

# THE MINERAL INDUSTRY OF PERU

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In 2003, Peru remained among the leading world producers of such mineral commodities as, in order of production, arsenic (after China, Chile, and Mexico), bismuth (China), copper (Chile, Indonesia, the United States, and Australia), lead (Australia, China, and the United States), rhenium (Chile), silver (Mexico), tin (China), and zinc (Australia and China) (Brooks, 2004; Carlin, 2004; Edelstein, 2004; Hilliard, 2004; Jorgenson, 2004; Magyar, 2004; Plachy, 2004; Smith, 2004).

In 2003, with an area of about 1.3 million square kilometers and a population of almost 28 million, Peru had a gross domestic product (GDP) of \$63.5 billion,<sup>1</sup> or \$146 billion based on purchasing power parity. Peru's real GDP growth was 4.1% compared with 4.9% in 2002. The annual inflation rate in 2003 was 2.5% compared with 1.5% in 2002 (Banco Central de Reserva del Perú, 2004a§,<sup>2</sup> b§; International Monetary Fund, 2004§; U.S. Central Intelligence Agency, 2004§). The mining and fuel sectors contributed a total of 6.7% of Peru's GDP compared with 11.6% in 2002. Peru's mining industry, which has consistently been the country's major foreign exchange generator, accounted for more than 51% (\$4.6 billion) of total export revenues of almost \$9.0 billion in 2003. In 2003, Peru's trade balance recorded a surplus of about \$731 million compared with \$306 million in 2002, a \$195 million deficit in 2001, and the highest deficit of \$2.4 billion in 1998. Peru's trade grew by 6.1% compared with 5.5% in 2002 (Ministerio de Energía y Minas, 2004a, p. 20-23, 40; Banco Central de Reserva del Perú, 2004a§). Mineral and petroleum and derivatives exports in 2003 (more than \$5.2 billion) increased by about 21.0% compared with those of 2002 (almost \$4.3 billion). During 2003, increased demand for base metals used in construction and manufacturing in, in order of importance, the United States, China, and other Asian countries brought higher prices for Peru's major mineral exports; for example, copper increased to \$0.726 per pound from \$0.627 per pound in 2002; lead, \$0.353 per pound from \$0.349 per pound; zinc, \$0.203 per pound from \$0.172 per pound; and tin, \$2.176 per pound from \$1.877 per pound. At the same time, the dollar depreciation during the second half of 2003 resulted in higher precious metal prices; for example, gold increased to \$363.7 per troy ounce from \$315.9 per troy ounce in 2002, and silver, to \$4.9 per troy ounce from \$4.6 per troy ounce. The copper price, for example, increased by almost 16% owing to the imbalance between lower supply and higher demand and lower copper stocks in 2003 (Banco Central de Reserva del Perú, 2004a§). Peru's foreign debt amounted to \$29.7 billion, which was 6.8% higher than that of 2002 (\$27.8 billion), and its net international reserves increased by \$600 million to \$10.2 billion from \$9.6 billion in 2002 (Banco Central de Reserva del Perú, 2004a§, b§; Ministerio de Energía y Minas, 2004§).

According to the Ministerio de Energía y Minas (2004§), the country has immense metal and oil and gas resources that offer attractive investment opportunities. The privatization of state-owned firms and the formation of joint ventures and consortia in the mining and fuels industries provide a continuous committed capital flow of \$9.8 billion between 1992 and 2007. In Peru, investment by mining companies in precious- and base-metal and polymetallic projects increased to \$462 million from \$420.3 million in 2002. Foreign investors continued to view Peru as an attractive Latin American open market economy because the Government guarantees property ownership, investments, free remittance of profits, and capital repatriation and provides equal treatment with domestic investors. The State continued to slash subsidies and tariffs, freed foreign exchange and interest rates, liberalized international investment rules, simplified the tax code, and established concessions for construction and operation of public infrastructure, such as, in order of magnitude, telecommunications, roads, ports, and airports. The State continued to embark on fiscal austerity and increased investment in social development to establish better relationships with the local communities. Finally, the Government wanted to maintain its role of regulator, promoter, and overseer, thus minimizing interferences with the private sector (Banco Central de Reserva del Perú, 2004a§; Ministerio de Energía y Minas, 2004§).

In 2003, foreign direct investment (FDI) inflows to the emerging economies increased to \$162 billion from \$102 billion in 2002. Of this total, Latin America received \$36.5 billion, or 22.5%, compared with \$45.0 billion in 2002 (Economic Commission for Latin America and the Caribbean, 2004a§, b§).

The global and regional adverse economic conditions had a less negative effect on FDI for the Mercado Común Andino (ANCOM) (Bolivia, Colombia, Ecuador, Peru, and Venezuela) where the minerals (metals, industrial minerals, and fuels) sector predominated, but instability in the Mercado Común del Cono Sur (MERCOSUR) countries (Argentina, Brazil, Paraguay, and Uruguay and associate members Bolivia and Chile) affected their attractiveness to transnational firms that implement open market investment strategies (Economic Commission for Latin America and the Caribbean, 2004a§).

In 2003, after a decade of unprecedented growth (1990-2000), the FDI inflows into the Caribbean and Latin America decreased by 53% and almost 19% compared with those of 2002 and 2000, respectively. South America's FDI inflows declined sharply to \$21.5 billion in 2003 from \$26.5 billion in 2002 and \$57.7 billion in 2000, and those of MERCOSUR declined to \$11.4 billion in 2003 from \$17.5 billion in 2002. Chile's, however, increased to almost \$3.0 billion from \$1.9 billion in 2002. In the Andean countries where higher risk investments in such mineral commodities as diamond, gold, and hydrocarbon were more common, FDI was less impacted by the global economic downturn and with less severity than in the region, and the inflows remained about the same level as that of 2002 (\$7.1 billion).

<sup>1</sup>Where necessary, values have been converted from Peruvian new soles (S/) to U.S. dollars (US\$) at the rate of S/3.472=US\$1.00.

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

In 2003, the Ministerio de Energía y Minas (MEM) reported that Peru received more than \$2.5 billion of FDI in the minerals sector (gas, \$1.7 billion; mining, \$700 million; and petroleum, \$100 million) compared with more than \$3.4 billion in 2002 (Banco Central de Reserva del Perú, 2004a§; Ministerio de Energía y Minas, 2004§). Peru's reduced FDI inflows were a result, in part, of the political instability created by the Peruvian nongovernmental organization Coordinadora Nacional de Comunidades Afectadas por la Minería (CONACAMI), residents of the town of Tambogrande, and others who indicated that they are opposed to the development of Manhattan Minerals Corp.'s Tambogrande gold-silver/copper-zinc deposit in northern Peru (Economic Commission for Latin America and the Caribbean, 2004b§, c§; Miguel Angel Yopez, Economic Section Officer, U.S. Embassy, Lima, Peru, written commun., September 16, 2004).

According to the Comisión Nacional de Inversiones y Tecnologías Extranjeras (CONITE), Peru's unprecedented growth (1990-2003) of FDI inflows into its economy, which increased to more than \$14.0 billion by 2003 from \$801 million in 1990, was partly due to the country's relative stability in the economic front enhanced by its natural resources, mainly copper, gold, and oil and gas, which were less affected by the global downturn. National and international corporations have been very active in recent years (Comisión Nacional de Inversiones y Tecnologías Extranjeras, 2004a§, b§).

CONITE reported that since July 19, 1991, when the privatization program began, the Peruvian Government has privatized more than 235 state-owned corporations and netted about \$10.6 billion, and domestic and foreign investors committed new investments of almost \$10.0 billion between 1992 and 2007. By the end of 2003, the Government had privatized most of its assets in the following sectors: mining, 95%; manufacturing, 86%; electricity and hydrocarbons, 68% each; and agriculture, 35% (Comisión Nacional de Inversiones y Tecnologías Extranjeras, 2004b§; Ministerio de Energía y Minas, 2004§).

In the mining sector, some tenders were still pending for the following large projects in 2003-04—Empresa Minera del Centro del Perú S.A.'s (Centromín's) copper deposits at Michiquillay, Department of Cajamarca, the coal deposits at Alto Chicama, Department of La Libertad, and the phosphates and brine at Bayovar, Department of Piura. Additionally, several mining prospects for, in order of production, gold, copper, coal, and industrial minerals were to be privatized. Government officials estimated that Centromín's privatization could generate about \$2.1 billion and that privatization earnings could be increased by additional sales of Government assets, such as the Talara oil refinery and the Mantaro hydroelectric complex, which were valued at almost \$2 billion, possibly by 2005 (Comisión Nacional de Inversiones y Tecnologías Extranjeras, 2004b§).

Additional investments (\$1.3 billion) were expected in projects with advanced exploration and environmental assessment work, such as the San Gregorio zinc project of Sociedad Minera El Brocal S.A.A. in the Department of Cerro de Pasco, the Minas Carachugo gold-and-silver mineralization of Minera Yanacocha S.A. (MYSA) in the Department of

Cajamarca, and the Magistral copper-molybdenum-silver deposit of Minera Ancash Cobre S.A. in the Department of Ancash. Magistral is located in the same geologic trend as Compañía Minera Antamina's (CMA) Antamina base-metal mine. The Government was expecting that Minero Peru S.A.'s projects that were pending privatization, such as Las Bambas, the Toromocho, and other base-metal deposits, would generate an estimated investment of \$700 million (Instituto de Ingenieros de Minas del Perú, 2003a, p. 38; Asesoría de Prensa, Privatization Issues, Ministerio de Energía y Minas, written commun., November 4, 2003).

