THE MINERAL INDUSTRIES OF

CÔTE D'IVOIRE, GUINEA, LIBERIA, AND SIERRA LEONE

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CÔTE D'IVOIRE

Civil unrest that began in December 1999 caused foreign investment to begin to dry up and pushed the economy towards a recession (Washington Post, 2000). Côte d'Ivoire's production of minerals represented a minor component of its national economy, whereas agriculture accounted for 26% of the gross domestic product (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. Côte d'Ivoire had proven deposits of bauxite, cobalt, diamond, iron, manganese, nickel, and tantalite (Mining Journal, 2000a). A number of companies were actively operating on exploration permits in 2000.

Despite the civil unrest, gold production in 2000 increased to 3,154 kilograms (kg), which exceeded forecasts of 2,880 kg (Gold Gazette, 2000). Most of the gold was produced at two gold mines. The Ity gold mine, which was operated by the Société des Mines d'Ity [Normandy Mining Ltd. of Australia (51%) and the state-owned Société d'Etat pour le Développment Minier (SODEMI) (49%)] produced more than 1,500 kg of gold. The Angovia gold mine, which was purchased on July 31, 2000, from Bureau de Recherches Geologiques et Minières of France by the COGEMA Group of France through its subsidiary Compagnie Francaise de Mines et Metaux, also produced more than 1,500 kg of gold in 2000 (COGEMA, August 9, 2000, COGEMA buys COMINOR, accessed April 11, 2001, at URL http://www.cogema.fr/actualites_gb/communiques/presse_gb/august092000.html).

Eden Roc Mineral Corp. of Canada renewed its exploration permit for the Afema property for an additional 3 years; the Afema exploration permit was jointly owned by Eden Roc Mineral Corp. (85%) and SODEMI (15%). Eden Roc's production of gold from Afema was short-lived because the mine had been deemed unprofitable (Canada News Wire, October 12, 2000, Exploration permit for Afema property renewed and reissued to Eden Roc Mineral Corp., accessed October 13, 2000, at URL http://www.newswire.ca/releases/October2000/12/c2403.html).

The Nielle joint venture of Randgold Resources Ltd. of the United Kingdom and North Ltd. of Australia continued evaluation of the Tongon project. Resource estimates at Tongon were upgraded to 52,876 kilograms per year (reported as 1.7 million ounces per year) of gold (Randgold Resources Ltd., August 1, 2000, Morila on track, decision time for Syama as Randgold Resources Ltd. posts first profit, accessed July 25, 2001, at URL http://www.randgoldresources.com/new_page_1.htm).

Other companies with gold interests in Côte d'Ivoire were Ashanti Goldfields Co. Ltd. of Ghana, Durban Roodepoort Deep Ltd. of South Africa, Equigold NL of Australia, Jandera Resources NL (a subsidiary of Diversified Mineral Resources NL of Australia), and Shield Equities Ltd. of Australia.

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 Corp. Ltd. at the mining stage. Absolute Resources Corp. of Canada announced the sale of their diamond interests to Tanqueray Resources Ltd. of Canada.

Iron ore deposits in Côte d'Ivoire were at Monogaga, Mount Gao, Mount Klahoyo, Mount Nimba, Mount Segaye, Mount Tia, and Mount Tortro (Mines98, 1998, Ivory Coast country profile, accessed November 8, 2001, at URL http://www.mines98.com/country/ci/3.htm). 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 (Melkior Resources, Inc., December 16, 1999, Melkior lands a major iron project in Ivory Coast, accessed December 17, 1999, at URL http://biz.yahoo.com/ccn/991216/m.html).

Falconbridge Ltd. of Canada continued evaluation of its Touba-Biankouma license. The property contains a deposit of nickel and cobalt that was estimated to be 292 Mt of ore at a grade of 1.46% nickel and 0.11% cobalt. In 1999, a feasibility study was carried out by Falconbridge Ltd.'s (60%) joint venture with SODEMI (25%) and Consolidated Trillion Resources Ltd. of Canada (15%) (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).

