



2005 Minerals Yearbook

ECUADOR

THE MINERAL INDUSTRY OF ECUADOR

By Steven T. Anderson

In 2005, the total value of production by the mineral industry of Ecuador was almost entirely (98.67%) accounted for by the value of production of crude petroleum.¹ Production of limestone for cement and glass manufacture was of significant value within the mining sector of Ecuador, however, as was the production of other industrial minerals such as, in order of decreasing value, feldspar, pozzolan, pumice, kaolin, and barite. Existing mine production of metals was dominated by small-scale gold mining operations that employed artisanal methods. These operations mined mostly low-sulfidation epithermal, polymetallic, and skarn deposits, which also produced trace amounts of metals other than gold, such as copper and silver. The potential for establishing a more-diverse mineral industry in Ecuador was beginning to attract increasing flows of foreign direct investment (FDI), especially with respect to exploration for metallic minerals, but this increased investment had not yet resulted in the establishment of any proven or probable reserves of metals for production using modern methods. Gold has been mined in Ecuador since precolonial times and continued to dominate exploration targets during the year, but a few companies were also engaged in extensive exploration for deposits of copper, molybdenum, silver, and zinc. Some diverse types of metallic mineral deposits have been discovered in Ecuador, including copper and copper-gold porphyries, high- and low-sulfidation epithermal gold deposits, and gold-rich volcanogenic massive sulfide (VMS) deposits (Sutcliffe, 2005; 2006§; Banco Central del Ecuador, 2006§²; Dirección Nacional de Hidrocarburos, 2006§).

In 2005, about 71% of the volume of the country's production of crude petroleum was exported directly rather than refined domestically. This volume of crude petroleum production represented a slight increase compared with that of 2004. This increase, combined with continuing high prices for crude petroleum, helped increase the country's real gross domestic product (GDP) by 4.7% compared with that of 2004. In 2005, the country's GDP based on purchasing power parity was about \$57 billion, and the rate of inflation was 2.1%. The value of the country's production of crude petroleum and natural gas during the year was about \$7.4 billion and accounted for about 20% of the country's nominal GDP, and the value of mine production of nonfuel minerals was about \$100 million and accounted for 0.3% of the nominal GDP. The value of exports of crude petroleum and natural gas was about \$5.4 billion and accounted for about 55% of the nominal value of Ecuador's exports of all goods, whereas the value of exports of nonfuel minerals was only about \$950,000. In 2005, Ecuador was the fifth ranked producer of crude petroleum in South America, but the level of proven reserves of crude petroleum in the country decreased

to 3,780 million barrels (Mbbbl) compared with 3,824 Mbbbl in 2004 (Empresa Estatal Petróleos del Ecuador, 2006, p. 33; U.S. Energy Information Administration, 2006; Banco Central del Ecuador, 2006§, undated§; International Monetary Fund, 2006§; Sutcliffe, 2006§).

Government Policies and Programs

In September 2005, the Government announced that it would renegotiate all contracts with foreign producers of crude petroleum in Ecuador to increase the total of taxes and royalties paid to the state to equal at least 50% of the value of the crude petroleum produced by foreign-owned operations in the country. Throughout 2005, the average tax burden on foreign production of crude petroleum was about 20%, and the Government expected to complete negotiations with the foreign oil companies by the middle of 2006. Legal actions by both Occidental Petroleum Corporation and EnCana Corporation to recoup expected value-added tax rebates, which had reportedly not been paid by the Government, continued in 2005 but were unsuccessful. Public protests against the mineral fuels sector, including some of the operations of state-owned Empresa Estatal Petróleos del Ecuador (PetroEcuador), were believed to have had a negative impact on the country's production and export of crude petroleum during the year, although total production and exports actually increased compared with those of 2004 (U.S. Energy Information Administration, 2006).

During the last quarter of 2005, public protests against exploration and development (using modern mining methods) of metallic mineral deposits were considered to be the most important source of risk that was deterring the progress of such projects. These public protests were somewhat counteracting Government revisions to the 1991 mining law in 2001 that were aimed at encouraging additional FDI in the mining sector by eliminating Government royalties, reducing the payment of surface rights per hectare, approving mining titles valid for all mining processes for 30 years, and streamlining the concession application and approval processes. The primary goal of the revision was to enable foreign investors to have the same access to mining concessions as domestic investors, and the two main short-run objectives were to double investment in the mining sector and to substitute domestic production for at least 50% of the country's imports of minerals that were deemed critical for establishing a mineral industry in the country. This mineral security strategy targeted imports of copper, gold, silver, and some industrial minerals. In the medium run, the objectives were to have explored and mapped at least 30% of the most promising mineral deposits in the country, to have created at least three industrial parks for mineral processing and metallurgical production, and to have the nonfuel minerals sector contribute at least 5% of the country's GDP. In 2005, it was beginning to appear that at least the main goal of attracting more FDI to the metallic mining sector was beginning to succeed (despite the

¹All values in this chapter are given in current (nominal) U.S. dollars unless otherwise noted. The U.S. dollar has been used since 2000 as legal tender and for financial reporting purposes in Ecuador.