## Government Policies and Programs

Between March 16 and April 10, 2002, Peru enacted the Supreme Decree No. 047-2002-EF (Import Duties for Capital Goods) to reduce the duties paid (to 7% from 20% and 12%) on capital goods to be used in exploration and production of certain minerals, such as oil and gas, in the Amazon region. In September 2002, Supreme Decree No. 135-2002-EF was enacted to reduce duties paid (to 4% from 7%) on certain capital goods linked to agricultural exports under the Andean Trade Preferences and Drug Eradication Act. The capital, goods, and services linked to minerals exploration benefited from the elimination of the 18% sales tax when law No. 27623 was enacted in January 2002 (Instituto de Ingenieros de Minas del Perú, 2003a, p. 20-21; b, p. 30-31; Banco Central de Reserva del Perú, 2004a§, b§).

Supreme Decree No. 014-92-EM of June 1992 (the general mining law) and Legislative Decree No. 868 of May 1996 provide guaranteed protections to mining ventures and contracts under the Peruvian Civil Code. Consequently, such ventures and contracts are immune from unilateral changes by any governmental authority in Peru without an appropriate legal or administrative remedy or arbitration by the Convenio Constitutivo del Centro Internacional de Arreglo de Diferencias Relativas a Inversiones (Comisión Nacional de Inversiones y Tecnologías Extranjeras, 2004b§).

Hydrocarbon Law No. 26844 of 1997 eliminated the exclusive rights of the state-owned Petróleos del Perú S.A. to control the secondary recovery of crude oil, refining, and imports and subsequent resale of petroleum and byproducts.

These Peruvian laws have attempted to ensure more-favorable minerals and crude oil and gas exploration and production contract terms for investors, which has resulted in an increased number of domestic and foreign companies that have expressed interest in participating in exploration, production, and distribution of natural gas and petroleum contracts with Perupetro S.A. and mineral properties with Centromín (table 2).

The Peruvian Constitution establishes equal protection for domestic and foreign investors who may enter into agreements with the Government and guarantees free access, possession, and disposal of foreign currency. Within the framework of Decree law No. 708 of November 1991 (promotion of investment in mining), Legislative Decree No. 662 of August, 1991 (promotion of foreign investment), Legislative Decree No. 757 of November 1991 (framework for the development of private investment), Legislative Decree No. 818 of April 1996

(incentives for investing in natural resources), and Supreme Decree No. 162-92-EF of October 1992 (rules guaranteeing foreign investment), more than 250 domestic stability and guarantee contracts have been signed since 1993 (Comisión Nacional de Inversiones y Tecnologías Extranjeras, 2004b§).

Legal procedures to obtain mining rights were made easier by the enactment of complementary legislation Supreme Decree No. 018 of July 9, 1992. The Government relinquished exclusive control over exploration, mining, smelting, and refining of metals and fuel minerals. Individuals and private companies are allowed to hold mining permits in Peru. In the legal framework for investment and taxation, no distinction is made among domestic and foreign investors, corporations, and consortia formed in Peru or abroad. Local and regional governments in areas where mineral resources (metals and industrial minerals) are exploited will receive 50% of the taxes collected to be invested in education and in social programs (health, housing, and others) in conformance with the Canon Minero (Resolución Ministerial No. 266-2002-EF/15). The remittance of dividends, depreciation, and royalties abroad has no restrictions. Contracts can be signed by investors, and the Government guarantees the stability of legal commitments and taxes. To increase protection of investors' interests, Peru signed agreements with the World Bank's Multilateral Investment Guarantee Agency in April 1991 (authorized by Legislative Decree No. 25312) and with the Overseas Private Investment Corporation in December 2002 (authorized by Legislative Decree No. 25809) (Comisión de Promoción de la Inversión Privada, 2004, p. 6; Comisión Nacional de Inversiones y Tecnologías Extranjeras, 2004b§).

Petroperú S.A. manages energy-related activities for the Government. In principle, all mineral and geothermal resources belong to the State, which grants concessions for use by the private companies and individuals. The administration and management of all mining legal processes and concessions rested with the executive branch.

## Environmental Issues

The Dirección General de Asuntos Ambientales (DGAA) of the MEM has the responsibility to address environmental problems that result from energy and mining activities and is mandated to implement the laws and regulations of the environmental legal framework, such as Legislative Decree No. 613 of September 1990 (the environmental code) and Supreme Decree No. 016-93-EM of April 28, 1993 (the environmental regulation) (Ministerio de Energía y Minas, 2004b, p. 70-72).

The sustainable development model for the mining and energy sectors began in 1993 with regulations and procedures for the gradual reduction of pollution, which include economic development policies and environmental protection. The mining industry must comply by adjusting its ongoing operations to permissible effluent levels and its new operations by using cleaner technologies. The DGAA evaluates and proposes the environmental regulations for the mining and energy sectors, which include the maximum emission levels that are compatible with the internationally accepted limits set by the United Nations and the World Bank; approves environmental impact

assessments for new operations and environmental adjustment and management programs for ongoing ones; and administers the national environmental information system. The MEM is authorized to handle environmental affairs in the minerals sector, such as establishing the environmental protection policy and maximum allowable levels for effluents, signing environmental administrative stability agreements, overseeing the impact of operations, determining responsibilities, and imposing administrative sanctions (Ministerio de Energía y Minas, 2004b, p. 72-75). The mining and oil companies are increasing their efforts to protect the environment, and oil companies, in particular, are under pressure because the number of operations in the Amazon Rain Forest, which is one of the world's most sensitive ecosystems, is increasing.

## Production

In 2003, Peruvian minerals (metals, industrial minerals, and fuels) production value amounted to \$4.8 billion compared with \$4.6 billion in 2002. Mining and fuel production grew by 6.7% as a result of larger volumes of metals (7.8%), which was partially offset by the decline of fuel output (4.5%). The increase of mining was mainly led by gold and zinc and to a lesser extent by lead, silver, and tin outputs compared with that of 2002 production (Ministerio de Energía y Minas, 2004a, p. 2-3; Banco Central de Reserva del Perú, 2004a§).

In 2003, gold production reached a new record; the main gold producers (Minera Yanacocha S.A. and Minera Barrick Misquichilca S.A.) and medium-sized gold mines exceeded their initial production goals. Yanacocha increased its output levels mainly as a result of technological innovations in its gold recovery process, and higher international prices allowed medium-sized mines and small producers to mine lower grade ores. Zinc production was largely the result of Antamina's production volume, with higher content of zinc and lower grade of copper. Thus, Antamina was the first producer of zinc and the second producer of copper in the country in 2003. Minsur S.A., which was the only tin producer in Peru, increased its production after incorporating new equipment, automatic feed of reagents, and new flotation cells, which increased the tin content in concentrates. In spite of a 15-day production halt at Shougang Hierro Perú, S.A. owing to road blockades, iron production increased because of higher demand from China and other Asian countries. Despite an increase in production by Southern Perú Copper Corp. (SPCC), the resumption of operations by BHP Billiton plc. in October, and the increase in capacity of the medium-sized Condestable Mine, copper output decreased by 2.7% owing to lower grades of copper in Antamina, which decreased to 1.18% from 1.37% in 2002 (Ministerio de Energía y Minas, 2004a, p. 2-3, 27; Banco Central de Reserva del Perú, 2004a§).

In 2003, crude oil and natural gas production decreased owing to lower extraction rates of crude, particularly in Pluspetrol Norte; depletion of reserves; lower level of investment; and lack of new discoveries would explain the decreasing crude oil production trend since 1994. In the second half of 2003, fewer showers took place in the mountains, so natural gas liquids and butane were good substitutes for the decreased hydroelectric

energy output (table 1; Ministerio de Energía y Minas, 2004a, p. 27-28; Banco Central de Reserva del Perú, 2004a§).

## Trade

In 2003, mining was the main exporting sector of the country. Peru's main mineral exports were gold (\$2.0 billion), copper (\$1.3 billion), zinc (\$529 million), lead (\$201 million), silver (\$191 million), tin (\$175 million), and iron (\$94 million) (Ministerio de Energía y Minas, 2004a, p. 8-15; Banco Central de Reserva del Perú, 2004a§). The value of all mining products exported during the year was more than 51% of all exports, which totaled \$9.0 billion compared with \$7.7 billion in 2002 and \$7.0 billion in 2001. Mineral exports amounted to \$5.2 billion (petroleum and derivatives, \$626 million) compared with \$4.3 billion (petroleum and derivatives, \$451 million) in 2002 and \$3.6 billion (petroleum and derivatives, \$391 million) in 2001. Including petroleum and derivatives, Peru's mineral export earnings amounted to almost 58% of its total exports in 2003. The increase in exports resulted, in part, from a higher volume of copper and zinc production from the Antamina Mine and gold production from the Yanacocha Mine plus the recovery of base- and precious-metals prices. Total mineral imports, which were mostly petroleum and derivatives, however, increased by about 41.2% to \$1.4 billion compared with \$975 million in 2002 and \$908 million in 2001. Total imports increased by about 11.3% to \$8.3 billion compared with \$7.4 billion in 2002 and \$7.2 billion in 2001 and generated a surplus of \$731 million compared with \$306 million in 2002 and with a deficit of \$195 million in 2001 (Sociedad Nacional de Minería, Petróleo y Energía, 2004a, p. 32; b, p. 28; c, p. 17; Banco Central de Reserva del Perú, 2004a§, b§).

