

# THE MINERAL INDUSTRY OF

# PERU

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With a population of more than 26 million, Peru had a gross domestic product (GDP) of \$64.3 billion<sup>1</sup>, or \$111.8 billion in terms of purchasing power parity in 1998 (Campbell, 1999, p. 14; Central Intelligence Agency, 1999). The GDP grew by 0.7%, which was considerably lower than the 7.2% for 1997, and the average inflation rate for the year was 6.01%, which was lower than the 6.5% for 1997. Minerals and related industries were 6.8% of Peru's 1998 GDP. Mining export revenues represented 47.4% of total exports of \$5.7 billion; the trade deficit was about \$2.5 billion. In spite of the effects of El Niño, the Asian financial crisis, the instability in the Brazilian markets of Rio de Janeiro and São Paulo, and the lower prices for its major mineral exports, mainly copper, gold, lead, and zinc, the Peruvian economy was still functioning. The foreign debt amounted to \$27.4 billion, and its reported net international reserves were about \$9.8 billion by yearend 1998. The public debt as a percentage of the GDP decreased to 28% in 1998 from 54% in 1993 (Ministerio de Energía y Minas, 1999b, p. 5-7; Sociedad Nacional de Minería, Petróleo y Energía, 1999, p. 53- 58).

The privatization of state-owned firms and formation of joint ventures in the mining industry continued, and foreign investors viewed Peru as an attractive open-market economy in Latin America (Campbell, 1999, p. 14). Foreign direct investments in the country were about \$2 billion in 1998 (Ministerio de Energía y Minas, 1999b, p. 47).

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 (roads, ports, and airports), and embarked on fiscal austerity and investment in social development and agriculture. A final border agreement with Ecuador was completed (Ministerio de Energía y Minas, 1999b, p. 3, 6).

In November 1998, the Asian Pacific Economic Council (APEC) admitted Peru to full membership, which increased Peru's opportunities to expand and diversify its international trade. APEC's 18 members had a GDP of \$13 trillion, which represented 56% of world income and 46% of global trade in 1998 (Ministerio de Energía y Minas, 1999b, p. 8).

By yearend, the Comisión Nacional para Inversión Extranjera y Tecnología reported a total of \$13.6 billion of direct foreign investments and \$14 billion of committed new foreign investments since 1993. Of that total mining would receive 51%; petroleum, 34%; and the other sectors of the economy, 15% (Ministerio de Energía y Minas, 1999b, p. 9;

Sociedad Nacional de Minería, Petróleo y Energía, 1999, p. 19-24).

The Peruvian privatization program, which began on July 19, 1991, privatized more than 200 state-owned corporations and netted \$8.656 billion, with committed new investments of \$7.042 billion, from 1991 to 1998. Privatization revenues amounted to \$292 million in 1998. As of December 31, revenues of the mining sector amounted to \$1.146 billion, with projected investments of \$4.547 billion (Ministerio de Energía y Minas, 1999b, p. 48). The privatization process continued to be managed by the Comisión para Promoción de Inversión Privada, which had the legal authority to transfer state-owned assets. Responsibility for specific privatization was vested in special committees, Comités de Privatización (CEPRI's), whose members were selected from the ranks of leading professionals and officials, mainly from the private sector. Currently, there are more than 30 CEPRI's in more than 50 privatization projects (Ministerio de Energía y Minas, 1999b, p. 47).

The new hydrocarbon law (No. 26844 of 1997) eliminates Petroperu's exclusive rights in the industry, such as control over secondary recovery of crude oil, refining, and imports and subsequent resale of petroleum and byproducts, held by the state-owned Petróleos del Perú S.A. (Petroperu). The law has ensured more favorable 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 contracts with Petroperu (Sociedad Nacional de Minería, Petróleo y Energía, 1999, p. 14- 18). (*See table 2.*)

Supreme Decree No. 014-92-EM, the single revised text of the General Mining Law of June 2, 1992, provides 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. Also, the Peruvian Constitution establishes equal protection for domestic and foreign investors who may enter into agreements with the Government. It also guarantees free access, possession, and disposal of foreign currency. Within the framework of the promotion and protection legislation, 247 domestic "Stability and Guarantee Contracts" have been signed since 1993 (Mendoza, 1998, p. 2; Ministerio de Energía y Minas, 1999b, p. 9).

Legal procedures to obtain mining rights were made easier by the enactment of complementary legislation, Supreme Decree No. 018 of July 9, 1992. The State no longer has exclusive control over exploration, mining, smelting, and refining of metals and fuel minerals. Individuals and private companies

<sup>1</sup>Where necessary, values have been converted from Peruvian new soles (S/.) to U.S. dollars at the rate of S/2.925=US\$1.00.

are allowed to hold mining permits in Peru. In the legal framework for investment and taxation, no distinction is made between domestic and foreign investors, corporations, and consortia formed in Peru or abroad. No restrictions are put on the remittance of dividends, depreciation, and royalties abroad. Contracts can be signed among investors, and the State guarantees the stability of legal commitments and taxes. Peru is a signatory of the Multilateral Investment Guarantee Agency (MIGA), the international MIGA agreement, and of many bilateral agreements, such as the Overseas Private Investment Corporation and with 25 countries (Mendoza, 1998, p. 3-4; Ministerio de Energía y Minas, 1999b, p. 9).

Petroperu managed energy-related activities for the Government. In principle, all mineral resources, including geothermal resources, belonged to the Government. The State granted concessions for use by the Government, private companies, and individuals. The administration and management of all mining legal processes and concessions rested in the executive branch.

