

THE MINERAL INDUSTRY OF

BOLIVIA

By Pablo Velasco

According to the National Statistical Institute, the gross domestic product (GDP) of Bolivia grew by 3.7% to \$15.8 billion² in 1995, lower than the 4.2% growth registered in 1994. Bolivia's public debt to December 1995 totaled \$4.5 billion. Export revenues increased by about 13.3% to about \$1.2 billion owing to increases in the total mineral exports of gold, silver, and zinc, including crude oil and natural gas. These revenues, including petroleum and natural gas, represented about 53.5% of Bolivia's total export earnings. Gold, silver, and zinc outputs are currently the mineral base sustaining Bolivia's mineral industry.

In August, 1995, Bolivia signed a final agreement for the natural gas export project to Brazil. The pipeline construction could begin in the third quarter of 1997 with natural gas delivery by late 1998. Bolivia also signed a free trade agreement with Mexico late in 1995 and agreed to a trade agreement with the Mercosur customs union under a so-called four-plus-one formula. The formula allows for the creation of freetrade zones between the Mercosur and other countries, but it stops short of full membership in an eventual common market. The Mercosur is currently composed of Argentina, Brazil, Paraguay, and Uruguay.

Zinc became the most valuable export commodity, producing an income of about \$151.4 million, an increase of 43.8% compared with that of 1994, followed by gold, which increased 9.8% to about \$130.8 million over that of the previous year. Hydrocarbons continued in third place in the Bolivian export balance sheet after minerals and nontraditional goods. However, in 1995, the nontraditional export value increased about 5% to \$549.5 million compared with that of 1994 and represented about 47% of the total export earnings.

The medium mining sector—the privately owned commercial mines—was the dominant producer responsible for more than one-half (57%) of the value of mine production in 1995. Value of production by Corporación minera de Bolivia (COMIBOL), the state-owned company, in the same period, declined from 51% in 1985 to about 7% in 1995.

The Government in 1995 promulgated a number of significant legal and regulatory reforms designed to enhance the investment environment in which the capitalization process, will transfer operations to the private sector, will allow broader economic development. The reforms include the following: (1) The tax law passed by Congress on December 22, 1994, which dramatically simplifies the tax

regime, establishing a single corporate income tax rate (25%) and single fixed rates for value-added and other transaction-related taxes, will apply to all private companies. Mining companies (not smelters) are subject to a minimum 2.5% departmental income tax or the corporate income tax, whichever is larger. (2) Law No. 1333, the environmental protection law approved by Congress on April 27, 1992, was enacted to establish the Government's intentions to balance the need for improved environmental protection with the imperative of sustainable economic development and to set up the air and water emission guidelines that would guide economic development activity in Bolivia. (3) The Government is nearing completion of a revision of its mining code aimed at further improving the climate for investing and operating in the country's mineral sector. Although Bolivia is widely acknowledged as having a well-developed mining code, the changes under consideration have as their objectives, among others, the following improvements: (a) Ensuring equal treatment of foreign and national entities, (b) providing maximum legal and technical protection to holders of mining rights, and (c) facilitating and motivating exploration, development and profitable exploitation efforts. Included among the revisions to the mining code are provisions that allow significantly longer leases than those available under prevailing rules.

There are two main programs related to the mineral sector: (1) Capitalization is a process by which the Government will transfer ownership and administration of six large state-owned enterprises to private shareholders. Once this process is achieved, one-half of the shares of the newly capitalized enterprises will be distributed among all adult Bolivian citizens. Once the system is reformed, shares in the capitalized companies allocated to Bolivian citizens will be transferred to their benefit through the new pension system, which will serve to motivate personal savings and the development of Bolivian capital markets. The six large public enterprises that were expected to be capitalized in 1995 included Yacimientos Petrolíferos Fiscales Bolivianos (YPFB), Empresa Nacional de Telecomunicaciones, Lloyd Aéreo Boliviano, Empresa Nacional de Electricidad, Empresa Nacional de Fundiciones, and Empresa Nacional de Ferrocarriles. It was expected that investment related to capitalization would be equivalent to 25% of Bolivia's GDP, or about \$4.0 billion. (2) The implementation of a project to export natural gas to Brazil was expected to produce annual

revenues of about \$230 million and was expected to attract foreign investment in oil and gas development.

