

# ECUADOR

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The Republic of Ecuador is located in western South America and borders Colombia, Peru, and the Pacific Ocean. Ecuador has an area of 283,560 square kilometers (km<sup>2</sup>). Land boundaries total 2,010 kilometers (km). In 2002, the population was about 13 million. The gross domestic product (GDP) per capita was \$1,822, and the GDP was \$24.5 billion in current U.S. dollars. The Ecuadorian economy continued to be heavily dependent on production and exports of agricultural commodities, petroleum, and seafood. The economic indicators for 2002 improved dramatically with a real GDP growth rate of 3.4% and inflation at around 12.5% (International Monetary Fund, 2003a§;<sup>1</sup> b§; U.S. Central Intelligence Agency, 2003§).

The total exports of all commodities in 2002 were valued at \$4.9 billion. The major export commodities were petroleum, which was valued at \$2.03 billion; bananas; coffee; cocoa, cut flowers, fish, and shrimp. The major export markets were the United States (39.9%), Peru and Bolivia (7.5%), Colombia (6.9%), Italy (5.7%), Chile (1.4%), and Venezuela (1.2%). The total imports were valued at \$5.93 billion and included chemicals, consumer goods, fuels, machinery and equipment, and raw materials for industry mainly from the United States (23%), Colombia (14%), Brazil (6.3%), Japan (6.1%), Venezuela (5.5%), and Chile (4.7%). Ecuadorian products continued to have duty-free access to the U.S. market under the Andean Trade Preferences Agreement (ATPA) (International Monetary Fund, 2003c§).

## Government Policies and Programs

Ecuador held national elections in October 2002 and a runoff election on November 24; the citizens elected a former army colonel as President. Among other things, the new Government promised to implement new economic policies—expanding social programs, creating jobs, redistributing wealth, ending political corruption, ending many free-market policies, and increasing the state's role in the economy. This political platform differed from the former President's policies and from some of the International Monetary Fund (IMF) conditions for the massive bailout in 2000. Since the election, the new President stressed the need for urgent fiscal reforms and stated that he will maintain the U.S. dollar as the official currency for all economic transactions (Sutcliffe, 2003). Since 2001, this "dollarization" in Ecuador has been primarily supported by income from petroleum exports, foreign direct investment (FDI), remittances from immigrants, and private sector external debt. Additional policy initiatives, which included efforts to reduce the Government's budget deficit and to implement

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<sup>1</sup>References that include a section mark (§) are found in the Internet References Cited section.

structural reforms to strengthen the banking system, were begun at the end of 2002 (U.S. Energy Information Administration, 2003§).

Ecuador's economy reached its 2002 state beginning with the country's severe economic and financial crisis of 1999, which led to heavy borrowing from the IMF and the World Bank in 2000 and then to adoption of the U.S. dollar as the official currency in 2001. This final step of dollarization was necessary for the Government to be able to restore stability in the national economy and to attract foreign direct investment, which was a key component of Ecuador's ability to continue to meet its external obligations.

The impact of these economic circumstances on the institutional structure of the mining sector in Ecuador was readily evident in 2002. As a part of the bailout agreement in 2000, the World Bank recommended development of the mining sector, which resulted in major modifications to Ecuador's 1991 mining law and the passing of an almost completely new set of mining regulations by April 17, 2001. In 2002, these new regulations provided safeguards for mining title holders and streamlined the title transfer process from exploration to mining through a new title registry, which the Dirección Nacional de Minera (DINAMI) was responsible for enforcing. The new regulations encouraged investment by increasing the terms of concessions to 30 years, eliminating a 3% mineral royalty, allowing foreigners to hold concessions without Ecuadorian partners, and legalizing guarantees that secure the right to mine once a positive feasibility study has been completed (Northern Miner, 2001c, 2003).

## Environment

In 1994, the Government's Comisión Asesora Ambiental (CAA) issued the country's first environmental policies with the stated goal of promoting sustainable development in all economic activities. By 2002, the CAA had evolved to become the Ministerio del Ambiente (MAE), which was primarily responsible for administration of the nation's protected areas. Mining and exploration operations have been completely excluded by law for the foreseeable future from these areas, which constitute 18% of Ecuador. In 2002, the MAE also administered two additional types of environmentally sensitive land—forest and vegetation reserves and state forestry lands. Mining was permitted on these lands but only with prior approval of the MAE and most likely required additional precautions, such as flying in portable drill rigs to avoid road construction (Northern Miner, 2001a).