The Dirección General de Asuntos Ambientales (DGAA) of the Ministerio de Energía y Minas has the responsibility to address environmental problems resulting from energy and mining activities and is mandated to implement the current environmental code and regulations. The sustainable development model for the mining and energy sectors began in 1993 with the setting of regulations and procedures for the gradual reduction of pollution. The model considers environmental protection and economic development policies. 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, including the maximum emission levels that are compatible with the internationally accepted limits set by the United Nations and the World Bank; evaluates and processes the approval of Environmental Impact Assessments (EIA's) for new operations, and the Environmental Adjustment and Management Programs (PAMA's) for ongoing operations; administers the national environmental information system; and is responsible for the EIA's and PAMA's in the hydrocarbon and electricity sectors (Ministerio de Energía y Minas, 1999b, p. 67). 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, one of the world's most sensitive ecosystems, are increasing (Wall Street Journal, 1997).

On July 15, 1998, Royal Dutch-Shell Group and Mobil Corp., announced that they would be unable to commit to the second phase (production) of the Camisea natural gas project in Cusco by the end of the initial stage of the Camisea license agreement and indicated that they sought solutions to critical issues related to gas distribution and pricing jointly with the authorities (Dave Dickson, Public Relations Manager, Mobil Corp., oral commun., July 16, 1998; Mobil Corp., July 16, 1998, Shell and Mobil unable to proceed with Camisea Project, accessed July 16, 1998, at URL <http://biz.yahoo.com/bw/980715/mobil-shel-1.html>; U.S. Embassy, Lima, Peru, July 27,

1998, Shell-Mobil consortium renews conversation on Camisea, accessed July 28, 1998, at U.S. State Department Internet 9807281332.AB01219 @pubhost.us-state.gov). Shell and Mobil decided not to go forward with development of the Camisea gasfield, which contained 368 billion cubic meters (Gm<sup>3</sup>) (13 trillion cubic feet of natural gas) (U.S. Embassy, Lima, Peru, 1999). Peru's Special Privatization Committee (CECAM) for the Camisea Project was planning to make presentations to the representatives of oil and gas multinationals in key locations in the Americas and Europe. CECAM officials will brief the representatives on the Government's plans for development of the Camisea natural gasfield and discuss their implementation (Caillaux, 1998).

In 1998, Peruvian metals and minerals production was valued at \$3.3 billion (Ministerio de Energía y Minas, 1999b, p. 15; Sociedad Nacional de Minería, Petróleo y Energía 1999, p. 60). (See table 1.)

While the Latin American region was experiencing economic turmoil, Peru's 1998 metal production increased compared with that of 1997, particularly in gold (22%), lead (19%), copper (4.7%), and zinc (2.9%). In gold, the output increased because the new Ares and the Sipán Mines came on-stream and the Minera Yanacocha S.A., Aurífera Retamas, and Consorcio Horizonte firms increased their gold production. The copper increase was the result of expansions at several mines—BHP Tintaya S.A.'s Tintaya, Cyprus-Amex Minerals Company's Cerro Verde, and Southern Peru Limited's (SPL) Cuajone—plus leaching and electrowinning (SX-EW) cathodes of oxide ores in the Cuajone and the Toquepala copper mines. Cía. Minera Volcan S.A. and several medium-sized mines contributed to offset the output loss of lead, silver, and zinc in the flooded mines of Animón and Huarón and other closed small-sized mines in central Peru (Ministerio de Energía y Minas, 1998a, p. 19-21; 1999b, p. 16- 17).

In 1998, mining was the main exporting sector of the country. Gold, copper, lead, and zinc ranked first, second, third, and seventh, respectively, among its main exports. As a member of the Andean Common Market [ANCOM (Bolivia, Colombia, Ecuador, Peru, and Venezuela)], Peru sold about 6% of its exports to the other ANCOM members; about 4% was sold to other countries in Latin America. Peruvian mineral exports could increase as the negotiations between the Common Market of the Southern Cone (Argentina, Brazil, Paraguay, and Uruguay and associate members Bolivia and Chile) and ANCOM lead to a free-trade pact by 2001 and perhaps create the South American Free Trade Agreement (SAFTA). Peru, however, is cautious about turning bilateral agreements into a single one, or SAFTA (Hall, 1998).

Including petroleum, Peru's mineral export earnings amounted to \$3 billion, or 52.6% of its total exports of \$5.7 billion. Imports decreased by 4.7% to \$8.2 billion. Peru imported crude oil valued at \$615.4 million, which created a trade deficit of \$381.5 million for the energy sector in 1998 (Ministerio de Energía y Minas, 1998b, p. 6; 1999a, p.16; Sociedad Nacional de Minería, Petróleo y Energía, 1999, p. 70).

In 1998, several enterprising activities took place in the private sector. Cominco Ltd.'s Cominco Perú SRL and Solitario

Resources Corp. of Canada entered into a joint venture to develop the Bongará zinc project in the Amazonas Department; if needed, Cominco will provide financing for the project to earn up to 65% interest, Crown Resources Corp. of the United States and Placer Dome Inc. of Canada formed a joint venture to develop the Yanacocha gold project, north of the gold operations of Minera Yanacocha S.A. [Newmont Mining Corp. of the United States (51.35%), Cía. de Minas Buenaventura S.A. (43.65%), and World Bank's International Finance Corporation (5%)] in Cajamarca; Placer can earn a 60% interest. Crown and Billiton Group of the Netherlands signed a joint-venture agreement to explore the Soloco zinc project, south of the Bongará zinc project; Billiton can earn a 60% interest in Soloco. On July 19, Doe Run Resources Corp. of the United States acquired Empresa Minera Cobriza, a state-owned firm in Huancavelica Department, for \$7.5 million and a committed investment of \$12 million (Ministerio de Energía y Minas, 1999b, p. 48-51).

Empresa Minera del Centro del Perú S.A. (Centromín) and Minero Perú S.A., state-owned corporations, have completed 80% and 100%, respectively, of their privatization process. Because of their reduced operations in mining and prospection, both companies were merged under a single management. More than 20 state-owned mining operations and prospects, such as Centromín's Cerro de Pasco Unit (lead/zinc) and Minero Peru's Toromocho and Michiquillay (copper), Las Bambas (copper and iron), Bayovar (phosphates and brines), Alto Chicama (coal), and others, still need to be auctioned (Ministerio de Energía y Minas, 1999b, p. 51).