Mercosur, the four-nation Latin American trade grouping, will sign an agreement giving associate membership to Bolivia despite a last minute disagreement which threatened to derail previous negotiations. Bolivia's status in Mercosur will be similar to that of Chile, reducing tariffs between Chile and the Mercosur nations to an average of 6% in 1997 and to zero over eight years.

Environmental Law No. 1333 of April 27, 1992, was created for the protection and conservation of the environment and natural resources and the regulation of human activities in order to promote and sustain development of the country while maintaining its quality of life. The objective of proposed regulations under this legislation was to follow a "best-available-technology" approach rather than a normative approach. In other words, the regime should require technology in pollution abatement, for example, in the treatment of mine water and stack effluent rather than establishing fixed contaminant levels to be achieved without regard to technology. 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. Environmental Law No.1333 fully in force in 1995, required that both individuals and corporations to provide information to the environmental authorities whenever their activities affect or could affect the environment and also whenever an individual accident or environmental incident took place.

The law requires both individuals and corporations to keep internal records of this information and to make it available to the authorities upon request. The Inter-American Development Bank (IDB) of Washington, DC in 1994 approved a \$20 million environmental assistance loan to the Ministry of Sustainable Development of Bolivia for various activities applicable to preserving the environment in new mining and processing projects, including abandoned mined land projects. A Swedish technical mission in Bolivia completed in 1995 a preliminary report indicating a new criterion for establishment of levels and limits of permissible contamination in the mining and industrial sectors and recommended to the Government the environmental remediation of old mining sites in various parts of the country and preparing environmental audits of mining and smelting areas to follow through with backing by the IDB.

The Bolivian metals and mineral production increased substantially compared to the previous year (*See table 1.*) Crude oil and natural gas were produced by YPFB, and its contractors represented 68.3% and 31.7% of the total production, respectively. Natural gas output decreased 9.6% in 1995 compared with 5,918 million cubic meters (Mm³) in 1994.

Nonfuel minerals and mineral fuels (oil and gas) continued

to be Bolivia's leading exports; in combination, they contributed about 53.5% of Government revenues. Exports of nonfuel minerals in 1995 increased by 16.1% in value compared with those of 1994, to \$479.1 million, amounting to less than one-half of total exports. In 1995, Bolivia continued to be a modest source of minerals for the United States. Bolivian mineral exports to the U.S. increased slightly in 1995 to \$87 million. Tin export value, including metallic tin, was down 2.3% to \$88.6 million. Exports of metallic tin by Vinto decreased in volume 14.5% to 13,144 metric tons (t) and decreased in value 4.6% to \$80.9 million from \$83 million in 1994.

In 1995, crude oil, natural gas and liquefied natural gas exports, and domestic sales contributed 33% of the national treasury's consolidated revenues. Exports of petroleum and refined products valued at \$60.2 million in 1995, increased 298.4% compared with the previous year. The value of natural gas exported to Argentina increased from \$91.6 million in 1994 to \$92.4 million in 1995. The long-delayed hydrocarbons law was finally approved by yearend 1995, and it will be enacted on April 30, 1996, according to YPFB officials. The passage of law no. 1689 was necessary to set the stage for the capitalization of YPFB and to consolidate the natural gas export project to Brazil.

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 sectors' development. NSM also has the function of providing investors with all of the necessary information regarding the guarantees and rights 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 de Geología y Minería, formerly Servicio Geológico de Bolivia, the Instituto de Investigaciones Minero-Metalúrgico de Oruro, and Servicio Nacional de Información Minera. The Servicio Nacional de Catastro Minero and COMIBOL are autonomous entities.