In 2003, Peru's exports to the main world economic blocks were Asia-Pacific Economic Cooperation, 52%; North America Free Trade Agreement (NAFTA), 30%; the European Union, 26%; and Eastern European countries, 13%. Peru sold about 6% of its exports to the other ANCOM members; about 3% was sold to the MERCOSUR countries; and 15% to other Latin American countries. Peruvian mineral exports could increase if the negotiations between ANCOM and MERCOSUR led to a South American free trade agreement in the near future (Sociedad Nacional de Minería, Petróleo y Energía, 2004c, p. 55; Banco Central de Reserva del Perú, 2004a§).

## Structure of the Mineral Industry

The structure of the Peruvian mineral industry continued to change owing to the privatizations and joint-venture projects that are changing the industrial operating mode from Government-owned/Government-operated to a privately owned/Government-regulated regime. The establishment of consortia in such deregulated industries as electricity, oil and gas, and telecommunications; joint ventures in construction, energy, and mining projects; and infrastructure management are becoming a common practice in Peru. According to The Fraser Institute (2004§), Peru was the fifth most attractive area for investments in exploration after, in order of Fraser's investment attractiveness ranking, Chile, Quebec (Canada), Australia, and

Nevada (United States) and tied for third in mineral potential with Australia and Brazil after Chile and Quebec (Instituto de Ingenieros de Minas del Perú, 2003a, p. 20; 2003b, p. 15).

The new operating process, which was the result of privatization and joint-venture projects, has incorporated policies that deal with economic and societal development issues and environmental protection in a sustainable way. Private local interests owned most of the medium- and small-sized mining operations. Private firms owned large operations mostly by consortia and joint ventures. More than 100 foreign mining companies have been established in Peru since 1990 (table 2).

## Commodity Review

### Metals

**Copper.**—Peru's copper (content in concentrates) output decreased to 842,578 metric tons (t) compared with 844,553 t in 2002. This decrease was mostly the result of the reduced output from the Antamina Mine and reduced extraction of oxide ores at SPCC's Cuajone and Toquepala Mines, which had lower grades of copper. Sociedad Minera Cerro Verde S.A.A.'s Cerro Verde Mine; BHP Billiton Tintaya S.A.'s Tintaya Mine; expansions at Volcan Compañía Minera S.A.A.'s San Cristobal Mine, Doe Run Peru S.R. Ltda.'s Cobriza Mine, and Cía. Minera Condestable S.A.'s Condestable Mine, and Cía. Minera Atacocha S.A.'s (CMA) Atacocha Mine; and increased outputs at several small- and medium-sized mines contributed to the country's copper metal exports in 2003, which totaled about 787,300 t valued at \$1.3 billion compared with 858,800 t valued at \$1.2 billion in 2002. This value was 8.3% higher than that of 2002 as a result of the copper price increase to \$0.726 per pound of copper in 2003 from \$0.627 per pound in 2002 (Ministerio de Energía y Minas, 2004a, p. 7-15, 44, 50, 54; Banco Central de Reserva del Perú, 2004a, b§).

SPCC was the leading copper producer in the country with a total output of 326,900 t of copper in concentrates (almost 39% of Peru's total copper concentrate produced in 2003) from its mine operations at the Cuajone (184,527 t) and Toquepala (142,372 t) open pits and its solvent extraction-electrowinning (SX-EW) cathode plant at Toquepala, which produced 47,755 t of metal in 2003. Copper metal output at SPCC's Ilo refinery in the Department of Moquegua increased to 284,001 t in 2003 from 281,663 t in 2002, or almost 1.0% (Bengoa, 2003; Ministerio de Energía y Minas, 2004a, p. 4).

The Antamina Mine was the second ranked copper producer in the country with a total output of 267,873 t from its mine operations, which consisted of an open pit, a 70,000-metric-ton-per-day concentrator, and a 302-kilometer (km) slurry pipeline, port facilities in Huarney, a new access road, a powerline, and a town site. CMA (BHP Billiton, 33.75%; Noranda Inc., 33.75%; Teck Cominco Ltd., 22.5%; and Mitsubishi Corp., 10%) owned the mine. Antamina's revised proven and probable ore reserves were calculated to be 559 million metric tons (Mt) at grades of 1.24% copper, 1.03% zinc, 13.71 grams per metric ton silver, and 0.029% molybdenum, or 1.8% equivalent copper (Ministerio de Energía y Minas, 2004a, p. 38).

Phelps Dodge Corporation's (Sociedad Minera Cerro Verde) SX-EW cathode plant at the Cerro Verde copper mine produced 87,327 t of cathode metal compared with 86,401 t of cathode copper in 2002. BHP Billiton Tintaya's SX-EW plant reported an output of 36,116 t of cathode copper compared with 17,212 t in 2002; this increase was due to expansions of the mine and higher copper prices in the open market. Doe Run Peru produced 61,847 t of cathode copper compared with 64,619 t in 2002. Medium- and small-sized mines in the country supplied an additional 43,726 t of copper in concentrates compared with 36,778 t in 2002 (Ministerio de Energía y Minas, 2004a, p. 11-12, 20).

SPCC was planning to build a new smelter that will produce anodes instead of blister in Ilo during fiscal year 2005-06; processing costs will decrease to \$0.52 per pound of copper compared with \$0.54 per pound in 2001. The new smelter will process 1.83 Mt of copper concentrates, which will be an increase of 59.1% compared with the current (2003) capacity of 1.15 Mt. Ilo's refinery will be expanded to 330,000 t/yr from the current (2003) capacity of 280,000 t/yr. These improvements were the result of the completion of the Toquepala Mine's expansion owing to the identification of a massive sulfide ore body, which increased the mine's proven and probable reserves to 770 Mt at grades of 0.74% copper and 0.08% molybdenum and 1.931 billion metric tons (Gt) of leachable ("lixiviable") reserves at a grade of 0.20% copper (Bengoa, 2003; Ministerio de Energía y Minas, 2004a, p. 4-6, 20).

**Gold.**—In 2003, the increased gold output was a result of better prices in the open market and higher production achieved by all types of mine operations, which was 172.6 t compared with 157.5 t in 2002. MYSA (Newmont Mining Corp. of the United States, 51.35%; Cia. de Minas Buenaventura S.A.A., 43.65%; and World Bank/International Finance Corporation, 5%) produced 88.6 t, or 51.3%, of the total gold output in 2003. Other gold producers were Minera Barrick Misquichilca S.A. (28.4 t), Cia. Minera Ares S.A. (5.8 t), Buenaventura (5.7 t), Minera Aurifera Retamas S.A. (5.2 t), Cia. Minera Aurifera Santa Rosa S.A. (3.7 t), Cia. Minera Ponderosa S.A. (2.8 t), and Inversiones Mineras del Sur S.A. (2.7 t) (Ministerio de Energía y Minas, 2004a, p. 18).

Gold recovered as a byproduct from the concentrates of Peru's polymetallic mines amounted to 9.4 t. From the total gold output, large-sized producers reported 117.3 t; medium-sized producers, 32.5 t; small-sized mines, 0.6 t; and an unknown number of placers and "garimpos" (informal individual miners), about 12.8 t. Placers accounted for about 14% of the gold produced in the country. The southeastern Andes have well-known gold placers on the Inambari River and its tributaries. Placer gold production was concentrated in the Inca and Mariategui Regions. Gold also was recovered from placers in rivers and streams throughout the jungle (Ministerio de Energía y Minas, 2004a, p. 13, 20).

**Iron Ore.**—Shougang Hierro (a subsidiary of China's Shougang Corp.) continued to be Peru's sole iron ore producer in Marcona, Department of Ica. Mine output increased to 3.5 Mt of iron content in 2003 from 3.1 Mt in 2002. The iron ore exports amounted to 5.1 Mt at a value of \$94 million compared

with 4.4 Mt at a value of \$83 million in 2002, which was an increase of 13.3% in value compared with 2002. Shougang Hierro built a new pellet plant at a cost of \$100 million to increase its production capacity to 4 million metric tons per year (Mt/yr) (Ministerio de Energía y Minas, 2004a, p. 21-24; Banco Central de Reserva del Perú, 2004a§).

**Lead, Silver, and Zinc.**—In 2003, the Peruvian zinc industry produced 1.4 Mt of zinc in concentrates and was the world's third ranked producer after China and Australia (Plachy, 2004). This production level represented an increase of about 16.7% compared with the output of 2002 and 12% of the world's concentrate output and almost 62% of zinc concentrate and 29% of refined zinc of Latin America's outputs, respectively. The zinc increase was the result of expansions at Peru's leading private zinc producer Volcan (Ministerio de Energía y Minas, 2004a, p. 25-32).