Several mines and plants were expanded. Minera Yanacocha S.A. brought its gold mines, Yanacochas Norte, Oeste, and Sur, Encajón, and Plateros, into operation, which augmented gold output to 41.4 metric tons (t) from 32.8 t in 1997. Cyprus, Cerro Verde's operator, decided to develop the Cerro Negro copper project by 2000, which has 70 million metric tons (Mt) of ore reserves grading 0.532% of copper, at a cost of about \$100 million; Cerro Negro will provide an additional 20,000 metric tons per year (t/yr), which will increase Cerro Verde's copper metal output to about 120,000 t/yr in 2000. The Cajamarquilla zinc refinery owned by Refinería Cajamarquilla S.A. (RCSA) in Lima (Cominco Ltd. of Canada and Marubeni Corp. of Japan) expanded to 120,000 t/yr from 100,000 t/yr in 1996 at a cost of \$30 million. A parallel zinc refinery of 120,000 t/yr will be built by RCSA at a cost of \$326 million, which will increase its zinc metal production to 240,000 t/yr in 2001. Cía. Minera Sipán S.A. of Peru entered into operation and will produce about 3.7 t/yr of gold, with an investment of \$36 million (Ministerio de Energía y Minas, Plan Referencial 1999-2007, data accessed August 13, 1999, at URL <http://www.mem.gob.pe/wmem/publica/dgm/anuario.asp>).

According to SPL, its Cuajone Mine and Ilo refinery operations in Moquegua and Tacna Departments will be expanded and modernized in three phases during the next decade. In Phase 1, a sulfuric acid plant will be built and the Cuajone Mine and concentrator will be expanded to 87,100 metric tons per day (t/d) from 58,100 t/d in 1997 at a cost of \$245 million. In Phase 2, the Ilo smelter-refinery will be modernized and expanded to 1.134 million metric tons per year

(Mt/yr) from 1.026 Mt/yr in 1997. The cost of Phases 1 and 2 has been estimated to be \$787 million. In Phase 3, Cuajone Mine will be expanded to about 140,000 t/d at a cost of \$700 million, and the Ilo refinery will be expanded to about 1.6 Mt/yr at a cost of \$84 million. The Ilo refinery will process the concentrates produced by the Cuajone and the Toquepala copper mines, which contain 1.73 billion metric tons of minable reserves and 665 Mt of leachable ("lixiviable") reserves (Smith, 1999).

Other copper and gold feasibility studies and project constructions are taking place in the northern copper belt (La Granja, Michiquillay), the southeastern copper belt (Tintaya, Ferrobamba), the central polymetallic belt (Yauricocha, Toromocho, Cerro de Pasco), and the gold belt (Quicay, Ocoña) (Mendoza, 1998, p. 5).

In 1998, the only state-owned mine in operation was Centromín's Cerro de Pasco, which was scheduled to be privatized during the second quarter of 2000. Private firms, mostly controlled by local interests, dominated the medium- and small-sized mining operations, and more than 80 foreign mining companies have been established in Peru since 1990. This private sector was producing 95% of minerals consumed by local and international markets as opposed to 55% 8 years ago (Ministerio de Energía y Minas, 1999b, p. 13). Between 1999 and 2007, the private sector was planning to invest more than \$9 billion in several mining projects in the construction and expansion stages, exploration prospects, projects in the feasibility stage, and the privatization process (Ministerio de Energía y Minas, 1999b, p. 29).

Peru's copper output increased to 554,171 t from 481,173 t, or 15.2% compared with that of 1997. About 485,400 t of copper was exported with a value of \$777.3 million (Ministerio de Energía y Minas, 1999a p. 24; Sociedad Nacional de Minería, Petróleo y Energía, 1999, p. 55).

SPL remained the largest copper producer in the country with an output of 302,286 t of copper from its mine operations at the Toquepala and the Cuajone open pits and 42,289 t of copper recovered from the SX-EW cathodes plant at Toquepala. SPL's Ilo refinery's output was a record high of 233,038 t of copper and 4,268 t of molybdenum, with 107 t of silver. BHP, Peru's second largest copper producer, reported an output of 72,486 t of copper from its Tintaya open pit in Cusco. Sociedad Minera Cerro Verde S.A., owned by Cyprus, produced 57,036 t of copper. This represented Cerro Verde's fourth consecutive increase in output following the completion of its mine expansion and mill recovery improvement programs. Centromin, Peru's fourth largest producer, produced 17,724 t of copper from its base metal mines. Medium- and small-sized mines in the country supplied an additional 104,629 t (Ministerio de Energía y Minas, 1998b, p. 43; G.P. Touzett, Director General de Hidrocarburos, Ministerio de Energía y Minas, Peru, written commun., August 23, 1999).

In 1998, Peru's gold production increased by about 22.1% from that of 1997, amounting to 93.8 t; the country exported 98.2 t of gold valued at about \$925 million (Ministerio de Energía y Minas, 1999a, p. 24; G.P. Touzett, Director General de Hidrocarburos, Ministerio de Energía y Minas, Peru, written commun., August 23, 1999). Minera Yanacocha remained the

largest gold producer in the country, having produced 41.4 t of gold, a 26.2% increase compared with that of 1997, and representing 44.1% of Peru's gold production in 1998. Gold recovered as a byproduct from the concentrates of the nation's polymetallic mines amounted to 4 t. Other private gold producers in 1998 were Cía Minera Sipán S.A. (5.8 t), Minera Aurífera Retamas S.A. (5 t), Cía. Minera Poderosa S.A. (3 t), Consorcio Minero Horizonte S.A. (2.7 t), Cía. Minera Ares S.A. (2.5 t), and Minera Barrick Misquichilca S.A. (1.8 t). Medium- and small-sized mines reported 19.6 t, and an unknown number of placers and "garimpos" (informal individual miners) accounted for about 8 t. Placers accounted for 22.6 t, or 24.1% 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, although gold was recovered from placers in rivers and streams throughout the jungle (Ministerio de Energía y Minas, 1998b, p. 37-38; Sociedad Nacional de Minería, Petróleo y Energía, 1999 p. 64; G.P. Touzett, Director General de Hidrocarburos, Ministerio de Energía y Minas, Peru, written commun., August 23, 1999).