Although Ocean Energy, Inc. of the United States abandoned the East Grand Lahou well in October 1999, it continued to produce oil from the Lion Field and gas from the Panthere Field and had several development projects at the Eland, the Ibex, and the Kudu fields (Ocean Energy, Inc., 2000, Côte d'Ivoire news, accessed November 8, 2001, at URL http://www.oceanenergy.com/3ep/internat_cote1.html).

The operating company for the Foxtrot gasfield on offshore Bock 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 state-owned La Société Nationale d'Operations Pétroliéres de la Côte d'Ivoire (40%), Mondoil Côte d'Ivoire (24%), SAUR Energies Côte d'Ivoire (24%) (a subsidiary of SAUR International of France), and the Electricité de France/Gaz de France Group (12%) (Africa Energy and Mining, 1999).

Among the other companies with oil and gas interests in Côte d'Ivoire were Dana Petroleum plc of the United Kingdom, Ranger Oil Ltd. of Canada, Tullow Oil plc of the United Kingdom, and Vanco Energy Co. of the United States.

The Government announced its intention to privatize 26 state-owned companies by the end of 2000. Among them was Côte d'Ivoire's oil refinery Société Ivoirienne de Raffinage (SIR). 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 Aquitane Group of France, Exxon Mobil Corporation 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 Elf Group of France. SIR had a refining capacity of 3 million metric tons per year (Mt/yr) 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, 2000a).

GUINEA

Guinea was the world's second largest bauxite producer and had the world's largest bauxite resources (Plunkert, 2001a). In 1999 (the latest year for which data are available), mining accounted for about 16% of the nation's estimated $3.7 billion GDP and a major portion of the value of Guinea's exports (World Bank, September 9, 2000, Guinea at a glance, accessed November 22, 2000, at URL http://www.worldbank.org/data/countrydata/aag/gin_aag.pdf). Guinea supplied about 39% of the United States' metallurgical-grade bauxite imports in 2000 (Plunkert, 2001b). In addition to possessing significant bauxite reserves, Guinea has diamond, gold, granite, and iron deposits. The Government encouraged the foreign participation in the bauxite sector and promoted the diversification of the mineral industry.

The Mining Code of 1995, as amended by Arrêté no. A98/5874/MRNE/SGG of August 10, 1998, defines incentives, mineral ownership, mining fees, mining titles, royalties, and other taxes. The Government reserves 15% free equity for itself in all gold and gem operations. State participation in bauxite- and iron-ore-mining ventures is subject to negotiation. Mineral beneficiation in Guinea is encouraged. Royalties are 5% on alumina and 3.5% on concentrates of other minerals compared with 10% on bauxite and 7% on other ores. The corporate income tax rate was 35%.

The largest bauxite producer in Guinea Compagnie des Bauxites de Guinée (CBG) operated a number of open pit bauxite mines, which included the Sangarédi, in the Boké District. CBG had a capacity of 14 Mt/yr and was controlled by Halco Mining, Inc. (51%) (a consortium comprised of Alcan, Inc. of Canada, Pechiney of France, and Alcoa, Inc. of the United States), and the Government (49%) (Mbendi Information Services, May 16, 2001, Guinea—Bauxite mining, accessed November 8, 2001, at URL http://www.mbendi.co.za/indy/ming/baux/af/gu/p0005.htm).

In 2000, Reynolds Metals Co. of the United States and the Guinean Government were negotiating for the sale of 100% of the Government's stake in the Fria bauxite mine and the Kimbo alumina refinery. Reynolds Metals Co. offered to modernize the Kimbo alumina plant, which had a capacity of 650,000 metric tons per year (t/yr). Russia's Sibirsky Aluminy Group was also interested in the mine and refinery (Metal Bulletin, 2000a).

The State Bauxite Company of Guinea signed an agreement with Sibirsky Aluminy Group to supply bauxite to Sibirsky Aluminy Group's alumina plant in Russia in exchange for mining equipment (Metal Bulletin, 2000c). Also, United Arab Emirates Offset Group secured a bauxite concession in Guinea and was discussing the acquisition of technology for a 250,000-t/yr smelter with Pechiney (Metal Bulletin, 2000b).