COMIBOL's efforts continued to be centered on its privatization program in order to attract private capital to operate its mines and participate on new projects in exploration under joint ventures, leasing, or operating contracts. Until December 1995, COMIBOL had nine joint ventures and five large leasing contracts in operation. COMIBOL is also negotiating seven other large joint-venture contracts to explore/exploit known ore bodies. COMIBOL itself is not part of the capitalization program of the Government. However, COMIBOL's tin and zinc/tin mines are being offered as part of the capitalization program of Empresa Metalúrgica Vinto. 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 1995: Huanuni tin mine, Colquiri tin-zinc mine, and Caracoles 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 1995, the private Medium-Size Miners Association was composed of 12 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, Mapiquí, 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 1995 mainly in the Tipuani area in the Province of Larecaja, La Paz Department.

Bolivia's antimony output decreased 8.9% compared with that of 1994, amounting to 6,426 t for a total value of \$18.4 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 Chilcobija and Caracota Mines, remained by far the largest Bolivian antimony producer, followed by Cia. Minera Salinas S.A.

During 1995, Vinto smelted 4,337 t of antimony-in-concentrates received from Laurel Industries to produce about 3,400 t of antimony trioxide. Bolivia exported 26% of its production as antimony concentrate, 67% as antimony trioxide, and 6% as antimony alloy in 1995.

Official gold production in Bolivia increased by 13% from that of the previous year, amounting to 14.4 t for a total value of \$178 million. In 1995, gold production is the second largest money earner after zinc for the country's mining industry. The success of the Kori Kollo gold and silver mine operated by Inti Raymi in the Altiplano north of Oruro has stimulated much of the recent foreign interest in the Bolivian mining sector. In 1995, the Kori Kollo Mine set a new production record with an output of 10.5 t of gold and 49.2 t of silver recovered compared to 9.7 t in 1994 and 40.7 t of silver. Orvana Minerals Corporation of Canada and EMUSA formed a joint-ventured to explore the disseminated gold prospect of San Bernardino in Challapata (Pederson Project) in the Altiplano. Orvana Minerals also purchased the copper-gold Don Mario deposit in eastern Bolivia and was concluding an intensive drilling exploration program in 1995. Da Capo Mining Company of Canada concluded its exploration program in the Amayapampa gold deposit with positive results. The richest and most productive alluvial gold deposits are located on the Challana, Kaka, Mapiquí, 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.

Production of metallic lead, including alloys, decreased by 67% from the depressed level of previous years. Output of metallic silver decreased 1.8% below that of 1994. The medium-size mining sector was the dominant lead and zinc producer, with 83% of total lead and 69% of total zinc. In this sector, the major producers were Empresa Minera Quioma S.A. COMSUR's subsidiary and La Solucion S.A. In 1995, Bolivia's zinc concentrates were smelted in Germany.

1995, tin prices remained low and consequently tin output decreased about 10% to 14,419 t from 16,027 t in 1994. Tin output amounted to 14% of the country's total 1995 mineral exports value compared with zinc exports that decreased to 30% of the total mineral exports value. The largest production increase in the private sector was by the small-size mines and cooperatives. For the ninth consecutive year, they replaced COMIBOL as the leading tin producer, which accounted for about 69% of Bolivia's tin production in 1995. The COMIBOL mines produced about 28% of the country's total mining output.

In 1995, COMIBOL signed 12 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 Potosi Department. COMIBOL's Huanuni Mine became the largest and the richest tin mine in the country since its reopening in September 1988. The Vinto tin smelter (formerly operated by ENAF) smelted 37,966 t of tin ore (12% less than that of 1994) to produce 17,663 t of metallic tin. Of this, under a toll contract, Vinto smelted 11,474 t of tin ore for Minsur, S.A. and San Rafael Mine of Peru. Vinto's exports decreased to 12,915 t of metallic tin (99.93% average tin content) in 1995. About 93% of Bolivia's metallic tin exports went to the United States and the rest to six Latin American countries.