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

public protests), although no hard timeline was set for obtaining any of the above goals (U.S. Commercial Service, 2005, p. 53; Dirección Nacional de Minería, 2005§; Sutcliffe, 2006§).

Structure of the Mineral Industry

Information on the structure of the mineral industry in Ecuador is presented in table 2. PetroEcuador accounted for 36.6% of the country's total production of crude petroleum in 2005 compared with 37.4% in 2004. This decline reflects stagnation in the production of crude petroleum by the state-run company relative to production by private (foreign-owned) petroleum companies. Private companies have combined to increase production and exports of crude petroleum dramatically following completion in 2003 of the Oleoducto de Crudos Pesados (OCP) pipeline in Ecuador. The OCP was constructed to transport crude petroleum mostly from foreign-operated wells to an export terminal on the coast of the Pacific Ocean, while PetroEcuador primarily used the Sistema Oleoducto Trans-Ecuatoriano (SOTE) pipeline for the same purpose. The most significant structural change expected during 2005 that is not reflected in table 2 involved the announcement by EnCana Corporation that it had reached an agreement in principle to sell all its mineral fuel interests in Ecuador to Andes Petroleum Company, which was 100% owned by the Chinese National Petroleum Corporation (CNPC). This agreement was expected to become effective sometime during the first quarter of 2006, although EnCana planned to make the sale retroactive to July 1, 2005. Once the deal becomes effective, it would include the sale of all production from the fields operated by Alberta Energy Corporation Ecuador Ltd. and EnCana's ownership share in the OCP pipeline. In August 2005, PetroEcuador recommended that the Minister of Energy terminate the participation contract of Occidental Petroleum Corporation for exploration and exploitation of Block 15 in Ecuador. During the year, Occidental was the leading foreign-owned producer of crude petroleum in Ecuador and accounted for about 19% of the country's total annual production; EnCana was ranked second and accounted for 12% of the total annual production. Occidental's operation and development of Block 15 accounted for about 7% of the company's consolidated global production of crude petroleum and 4% of its consolidated worldwide reserves. Through the end of 2005 and the first quarter of 2006, Occidental continued negotiations with the Government of Ecuador to resolve this issue. A resolution was not expected to have any consequences for the company's interest in the OCP pipeline (table 2; EnCana Corporation, 2006, p. 29, 31, 47; Occidental Petroleum Corporation, 2006, p. 16-17, 27; Dirección Nacional de Hidrocarburos, 2005§, 2006§).

Ecuador's mineral fuel fields are located in the Amazon Basin in the northeastern part of the country. In 2005, the most productive field was Eden Yuturi, which accounted for about 13% of the total production of crude petroleum in Ecuador. The other leading fields were, in order of production of crude petroleum in 2005, Shushufindi (9%), Sacha (8%), and Dorine (6%). This production was mostly transported to the Pacific coast via two domestic pipelines and one international pipeline. The main domestic pipeline was the SOTE, which was 100%

owned and operated by the Government through PetroEcuador. In 2005, about 122 Mbbbl of crude petroleum was transported through the SOTE, which terminated in the petroleum terminal at the Port of Balao on the Pacific coast. The other domestic pipeline was the OCP, which was completed in 2003 and was owned and operated by Oleoducto de Crudos Pesados Ltd. (EnCana, 31%; Repsol YPF S.A., 26%; Petróleo Brasileiro S.A., 15%; Occidental, 12%; Agip Petroleum Ecuador Ltd., 8%; Perenco plc, 4%; and Techint S.A., 4%). About 58 Mbbbl of crude petroleum was transported through the OCP during the year. The international pipeline was the Oleoducto Trans-Andino (OTA), which was also owned and operated by PetroEcuador. The OTA links Ecuador's fields to the Pacific Port of Tumaco, Colombia, but it was reportedly not in use in 2005 (Empresa Estatal Petróleos del Ecuador, 2006, p. 51-54; U.S. Energy Information Administration, 2006; Dirección Nacional de Hidrocarburos, 2006§).