In 2002, the Ministerio de Energía y Minas (MEM) was responsible for administration of environmental regulations as they relate to miners. Therefore, almost all environmental

matters concerned with mining in Ecuador were handled by MEM's Subsecretaría de Protección Ambiental. Mining operations in Ecuador had to comply with the terms of sustainable development, environmental protection, and conservation as defined in the National Constitution, which was adopted in August 1998; the Law of Environmental Administration, which was issued in July 1999; and the Law of Forestry and Conservation of Natural Areas and Wildlife. In 2002, the mining and the petroleum sectors were legally required to prepare environmental impact statements (EISs) for each level of work; each EIS had to be approved by the MEM. The first was a preliminary EIS for basic exploration; the second EIS was for advanced exploration; the third EIS was required before actual mining; and the fourth EIS was required before beneficiation, smelting, and refining. MEM also required annual follow-up environmental reports from mining and exploration operations, enforced environmental regulations by levying fines or suspending mining rights if miners were in violation, regulated how mining companies could negotiate with local communities if they were going to alter the environment surrounding a community (Northern Miner, 2001a).

In the petroleum sector, exploration and development of projected reserves could prove to be environmentally costly because most of these reserves are located in the Amazonian Rain Forest. In 2002, resistance to such development was well organized, and pipelines that transported oil over the mountains to the coast were bombed. Resulting damage to the pipelines and other breaches caused by natural mishaps, such as earthquakes and mud slides, led to pollution in the mountains and other regions between the Rain Forest and the coast of Ecuador (International Monetary Fund, 2003c§).

### Structure of the Mineral Industry

In 2002, the Ecuadorian economy continued to become more dependent on petroleum. Ecuador's petroleum sector accounted for about one-third of the Government's revenue and 40% of export earnings (U.S. Energy Information Administration, 2003§). The Government-owned oil company Empresa Estatal Petróleos del Ecuador (PetroEcuador) estimated Ecuadorian petroleum reserves to be about 4.574 billion barrels (Gbbbl) in 2002; PetroEcuador based that estimate on the assumed discovery of 100 million barrels per year (Mbbbl/yr). Under this optimistic scenario, reserves would not be exhausted until 2032. Conversely, under a pessimistic scenario (no more oil being discovered), oil reserves could "run out" in 2021. In the IMF's 2003 projections, Ecuador's oil reserves were estimated to be declining by about 150 to 250 Mbbbl/yr and could be depleted in 20 to 30 years (International Monetary Fund, 2003c§). This still would not allow Ecuador very much time to make changes in its economic structure, especially as Ecuador appeared to be increasing rather than decreasing its dependence on oil by the end of 2002 (U.S. Energy Information Administration, 2003§).

Ecuador's proven natural gas reserves are small, and other mining production has been mostly limited to gold production in the Zaruma-Portovelo gold district (Mining Journal, 2002). Because of the geologic similarity of many regions in Ecuador with prolific mineral-producing regions in Chile and Peru and the high value of a potential discovery, especially gold, many

firms continued their risky exploration ventures (IAMGOLD Corporation, 2003, p. 32). Gold exploration and production by small-scale private companies, mainly mining cooperatives, continued to be an important activity in the Nambija, the Ponce Enriquez, and the Zaruma-Portovelo gold districts of Ecuador. Estimates of actual production from these activities are unreliable for any given year, and reports varied for 2002. On the basis of a poll of small miners and work meetings with the DINAMI, the last available estimate was approximately 5,000 kilograms (kg) for 2000. At least one source estimated total Ecuadorian production to be approximately 8,000 kg in 2002, and that number would imply only slightly higher unofficial production in 2002 compared with what the DINAMI's Unidad Técnica Nacional reported for 2000 (Sandoval, 2001§). This approximation for total gold production in Ecuador is not unreasonable given that Ecuador's official gold production was reportedly 2,750 kg in 2002. Nonetheless, reliable estimates of unofficial gold mining production in Ecuador were not available for 2002 (Sutcliffe, 2003).

