

THE MINERAL INDUSTRY OF CÔTE D'IVOIRE

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Côte d'Ivoire is a West African country that borders Burkina Faso, Ghana, Guinea, Liberia, and Mali. For 1999, Côte d'Ivoire's gross domestic product (GDP) was estimated to be \$11.2 billion, and the annual GDP growth rate was estimated to be 2.8% compared with 1998. Minerals were a minor component of the national economy, whereas agriculture accounted for 26% of the GDP in 1999 (World Bank, September 11, 2000, Côte d'Ivoire at a glance, 1999, accessed November 2, 2000, at URL http://www.worldbank.org/data/countrydata/aag/civ_aag.pdf). The country was one of the world's largest producers of cocoa beans, coffee, and palm oil. Although mineral production was modest, offshore hydrocarbon production remained an important domestic source of energy (table 1).

The February 1999 dissolution of the LaSource Compagnie Minière joint venture between Bureau de Recherches Géologiques et Minières (BRGM) of France and Normandy Mining Ltd. of Australia altered the ownership of two gold properties in Côte d'Ivoire formerly held by LaSource. The Ity gold mine, which was operated by the Société des Mines d'Ity (SMI), was undergoing a \$2.6 million upgrade to expand output by 700 kilograms per year (kg/yr) of gold to about 2,000 kg/yr. After the LaSource breakup, SMI was owned by Normandy Mining (51%) and the state-owned Société d'Etat pour le Développement Minier (SODEMI) (49%). In July 1999, Cie. Minière d'Afrique (CMA) opened the Angovia gold mine, which was northwest of the capital of Yamoussoukro; the mine was producing at a rate of about 1,200 kg/yr. CMA became a subsidiary of BRGM after the LaSource unbundling (Gold Gazette, 2000).

The Afema gold mine, which was in the southwest of the country, ceased mining operations in December 1998. Depletion of high-grade oxide reserves and the continuous weakness of the gold market made operations unprofitable. The Afema permit was jointly owned by Société des Mines d'Afema (68%), which was owned by Eden Roc Mineral Corp. of Canada, and SODEMI (32%). Evaluation of the development of the sulfide resources at Afema was planned (Northern Miner, 1999).

Côte d'Ivoire had proven deposits of bauxite, cobalt, diamond, iron, manganese, nickel, and tantalite (Mining Journal, 2000). A number of companies were actively operating on exploration permits in 1999.

Although kimberlites were known to exist at Kanangone, Seguela, and Tortiya, diamond was produced only from the alluvial deposits at Tortiya and Seguela. Carnegie Minerals Ivory Coast s.a.r.l. (CMIC) explored the Bobi concession, which included the Toubaboukou dyke. CMIC was a joint venture of African Carnegie Diamonds Plc. (75%), which was a subsidiary of Carnegie Corp. Ltd. of Australia (formerly Carnegie Minerals NL), and SODEMI (25%). The Government

would acquire 10% interest in the venture from Carnegie at the mining stage.

Iron ore deposits in Côte d'Ivoire were at Monogaga, which is near Sassandra between San-Pédro and Dabou, and Mount Gao, Mount Klahoyo, Mount Nimba, Mount Segaye, Mount Tia, and Mount Tortro. The country's total iron ore resource was estimated to be 3,000 million metric tons (Mt) (MBendi Information Services (Pty.) Ltd., July 12, 2000, Côte d'Ivoire—Iron ore mining, accessed February 19, 2001, at URL <http://www.mbendi.co.za/indy/ming/iron/af/ci/p0005.htm>). In December 1999, Melkior Resources Inc. of Canada signed a letter of agreement with SODEMI to earn a 50% interest in the Mount Klahoyo iron deposit; SODEMI would retain 50% equity interest in the prospect. In a 1976 feasibility study, Mount Klahoyo's iron ore reserves were estimated to be 670 Mt of iron content. The study proposed that the Mount Klahoyo magnetite, a 32.7% iron ore, could be beneficiated to a concentrate grading 70% iron with 2% silica (Melkior Resources Inc., December 16, 1999, Melkior lands a major iron project in Ivory Coast, Press Release, accessed December 17, 1999, at URL <http://biz.yahoo.com/ccn/991216/m.html>).