Bolivia's production of tungsten concentrate (WO_3), heavily dependent on international prices, increased to 826 t in 1995 from 583 t in 1994. Production came from the small miners and cooperatives that have small deposits with high ore grades and low labor costs. Output of the small-size mining sector increased about 42% to 583 t (WO_3 content).

During 1995, total cement produced in the country was more than 800,000 t, an increase of 33% compared with that of 1994. Cement in Bolivia was produced by four plants in different regions of the country having a total production capacity of about 870,000 metric tons per year (t/yr). Two plants, Fábrica Nacional de Cementos S.A. and Fábrica de Cementos El Puente, were state-owned. Under the current Government's privatization policy, the two plants were offered for sale under an international bid. The Compañía Boliviana de Cementos S.A.M., in Irpa Irpa, Department of Cochabamba, has a production capacity of 300,000 t/yr and is a mixed-capital company (state 50% and private 50%). The Sociedad Boliviana de Cementos S.A. in Viacha, Department of La Paz, with a capacity of 300,000 t/yr, is the

only wholly privately owned cement plant in the country.

In 1995, the state oil and gas company YPFB produced about 30,000 barrels per day of crude oil. In August 1995, the Government began receiving preliminary bids from investors interested in buying a share of YPFB. A total of 80 foreign and domestic firms initially expressed interest in bidding on the company. In the end, 35 companies qualified to participate in an auction for the oil conglomerate. In October 1995, the Bolivian Government announced a delay in the transfer of YPFB to private control pending review of the bidding process. Deadlines for submission of prequalification credentials were extended, with a final list of selected companies in late 1995. In January 1996, the government will unveil YPFB's latest capitalization plan. During 1995, YPFB had 17 active operational contracts (production sharing exploration contracts). Eight were with subsidiaries of U.S. oil companies, and the remainder were with other operational contracts from other foreign and domestic companies as operators. During 1995, no new contracts were signed, but YPFB continued to negotiate 11 exploration and enhanced recovery contracts with different foreign companies.

Production of natural gas decreased 9.7% from that of 1994 to 5,346 Mm³. YPFB's Víbora Gasfield with 858.4 Mm³ became the largest natural gas producer in 1995; its production increased 13.8% compared with that of 1994. The Carrasco's Gasfield output was YPFB's second largest natural gas producer, increasing 39.9% in 1995. Production from the new fields of Patujusal and Los Cusis increased 120.5% and 152.5%, respectively. Maxus Bolivia Inc.'s Surubi Gasfield and Pluspetrol S.A.'s Toro Gasfield increased 136.5% and 778%, respectively.

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 future 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. Additionally, the Bolivian army has refused to support the pipeline project until Chile agreed to deal with the issue of Bolivian access to the Pacific Ocean. The pipeline is eventually expected to handle as much as 20 million cubic meters per day (Mm³/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 Trans Chaco pipeline was 800-kilometers (km) long and could transport up to 1.4

Mm³/d after 5 years from its initial level of 566,000 cubic meters per day m³/d. The initial delivery of 566,000 m³/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 of the projects. On August 17, 1994, Bolivia and Brazil renegotiated the 1993 contract, just before the project financing deadline. As a result of this renegotiation, an addendum to the contract was signed by YPFB and Petróleo Brasileiro, S.A. Based on recommendations made by the First Boston Consulting Group, the financial and institutional structure of the \$2.0-billion-plus pipeline will comprise two major companies. One will run the \$400-million, 577-km Bolivian portion of the pipeline from the Rio Grande Gasfield in Santa Cruz to Puerto Suarez. The other company will run the \$1.6-billion, 1,800-km-long pipeline from the Brazilian border to Sao Paulo and beyond. Recently, YPFB and Enron Development Corp. of the United States formed a joint-venture company to construct and run the natural gas pipeline, which is 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 1995. Bolivia's total liquids production increased 10.3% to 10.3 million barrels (Mbbbl), or 28,349 barrel per day (bbl/d), compared with 9.3 million barrels (Mbbbl) (25,703 bbl/d) produced in 1994. The country's total liquids production, including the production of LPG and natural gasoline, reached 31,083 bbl/d for 1995 compared with 28,186 bbl/d for 1994. Increases were seen in YPFB's new oilfields of Los Cusis (up 152.5%) and Patujusal (up 120.5%).