Vancouver, British Columbia, Canada-based Corriente Resources Inc. announced that exploration at its Mirador property began a transition to the feasibility phase in 2002. The Mirador property lies in a region called the Corriente Copper Belt, which was first explored by BHP Billiton Plc but has been developed mainly by Corriente since the late 1990s. By the end of 2002, four major deposits (Mirador, Panantza, San Carlos, and Warintza) had been identified within this region and inferred geologic resources of about 550 million metric tons (Mt), summed over the first three of these deposits at an average grade of about 0.8% copper plus gold and molybdenum resources, was announced by Corriente (Corriente Resources Inc., 2002a§).

In 2002, development of this region was viewed as a copper-gold joint venture among Corriente, J. David Lowell, and BHP Billiton. Corriente officially established 100% control over Mirador, Panantza, and San Carlos in 2002. Lowell held a 10% interest in Corriente. BHP Billiton kept only a 2% net smelter royalty interest in these same three deposits after 2002 with no further "back-in" rights. Also, Corriente can purchase one-half of this remaining royalty interest for \$2 million at its discretion (Corriente Resources Inc., 2002a§).

Results from its latest round of drilling during the middle of 2002 indicated to Corriente that the highest grades of copper-gold were most likely to be at Mirador rather than at one of the other three major deposits (Corriente Resources Inc., 2002b§). These results helped prompt Corriente to select Mirador as the starter project to fund subsequent operations for a phased development of the entire Corriente Copper Belt. By the end of 2002, Corriente chose the Mirador copper-gold deposit to be the first of the major deposits to enter the feasibility stage with hopes that production would begin sometime in 2004 (Corriente Resources Inc., 2002a§).

### Commodity Review

#### Metals

**Copper.**—Corriente entered into two joint-venture agreements with BHP Billiton in 1999 and 2000 to explore the Corriente Copper Belt. Despite its focus on copper and copper-

gold projects at the advanced drilling stage in 2002, Corriente decided to make the Mirador project its first venture into the feasibility stage of production in the region. Corriente intended to “fast-track” the feasibility studies for Mirador in 2003 (Corriente Resources Inc., 2004, p. 3).

**Gold and Silver.**—Bienes Raíces, S.A. (Bira) was the largest official gold producer in Ecuador; artisanal gold mines were numerous. Official gold production in 2002 was about 2,750 kg, most of which was by BIRA (Mining Journal, 2002). Zamora Gold Corp. announced that it had processed ore from the Campanillas and the Mina Real concessions in 2002. Its estimated production for the first three quarters of the year was 953 troy ounces (30 kg) (Zamora Gold Corp., 2002§). Zamora failed to file its 2002 annual financial statements, and the corporation’s common shares were subjected to a cease trade order issued by the Ontario Securities Commission at the end of 2002 (Zamora Gold Corp., 2004§). Any estimates for Zamora in 2002, therefore, should be considered unofficial.

In 2002, Hydromet Technologies Limited entered into a joint-venture agreement with Government-owned Minera Condor S.A. to acquire a 70% interest in the Pachicutza Gold Project in Ecuador. Under the agreement, Hydromet can earn and maintain its interest by completing a revised feasibility study by the end of 2003 and subsequently installing and commissioning a treatment plant for economic gold production. Hydromet agreed to pay Minera Condor \$120,000 in quarterly payments during 2003. The Dirección de Industrias Nacional del Ejercicio (DINE) controls Minera Condor and was apparently attempting to “fast track” the Pachicutza Mine through the feasibility stage from development to production as an implicit contribution to the agreement. The agreement also called for the use of Hydromet’s Australian Modular Gold Plant Technology (Hydromet Technologies Limited, 2002).

### **Industrial Minerals**

**Cement.**—Four cement companies, which controlled some 3.2 million metric tons per year (Mt/yr) of clinker production capacity, operated in Ecuador. Two-thirds of the capacity was in the hands of the Holcim Group’s La Cemento Nacional with plants at Cerro Blanco and San Eduardo (1.98 Mt/yr of clinker capacity). The other cement plants were Selva Alegre [600,000 metric tons per year (t/yr) of clinker capacity] at Otavalo, Empresa Industrias Guapan at Azogues (350,000 t/yr of clinker capacity), and Empresa de Cemento Chimborazo at San Juan Chico (290,000 t/yr of clinker capacity), which was owned by the Central Bank of Ecuador (International Cement Review, 2003).

