

# THE MINERAL INDUSTRIES OF CENTRAL AFRICAN REPUBLIC, CÔTE D'IVOIRE, AND TOGO

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## CENTRAL AFRICAN REPUBLIC

Central African Republic was a producer of diamond, gold, and small amounts of kaolin and quartz crystals. Identified mineral occurrences in the country included copper, graphite, ilmenite, iron ore, kyanite, lignite, limestone, manganese, monazite, rutile, salt, tin, and uranium. In 2004, the country's gross domestic product (GDP) at purchasing power parity was estimated to be about \$4.6 billion (International Monetary Fund, 2005<sup>§1</sup>). The population was estimated to be about 3.7 million (U.S. Central Intelligence Agency, 2005<sup>§</sup>).

In 2004, diamond production rose to about 350,000 carats from 332,700 carats in 2003. Diamond was produced from alluvial deposits in the north. Diamond exports amounted to 349,451 carats at a value of \$51.6 million. Uncut diamond made up nearly 60% of export earnings (Harben, 2004).

Energem Resources Inc., formerly known as Diamondworks Ltd., of Canada (name changed in May 2004) relinquished some of the properties that it had held under concession in the country, but kept the Bangana, Bria, Kotto, and Ouadda alluvial diamond mining areas. Mining licenses had been temporarily suspended in 2003 following the overthrow of the Government. In 2004, the rights to the concessions kept by Energem were reconfirmed by the relevant authorities and the company recommenced prospecting in May 2004 (Energem Resources Inc., 2004, p. 4-5).

Vaaldiam Resources Ltd. of Canada was granted an exploration permit for the Haute Kotto alluvial diamond mining area. The company's plans to explore for diamond at its Central African Republic Kimberlite Project were on hold during the year as the company focused on other priority exploration areas in Brazil (Vaaldiam Resources Ltd., 2005).

Gold was produced by artisanal miners from the Bandas and the Bogoin-Boali greenstone belts. Axmin Inc. of Canada continued to explore for gold in the country. In March 2004, the company was granted a renewal of its 100%-owned Bambari permit. The four gold prospects delineated at Bambari were the Ao, the Louba, the Ndassima, and the Passendro gold prospects. At least six gold targets had been delineated at Passendro; these included the Baceta, the French Camp, the Katsia, the Main Zone, the Ngetepe, and the Ngodo. The company reported the indicated resource at French Camp to be 2.38 million metric tons (Mt) at a grade of 3.4 grams per metric ton (g/t) gold and the inferred resource to be 0.22 Mt at a grade of 2.4 g/t gold. The indicated resource at Katsia was reported to be 1.65 Mt at a grade of 3.7 g/t gold and the inferred resource to be 1.1 Mt at a

grade of 3.6 g/t gold. The inferred resource at Main Zone was reported to be 17 Mt at a grade of 1.6 g/t gold. The company planned to drill the Ao and the Ndassima areas in early 2005 (Axmin Inc., 2004<sup>§</sup>).

Central African Republic did not produce mineral fuels in 2004 and depended upon imports for its energy requirements. In September 2004, United Reef Limited of Canada obtained the rights to a petroleum exploration permit in Central African Republic through a farm-in agreement with Denver-based RSM Production Corporation (RSM), which was a subsidiary of Grynberg Petroleum of the United States. The exploration permit was for the Doseo and the Salamat Basins in the northern part of the country. According to United Reef, a total of 18 prospects had been identified in the Salamat Basin. No prospects had been identified in the Doseo Basin. After meeting the terms of the farm-in agreement, the company will have the option to acquire a 25% working interest in RSM's exploration permit. United Reef planned to conduct a seismic program in 2005 and will begin its drilling program as early as the fourth quarter of 2005 (Paul A. MacKay Geoconsultants Ltd., 2004, p. 1, 3, 5).

## Outlook

The successful development of Central African Republic's mining industry will depend upon the country reaching political stability in the near future and the Government's willingness to allow foreign companies to continue with their diamond, gold, and petroleum exploration programs.

