

THE MINERAL INDUSTRY OF

ARGENTINA

By Pablo Velasco¹

Argentina, the second largest country in South America after Brazil, continued to be a modest producer of minerals. Its mining activities, excluding hydrocarbons, accounted for an estimated 0.3% or less of the country's 1994 gross domestic product (GDP) of about \$310 billion.² Argentina's mining industry was relatively small and undeveloped. The main reason for this lack of mining development was the historic practice of reserving huge tracts of land in the country for exploration and exploitation by the military. Much of the mining activity developed was both uneconomic and technologically outdated. Military lands were returned to Provincial jurisdiction, and the Provinces signed the Federal Mining agreement (Law 24224) with the Federal Government, which ensured equal legal and economic treatment concerning mining projects.

In 1994, Argentina continued its self-sufficiency in energy resources (natural gas, petroleum, and uranium) and was a large producer of electricity. Argentina was the fourth largest producer of crude oil and natural gas in Latin America and ranked third in world production of boron minerals. Argentina had the most advanced nuclear energy program in Latin America, with two nuclear plants in operation and a third one under construction. Nuclear plants provided 7,081 megawatts (MW) of electric power to Argentina in 1994, or 12.6% of the total of 56,273 MW.

Argentina's remarkable economic reforms inspired growing confidence from both domestic and foreign investors. Few countries have undertaken so much in such little time, especially in a democratic context. Deregulation and privatization of major Argentine industries set off a boom in the oil industry, which became open for exploration and production. Yacimientos Petroliferos Fiscales Sociedad Anonima (YPF) S.A., since privatization was set in 1991, sold more than \$3 billion of its \$6 billion in assets and reduced the number of its employees from 52,000 to 5,800. According to government officials, the public and private demand for investment in infrastructure was expected to reach \$35 billion for the period 1993-2000. Argentina's mineral production and trade remained almost negligible in terms of their contributions to the GDP and total exports. Total mineral sector exports in 1994, excluding hydrocarbons, declined to an estimated \$50 million, 36% lower than those in 1993. Metallic mineral exports represented 60.5% and industrial minerals 39.5% of the total nonfuel mineral sector's exports figure.

Government Policies and Programs

The new Mining Investment Law contained a number of important improvements over the previous Mining Promotion Law of 1979. It envisioned agreements between the Federal and Provincial Governments on mining taxation and incentives that would remove an important constraint to mining investment in Argentina by reducing the risk for the investor of unilateral changes in mining taxation. Tax stability, including a maximum royalty of 3%, would be guaranteed at both Federal and Provincial levels. The new law also avoided a costly and cumbersome evaluation of investments, which was required under the Mining Promotion Law. The new investment law represented an important Government initiative and was certainly a step in the right direction. The rules covering foreign investments were contained in the Foreign Investment Law No. 21,382 as amended by Law No. 22,208, Law No. 23,696, and later by Law No. 23,697 of August 1989. The Law entitled foreign investors to the same rights and to be subject to the same obligations as domestic investors. Foreign investors were entitled, without approvals or formalities, to repatriate capital and remit profits at any time and to have unrestricted access to foreign exchange markets.

The Government promulgated a new Mining Investment Regulation Law (Law No. 24,196), Mining Reorganization Law (Law No. 24,224), and the Federal Mining Agreement (Law No. 24,228) (El Acuerdo Federal Minero). The Mining Investment Regulation Law was a promotional law based on tax incentives aimed toward (1) creating a stable business environment for mining activities, (2) alleviating the tax impact in the initial development stages, and (3) promoting the importation of mining equipment and machinery.

The Mining Code No. 22,259 of August 1980 included rules intended to attract leading companies to engage in mining operations through public tenders. Large-scale production was allowed through regular prospecting permits. There were no restrictions on the involvement of foreign companies in mining and owning mining properties, nor was there any discrimination against them in obtaining local financing in dollars or local currency. Furthermore, there were no export duties on mining products. The Law No. 24,196 instituted a new system for mining investment. To be eligible for this system, individuals and corporations were to be domiciled in Argentina and registered with the

National Mining Department. The system would be applicable in all the provinces that ratified it.

The system specifically excluded oil and gas activities, as well as the manufacture of cement, tiles, ceramics, sand, pebbles, and gravel. In addition, it guaranteed tax stability for 30 years; stable foreign exchange and customs treatment; income tax deductibility of the full amount of prospecting and exploration outlays; income tax deductibility of an environmental conservation allowance up to a maximum of 5% of operating costs for extraction of minerals and smelting; accelerated depreciation rates on income taxes for investments made in carrying out new mining prospects or extending the productive capacity of existing operations, in line with the new guidelines; income tax exemption for profits; exemption from import duties, statistical taxes, and other taxes on import of capital goods; and equipment and spare parts.

Several Provincial governments were very active in promoting joint-venture explorations in 1994. The governments of Catamarca (Bajo La Alumbreira, gold/copper project), San Juan (El Pachon, copper project), Neuquén (Rio Colorado, potash project) and San Juan Provinces reorganized into more flexible organizations that were at liberty to form joint ventures.

On October 20, 1994, the United States-Argentina bilateral investment treaty came into force, the first of its kind signed by both countries. Under this treaty, U.S. investors enjoyed national treatment in most sectors of the economy, including mining. The treaty provided U.S. investors with additional safeguards, such as the right to arbitration, to help protect their capital invested in Argentina.