### **Mineral Fuels**

**Natural Gas.**—Ecuador’s proven natural gas reserves were only 9,660 million cubic meters in 2002. Nonetheless, in September 2002, Ecuador made further entry into the natural gas market with the development of some gasfields in the Gulf of Guayaquil by Energy Development Corporation Ecuador Ltd. (EDC Ecuador) (an affiliate of United States-based Noble Affiliates Inc.). In 1996, EDC Ecuador signed a 15-year

agreement with PetroEcuador to tap the estimated 5.0 billion cubic meters of recoverable gas reserves from the Amistad field in the Gulf of Guayaquil. By 2002, EDC Ecuador had built a 64-km pipeline that connected these gasfields to the 130-megawatt (MW) Machala natural-gas-fired powerplant located onshore. Following completion of the pipeline, the powerplant began operations in September 2002 (U.S. Energy Information Administration, 2003§).

**Petroleum.**—Ecuador had 4.6 billion barrels of proven petroleum reserves in 2002. Crude oil production averaged about 400,000 barrels per day (bbl/d) in 2002, which was down from a 422,000-bbl/d average in 2001. Ecuador’s major oilfields in 2002 included the Auca, the Cononaco, the Cuyabeno, the Lago Agrio, the Libertador, the Sacha, and the Shushufindi in the eastern Amazonian region known as the Oriente; smaller oilfields included the Anaconda, Culebra, and Yulebra. In 2002, Ecuador consumed about 164,000 bbl/d of petroleum and reportedly exported the remaining 247,000 bbl/d (U.S. Energy Information Administration, 2003§).

In 2002, significant new oil deposits were suspected to exist in the southeastern Oriente, and PetroEcuador was laying the groundwork to develop four fields there—Biguno, Huachito, Mauro Davalos Cordero, and Paraiso—at a cost of \$80 million during 4 years. Although this potential expansion remained undeveloped by the end of 2002, PetroEcuador, which oversaw all hydrocarbon operations in Ecuador, had made many attempts to attract foreign investment to this project. In 2002, PetroEcuador was not able to proceed on its own with developing these fields or the Ishpingo, the Tiputini, and the Tambococha (ITT) oilfields, which have possible reserves of 1.46 Gbbl of oil that were virtually untapped and potentially constitute another significant portion of the country’s oil reserves. Apparently, PetroEcuador’s inability to proceed with development was mainly because many of its developed properties were ageing fields that did not provide sufficient revenue for reinvestment or new development. In fact, PetroEcuador reported that its oil output was at a 10-year low in 2002 (U.S. Energy Information Administration, 2003§).

A key development in attracting FDI in the petroleum sector would be completion of the new pipeline Oleoducto de Crudos Pesados Ltd. (OCP), which was designed to connect oilfields in the Oriente region to port facilities on the Pacific Ocean. In 2002, construction proceeded according to plan, and the OCP was due to become operational sometime in 2003. This pipeline was projected to have a transporting capacity of 450,000 bbl/d of heavy oil with an API gravity of 18° to 24°, which would at least partially alleviate the “oil transport bottleneck” that has deterred progress in Ecuador’s petroleum industry for at least 10 years (U.S. Energy Information Administration, 2003§). It will be built and operated by OCP Ecuador S.A., which was a private sector consortium led by Alberta Energy Corporation of Canada and the Argentine-Spanish oil company Repsol-YPF; other members of the consortium were Agip Petroleum Ecuador Ltd. of Italy, Kerr McGee Corporation of the United States, Occidental Petroleum Corporation, and the engineering firm Techint Group of Argentina. The new pipeline will run 500 km from Nueva Loja to refining facilities at the Port of Balao near the city of Esmeraldas in the north of the country. It will

be laid underground alongside the existing Trans-Ecuadorian Pipeline except for a deviation on the northern outskirts of Quito (Northern Miner, 2001b).

