

PERU

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In 2002, Peru remained among the leading world producers of such mineral commodities as arsenic (after China and Chile), bismuth (China and Mexico), copper (Chile, the United States, and Indonesia), lead (Australia, China, and the United States), rhenium (the United States), silver (Mexico), tin (China), and zinc (Australia and China) (Brooks, 2003; Carlin, 2003; Edelstein, 2003; Hilliard, 2003; Jorgenson, 2003; Magyar, 2003; Plachy, 2003; Smith, 2003).

In 2002, with a population of more than 28 million, Peru had a gross domestic product (GDP) of \$57.4 billion¹, or \$132 billion in terms of purchasing power parity. Peru's GDP growth was quite substantial—4.5% compared with 0.2% in 2001. The annual inflation rate in 2002 was 1.52% compared with a negative 0.1% in 2001 (Ministerio de Energía y Minas, 2003a, p. 22; Banco Central de Reserva del Perú, 2003²; U.S. Central Intelligence Agency, 2003³). The minerals and hydrocarbon industries contributed with 6.4% of Peru's GDP compared with 6.1% in 2001 and 5.4% in 2000. Peru's mining industry, which has consistently been the country's major foreign exchange generator, accounted for about 45% (\$3.5 billion) of total export revenues of \$7.7 billion in 2002. In 2002, Peru's trade balance recorded a surplus of about \$207 million compared with a \$267 million deficit in 2001 and the highest deficit of \$616 million in 1999. Peru's trade grew by 5.5% compared with 1.4% in 2001 (Ministerio de Energía y Minas, 2003a, p. 20-22, 39; Banco Central de Reserva del Perú, 2003⁴). Metal exports in 2002 (more than \$3.7 billion) increased by about 17.2% compared with those of 2001 (almost \$3.2 billion), although the prices for major mineral exports (in order of importance, copper, zinc, lead, silver, tin, and iron) remained at low levels, except gold, which increased to \$347 per troy ounce at the end of 2002 from \$276 per troy ounce at the end of 2001 (Banco Central de Reserva del Perú, 2003⁵). Peru's foreign debt amounted to \$28.3 billion, which was 2.5% higher than that of 2001 (\$27.6 billion) and remained about the same level as that of 2000 (\$28.4 billion), and its net international reserves increased to \$9.6 billion from \$8.6 billion in 2001 and from \$8.2 billion in 2000 (Ministerio de Energía y Minas, 2003a, p. 18, 36-39; Muñiz, 2003; Banco Central de Reserva del Perú, 2003⁶).

Peru has immense metal and oil and gas resources, which offer investment opportunities. The privatization of state-owned firms and the formation of joint ventures and consortia in the mining and fuels industries started off at a vigorous pace between 1991 and 1993 and have continued in fiscal years 2000 to 2002, although at a slower pace. 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 Government also slashed subsidies and tariffs, freed foreign exchange and interest rates, liberalized international investment rules, simplified the tax code, established concessions for construction and operation of public infrastructure (airports, ports, roads, and telecommunications), and embarked on fiscal austerity and investment in social development and agriculture, which was to establish a friendly relationship with the local communities and to maintain its role of that of regulator, promoter, and overseer (Ministerio de Energía y Minas, 2002, p. 6, 24).

According to the United Nations' Economic Commission for Latin America and the Caribbean, the decrease of foreign direct investment (FDI) in Latin America and the Caribbean, which began in 2000 and reflected changes in the world and regional economies, was more prevalent in 2002. At the hemispherical level, such factors as slower economic growth, apparent end of the privatization process and deep decline in acquisition of local assets; economic and political crises in Argentina, Uruguay, and Venezuela; and sluggish growth in demand in the United States also affected these Caribbean and Latin American economies. The global and regional conditions had a less adverse effect on FDI in the Mercado Común Andino (ANCOM) (Bolivia, Colombia, Ecuador, Peru, and Venezuela) where the primary sector minerals (metals, industrial minerals, and fuel minerals) predominated, but instability in the Mercado Común del Cone Sur (MERCOSUR) (Argentina, Brazil, Paraguay, and Uruguay and associate members Bolivia and Chile) countries affected their attractiveness to transnational firms that implement open market investment strategies (Economic Commission for Latin America and the Caribbean, April 2003⁷).

After a decade of unprecedented growth (1990-2000), the FDI inflows into Latin America and the Caribbean decreased to \$56.2 billion in 2002 from \$84.0 billion in 2001; South America's FDI inflows declined sharply to \$27.7 billion in 2002 from \$39.6 billion in 2001; MERCOSUR plus Chile's FDI inflows declined to \$19.4 billion in 2002 from \$30.7 billion in 2001. In the Andean community where higher risk investments in such minerals as diamond, gold, and hydrocarbons were more common, FDI was less impacted by the global downturn and with less severity than in the region, and the inflows declined to \$7.2 billion in 2002 from \$8.8 billion in 2001, or by about 18% (Economic Commission for Latin America and the Caribbean, April 2003⁸).

In fiscal year 2001-02, investments were being used to modernize Peru's industrial infrastructure. Future foreign investments in the minerals sector are projected to be about \$17 billion, which is the largest committed capital to date, and will contribute significantly to the future of Peru's economic development (Ministerio de Energía y Minas, 2002, p. 10).

According to the Comisión Nacional de Inversiones y Tecnologías Extranjeras (CONITE), Peru registered more than \$11.5 billion of FDI, which was about 15.2% higher than that of 2001 (almost \$11.0 billion); FDI was about \$10.2 billion in 2000, almost \$9.5

¹ Where necessary, values have been converted from Peruvian new soles (S/) to U.S. dollars (US\$) at the rate of S/3.52=US\$1.00.

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

billion in 1999, and \$8.1 billion in 1998. Peru had a decade of unprecedented growth (1992-2002), flows of FDI into Peru in general increased to \$11.5 billion in 2002 from \$1.5 billion in 1992 partly owing to the country's relative stability in the economic and political fronts augmented by its natural resources, mainly metals and oil and gas, which were less affected by the global downturn and the adverse international economic conditions that included the aftermath of recession in the United States and lower growth in Europe and Japan (Comisión Nacional de Inversiones y Tecnologías Extranjeras, 2003a§).

The Ministerio de Energía y Minas reported that Peru received almost \$3.4 billion of FDI in the minerals sector (mining, \$1.7 billion; gas, \$1.6 billion; and petroleum, \$98 million) compared with more than \$3.3 billion in 2001, \$3.4 billion in 2000, and \$1.8 billion in 1999 (Ministerio de Energía y Minas, 2002, p. 8, 20-26; Banco Central de Reserva del Perú, 2003§).

CONITE reported that since July 19, 1991, when the privatization program began, the Peruvian Government had privatized more than 230 state-owned corporations and netted \$10.5 billion, and new investments of \$12.7 billion have been committed by domestic and foreign investors between 2001 and 2009. A total investment of \$9.1 billion for the mining sector was expected between 2001 and 2009. By the end of 2002, the state had privatized most of its assets in the following sectors: mining, 90%; manufacturing, 85.5%; electricity and hydrocarbons, 68% each; and agriculture, 35% (Ministerio de Energía y Minas, 2002, p. 20-26; Comisión Nacional de Inversiones y Tecnologías Extranjeras, 2003b§). The privatization process continued to be managed by the Comisión de Promoción de la Inversión Privada, which had the legal authority to transfer state-owned assets. Responsibility for specific privatization was vested in the Comités de Privatización (CEPRIs) whose members were selected from the ranks of leading professionals and officials mainly from the private sector (Ministerio de Energía y Minas, 2002, p. 20-22).