In 2000, Guinea Aluminum Products Corp. of the United States signed a memorandum of understanding with the Guinean Government for the construction and operation of an alumina refinery. The facility would involve investment of $1.5 billion with an operating capacity of 240,000 t/yr (Boubah.Com, December 2000, Interview with GAPCO's director on new Guinea project, accessed August 3, 2001, at URL http://www.boubah.com/Guineenews/Interview/ Interview.htm).

In December, the Government awarded Semafo, Inc. of Canada a 10-year mining license for the Jean Gobele project. Construction was expected to begin in early 2001 with production of 18,662 kg/yr (reported as 600,000 ounces per year) of gold expected to begin by the end of 2001. Costs of operations were estimated to be $157 per ounce of gold (Semafo, Inc., [undated], Guinea operations, accessed July 11, 2001, at URL http://www.semafo.com/operations_guinea.html).

Kenor ASA of Norway was the operator of the Siguiri gold mine, which was the largest in Guinea, and discovered significant gold mineralization at its Kankarta prospect. Kenor ASA noted that the property is located in a region that had not been subjected to previous drilling activity (Mining Journal, 2001). Other companies with gold interests in Guinea were African Mining Corp. of Canada, Arena Gold Resources, Inc., of Canada, Cambior, Inc., of Canada, Mano River Resources, Inc., of Canada, Mincor Resources NL of Australia, Rio Tinto plc of the United Kingdom, and Shield Equities Ltd.

The Government forecast for diamond production in 2000 was 60,000 carats; the potential for an additional 220,000 carats could come from small-scale operators (Africa Energy and Mining, 2000b). Trivalence Mining Corp. of Canada was the largest producer with diamond production of 40,803 carats at its Aredor diamond concession. Trivalence estimated that production from Aredor at the current (2000) level could continue for an additional 10 years (Trivalence Mining Corp., 2000, Overview of operations at Aredor diamond mine in Republic of Guinea, accessed August 6, 2001, at URL http://www.trivalence.com/guinea_operations.htm). Other companies with diamond interests in Guinea were Arena Gold Resources, Inc., Dia Bras Exploration, Inc. of Canada, Hymex Diamond Corp. of Canada, Kenor, Rio Tinto, and Searchgold Resources, Inc. of Canada.

Total bauxite reserves were estimated to be about 20 billion metric tons (Gt) at a grade of more than 40% aluminum oxide, according to the Ministère des Ressources Naturelles et de l'Energie (1997). Iron resources were estimated to be about 6 Gt at a grade of 64% to 68% iron, and gold reserves were estimated to be between 200 and 1,000 metric tons (t) of contained gold. The Government also estimated there were reserves of 20 million carats of diamond in Guinea.

Major highways have been paved, but the rural transportation infrastructure was inadequate to meet needs. Guinea had two main ports—Conakry and Kamsar. Conakry, which was the country's main general cargo port, was linked to the Kinda Mine by a 104-kilometer (km) 1.435-meter (m) standard-gauge railroad line and to the Fria Mine by a 145-km 1-m narrow-gauge railway. Kamsar, which handled only bauxite shipments, was linked to the Sangarédi Mine by a 135-km standard-gauge railroad line. In addition to the mine railroads, a 661-km 1-m narrow-gauge line connected Conakry with Kankan.

Although the 1995 mining code significantly improved the business climate for the mineral industry, mining operations remained hampered by infrastructural constraints. International funding of mineral deposit development was proceeding more slowly than anticipated. The less-than-expected foreign investment was attributed to the country's perceived political and economic risks and decreased availability of financing for junior mining companies, as well as civil disturbances in the adjacent countries of Guinea-Bissau, Senegal, and Sierra Leone.

Alumina, bauxite, and gold production are expected to continue to dominate Guinea's economic activity. Ventures requiring significant electric power availability, such as an aluminum smelter, could become feasible as the nation's power-generation capacity is increased.