The country's total silver output increased to 2,921 t in 2003 from 2,870 t in 2002, which made Peru the second leading producer in the world after Mexico (Hilliard, 2004; Ministerio de Energía y Minas, 2004a, p. 32-36). Peru produced 308,874 t of lead in concentrates compared with 305,651 t in 2002 and was the fourth ranked producer in the world after Australia, China, and the United States (Ministerio de Energía y Minas, 2004a, p. 40, 48; Smith, 2004). Exports of zinc, lead, and silver were valued at about \$529 million, \$201 million, and \$191 million, respectively, compared with \$429 million, \$211 million, and \$174 million, respectively, in 2002 (Ministerio de Energía y Minas, 2004a, p. 23, 32, 40; Banco Central de Reserva del Perú, 2004a§, b§).

In 2003, CMA was the leading zinc producer in the country with an output of 400,718 t of zinc. Volcan produced 224,382 t of zinc, 54,254 t of lead, and 296.1 t of silver from its operations in the Yauli mining district, the San Cristobal base-metal mine in the Junin Department, and the Cerro de Pasco property in the Cerro de Pasco Department; Volcan was the second ranked private producer of lead, silver, and zinc in Peru. Empresa Minera los Quenuales S.A. (a subsidiary of Glencore International AG) produced 148,815 t of zinc, 8,643 t of lead, and 22.2 t of silver from the Iscaycruz Mine and 38,014 t of zinc, 15,617 t of lead, and 161 t of silver from the Casapalca Mine and became Peru's third ranked private zinc producer with a total of 188,830 t after Volcan and CMA.

Other important medium- and small-sized base-metal producers were Cia. Minera Milpo S.A. with 95,095 t of zinc, 30,000 t of lead, and 133.0 t of silver; Atacocha, 66,109 t of zinc, 39,420 t of lead, and 147.1 t of silver; Sociedad Minera El Brocal S.A.A., 58,457 t of zinc, 23,208 t of lead, and 90.8 t of silver; Cia. Minera Santa Luisa S.A. (a subsidiary of Mitsui Mining & Smelting Co. Ltd. of Japan), 44,601 t of zinc, 20,487 t of lead, and 46.8 t of silver from its Huanzala Mine; and Corp. Minera Nor Perú S.A. (a subsidiary of Pan American Silver Corp. of Canada), 13,426 t of zinc, 4,845 t of lead, and 94.3 t of silver from its underground Quiruvilca Mine in northern Peru.

Refined metals production was reported by Doe Run Resources Corp. (112,289 t of lead, 1,010 t of silver, and 73,034 t of zinc from La Oroya complex), Sociedad Minera Refinería de Zinc de Cajamarquilla S.A. (29.7 t of silver and 129,043 t of zinc from the Cajamarquilla refinery), and SPCC (110.8 t

of silver from its refining operations in Ilo). Peru's silver production increased to 2,921 t from 2,870 t in 2002 (Ministerio de Energía y Minas, 2004a, p. 23-24, 30-32, 38-40).

**Tin.**—Minsur S.A. was Peru's sole tin producer in 2003. Production from its San Rafael Mine in the Mariategui Region was 40,202 t in concentrate compared with 38,815 t in 2002 and 38,182 t in 2001. Minsur's tin smelting and refining operations in Pisco, which is located south of Lima, produced 39,181 t of metal compared with 35,828 t in 2002; this was a 9.4% increase compared with the previous year owing to better market conditions and the increase in the price of tin by almost 16% during 2002 because of higher consumption than supply and lowering stocks during the past 2 years worldwide. Peru was the leading tin producer in Latin America followed by Bolivia and Brazil and the second ranked tin producer in the world after China. Minsur, which was the only fully integrated tin supplier, produced 14.2% of world's output and exported 36,500 t at a value of \$175.2 million in 2003, which was almost 13% higher in value than that of 2002 (Kettle, 2004; Ministerio de Energía y Minas, 2004a, p. 50-53; Banco Central de Reserva del Perú, 2004a\$).

### **Industrial Minerals**

**Cement.**—According to the International Cement Review and the domestic Association of Cement Producers, Peru's total cement production in 2003 was similar to that of 2002 (5.10 Mt). Five main cement companies operated and produced 4.0 Mt of hydraulic. The leading cement producer Cementos Lima S.A. (CLSA) produced about 3.0 Mt of cement, or almost 60% of Peru's total cement output; CLSA's Atocongo plant had a production capacity of about 3.5 Mt/yr and drew from nearby limestone quarries. The second ranked cement producer Cementos Andino S.A. accounted for 24% of total production; it had a production capacity of more than 1.0 Mt/yr. The third leading cement producer Cementos Norte Pacasmayo S.A.A. accounted for 16% of total production. Cementos Yura S.A. had a market share of 14%, and Cementos Sur S.A., about 10% (International Cement Review, 2003; Ministerio de Energía y Minas, 2004a, p. 62-64; Pflucker, 2004, p. 6).

**Phosphate Rock.**—Minero Perú's phosphate deposits (Bayovar Project), which comprised 150,000 hectares of phosphate and brine, have proven reserves of 550 Mt of phosphatic rock. Bayovar has been rescheduled for privatization in fiscal year 2004-05. As a consumer of sulfuric acid and a producer of fertilizer, the Bayovar Project could be developed competitively because it is located in a valley of great agricultural potential and tremendous export opportunities to Asia and the Pacific region via the Port of Paita. The 90,000-t/yr phosphate plant that was operated by Empresa Minera Regional Grau Bayóvar S.A. produced 11,610 t of phosphate ( $P_2O_5$ ) in 2003 (Ministerio de Energía y Minas, 2004a, p. 62).

### **Mineral Fuels**

**Coal.**—Peru's largest coal deposits were at Alto Chicama, which is located 140 km north of Trujillo in La Libertad Region. Other coal deposits occur in the Cuenca del Santa in the Marañon Region and the coal basins of Goyllarisquizga

and Hatun Huasi in the Caceres Region of central Peru. In 2003, according to the U.S. Energy Information Administration (2004\$), Peru's recoverable coal reserves were estimated to be 1.1 Gt, and coal production was relatively small (about 61,700 t) compared with an estimated consumption of 1.1 Mt.

**Natural Gas and Petroleum.**—Natural gas was primarily transported by pipeline from the Talara Basin in the Grau Region to the Talara refinery on the coast. The Aguaytia gasfield, which is located approximately 41 km west-northwest of Pucallpa, has proven reserves of 8.5 billion cubic meters (301 billion cubic feet) of gas and 9 million barrels (Mbbbl) of condensate, or natural gas liquid (NGL). The proven natural gas reserves of Camisea's Cashiriari and San Martin gasfields in the Ucayali Basin were estimated to be 250 billion cubic meters (8.7 trillion cubic feet), which included 600 Mbbbl of condensate at the end of 2003 (Moons, 2003, p. 10; Ortigas, 2003, p. 7; U.S. Energy Information Administration, 2004\$). Camisea consisted of a pair of crescent-shaped gasfields that have the potential to supply Arequipa, Cusco, Lima, and other cities with energy for the next 100 years and that could be integrated to supply fuel to the neighboring countries of MERCOSUR, Brazil in particular (Ortigas, 2003, p. 10-12). Because the fields are distant from accessible markets, the MEM indicated that new infrastructure (pipelines) must be developed.

Natural gas production decreased to 523 million cubic meters from 543 million cubic meters in 2002, which was produced by Petrotech del Perú S.A. (40.6%), Aguaytia S.A. (26.1%), Perez Companc S.A. (20.7%), and others (12.6%) (Ministerio de Energía y Minas, 2004b, p. 2-15; Soldi, 2004, p. 3; U.S. Energy Information Administration, 2004\$).

The required investments to develop, produce, transport, and distribute natural gas from the Camisea field, which is located in the Ucayali Basin in the Cusco Department, were as follows: the Upstream Project to develop and produce natural gas, \$670 million; the Transportation Project to transport natural gas and liquids to Lima through pipelines, \$820 million; and the Distribution Project for the distribution network in Lima, \$170 million.

For the Upstream Project, Peru's Comité Especial del Proyecto Camisea approved the upstream consortium that was led by Argentina's leading oil producer Pluspetrol S.A. (Pluspetrol Perú Corp. S.A. as operator) (36%) and that included Hunt Oil Company of the United States (Hunt Oil Company of Peru L.L.C.) (36%), SK Corp. of the Republic of Korea (18%), and Tecpetrol del Perú S.A.C. (wholly owned by Argentina's Techint Group) (10%) on February 16, 2000. The upstream consortium will produce natural gas during the 40-year operations (exploration and production) at Camisea. Supreme Decree No. 021-2000-EM of December 7, 2000 (license to exploit Camisea) and the Comisión de Promoción de la Inversión Privada's approbation of December 4, 2000, approved the exploitation contract between Perupetro and the consortium led by Pluspetrol.