In the mining sector, some tenders were still pending for the following large projects in 2002-03—Empresa Minera del Centro del Perú S.A.'s (Centromín's) copper deposits at Michiquillay, Department of Cajamarca; Minero Perú S.A.'s copper and iron deposits at Las Bambas, Department of Cusco; the coal deposits at Alto Chicama, Department of La Libertad; and the phosphates and brine at Bayóvar, Department of Piura. Additionally, several mining prospects for, in order of importance, gold, copper, coal, and industrial minerals were to be privatized (Ministerio de Energía y Minas, 2002, p. 25, 29-32; Comisión Nacional de Inversiones y Tecnologías Extranjeras, 2003b§). Government officials estimated that Centromín's privatization could generate around \$2.1 billion and that privatization earnings could be increased to between \$3 billion and \$4 billion on additional sales of Government assets, such as the Talara oil refinery and the Mantaro hydroelectric complex, possibly between 2003 and 2005. One successful acquisition in 2002 was that of the Minera Pampa de Cobre S.A., which was bought by Phelps Dodge Chapi Inc. of the United States in June 2002 for \$130 million (Comisión Nacional de Inversiones y Tecnologías Extranjeras, 2003b§).

In fiscal year 2001-02, mine expansions with total investments of \$1.4 billion were completed. The most important completions were Southern Peru Copper Corp.'s (SPCC's) Cuajone Mine, to 87,000 metric tons per day (t/d) of copper ore from 60,000 t/d; the concentrator, leaching, and ion exchange plants at SPCC's Toquepala Mine, to 60,000 t/d of copper ore from 45,000 t/d; Cía. Minera Atacocha S.A.'s (Atacocha's) mill, to 3,500 t/d of lead-zinc concentrates from 2,100 t/d; Empresa Minera los Quenuales S.A.'s Iscaycruz mill, to 2,500 t/d of zinc ore from 1,700 t/d; and the gold smelter at Minera Yanacocha S.R.L.'s (MYS's) Yanacocha Mine, to 350 t/d from 150 t/d. Sociedad Minera Refinería de Zinc de Cajamarquilla S.A. (Teck Cominco Ltd., 87%; Marubeni Corp. of Japan, 13%) was considering building an equivalent 120,000-metric-ton-per-year (t/yr) zinc refinery next to the existing facility, but it was postponed because of lower zinc prices in the open market (Ministerio de Energía y Minas, 2002, p. 29; Instituto de Ingenieros de Minas del Perú, 2003b, p. 70).

In fiscal year 2002-03, mine projects with a total investment of \$2.6 billion were completed, such as BHP Billiton Tintaya S.A.'s ion exchange plant to treat copper oxides in Yauri, Department of Cusco; Cía. de Minas Buenaventura S.A.A.'s Antapite gold mine in Huaytará, Department of Huancavelica; Compañía Minera Antamina S.A.'s (CMA's) Antamina polymetallic mine in the Department of Ancash; and MYS's La Quinoa gold mine in Cajamarca, Department of Cajamarca. Mine projects with feasibility studies included Tintaya's Antapaccay copper-gold project, which is 10 kilometers (km) from the Tintaya open pit in Yauri, Department of Cusco; Minera Quellaveco S.A.'s copper project in Moquegua, Department of Moquegua; and SPCC's Cuajone ion-exchange plant also in Moquegua. Projected investments totaled \$3.3 billion (Ministerio de Energía y Minas, 2002, p. 28-34; Comisión de Promoción de la Inversión Privada, 2003).

Additional investments (\$1.3 billion) were expected in projects with advanced exploration and environmental assessment work, such as the Tambogrande gold and base-metal deposit of Manhattan Sechura Company (Manhattan, 75%; Peru Minero S.A., 25%) in the Department of Piura, 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 MYS 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 that of CMA's Antamina base-metal mine. The state was expecting that Minero Peru's projects that were pending privatization, such as Las Bambas, the Michiquillay, the Bayóvar phosphates and other base-metal deposits and Centromín's Morococha base-metal deposit would generate an estimated investment of \$2.1 billion (Ministerio de Energía y Minas, 2002, p. 37-38; Asesoría de Prensa, Ministerio de Energía y Minas, written commun., November 4, 2003).

Government Policies and Programs

In March, Supreme Decree No. 047-2002-EF (Import Duties for Capital Goods) was enacted 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, 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 18% sales tax when law No. 27623 was enacted in September (Instituto de Ingenieros de Minas del Perú, 2003a, p. 18-19; Banco Central de Reserva del Perú, 2003§).

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, 2003b§). 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. The new 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 expressing 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 (Ministerio de Energía y Minas, 2002, p. 28; Comisión Nacional de Inversiones y Tecnologías Extranjeras, 2003b§).

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 to 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 (authorized by Legislative Decree No. 25312) and with the Overseas Private Investment Corporation (authorized by Legislative Decree No. 25809) (Ministerio de Energía y Minas, 2002, p. 74-78; Comisión de Promoción de la Inversión Privada, 2003, p. 4; Comisión Nacional de Inversiones y Tecnologías Extranjeras, 2003b§).

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 Ministerio de Energía y Minas (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, 2002, p. 71-73). The sustainable development model for the energy and mining 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 energy and mining 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, 2002, p. 73-74). 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 2002, Peruvian minerals (metals, industrial minerals, and fuels) production value amounted to \$4.6 billion; the value of all mining products exported during the year was almost 50% of all exports of \$7.65 billion compared with \$7.01 billion in 2001 and \$6.95 billion in 2000. In 2002, mineral exports amounted to \$3.74 billion compared with \$3.19 billion in 2001 and \$3.21 billion in 2000. Including petroleum and derivatives, Peru's mineral export earnings amounted to \$4.2 billion, or about 55% of its total exports.

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 gold prices. Total mineral imports, however, increased by about 2.3% to \$7.44 billion compared with \$7.27 billion in 2001 and \$7.41 billion in 2000 and generated a surplus of \$207 billion compared with deficits of \$267 million in 2001 and \$456 million in 2000 (Banco Central de Reserva del Perú, 2003§). Peru imported crude oil valued at \$976 million compared with \$907 million in 2001 and \$1.1 billion in 2000; this created a trade deficit of \$60 million for the energy sector in 2002 (Ministerio de Energía y Minas, 2003b, p. 18, 35-38; Sociedad Nacional de Minería, Petróleo y Energía, 2003c, p. 58; Banco Central de Reserva del Perú, 2003§).

Despite the economic downturn in Latin America and weaker metal prices in world markets, exports of most of Peru's metals increased in value compared with that of 2001, particularly gold (26.8%), copper (20.4%), lead (7.5%), silver (3.0%), and zinc (2.3%); tin exports decreased dramatically (-21.1%) (Banco Central de Reserva del Perú, 2003§).