In 1998, Shougang Hierro Perú S.A., a subsidiary of China's Shougang Corp., was Peru's only iron ore producer; its mine output increased to 4.83 Mt from 4.44 Mt in 1997. The value of iron ore exports increased by about 26% to \$96.4 million (Ministerio de Energía y Minas, 1999a, p. 24). With an investment of \$100 million, Shougang Hierro Peru S.A. will build a new pellet plant to increase production by 3 Mt/yr in 2001. From 1993 to 1998, the company invested \$114 million (Ministerio de Energía y Minas, 1999b, p. 31-32; G.P. Touzett, Director General de Hidrocarburos, Ministerio de Energía y Minas, Peru, written commun., August 23, 1999). Continued growth in the construction industry generated demand for steel and cement in the domestic market (Soldi, 1999 p. 2).

Acerco S.A., the new owner of Empresa Siderúrgica del Perú's steel plant, continued with an investment program to upgrade and modernize Peru's largest steelworks. Acerco was owned by G.S. Industries Inc. of the United States, Stanton Funding Co. of Canada, and Wiese Inversiones Financieras S.A. of Peru. Acerco paid \$20.2 million in cash, with \$142.7 million to be paid during a period of 8 years, and an additional \$30 million investment commitment to upgrade the steelworks (Ministerio de Energía y Minas, 1998b, p. 49).

In 1998, the Peruvian zinc industry produced 868,757 t of zinc in concentrates, or 0.1% more than that of 1997; 1998 output was the world's fourth largest after China, Australia, and Canada. This represented about 11% of the world's concentrate output and 53% of Latin America's zinc concentrate and 27% of refined zinc. Also, Peru produced 257,713 t of lead in concentrates and was the fourth largest producer in the world after Australia, China, and the United States. Exports of lead (217,400 t) and zinc (656,600 t), with silver content, were valued at about \$208.6 million and \$445.1 million, respectively. Centromin reported an output of 72,488 t of refined lead and 210,309 t of zinc metal and continued as the leading lead-zinc producer in the country (Ministerio de Energía y Minas, 1998b, p. 51, 56; 1999a, p. 24).

In 1998, Empresa Minera Iscaycruz S.A. was Peru's second largest private zinc producer with 97,919 t. Cía. Minera Volcan S.A. produced 13,282 t of lead and 95,003 t of zinc. Cía. Minera San Ignacio de Morococha S.A. produced 8,714 t of lead and 71,060 t of zinc. Cía. Minera Milpo S.A., owned by local shareholders (73.8%) and foreign investors (26.2%), produced 19,031 t of lead and 57,418 t of zinc. Cía. Minera Atacocha S.A., the largest private lead producer in Peru, produced 23,354 t of lead and 45,341 t of zinc. Cía. Minera Santa Luisa S.A., a subsidiary of Mitsui Mining Co. of Japan, produced 46,854 t of zinc and 22,498 t of lead from its Huanzalá Mine. Cía. Minera Raura S.A. produced about 44,519 t of zinc and 9,991 t of lead. Perubar S.A., a subsidiary of Glencore Group, produced 25,435 t of zinc and 3,957 t of lead. Corp. Minera Nor Perú S.A., a subsidiary of Panamerican Silver of Canada, produced 23,410 t of zinc, 6,570 t of lead, and 96.8 t of silver from its Quiruvilca Mine in northern Peru (Ministerio de Energía y Minas, 1998b, p. 48, 53, 58).

Silver production decreased by 3.1% to 2,024.6 t in 1998. Peru was the world's second largest producer after Mexico. The medium-sized companies produced 1,617 t; large mining companies contributed with 386.1 t; and small-sized companies produced the remaining 21.5 t (Ministerio de Energía y Minas, 1998b, p. 59).

In 1998, Buenaventura and Cía. de Minas Orcopampa S.A., its subsidiary, led silver producers in the nation's total output, with 227.5 t, followed very closely by Centromin with 227.1 t (Ministerio de Energía y Minas, 1998b, p. 58).

Minsur S.A. continued as Peru's only tin producer in 1998. Production from its San Rafael Mine in the Mariategui Region was 25,747 t of tin, a 7.9% decrease from that of 1997. 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. Minsur recently completed its tin smelting and refining installation in Pisco, south of Lima (Ministerio de Energía y Minas, 1998b, p. 65-66).

Other industrial and fuel minerals produced in Peru are depicted in the sequence of their potential value to the local economies. According to International Cement Review (1999), Peru's total cement production in 1998 was 4.34 Mt, up 0.9% from that of 1997. Five main cement companies operated and produced 3.85 Mt. Cementos Lima S.A. (CLSA), the largest, produced about 1.94 Mt of cement, or about 45% of Peru's total cement output. CLSA's Atocongo plant had a design capacity of almost 1 Mt/yr and drew from limestone quarries nearby. Cementos Norte Pacasmayo S.A., the second largest cement company in Peru, accounted for 22% of total production. It had an installed capacity of 800,000 t/yr, with a plant utilization of 60%. The plant is 670 kilometers (km) north of the Panamerican Highway in Pacasmayo, La Libertad. Cementos Andino S.A., east of Lima, the third largest cement company in Peru, accounted for 18% of total production. Cementos Yura S.A. had a market share of about 14%, and Cementos Sur S.A. had 5%; both companies were in Arequipa (McCaffrey, 1998; International Cement Review, 1999, p. 10).