The contractor's crude oil production continued to rise and was 54.1% higher than in 1994 owing to Maxus's increased output. The Surubi Oilfield operated by Maxus Energy Corp. of the United States started production in August 1992 and has already doubled its output to 2.3 Mbbbl (up 136.5%) in 1995.

The transportation network of Bolivia was composed of a total of 38,836 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 Peru via Matarani port to international markets.

About 13.5 Mbbbl of crude oil and condensates, 5.6 Mbbbl of refined oil products, and 1,251 Mm³ 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 both state and private companies. Bolivia had an installed electrical generating capacity of 756 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 468.2 MW, or 62% of Bolivia's total.

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. On March 1994, YPFB signed a new 3-year contract with Yacimientos Petroliferos 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 August 1995, the final agreement and an annex for the natural gas export project to Brazil was signed by YPFB of Bolivia and Petrobrás of Brazil.

Through a combination of capitalization and joint venture transfer 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.

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. Mining companies, both 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. COMSUR S.A.'s El Puquio Norte project also has

considerable potential. The Bolivia's capitalization plan is an audacious program designed to bring to the country the benefits of privatization without turning the companies involved completely over to private investors.

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.

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.

¹Where necessary, values have been converted from bolivianos (\$b) to U.S. dollars at the rate of \$b4.9=US\$1.00.

Major Source of Information

Secretaría Nacional de Minas
Ave. 16 de Julio 1769, Casilla 8686
La Paz, Bolivia

Major Publications

Secretaría Nacional de Minería, La Paz, Bolivia: Boletín Estadístico de Minería, monthly, annual.
Asociación Nacional de Mineros Medianos, La Paz, Bolivia: Minería Mediana-Memoria 1995, annual.
U.S. Geological Survey and Servicio Geológico de Bolivia on the "Geology and Mineral Resources of the Altiplano and Cordillera Occidental" Bulletin 1975.
Corporación Minera de Bolivia, La Paz, Bolivia: Information Memorandum for Prospective Investors.
American Embassy, La Paz, Bolivia: Bolivian Mining and Petroleum Outlook, 1995-96 report.