For the Transportation Project, Peru issued a tender for a 33-year contract on October 20, 2000. The Project includes the construction and operation of two pipelines, one for the natural gas (714 km) and for NGL (540 km), by fiscal year 2004-05. Transportadora de Gas del Perú (TGP) was the Peruvian company in charge of the Transportation Project. The

transportation contract was signed by TGP and the consortium that was led by Argentina's Tecgas N.V. (23.4%) and that included Pluspetrol Resources Corp. (Techint Group, 22.2%), Hunt Oil (Hunt Oil Company of Peru, 22.2%), SK Corp. (11.1%), Sonatrach Group of Algeria (11.1%), Tractebel S.A. (Tractebel Electricity & Gas International of Belgium, 8.0%), and Graña y Montero S.A. of Peru (2.0%).

In June 2002, the Distribution Project was assigned to Tractebel. This company acquired 8.0% equity in TGP in February 2001 and will build a 60-km main distribution pipeline that will supply gas to the largest industries and generate electricity for, in order of market size, Lima and Callao at an initial investment of about \$55 million. Additional networks will be developed to supply gas to increasing commercial, industrial, and residential customers.

The fourth phase of the Camisea contract for the transformation of gas into liquefied natural gas (LNG) in a facility south of Lima and export LNG to western Mexico and the United States by fiscal year 2005-06 was signed by the consortium formed by Hunt Oil and Halliburton Company of Houston, Texas, on February 10, 2002. The total investment for the LNG export project was estimated to be about \$2.0 billion (plant construction, \$1.0 billion; terminal port, \$400 million; four shipping vessels, \$200 million; and degasification plant, \$400 million) (Moons, 2003, p. 5; Comisión de Promoción de la Inversión Privada, 2004; Camisea Project, 2004§; U.S. Energy Information Administration, 2004§).

In 2003, crude oil production decreased to an average 91,350 barrels per day (bbl/d) from 97,700 bbl/d in 2002, or about 6.5%. Production of petroleum derivatives decreased by almost 8.0% and averaged 175,810 bbl/d compared with the average 2002 output of 190,950 bbl/d (Ministerio de Energía y Minas, 2004b, p. 2-15; Soldi, 2004, p. 5; U.S. Energy Information Administration, 2004§). Peru imported an average of 68,000 bbl/d crude oil and petroleum products to satisfy its internal consumption of 163,000 bbl/d. The value of petroleum and derivative imports was about \$1.4 billion compared with \$975 million in 2002, which created a trade deficit of \$751 million in the energy sector for 2003 (Ministerio de Energía y Minas, 2004b, p. 18; Sociedad Nacional de Minería, Petróleo y Energía, 2004b, p. 54; c, p. 56; Banco Central de Reserva del Perú, 2004a§).

Peru's total crude oil production of 33.3 Mbbbl in 2003 came from Pluspetrol S.A. (66.0%), Petrotech (13.0%), Perez Companc (12.0%), and others (9.0%) (table 1; Sociedad Nacional de Minería, Petróleo y Energía, 2004c, p. 55; Soldi, 2004, p. 4). Almost 70% of the country's crude oil production came from the jungle blocks in the Loreto and the Ucayali Regions; the remainder was produced at the coastal and offshore fields in Talara. The country's petroleum reserves were estimated to be about 285 Mbbbl in 2003 (U.S. Energy Information Administration, 2004§).

In 2003, the largest oil refinery was Petroperu S.A.'s La Pampilla, which had a design capacity of about 100,000 bbl/d. The second largest oil refinery was Petroperu's Talara, which had a design capacity of about 60,000 bbl/d. Other refineries had the following design capacities—Conchan, 15,500 bbl/d; Iquitos, 10,500 bbl/d; Pucallpa, 3,250 bbl/d; and El Milagro, 1,700 bbl/d.

Refinery production came from La Pampilla (47%), Talara (38%), Conchan (7%), Iquitos (5%), Pucallpa (2%), and El Milagro (1%) (Ministerio de Energía y Minas, 2004b, p. 19; Sociedad Nacional de Minería, Petróleo y Energía, 2004a, p. 50).

## Reserves

Table 3 lists the Peruvian reserves of major minerals, such as copper, gold, iron ore, lead, molybdenum, silver, and zinc, on or about January 1, 2004. Data are shown in terms of metal contained in ore for the base and precious metals or recoverable quantities of other mineral commodities, which included industrial minerals and mineral fuels. These mineral reserves represent "proven" (measured) and "probable" (indicated) categories and exclude quantities reported as "possible" (inferred). Reserves were defined as being well-delineated and economically recoverable volumes of crude oil and natural gas from wells and minable ore from mines committed to production (U.S. Bureau of Mines and U.S. Geological Survey, 1980).

Annual changes in assessment of reserves are, in simplest terms, the arithmetic result of additions to reserves, deletions from reserves, and production. A complication in Peru has been the production of more than one metal by a large number of mines, thus necessitating close attention to market price and processing costs for two or possibly several mineral commodities simultaneously to enable production as coproducts or even byproducts.

Reserves of the leading base and precious metals increased significantly; especially gold in Alto Chicama and copper ore during the expansion of the Cerro Verde, the Cuajone, the Tintaya, and the Toquepala pits. Reserves of major metals are distributed unevenly throughout Peru and were influenced mostly by mineralization of the Precambrian Cordillera and the Coast Ranges where several districts dominated the reserves position in terms of proven and probable (minable) reserves of major metals.

## Infrastructure

Peru had 3,462 km of railroads and 72,900 km of roads, of which 9,331 km was paved and 63,569 km was unpaved. Peru had 8,808 km of waterways, 8,600 km of navigable tributaries of the Amazon River system, and 208 km of waterways into Lake Titicaca. Also, a petroleum depot at Bayovar serviced the 800-km northern Peru crude oil pipeline. Natural gas and NGL were transported through a 388-km dual pipeline; crude oil, 1,557 km; and refined products, 13 km. Important mineral industry ports included Callao, Ilo, Matarani, Paita, San Nicolas, and Talara on the Pacific Ocean and Iquitos on the Amazon River. Peru had an installed electrical generating capacity of 5,050 megawatts (MW), about 80% of which came from hydroelectric plants (U.S. Central Intelligence Agency, 2004§). The Peruvian Government raised about \$2 billion from the privatization of its electrical sector and committed to an investment of about \$20 million to install an additional 1,006 MW of capacity in the immediate future. The energy mix was, by source, hydro (74.8%), fossil fuel (24.5%), and others (0.7%) (Ministerio de Energía y Minas, 2004§; U.S. Central Intelligence Agency, 2004§).

## Outlook

Since July 2002, the legal framework for decentralization was established; regional authorities were elected in November and took office in January 2003. The rationale of the process was to use revenues from mineral production to maximize the well-being of the locals through economic growth, environmental protection, and social development in a sustainable way. During fiscal year 2002-03, the country's 4-year recession came to an end, which allowed a robust economic recovery and growth. The energy, mining, and related industries remain very attractive sectors of the Peruvian economy, which, with continued capital flow from investors, are expected to provide long-term benefits to the regional government(s) and the country. The privatization of Mineró Perú, Petroperú, and the banking sector is expected to continue improving prospects for the minerals and financial sectors and the thermoelectricity generation industry. According to CONITE, the privatization process in the minerals sector and FDI in every sector of the Peruvian economy, particularly in the banking and energy industries, is expected to generate additional investments (Comisión Nacional de Inversiones y Tecnologías Extranjeras, 2004a§, b§; Ministerio de Energía y Minas, 2004§).

The mineral industries could continue to be an important part of the Peruvian economy. In 2003, several major mineral developments took place that will continue to contribute to Peru's economic growth. For example, CMA's Antamina project, which was designed to produce up to 1.5 Mt/yr of copper and zinc concentrates during a 23-year mine life, will be the third ranked producer of zinc (163,300 t/yr) and the seventh ranked producer of copper (272,200 t/yr) in the world by 2005 (Botts, 2003, p. 15). Pluspetrol Peru announced that drilling four development wells to depths of more than 2,000 m in the San Martín I structure on block 88 for the Camisea natural gas development will take place in fiscal year 2003-04. The liquefaction of Camisea's natural gas for exports to NAFTA would increase and have a positive impact on the reliance of the supply side of NAFTA's economy (Comisión de Promoción de la Inversión Privada, 2004, p. 4-8).

Investors are implementing an approach to community development and environmental protection that is based on sustainable development principles. Despite new standards in Peru for sustainable development and environmental protection set by such mineral investors as CMA and MYSA, the country is facing political upheavals, and the mining industry is increasingly on the defensive. For example, CMA's Huarmey port facilities site was the target of protestors who were demonstrating against the relocation of Huarmey's residents to another city in Ancash. MYSA's Cerro Quilish gold deposit development at the Yanacocha Mine was stalled by the city government of Cajamarca, which wanted to protect the city's major watershed by issuing Municipal Ordinance 012, which declared that Cerro Quilish was a "protected area." Oxfam America supports communities affected by mining in Peru. They say that "mining should demonstrate greater respect for the human rights of such communities." CONACAMI indicated that "it has the right to participate and be consulted on mineral policies that involve communities affected by mining operations"

(Miguel Angel Yepez, Economic Section Officer, U.S. Embassy, Lima, Peru, written commun., September 16, 2004).