Trade

In 2002, mining was the main exporting sector of the country. Peru's main mineral exports were gold (\$1.5 billion), copper (\$1.2 billion), zinc (\$429 million), lead (\$211 million), and silver (\$174 million) (Ministerio de Energía y Minas, 2003a, p. 9-14; Banco Central de Reserva del Perú, 2003§). Peru's exports to the main world economic blocks were Asia-Pacific Economic Cooperation, 35%; the North America Free Trade Agreement, 21%; the European Union, 18%; and Eastern European countries, 10%. Peru sold about 4% of its exports to the other ANCOM members, about 2% was sold to the MERCOSUR countries, and 10% 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, 2003c, p. 55; Banco Central de Reserva del Perú, 2003§).

Structure of the Mineral Industry

The structure of the Peruvian mineral industry continued to change owing to privatizations and joint-venture projects, which 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, Peru was the fifth most attractive country worldwide for investments in exploration and third because of its geologic potential (Instituto de Ingenieros de Minas del Perú, 2003a, p. 18). The noted operating mode has incorporated policies that deal with economic and societal development issues with environmental protection in a sustainable way. For example, because of the new mining laws, Minera Barrick Misquichilca S.A. discovered the Alto Chicama gold deposit in northern Peru, which is considered to be comparable to the Pierina and the Yanacocha gold deposits. The mineral concession of the Alto Chicama project was given to Barrick in 2001. Since then and after drilling more than 41,700 meters (m), the company has delineated 123.5 million metric tons (Mt) of proven and probable reserves with a grade of 1.83 grams per metric ton (g/t) gold and containing about 202,200 kilograms (kg) (6.5 million ounces) of gold in oxides and more than 34,200 kg (1.1 million ounces) in sulfur ores. Barrick was planning to have a finalized feasibility study and an environmental assessment by mid-2003 to produce about 15,600 kilograms per year at a cash cost of \$130 per ounce starting in 2005. The investment would total between \$300 million and \$500 million (Instituto de Ingenieros de Minas del Perú, 2003a, p. 19).

Similarly, MYS acquired the Yanacocha gold project in Cajamarca from two U.S. companies (Solitario Resources Corp., 58.8%; Crown Resources Corp., 41.2%). In addition to being in the vicinity of the Amaro, the Chailhuagon, and the Perol gold properties, the project contained 641.4 Mt of geological reserves with 0.30% copper and 0.79 g/t gold. MYS was planning a feasibility study to develop and mine those properties by 2004. Cominco Ltd. committed to invest \$2.5 million per year during the next 7 years and to carry out no less than 3,000 m of diamond drilling each year for the Bongará zinc project in Florida Canyon, Department of Cajamarca (Instituto de Ingenieros de Minas del Perú, 2003a, p. 10, 15).

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 increased to 843,213 metric tons (t) compared with 722,035 t in 2001 and 553,924 t in 2000. This increase was the result of the Antamina Mine's output; solvent extraction and electrowinning (SX-EW) of oxide ores at SPCC's Cuajone and Toquepala Mines, Sociedad Minera Cerro Verde S.A.A.'s Cerro Verde Mine, and BHP Billiton Tintaya's Tintaya Mine; some expansions at the Volcan Compañía Minera S.A.A.'s San Cristobal Mine, the Doe Run Peru S.R. Ltda.'s Cobriza Mine, the Cía. Minera Condestable S.A.'s Condestable Mine, and Atacocha's Atacocha Mine; and increased outputs at several small- and medium-sized mines. All contributed to the growth in copper output, and the country exported about 820,000 t of copper metal valued at \$1.2 billion compared with 686,000 t valued at \$987 million in 2001 (Ministerio de Energía y Minas, 2003a, p. 8-14, 46, 51, 56; Sociedad Nacional de Minería, Petróleo y Energía, 2003b, p. 13, 39; Banco Central de Reserva del Perú, 2003§).

The Antamina Mine was the largest copper producer in the country with a total output of 341,412 t (40.5% of Peru's total copper concentrate produced in 2002) from its mine operations, which consisted of an open pit, a 70,000- t/d concentrator, a 302-kilometer (km) slurry pipeline, port facilities in Huarney, and a new access road, powerline, and town site. CMA (BHP Billiton plc., 33.75%; Noranda Inc., 33.75%; Teck Cominco, 22.5%; Mitsubishi Corporation, 10%) owned the mine. Antamina's revised proven and probable ore reserves were calculated to be 559 Mt at a grade of 1.24% copper, 1.03% zinc, 13.71 g/t silver, and 0.029% molybdenum, or 1.8% equivalent copper (Ministerio de Energía y Minas, 2003a, p. 35).

SPCC remained the second largest copper producer in the country with a total output of 291,446 t of copper in concentrates from its mine operations at the Cuajone (168,070 t) and the Toquepala (123,376 t) open pits and its SX-EW cathode plant at Toquepala, which produced 52,852 t of metal in 2002. Copper metal output at the SPCC's Ilo refinery in the Department of Moquegua increased to 281,658 t in 2002 from 280,000 t in 2001 and 227,000 t in 1998, which represented a total increase of 24.1% compared with that of 1998 refining capacity (Bengoa, 2003, p. 2-3). Phelps Dodge Corp.'s (Sociedad Minera Cerro Verde S.A.A.'s) SX-EW cathode plant at the Cerro Verde copper mine produced 86,401 t of cathode metal compared with 76,665 t of cathode copper in 2001, and BHP Billiton Tintaya's SX-EW reported an output of 17,212 t of cathode copper compared with 85,184 t of cathode copper from its open pit operations in 2001; this decrease was due to a temporary shut down of the mine and lower copper prices in the open market. Doe Run Perú produced 15,473 t compared with 16,509 t of copper in 2001 from its Cobriza base-metal mine in the Department of Huancavelica. Medium- and small-sized mines in the country supplied an additional 35,437 t of copper in concentrates (Ministerio de Energía y Minas, 2003a, p. 51).

In fiscal year 2001-02, expansion of the Toquepala Mine was completed with the identification of a massive sulfide ore body, which increased the mine's proven and probable reserves to 770 Mt at a grade of 0.74% copper and 0.08% molybdenum and 1.931 billion metric tons of leachable ("lixiviable") reserves at a grade of 0.20% copper. The concentrator's capacity was increased to 60,000 t/d from 43,500 t/d by mid-2002 at a cost of \$80 million. The construction of an additional leaching section at the Cuajone SX-EW cathode plant continued; this will increase the plant's capacity to 56,000 t/yr from 22,000 t/yr by mid-2003. 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 (2002) capacity of 1.15 Mt, and Ilo's refinery will be expanded further to 330,000 t/yr from the current (2002) capacity of 280,000 t/yr, as well (Bengoa, 2003, p. 1-9; Ministerio de Energía y Minas, 2003a, p. 3-5).

Gold.— In 2002, the increased gold output was a result of better prices in the open market and higher production achieved by all types of mine operations in the country, which was 157.0 t compared with 138.0 t in 2001 and 132.6 t in 2000. MYS (Newmont Mining Corp. of the United States, 51.35%; Buenaventura, 43.65%; the World Bank International Finance Corporation, 5%) produced 72.5 t or almost 46.2% of the total gold output in 2002. Other gold producers were Minera Barrick Misquichilca S.A. (27.9 t), Cía. Minera Ares S.A. (5.7 t), Minera Aurífera Retamas S.A. (5.0 t), Cía. Minera Aurífera Santa Rosa S.A. (3.7 t), and Inversiones Mineras del Sur S.A. (1.2 t) (Ministerio de Energía y Minas, 2003a, p. 12-19).