Argentina and Chile recently signed a binational mining integration agreement, which will bring substantial improvements for Argentina and Chilean mining companies.

Environmental Issues

Argentina initiated a number of measures to regulate, monitor, and improve its environmental standards. Until recently, Argentina's environmental protection applied primarily to the provinces. In 1992, the Government established the National Secretariat of the Environment, pursuant to a presidential decree calling for a balance of economic development with natural resource conservation, environmental improvements, and pollution prevention and remediation. Critical environmental issues facing Argentina included water and air pollution, and hazardous-waste disposal. Local, Provincial, and national authorities moved toward more stringent enforcement of environmental laws.

The Government also established a national registry of producers and handlers of hazardous wastes. These companies were required to pay annual fees based on the volume of hazardous waste they handled and the earnings they generated.

Production

Argentina continued to be the world's third largest producer and exporter of boron minerals and byproducts, after the United States and Turkey. It also produced modest quantities of base metals, such as cadmium, copper, lead, silver, manganese, and zinc; other industrial minerals, such as asbestos, barite, boron, bentonite, clays, celestite, diatomite, feldspar, fluorspar, graphite, gypsum, kaolin, marble, sodium carbonate, vermiculite, and others. Mineral fuels, such as coal, coke, crude oil, and natural gas, and uranium also were produced. Argentina's only primary aluminum producer, Aluminios Argentinos, S.A.I.C. (ALUAR), produced about 165,000 metric tons per year (mt/a) of aluminum ingot, billet, and slab. Crude steel production in Argentina increased 14.2% in 1994 to about 3.3 million metric tons (Mmt), while domestic consumption decreased to 2.3 Mmt from 2.9 Mmt in 1993. The biggest producers of steel in Argentina were Aceros Parana S.A. (formerly SOMISA) and ACINDAR-Industria Argentina de Aceros S.A., which were privatized in 1993. Production of crude oil increased nearly 9% in 1994, and refinery products maintained the same level in 1994. (*See table 1.*)

Trade

The National Customs Administration and the National Institute of Statistics and Census reported the value of exported nonfuel minerals, mineral related products, and metals to be approximately \$50 million, a decrease of 36% compared with that of 1993. The export value of crude oil and refinery products increased 38.3% to \$848 million in 1994. Small quantities of both commodities were exported to the United States. The following principal nonfuel mineral exports were classified in five groups based on their export value: borates, 25.9%, of which boron minerals were 2.2%; boric acid, 10.3%; and sodium borate, 13.4%; metals, 23.5%, of which refined zinc is 23.0% and refined lead, 0.5%; metallic minerals, 22.5%, of which lead minerals were 19.4% and zinc minerals, 3.1%; granites, 12.0%, of which manufactured is 11.6% and granite in blocks, 0.4%; and others, 16.1%. In 1994, the nonfuel mineral and mineral-related products exported went to 51 countries, including: Brazil, 30.5%; the United States, 15.1%; Belgium, 12.7%; Japan, 8.6%; Chile, 6.1%; Uruguay, 5.1%; Morocco, 4.7%; and Bolivia, 1.1%.

The total amount of steel imported reached 1,281,000 metric tons (mt), of which 65% was from Brazil, 10% from Poland, 5% from South Africa, and the remainder from other countries. In 1994, the steel industry had to import about 1.8 Mmt of iron ore and concentrate, for a total value of \$61.1 million, and 993,000 mt of coal for the coke plants, for the amount of \$66.4 million.

Structure of the Mineral Industry

The Secretariat of Mines was a unit under the Ministry of Economy and Public Works and Services, one of the eight ministries of the National Executive Branch. The Secretariat of Mines defined and controlled the tasks performed by the National Mining Board and the National Geological Service Board. The Mining Subsecretariat promoted and coordinated mining technology policy, established the development and incorporation of new technologies, and monitored and preserved a single data bank of mining and geological information.

The Comisión Nacional de Energía Atómica (CNEA), which controlled Empresa Nuclear Mendoza's uranium production from the Sierra Pintada Mine and provided the uranium needed for the Atucha I and the Embalse nuclear powerplants in Buenos Aires and Córdoba, respectively, was expected in early 1995 to be split into two companies—Nucleoelectrica Inc. and Atomica Inc. ENACE Inc., which was engaged in the construction of the Atucha II nuclear powerplant, was to be sold 75% by the Government.

The mineral industry in the private sector was composed of several mining and manufacturing companies, such as Aluminios Argentinos S.A.I.C. ALUAR, Cementos Loma Negra C.I.A.S.A., Cia. Boroquímica SAMICAF, Cia. Minera Aguilar S.A., Cia. Minera Tea SAMICAF, Sulfacid SACIF, and hundreds of small metallic and industrial mineral companies engaged in mining activities throughout Argentina.

At yearend, there were 10.9 million people employed nationwide, of which 7,000 were in the cement industry, 36,000 in the metallurgical plants, 16,000 in the mining sector, and 21,000 in the oil and gas industry. (*See table 2.*)

Commodity Review

Metals

Aluminum.—Primary aluminum in Argentina was produced by ALUAR. ALUAR's refinery in Puerto Madryn, Chubut Province, had installed production capacity of 170,000 mt/a of primary aluminum. ALUAR was considering proposals to expand its production capacity to 180,000 mt/a. A decision was expected by early 1995. The complex imported in 1994 about 350,000 mt/a of alumina feedstocks from Aluminum Company of America (ALCOA) with about one-half coming from Australia and one-half from Brazil. ALUAR exported about two-thirds of its output to Japan and would aim to export the additional production.