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

## CÔTE D'IVOIRE

Côte d'Ivoire was a producer of cement, clay, columbium (niobium) and tantalum, diamond, gold, gravel and crushed rock, manganese, natural gas, crude petroleum and petroleum products, sand, and sulfuric acid. The country also had deposits of bauxite, cobalt, copper, iron ore, nickel, and silica sand.

According to the United Nations Office for the Coordination of Humanitarian Affairs (2004§), Côte d'Ivoire almost relapsed into civil war during 2004 after the Government violated the ceasefire agreements it had signed with rebel groups in 2002 and 2003. Violence erupted in March after the Government banned opposition demonstrations in Abidjan and in November when French peacekeeping troops attacked the Ivorian air force in retaliation for an Ivorian raid on rebel-held cities to the north of the country and an attack on a French military base by rioters (United Nations Office for the Coordination of Humanitarian Affairs, 2004§; U.S. Department of State, 2005§).

The Ivorian economy was largely dependent on agriculture. Cocoa and coffee accounted for about 40% of export earnings in 2004. The mining sector grew by 29% during the year owing to an increase in petroleum production. Gold output decreased as a result of the closing of the Angovia gold mine (Organisation for Economic Co-operation and Development, 2005, p. 194-196). In 2004, Côte d'Ivoire's gross domestic product at purchasing power parity was estimated to be about \$26.6 billion (International Monetary Fund, 2005§). The population was estimated to be 16.9 million (Organisation for Economic Co-operation and Development, 2005, p. 192).

### Metals

In 2004, gold production fell to 1,219 kilograms (kg) from 1,313 kg in 2003. The decrease in output was attributed to the closure of the Angovia Mine. Gold production came from the Ity Mine, which was owned by the Cie. Générale Des Matieres Nucleaires Group (COGEMA) of France (51%) and state-owned Société pour le Développement Minier en Côte d'Ivoire (SODEMI) (49%). The Ity Mine is located at the border of the buffer zone between the northern part of the country, which is controlled by the Forces Nouvelles rebel group, and the southern part of the country, which is controlled by Les Forces Armées Nationales de Côte d'Ivoire (FANCI), which are the national armed forces. The buffer zone is controlled by the French Army. The Ity Mine had stopped production in 2003 after rebel groups took over the mining site in late 2002. Ity mining company vehicles were seized by the FANCI during the November 2004 incident, but were later returned. The Forces Nouvelles have denied Ity access to the mine from the north via the Zouart-Hounien-Danane-Man road, which delayed the delivery of cyanide and cement supplies to the mine (Africa Mining Intelligence, 2005).

Equigold NL of Australia through its subsidiary Equigold Côte d'Ivoire S.A. held a 94% interest in five gold exploration

permits. The permits were for the Bassawa, the Didievi, the Kokoumbo, the Oume, and the Timbe properties, which are located within the country's Oume-Fetekro Proterozoic greenstone belt. In 2004, a drilling program was completed at the Bonikro gold deposit, which is located on the Oume property. The company reported a new resource estimate for Bonikro of 25 Mt of ore at a grade of 1.6 g/t gold and a cutoff grade of 0.6 g/t gold. Equigold planned to complete a feasibility study for Bonikro in 2005 (Equigold NL, 2005, p. 10-11).