Falconbridge International Ltd. of Canada continued evaluation of its Touba-Biankouma license. The property contains deposits of nickel and cobalt that were estimated to be 292 Mt of ore at a grade of 1.46% nickel and 0.11% cobalt. A feasibility study was carried out by Falconbridge's (60%) joint venture with Consolidated Trillion Resources Ltd. of Canada (15%) and SODEMI (25%) (MBendi Information Services (Pty.) Ltd., [undated], Côte d'Ivoire—Nickel and cobalt mining, accessed February 10, 2001, at URL <http://www.mbendi.co.za/indy/ming/nkcb/af/ci/p0005.htm>).

The Nielle joint venture of Randgold Resources Ltd. of the United Kingdom and North Ltd. of Australia continued evaluation of the Tongon project. At midyear, Ashanti Goldfields Co. Ltd. of Ghana acquired a 3-year gold exploration permit in the Allangoua region near Abengourou (African Mining, 1999). Jandera Resources NL, which was a subsidiary of Diversified Mineral Resources NL of Australia, was exploring the Agbaou gold property, which was 200 kilometers (km) northwest of Abidjan. In May 1999, Diversified Mineral Resources was acquired by Hargraves Resources NL of Australia. By yearend, Hargraves had been acquired by Durban Roodepoort Deep, Ltd. of South Africa.

Shield Equities Ltd. of Australia (formerly Leo Shield Exploration Ltd.) held three gold concessions in Côte d'Ivoire—the Korhogo, the Tengrela East, and the Tengrela South. In September 1999, Ashanti Goldfields withdrew from a joint venture with Shield on the Korhogo permit. The Tengrela East and the Tengrela South concessions were in a Birimian greenstone belt in northern Côte d'Ivoire. Ownership interest of both Tengrela exploration licenses was Shield (80%), Randgold

Resources (10%), and the Government of Côte d'Ivoire (10%) until November 1999, when Randgold withdrew from the joint venture. According to Shield, a number of companies expressed interest in joining the Tengrela joint venture (Shield Telecommunications Ltd., [undated], Leo Shield Exploration Ltd., Review of operations—Côte d'Ivoire, accessed February 21, 2001, at URL <http://www.shieldequities.com.au/AnnReport99Ops.html>).

Golden Star Resources Ltd. closed its offices in Côte d'Ivoire and relinquished its right on the Koutoukounou and the Tortiya prospects. Changes in corporate strategy and weak gold prices were cited as the principal reasons for their divestment.

In October 1999, Ocean Energy Inc. of the United States abandoned the East Grand Lahou well located on block CI-105 (Africa Energy and Mining, 1999b). Ranger Oil Ltd. of Canada was evaluating the Espoir oilfield on offshore block CI-40; the company had scheduled a 1-year drilling program to begin in the fourth quarter of 2000.

The operating company for the Foxtrot gasfield on offshore block CI-27 was Apache Côte d'Ivoire Petroleum. After Apache Corp. of the United States sold its stake in the Apache Côte d'Ivoire Petroleum venture in September 1999 to Mondoil Corp. of the United States, the new owners were Mondoil Côte d'Ivoire (24%); SAUR Energies Côte d'Ivoire (24%), which was a subsidiary of SAUR International of France; state-owned La Société Nationale d'Opérations Pétrolières de la Côte d'Ivoire (Petroci) (40%); and the Electricité de France/Gaz de France Group (12%) (Africa Energy and Mining, 1999a). The first production well on block CI-27 had been drilled in 1998 and tested at the rate of 1.15 million cubic meters per day of natural gas and 600 barrels per day of condensate. The initial production of 850,000 cubic meters per day was supplied to powerplants at Azito and Vridi under a 10-year take-or-pay contract (World Oil, 1999).

On April 20, 1999, Vanco International Ltd., which was a subsidiary of Vanco Energy Co. of the United States, signed production-sharing contracts with Petroci for deepwater blocks CI-109 and CI-112. Vanco will be the operator for both blocks and will hold a 90% interest in block CI-109 and a 76.5% interest in block CI-112. Petroci held the remaining interest in block CI-109. Block CI-112 partners included Xpronet (13.5%) and Petroci (10%) (Vanco Energy Co., April 21, 1999, Vanco expands west Africa activity—Signs agreement for deepwater Blocks offshore Côte d'Ivoire, accessed April 3, 2000, at URL <http://www.businesswire.com/photowire/pw.042199/191110309.htm>).