LIBERIA

Mineral production in Liberia consisted mainly of artisanal recovery of diamond and gold. The Government encouraged investment in natural resource development, although formal economic activity has been slow to recover since the end of the civil war in 1997. International exploration increased in 2000 as companies came to Liberia to examine what has been described as one of the last areas of virtually unexplored rocks in the world. Eastern Liberia is made up of rocks of Birimian age with significant potential for gold. Western Liberia is made up of rocks of Archean age that contain diamond, gold, iron ore, nickel, manganese, palladium, platinum, and uranium (Mining Journal, 2000b; Mines98, 1998, Liberia country profile, accessed November 8, 2001, at URL http://www.mines98.com/country/lr/3.htm).

In December, Mano River Resources, Inc., announced the discovery of a kimberlite pipe in western Liberia only 6 months after beginning its exploration program in mid-2000. The company's president expected that additional kimberlite pipes would be discovered and that there was a reasonable basis to expect some of them to be diamondiferous (Mano River Resources, Inc., 2000b). Also in December 2000, a United Nations panel called for an embargo on all diamond exports from Liberia owing to concerns of their potential involvement in civil unrest in Sierra Leone, their neighbor to the northwest. This action by the United Nations followed previous bans on diamond exports from Angola and Sierra Leone (Associated Press, December 19, 2000, Embargo on Liberian diamonds pursued, accessed December 30, 2000, at URL http://dailynews.yahoo.com/h/ap/20001219/wl/un_conflict_diamonds_1.html).

Mano River Resources, Inc., made several announcements of gold discoveries in 2000. In May, Mano River, announced that drilling had intersected gold mineralization at its Gondoja property (Mining Journal, 2000c). In July, Mano River announced discoveries of gold on its Weaju and King George Larjor properties, both of which are located in western Liberia. Resources at Weaju were estimated to be around 660,000 t at a grade of 10.9 grams per ton (g/t) gold (233,000 ounces of contained gold), and those at King George Larjor were estimated to be 4.1 Mt at a grade of 4.6 g/t gold (610,000 ounces of contained gold) (Mano River Resources, Inc., 2000a, 2000c). Other companies with gold interests in Liberia in 2000 were Freedom Gold Ltd. of the United States and Haddington International Resources Ltd. of Australia.

SIERRA LEONE

Mineral production in Sierra Leone in 2000 consisted mainly of artisanal recovery of diamond and gold. Civil strife has adversely affected investment in natural resource development since 1995, although conditions could improve with the implementation of the July 1999 peace agreement.

In 1999, the Sierra Leonean Parliament enacted an amendment to the 1994 Mines and Minerals Act that introduced three new sections. These were a procedure for sale and export of precious minerals by licence holders, penalties for unlawful possession of precious minerals, and penalties for smuggling precious minerals from Sierra Leone (Mining Journal, 2000d).

In November 2000, Sierra Leone's President announced that he hoped that Sierra Rutile Ltd. (owned 100% by MIL Investments SA of Luxembourg by mid-2001) would be producing sometime in 2002. Sierra Rutile had operated the largest and highest grade resource of rutile in the world prior to its closing in 1995. Furthermore, he pledged to assist in any financing needed to restart operations. Nord Resources Corp. of the United States, which sold its 50% share in Sierra Rutile Ltd. in 1999, had expected capital expenditures of more than $100 million were needed to restart operations (Industrial Minerals, 2001).

Alusuisse Group of Switzerland, which was the owner of the

Sieromco bauxite mine, announced that after reassessing the mine, it had decided not to return to Sierra Leone and was looking for a buyer of its operation (Mining Journal, 2000d; Economist Intelligence Unit, October 20, 2000, Sierra Leone economic background, accessed June 6, 2001, at URL http://www.eiu.com/latest/433013.asp).