Exploration

A number of firms were engaged in exploration for nonfuel minerals. A listing of the companies that made the most significant investments during 2005 is provided in table 3. Most of these firms were primarily exploring for gold, although some made significant investments exploring for other metals, such as copper, molybdenum, silver, and zinc. Through the end of 2005, none of these companies had reported any proven or probable reserves for any of these metals (table 3).

Accurate figures were not readily available concerning the amounts separately invested in the exploration for new sources of crude petroleum and the development of new production capacity for mineral fuels. PetroEcuador reported the drilling of one well for the state-run company's own mineral fuels exploration program, and reported that CNPC, EnCana, and Occidental also drilled one exploratory well each. PetroEcuador reported that the only other exploration during the year was carried out by Perenco, which drilled two exploratory wells. No major discoveries were reported, however, and only about 27 Mbbbl of new proven reserves were added to the total for Ecuador, while about 71 Mbbbl of proven reserves were extracted in the course of production operations in the country (Empresa Estatal Petróleos del Ecuador, 2006, p. 33-37). Any increases in Ecuador's total reserves of crude petroleum were expected to come from development of the Ishpingo-Tapochocha-Tiputini (ITT) block of potential petroleum fields. The ITT block is located further east than the major existing fields in the Amazon region, and it was estimated to contain about 900 Mbbbl of proven reserves. Private foreign investors have shown mixed interest in developing the ITT block, however, because of uncertainty concerning revisions to the hydrocarbons law and because the ITT fields reportedly contain an extremely heavy variety of crude petroleum that would require blending with lighter mineral fuels before it could be transported via Ecuador's pipelines. Also, protests against increasing crude petroleum production in the Amazon region have repeatedly obstructed exploration and production by all petroleum companies, including PetroEcuador. The protests have primarily focused on the activities of foreign-owned petroleum companies

operating in the country. The protests against the activities of petroleum companies have been mostly by indigenous groups concerned with environmental issues, whereas protests against exploration and development by foreign-owned mining companies have been by small organized groups from the communities immediately surrounding the proposed mine sites. The forces supporting the organization of these small local anti-mining groups remained unclear (U.S. Energy Information Administration, 2006; Sutcliffe, 2006§).

Production

Production of crude petroleum increased slightly in 2005 compared with that of 2004, although the OCP was not being used at full capacity. Previous to completion of the OCP, companies had complained that reliance on the SOTE was creating a bottleneck in production of crude petroleum for export. PetroEcuador's annual production of crude petroleum has decreased since at least 2002, and the state-run company had not reinvested much in its aging fields nor in exploring for new fields since that time. This lack of investment raised the relative importance of the private (foreign-owned) petroleum companies in Ecuador, which increased their annual share in the country's production of crude petroleum during the same timeframe (table 1; U.S. Energy Information Administration, 2006).

In 2005, the artisanal production of gold and some associated metals increased only slightly compared with that of 2004, although gold prices remained high during this timeframe, on average. Total production capacity for mine production of gold by the many small-scale operations in the country has been estimated to range from about 8 metric tons per year (t/yr) to 10 t/yr, but actual production was not very close to these estimates in 2005 (Sutcliffe, 2005; table 1).

The International Iron and Steel Institute (IISI) reported that production of continuously cast crude steel from imports of ferrous raw mineral materials in 2005 increased substantially compared with that of 2004. Primary production of crude steel in Ecuador was by one company, Acerías Nacionales del Ecuador S.A. (ANDEC), and secondary production was by a subsidiary of ANDEC, Fundiciones Nacionales S.A. (FUNASA) (International Iron and Steel Institute, 2005, p. 11).

Trade

In 2005, Ecuador's imports of petroleum refinery products (\$1,012 million) and nonfuel minerals in raw form (\$21 million) combined to account for about 11% of the value of the country's total imports of goods, but no imports of crude petroleum or natural gas were reported by the Central Bank of Ecuador. The nominal trade balance for petroleum refinery products was about -\$540 million and about -\$20 million for raw nonfuel minerals. By far, the leading export destination for crude petroleum produced in Ecuador was the United States (which accounted for about 68% of the total value of Ecuadorian exports of crude petroleum in 2005), followed by Peru (14%), Panama (9%), and Chile (4%); the remaining country destinations each accounted for only about 1% or less (Banco Central del Ecuador, 2006§, undated§).