CONACAMI, residents of the town of Tambogrande, and others have indicated that they oppose the development of Manhattan Minerals' Tambogrande gold-silver/copper-zinc deposit. According to the project's feasibility study, the open pit project would require an investment of \$405 million during the 17-year life of the Tambogrande Mine. The study also indicates that during the first 4 years, about 8.1 t/yr (260,000 ounces per year) of gold and 100 t/yr (3.2 million ounces per year) of silver could be produced before the underlying copper-zinc deposit is developed (Soldi, 2004, p. 2). Local leaders decided to ignore the Government's plea to consider the study before a final decision is to be rendered by the MEM. The locals have mounted a vigorous resistance to mining and have decided to defend their right to make a living by cultivating lemons and mangos. Their position could affect future flows of investments to Peru (Miguel Angel Yepez, Economic Section Officer, U.S. Embassy, Lima, Peru, written commun., October 20, 2003).

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TABLE 1  
PERU: PRODUCTION OF MINERAL COMMODITIES<sup>1</sup>

(Metric tons unless otherwise specified)

Commodity	1999	2000	2001	2002	2003 <sup>P</sup>
<b>METALS</b>					
<b>Antimony:</b>					
Mine output, Sb content <sup>e</sup>	460	460	460	460	460
Metal	255	461	274	356	356
Arsenic, white <sup>2</sup>	1,611	2,495	2,800 <sup>r</sup>	2,970	2,970
<b>Bismuth:</b>					
Mine output, Bi content <sup>e</sup>	1,000	1,000	1,000	1,000	1,000
Metal	705	744	640	568	600
Cadmium, metal	466	483	473 <sup>r</sup>	422	529
<b>Copper:</b>					
Mine output, Cu content	536,387	553,924	722,335 <sup>r</sup>	844,553 <sup>r</sup>	842,578 <sup>3</sup>
Sulfate, Cu content	2,554	2,484	1,953	1,950	2,000
<b>Metal:</b>					
Blister	331,463 <sup>r</sup>	316,030 <sup>r</sup>	326,899 <sup>r</sup>	314,938 <sup>r</sup>	314,228 <sup>3</sup>
<b>Refined, primary:</b>					
Electrowon	114,425	127,311	131,409 <sup>r</sup>	156,467 <sup>r</sup>	171,198 <sup>3</sup>
Other	318,914	324,417	342,502 <sup>r</sup>	346,282 <sup>r</sup>	345,848 <sup>3</sup>
Total	433,339	451,728	473,911	502,749	517,046 <sup>3</sup>
Grand total	764,802	767,758	800,810 <sup>r</sup>	817,687 <sup>r</sup>	831,274 <sup>3</sup>
<b>Gold:<sup>4</sup></b>					
Mines kilograms	110,530	116,085	121,902 <sup>r</sup>	138,810 <sup>r</sup>	159,770 <sup>3</sup>
Placers do.	17,956	16,500	16,620	18,720	12,849 <sup>3</sup>
Total do.	128,486	132,585	138,522 <sup>r</sup>	157,530 <sup>r</sup>	172,619 <sup>3</sup>
Indium do.	5,005	5,015	4,263	5,500	5,500
<b>Iron and steel:</b>					
<b>Iron ore and concentrate:</b>					
Gross weight thousand metric tons	3,949	4,144	4,564	4,594	5,239 <sup>3</sup>
Fe content do.	2,715	2,813	3,087	3,105	3,541 <sup>3</sup>
<b>Metal:</b>					
Pig iron do.	250	327	330 <sup>e</sup>	330 <sup>e</sup>	330 <sup>e</sup>
Sponge iron do.	50	80	70 <sup>r</sup>	30 <sup>r</sup>	80
Ferroalloys <sup>e</sup>	360	360	360	360	360
<b>Steel:</b>					
Crude	558,697	749,082	750,000 <sup>e</sup>	750,000 <sup>e</sup>	750,000 <sup>e</sup>
Ingots and castings <sup>e</sup> thousand metric tons	510	510	510	510	510
Semimanufactures <sup>e</sup>	250	250	250	250	250
<b>Lead:</b>					
Mine output, Pb content	271,782	270,576	289,546	305,651 <sup>r</sup>	308,874 <sup>3</sup>
Metal	121,090	116,412	121,169 <sup>r</sup>	119,588	112,289 <sup>3</sup>
Manganese, mine output, Mn content <sup>e</sup>	200	200	200	200	200
Mercury, byproduct output, Hg content <sup>e,5</sup> metric tons	50	50	50	50	50
Molybdenum, mine output, Mo content	5,470	7,193	9,499	8,613 <sup>r</sup>	9,561 <sup>3</sup>
Selenium, metal, refined kilograms	23,008	23,110	16,110	20,600	20,600 <sup>e</sup>
<b>Silver:</b>					
Mine output, Ag content	2,231	2,438	2,571 <sup>r</sup>	2,870	2,921 <sup>3</sup>
Metal, refined	1,115	1,180	1,194 <sup>r</sup>	1,193	1,147 <sup>3</sup>
Tellurium, metal kilograms	17,110	22,020	19,105	21,600	22,000
<b>Tin:</b>					
Mine output, Sn content	59,191	70,901	38,182 <sup>r</sup>	38,815	40,202 <sup>3</sup>
Metal <sup>5</sup>	30,618	37,410	27,683 <sup>r</sup>	35,828	39,181 <sup>3</sup>
<b>Zinc:</b>					
Mine output, Zn content	899,524	910,303	1,056,629	1,232,997 <sup>r</sup>	1,372,790 <sup>3</sup>
Metal	196,978	199,813	204,646 <sup>r</sup>	172,688	202,076 <sup>3</sup>

See footnotes at end of table.

TABLE 1--Continued  
PERU: PRODUCTION OF MINERAL COMMODITIES<sup>1</sup>

(Metric tons unless otherwise specified)

Commodity	1999	2000	2001	2002	2003 <sup>p</sup>	
<b>INDUSTRIAL MINERALS</b>						
Barite	3,512	11,403	11,031	3,806	2,906 <sup>3</sup>	
Boron materials, crude (borates)	14,716	9,309	9,374	6,698	9,315 <sup>3</sup>	
Cement, hydraulic	thousand metric tons	3,799	3,906	3,950	3,980	4,000 <sup>3</sup>
Chalk <sup>e</sup>	101,000	101,000	101,000	101,000	101,000	
Clays:						
Bentonite	19,659	21,059	18,217	20,760	14,980 <sup>3</sup>	
Fire clay	10	5,973	5,900 <sup>e</sup>	5,900	5,900 <sup>3</sup>	
Kaolin	1,332	6,165	5,532	1,934	2,653 <sup>3</sup>	
Common clay	240,889	398,523	676,944	428,820	232,002 <sup>3</sup>	
Diatomite <sup>e</sup>	35,100	35,100	35,100	35,100	35,100 <sup>3</sup>	
Feldspar	1,594	5,642	4,253	6,018	7,349 <sup>3</sup>	
Gypsum, crude	28,355	140,630	30,658	75,306	71,114 <sup>3</sup>	
Lime	28,344	140,630	30,568	30,600	21,134 <sup>3</sup>	
Nitrogen, N content of ammonia <sup>e</sup>	-- <sup>r</sup>	-- <sup>r</sup>	5,000 <sup>r</sup>	5,000 <sup>r</sup>	5,000	
Phosphate rock:						
Crude, gross weight <sup>e</sup>	25,200	17,300	15,800	16,400	31,600 <sup>3</sup>	
P <sub>2</sub> O <sub>5</sub> content	9,038	5,581	4,825	6,018	11,610 <sup>3</sup>	
Salt, all types	778,048	247,619	418,954	278,948	187,416 <sup>3</sup>	
Stone, sand and gravel:						
Stone: <sup>e</sup>						
Dolomite	645	645	645	645	645	
Flagstone	300,000	300,000	300,000	300,000	300,000	
Granite	2,000	2,000	2,000	2,000	2,000	
Limestone	thousand metric tons	4,313 <sup>6</sup>	4,334 <sup>6</sup>	4,370 <sup>6</sup>	4,400	
Marble	7,651 <sup>6</sup>	10,511 <sup>6</sup>	11,636 <sup>6</sup>	16,553 <sup>6</sup>	21,134 <sup>3</sup>	
Onyx	150	150	150	150	150	
Quartz and quartzite (crushed)	40,000	40,000	40,000	40,000	40,000	
Shell, marl	4,000	4,000	4,000	4,000	4,000	
Slate	15,792 <sup>6</sup>	16,706 <sup>6</sup>	16,800 <sup>6</sup>	10,944 <sup>6</sup>	14,260 <sup>3</sup>	
Travertine	15,463 <sup>6</sup>	16,220 <sup>6</sup>	2,971 <sup>6</sup>	4,183 <sup>6</sup>	4,658 <sup>3</sup>	
Sand and gravel:						
Construction	thousand metric tons	1,848	1,607	1,154	1,011	907 <sup>3</sup>
Silica sand	do.	90	74	120	300	196 <sup>3</sup>
Sulfur, elemental:						
Native <sup>e</sup>	100	100	100	100	100	
Byproduct of metallurgy <sup>e</sup>	60,000	60,000	60,000	60,000	60,000	
Sulfuric acid, gross weight	517,000	590,209	623,084	623,100	623,000	
Talc and related materials:						
Talc	12,085	9,668	11,165	10,685	10,791	
Pyrophyllite <sup>e</sup>	8,000	8,000	8,000	8,000	12,291 <sup>3</sup>	
Total <sup>e</sup>	20,100	17,700	19,200	18,700	23,100	
<b>MINERAL FUELS AND RELATED MATERIALS</b>						
Coal:						
Anthracite, run-of-mine	1,488	16,625	20,093	22,085	15,688 <sup>3</sup>	
Bituminous, run-of-mine <sup>e</sup>	45,000	45,000	45,000	45,885 <sup>6</sup>	46,000	
Total <sup>e</sup>	46,500	61,600	65,100	68,000	61,700	
Coke, all types <sup>e</sup>	10,000	10,000	10,000	10,000	10,000	
Gas, natural:						
Gross	million cubic meters	416 <sup>r</sup>	371 <sup>r</sup>	371 <sup>r</sup>	543 <sup>r</sup>	523 <sup>3</sup>
Marketed	do.	333	277	277	371	357 <sup>3</sup>
Natural gas liquids: <sup>e</sup>						
Natural gasoline and others <sup>7</sup>	thousand 42-gallon barrels	295	295	295	295	300
Butane	do.	5	5	5	5	18
Total	do.	300	300	300	300	318