Olympus Stone, Inc., of Canada entered into an agreement to acquire the Black Pearl granite mine at Adonkia, Freetown. The mine had a production capacity of 300 cubic meters per month of dimension stone. Management estimated that $437,000 would be required to restart operations (Canada Newswire, April 10, 2000, Olympus announces Black Granite mine acquisition, accessed July 24, 2001, at URL http://www1.newswire.ca/releases/April2000/10/c2676.html).

In a joint venture with the Ministry of Mineral Resources of Sierra Leone, TGS-NOPEC Geophysical Co. of the United States began a two-dimensional seismic survey that will cover 2,500 km in Sierra Leone's portion of the Liberia offshore basin (Africa Energy and Mining, 2000c).

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TABLE 1

CÔTE D'IVOIRE, GUINEA, LIBERIA, AND SIERRA LEONE: ESTIMATED PRODUCTI0N OF MINERAL COMMODITIES 1/ 2/

(Thousand metric tons unless otherwise specified)

Commodity		1996	1997	1998	1999	2000
CÔTE D'IVOIRE 3/						
Cement		1,000	1,100	650	650	650
Columbite	kilograms	NA	NA	NA	273 r/ 4/	137 4/
Diamond	carats	301,591 4/	306,665 4/	310,000	398,282 r/ 4/	320,207 4/
Gold	kilograms	1,883 4/	2,419 4/	3,400	2,717 r/ 4/	3,154 4/
Natural gas	million cubic meters	547 4/	879	1,000	800	800
Petroleum:						
Crude	thousand 42-gallon barrels	5,833 4/	5,334 4/	7,300	10,000	10,000
Refinery products	do.	7,620 4/	7,850 4/	7,500	10,000	10,000
Tantalite	kilograms	500	1,350 4/	1,400	686 r/ 4/	408 4/
GUINEA 5/						
Alumina:						
Production:						
Hydrate		650	527	490	500	550
Calcined		640	650 4/	480	500	500
Shipments, calcined		619	640	511 4/	480 4/	480
Bauxite:						
Mine production:						
Wet basis 6/		18,700	19,250	17,000	17,000	17,000
Dry basis 7/		15,628	16,359 4/	15,000	15,000	15,000
Calcined		470	660	100	100	100
Shipments (dry basis):						
Metallurgical		13,000	14,500	14,000	14,000	14,000
Calcined		95	95	100	100	100
Cement		260,000	260,000	260,000	250,000	250,000
Diamond 8/ 9/	thousand carats	205	205	400	550 r/	450
Gold 9/	kilograms	6,838	7,100	11,700	13,300	13,300
Salt		NA	NA	NA	15	15
LIBERIA 10/						
Cement, hydraulic 11/		15	7	10	15	15
Diamond	carats	150,000	200,000	300,000	200,000 r/	170,000
Gold	kilograms	700	500	800	1,000	1,000
SIERRA LEONE						
Cement 12/		160	50	100	100	100
Diamond	thousand carats	270	400	250	600	350
Gold	kilograms	16	20	15	30	30
Gypsum		5	2	4	4	4
Salt		50	10	1	1	1

r/ Revised. NA Not available.

1/ Table includes data available through July 26, 2001.

2/ Estimated data are rounded to no more than three significant digits.

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

4/ Reported figure.

5/ In addition to the commodities listed, Guinea produced modest quantities of crude construction materials (clays, sand and gravel, and stone); but information is inadequate to make reliable estimates of output levels.

6/ Metallurgical plus calcinable ore estimated to be 13% water.

7/ Data are for wet-basis ore estimated to be 13% water, reduced to dry basis estimated to be 3% water.

8/ Production is approximately 70% to 80% gem quality.

9/ Figures include artisanal production.

10/ In addition to the commodities listed, Liberia produced a variety of industrial minerals and construction materials (clays, gypsum, sand and gravel, and stone); but information is inadequate to make reliable estimates of output levels.

11/ Cement production from Liberian Cement Corporation had been reported as zero from 1996 to 1997 because of the civil war. The Scancem AB 1997 annual report indicates the cement plant was open during most of the civil war.

12/ Production from imported cement clinker.