Outlook

The major economic activities in the mineral industry of Ecuador are expected to continue to center around the efforts of PetroEcuador to find joint-venture partners and to reactivate some of the marginal petroleum fields under its control. The Government's plans to auction off the rights to explore and exploit the ITT fields to private foreign investors have continued to be delayed owing to continuing turnover in control of the Government and to uncertainties concerning future ownership of these fields, uncertainties concerning possible passage of a new hydrocarbons law, and the legal risks inherent in inconsistent enforcement of the many overlapping applicable investment, property rights, and tax laws in Ecuador. Foreign companies are also expected to continue to face uncertainties concerning taxation, environmental lawsuits, possible nationalization of their petroleum fields, and ongoing public protests that are disruptive to both exploration and production activities.

The modernization of Ecuador's mining law in 2001 and the continuation of higher prices in 2005 for most of the minerals targeted for investment promotion by this revision to the law resulted in significantly increased exploration for reserves of metallic minerals—an increase that continued into 2006. A few of these exploration projects approached more-advanced stages in 2005, including two or three that entered or completed the feasibility stage. Timelines for eventual production from most of the proposed mines listed in table 3 remain unclear, however, because of political uncertainty and increasing public protests against the mineral industry in 2006.

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Major Sources of Information

Banco Central del Ecuador

Av. Amazonas N34-451 y Av. Atahualpa,
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TABLE 1
ECUADOR: PRODUCTION OF MINERAL COMMODITIES¹

(Metric tons unless otherwise specified)

Commodity	2001	2002	2003	2004	2005 ^p	
METALS						
Cadmium, mine output, Cd content ^e	kilograms	-- ^r	-- ^r	--	--	
Copper, mine output, Cu content		-- ^r	--	242 ^r	254	
Gold, mine output, Au content	kilograms	3,005	2,750	4,819	5,158 ^r	5,416
Lead, mine output, Pb content ^e		-- ^r	-- ^r	--	--	
Silver, mine output, Ag content	kilograms	2,000 ^e	96	100	372 ^r	391
Steel, crude, continuously cast, electric furnace		59,732	68,743	79,794	72,000 ^r	85,000 ^e
Zinc, mine output, Zn content ^e		-- ^r	-- ^r	--	--	--
INDUSTRIAL MINERALS						
Barite		1,181	1,180 ^e	2,139	3,695 ^r	3,879
Carbon dioxide (CO ₂)		14	752	329	685	719
Cement, hydraulic ^e	thousand metric tons	2,920	3,000	3,100	3,000 ^r	3,000
Clays: ³						
Common	do.	345	382	340	903 ^r	948
Kaolin		703	8,483	11,884	5,646 ^r	5,928
Feldspar		60,688	31,254	44,268	53,469 ^r	56,142
Gypsum, crude		834	4,730	5,200	232 ^r	244
Pozzolan		373,023	519,090	190,747	612,256 ^r	642,868
Pumice		100,000 ^{r, e}	130,459 ^r	88,830	183,119 ^r	192,275
Salt, common ^e		75,000 ^r	75,000 ^r	75,000	75,000 ^r	75,000
Sand:						
Silica (quartz) sand		34,718	40,880	38,856	32,148 ^r	33,754
Ferruginous ^e		9,900	10,000 ^r	10,000	11,325 ^{r, 2}	11,890 ²
Stone, sand and gravel:						
Limestone ³	thousand metric tons	4,079	5,712 ^r	4,688	4,700 ^r	4,935
Marble		1,344	265	1,890	1,431 ^r	1,503
Sand and gravel	thousand cubic meters	3,414	4,467	3,272	5,834 ^r	6,126
Sulfur: ^e						
Native		4,000	4,000	4,000	4,000	4,000
Byproduct, petroleum refining		3,000 ^r	3,000 ^r	3,000	3,088 ^{r, 2}	3,008 ²
Zeolites		1,801	1,883	--	--	--
MINERAL FUELS AND RELATED MATERIALS						
Gas, natural:						
Gross	million cubic meters	1,001	1,085 ^r	1,287	1,422 ^r	1,609
Of which, marketable	do.	-- ^r	86 ^r	249	240	262
Liquefied natural gasoline	thousand 42-gallon barrels	664	603	514	542	458
Petroleum:						
Crude	do.	148,746	143,758	153,539	192,517	194,169
Refinery products:						
Liquefied petroleum gas	do.	2,566 ^r	2,199 ^r	2,358	2,412 ^r	2,259
Gasoline	do.	8,386 ^r	9,883 ^r	9,338	8,816 ^r	6,954
Jet fuel	do.	1,252 ^r	1,820 ^r	1,897	2,235 ^r	2,500
Distillate fuel oil	do.	14,354 ^r	13,174 ^r	11,752	13,397 ^r	13,064
Residual fuel oil	do.	24,543 ^r	23,465 ^r	23,622	22,851 ^r	21,255
Asphalt	do.	1,065	1,087	1,200	1,158	990
Turpentine	do.	32	19	8	19	23
Solvents, including rubber solvent	do.	33	42	13	21	32
Other, including oils and lubricants	do.	67 ^r	87 ^r	64	88 ^r	102
Total	do.	52,298 ^r	51,776 ^r	50,252	50,997 ^r	47,179