Copper.—At yearend, Musto International and Musto Exploration Ltd. had completed its feasibility study on the copper/gold Bajo la Alumbraera deposit in Catamarca and began soliciting offers for a joint-venture partner. Musto Exploration Ltd. announced that in early 1995, the Ministry of Economy and Public Works of Argentina announced the 50-50 joint-venture project with Mount Isa Mines (MIM). CRA Exploration Pty. Ltd. of Australia also completed an

option agreement with YAMIRI Company of La Rioja to explore the well-known Famatina copper deposit in northwest Argentina.

Development of the Bajo de la Alumbraera copper-gold deposit in northwestern Argentina continued on schedule. Proven and probable reserves exceeded 563 Mmt grading 0.52% copper and 0.66 grams per metric ton of gold, according to company officials. Studies were underway to increase daily output from the previously planned level of 60,000 mt/a. Any increase in production would result in lower operating costs. The development of the mine and infrastructure, including a significant improvement of the 1,300-kilometer (km) rail system from Belén in Catamarca to the port in Rosario, would require an investment of \$580 million. MIM was to be the operator and had begun engineering and some site preparation activities. Bajo de la Alumbraera was expected to produce 90,000 mt/a of copper concentrate and about 1,500 kilograms per year (kg/a) of gold in early years; by mid-1997, the copper concentrate was expected to be shipped to smelters in Brazil, Chile, Europe, and Japan.

Argentina was set to become a major world copper producer with the development of the Pachon copper/molybdenum deposit, containing an estimated 500 Mmt of copper in San Juan Province near the Chilean border, about 1,280 km west of Buenos Aires. Pachon's owner, Compania Minera San Jose, was controlled by Minera SA, a Panama-based company owned 60% by Bolivia's COMSUR Group, and 33% by RTZ Corp. of Great Britain. By 1999, Pachon was expected to be among the world's major copper sources. With a 500-Mmt sulfide copper deposit, it could follow in the footsteps of the \$600 million Bajo de la Alumbraera project.

Gold and Silver.—The main sources of gold and silver production in 1994 were Angela Mine in Chubut Province in southern Argentina, Farallón Negro Mine in the northwestern Province of Catamarca, and other properties in the mining district owned by Yacimientos Mineros de Agua de Dionisio, a quasi state-owned company. The Angela Mine, an underground operation owned by Cerro Castillo S.A., produced silver as well as gold, plus some base metals.

At yearend, a major gold-silver project in southern Argentina was sending ore samples to Brazil and beginning a prefeasibility study amid encouraging signs of positive results. The Cerro Vanguardia project, in the Patagonian province of Santa Cruz, was being developed by Mincorp S.A., a 50-50 joint-venture between Amcorp S.A., a subsidiary of Anglo-American of South Africa and Argentina's Perez Companac. A resource containing some 62,000 kg of gold and 498,000 kg of silver had been identified.

Sikaman announced that it intended to purchase an additional 25% interest in the Cerro Mayal Mine in Argentina. The Cerro Mayal Mine started operations on May 4 and the plant was processing low-grade ore to optimize gold recovery. The plant operated at rates of up to 200 cubic meters per hour over extended periods; however, the gold

recovery system was being modified to achieve optimum recoveries. All material processed in 1994 remained in the form of a high-grade gold concentrate. Once plant operations were optimized, it was expected that the Cerro Mayal Mine would produce initially at a rate of 778 kg in its first full year of operations, increasing to 1,555 kg/a thereafter. Operating costs were expected to average \$150 to \$175 per tray ounce (\$4.80 to \$5.60 per gram) of production.

Iron and Steel.—According to the Government of the Rio Negro Province, currently the owner of the Sierra Grande iron ore deposit, production of iron ore in 1994 was limited to about 4,000 mt. Argentina imported 3.2 Mmt of iron ore concentrate from Brazil (97%) and Chile (3%). Hierro Patagonico Argentino S.A. the new company in charge of running the business, announced through its new officials that an evaluation study of the formerly Hierro Patagonico Sociedad Anonima Minera (HIPASAM) installation was completed. The study was conducted by Lurgie Metallurgical of Frankfurt, Germany, which found the installation highly satisfactory, thus opening up a new perspective for reactivating the entire operation of the company.

Crude steel production in Argentina increased about 14% to 3.3 Mmt compared with that of 1993, and output of semimanufactured products increased about 17% to 3.3 Mmt. Meanwhile, apparent domestic consumption of rolled steel products was estimated by the Siderurgical Industry Center of Argentina to be around 4.0 Mmt, an increase of about 8% compared with that of 1993, a per capita consumption of about 116 kg.

Investment in the iron and steel industry in 1994 amounted to \$91.6 million, compared with \$36.7 million in 1993. Siderurgical Industries Grassi, producer of special steel products and ferroalloys, announced its departure to the Republic of Paraguay, where the government assured the availability of cheaper and convenient energy for long-range planning and promotional industrial benefits and other advantages, such as the proximity to Brazilian manganese in the Alto Parana River.