## Exploration

During 2002, Toronto, Ontario, Canada-based IAMGOLD Corporation (IMG) continued exploration on, in order of decreasing levels of development, its Quimsacocha, Retazos, Norcay, and Condor projects along the Andean ridge. In 2002, the drilling program at Quimsacocha did not encounter any high-grade gold, which had been discovered earlier by time-domain electromagnetic survey, but it did indicate a potential for large flat-lying bodies of lower grade mineralization. The best mineralization intersections in Quimsacocha were at 69 meters (m) with an average grade of 0.8 gram per metric ton (g/t) gold and 26 m with an average grade of 1.2 g/t; these grades of gold, however, were not economic for the depths at which this mineralization was intersected in the drill holes. At the Retazos project in the Zaruma-Portovelo mining district, drilling was aimed at identifying extensions to the 15-km-long vein system that had been host to about 4.5 million troy ounces (1,400 t) of gold that had been produced in the area. Holes drilled along strike or down-dip from known ore shoots returned disappointingly low gold values. A new model identified important drill targets to the south and west of the Portovelo Mine, which was the largest of the past gold producers. At Norcay, geologic mapping, soil sampling, and a ground magnetic survey identified a number of drill targets on the Norcay epithermal vein system. The system accumulatively consists of at least 2.6 km of veins with an average width of 2 to 3 m and gold grades in trenches that range up to 60 g/t over 1 m. A drill program was scheduled to begin in 2003 once the drilling at Retazos was finished. At the Condor project, IMG signed a joint-venture agreement in 2002 with a subsidiary of Gold Fields Limited to carry out exploration for gold in southeastern Ecuador. Under the terms of the agreement, Gold Fields will fund \$5 million of exploration within a 4-year period to earn a 50% interest in the joint venture. IMG will manage the project, and Gold Fields will have the right to assume future control. Gold Fields will have the option to earn an additional 10% interest by making an expenditure of \$10 million within 8 years of signing the joint-venture agreement. Drilling was to begin in mid-2003 (IAMGOLD Corporation, 2003, p. 39).

International Minerals Corporation (IMC) completed another part of a drilling program at its Rio Blanco gold-silver property in Ecuador. IMC completed 4,868 m in 23 core drill holes during the year, which completed the third phase of the total program and attained 9,507 m in 71 core drill holes by the end of 2002. For the three main zones (Alejandra North, Alejandra South, and Dorada), inferred mineral resources were estimated to be 881,000 troy ounces (27,400 kg) of gold and 6.7 million troy ounces (210,000 kg) of silver from 5 Mt of ore at an average uncut grade of 5.5 g/t gold and 42 g/t silver processed during the first three phases of drilling (International Minerals Corporation, 2002).

At Mina Real, Zamora continued exploration by tunneling in five previously selected quartz-vein structures. Two of the

veins, each of which measured 300 m in length by 200 m in depth, had been evaluated by 2002. The other three veins were also scheduled to be evaluated by Zamora's geologists in 2002 (Zamora Gold Corp., 2002§).

Corriente entered into a global exploration alliance with BHP Billiton in 2001. During 2002, the Ecuador work program completed the drilling of 10 holes that totaled 2,738 m of core at Mirador. Corriente continued to be successful in identifying significant inferred and indicated reserves within the Mirador, the Panantza, and the San Carlos target areas. In addition to the Warintza deposit, eight other advanced copper and copper-gold targets in the Corriente Copper Belt were undergoing review by Corriente for drilling planned for 2003 (Corriente Resources Inc., 2002a§).

## Outlook

In 2002, the new Ecuadorian President projected that the Government would not default on Ecuador's \$2.7 billion foreign debt payments due in 2003 and vowed to cooperate with the IMF. This could mean tough austerity measures and continuation of free-market reforms. Looking forward from 2002, Ecuador's apparent increasing dependence on oil and the uncertainty associated with increased dependence on any single commodity would appear to be a great concern for Ecuador's economic future (U.S. Energy Information Administration, 2003§). Also within the Ecuadorian minerals sector, however, a few significant opportunities for economic diversification appear to be on the edge of significant breakthroughs by the end of 2002.

Although PetroEcuador plans to reduce its exploration and production investment budget by more than 40% in 2003, Ecuador's dependence on oil exports is still expected to increase in the coming years. Ecuador's oil exports should more than double by 2004 with the completion of the OCP. An additional pipeline is being planned. In addition, PetroEcuador still hopes to attract foreign direct investment to develop the Biguno, Cordero, Huachito, Mauro Davalos and Paraiso oilfields, as well as the ITT oilfields, which are thought to hold large reserves of low-gravity petroleum (U.S. Energy Information Administration, 2003§).

