and very transparent bidding process. In 1996, the company managed a shared-risk agreement with COMSUR. There were also 13 other contracts, all in the exploration phase. Moreover, COMIBOL was in the last stage of transferring to private hands, four productive mines that were still under state company's administration. Two of these mines were the Huanuni (tin) and Colquiri (tin and zinc). Both were part of the capitalization package of Empresa Metalúrgica de Vinto. The company that wins the bidding process will enter into shared-risk agreement with COMIBOL to administer both deposits. Once this is done, the remaining Caracoles and another small mine will be internationally offer for bids together with the Río Yura electric powerplant, which supplies power to the southern part of the country. The mines where production has been halted were San Vicente (silver and zinc), San José (gold, silver, and lead), and the Mutún (iron ore) deposit (near the border with Brazil). The industrial portion of the capitalization package was made up of the Karachipampa lead-silver smelter plant and the tin volatilization plant called La Palca in addition to the Río Yura powerplant. (Minas Hoy, 1997).

The activities of COMIBOL will be reduced to a purely administrative role following the transfer of operating control over its properties to the private sector. Only three of COMIBOL's existing mines remained in operation in 1996: Caracoles tin mine, Colquiri tin-zinc mine, and Huanuni tin mine.

The private mining sector, comprising 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 1996, the private Medium-Size Miners Association was composed of 14 affiliated mining companies, and the Small-Size Miners Association, 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, there were more than 320 mining cooperatives in the country, grouped under the Federación Regional de Cooperativas, of which about 40% were mining gold in 1996, mainly in the Tipuani area in the Province of Larecaja, La Paz Department.

Environmental Issues

The new environmental regulations were brought into force at the beginning of 1996. Included in the legislation are requirements for environmental impact studies to be submitted for all new mining and industrial projects, and for all existing projects to conform to environmental quality control systems within the next 5 years. Any operation failing to comply with these regulations faces closure, although the legislation does not address the widespread problems associated with 500 years of historical mining in the region and the pollution caused by artisanal miners. The environmental authorities are the Ministry of Sustainable Development and Environment (Ministerio de Desarrollo Sostenible y Medio Ambiente) of Bolivia, through its Departmental Secretary of Sustainable Development and Environment at the regional or departmental level. A Swedish technical mission in Bolivia completed in 1995 a preliminary report indicating new criteria for establishment of levels and limits of permissible contamination in the mining and industrial sectors. It recommended to the Government the environmental remediation of old mining sites in various parts of the country and preparation of environmental audits of mining and smelting areas, to follow through with backing by the Inter American Development Bank.

Commodity Review

Metals

Antimony.—Bolivia's antimony output increased 1% compared with that of 1995, amounting to 6,489 t for a total value of $14.7 million. Its production was entirely in the hands of the private sector. Approximately 67% was produced by the medium-size group of mines and 33% by the small-size group and cooperatives. Empresa Minera Unificada S.A. (EMUSA), operating its Caracota, Chilcobija, and Espititu Santo Mines, remained by far the largest Bolivian antimony producer, followed by Cía. Minera Salinas S.A.

During 1996, Vinto smelted 4,909 t of antimony-in-concentrates received from Laurel Industries to produce about 3,970 t of antimony trioxide. Bolivia exported 20% of its production as antimony concentrate, 78% as antimony trioxide, and 2% as antimony alloy.

Gold.—Official gold production in Bolivia decreased by 12% from that of 1995, amounting to 12.6 t for a total value of $154 million. The success of the Kori Kollo gold and silver mine operated by Empresa Minera Inti Raymi S.A. in the Altiplano north of Oruro, in which Battle Mountain Gold Mining Co. holds an 85% interest, continued. Kori Kollo was Bolivia's most productive operation although falling grades, a drop in mill recovery, and a higher striping ratio adversely affected production. However, this mine has stimulated much of the recent foreign interest in the Bolivian mining sector. In 1995, the Kori Kollo Mine set another production record with an output of 10.5 t of gold and 49.2 t of silver, however, in 1996 this record fell to 9.5 t of gold and 28.3 t of silver respectively.