The phosphate deposits of Bayóvar in northern Peru, scheduled for privatization in 2001, comprised 150,000 hectares of phosphate and brine, with proven reserves of 550

Mt of phosphatic rock. The potential Bayóvar Project, as consumer of sulfuric acid and producer of fertilizer, could be developed competitively because it would be located in a valley of great agricultural potential and tremendous export opportunities to the Asia-Pacific region via the port of Paita (Mendoza, p. 8; Ministerio de Energía y Minas, 1999b, p. 51).

The 90,000-t/yr phosphate plant was operated by Empresa Minera Regional Grau Bayóvar, S.A., which produced only 46,821 t of phosphate in 1998. Phosphate shipments continued to New Zealand under a 100,000-t contract signed with Norphos International Ltd. of Auckland. Other shipments went to Chile and Costa Rica through Paita.

Liquid fuels satisfied more than 60% of Peru's total energy requirements. Petroleum accounted for 23% of energy consumption, and electricity met 10% of energy demand. Natural gas supplied 7% to the country's energy mix.

Peru's largest coal deposits are at Alto Chicama, 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 Cárceles Region of central Peru.

Natural gas was primarily transported by pipeline from the Talara Basin in the Grau Region to the Talara refinery on the coast. Two gasfields were candidates for development in the Ucayali Basin. Peru's proven natural gas reserves were estimated to be 200 Gm<sup>3</sup> at the end of 1998. The Aguaytia gasfield, approximately 41 km west-northwest of Pucallpa, had proven reserves of 8.5 Gm<sup>3</sup> of gas and 9 million barrels (Mbbbl) of condensate [natural gas liquids (NGL)]. The country's largest potential gasfield is Camisea in Cusco, which consists of a pair of crescent-shaped gasfields with enough gas to supply Arequipa, Cusco, Lima, and other cities with energy for the next 100 years and is potentially rich enough to supply fuel to neighboring Brazil (Ministerio de Energía y Minas, 1999b, p. 51). The Cachiriari and the San Martín prospects at Camisea had estimated inferred reserves of about 368 Gm<sup>3</sup> of gas and 725 Mbbbl of NGL (Ministerio de Energía y Minas, 1999a, p. 9-12; Sociedad Nacional de Minería, Petróleo y Energía, 1999, p. 68-69). The fields are distant from potentially accessible markets; the Ministerio de Energía y Minas, however, indicated that new infrastructure was needed and must be developed.

Petroleum production in Peru averaged 163,357 barrels per day (bbl/d) compared with the 1997 output of 115,592 bbl/d (G.P. Touzett, Director General de Hidrocarburos, Ministerio de Energía y Minas, Peru, written commun., August 23, 1999). Peru imported crude oil and petroleum products to satisfy its internal demand. The value of petroleum and derivative imports was \$615.4 million, which created a trade deficit of \$381.5 million for 1998 in the energy sector (Ministerio de Energía y Minas, 1999a, p. 16; Sociedad Nacional de Minería, Petróleo y Energía, 1999, p. 70).

Peru's total crude oil production of 59.6 Mbbbl in 1998 came from Occidental Petroleum Corp. del Perú of the United States (42%), which remained as the largest oil producer of the country; Petroperu (35%), and other producers (23%). About 65% of the country's crude oil production came from the jungle blocks in the Ucayali Region; the remaining was produced at the coastal and offshore fields in northern Peru. The country's

petroleum reserves were estimated to be about 380 Mbbbl in 1998. La Pampilla in Lima, the largest oil refinery in Peru, had a capacity of about 102,000 bbl/d. Talara, the second largest oil refinery in the country, had a capacity of about 60,000 bbl/d (Ministerio de Energía y Minas, 1999a, p. 11; Sociedad Nacional de Minería, Petróleo y Energía, 1999, p. 70).

Peru had 1,801 km of railroads and 69,942 km of roads, of which 7,459 km was paved and 13,538 km was unpaved. There was 8,600 km of navigable waterways and tributaries to the Amazon River system and 208 km of waterways into Lake Titicaca. Peru had an installed electrical generating capacity of 5,042 megawatts (MW), 60% of which came from hydroelectric plants. The Peruvian Government has raised \$694 million from the privatization of its electrical sector, with a commitment to invest \$1.6 billion to install an additional 1,006 MW of capacity in the immediate future (Sociedad Nacional de Minería, Petróleo y Energía, 1999, p. 71).

Important mineral industry ports included Callao, Ilo, Matarani, Paita, San Nicolás, and Talara on the Pacific Ocean and Iquitos on the Amazon River. Also, a petroleum depot at Bayóvar serviced the 800-km northern Peru crude oil pipeline. Natural gas and liquid gas were transported through a 64-km pipeline in the same area (Central Intelligence Agency, 1999).

The country's economy, with continued capital flow from domestic and foreign investors, was expected to bring long-term benefits to the energy, mining, and related mineral industries, which remained the most interesting sectors of the Peruvian economy. The privatization of Peru's Centromin (Cerro de Pasco Unit), Electroperu S.A., and Petroperu was expected to continue improving prospects for the mining sector, the oil and gas industries, and the electricity generation industry.

The privatization process should continue to generate investments in every sector of the Peruvian economy, particularly in the mining and energy industries. Current investments are modernizing Peru's industrial infrastructure. Medium-term foreign investments in the minerals sector were projected to be about \$20 billion, which was the largest ever committed capital, and will contribute significantly to the future of Peru's economic development. According to the Vice-Minister of Mines, some important mineral developments were taking place in Peru, such as feasibility studies for the development of the Antamina copper-zinc project, which will need \$1.8 billion for its development, with a total capital requirement of \$2.2 billion. Antamina contains 501 Mt of resources, grading 1.2% copper, 1.0% zinc, 12 grams per metric ton silver, and 0.03% molybdenum, which will be mined by open pit and produce 70,000 t/d of ore in 2002. La Granja copper megaproject, owned by Cambior Inc. of Canada, will require a total of \$2.35 billion for its development (Mendoza, 1998, p. 2; Ministerio de Energía y Minas, 1999b, p. 30).