How long Ecuador's limited natural gas production can be sustained has not been projected, but Ecuador did attempt to increase recovery of natural gas from the Sacha and the Shushufindi oilfields in 2002. At least in the very near future, the Machala Power Plant is scheduled to be powered by natural gas piped from Amistad and will supply power to Guayaquil, which is the largest city in Ecuador. This natural gas could allow for potential expansion of powerplant capacity to 207 MW by mid-2004 and to 312 MW by mid-2005. In terms of improving broader social welfare in the short run, natural gas production can help Ecuador avoid power outages during dry periods when hydroelectric power output is low (U.S. Energy Information Administration, 2003§).

The outlook for gold production is heavily reliant on the always-uncertain results of extensive exploration efforts, whatever potential may exist for enforcing mining regulations, and on improved recovery rates for unofficial small-scale

miners through improved technology (Sandoval, 2001§). With respect to official production of gold, if the feasibility studies for the Pachicutza Mine are successfully fast tracked by the owners of Minera Condor (DINE) and the international gold market provides favorable conditions, then the Pachicutza Mine could evolve into Ecuador's first commercial-scale gold mine, possibly within 2 to 3 years. Additionally, IMG will continue to its development efforts along the Andean Ridge (IAMGOLD Corporation, 2003, p. 32). As usual, in such an uncertain industry, many gold development projects are in the early stages of exploratory drilling, and the firms involved are looking for partners in joint ventures to share risk and continue exploration.

The outlook with respect to Ecuador's nascent copper industry points to further development in 2003. In 2002, Corriente acquired many of the necessary rights and permissions to start production at the Mirador project in the Corriente Copper Belt but is expected to be involved in the feasibility stage through 2003. Corriente expects that staged copper production could become a reality in this region after 2 to 3 more years of development (Corriente Resources Inc., 2004, p. 3). In addition, Zamora plans to continue exploration for porphyry copper resources at the Mina Real concessions south of Nambija, but the Ecuadorian Government may revoke Zamora's rights to this concession (Zamora Gold Corp., 2004§).

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## Major Sources of Information

- Dirección Nacional de Minería (DINAMI)  
Calle General Baquedano No. 222 y Reina Victoria  
Edificio Araucaria, Piso 1  
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Telephone: (593-2) 2254-110, 2550-082  
Fax: (593-2) 2228-100  
Internet: [www.mineriaecuador.com](http://www.mineriaecuador.com)
- Ministerio de Energía y Minas del Ecuador  
Av. Orellana N26-220 y Juan León Mera  
Edificio MOP  
Quito, Ecuador  
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Fax: (593-2) 2540-279  
Internet: [www.menergia.gov.ec/php/index.php](http://www.menergia.gov.ec/php/index.php)
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TABLE 1  
ECUADOR: PRODUCTION OF MINERAL COMMODITIES<sup>1</sup>

(Metric tons unless otherwise specified)