See footnotes at end of table.

TABLE 1--Continued  
 PERU: PRODUCTION OF MINERAL COMMODITIES<sup>1</sup>

(Metric tons unless otherwise specified)

Commodity	1999	2000	2001	2002	2003 <sup>p</sup>	
MINERAL FUELS AND RELATED MATERIALS--Continued						
Petroleum:						
Crude	thousand 42-gallon barrels	38,663	36,314	35,040	35,661 <sup>r</sup>	33,343 <sup>3</sup>
Refinery products:						
Liquefied petroleum gas	do.	2,357	2,484	2,612	3,100	2,551
Gasoline, motor	do.	9,449	9,291	9,767	11,593	9,202
Jet fuel	do.	3,112	2,822	2,966	3,521	3,289
Kerosene	do.	4,910	5,235	5,503	6,532	4,354
Distillate fuel oil	do.	13,622	12,355	12,988	15,417	14,972
Lubricants	do.	530	513	539	642	520
Residual fuel oil	do.	17,437	18,348	19,287	22,894	23,134
Asphalt	do.	363	--	--	--	770
Other <sup>8</sup>	do.	4,611	4,800	5,053	5,998	5,379
Total	do.	56,391	55,848	58,715	69,697	64,171 <sup>3</sup>

<sup>c</sup>Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. <sup>p</sup>Preliminary. <sup>r</sup>Revised. -- Zero.

<sup>1</sup>Table includes data available through October 2004.

<sup>2</sup>Output reported by Doe Run Resources Corp.

<sup>3</sup>Reported figure.

<sup>4</sup>Peru's placer gold production was reported.

<sup>5</sup>Source: U.S. Census Bureau.

<sup>6</sup>Output reported by Minsur S.A.'s smelter.

<sup>7</sup>Includes hexane.

<sup>8</sup>Includes refinery fuel and losses.

TABLE 2  
PERU: STRUCTURE OF THE MINERAL INDUSTRY IN 2003

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity
Antimony	metric tons	Doe Run Resources Corp. (private, 100%)	Smelter at La Oroya, Junin Department	700
Barite		Barmine S.A. (private, 100%)	Santa Cruz de Cocachacra, Huarochiri, Lima Department	NA
Bentonite		Minerales Andinos S.A. (NL Industries Co., 90%)	Vichayal Mine, Piura Department	9
Bismuth	metric tons	Doe Run Resources Corp. (private, 100%)	Refinery at La Oroya, Junin Department	1,000
Cement		Cementos Lima S.A. (private, 100%)	Atocongo Plant, Lima Department	3,500
Do.		Cementos Norte Pacasmayo S.A.A. (private, 100%)	Pacasmayo Plant, La Libertad Department	1,000
Do.		Cementos Andino S.A. (private, 100%)	East Lima Plant, Lima Department	800
Do.		Cementos Yura S.A. (private, 100%)	Yura Plant, Arequipa Department	300
Do.		Cementos Sur S.A. (private, 100%)	Arequipa Plant, Arequipa Department	200
Copper		Southern Peru Copper Corp. (SPCC) (Grupo Mexico, S.A. de C.V., 54.2%; Marmon Corp., 14.2%; Phelps Dodge Overseas Capital Corp., 14%; others, 17.6%)	Cuajone Mine, Moquegua Department, Toquepala Mine, Tacna Department	350
Do.		do.	Smelter at Ilo, Moquegua Department	300
Do.		do.	Refinery at Ilo, Moquegua Department	280
Do.		Compania Minera Antamina S.A. (CMA) (BHP Billiton plc., 33.75%; Noranda Inc., 33.75%; Teck Cominco Ltd., 22.5%; Mitsubishi Corp., 10%)	Antamina Mine, Huari, Ancash Department	275
Do.		do.	Antamina concentrator, Ancash Department	70
Do.		Doe Run Resources Corp. (private, 100%)	Cobriza, Huancavelica Department	70
Do.		do.	Smelter at La Oroya, Junin Department	65
Do.		do.	Refinery at La Oroya, Junin Department	60
Do.		Cia. Minera Atacocha S.A. (private, 100%)	Yanacancha Mine, Junin Department	30
Do.		Cia. Minera Condestable S.A. (private, 100%)	Condestable Mine, Junin Department	20
Do.		Glencore International AG (private, 100%)	Casapalca, Lima Department	60
Do.		Volcan Compania Minera S.A.A. (private, 100%)	San Cristobal, Mahr Tunel, and Andaychagua, Junin Department	60
Do.		Cia. Minera San Ignacio de Morococha S.A. (private, 100%)	Yauricocha, Junin Department	60
Do.		BHP Tintaya S.A. (private, 100%)	Tintaya Mine, Cusco Department	90
Do.		Sociedad Minera Cerro Verde S.A.A. (Phelps Dodge Corp., 82.5%; Cia. de Minas Buenaventura S.A., 9.2%; others, 8.3%)	Cerro Verde, Arequipa Department	80
Do.		do.	Electrowon at Cerro Verde, Arequipa Department	90
Dolomite		Minera Baribent S.A. (private, 100%)	Esperanza, Ancash Department	25
Gold	kilograms	Minera Yanacocha S.A. (Newmont Mining Corp., 51.35%; Cia. de Minas Buenaventura S.A.A., 43.65%; World Bank International Finance Corporation, 5%)	Yanacocha, La Quinua, and Maqui-Maqui mines, Cajamarca Department	70,000
Do.	do.	Minera Barrick Misquichilca S.A. (Barrick Gold Corporation, private, 100%)	Pierina, Cajamarca Department	26,000
Do.	do.	Cia. Minera Poderosa S.A. (private, 100%)	Poderosa, La Libertad Department	2,000
Do.	do.	Cia. de Minas Orcopampa S.A. (Cia. de Minas Buenaventura S.A.A., 100%)	Orcopampa, Arequipa Department	5,000
Do.	do.	Minas Arirahua S.A. (private, 100%)	Arirahua, La Libertad Department	2,000
Do.	do.	Asesoría Contable Minera S.A. (private, 100%)	Ocona, Santa Clarita, Explorator, and Molino de Oro, Arequipa Department	1,000
Do.	do.	Cia. Aurifera Rio Inambari S.A. (Cia. Minera del Sur S.A., 84%; Aurifera Claudia, 16%)	Rio Caichive, Madre de Dios Department	200
Do.	do.	Minera Aurifera Retamas S.A. (private, 100%)	Retamas, La Libertad Department	5,200
Do.	do.	Consorcio Minero Horizonte S.A. (private, 100%)	Parcoy, La Libertad Department	4,000
Do.	do.	Cia. Minera Sipan S.A. (private, 100%)	Sipan, Inca, La Libertad Department	4,800

See footnote at end of table.