Randgold Resources Ltd. of the United Kingdom held the Boundiali, the Dabakala, the Mankono, the Nielle, and the Sikolo properties. Randgold reported that it had temporarily suspended its exploration activities in Côte d'Ivoire during 2004 owing to the outbreak of civil unrest in the country. The company's Tongon project, which was located within the Nielle property about 620 kilometers (km) north of Abidjan, was on hold in 2004. Randgold signed a standstill agreement with the Government and reported that it would not resume work at Tongon until the country reached political stability, the Government guaranteed the security of personnel and equipment, and Randgold had full access to the project through basic transportation routes (Randgold Resources Ltd., 2005, p. 10, 29). Following a prefeasibility study for Tongon, which was completed in 2001, the company reported an inferred resource of 34 Mt of ore at a grade of 2.6 g/t gold. The mineral resource estimate was based on 62 drill holes in the target area, of which 35 were diamond drill holes and 27 were reverse circulation holes at a drill spacing of 50 to 100 meters (m) in the southern zone and 150 to 300 m in the northern zone. Mineralization was found at a depth of 120 m, and the resource was calculated using a 0.5 g/t cutoff grade. Randgold envisioned an open pit operation with a 200,000 metric-ton-per-month (t/mo) recovery plant for the sulfide and a 240,000-t/mo recovery plant for the oxide. Metallurgical testwork indicated a recovery rate of 95% gold for the oxide and 82% for the sulfide (Randgold Resources Ltd., 2005, p. 31-32).

Etruscan Resources Inc. of Canada held an exploration permit for the Agbaou gold deposit, which is located about 200 km northwest of the Port of Abidjan. The deposit is accessible through a paved highway and is located within 2 km of the national power grid. The exploration permit was granted to Etruscan in November 2003. An independent resource estimate prepared by RSG Global of Australia in 2000 reported an indicated gold resource of 18.24 Mt at an average grade of 1.5 g/t gold using a cutoff grade of 0.5 g/t. Etruscan announced that it was unable to begin its planned drilling program in 2004 because of political instability in the country (Etruscan Resources Inc., 2005, p. 6).

Cluff Gold plc. of the United Kingdom held an exploration permit for the Mt. Yaoure property, which is located about 40 km north of Yamoussoukro. The property includes the recently closed Angovia gold mine, which operated between 1998 and 2003. In 2004, the company purchased exploration data from Cominor S.A. (a subsidiary of COGEMA), which included drill assay results that identified satellite gold deposits in the vicinity of the Angovia gold mine. Previous Cominor reports indicated a resource of 900,000 metric tons (t) of ore at a grade of 3.7 g/t gold. Cluff Gold planned to acquire most of the oxide

processing plant at Angovia from the Government (Cluff Gold plc., 2005, p. 6-7).

### **Industrial Minerals**

Kimberlites were known to occur at Kanangone, Seguela, and Tortiya; diamond was produced only from alluvial deposits at Seguela and Tortiya. In late November 2004, the Kimberley Process Chair issued a notice that countries participating in the Kimberley Process were not to accept shipments of rough diamond from Côte d'Ivoire. The ban was in response to the Government's report that the diamond-producing areas of Seguela and Tortiya were under rebel control and that a ministerial order was in effect that prohibited all exports of rough diamond from Côte d'Ivoire and suspended the issuance of Kimberley Process Certificates (Kimberley Process, 2005§).

### **Mineral Fuels**

A consortium formed by Canadian Natural Resources Ltd. (CNR), Société Nationale d'Opérations Pétrolières de la Côte d'Ivoire (PETROCI), and Tullow Oil plc of the United Kingdom produced natural gas from the East Espoir oilfield. According to the U.S. Energy Information Administration (2005§), about 93% of Côte d'Ivoire's oil and gas wells are located offshore. CNR held several exploration blocks offshore Côte d'Ivoire. In 2004, the company continued with the development of its Baobab oilfield and announced that it expected the first oil production to start by mid-2005 at a rate of 24,000 barrels per day (bbl/d) and to reach 35,000 bbl/d by 2006. CNR planned to continue with its exploration program for its other lease holdings in the country in 2005 (Canadian National Resources Ltd., 2005, p. 35).

In December 2004, Vanco Energy Co. of the United States through its subsidiary Vanco Côte d'Ivoire Ltd. announced that it had contracted the Transocean Deepwater Discovery drillship to drill the San Pedro prospect in early 2005. The San Pedro prospect is located within Block CI-112. Vanco Côte d'Ivoire was the operator and held a 27% interest in the block. The remaining partners in the block were Sinopec Overseas Oil & Gas Ltd. of China (27%), Indian National Oil Companies ONGC Videsh Ltd. (21.15%), Oil India Limited (10.35%), and Pétrolières de la Côte d'Ivoire (14.5%) (Vanco Energy Co., 2004§). Société Ivorienne de Raffinage operated Côte d'Ivoire's only petroleum refinery; Societe Multinationale des Bitumes operated an asphalt plant.