Gold recovered as a byproduct from the concentrates of Peru's polymetallic mines amounted to 9.2 t. From the total gold output, large-sized producers reported 101.0 t; medium-sized producers, 37.0 t; small-sized mines 0.3 t; and an unknown number of placers and "garimperos" (informal individual miners), about 18.7 t. Placers accounted for about 12% 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 the Mariategui Regions. Gold also was recovered from placers in rivers and streams throughout the jungle (Ministerio de Energía y Minas, 2003a, p. 12-19).

Iron Ore.—Shougang Hierro Perú S.A. (a subsidiary of China's Shougang Corp.) continued to be Peru's sole iron ore producer. Mine output increased to 4.5 Mt of iron content in 2002 from 3.1 Mt in 2001 and 2.8 Mt in 2000. The value of iron ore exports was \$83 million, which was an increase of 2.5% compared with \$81 million in 2001 and \$67 million in 2000. Shougang Hierro built a new pellet plant at a cost of \$100 million to increase its production capacity to 3 million metric tons per year (Mt/yr) in 2001 (Ministerio de Energía y Minas, 2002, p. 14, 71; 2003a, p. 20-23).

Lead, Silver, and Zinc.—In 2002, the Peruvian zinc industry produced 1.2 Mt of zinc in concentrates and was the world's third largest after China and Australia (Plachy, 2003). This represented an increase of about 15.6% and 34.2% compared with the output of 2001 and 2000, respectively; 12% of the world's concentrate output, and almost 62% of zinc concentrate and 29% of refined zinc of Latin America's outputs. The zinc increase was the result of expansions at Peru's largest private zinc producer Volcan Cía Minera S.A.A. (Volcan) (Ministerio de Energía y Minas, 2003a, p. 24-30; Sociedad Nacional de Minería, Petróleo y Energía, 2003b, p. 13, 39).

The country's total silver output increased to 2,687 t in 2002 from 2,674 t in 2001, which made Peru the second largest producer in the world after Mexico (Ministerio de Energía y Minas, 2003a, p. 31-38; Hilliard, 2003). Peru produced 297,704 t of lead in concentrates compared with 289,546 t in 2001 and was the fourth largest producer in the world after Australia, China, and the United States (Ministerio de Energía y Minas, 2003a, p. 39, 47; Smith, 2003). Exports of zinc, lead, and silver were valued at about \$429 million, \$211 million, and \$174 million, respectively compared with \$419 million, \$196 million, and \$169 million, respectively, in 2001 (Ministerio de Energía y Minas, 2003a, p. 24, 31, 39; Banco Central de Reserva del Perú, 2003§).

In 2002, Volcan produced 275,935 t of zinc, 69,344 t of lead, and 339 t of silver from its operations in the Yauli mining district, the San Cristobal base-metal mine in the Department of Junin, and the Cerro de Pasco property in the Department of Cerro de Pasco;

Volcan was the largest private producer of lead, silver, and zinc in Peru. CMA was the second largest zinc producer in the country with an output of 260,434 t of zinc. Glencore International AG's subsidiary Empresa Minera los Quenuales S.A. produced from the Iscaycruz Mine (138,102 t of zinc and 8,984 t of lead) and the Casapalca Mine (38,894 t of zinc, 15,408 t of lead, and 163 t of silver) and became Peru's third largest private zinc producer after Volcan and CMA with a total of 176,996 t. Other important medium- and small-sized base-metal producers were Cia. Minera Milpo S.A. with 91,348 t of zinc, 29,260 t of lead, and 133.3 t of silver; Atacocha, 62,888 t of zinc, 35,867 t of lead, and 159.1 t of silver; Sociedad Minera El Brocal S.A.A., 57,194 t of zinc, 21,384 t of lead, and 74.6 t of silver; Cia. Minera Santa Luisa S.A. (a subsidiary of Mitsui Mining & Smelting Co. Ltd. of Japan), 47,372 t of zinc, 20,979 t of lead, and 44.8 t of silver from its Huanzalá Mine; and Corp. Minera Nor Perú S.A. (a subsidiary of Pan American Silver Corp. of Canada), 18,842 t of zinc, 6,879 t of lead, and 95 t of silver from its underground Quiruvilca Mine in northern Peru. Refined metals were reported by, in alphabetical order, Doe Run—119,588 t of lead, 1,066 t of silver, and 79,790 t of zinc from La Oroya complex; Sociedad Minera Refinería de Zinc de Cajamarquilla S.A.—12.7 t of silver and 92,898 t of zinc from the Cajamarquilla refinery; and SPCC—113.8 t of silver from its refining operations in Ilo. Peru's silver production increased to 2,687 t from 2,674 t in 2001 and 2,438 t in 2000 (Ministerio de Energía y Minas, 2003a, p. 24-25, 30-31, 39-40).

Steel.—In fiscal year 2001-02, Sider Corp. S.A. (Acerco S.A., 49.4%; Grupo Wiese, 49.4%; others, 1.2%) continued to produce flats, rebars, bars 80B, and tubing (Apoyo & Asociados Internacionales, 2002§).

Tin.—Minsur S.A. was Peru's sole tin producer in 2002. Production from its San Rafael Mine in the Mariátegui Region was 65,400 t in concentrate compared with 69,700 t in 2001 and 70,900 t in 2000. Minsur's tin smelting and refining operations in Pisco, which is located south of Lima, produced 35,828 t of metal compared with 38,182 t in 2001; this was a 6.2% decrease compared with the previous year owing to weaker market conditions. Peru was the largest tin producer in Latin America followed by Brazil and Bolivia and the third largest tin producer in the world after China and Indonesia (Carlin, 2003; Ministerio de Energía y Minas, 2003a, p. 48-51).

Industrial Minerals

Cement.—According to the International Cement Review and the domestic Association of Cement Producers, Peru's total cement production in 2002 was 5.10 Mt compared with 3.95 Mt in 2001. Five main cement companies operated and produced 4.5 Mt. The largest cement producer Cementos Lima S.A. (CLSA) produced about 2.8 Mt of cement, or about 55% of Peru's total cement output; CLSA's Atocongo plant had a production capacity of almost 3 Mt/yr and drew from nearby limestone quarries. The second largest cement producer, Cementos Pacasmayo S.A.A., accounted for 17% of total production; it had a production capacity of 860,000 t/yr. The third largest cement producer, Cementos Andino S.A., accounted for 16% of total production. Cementos Sur S.A. had a market share of about 8%, and Cementos Yura S.A. had 7% (International Cement Review, 2002; Ministerio de Energía y Minas, 2003a, p. 60-62; Pflucker, 2003, p. 5).

Phosphate Rock.—State-owned Minero Perú's phosphate deposits (Bayóvar project), which comprised 150,000 hectares of phosphate and brine, have proven reserves of 550 Mt of phosphatic rock. Bayóvar has been scheduled for privatization in 2004. As a consumer of sulfuric acid and producer of fertilizer, the Bayóvar project could be developed competitively because it is located in a valley of great agricultural potential and tremendous export opportunities to the Asia-Pacific region via the port of Paita. The 90,000-t/yr phosphate plant, which was operated by Empresa Minera Regional Grau Bayóvar S.A., produced 45,252 t of phosphate in 2002, which was only about 50% of capacity because of shutdowns during the first half of 2002 (Ministerio de Energía y Minas, 2003a, p. 60).