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

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity
Gold--Continued	kilograms	Cia. Minera Ares S.A. (private, 100%)	Ares, La Libertad Department	5,200
Do.	do.	Cia. Minera Aurifera Santa Rosa S.A. (private, 100%)	Santa Rosa, Puno Department	3,000
Iron ore		Shougang Hierro Peru S.A. (Shougang Corp., 100%)	Marcona, Ica Department	13,000
Lead		Doe Run Resources Corp. (private, 100%)	Smelter at La Oroya, Junin Department	93
Do.	do.	do.	Refinery at La Oroya, Junin Department	95
Do.		Empresa Minera los Quenuales S.A. (Glencore International AG, 100%)	Iscaycruz, Lima Department	10
Do.		Empresa Minera Yauliyacu S.A. (Glencore International AG, 100%)	Casapalca, Lima Department	15
Do.		Volcan Compania Minera S.A.A. (private, 100%)	San Cristobal, Mahr Tunel, and Andaychagua, Junin Department	70
Do.	do.	do.	Paragsha, Cerro de Pasco Department	85
Do.		Cia. Minera San Ignacio de Morococha S.A. (private, 100%)	Yauricocha, Junin Department	5
Do.		Cia. Minera Atacocha S.A. (private, 100%)	Yanacancha Mine, Junin Department	40
Do.		Cia. Minera Milpo S.A. (private, 100%)	El Porvenir Mine, Cerro de Pasco Department	25
Do.		Cia. Minera Santa Luisa S.A. (private, 100%)	Huanzala Mine, Junin Department	40
Do.		Sociedad Minera El Brocal S.A.A. (private, 100%)	San Gregorio Mine, Cerro de Pasco Department	60
Do.		Corp. Minera Nor Peru S.A. (Pan American Silver Corp., 100%)	Quiruvilca, La Libertad Department	10
Molybdenum		Southern Peru Copper Corp. (SPCC) (Grupo Mexico, S.A. de C.V., 54.2%; Marmon Corp., 14.2%; Phelps Dodge Overseas Capital Corp., 14%; others, 17.6%)	Cuajone, Moquegua Department and Toquepala, Tacna Department	NA
Petroleum, crude	42-gallon barrels per day	Petrotech del Peru S.A. (Perupetro, 100%)	Onshore Piura Department; northeast and central jungle areas, Loreto Department	68,000
Do.	do.	Perez Companc S.A. (Perupetro, 100%)	Pacific Coast, offshore Piura Department	30,000
Do.	do.	Pluspetrol S.A. (private, 100%)	Northeastern jungle, Loreto Department	90,000
Do.	do.	Occidental Petroleum Corp. (private, 100%)	Block 1-AB, northern jungle, Loreto Department	28,000
Petroleum products	do.	Petroperu S.A.	La Pampilla, Callao Province Refineries: Talara, Piura Department Conchan, Lima Department Iquitos, Loreto Department Pucallpa, Ucayali Department El Milagro, Lima Department	100,000 60,000 15,500 10,500 3,250 1,700
Phosphate rock	metric tons	Empresa Minera Regional Grau Bayovar S.A. (private, 100%)	Bayovar phosphate mine, Piura Department	50
Natural gas	million cubic meters per day	Pluspetrol Perú Corp. S.A. (Pluspetrol S.A., 36%; Hunt Oil Company, 36%; SK Corp., 18%; Tecpetrol del Perú S.A.C., 10%)	Camisea gas deposit, Cusco Department	NA
Do.	do.	Petrotech del Peru S.A. (Petroperu S.A., 100%)	Pucallpa, Loreto Department	120
Do.	do.	Aguaytia S.A. (Petroperu S.A., 100%)	Aguaytia gas deposit, Ucayali Department	80
Do.	do.	Perrez Companc S.A. (Petroperu S.A., 100%)	Pucallpa, Loreto Department	60
Silica sand		Minera Baribent S.A. (private, 100%)	Maria G. and Martin I., Junin Department	27
Silver	kilograms	Empresa Minera Yauliyacu S.A. (Glencore International AG, 100%)	Casapalca, Lima Department	160,000
Do.	do.	Doe Run Resources Corp. (private, 100%)	Refinery at La Oroya	809,000
Do.	do.	Cia. Minera San Ignacio de Morococha S.A. (private, 100%)	Yauricocha, Junin Department	46,500
Do.	do.	Cia. de Minas Buenaventura S.A. (private, 83%; and Centromin 17%)	Julcani and Huachocolpa Mines Huancavelica Department, Uchucchacua Mine, Lima Department	350,000

See footnote at end of table.

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

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity
Silver--Continued	kilograms	Cia. de Minas Orcopampa S.A. (Buenaventura, 100%)	Orcopampa Mine, Arequipa Department	161,000
Do.	do.	Volcan Compania Minera S.A.A. (private, 100%)	San Cristobal, Mahr Tunel, and Andaychagua, Junin Department	325,000
Do.	do.	Sociedad Minera Corona S.A. (private, 100%)	Hualgayoc, Cajamarca Department	175,000
Do.	do.	Cia. Minas Arcata S.A. (private, 100%)	Arcata, Arequipa Department	170,000
Do.	do.	Southern Perú Copper Corp. (SPCC) (Grupo Mexico, S.A. de C.V., 54.2%; Marmon Corp., 14.2%; Phelps Dodge Overseas Capital Corp., 14%; others, 17.6%)	Ilo smelting and refining, Moquegua Department	150,000
Do.	do.	Cia. Minera Santa Luisa S.A. (private, 100%)	Huanzala Mine, Junin Department	53,000
Do.	do.	Cia. Minera Raura S.A. (private, 100%)	Raura, Lima Department	54,000
Do.	do.	Cia. Minera Nor Perú S.A. (private, 100%)	Quiruvilca, La Libertad Department	128,000
Do.	do.	Cia. Minera Milpo S.A. (private, 100%)	Yanacancha, Cerro de Pasco Department	110,000
Do.	do.	Cia. Minera Atacocha S.A. (private, 100%)	Yanacancha Mine, Junin Department	130,000
Do.	do.	Sociedad Minera El Brocal S.A. (private, 100%)	San Gregorio Mine, Cerro de Pasco Department	110,000
Do.	do.	Corp. Minera Nor Perú S.A. (Pan American Silver Corp., 100%)	Quiruvilca, La Libertad Department	125,000
Steel		Sider Corp. S.A. (Acerco S.A., 49.4%; Grupo Wiese, 49.4%, others, 1.2%)	Chimbote, Ancash Department	550
Do.		Empresa Laminadora del Pacifico S.A. (Acero Arequipa S.A., 100%)	Pisco, Ica Department	180
Tellurium	metric tons	Doe Run Resources Corp. (private, 100%)	Refinery at La Oroya	12
Tin	metric tons per day	Minsur S.A. (private 100%)	San Rafael Mine, Puno Department	2,500
Do.	metric tons	do.	Pisco smelting and refining, Ica Department	40,000
Tungsten	do.	Minera Regina S.A. (private, 100%)	Palca XI, Puno Department	1,400
Do.	do.	Fermín Málaga Santolalla S.A. (private, 100%)	Pasto Bueno, Ancash Department	1,000
Zinc		Volcan Compañía Minera S.A.A. (private, 100%)	Cerro de Pasco, Cerro de Pasco Department; San Cristobal, Mahr Tunel, and Andaychagua, Junin Department	320
Do.		Compañía Minera Antamina S.A. (CMA) (BHP Billiton plc., 33.75%; Noranda Inc., 33.75%; Teck Cominco Ltd., 22.5%; Mitsubishi Corp., 10%)	Antamina Mine, Huari, Ancash Department	165
Do.		do.	Antamina concentrator, Ancash Department	70
Do.		Empresa Minera Iscaycruz S.A. (Glencore International AG, 100%)	Pachangara, Lima Department	125
Do.		Empresa Minera Yauliyacu S.A. (Glencore International AG, 100%)	Casapalca, Lima Department	40
Do.		Cia. Minera San Ignacio de Morococha S.A. (private, 100%)	Yauricocha, Junin Department	80
Do.		Doe Run Resources Corp. (private, 100%)	Refinery at La Oroya	70
Do.		Refinería Cajamarquilla S.A. (Teck Cominco Ltd., 85%; Marubeni Corp. of Japan, 14%; employees, 1%)	Refinery at Cajamarquilla, Lima Department	130
Do.		Cia. Minera San Ignacio de Morococha S.A. (private, 100%)	San Vicente Mine, Junin Department	70
Do.		Cia. Minera Atacocha S.A. (private, 100%)	Yanacancha Mine, Junin Department	60
Do.		Cia. Minera Raura S.A. (private, 100%)	Raura, Lima Department	45
Do.		Corp. Minera Nor Perú S.A. (Pan American Silver Corp., 100%)	Quiruvilca, La Libertad Department	25
Do.		Cia. Minera Santa Luisa S.A. (Mitsui Mining Co. Ltd., 100%)	Huanzala Mine, Junin Department	50
Do.		Cia. Minera Milpo S.A. (private, 100%)	Yanacancha, Cerro de Pasco Department	80
Do.		Sociedad Minera El Brocal S.A. (private, 100%)	San Gregorio Mine, Cerro de Pasco Department	220

NA Not available.

TABLE 3  
PERU: RESERVES OF MAJOR MINERALS IN 2003<sup>1</sup>

(Thousand metric tons unless otherwise specified)

Commodity	Reserves
Coal, all types	1,100,000
Copper	57,400
Gold	metric tons 3,500 <sup>2</sup>
Iron ore	830,000
Lead	3,500
Molybdenum	450 <sup>c</sup>
Natural gas	billion cubic meters 250
Petroleum, crude	million barrels 320
Phosphate rock	million metric tons 550
Salt	100,000 <sup>e</sup>
Silver	metric tons 36,000
Sulfur	150,000 <sup>c</sup>
Tin	720
Uranium	100 <sup>3</sup>
Zinc	16,000

<sup>c</sup>Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown.

<sup>1</sup>2001 and 2002 Anuario de la Minería del Perú, Ministerio de Energía y Minas, except for natural gas and petroleum crude.

<sup>2</sup>Excludes metal in placer deposits.

<sup>3</sup>Recoverable at prices of \$100 or less per kilogram of uranium.