### **Outlook**

The growth potential of Côte d'Ivoire's mining industry depends on the country's future political stability. Presidential elections were to be held in 2005.

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## **TOGO**

Togo was a producer of cement, clinker, diamond, gold, limestone, and phosphate rock. The country also had resources of bauxite, gypsum, iron ore, manganese, marble, rutile, and zinc. The Ministère de l'Équipement, des Mines, de l'Énergie et des Postes et Télécommunications was responsible for the administration of the mining sector. In 2004, the country's GDP at purchasing power parity was estimated to be about \$8.48 billion (International Monetary Fund, 2005§). Agriculture, which accounted for about 41% of the GDP in 2004, was Togo's main economic activity followed by industry, which accounted for about 24% of the GDP. Most of the industrial activity in the country was limited to phosphate rock production (Ministry of External Affairs of India, 2005§). The population was estimated to be about 5.6 million (U.S. Central Intelligence Agency, 2005§).

Ciments du Togo and West African Cement Company produced cement. West African Cement Company produced about 1 million metric tons per year of clinker, most of which was exported. The company operated a limestone quarry at Tabligbo; limestone from the quarry was exported to Diamond Cement Factory in Ghana. Resources at Tabligbo were estimated to be more than 175 Mt (Palut, 2004). Limestone was produced from the Tabligbo deposit, which was located about 60 km northeast of Lome.

Togo's production of phosphate rock decreased to 1.115 Mt in 2004 from 1.471 Mt in 2003 (table 1). The International Fertilizer Group Togo, which was a 50-50 joint venture between the Government of Togo and Brifco Ltd. of France, was the

company in charge of phosphate rock production. Phosphate rock resources were mostly from coastal sedimentary deposits, which minimized transportation costs for processing and export. The phosphate rock being produced from these deposits however, had a high content of cadmium [about 150 milligrams per kilogram (mg/kg)]. Other cadmium-free resources have been identified to the northwest, but were not being mined (Ministry of External Affairs of India, 2005§). Phosphate rock reserves were estimated to be about 260 Mt (Palut, 2004).

Togo did not produce or refine petroleum and depended upon imports to satisfy its petroleum requirements. Togo Hunt Oil Co., a subsidiary of Hunt Oil Co. of the United States, was actively exploring for petroleum offshore.

The Government's of Benin and Togo planned to construct a 100-megawatt hydroelectric plant at Adjarala in the Mono Valley, which is located on Togo's southern border with Benin. The project will include a 50-m-high dam (afrolNews, 2004§).

## Outlook

According to the Ministry of External Affairs of India (2005§) the European Union, which is Togo's principal phosphate rock export market, planned to put a cadmium content ceiling of

60 mg/kg of phosphate rock imports within 5 years and 20 mg/kg of phosphate rock within 15 years. These limits could greatly affect Togo's economy given that about 24% of its GDP is from the export of phosphate rock and the mining of its cadmium-free phosphate rock resources was not commercially viable as of 2004.

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TABLE 1  
CENTRAL AFRICAN REPUBLIC, CÔTE D'IVOIRE, AND TOGO: PRODUCTION OF MINERAL COMMODITIES<sup>1</sup>

(Metric tons unless otherwise specified)