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TABLE 1  
PERU: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity	1994	1995	1996	1997	1998
<b>METALS</b>					
<b>Antimony:</b>					
Mine output, Sb content e/	460	460	460	460	460
Metal	385	230	305	242	364
Arsenic, white 2/	4,224	4,616	4,969	837	624
<b>Bismuth:</b>					
Mine output, Bi content e/	1,210 3/	900 3/	1,000	1,000	1,000
Metal	877	581	939	774	868
<b>Cadmium:</b>					
Mine output, Cd content e/	600	600	500	116 r/ 3/	-- 3/
Metal	510	560	405	359 r/	405
Chromium, mine output, Cr content	463 r/	499 r/	181 r/	191 r/	200 e/
<b>Copper:</b>					
Mine output, Cu content	365,513	409,693	484,231	481,173 r/	554,171
Sulfate, Cu content	3,598	3,755	3,655	3,502 r/	2,450
<b>Metal:</b>					
Blister	107,885	83,368	73,907	50,454 r/	45,086
Refined	265,413	261,751	249,890	294,988 r/	309,592
Electrowon	--	33,392	88,172	98,080 r/	101,837
Total	265,413	295,143	338,062	393,068 r/	411,429
<b>Gold: 4/</b>					
Mines kilograms	23,319	33,264	42,255	53,902 r/	71,218
Placers do.	24,480	24,480	22,535	22,920 r/	22,560
Total do.	47,799	57,744	64,790	76,822	93,778
Indium do.	4,101	5,069	4,290	3,799	3,800 e/
<b>Iron and steel:</b>					
<b>Iron ore and concentrate:</b>					
Gross weight thousand tons	7,430	6,234	4,364	4,439	4,825
Fe content do.	4,830	3,948	2,916	2,966	3,224
<b>Metal: e/</b>					
Pig iron do.	150	150	150	150	150
Sponge iron	20,000	20,000	20,000	20,000	20,000
Ferroalloys	360	360	360	360	360
Steel ingots and castings thousand tons	506 3/	515	510	510	510
Semimanufactures	250	250	250	250	250
<b>Lead:</b>					
Mine output, Pb content	233,510	237,597	248,787	262,466 r/	257,713
Metal	88,071	89,696	94,324	97,882 r/	116,446
Manganese, mine output, Mn content e/	200	200	200	200	200
Molybdenum, mine output, Mo content	4,631	3,411	3,711	4,262 r/	4,344
Selenium, metal, refined e/ kilograms	21,000	21,000	21,000	12,678 r/ 3/	18,006 3/
<b>Silver:</b>					
Mine output, Ag content	1,742	1,929	1,970	2,090 r/	2,025
Metal, refined	710	680	717	773 r/	987
Tellurium, metal kilograms	25,125	30,087	25,089	24,754	21,682
<b>Tin:</b>					
Mine output, Sn content	20,275	22,331	27,004	27,952	25,747
Metal 5/	--	--	2,370 3/	8,999 3/	14,363
Tungsten, mine output, W content	259	728	332	331 r/	285
<b>Zinc:</b>					
Mine output, Zn content	690,017	692,290	760,563	867,691 r/	868,757
Metal	182,000	158,987	173,139	169,809 r/	174,654
<b>INDUSTRIAL MINERALS</b>					
Barite	53,074	37,476	37,103 r/	63,600 r/	75,060
Boron materials, crude (borates)	30,000	40,581	38,973	46,988 r/	17,945
Cement, hydraulic thousand tons	3,000 e/	3,000 e/	3,848	3,848 r/	3,850 3/
Chalk e/	101,200	101,200	101,200	101,200	101,200
<b>Clays:</b>					
Bentonite	27,682	26,961	18,592	22,285 r/	22,300 e/
Fire clay e/	9,500	9,500	9,500	9,500	9,500
Kaolin	7,980 r/	8,445	14,295	7,875 r/	7,900 e/
Common clay	138,000	312,520	378,399	326,261 r/	360,958

See footnotes at end of table.

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

(Metric tons unless otherwise specified)