Uranium.—Preliminary figures released by the Secretaría de Hidrocarburos indicated that the production of yellow cake uranium (U_3O_8) in 1994 remained at 150,000 kg, about the same as the previous year. In late August 1994, plans were announced to split Argentina's CNEA into two companies—Nucleoelectrica Inc. and Atomica Inc. Under these plans, Nucleoelectrica would become a 60% private company and would take over operation of the Atucha I and Embalse nuclear powerplants. In addition, Nucleoelectrica would work with an existing mixed public-private company, ENACE Inc., to complete the Atucha II. The Atomica Inc. nuclear powerplant would remain under state control and would be responsible for nuclear waste management, the nuclear fuel cycle, nuclear research, and radioisotope production. The government planned to sell its 75% stake in ENACE Inc., which was engaged in the construction of Atucha II.

Industrial Minerals

Boron.—Argentina ranked third in the world in boron mineral production with output of borates amounting to about 140,000 mt in 1994. The main deposits are in the Provinces of Jujuy, Salta, and Catamarca in the Argentine Andes.

The most abundant borate was ulexite, which was found in the form of nodules or plates accompanied by sand, salt, and clays. It was usually extracted by manual methods, and after removal of the main gangue materials, was sun-dried, with the final product grading about 22% to 25% B_2O_5 . Despite the abundance of ulexite, the main production of borates in Argentina was from low-grade tincal (a sodium borate mineral). The tincal was processed by Cia. Boroquímica SAMICAF (a wholly owned subsidiary of RTZ Corp.) to obtain borax. The largest boron mineral producers in the country, Boroquímica SAMICAF and Industrias Químicas Boradero S.A., were both based in the Province of Salta.

The total installed boric acid production capacity in Argentina was about 30,000 mt/a, but currently most of the plants are on standby. The main producer was Norquímica S.A. at 5,400 mt/a. Exports of boric acid were 12,000 mt in 1994.

Cement.—Estimated production of cement was maintained at about the same level as in 1993 of more than 5.6 Mmt. For the year, the cement industry operated at 53% of its installed capacity. According to the Portland Cement Manufacturers' Association, the average consumption of cement per capita increased from 100 mt in 1982 to about 150 mt in 1994. Total installed production capacity of about 12 Mmt/a was far in excess of the present domestic requirements. Argentina Corcemar was adding a cement grinding facility with transport, storage silos, and dispatch facilities, with a rotary packer and palletizer at its Mendoza plant.

Lithium.—Reportedly, a lithium project being developed in northwestern Argentina by FMC-LITHCO of the United States was expected to cost a total of \$80 million. The startup date was not defined, but it wasn't expected to be later than yearend 1996. Developer Cia Minera Altiplano SA, wholly owned by U.S.-based, FMC Corp., reported in mid-1994 that it planned to spend \$45 million developing the first stage of the Salar del Hombre Muerto project, but would probably expand soon after. The first stage would bring lithium compound output to 4,500 mt a year, lithium carbonate equivalent, the company said. Eventually, the mine could produce 13,600 mt to 15,900 mt/a. The Salar del Hombre Muerto project, which will be the first major lithium mine outside of the United States and Chile, was based on an ancient dry lake bed about 4,000 m (13,200 feet) above sea level in the Andes. Reserves were estimated to be sufficient for 70 years.

Potassium.—The Río Colorado potash project in the

Province of Mendoza, western Argentina, appeared to be revived, following the completion of a feasibility study. Several companies were reportedly interested in the venture, and a twofold increase in the size of the project was being considered.

The reserves at Mendoza consisted of a high-grade sylvinitic ore and were estimated to contain over 1 billion mt of potash. The original proposal envisaged producing a 250,000 mt/a of potassium chloride (KCL) valued at an estimated \$60 million. A mine with an operating capacity of 500,000 mt/a KCL was under consideration. The cost was estimated at \$100 million.

Mineral Fuels

Argentina's estimated production of commercial energy totaled about 78.4 Mmt of standard coal equivalent. Of the total energy produced, solid fuels accounted for only 0.23%; liquid fuel oils, 54.2%; natural gas, 39%; and hydropower, 6.4%.

Energy consumption data were not available for years subsequent to 1992, when the total consumption was 66 Mmt of standard coal equivalent. Solid fuels provided 1.7%; liquid fuels, 39.5%; natural gas, 50.8%; and hydropower, 8.1%.

Of the total installed electrical generating capacity of 17,326 MW in 1992, 56.9% was thermal, 37.2% was hydroelectric, and 5.9% was nuclear. In that year, the latest for which complete data were available, a total of 56,273 kilowatt hours was produced, 52.6% by thermal plants, 34.8% by hydroelectric plants, and 12.6% by nuclear plants. Argentina had two operational nuclear powerplants, Atucha I and Embalse. Atucha II, still under construction, would utilize the same source of uranium oxide U_3O_8 fuel for its power reactor.

In September 1994, the Yacyreta hydroelectric power project generated its first electricity, after 20 years of work at a cost of more than \$7 billion. Yacyreta, on the Paran River between northern Argentina and Paraguay, was owned by the governments of both countries.

Coal.—Production of bituminous coal in 1994 reached 200,000 mt, maintaining the same level of output as the previous year. Yacimientos Carboníferos Fiscales (YCF), the state-owned coal company, produced coal from the Río Turbio Mine in Santa Cruz Province. The Ministry of Economy, Public Work and Services issued a tender for the concession to work the Río Turbio coal mine and railway linking the mine to the ports of Punta Loyola and Río Gallegos in Patagonia. The mine and transportation were operated by YCF. This was the second tender for the concession. After restructuring, the privatization process was expected to begin.