In March 1999, the Government of Côte d'Ivoire signed an agreement with the Government of the United Kingdom and Pepsen, which was an engineering and consultancy group, for a feasibility study to construct a pipeline between Côte d'Ivoire and Ghana (Alexander's Gas and Oil Connections, March 31, 1999, UK to fund Côte d'Ivoire to Ghana pipeline study, accessed September 16, 2000, at URL <http://www.gasandoil.com/goc/history/welcome.html>). On May 13, 1999, a 4-day fire at Côte d'Ivoire's main petroleum depot in Abidjan destroyed two large oil storage tanks (Yahoo News, May 17, 1999, Ivory Coast fuel depot in flames, accessed May 19, 1999, at URL <http://dailynews.yahoo.com/headlines/ap/I...=v/ap/19990517/>

[wl/ivory_coast_fire_1.html](http://dailynews.yahoo.com/headlines/ap/I...=v/ap/19990517/wl/ivory_coast_fire_1.html)).

The Government announced its intention to privatize 26 state-owned companies by the end of 2000. Among them was the Société Ivoirienne de Raffinage (SIR), which was Côte d'Ivoire's oil refinery. The Government planned to sell 37% of its 47.25% holding in SIR. The Government of Burkina Faso owned 5.39% equity interest in SIR, and the remainder was held by subsidiaries of the Elf Aquitaine Group of France, Mobil Corp. of the United States, the Royal Dutch/Shell Group of the Netherlands and the United Kingdom, Texaco Inc. of the United States, and the TotalFina Group of France. SIR had a refining capacity of 3 million metric tons per year and mainly refined crude oil from Nigeria (Alexander's Gas and Oil Connections, September 14, 1999, Ivory Coast extends preliminary round of bids for stake in SIR refinery, accessed September 16, 2000, at URL <http://www.gasandoil.com/goc/history/welcome.html>). The December 24, 1999, military coup d'état resulted in the indefinite postponement of the SIR privatization (Africa Energy and Mining, 2000).

Installed electricity generation capacity of about 1,300 megawatts (MW) from hydroelectric and diesel- and natural gas-fired plants was maintained by the Government-owned Energie Electrique de la Côte d'Ivoire, the private entity Cie. Ivoirienne de Production d'Electricite, and the Cinergy consortium. Cinergy's 114-MW gas-fired plant at Azito came online in early 1999. An additional 276 MW (a 144-MW gas-fired plant and a 132-MW steam-generation plant) were planned. Cie. Ivoirienne d'Electricité was responsible for transmission and distribution of electricity in Côte d'Ivoire (Energy Information Administration, Cote d'Ivoire, July 2000, accessed March 7, 2001, at URL <http://www.eia.doe.gov/emeu/cabs/cdivoire.html>; MBendi Information Services (Pty.) Ltd., July 12, 2000, Côte d'Ivoire—Electrical power, accessed February 10, 2001, at URL <http://www.mbendi.co.za/indy/powr/af/ci/p0005.htm>).

The Government of Côte d'Ivoire indicated interest in initiating a prefeasibility study to evaluate a 350-km rail line from the port of San-Pédro to the vicinity of the Mount Klayaho iron deposit and the Touba-Biankouma nickel deposit (Melkior Resources Inc., 1999, Melkior lands a major iron project in Ivory Coast, Press Release, accessed December 17, 1999, at URL <http://biz.yahoo.com/ccn/991216/m.html>).

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TABLE 1
CÔTE D'IVOIRE: ESTIMATED PRODUCTION OF MINERAL COMMODITIES 1/

| Commodity 2/ | | 1995 | 1996 | 1997 | 1998 | 1999 |
|-------------------|----------------------------|----------|------------|------------|----------|----------|
| Cement | thousand metric tons | 1,000 | 1,000 | 1,100 | 650 | 650 |
| Diamond | carats | 75,300 | 301,591 3/ | 306,665 3/ | 310,000 | 310,000 |
| Gold | kilograms | 1,983 3/ | 1,883 3/ | 2,419 3/ | 3,400 r/ | 2,628 3/ |
| Natural gas | million cubic meters | 36 | 547 3/ | 879 | 1,000 | 800 |
| Petroleum: | | | | | | |
| Crude | thousand 42-gallon barrels | 2,000 | 5,833 3/ | 5,334 3/ | 7,300 | 10,000 |
| Refinery products | do. | 19,300 | 7,620 3/ | 7,850 3/ | 7,500 | 10,000 |
| Tantalite | kilograms | 500 | 500 | 1,350 3/ | 1,400 | 1,000 |

r/ Revised.

1/ Includes data available through November 1, 2000.

2/ In addition to the commodities listed, Côte d'Ivoire produced clays, crushed granite, manganese, sand and gravel, and stone. Information is inadequate to make estimates of output levels.

3/ Reported figure.