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 Marañón Region and the coal basins of Goyllarisquizga and Hatun Huasi in the Caceres Region of central Peru. In 2002, according to the U.S. Energy Information Administration (2003§), Peru's recoverable coal reserves were estimated to be 1.1 billion metric tons, and coal production was relatively small (about 68,000 t) compared with an estimated consumption of 835,000 t.

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, had proven reserves of 8.5 billion cubic meters (301 billion cubic feet) of gas and 9 million barrels (Mbbl) of 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 590 Mbbl of NGL at the end of 2002 (Ortigas, 2002, p. 5; Moons, 2003, p. 10; U.S. Energy Information Administration, 2003§). Camisea consisted of a pair of crescent-shaped gasfields that have potentially enough gas 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, 2002, p. 10-12). Because the fields are distant from accessible markets, the MEM indicated that new infrastructure must be developed.

Natural gas production increased to 543 million cubic meters from 371.0 million cubic meters (13.1 billion cubic feet), which was produced by Petrotech del Perú S.A. (42.2%), Aguaytia S.A. (27.1%), Perez Companc S.A. (21.6%), and others (9.1%) (Ministerio de Energía y Minas, 2003b, p. 3-16; Soldi, 2003, p. 4; U.S. Energy Information Administration, 2003§).

In 2002, crude oil production increased by almost 2.0%, or an average of 97,700 barrels per day (bbl/d), compared with (96,000 bbl/d) in 2001. Production of petroleum derivatives increased by about 18.7% and averaged 190,950 bbl/d compared with the 2001 output of 160,863 bbl/d (Ministerio de Energía y Minas, 2003b, p. 3-16; Sociedad Nacional de Minería, Petróleo y Energía, 2003b, p. 51; Soldi, 2003, p. 4; U.S. Energy Information Administration, 2003§). Peru imported 83,000 bbl/d of crude oil and petroleum products to satisfy its internal consumption of 160,000 bbl/d. The value of petroleum and derivative imports was about \$978 million, which created a trade deficit of \$509 million in the energy sector for 2002 (Ministerio de Energía y Minas, 2003b, p. 16; Sociedad Nacional de Minería, Petróleo y Energía, 2003c, p. 54; Banco Central de Reserva del Perú, 2003§).

Peru's total crude oil production of 35.6 Mbbl in 2002 came from Pluspetrol S.A. (66.0%); the balance was produced by Petrotech (13.0%), Perez Companc (12.0%), and others (9.0%) (Sociedad Nacional de Minería, Petróleo y Energía, 2003c, p. 54; Soldi, 2003, p. 5). 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 323 Mbbl in 2002 (U.S. Energy Information Administration, 2003§).

In 2002, the largest oil refinery was Petroperu's La Pampilla and had a designed capacity of about 100,000 bbl/d. The second largest oil refinery was Petroperu's Talara and had a design capacity of about 60,000 bbl/d. Other refineries had the following designed capacities—Conchán (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%), Conchán (7%), Iquitos (5%), Pucallpa (2%), and El Milagro (1%) (Ministerio de Energía y Minas, 2003b, p. 17; Sociedad Nacional de Minería, Petróleo y Energía, 2003a, p. 51).

The Camisea natural gas project, which was located in the Ucayali Basin in the Cusco Department, consisted of about \$670 million natural gas field development (Upstream Project), approximately \$820 million for transporting the natural gas (Transportation Project), and an almost \$170 million natural gas distribution network (Distribution Project).

For the Upstream Project, Peru's Comité Especial del Proyecto Camisea approved on February 16, 2000, the upstream consortium led by Argentina's largest oil producer Pluspetrol S.A. (Pluspetrol Perú Corp. S.A. as operator) (36%) and 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%). The upstream consortium will produce natural gas during the 40 years of operation (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 S.A.

For the Transportation Project, Peru issued a tender for a 33-year contract on October 20, 2000. The project included the construction and operation of two pipelines, one for the natural gas (714 km) and one 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 between TGP and the consortium was led by Argentina's Tecgas N.V. (23.4%) and included Pluspetrol Resources Corp. (Techint Group) (22.2%), Hunt Oil Company of the United States (Hunt Oil Company of Peru L.L.C.) (22.2%), SK Corp. of the Republic of Korea (11.1%), Sonatrach Company 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 S.A. Tractebel acquired 8.0% equity in TGP and will build a 60-km main distribution pipeline that will deliver gas to the largest industries and power generation to Lima and Callao at an initial investment of about \$55 million. Additional networks will be developed to supply gas to increasing numbers of industrial, commercial, and residential customers.

The fourth phase of the Camisea contract for the transformation of gas into liquefied natural gas (LNG) south of Lima and exporting 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 in 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, 2003, p. 4-8; Camisea 2003§; U.S. Energy Information Administration, 2003§; U.S. Embassy in Lima, Peru, written commun., 2002).

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, 2003. 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 minable ore from mines committed to production (U.S. Bureau of Mines and U.S. Geological Survey, 1980).

Annual changes in the 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.

During fiscal year 2001-02, reserves of the leading base and precious metals increased significantly because of new discoveries of 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 1,988 km of railroads and 72,900 km of roads, of which 8,700 km was paved and 64,200 km was unpaved. Peru had 8,800 km of navigable waterways and tributaries to 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 64-km pipeline in the same area. Peru had an installed electrical generating capacity of 5,050 megawatts (MW), more than 76% of which came from hydroelectric plants (U.S. Central Intelligence Agency, 2003§). 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 (Ministerio de Energía y Minas, 2002, p. 21-22, 52).

Important mineral industry ports included Callao, Ilo, Matarani, Paita, San Nicolas, and Talara on the Pacific Ocean and Iquitos on the Amazon River. The energy mix, by source, was hydro (74.8%), fossil fuel (24.5%), and others (0.7%) (U.S. Central Intelligence Agency, 2003§).

Outlook

In July 2002, the legal framework for decentralization was enacted; regional authorities were elected in November and were to take office in January 2003. The rationale of the process was to use revenues from minerals production to maximize the well-being of the locals through economic growth, social development, and environmental protection in a sustainable way. In 2002, 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 Governments and the country. The privatization of Minero 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 the CEPRI, the privatization process is expected to continue to generate additional investments in every sector of the Peruvian economy, particularly in the mining and energy industries (Ministerio de Energía y Minas, 2002, p. 21-25).