Orvana Minerals Corporation of Canada and EMUSA formed a joint venture to explore the disseminated gold prospect of San Bernardino in Challapata (Pederson Project) in the Altiplano. The Pederson Project is 360 kilometers (km) south of La Paz, close to the town of Challapata in the Departmentof Oruro. It is an old mine named San Bernardino that was mined for antimony where a gold vein was discovered. To date, 206 holes have been drilled with reverse circulation for a total of 16,800 meters (m) plus a further 10 diamond drilling holes totaling 1,700 m

which covers an area of 47 square kilometers (only the nucleus of the Achachucani Mountain). The results obtained were fairly positive, identifying a potential on the order of 52 million tons of ore containing an average grade ore of 1.4 grams per ton, totaling 2.3 million ounces of gold as measured and inferred geologic resources. Orvana Minerals also purchased the copper-gold-silver Don Mario deposit south eastern of Santa Cruz. The company owns 10 mining concessions with a total area of 69,565 hectares, which include the project area itself and adjacent areas of potential interest. Orvana plans to test the continuity of the down-dip mineralization of the ore zone between the central core and a hole drilled by Billiton, the former owner, 300 m away (Mining Journal, 1996). Vista Gold Corp., formed from the amalgamation of Granges Inc. and Da Capo Resources Ltd. of Canada plans to carry out exploration and development drilling programs on 10 of its properties over the next 6 months. These programs, including development drilling programs at the Amayapampa, Capa Circa, and Guariche properties are budgeted to cost a total of $3 million. It is anticipated that significant additions to Vista's gold reserves and resources will result from these aggressive programs by mid-1997.

A 9,000-m development drilling program was underway in 1996 on the Amayapampa property, using three drills. Development drilling will commence on the Capa Circa property in early 1997. These programs are expected to increase proven and probable minable gold reserves at both properties and form the basis for a feasibility study due in April 1997 (Vista Gold Corp., 1996).

The richest and most productive alluvial gold deposits in Bolivia are located on the Challana, Kaka, Mapirí, and Tipuani Rivers, all in the northern area of the Department of La Paz. The second most important alluvial mining is in the Araras area in the northeast part of the country on the border with Brazil, where gold has been recovered from the Madera and Madre de Dios Rivers.

Lead, Silver, and Zinc.—Production of lead ore and concentrates and metallic lead, including alloys, decreased by 48% and 19% respectively from the already depressed level of 1995. Output of metallic silver decreased almost 14% below that of 1995. The medium-size mining sector was the dominant lead and zinc producer, with 84% of total lead and 66% of total zinc. In this sector, the major producers of silver, lead, and zinc were Empresa Minera Inti-Raymi S.A. (silver), Empresa Minera Quioma S.A. a COMSUR subsidiary (lead and zinc) and Arisur S.A. (silver, lead, and zinc).

In 1996, Bolivia's zinc concentrates were smelted in Germany. Zinc exports decreased to 31% of the total nonfuel mineral exports value.

Tin.—Tin production increased about 3% from 14,419 t in 1995 to 14,802 t in 1996. Tin output amounted to 16% of the country's total 1996 mineral exports value. The largest production increase in the private sector was by the small-size mines and cooperatives. For the 10th consecutive year, they replaced COMIBOL as the leading tin producer, with an output of about 70% of Bolivia's tin production in 1996. The COMIBOL mines produced about 26% of the country's total mining output.

COMIBOL signed 13 new joint-venture exploration contracts with local and foreign mining companies to explore mines and ore bodies of its own in Northern and Southern Lipez in Potosí Department. COMIBOL's Huanuni Mine continued as the largest tin mine in the country since its reopening in September 1988. The Vinto tin smelter, formerly operated by Empresa Nacional de Fundiciones smelted 35,890 t of tin ore (6% less than that of 1995) to produce 16,733 t of metallic tin. Of this, under a toll contract, Vinto smelted 11,768 t of tin ore for Minsur, S.A. and San Rafael Mine of Peru. Vinto's exports decreased to 11,326 t of metallic tin (99.93% average tin content). About 98% of Bolivia's metallic tin exports went to the United States and the rest to three Latin American countries.

Tungsten.—Bolivia's production of tungsten concentrate (WO_3), heavily dependent on international prices, decreased 11% from 826 t in 1995 to 733 t in 1996. Production came from the small miners and cooperatives that have small deposits with high ore grades and low labor costs.