TABLE 1
BOLIVIA: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity 2/ METALS 3/	1991	1992	1993	1994	1995
Antimony:					
Mine output, Sb content	7,287	6,022	5,556	7,050	6,426
Metal including Sb content of trioxide	3,550	5,670	4,470	5,880	4,840
Arsenic, mine output, arsenic trioxide, arsenic sulfide	463	633	663	341	362
Bismuth:					
Mine output, Bi content	--	--	--	--	121
Metal, smelter	--	30	7	36 r/	19
Cadmium, mine output, Cd content 4/	115	71	4	--	-- e/
Copper, mine output, Cu content	30	101	94	79	127
Gold, mine output, Au content 5/ kilograms	3,500	4,690	10,400 r/	12,838	14,405
Iron ore: 6/					
Gross weight	102,000	55,500	51,000 e/	2,600 r/ e/	-- e/
Fe content	72,100	35,000	32,100	1,650 r/	-- e/
Lead:					
Mine output, Pb content	20,800	20,002	21,220	19,679	20,387
Metal, smelter	213	261	537	597	195
Manganese, mine output, Mn content	215	100	--	--	-- e/
Silver, mine output, Ag content 7/ kilograms	375,708 r/	282,350	332,768	352,083	425,053
Tantalum, tantalite do.	3,740	2,720	3,535	1,820	565
Tin:					
Mine output, Sn content	16,800	16,500	18,600	16,200	14,419
Metal, smelter	14,700	14,400	14,500	15,300	17,709
Alloys	261	75	94	100 e/	248
Tungsten, mine output, W content	1,070	851	287	462	655
Zinc, mine output, Zn content	129,778	143,936	122,638	100,742	146,131
INDUSTRIAL MINERALS					
Barite	1,280	368	--	3,310	10,845
Bentonite	825	454	368	364	252
Calcite	480	500 e/	37	100 e/	20 e/
Cement, hydraulic	591,630	600,288	653,800 r/	767,953 8/	868,817 8/
Gemstone, amethyst:					
Polished kilograms	254	3	15	33	47 e/
Rough do.	32,100	47,200	248	220	310
Gypsum, crude e/	4,000	6,000	4,000	532 8/	1,800 8/
Marble	37	67	37	318	170
Onyx kilograms	10,800	104	133	56	250
Pumice e/	100	100	80	50	--
Quartz kilograms	--	100	816	400	-- e/
Salt e/	255 8/	260	200	200	4,924 8/
Sandstone (arsenisca)	--	119	--	--	-- e/
Slate (pizarra)	14,800	5,000 e/	163	268	280
Sodalite kilograms	4,170	3,000 e/	--	--	-- e/
Sulfur, native	2,780	15	1,050	252	-- e/
Ulexite	14,200	18,131 r/	11,990 r/	10,433	6,891
MINERAL FUELS AND RELATED MATERIALS					
Gas, natural:					
Gross million cubic meters	5,432	5,522	5,593	5,918 8/	5,346 8/
Marketed do.	2,180	2,130	2,090	2,949 8/	2,943 8/
Natural gas liquids:					
Natural gasoline thousand 42-gallon barrels	814	915 r/	772 r/	788 8/	902 8/
Other (consumption) do.	1,900	1,816	1,809	1,939 8/	2,447 8/
Petroleum:					
Crude including condensate thousand 42-gallon barrels	8,090	7,752	8,116	9,381 8/	10,347 8/
Refinery products:					
Liquefied petroleum gas do.	570	511	513	510 e/	504 8/
Gasoline do.	3,300	3,224	3,235	3,200 e/	3,433 8/
Jet fuel do.	683	669	741	750 e/	822 8/
Kerosene do.	269	262	231	235 e/	223 8/
Distillate fuel oil do.	2,830	2,848	2,635	2,600 e/	2,687 8/

See footnotes at end of table.

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

(Metric tons unless otherwise specified)

Commodity 2/		1991	1992	1993	1994	1995
MINERAL FUELS AND RELATED MATERIALS--Continued						
Petroleum--Refinery products--Continued:						
Lubricants	do.	90	70	31	30 e/	56 8/
Residual fuel oil	do.	816	202	330	330 e/	400 8/
Unspecified	do.	1,220	1,933	2,000 e/	2,000 e/	2,220 8/
Refinery fuel and losses	do.	--	--	96	100 e/	100 8/
Total	do.	9,778 r/	9,719	9,812	9,755 e/	10,445 8/

e/ Estimated. r/ Revised.