The mineral industries are and will be an important part of the Peruvian economy. In 2002, several major mineral developments took place that will continue to contribute to its economic growth. For example, Teck Cominco plans to increase Cajamarquilla's zinc refinery capacity in 2004 to 240,000 t/yr from 120,000 t/yr zinc (Ministerio de Energía y Minas, 2002, p. 29; Instituto de Ingenieros de Minas del Perú, 2003b, p. 12-13). 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 largest producer of zinc (163,300 t/yr) and the seventh largest producer of copper (272,200 t/yr) in the world by 2005 (Botts, 2003). Pluspetrol Peru Corp. S.A. announced that the timetable for drilling four development wells for the Camisea natural gas development to depths of more than 2,000 m in the San Martin I structure on block 88 is by 2003. Hunt Oil is working on a prefeasibility study for the construction of a NGL export project facility in Peru. The total cost of production, transport, distribution, and exports, which would include transportation vessels, would increase to an estimated \$2.0 billion (Oil & Gas Journal, 2002; Ministerio de Energía y Minas, 2002, p. 21; Comisión de Promoción de la Inversión Privada, 2003, 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 MYS, 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 demonstrating against the relocation of Huarmey's residents to another city in Ancash. MYS's Cerro Quilish gold deposit development at the Yanacocha Mine was stalled by the city government of Cajamarca to protect the city's major watershed by issuing a municipal ordinance declaring Cerro Quilish a "protected area."

The Coordinadora Nacional de Comunidades Afectadas por la Minería's (Conacami) expects to bring collective strength to counter Central Government policies and to negotiate "demands" with mining companies. Conacami indicated that they have the right to participate and be consulted on mineral policies that involve communities affected by mining operations. For example, Conacami, residents of the town of Tambogrande, and others have indicated that they "want nothing to do" with the development of Manhattan Minerals Corp.'s Tambogrande gold-silver/copper-zinc deposit. The project's feasibility study indicates that the open pit project would require an investment of \$405 million during a 17-year life. The implementation of the Tambogrande study would involve the relocation of 1,800 homes to the south of the town and the construction of a new town center, as well. According to the study, 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, 2003, p. 2). Local leaders have decided to ignore the Government's plea to consider the study before a final decision is to be rendered by the MEM (Metal Bulletin, 2002).

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TABLE 1
PERU: PRODUCTION OF MINERAL COMMODITIES¹

(Metric tons unless otherwise specified)

Commodity	1998	1999	2000	2001	2002 ^P
METALS					
Antimony:					
Mine output, Sb content ^e	460	460	460	460	460
Metal	364	255	461	274	356
Arsenic, white ²	624	1,611	2,495	2,800 ^r	2,970
Bismuth:					
Mine output, Bi content ^e	1,000	1,000	1,000	1,000	1,000
Metal	832	705	744	640	568
Cadmium, metal	535	466 ^r	483 ^r	456	422
Copper:					
Mine output, Cu content	483,338	536,387	553,924	722,035	843,213
Sulfate, Cu content	2,450	2,554	2,484	1,953	1,950
Metal:					
Blister	46,595	31,463	16,030	44,176	30,300
Refined	309,594	318,914	324,417	340,736	346,277
Electrowon	101,837	114,425	127,311	131,139	156,465
Total	458,026 ^r	464,802 ^r	467,758 ^r	516,501 ^r	533,042
Gold:³					
Mines kilograms	71,654	110,530	116,085	121,402	138,293
Placers do.	22,560	17,956	16,500	16,620	18,720
Total do.	94,214	128,486	132,585	138,022	157,013
Indium do.	4,231	5,005	5,015	4,263	5,500
Iron and steel:					
Iron ore and concentrate:					
Gross weight thousand tons	4,880	3,949	4,144 ^r	4,564 ^r	4,594
Fe content do.	3,282	2,715	2,813	3,087	3,105
Metal:					
Pig iron do.	283	250	327	330 ^e	330 ^e
Sponge iron do.	61	50	80	80 ^e	80 ^e
Ferroalloys ^e	360	360	360	360	360
Steel ingots and castings ^e thousand tons	510	510	510	510	510
Semimanufactures ^e	250	250	250	250	250
Lead:					
Mine output, Pb content	257,713	271,782	270,576	289,546	297,704
Metal	109,492	121,090	116,412	121,181	119,588
Manganese, mine output, Mn content ^e	200	200	200	200	200
Molybdenum, mine output, Mo content	4,344	5,470	7,193	9,499	8,616
Selenium, metal, refined kilograms	18,006	23,008	23,110	16,110	20,600
Silver:					
Mine output, Ag content	2,025	2,231	2,438	2,674	2,687
Metal, refined	989	1,115	1,180	1,184	1,193
Tellurium, metal kilograms	21,682	17,110	22,020	19,105	21,600
Tin:					
Mine output, Sn content	49,574	59,191	70,901	69,696	38,815
Metal ⁴	25,907	30,618	37,410	38,182	35,828
Tungsten, mine output, W content	76	--	--	--	--
Zinc:					
Mine output, Zn content	868,757	899,524	910,303	1,056,629	1,221,830
Metal	174,655	196,978	199,813	201,498	172,688

See footnotes at end of table.

TABLE 1--Continued
PERU: PRODUCTION OF MINERAL COMMODITIES¹

(Metric tons unless otherwise specified)

Commodity	1998	1999	2000	2001	2002 ^P	
INDUSTRIAL MINERALS						
Barite	7,506	3,512	11,403	11,031	3,806	
Boron materials, crude (borates)	22,002	14,716	9,309	9,374	6,698	
Cement, hydraulic	thousand tons	4,340	3,799	3,906	3,950	3,980
Chalk ^e	101,000	101,000	101,000	101,000	101,000	
Clays:						
Bentonite	19,563	19,659	21,059	18,217	20,760	
Fire clay	3,255	10	5,973	5,900 ^e	5,900 ^e	
Kaolin	4,968	1,332	6,165	5,532	1,934	
Common clay	360,958	240,889	398,523	676,944	428,820	
Diatomite ^e	35,100	35,100	35,100	35,100	35,100	
Feldspar	3,983	1,594	5,642	4,253	6,018	
Gypsum, crude	78,656	28,355	140,630	30,658	75,306	
Lime	37,220	28,344	140,630	30,568	30,600	
Nitrogen, N content of ammonia	thousand tons	949	950	950	950	
Phosphate rock, crude	46,821	9,038	5,581	4,825	6,018	
Salt, all types	808,625	778,048	247,619	418,954	278,948	
Stone, sand and gravel:						
Stone: ^e						
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 tons	5,508 ⁵	4,313 ⁵	4,334 ⁵	4,370 ⁵	4,370 ⁵
Marble	9,716 ⁵	7,651 ⁵	10,511 ⁵	11,636 ⁵	16,553 ⁵	
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	35,202 ⁵	15,792 ⁵	16,706 ⁵	16,800 ⁵	10,944 ⁵	
Travertine	69,248 ⁵	15,463 ⁵	16,220 ⁵	2,971 ⁵	4,183 ⁵	
Sand and gravel:						
Construction	thousand tons	1,819	1,848	1,607	1,154	1,011
Silica sand	do.	96	90	74	120	300
Sulfur, elemental:						
Native ^e	100	100	100	100	100	
Byproduct of metallurgy ^e	60,000	60,000	60,000	60,000	60,000	
Sulfuric acid, gross weight	516,514	517,000 ^e	590,209	623,084	623,100	
Talc and related materials:						
Talc	11,165	12,085	9,668	11,165	10,685	
Pyrophyllite ^e	8,000	8,000	8,000	8,000	8,000	
Total ^e	19,200	20,100	17,700	19,200	18,700	
MINERAL FUELS AND RELATED MATERIALS						
Coal:						
Anthracite, run-of-mine	7,385	1,488	16,625	20,093	22,085	
Bituminous, run-of-mine ^e	45,000	45,000	45,000	45,000	45,885	
Total ^e	52,400	46,500	61,600	65,100	68,000	
Coke, all types ^e	10,000	10,000	10,000	10,000	10,000	
Gas, natural:						
Gross ^e	million cubic meters	1,000	1,000	1,000	1,000	
Marketed	do.	409	333	277	371	

See footnotes at end of table.