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

¹Table includes data available through November 2006.

²Reported figure.

³No reports of separate quantities for limestone or clay used in cement production were available for this table.

TABLE 2
ECUADOR: STRUCTURE OF THE MINERAL INDUSTRY IN 2005

(Metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity ^c
Cement	thousand metric tons	Holcim Ecuador S.A. (Holcim Ltd., 83.5%, and other private, 16.5%)	Cerro Blanco Plant, Guayaquil, Guayas Province, and San Rafael grinding plant, Latacunga, Cotopaxi Province	3,500.
Do.	do.	Cementos Selva Alegre S.A. (Lafarge S.A., 98.2%, and other private, 1.8%)	Cement plant near capital city of Quito, Pichincha Province	700.
Gold	kilograms	Small-scale and artisanal mining operations (private, 100%)	Western and eastern Cordilleras, southern Ecuador	8,000.
Petroleum, crude	thousand 42-gallon barrels	Owned and operated by Empresa Estatal Petróleos del Ecuador (Ecuadorian Government, 100%)	About 28 active fields, led by Sacha, Sucumbios Province, and Shushufindi, Napo Province	71,000.
Do.	do.	Operated by Sipetrol S.A. (Empresa Nacional del Petróleo S.A., Chilean Government, 100%)	Biguno, Huachito, Mauro Davalos Cordero, and Paraiso Fields, Napo Province	7,000.
Do.	do.	Operated by Alberta Energy Company (AEC) Ecuador Ltd. (EnCana Corporation, 100%)	Mostly Dorine Field but 6 others, led by Fanny 18-B and Alice Fields, Tarapoa Block, Sucumbios Province	20,000.
Do.	do.	Owned and operated by City Oriente Ltd., 100%	Three fields, led by Tipishca-Huaico, Block 27, Sucumbios Province	1,500.
Do.	do.	Owned and operated by Occidental Petroleum Corporation, 100%	Most production from Eden Yuturi Field, Block 15, Napo Province, but also from Indillana and Yanaquincha wells; Limoncocha Field, Block 15, Sucumbios Province	37,000.
Do.	do.	Owned and operated by Petrobell Inc., 100%	Tigüino field, Block 30, Pastaza Province	1,700.
Do.	do.	Owned and operated by Petróleos Sudamericanos S.A., 100%	Mascarey Field, Block 11, Sucumbios Province	2,400.
Do.	do.	Owned and operated by EnCana Corporation, 100%	Hormiguero, Nantu, Sunka, Wanke Fields, Block 14, Napo Province; fields in Block 17, Napo and Pastaza Provinces	3,200.
Do.	do.	Owned and operated by Perenco plc	About seven fields, led by the Coca-Payamino Field, Block 7, Napo Province, and the Yuralpa Field, Block 21, Pastaza Province	8,100.
Do.	do.	Owned and operated by Repsol YPF S.A.	Amo, Bogui-Capiron, Daimi, Ginta, and Iro Fields, and three other small fields, Block 16, Napo Province	19,300.
Do.	do.	Owned and operated by Agip Petroleum Ecuador Ltd. (Eni S.p.A., 100%)	Villano Field, Block 10, Pastaza Province	7,600.
Do.	do.	Operated by Ecuador TLC S.A. (Petrobras Energía Ecuador S.A. [Petróleo Brasileiro S.A., 100%], 100%)	Palo Azul and Pata Fields, Block 18, Napo Province	11,700.
Do.	do.	Operated by TecpEcuador S.A.; owned by Tecpetrol S.A. (Techint S.A., 100%)	Bermejo Field, Block 11, Sucumbios Province	3,100.
Petroleum, refinery products	do.	Owned and operated by Empresa Estatal Petróleos del Ecuador (Ecuadorian Government, 100%)	Esmeraldas refinery, Esmeraldas Province	40,200.
Do.	do.	do.	Libertad refinery, Guayas Province	16,800.
Do.	do.	do.	Amazonas refinery and gas plant, Napo Province	7,300.
Sand and gravel (aggregates)	thousand metric tons	Holcim Agregados S.A. (Holcim Ecuador S.A., 100%)	Two plants near Manta and Portoviejo, Manabi Province, and one plant near the capital city of Quito, Pichincha Province	2,500
Steel, crude		Complejo Siderurgico ANDEC - FUNASA (Acerías Nacionales del Ecuador-Fundiciones Nacionales S.A.) (Holdindine S.A. and other private, 100%)	Complex of plants in Port of Guayaquil, Guayas Province	85,000.