Commodity	1998 <sup>e</sup>	1999	2000	2001	2002	
METALS						
Cadmium, mine output, Cd content <sup>e</sup>	kilograms	200	200	200	200	200
Copper, mine output, Cu content <sup>e</sup>		100	100	100	100	100
Gold, mine output, Au content	kilograms	1,474 <sup>r,2</sup>	2,026	2,871	3,005 <sup>r</sup>	2,750
Iron and steel, steel, crude		45,784 <sup>2</sup>	53,000	58,483	59,700 <sup>r</sup>	67,200 <sup>e</sup>
Lead, mine output, Pb content <sup>e</sup>		200	200	200	200	220
Silver, mine output, Ag content <sup>e</sup>	kilograms	2,000	2,000	2,000	2,000	96
Zinc, mine output, Zn content <sup>e</sup>		100	100	100	100	100
INDUSTRIAL MINERALS						
Barite		--	2,532 <sup>r</sup>	1,476	1,181	1,180 <sup>e</sup>
Cement, hydraulic	thousand tons	2,600 <sup>2</sup>	2,300	2,800 <sup>e</sup>	2,920 <sup>r</sup>	3,000
Clays:						
Bentonite		200,000	--	-- <sup>r</sup>	-- <sup>r</sup>	--
Common:						
For cement <sup>e</sup>	thousand tons	2,000	2,000	2,000	2,000	2,000
Other	do.	812 <sup>r,2</sup>	413 <sup>r</sup>	325	345 <sup>r</sup>	382
Kaolin		5,600 <sup>r,2</sup>	20,652	11,022	703 <sup>r</sup>	8,483
Feldspar		69,318 <sup>r,2</sup>	33,142	47,041	60,688 <sup>r</sup>	31,254
Gypsum, crude		1,672 <sup>r,2</sup>	1,456	1,043	834	4,730
Salt, common <sup>e</sup>		100,000	95,000	90,000	90,000	90,000
Sand:						
Silica, glass sand		25,926 <sup>r,2</sup>	21,978	27,522	34,718 <sup>r</sup>	40,880
Ferruginous <sup>e</sup>		10,000	9,950	9,950	9,900	9,000
Stone, sand and gravel:						
Limestone, for cement manufacture	thousand tons	4,200	2,865	3,147	4,079 <sup>r</sup>	6,699
Marble		1,000	2,508	1,680	1,344	265
Pozzolan		5,266 <sup>r,2</sup>	13,978 <sup>r</sup>	27,687	22,149	22,200 <sup>e</sup>
Pumice	thousand tons	320	275	345	373 <sup>r</sup>	130
Sand and gravel	do.	2,100	6,148	6,489	3,414 <sup>r</sup>	6,357
Sulfur: <sup>e</sup>						
Native		4,000	4,000	4,000	4,000	4,000
Byproduct:						
From petroleum		5,000	8,243 <sup>2</sup>	11,778 <sup>2</sup>	11,700	11,700
From natural gas		5,000	5,000	5,000	5,000	5,000
Total		14,000	17,200	20,800	20,700	20,700
Zeolites		--	1,237 <sup>r</sup>	1,291	1,801 <sup>r</sup>	1,883
MINERAL FUELS AND RELATED MATERIALS						
Gas, natural:						
Gross	million cubic meters	190	964	1,057	1,001 <sup>r</sup>	998
Marketed	do.	119	113	156 <sup>r</sup>	121 <sup>r</sup>	93
Liquefied natural gasoline	thousand 42-gallon barrels	1,830	2,014	699 <sup>r</sup>	664 <sup>r</sup>	603
Petroleum:						
Crude	do.	137,100 <sup>r,2</sup>	136,300 <sup>r</sup>	146,209 <sup>r,3</sup>	148,746 <sup>r,3</sup>	143,758 <sup>3</sup>
Refinery products:						
Liquefied petroleum gas	do.	3,000	3,000	2,818 <sup>r,3</sup>	2,407 <sup>r,3</sup>	2,060 <sup>3</sup>
Gasoline	do.	10,800	9,783	13,306 <sup>r,3</sup>	12,236 <sup>r,3</sup>	12,887 <sup>3</sup>
Jet fuel	do.	1,700	1,554	1,938 <sup>r,3</sup>	1,771 <sup>r,3</sup>	1,797 <sup>3</sup>
Distillate fuel oil	do.	8,300 <sup>r,2</sup>	7,061 <sup>r</sup>	10,787 <sup>r,3</sup>	10,953 <sup>r,3</sup>	11,354 <sup>3</sup>
Residual fuel oil	do.	18,800 <sup>r,2</sup>	18,530 <sup>r</sup>	14,079 <sup>r,3</sup>	11,898 <sup>r,3</sup>	10,742 <sup>3</sup>
Unspecified, including kerosene	do.	8,150 <sup>r</sup>	8,572 <sup>r</sup>	13,942 <sup>r,3</sup>	15,786 <sup>r,3</sup>	14,687 <sup>3</sup>
Total	do.	50,800 <sup>r</sup>	48,500 <sup>r</sup>	56,870 <sup>r,3</sup>	55,051 <sup>r,3</sup>	53,527 <sup>3</sup>

<sup>e</sup>Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. <sup>1</sup>Revised. -- Zero.

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

<sup>2</sup>Reported figure.

<sup>3</sup>Cited from URL [http://www.petroecuador.com.ec/cifras\\_de\\_petroecuador.htm](http://www.petroecuador.com.ec/cifras_de_petroecuador.htm).