TABLE 1--Continued
 PERU: PRODUCTION OF MINERAL COMMODITIES¹

(Metric tons unless otherwise specified)

Commodity	1998	1999	2000	2001	2002 ^p
MINERAL FUELS AND RELATED MATERIALS--Continued					
Natural gas liquids: ^c					
Natural gasoline and others ⁶ thousand 42-gallon barrels	295	295	295	295	295
Butane do.	5	5	5	5	5
Total do.	300	300	300	300	300
Petroleum:					
Crude do.	59,625	38,663	36,314	35,040	35,661
Refinery products:					
Liquefied petroleum gas do.	2,292	2,357	2,484	2,612	3,100
Gasoline, motor do.	10,134	9,449	9,291	9,767	11,593
Jet fuel do.	3,416	3,112	2,822	2,966	3,521
Kerosene do.	5,103	4,910	5,235	5,503	6,532
Distillate fuel oil do.	15,040	13,622	12,355	12,988	15,417
Lubricants do.	525	530	513	539	642
Residual fuel oil do.	20,640	17,437	18,348	19,287	22,894
Asphalt do.	987	363	--	--	--
Other ⁷ do.	3,784	4,611	4,800	5,053	5,998
Total do.	61,921	56,391	55,848	58,715	69,697

^cEstimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. ^pPreliminary. ^rRevised. -- Zero.

¹Table includes data available through November 2003.

²Output reported by Doe Run Resources Corp.

³Peru's placer gold production was reported.

⁴Output reported by Minsur S.A.'s smelter.

⁵Reported figure.

⁶Includes hexane.

⁷Includes refinery fuel and losses.

TABLE 2
PERU: STRUCTURE OF THE MINERAL INDUSTRY IN 2002

(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 Peru S.R.Ltda. (private, 100%)	Smelter at La Oroya, Junín Department	700
Barite		Barmine S.A. (private, 100%)	Santa Cruz de Cocachacra Quarry, Huarochirí, Lima Department	NA
Bentonite		Minerales Andinos S.A.A. (NL Industries Co., 90%)	Vichayal Mine, Piura Department	9
Bismuth	metric tons	Doe Run Peru S.R.Ltda. (private, 100%)	Refinery at La Oroya, Junín Department	1,000
Cement		Cementos Lima S.A. (private, 100%)	Atocongo Plant, Lima Department	3,000
Do.		Cementos Pacasmayo S.A.A. (private, 100%)	Pacasmayo Plant, La Libertad Department	860
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.		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	275
Do.		do.	Antamina concentrator, Ancash Department	70
Do.		Doe Run Peru S.R.Ltda. (private, 100%)	Cobriza Mine, Huancavelica Department	60
Do.		do.	Smelter at La Oroya, Junín Department	65
Do.		do.	Refinery at La Oroya, Junín Department	60
Do.		Cía. Minera Atacocha S.A. (private, 100%)	Yanacancha Mine, Junín Department	30
Do.		Cía. Minera Condestable S.A. (private, 100%)	Condestable Mine, Junín Department	20
Do.		Glencore International AG (private, 100%)	Casapalca Mine, Lima Department	60
Do.		Volcan Cía. Minera S.A.A. (private, 100%)	San Cristóbal, Mahr Túnel, and Andaychagua Mines, Junín Department	60
Do.		Cía. Minera San Ignacio de Morococha S.A. (private, 100%)	Yauricocha Mine, Junín Department	60
Do.		BHP Billiton Tintaya S.A. (private, 100%)	Tintaya Mine, Cusco Department	90
Do.		Sociedad Minera Cerro Verde S.A. (Phelps Dodge Corp., 82.5%; Cía. de Minas Buenaventura S.A., 9.2%; others, 8.3%)	Cerro Verde Mine, Arequipa Department	80
Do.		do.	Electrowinning facility at Cerro Verde, Arequipa Department	20
Dolomite		Minera Baribent S.A. (private, 100%)	Esperanza Mine, Ancash Department	25
Gold	kilograms	Minera Yanacocha S.R.L. (Newmont Mining Corp., 51.35%; Cía. de Minas Buenaventura S.A.A., 43.65%; World Bank's International Finance Corporation, 5%)	Yanacocha, La Quinua, and Maqui-Maqui Mines, Cajamarca Department	70,000
Do.	do.	Minera Barrick Misquichilca S.A. (Barrick Gold Corp., private, 100%)	Pierina Mine, Cajamarca Department	26,000
Do.	do.	Cía. Minera Poderosa S.A. (private, 100%)	Poderosa Mine, La Libertad Department	2,000
Do.	do.	Cía. de Minas Orcopampa S.A. (Cía. de Minas Buenaventura S.A.A., 100%)	Orcopampa Mine, Arequipa Department	5,000
Do.	do.	Minas Arirahua S.A. (private, 100%)	Arirahua Mine, La Libertad Department	2,000
Do.	do.	Asesoría Contable Minera S.A. (private, 100%)	Ocoña, Santa Clarita, Explorator, and Molino de Oro Mines, Arequipa Department	1,000
Do.	do.	Cía. Aurífera Río Inambari S.A. (Cía. Minera del Sur S.A., 84%; Aurífera Claudia S.A., 16%)	Río Caichive Mine, Madre de Dios Department	200
Do.	do.	Minera Aurífera Retamas S.A. (private, 100%)	Retamas Mines, La Libertad Department	5,200
Do.	do.	Consorcio Minero Horizonte S.A. (private, 100%)	Parcoy Mine, La Libertad Department	4,000
Do.	do.	Cía. Minera Sipán S.A. (private, 100%)	Sipán, Inca Mines La Libertad Department	4,800
Do.	do.	Cía. Minera Ares S.A. (private, 100%)	Ares Mines, La Libertad Department	5,200
Do.	do.	Cía. Minera Aurífera Santa Rosa S.A. (private, 100%)	Santa Rosa Mine, Puno Department	3,000