Industrial Minerals

Cement.—During 1996, total cement produced in the country was 934,303 t, an increase of 4.8% compared with that of 1995. Cement in Bolivia was produced by four plants in different regions of the country having a total production capacity of about 1.4 million tons per year. Two plants, Fábrica Nacional de Cementos S.A. (FANCESA) and Fábrica de Cementos (EL PUENTE), were state-owned plants. During the year, these plants were purchased by Sociedad Boliviana de Cementos S.A. (SABOCE), the only private cement company in Bolivia. SABOCE, located in Viacha, Deparment of La Paz, has two plants, the Viacha and Warnes plants, with a combined production capacity of more than 300,000 tons per year. The Compañía Boliviana de Cementos S.A.M., located in Irpa Irpa, Department of Cochabamba, has a production capacity of 300,000 t/yr and is a mixed-capital company (50% private, and 50% state owned).

Mineral Fuels

In 1996, the state oil and gas company YPFB produced about 30,000 barrels per day of crude oil. Increases were seen in YPFB's new oilfields of Los Cusis (up 153%) and Patujusal (up 121%). Investment in the sector has dwindled to a trickle and the Government of Bolivia has had to borrow money just to keep YPFB operating through December. Production has slowed and only the rapidly increasing output of independent contractors has kept Bolivia's hydrocarbons sector on an upward trend (U.S. Embassy, La Paz, Bolivia, 1996, p. 3).

The contractors' crude oil production continued to rise and was 54.1% higher than in 1995 owing to Maxus' Energy Corp. of the United States increased output. The Surubi Oilfield operated by Maxus started production in August 1992 and has

already doubled its output to 2.3 million barrels (up 137%).

Production of natural gas increased about 2.9% from that of 1995 to 5,500 Mm^3. YPFB's Víbora Gasfield continued as the largest natural gas producer. The Carrasco Gasfield was YPFB's second largest natural gas producer. Production from the new fields of Patujusal and Los Cusis increased as well. Maxus Bolivia Inc.'s Surubi Gasfield and Pluspetrol S.A.'s Toro Gasfield increased also.

Of the total natural gas produced in Bolivia, 38.4% was exported to Argentina; 16.5% was consumed domestically; 28.6% was reinjected into the gasfields; 9.9% was vented, flared, or lost; 3.9% was consumed as fuel by YPFB; and the remaining 2.7% was converted into liquefied petroleum gas (LPG). Currently, Bolivia exports natural gas to Argentina and has major plans to export gas to Brazil, Chile, and Paraguay in the near future. Bolivia's pipeline plans include a link to northern Chile, a pipeline to Brazil, and the Paraguayan pipeline project. The pipeline to Chile has been delayed because of a problem with the proposed route, which was found, in January 1995, to have geological faults. The pipeline is eventually expected to handle as much as 20 million cubic meters per day (Mm^3/d) of natural gas as demand increases.

In September 1995, Bolivia and Paraguay signed an agreement for Bolivia to supply natural gas to Paraguay through a new pipeline. The Paraguay-Bolivia pipeline would run from Vuelta Grande Gasfield in Santa Cruz, Bolivia, to Asunción, Paraguay. The Tans Chaco pipeline was 800 km long and could transport up to 1.4 Mm^3/d after 5 years from its initial level of 566,000 cubic meters per day (m^3/d). The initial delivery of 566,000 m^3/d of natural gas was at a cost of $1.20 per million British thermal units (Btu). The Bolivia-Brazil gas pipeline is by far the most important and the largest project in Bolivia's history and should bring about significant short- and long-term economic benefits.

YPFB and Enron Development Corp. of the United States formed a joint-venture company to construct and operate the natural gas pipeline, scheduled to begin gas deliveries to the Brazilian cities of Sao Paulo in 1998 and Porto Alegre in 1999. Crude oil plus lease condensates are produced by YPFB and its contractors. YPFB's production represented 68.3% and the contractors 31.7% of the country's total production in 1996. Bolivia's total liquids production increased 10.3% to 10.3 Mbbl, or 28,349 barrels per day (bbl/d), compared with 9.3 Mbbl (25,703 bbl/d) produced in 1995. The country's total liquids production, including the production of LPG and natural gasoline, reached 31,083 bbl/d for 1996 compared with 28,186 bbl/d for 1995.

In March 1994, YPFB signed a new 3-year contract with Yacimientos Petrolíferos Fiscales S.A. (YPF S.A.) of Argentina to continue exporting the same volume of gas through March 1997 at an average price of $1.07 per million Btu. In December 1996, the final agreement and an annex for the natural gas export project to Brazil was signed by YPFB of Bolivia and Petróleo Brasileiro, S.A. of Brazil. The Bolivia-Brazil energy integration agreement included the selling of electricity generated by a natural gas-fired thermoelectric plant; urea and high-density polyethylene from a proposed plant to be installed in Puerto Suarez, Department of Santa Cruz; and the construction of the 563-km gas pipeline between the Santa Cruz Gasfields and Puerto Suarez near the Brazilian border.