Natural Gas.—Natural gas production in 1994 was maintained at about 22 billion cubic meters (m^3), setting a new record for recent years. During 1993, Argentina's proven reserves of natural gas were reported at about 744

trillion m^3 . As a result of this reassessment of natural gas reserves, future shortages of natural gas were likely to develop in certain regions of the country, depending on the availability of transport and gas distribution systems. Most natural gas produced in Argentina was controlled by the former state-run oil company, YPF. About 53% of the gas was produced by YPF, and the rest either imported from Bolivia or produced under service contracts with private production companies. Gas imports from Bolivia in 1994 amounted to more than 2 billion m^3 , valued at \$91.6 million, which was paid directly by Gas del Estado, the State-owned gas distribution company, now Transportadora de Gas del Norte TGN.

Natural gas was an important fuel in the Argentine energy mix, accounting for about one-third of Argentina's total energy consumption in 1994. Natural gas production was expected to rise sharply in 1995, and to continue growing at 4% to 6% annually through the next decade. At current production levels, Argentina's natural gas reserves should last about 20 years. Most gas reserves in Argentina were discovered as a result of oil exploration. Current Argentine gas production was centered on five basins: Noroeste in northern Argentina, Cuyana and Neuquina in the center of the country, and Golfo San Jorge and Austral in the south. Neuquina was the largest of these basins, accounting for approximately 59% of proven reserves. Noroeste ranked second, with about 23% of proven gas reserves. YPF controlled about one-half of Argentina's gas reserves.

The construction of a 700-km natural gas pipeline from Neuquen to Chile was underway in 1994 and was expected to be completed by 1996. The consortium building the pipeline was composed of YPF, Astra, Bidas, San Jorge, and Pluspetrol. The group expected to export 5 million m^3 of natural gas each day through the pipeline and eventually export liquified natural gas from Chile's Pacific Ocean ports. The group has already signed a contract with Chile's Empresa Nacional de Petróleo to sell the gas at a rate of \$1.35 per million British Thermal Unit (Btu). The operator of the trunk pipeline was to be Tenneco of the United States, while British Gas was to be in charge of the urban distribution network within Chile.

Petroleum.—Argentina began a drastic restructuring and privatization of its former State oil company, YPF, in 1990. To date, these moves have raised more than \$3 billion and have reduced YPF's work force from 52,000 to 5,800 employees. In addition, noncore assets, such as YPF's shipping fleet, as well as certain oil and gas wells, were sold.

The successful privatization of YPF, along with changes in investment laws allowing increased upstream activity by foreign oil companies, had helped revitalize the Argentine oil sector in recent years. The deregulation and privatization of major Argentine industries started a boom in the oil industry, which became open for exploration and production. As a result, Argentine oil production has increased in recent years. Oil production in 1994, according to YPF, was 240 million barrels, an increase of 12% compared with 1993.

The State company, which accounted for 43% of the total production, opened up several central and secondary areas to the private sector which, encouraged by free availability, spurred a dynamic growth for sectorial investments. Private operators accounted for 57% of the total production, and YPF produced the remaining 43%.

Infrastructure

Inadequate infrastructure was an important constraint to mining development in Argentina. Argentina's railway system did not reach the mining areas and the road system in the mining provinces was underdeveloped. The major industrial centers and national ports are at great distances from the mining areas, raising the cost of inputs and of marketing. In several cases, the transport cost of processed minerals was as high as the mining and processing cost. Costs of power and water supply were also high. Mining companies faced the option of paying for the connection to a regional power system or installing their own power generation. Water supply was an even more serious problem than power supply, as much of the present and potential mining activity was located in arid areas. Finally, the isolated location of mining operations required the establishment of fully developed mining camps. Roads were one of the principal transport methods used to move mine production to processing plants in Buenos Aires and other shipping centers. Argentina has 11,000 kilometers (km) of navigable inland waterways and an excellent navigable river system. River transport operates largely on the Río de la Plata estuary and its tributaries: the Paraná, Uruguay, Paraguay, and Alto Paraná Rivers.

Argentina had about 4,090 km of pipelines to transport crude oil and 2,900 km for refined products, and 9,918 km of gas pipelines from production centers to consumer centers. The system connected oilfields and refineries to the north, center, west, and southeast with main industrial centers. When completed in early 1994, a 410-km oil pipeline was expected to be available to transport crude oil from Argentina's Neuquén Basin to Concepción, Chile, across the Andean Range. Natural gas was imported from Bolivia by a gas pipeline through Yacuiba-Pocitos at the border to the northern provinces and Buenos Aires. The existing Argentine railroad network, owned and operated by the state enterprise Ferrocarriles Argentinos, covered approximately 34,172 km.

Outlook

Argentina's energy resources, which are abundant and diverse, include crude oil, natural gas, hydropower, and fair amounts of coal and uranium, with a potential not fully determined. New investments in Argentina were directed toward several promising areas, including copper, gold, crude oil, natural gas, petrochemicals, and gas pipelines. Foreign investments were welcome in mining and both National and provincial laws encouraged the development of mining by private enterprises, including mineral deposits in secondary areas.

The Southern Cone Common Market (Mercosur) that was being formed by Argentina, Brazil, Paraguay, and Uruguay was also expected to increase trade and investment opportunities in Argentina. Mercosur offered additional opportunities in the form of a four-country common market with a total population of 200 million and a combined GDP of \$600 billion.

¹Text prepared July 1995.

²Where necessary, values have been converted from Argentine pesos to U.S. dollars at the rate of 1.00 peso = US\$1.00, the average exchange rate in 1993.