TABLE 2--Continued
PERU: STRUCTURE OF THE MINERAL INDUSTRY IN 2002

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity
Iron ore		Shougang Hierro Perú S.A. (Shougang Corp., 100%)	Marcona Mine, Ica Department	13,000
Lead		Doe Run Peru S.R.Ltda. (private, 100%)	Smelter at La Oroya, Junín Department	93
Do.	do.	do.	Refinery at La Oroya, Junín Department	95
Do.		Empresa Minera los Quenuales S.A. (Glencore International AG, 100%)	Pachangara Mine, Lima Department	10
Do.		Empresa Minera los Quenuales S.A. (Glencore International AG, 100%)	Casapalca Mine, Lima Department	15
Do.		Volcan Cía. Minera S.A.A. (private, 100%)	San Cristóbal, Mahr Túnel, and Andaychagua Mines, Junín Department	70
Do.	do.	do.	Paragsha Mine, Cerro de Pasco Department	85
Do.		Cía. Minera San Ignacio de Morococha S.A. (private, 100%)	Yauricocha Mine, Junín Department	5
Do.		Cía. Minera Atacocha S.A. (private, 100%)	Yanacancha Mine, Junín Department	40
Do.		Cía. Minera Milpo S.A. (private, 100%)	El Porvenir Mine, Cerro de Pasco Department	25
Do.		Cía. Minera Santa Luisa S.A. (Mitsui Mining & Smelting Co. Ltd., 100%)	Huanzalá Mine, Junín Department	40
Do.		Sociedad Minera El Brocal S.A.A. (private, 100%)	San Gregorio Mine, Cerro de Pasco Department	60
Do.		Corp. Minera Nor Perú S.A. (Pan American Silver Corp., 100%)	Quiruvilca Mine, La Libertad Department	10
Molybdenum		Southern Peru Ccpper Corp.	Cuajone Mine, Moquegua Department and Toquepala Mine, Tacna Department	NA
Natural gas	million cubic meters per day	Pluspetrol Perú Corp. (Pluspetrol S.A., 36%; Hunt Oil Company, 36%; SK Corp., 18%; Tecpetrol S.A., 10%)	Camisea gas deposit, Cusco Department	NA
Do.	do.	Petrotech del Perú S.A. (Petroperú S.A., 100%)	Pucallpa, Loreto Department	120
Do.	do.	Aguaytia S.A. (Petroperú S.A., 100%)	Aguaytia gas deposit, Ucayali Department	80
Do.	do.	Perrez Companc S.A. (Petroperú S.A., 100%)	Pucallpa, Loreto Department	60
Petroleum, crude	42-gallon barrels per day	Petrotech del Perú S.A. (Perúpetro S.A., 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.	Perúpetro S.A.	Refineries at Talara, Lima, Iquitos, Marsella, El Milagro, and Pucallpa	195,000
Phosphate rock	metric tons	Empresa Minera Regional Grau Bayóvar S.A. (private, 100%)	Bayóvar phosphate mine, Piura Department	50
Silica sand		Minera Baribent S.A. (private, 100%)	María G. and Martín I., Junín Department	27
Silver	kilograms	Empresa Minera Yauliyacu S.A. (Glencore International AG, 100%)	Casapalca Mine, Lima Department	160,000
Do.	do.	Doe Run Peru S.R.Ltda. (private, 100%)	Refinery at La Oroya	809,000
Do.	do.	Cía. Minera San Ignacio de Morococha S.A. (private, 100%)	Yauricocha Mine, Junín Department	46,500
Do.	do.	Cía. de Minas Buenaventura S.A.A. (private, 83%; Centromin 17%)	Julcani and Huachocolpa Mines Huancavelica Department, Uchucchacua Mine, Lima Department	350,000
Do.	do.	Cía. de Minas Orcopampa S.A. (Cía. de Minas Buenaventura S.A.A., 100%)	Orcopampa Mine, Arequipa Department	161,000
Do.	do.	Volcan Cía. Minera S.A.A. (private, 100%)	San Cristóbal, Mahr Túnel, and Andaychagua Mines, Junín Department	325,000
Do.	do.	Sociedad Minera Corona S.A. (private, 100%)	Hualgayoc Mine, Cajamarca Department	175,000
Do.	do.	Cía. Minas Arcata S.A. (private, 100%)	Arcata Mine, Arequipa Department	170,000
Do.	do.	Southern Peru Ccpper Corp.	Ilo smelting and refining, Moquegua Department	150,000
Do.	do.	Cía. Minera Santa Luisa S.A. (Mitsui Mining & Smelting Co. Ltd., 100%)	Huanzalá Mine, Junín Department	53,000

TABLE 2--Continued
PERU: STRUCTURE OF THE MINERAL INDUSTRY IN 2002

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity
Silver--Continued	do.	Cía. Minera Raura S.A. (private, 100%)	Raura Mine, Lima Department	54,000
Do.	do.	Cía. Minera Nor Perú S.A. (private, 100%)	Quiruvilca Mine, La Libertad Department	128,000
Do.	do.	Cía. Minera Milpo S.A. (private, 100%)	Yanacancha Mine, Cerro de Pasco Department	110,000
Do.	do.	Cía. Minera Atacocha S.A. (private, 100%)	Yanacancha Mine, Junín 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 Mine, La Libertad Department	125,000
Steel		Sider Corp. S.A. (Acerco S.A., 49.4%; Grupo Wiese, 49.4%, others, 1.2%)	Chimbote plant, Ancash Department	550
Do.		Empresa Laminadora del Pacífico S.A. (private, 100%)	Pisco plant, Ica Department	180
Tellurium	metric tons	Doe Run Peru S.R.Ltda. (private, 100%)	Refinery at La Oroya	12
Tin	metric tons per day of ore	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 Mine, Puno Department	1,400
Do.	do.	Fermín Málaga Santolalla S.A. (private, 100%)	Pasto Bueno Mine, Ancash Department	1,000
Zinc		Volcan Cía. Minera S.A.A. (private, 100%)	Cerro de Pasco Mine, Cerro de Pasco Department; San Cristóbal, Mahr Túnel, and Andaychagua Mines, Junín 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 los Quenuales S.A. (Glencore International AG, 100%)	Pachangara Mine, Lima Department	125
Do.		Empresa Minera los Quenuales S.A. (Glencore International AG, 100%)	Casapalca Mine, Lima Department	40
Do.		Cía. Minera San Ignacio de Morococha S.A. (private, 100%)	Yauricocha Mine, Junín Department	80
Do.		Doe Run Peru S.R.Ltda. (private, 100%)	Refinery at La Oroya, Junín Department	70
Do.		Sociedad Minera Refinería de Zinc de Cajamarquilla S.A. (Teck Cominco Ltd., 87%; Marubeni Corp., 13%)	Refinery at Cajamarquilla, Lima Department	120
Do.		Cía. Minera San Ignacio de Morococha S.A. (private, 100%)	San Vicente Mine, Junín Department	70
Do.		Cía. Minera Atacocha S.A. (private, 100%)	Yanacancha Mine, Junín Department	60
Do.		Cía. Minera Raura S.A. (private, 100%)	Raura Mine, Lima Department	45
Do.		Corp. Minera Nor Perú S.A. (Pan American Silver Corp., 100%)	Quiruvilca Mine, La Libertad Department	25
Do.		Cía. Minera Santa Luisa S.A. (Mitsui Mining & Smelting Co. Ltd., 100%)	Huanzalá Mine, Junín Department	50
Do.		Cía. Minera Milpo S.A. (private, 100%)	Yanacancha Mine, Junín Department	80
Do.		Sociedad Minera El Brocal S.A.A. (private, 100%)	San Gregorio Mine, Cerro de Pasco Department	220

TABLE 3
PERU: RESERVES OF MAJOR MINERALS IN 2002

(Thousand metric tons unless otherwise specified)¹

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

^eEstimated; estimated data are rounded to no more than three significant digits; may not add to totals shown.

¹2001 and 2002 "Anuario de la Minería del Perú" Ministerio de Energía y Minas except for natural gas and petroleum crude; U.S. Geological Survey Mineral Commodity Summaries 2003.

²Excludes metal in placer deposits.

³Recoverable at prices of \$100 or less per kilogram of uranium.