Infrastructure

The transportation network of Bolivia was composed of a total of 42,815 km of highways. The Pan-American Highway linking Argentina and Peru crossed the country from south to northwest. The 3,684-km, Government-owned railroad system was controlled by Empresa Nacional de Ferrocarriles. Bolivia's 10,000 km of commercially navigable waterways connected the eastern region of the country with the Amazon Basin. As a landlocked country, Bolivia had no ocean ports but had access to ports in Chile through the Arica and Antofagasta Provinces and in Peru via Matarani port to international markets.

About 13.5 Mbbl of crude oil and condensates, 5.6 Mbbl of refined oil products, and 1,251 Mm^3 of natural gas were transported between major distribution centers in Bolivia through 5,980 km of pipelines owned and operated by YPFB. All the pipelines were reversible, with the exception of an export pipeline to Arica, Chile. The generation, transmission, and distribution of electrical power in Bolivia was carried out by state and private companies. Bolivia had an installed electrical generating capacity of 787 megawatts (MW), of which 308 MW, or about 55%, was generated by hydroelectric plants and the remainder by thermoelectric plants operated by Empresa Nacional de Electricidad, that had an installed generating capacity of 496.5 MW, or 62% of Bolivia's total (capitalized by three U.S. companies: Energy Initiatives, Dominion Energy, and Constellation Energy Inc.).

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 will be a valid component of Bolivia's foreign exchange earnings.

Future resource development is likely to focus on continued expansion of the hydrocarbon sector, as well as the development of Bolivia's gold industry and 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 expansion of sulfur production, and the extraction of gold from alluvial deposits in La Paz and at the Brazilian border.

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Asociación Nacional de Mineros Medianos,
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Major Publications

Servicio Nacional de Geología y Minería, (SERGEOMIN)
Departamento de Información Geológica Minera (DIGEM)
La Paz, Bolivia: Boletín Estadístico de Minería, monthly, annual.
Asociación Nacional de Mineros Medianos, La Paz, Bolivia:
Memoria e Informe Anual—1996
Noticias Mineras Mensuales—1996

TABLE 1
BOLIVIA: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity 2/		1992	1993	1994	1995	1996
METALS 3/						
Antimony:						
Mine output, Sb content		6,022	5,556	7,050	6,426	6,489
Metal including Sb content of trioxide		5,670	4,470	5,880	4,840	4,909
Arsenic: Mine output, arsenic trioxide, arsenic sulfide		633	663	341	362	255
Bismuth:						
Mine output, Bi content	kilograms	--	--	--	121	348
Metal, smelter	do.	30	7	36	19	28
Cadmium: Mine output, Cd content 4/		71	4	--	--	--
Copper: Mine output, Cu content		101	94	79	127	92
Gold: Mine output, Au content 5/	kilograms	4,690	10,400 r/	12,838	14,405	12,634
Iron ore: 6/						
Gross weight		55,500	51,000 e/	2,600 r/ e/	--	--
Fe content		35,000	32,100	1,650 r/	--	--
Lead :						
Mine output, Pb content		20,002	21,220	19,679	20,387	16,538
Metal, smelter		261	537	597	195	102
Manganese: Mine output, Mn content		100	--	--	--	--
Silver: Mine output, Ag content 7/	kilograms	282,350	332,768	352,083	425,053	384,384
Tantalum, tantalite	do.	2,720	3,535	1,820	565	--
Tin:						
Mine output, Sn content		16,500	18,600	16,169	14,419	14,802
Metal, smelter		14,400	14,500	15,300	17,709	16,733
Alloys		75	94	100 e/	248	226
Tungsten: Mine output, W content		851	287	462	655	582
Zinc: Mine output, Zn content		143,936	122,638	100,742	146,131	145,092
INDUSTRIAL MINERALS						
Barite		368	--	3,310	10,845	4,745
Bentonite		454	368	364	252	69
Calcite e/		500	37 8/	100	20	20
Cement, hydraulic		600,288	653,800 r/	767,953	891,776	934,303
Gemstone, amethyst:						
Polished	kilograms	3	15	33	47 e/	36
Rough	do.	47,200	248	220	310	238
Gypsum, crude e/		6,000 e/	4,000 e/	532	1,800	192
Marble		67	37	318	170	242
Onyx	kilograms	104	133	56	250	--
Pumice e/		100	80	50	--	--
Quartz	kilograms	100	816	400	--	--
Salt e/		260	200	200	4,924	273
Sandstone (arenisca)		119	--	--	--	--
Slate (pizarra)		5,000 e/	163	268	280	393
Sodalite	kilograms	3,000 e/	--	--	--	--
Sulfur, native		15	1,050	252	--	--
Ulexite		18,131 r/	11,990 r/	10,433	6,891	4,332
MINERAL FUELS AND RELATED MATERIALS						
Gas, natural:						
Gross	million cubic meters	5,522	5,593	5,918	5,346	5,500 e/
Marketed	do.	2,130	2,090	2,949	2,943	2,950 e/
Natural gas liquids:						
Natural gasoline	thousand 42-gallon barrels	915 r/	772 r/	788	902	900 e/
Other (consumption)	do.	1,816	1,809	1,939	2,447	2,450