Major Sources Of Information

Ministerio de Economía y Obras y Servicios Públicos

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Publications

Estadística Minera de la República Argentina,

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Panorama Minero, Monthly magazine.

TABLE 1
ARGENTINA: PRODUCTION OF MINERAL COMMODITIES 1/ 2/

(Metric tons unless otherwise specified)

Commodity 3/ METALS	1990	1991	1992	1993	1994 e/
Aluminum: e/					
Primary	166,000	165,000	165,000	165,000	165,000
Secondary	6,000	6,000	6,000	6,000	6,000
Beryllium: Beryl concentrate: e/					
Gross weight	34 4/	34	34	35	--
BeO content	3 4/	3	-- r/	-- r/	--
Cadmium concentrate:					
Gross weight	115	118	119	80	80
Cd content	55	49 e/	37	34 r/	35
Columbium: Columbite concentrate: e/					
Gross weight kilograms	100	90	95	-- r/	--
Cb ₂ O ₅ content do.	75	67	70	-- r/	--
Copper:					
Mine output, Cu content	357	409	300 e/	300 r/ e/	300
Refined e/	10,900 r/	12,000 r/	15,000	15,000	15,000
Gold: Mine output, Au content kilograms	1,200	1,510	1,300 e/	937 r/	1,000
Iron and steel:					
Iron ore and concentrate:					
Gross weight thousand tons	992	259	--	--	--
Fe content do.	681	171	3 r/	2 r/	2
Metal:					
Pig iron do.	1,930 r/	1,310 r/	966	994	990
Sponge iron (direct reduction) do.	1,040 r/	954	1,030	1,160	1,200
Total do.	2,970 r/	2,260 r/	1,990	2,150	2,190
Ferroalloys, electric-furnace:					
Ferromanganese	24,300	26,300	4,520	5,400 r/	5,000
Ferrosilicomanganese	21,800	14,600	30,800	18,500 r/	20,000
Ferrosilicon	23,600	14,400	8,070	10,000 e/	10,000
Silicon metal	5,930	5,030	3,400	3,500 e/	3,500
Other	380	375	197	200 e/	200
Total	76,100	60,700	47,000	37,600 r/ e/	38,700
Steel, crude thousand tons	3,640	2,970	2,700 r/	2,890 r/	3,300
Semimanufactures 5/ do.	3,450	2,930 r/	2,640 r/	2,850 r/	3,340

See footnotes at end of table.

TABLE 1--Continued
 ARGENTINA: PRODUCTION OF MINERAL COMMODITIES 1/ 2/

(Metric tons unless otherwise specified)

Commodity 3/ METALS--Continued	1990	1991	1992	1993	1994 e/
Lead:					
Mine output, Pb content	23,400	23,700	18,000	11,800 r/	12,000
Metal:					
Smelter, primary	5,500	11,000 e/	14,600	14,600 e/	14,600
Refined:					
Primary e/	10,000	10,000	14,600 4/	15,000	15,000
Secondary	13,400	13,700	15,000 e/	14,500 e/	14,000
Total	23,400	23,700	29,600	29,500 e/	29,000
Manganese ore and concentrate:					
Gross weight	3,500 e/	4,940	3,840	3,900	3,900
Mn content	727	965	750 e/	760 e/	760
Silver:					
Mine output, Ag content kilograms	82,700 r/	70,000 r/	45,400 r/	42,700 r/	43,000
Metal, smelter e/ do.	112,000	109,000	107,000	108,000	108,000
Tin:					
Mine output, Sn content	123	--	--	--	--
Metal, smelter e/	180	240 4/	140	145	100
Tungsten, mine output, W content	6	5 r/	-- r/	-- r/	--
Uranium, mine output, U₃O₈ content kilograms	1,100 r/	2,100 r/	146,000 r/ e/	148,000 r/	150,000
Zinc:					
Mine output, Zn content	38,700	39,300	41,000	31,400 r/	33,000
Metal: Smelter:					
Primary	31,500	35,800	34,500	35,000 e/	34,500
Secondary e/	2,700	2,800	2,800	2,800	2,700
Total	34,200	38,600	37,300	37,800 e/	37,200
INDUSTRIAL MINERALS					
Asbestos	275	270	215 r/	309 r/	350
Barite	40,100 r/	23,900 r/	10,000 r/	11,300 r/	11,500
Boron materials, crude	144,000 r/	116,000 r/	125,000 r/	146,000 r/	140,000
Cement, hydraulic thousand tons	3,610	3,400	5,050	5,650	5,650
Clays:					
Ball clay (plastic clay), n.e.s. do.	82	80	100 e/	100 e/	90
Bentonite	107,000 r/	108,000 r/	97,500 r/	96,700 r/	97,000
Foundry earth e/	100,000	100,000	90,000	90,000	90,000
Fuller's earth (decolorizing clay) e/	2,000	2,000	1,500	1,600	1,600
Kaolin	33,700 r/	47,100 r/	43,700 r/	42,100 r/	43,000
Laterite (aluminous)	57,400 r/	21,400 r/	63,500 r/	50,000 r/	55,000
Refractory	32,800	30,900	31,000 e/	32,000 e/	30,000
Other 6/ thousand tons	2,170	2,350	2,610	2,700 e/	2,600
Diatomie	4,250 r/	6,130 r/	5,360 r/	3,100 r/	3,100
Feldspar	28,000 r/	42,300 r/	48,500 r/	55,800 r/	50,000
Fluorspar	24,500 r/	16,500 r/	4,590 r/	4,610 r/	5,000
Graphite	318 r/	85 r/	20 r/	20 r/	25
Gypsum, crude	616,000	384,000 r/	514,000 r/	519,000 r/	520,000
Lithium: Spodumene, amblygonite, gross weight	69 r/	287 r/	620 r/	300 r/ e/	400
Mica:					
Sheet	226 r/	610 r/	373 r/	720 r/	720
Waste and scrap	638 r/	1,040 r/	635 r/	1,230 r/	1,230
Nitrogen: N content of ammonia e/	70,000 4/	75,000	72,000	72,000	72,000
Phosphates: Thomas slag e/ 7/	55	50	50	50	50
Pigments, mineral, natural: Other e/	36 r/	77 r/	40 r/	28 r/	35
Pumice and related volcanic materials (perlite, pozzolan, and toba, etc.)	118,000	69,700 r/	89,100 r/	89,000 r/	89,000
Salt:					
Rock e/ thousand tons	1	-- r/	-- r/	1	1
Solar do.	833 r/	943 r/	952 r/	1,030 r/	1,000
Total do.	834 r/	943 r/	952 r/	1,030 r/	1,000
Sand and gravel:					
Sand:					
Construction do.	10,200	11,000	12,800	13,000 e/	12,500
Silica sand (glass sand) do.	335 r/	374	340 r/	396 r/	380
Gravel do.	5,750 r/	7,150 r/	6,810 r/	8,120 r/	7,500
Soda ash e/	300	300	290	300	250
Stone:					
Basalt thousand tons	737	548	677 r/	1,110 r/	900
Calcareous:					
Calcite, nonoptical	6,790	7,520	13,600 r/	15,500 r/	15,000
Calcium carbonate (chalk)	17,600	8,330	17,000 r/	19,000 r/	20,000
Dolomite	278,000	402,000 r/	353,000 r/	435,000 r/	390,000
Limestone thousand tons	7,590	9,240	10,800 e/	10,000 e/	10,000
Marble:					
Aragonite, broken	1,120	1,200 r/	1,650 r/	1,110 r/	1,100
Onyx, in blocks and broken	1,640 r/	2,520 r/	2,920 r/	1,700 e/	2,000
Travertine, in blocks and broken	12,100 r/	13,200 r/	19,900 r/	27,900 r/	25,000
Unspecified, in blocks and broken	24,900	23,100	15,000 e/	17,000 e/	15,000
Flagstone	83,800 r/	70,200 r/	97,600 r/	94,700 r/	94,000