^cEstimated; estimated data are rounded to no more than three significant digits.

TABLE 3
ECUADOR: ESTIMATED MAJOR INVESTMENT EXPENDITURES IN MINERAL EXPLORATION IN 2005¹

(Thousand dollars)

Location	Project Name	Commodity	Ownership	Annual investment	Planned startup date
50 kilometers west of Cuenca, Azuay Province	Rio Blanco (feasibility)	Gold, silver	International Minerals Corp., 100%	4,900	2008
40 kilometers southwest of Cuenca, Azuay Province	Quimsacocha (advanced exploration)	Gold, silver	IAMGOLD Corporation	5,200	NA
65 kilometers southwest of Cuenca, in Azuay Province	Ganarin (exploration)	Gold, silver	Nortec Ventures Corporation (on 51% earn-in option from Doubloon Exploration Corp.), 100%	340	NA
Azuay, El Oro, and Pichincha Provinces, of which:					
Azuay Province, southcentral Ecuador	Shyri (exploration)	Gold, silver	Cornerstone Capital Resources Inc., (on option from Sierra Minera S.A.), 100%	1,300 ²	NA
50 kilometers southeast of Machala, El Oro Province, southwestern Ecuador	Bella Maria (exploration)	Gold	Cornerstone Capital Resources Inc. (on option from Sierra Minera S.A.), 100%	do.	NA
60 kilometers west of Quito, Pichincha Province	La Plata (exploration)	Copper, gold, silver, lead, zinc	Cornerstone Capital Resources Inc. (on 70% earn-in option from Sultana del Condor Minera S.A.), 100%	do.	NA
200 kilometers southwest of Quito, in Cotopaxi Province	Macuchi (exploration)	Copper, gold, silver, zinc	Largo Resources Ltd. (on 51% earn-in option from Compañía Minera Macuchi Mimacuchi S.A.), 100%	1,200	NA
40 kilometers southeast of Machala, El Oro Province	Cangrejos (exploration)	Copper, gold, molybdenum	Odin Mining and Exploration Ltd., 100%	65	NA
Near cities of Zaruma and Portovelo, El Oro Province	Zaruma (exploration)	do.	do.	680	NA
60 kilometers northeast of Quito, in Imbabura Province	El Corazon (exploration)	Gold	Skeena Resources Limited	2,400	NA
50 kilometers north of Loja, Loja Province	Cañicapa (exploration)	Gold	do.	22	NA
Loja Province, southwest Ecuador	Dynasty Goldfield (exploration)	Copper, gold, silver	Dynasty Metals & Mining Inc., 100%	1,900	NA
40 kilometers north of Mirador project, Marong-Santiago Province	Panantza and San Carlos (exploration)	Copper, gold, molybdenum	do.	160	NA
North Zamora-Chinchipe and south Marona-Santiago Provinces	Condor (4 exploration sites, including the Fruta del Norte prospect)	Gold	Aurelian Resources Inc., 100%	3,600	NA
Zamora-Chinchipe Province	Condor (exploration)	Gold	Goldmarca Limited (under 70% earn-in option with Government of Ecuador), 100%	2,100	NA
40 kilometers east of Zamora, Zamora-Chinchipe Province	Jerusalem (feasibility)	Gold	do.	320	NA
70 kilometers east-southeast of Cuenca, in Zamora-Chinchipe Province	Mirador (feasibility)	Copper, gold, silver	Corriente Resources Inc., 100%	8,400	2008 ³

NA Not available.

¹Estimated data are rounded to no more than two significant digits.

²Across La Plata, the Shyri, and the Bella Maria properties in Ecuador.

³Not before this date.