See footnotes at end of table.

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

(Metric tons unless otherwise specified)

Commodity 2/		1992	1993	1994	1995	1996
MINERAL FUELS AND RELATED MATERIALS--Continued						
Petroleum:						
Crude including condensate	thounsand 42-gallon barrels	7,752	8,116	9,381	10,347	10,400 e/
Refinery products:	do.					
Liquefied petroleum gas	do.	511	513	510 e/	504	500 e/
Gasoline	do.	3,224	3,235	3,200 e/	3,433	3,450 e/
Jet fuel	do.	669	741	750 e/	822	825 e/
Kerosene	do.	262	231	235 e/	223	225 e/
Distillate fuel oil	do.	2,848	2,635	2,600 e/	2,687	2,690 e/
Lubricants	do.	70	31	30 e/	56	60 e/
Residual fuel oil	do.	202	330	330 e/	400	400 e/
Unspecified	do.	1,933	2,000 e/	2,000 e/	2,220	2,250 e/
Refinery fuel and losses	do.	--	96	100 e/	100	100 e/
Total	do.	9,719	9,812	9,755 e/	10,445	10,500 e/

e/ Estimated. r/ Revised.

1/ Table includes data available through Dec. 1996.

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 inadequte to make reliable estimates of output levels.

3/ Unless otherwise specified, data represent actual production by COMIBOL and small- and medium-size mines.

4/ Cadmium contained in zinc concentrates produced by COMIBOL. (Cadmium is not recovered in elemental form in Bolivia.)

5/ Includes production of metallic gold.

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

7/ Includes production of metallic silver.

8/ Reported figure.

TABLE 2
BOLIVIA: STRUCTURE OF THE MINERAL INDUSTRY FOR 1996

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity
Antimony		Empresa Minera Unificada S.A. (EMUSA) (private 100%)	Caracota, Chilcobija, and Espíritu Santo Mines,	2.7
Do.		Cía. Minera Salinas S.A. (COMISAL) (private, 100%)	Potosí Department	0.9
Do.		Empresa Minera Hermanos Bernal S.A. (private 100%)	Putuma Mine, Potosí Department	0.7
Antimony trioxide		Empresa Minera Hermanos Bernal S.A (private 100%)	Palala smelter, Tupiza, Potosí Department	1.0
Cement		Sociedad Boliviana de Cemento S.A. (private, 100%)	Viacha, (La Paz); Sucre; and Tarija plants	650
Do.		Cía. Boliviana de Cementos S.A.M. (50% Government, 50% private)	Irpa Irpa, Cochabamba Department	300
Gas	cubic meters	Yacimientos Petrolíferos Fiscales Bolivianos (YPFB) (Government, 100%) 1/	Río Grande, Vuelta Grande, and Sirari Gasfields, Santa Cruz Department	2,472
Do.	do.	do.	San Roque, Vibora, and Yapacani Gasfields, Southern District	683
Do.	do.	do.	Cascabel, Naranjillos, Carrasco, Camiri, Monteagudo, Santa Cruz Gasfield Central, and Southern Districts	441
Do.	do.	Occidental Boliviana Inc., Tesoro Bolivia Petroleum Co. (U.S.) and Empresa Naviera	El Porvernir, La Vertiente, Gasfields, Santa Cruz Department	66,100
Gold	kilograms	Cooperatives. (private, 100%)	Tipuani, Guanay, Mapiri, Huayta, Kaka and Teoponte Rivers, La Paz Department	3.1
Do.	do.	Empresa Inti-Raymi S.A. (private, 100%) (Battle Mountain Gold Mining Co., 85%; EMUSA, 15%)	Gold leaching, open pit operation at La Joya, near Oruro, Oruro Department	9.6
Lead		(COMSUR S.A.), Arisur S.A., La Solución S.A. (private, 100%)	Asientos, lead-silver-zinc mine at Mizque, Cochabamba Department	13.8
Do.		Empresa Metalúrgica de Karachipampa (Government, 100%) (Autonomous subsidiary Corporacion Minera de Bolivia (COMIBOL), Lead/silver smelter (continued shutdown for lack of operating capital and shortage of ore feed	Karachipampa, Potosí Department	24