See footnotes at end of table.

TABLE 1--Continued
 ARGENTINA: PRODUCTION OF MINERAL COMMODITIES 1/ 2/

(Metric tons unless otherwise specified)

Commodity 3/	1990	1991	1992	1993	1994 e/	
INDUSTRIAL MINERALS--Continued						
Stone--Continued:						
Granite:						
In blocks	46,300	53,900 r/	53,900 r/	81,300 r/	68,000	
Crushed	thousand tons	3,520 r/	4,500 r/	5,130 r/	5,630 r/	5,500
Quartz, crushed	122,000 r/	121,000 r/	106,000 r/	101,000 r/	102,000	
Quartzite, crushed	thousand tons	476	538	400 e/	450 e/	450
Rhodochrosite	67	20	30 e/	58 r/	60	
Gamestone (agate, amatist, apolo, turmalin, etc.)	kilograms	15,000	43,400	30,000 e/	4,960 r/	10
Sandstone e/	300	250	240	240	230	
Serpentine, crushed	13,700	19,900	36,800 r/	26,500 r/	30,000	
Shell, marl	329,000	240,000	237,000 r/	248,000 r/	250,000	
Tuff, (tosca)	thousand tons	2,200 r/	2,330 r/	3,280 r/	5,120 r/	5,000
Strontium minerals: Celestite	3,110	1,200 e/	1,200 e/	-- r/	--	
Sulfates, natural:						
Aluminum (alum)	71,700 r/	71,900 r/	85,300 r/	29,200 r/	30,000	
Magnesium (epsomite) e/	7,000	6,500	6,500	6,400	6,400	
Sodium (mirabilite)	14,700 r/	16,100 r/	24,800 r/	6,550 r/	10,000	
Talc and related materials:						
Pyrophyllite	-- r/	-- r/	-- r/	-- r/	--	
Steatite	200 r/	274 r/	425 r/	840 r/	500	
Talc	17,800 r/	22,800 r/	21,200 r/	17,200 r/	17,300	
Total	18,000 r/	23,100 r/	21,600 r/	18,100 r/	17,800	
Vermiculite	10 r/	190 r/	-- r/	38 r/	50	
Water, mineral-containing	140,000 4/	140,000	140,000	140,000	130,000	
Zeolite e/	100	90	95	90	90	
MINERAL FUELS AND RELATED MATERIALS						
Asphalt and bitumen, natural (asphaltite)	2,480	5,850	994	1,000 e/	1,000	
Coal, bituminous	thousand tons	270	294	212	200 e/	215
Coke, all types, including breeze e/	do.	800	830	820	800	200
Gas, natural:						
Gross e/	million cubic meters	21,800	22,000	22,000 4/	27,200	28,000
Marketed 8/	do.	18,100	17,900	19,100	24,200 e/	24,000
Natural gas liquids: e/						
Butane	thousand 42-gallon barrels	4,200	4,200	3,770	3,800 4/	3,850
Propane	do.	5,000	5,000	4,560 4/	4,600 4/	4,600
Total	do.	9,200	9,200	8,330 4/	8,400 4/	8,450
Peat, agricultural (turba)	6,720 r/	1,210 r/	1,180 r/	10,500 r/	10,500	
Petroleum:						
Crude	thousand 42-gallon barrels	176,000	180,000	203,000	218,000 r/	237,000
Refinery products:						
Gasoline	do.	34,600	35,900	30,700	31,200	31,200
Kerosene	do.	3,600	3,770	2,610	2,400	2,400
Jet fuel	do.	6,120	6,350	4,540	4,670	4,670
Distillate fuel oil	do.	58,800	61,000	48,800	48,700	48,700
Lubricants	do.	1,350	1,410	1,160	1,280	1,280
Residual fuel oil	do.	25,600	26,600	28,600	27,800	27,800
Other	do.	13,200	13,700	17,700	17,000	17,100
Refinery fuel and losses	do.	25,800	26,700	1,040	--	--
Total	do.	169,100	175,000	135,000	133,000	133,000