1/ Table includes data available through Sept. 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 inadequate 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 1995

(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 Espiritu Santo Mines, Potosi Department	2.7
Do.		Cia. Minera Salinas S.A. (COMISAL) (private, 100%)	Putuma Mine, Potosi Department	1.0
Antimony trioxide		Empresa Minera Hermanos Bernal S.A. (private, 100%)	Palala smelter, Tupiza, Potosi Department	1.0
Gas	cubic meters	Yacimientos Petroliferos Fiscales Bolivianos (YPFB) (Government, 100%)	Rio 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 (some with U.S. equity) (private, 100%)	Tipuani, Guanay, Mapiri, Huayta, Kaka and Teoponte Rivers, La Paz Department	2.2
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	10.5
Do.	do.	Bolivian Army's Development Corp.; 200 dredges operating in the Araras region (without legal concession)	Araras, Cachueta Esperanza gold dredging, Pando and Beni Departments	6.0
Lead		Empresa Minera Quioma S.A. (COMSUR S.A.) (private, 100%) (formerly owned by ASARCO Incorporated of the U.S.)	Asientos, lead-silver-zinc mine at Mizque, Cochabamba Department	16.7
Do.		Empresa Metalurgica 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, Potosi Department	24.0
Petroleum	thousand 42-gallon barrels	Yacimientos Petroliferos Fiscales Bolivianos Bolivianos (YPFB) (Government, 100%)	La Peña, Vuelta Grande, Rio Grande, San Roque, and Vibora Oilfield, Santa Cruz Department	4,500
Do.	do.	Occidental Boliviana Inc. and Tesoro Bolivia Petroleum Co., both U.S. companies, and other contractors (private, 100%)	Porvernir, La Vertiente, Bermejo, Caigua, and Colpa Oilfields	1,200

TABLE 2--Continued
BOLIVIA: STRUCTURE OF THE MINERAL INDUSTRY FOR 1995

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity
Silver	kilograms	COMIBOL, Cia. Minera de Oruro, Cia. Minera Quechisla, and Cia. Minera Potosi subsidiaries (Government, 100%)	San Jose, Bolivar, Poopo, Santa Fe, San Vicente, Tatasi, Animas-Inocente, and Unificada Mines at Oruro, and Potosi Departments	99.0
Do.	do.	Cia. Minera del Sur., S.A. (COMSUR) (private, 100%) (RTZ of the United Kingdom, shareholder)	Martha, Huari, Porco, and Milluni Mines La Paz Department	130.6
Do.	do	Empresa Inti-Raymi S.A.(Battle Mountain Gold Co. 85%, EMUSA 15%)	La Joya, near Oruro, Oruro Department	40.7
Tin		COMIBOL.; Cia. Minera de Oruro, Cia. Minera Quechisla, Cia Minera de Potosi, and Cia. Minera La Paz (Government, 100%)	Huanuni, Colquiri, Caracoles, Viloco, and Chorolque Mines, at Oruro, Potosi, and La Paz Departments	5.7
Do.		COMSUR, Barrosqira, International Mining Co., Yana Malleu and Avicaya companies (private, 100%)	Martha, Cerro Grande, Milluni, and Berenguela tin mines	.8
Do.		Small miners and cooperatives (private, 100%)	Catavi-Siglo XX, Caracoles, Bolivar Viloco, Colquiri, and Colquechaca Mines	10.0
Tin, refined		Empresa Metalurgica de Vinto (COMIBOL's subsidiary) (Government, 100%)	Vinto, Oruro Department	14.3
Do.		Fundestano de Oruro S.A. (private, 100%)	City of Oruro, Oruro Department	.05
Do.		Cia. Metalurgica Industrial y Comercial-Hormet S.A. (private, 100%)	City of La Paz, La Paz Department	.25
Zinc		COMIBOL, Cia. Minera de Oruro, Cia. Minera Quechisla, Cia. Minera de Potosi (Government, 100%)	Santa Fe, Colquiri, San Vicente, Tatasi, Animas-Inocente and Unificada Mines at Oruro, Potosi, and La Paz Departments	8.3
Do.		COMSUR, Maragua Ltda., Caballo Blanco S.A. (private, 100%)	Porco, Asientos, Maragua, Huari-Huari Monserrate, and Monte Blanco Mines at Cochabamba, Oruro, and Potosi Departments	98.5

TABLE 3
BOLIVIA: RESERVES OF MAJOR MINERAL
COMMODITIES FOR 1995

(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