TABLE 2--Continued
BOLIVIA: STRUCTURE OF THE MINERAL INDUSTRY FOR 1996

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity
Petroleum thousand 42-gallon barrels	Yacimientos Petrolíferos Fiscales Bolivianos Bolivianos (YPFB) (Government, 100%) 1/	La Peña, Vuelta Grande, Rio Grande, San Roque, and Vibora Oilfields Santa Cruz Department	4,500
Do. do.	Occidental Boliviana Inc. and Tesoro Bolivia Petroleum Co., both U.S. companies, and other contractors (private, 100%)	Porvenir, La Vertiente, Bermejo, Caigua, and Colpa Oilfields	1,200
Silver kilograms	Cía. Minera del Sur., S.A. (COMSUR) (private, 100%) (RTZ of the United Kingdom, shareholders)	Martha, Huari, Porco, and Milluni Mines La Paz Department	103.2
Do. do.	Empresa Inti-Raymi S.A.,(Battle Mountain Gold Co., 85% EMUSA, 15%)	La Joya, near Oruro, Oruro Department	28.3
	Empresa Minera Arisúr S.A.	Silver, lead and zinc mines in Potosí Department	
Tin	COMIBOL: Cía. Minera de Oruro, Cía Minera Quechisla, Cía Minera de Potosí, and Cía Minera La Paz (Government, 100%)	Huanuni, Colquiri, Caracoles, Viloco, and Chorolque Mines, at Oruro, Potosi, and La Paz Departments	3.9
Do.	Barrosquira Ltda., Avicaya Ltda.,and COMSUR S.A. (private, 100%)	Martha, Cerro Grande, Milluni, and Berenguela tin mines	0.6
Do.	Small miners and cooperatives (private, 100%)	Catavi-Siglo XX, Caracoles, Bolivar Viloco, Colquiri, and Colquechaca Mines	10.3
Tin, refined	Empresa Metalúrgica de Vinto (COMIBOL's subsidiary) (Government, 100%)	Vinto, Oruro Department	16.7
Do.	Fundestaño de Oruro S.A. (private, 100%)	City of Oruro, Oruro Department	0.1
Do.	Cía. Metalúrgica Industríal y Comercíal Hormet S.A. (private, 100%).	City of La Paz, La Paz Department	4.7
Zinc	COMIBOL, Cía. Minera de Oruro, Cía. Minera Quechisla, Cía. Minera de Potosí (Government, 100%)	Santa Fe, Colquiri, San Vicente, Tatasi, Animas-Inocente and Unificada Mines at Oruro, Potosí, and La Paz Departments	7.3
Do.	COMSUR, S.A., Arisúr, S.A. and La Solución S.A. (private, 100%).	Porco, Asientos, Maragua, Huari-Huari Monserrate,and Monte Blanco Mines at Cochabamba, Oruro, and Potosí Departments	96

1/ At yearend 1996, 50% of Yacimientos Petrolíferos Fiscales Bolivianos was sold to the private sector. The new company structure was to become effective in March 1997.

TABLE 3
BOLIVIA: RESERVES OF MAJOR MINERAL COMMODITIES FOR 1996

(Metric tons unless otherwise specified)

Commodity		Reserves
Antimony, metal content		350,000
Lead, metal content		25,965
Lithium carbonate	thousand metric tons	5,500
Natural gas	trillion cubic meters	5.85
Petroleum	million 42-gallon barrels	134.93
Silver, metal content	thousand metric tons	29,970
Tin, metal content		448,358
Tungsten, metal content		53,000
Zinc, metal content		935,497
Iron, metal content	thousand metric tons	121,223