e/ Estimated. r/ Revised.

1/ Previously published and 1994 data are rounded by the U.S. Bureau of Mines to three significant digits; may not add to totals shown.

2/ Table includes data available through July 1995.

3/ In addition to the commodities listed, bismuth, carbon black, columbite, lime, natural gasoline, perlite, and potassium sulfate (kalinite) were believed to be produced but output was not reported quantitatively, and available information was inadequate to make reliable estimates of output levels.

4/ Reported figure.

5/ Hot-rolled semimanufactures only; excludes castings and cold-rolled semimanufactures produced from imported hot-rolled semimanufactures.

6/ Includes plastic, semiplastic, and/or ferruginous clays used totally in the manufacture of portland cement.

7/ Thomas slag production was estimated from the Thomas crude steel reported in La Siderurgia Argentina annual, published by the Instituto Argentino de Siderurgia.

8/ Includes natural gas imported from Bolivia.

TABLE 2
ARGENTINA: STRUCTURE OF THE MINERAL INDUSTRY FOR 1994

(Thousand metric tons unless otherwise specified)

Commodity		Major operating copanies and major equity owners	Location of main facilities	Annual capacity
Aluminum		Aluminios Argentinos S.A.I.C. (ALUAR) (State, 52.1%; private 47.9%)	Puerto Madryn, Chubut Province	170.
Boron		Cia. Boroquimica S.Q.A.M.I.C.A.F., (owned by Rio Tinto Zinc Corp. Ltd.)	El Porvenir Mine, Jujuy Province; Tincalayu and Campo Quijano, Salta Province	146.
Cement		Loma Negra C.I.A.S.A., #1; Juan Minetti, S.QA., #2; Corporacion Cementera Argentina, S.A., #3 (private, 100%)	Buenos Aires, Cordoba, Corrientes, Salta San Juan, Mendoza, and Jujuy Provinces	6,000.
Coal		Yacimientos Carboníferos Fiscales (Government, 100%) (Shutdown partially in 1991)	Rio Turbio, Santa Cruz Provoince	200.
Gold and silver	kilograms	Yacimientos Mineros de Agua de Dionio (YMAD) (Government, 100%), Angela Mine (private, 100%)	Farallon Negro, Hualfin & Belen Departments Gastre Department, Chubut Province	1,330 Au 50,000 Ag.
Iron ore		Hierro Patagonico de Sierra Grade, S.A. Minera (HIPASAM) (Government, 100%) (shutdown partially in 1991)	Sierra Grande, Rio Negro Province	1,000.
Lead, silver, zinc	kilograms	Cia. Minera Aguilar, S.A. (A Bolivian Consortium Cia. Minera del Sur. {COMSUR}, private, 100%)	Estacion Tres Cruces, El Aguilar, Jujuy Province	49,800 Ag, 24,000 Pb, 30,000 Zn.
Natural gas	million cubic meters	Transportadora de Gas del Sur, S.A. (TGS) and Transportadora de Gas del Norte (TGN) both private	Neuquen Santa Cruz, Tieerra del Fuego, Salta, and Rio Negro Provinces	28,000.
Petroleum	million barrels	Yacimientos Petrolíferos Fiscales (YPF, S.A.) Partially private	Chubut, Santa Cruz, Neuquen, Rio Negro, Mendoza, Salta, Tierra del Fuego, Jujuy. La Pampa, and Formosa Provinces	240.
Steel		Aceros Parana, S.A., (Private, 79..9%; Government, 20.1%)	7 km from San Nicolas de los Arroyos, Buenos Aires Province	3,300.
Do.		ACINDAR-Industria Argentina de ACEROS, S.A. (private, 100%)	Plant Nos. 1, and 3, Buenos Aiores Province; Plant No. 2. near Rio Parana, Santa Fe Province	1,500.
Uranium (ore)		Empresa Nuclear Mendoza, subsidiary Nucleoelectrica, Inc and Atomica, Inc.	Sierra Pintada, San Rafel, Mendoza Province	160.
Zinc, refinery		Cia. Sulfacid S.A.C.I. y f (C.M.A.S.A.,50%; private, 50%)	Near Rosario on the Parana River, Santa Fe Province	35.

1/ By Decree No. 2778/90 was no longer a state-owned company, but a corporation ruled by Law 19,550.