Commodity	1994	1995	1996	1997	1998
<b>INDUSTRIAL MINERALS--Continued</b>					
Diatomite e/	35,100	35,100	35,100	35,100	35,100
Feldspar	14,808 r/	9,099 r/	5,918 r/	2,502 r/	3,984
Gypsum, crude	15,161 r/	25,340 r/	65,446 r/	64,863 r/	71,018
Lime	4,298,528 r/	4,315,126 r/	4,369,724 r/	4,097,216 r/	4,100,000 e/
Mica e/	100	100	100	-- r/	-- 3/
Nitrogen, N content of ammonia thousand tons	900 r/ e/	900 r/ e/	977 r/	1,019 r/	949
Phosphate rock, crude	86,075 r/	88,638 r/	65,436 r/	52,174 r/	46,821
Salt, all types	150,293 r/	125,651 r/	293,308 r/	79,492 r/	220,310
<b>Stone, sand and gravel:</b>					
<b>Stone: e/</b>					
Dolomite	50,000	1,622 3/	645 3/	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	1,600	4,315 3/	4,363 3/	4,097 r/ 3/	5,510
Marble	12,000	14,924 3/	12,410 3/	10,080 r/ 3/	9,716 3/
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	18,000	22,954 3/	31,164 3/	33,488 r/ 3/	35,202 3/
Travertine	5,000	199,944 3/	259,465 3/	261,392 r/ 3/	69,248 3/
<b>Sand and gravel:</b>					
Construction thousand tons	954 r/	1,271 r/	1,672 r/	1,631 r/	1,021
Silica sand do.	100	92	76	83 r/	99
<b>Sulfur, elemental:</b>					
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	220,000	213,539	233,876	408,010 r/	516,514
<b>Talc and related materials: e/</b>					
Talc	1,200	13,818 3/	12,985 3/	5,750 3/	11,165
Pyrophyllite	8,000	8,000	8,000	8,000	8,000
Total 6/	9,200	21,820 r/	20,990 r/	13,750 r/	19,170
<b>MINERAL FUELS AND RELATED MATERIALS</b>					
<b>Coal: e/</b>					
Anthracite, run-of-mine	35,000	14,324 3/	16,778 3/	21,694 r/	7,381 3/
Bituminous, run-of-mine	45,000	45,000	45,000	45,000	45,000
Total 6/	80,000	59,320	61,780	66,690	52,380
Coke, all types e/	10,000	32,500 3/	10,000	10,000	10,000
<b>Gas, natural:</b>					
Gross million cubic meters	1,200 e/	1,095 r/	1,178 r/	1,055 r/	1,402
Marketed thousand cubic meters	600 e/	267	248	239 r/	404
<b>Natural gas liquids: e/</b>					
Natural gasoline and others 7/ thousand 42-gallon barrels	295	295	295	295	295
Butane do.	5 r/	5 r/	5 r/ e/	5 r/	5
Total do.	300 r/	300 r/	300 r/	300 r/	300
<b>Petroleum:</b>					
Crude do.	46,465	44,443	43,909	42,191 r/	59,625
<b>Refinery products:</b>					
Liquefied petroleum gas do.	2,720	3,107	3,191	2,329 r/	2,292
Gasoline, motor do.	9,522	9,994	10,561	9,641 r/	10,134
Jet fuel do.	2,427	3,155	4,348	2,862 r/	3,416
Kerosene do.	5,123	5,092	5,103	5,200 r/	5,103
Distillate fuel oil do.					
Lubricants do.	38	65	243	567 r/	525
Residual fuel oil do.	16,252	19,199	19,592	18,959 r/	20,640

See footnotes at end of table.



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

(Metric tons unless otherwise specified)

Commodity	1994	1995	1996	1997	1998	
MINERAL FUELS AND RELATED MATERIALS--Continued						
Petroleum--Continued:						
Refinery products--Continued:						
Asphalt	thousand 42-gallon barrels	270	1,557	761	1,206 r/	987
Other 8/	do.	1,463	1,570	1,303	1,720 r/	3,784
Total	do.	46,755	54,149	56,989	57,576 r/	61,921

e/ Estimated. r/ Revised.

1/ Table includes data available through August 1999.

2/ Output reported by Doe Run Resources Corp.

3/ Reported figure.

4/ Peru's placer gold production was reported.

5/ Output reported by Minsur S.A.'s smelter.

6/ Data may not add to totals shown because of independent rounding.

7/ Includes hexane.

8/ Includes refinery fuel and losses.

TABLE 2  
PERU: STRUCTURE OF THE MINERAL INDUSTRY IN 1998

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity
Antimony	Doe Run Resources Corp. (private, 100%)	Smelter at La Oroya, Junín Department	700 1/
Barite	Barmine S.A. (private, 100%)	Santa Cruz de Cocachaca, Huarochirí, Lima Department	NA
Bentonite	Minerales Andinos S.A. (NL Industries, 90%)	Vichayal Mine, Piura Department	9
Bismuth	Doe Run Resources Corp. (private, 100%)	Refinery at La Oroya	1,000 1/
Cement	Cementos Lima S.A. (private, 100%)	Atocongo Plant, Lima Department	1,000
Do.	Cementos Norte Pacasmayo S.A. (private, 100%)	Pacasmayo Plant, La Libertad Department	800
Do.	Cementos Andino S.A. (private, 100%)	East Lima Plant, Lima Department	500
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 Limited (SPL) (Asarco Incorporated., 63.0%; Phelps Dodge Overseas Capital Corp., 16.3%; The Marmon Group Inc., 20.7%)	Cuajone, Moquegua Department, and Toquepala, Tacna Department	300
Do.	Doe Run Resources Corp. (private, 100%)	Smelter at Ilo, Moquegua Department	250
Do.	Doe Run Resources Corp. (private, 100%)	Refinery at Ilo, Moquegua Department	175
Do.	Doe Run Resources Corp. (private, 100%)	Cobriza, Huancavelica Department;	60
Do.	Doe Run Resources Corp. (private, 100%)	Smelter at La Oroya	65
Do.	Doe Run Resources Corp. (private, 100%)	Refinery at La Oroya	60
Do.	Glencore International (private, 100%)	Casapalca, Lima Department	60
Do.	Cía. Minera Volcán S.A. (private, 100%)	San Cristóbal, Mahr Túnel, and Andaychagua, Junín Department	60
Do.	Cía. Minera San Ignacio de Morococha S.A. (private, 100%)	Yauricocha, Junín Department	60
Do.	BHP Tintaya S.A. (private, 100%)	Tintaya Mine, Cusco Department	50
Do.	Sociedad Minera Cerro Verde S.A. (Cyprus-Amax Minerals Co., 90.9%; Cía. de Minas Buenaventura S.A. 9.1%)	Cerro Verde, Arequipa Department	30
Do.	Sociedad Minera Cerro Verde S.A. (Cyprus-Amax Minerals Co., 90.9%; Cía. de Minas Buenaventura S.A. 9.1%)	Electrowon at Cerro Verde	20
Dolomite	Minera Baribent S.A. (private, 100%)	Esperanza, Ancash Department	25
Gold	Minera Yanacocha S.A. (Newmont Mining Corp., 51.4%; Cía. de Minas Buenaventura S.A., 43.6%; World Bank's International Finance Corporation, 5%)	Yanacocha and Magui-Magui mines	50,000 2/
Do.	Minera Barrick Misquichilca S.A. (Barrick Gold Corp., private, 100%)	Cajamarca Department	26,000 2/
Do.	Cía. Minera Poderosa S.A. (private, 100%)	Poderosa, La Libertad Department	1,300 2/
Do.	Cía. de Minas Orcopampa S.A. (Buenaventura, 100%)	Orcopampa, Arequipa Department	1,050 2/
Do.	Asesoría Contable Minera S.A. (private, 100%)	Ocoña, Santa Clarita, Explorato, and Molino de Oro, Arequipa Department	1,000 2/
Do.	Cía. Aurífera Río Inambari S.A. (Cía. Minera del Sur S.A., 84%, Aurífera Claudia, 16%)	Río Caichive, Madre de Dios Department	200 2/
Do.	Minera Aurífera Retamas S.A. (private, 100%)	Retamas, La Libertad Department.	3,900 2/
Do.	Consorcio Minero Horizonte S.A. (private, 100%)	Parcoy, La Libertad Department.	2,100 2/
Do.	Cía. Minera Sipán S.A. (private, 100%)	Sipán, Inca, La Libertad Department.	3,900 2/

See footnotes at end of table.

TABLE 2--Continued  
PERU: STRUCTURE OF THE MINERAL INDUSTRY IN 1998

(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, Ica Department.	13,000
Lead	Empresa Minera del Centro del Perú S.A. (Centromín) (Government, 100%)	Cerro de Pasco, Cerro de Pasco Department	85
Do.	Doe Run Resources Corp. (private, 100%)	Smelter at La Oroya	93
		Refinery at La Oroya	95
Do.	Glencore International (private, 100%)	Casapalca, Lima Department	60
Do.	Cía. Minera Volcán S.A. (private, 100%)	San Cristóbal, Mahr Túnel, and Andaychagua, Junín Department	60
Do.	Cía. Minera San Ignacio de Morococha S.A. (private, 100%)	Yauricocha, Junín Department	60
Do.	Cía. Minera Milpo S.A. (private, 100%)	El Porvenir Mine, Pasco Department	20
Do.	Cía. Minera Santa Luisa S.A. (private, 100%)	Huanzalá Mine, Junín Department	40
Molybdenum	SPL	Cuajone, Moquegua Department and Toquepala, Tacna Department	NA
Petroleum, crude	Petróleos del Perú S.A. (Petroperu) (Government, 100%)	Onshore Piura Department; northeast and central jungle areas, Loreto Department	68,000 3/
Do.	Petróleos del Mar S.A. (Petroperu, 100%)	Pacific Coast, offshore Piura Department	28,000 3/
Do.	Occidental Petroleum Corp. del Perú (private, 100%)	Northeastern jungle, Loreto Department	90,000 3/
Petroleum products	Petroperu	Refineries at Talara, Lima, Iquitos, Marsella, and Pucallpa	185,500 3/
Silica sand	Minera Baribent S.A. (private, 100%)	María G. and Martín I., Junín Department	27
Silver	Centromín	Cerro de Pasco, Cerro de Pasco Department	116,500 2/
Do.	Glencore International (private, 100%)	Casapalca, Lima Department	65,000 2/
Do.	Doe Run Resources Corp. (private, 100%)	Refinery at La Oroya	809,000 2/
Do.	Cía. Minera Volcán S.A. (private, 100%)	San Cristóbal, Mahr Túnel, and Andaychagua, Junín Department	50,000 2/
Do.	Cía. Minera San Ignacio de Morococha S.A. (private, 100%)	Yauricocha, Junín Department	46,500 2/
Do.	Cía. de Minas Buenaventura S.A. (Buenaventura) (private, 83%; Centromin 17%)	Julcani and Huachocolpa Mines Huancavelica Department, Uchucchacua Mine, Lima Department	187,000 2/
Do.	Cía. de Minas Orcopampa S.A. (Buenaventura, 100%)	Orcopampa Mine, Arequipa Department	161,000 2/
Steel	Empresa Siderúrgica del Perú (Acerco S.A., 100%)	Chimbote, Ancash Department	550
Do.	Empresa Laminadora del Pacífico S.A. (private, 100%)	Pisco, Ica Department	180
Tellurium	Doe Run Resources Corp. (private, 100%)	Refinery at La Oroya	12 1/
Tin	Minsur S.A. (private 100%)	San Rafael Mine, Puno Department	2,500 1/
Tungsten	Minera Regina S.A. (private, 100%)	Palca XI, Puno Department	1,400 1/
Do.	Fermín Málaga Santolalla S.A. (private, 100%)	Pasto Bueno, Ancash Department	1,000 1/
Zinc	Centromín	Cerro de Pasco, Cerro de Pasco Department	195
Do.	Empresa Minera Iscaycruz S.A. (Glencore International, 100%)	Iscaycruz, Lima Department	90
Do.	Cía. Minera Volcán S.A. (private, 100%)	Casapalca, Lima Department	25
Do.	Cía. Minera San Ignacio de Morococha (private, 100%)	San Cristóbal, Mahr Túnel, and Andaychagua, Junín Department	80
Do.	Doe Run Resources Corp. (private, 100%)	Yauricocha, Junín Department	80
Do.	Refinería Cajamarquilla S.A. (Cominco Ltd. of Canada, 87%; Marubeni Corp. of Japan, 13%)	Refinery at La Oroya	70
Do.	Refinería Cajamarquilla S.A. (Cominco Ltd. of Canada, 87%; Marubeni Corp. of Japan, 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 Raura S.A. (private, 100%)	Raura, Lima Department	45
Do.	Corp. Minera Nor Perú S.A. (Panamerican Silver, 100%)	Quiruvilca, La Libertad Department	25
Do.	Cía. Minera Santa Luisa S.A. (private, 100%)	Huanzalá Mine, Junín Department	20
Do.	Cía. Minera Milpo S.A. (private, 100%)	Yanacancha, Cerro de Pasco Department.	60

NA Not available.

1/ Metric tons per year.

2/ Kilograms per year.

3/ 42-gallon barrels per day.