Country and commodity	2000	2001	2003 <sup>e</sup>	2004 <sup>e</sup>	
<b>CENTRAL AFRICAN REPUBLIC</b>					
Diamond carats	464,000	452,700	416,400	332,700 <sup>2</sup>	350,000 <sup>p</sup>
Gold kilograms	15	34	16	7 <sup>r</sup>	7
<b>CÔTE D'IVOIRE<sup>3</sup></b>					
Cement <sup>e</sup>	650,000	650,000	650,000	650,000	650,000
Columbium (niobium) and tantalum:					
Columbite kilograms	137	130 <sup>e</sup>	130 <sup>e</sup>	130	130
Tantalite do.	408	400 <sup>e</sup>	400 <sup>e</sup>	400	400
Diamond carats	320,207	309,000	306,500	230,000	230,000
Gold kilograms	3,444	3,672	3,570	1,313 <sup>2</sup>	1,219 <sup>2</sup>
Gravel and crushed rock	540,000	550,000 <sup>e</sup>	550,000 <sup>e</sup>	550,000	550,000
Natural gas million cubic meters	1,146	1,062	1,610	1,457 <sup>2</sup>	1,500
Petroleum:					
Crude thousand 42-gallon barrels	2,578	2,099	5,495	6,767 <sup>r</sup>	7,434 <sup>2</sup>
Refinery products <sup>e</sup> do.	20,100	19,500	19,000	19,000	19,000
Sand <sup>e</sup>	740,000	750,000	750,000	750,000	750,000
Sulfuric acid	3,000	3,000	3,000	3,000	3,000
<b>TOGO<sup>4</sup></b>					
Cement <sup>e</sup> :					
Clinker	1,000,000	1,000,000	1,000,000	1,200,000	1,200,000
Hydraulic <sup>5</sup>	700,000	800,000	800,000	800,000	800,000
Limestone	2,400,000	2,400,000 <sup>e</sup>	2,400,000 <sup>e</sup>	2,400,000	2,400,000
Phosphate rock, beneficiated product:					
Gross weight thousand metric tons	1,370	1,067	1,271	1,471 <sup>2</sup>	1,115 <sup>2</sup>
P <sub>2</sub> O <sub>5</sub> content <sup>e</sup> do.	490	380	460	530	418 <sup>2</sup>

<sup>e</sup>Estimated; estimated data are rounded to no more than three significant digits. <sup>p</sup>Preliminary. <sup>r</sup>Revised.

<sup>1</sup>Includes data available through August 23, 2005.

<sup>2</sup>Reported figure.

<sup>3</sup>In addition to the mineral commodities listed, Côte d'Ivoire produced clay, crushed granite, manganese, and stone, but information is inadequate to make estimates of output levels.

<sup>4</sup>Togo also presumably produced diamond and gold, but output is not reported, and available information is inadequate to make reliable estimates of output levels.

<sup>5</sup>Includes cement produced from imported clinker.

TABLE 2  
CÔTE D'IVOIRE AND TOGO: STRUCTURE OF THE MINERAL INDUSTRIES IN 2004

(Metric tons unless otherwise specified)

Country and commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity	
<b>CÔTE D'IVOIRE</b>				
Cement	Société des Ciments d'Abidjan (Government, 40%; Ominum Tropical, 24%; SCOA Côte d'Ivoire SA, 12%)	Abidjan plant	750,000.	
Do.	Société Ivoirienne de Ciment et Matériaux (Holcim and Origny, 80%)	do.	500,000.	
Do.	Société des Ciments du Sud-Ouest (Government and Ominum Tropical)	San Pedro	100,000.	
Gold	Société des Mines d'Ity (Cie. Générale des Matières Nucleaires Group, 51%, and Société pour le Développement Minier en Côte d'Ivoire, 49%)	Ity Mine	450,000 ore.	
Do.	kilograms	do.	2,250 gold.	
Do.	do.	do.	1,200 gold.	
Petroleum products	thousand 42-gallon barrels	Société Ivoirienne de Raffinage	Abidjan	23,800.
<b>TOGO</b>				
Cement	Ciments du Togo (Scancem International, 99.6%)	Lomé plant	800,000 cement.	
Do.	West African Cement Company (Indian Kenyan Co., 100%)	Tabligbo	1,000,000 cement; 1,200,000 clinker.	
Limestone	Ciments de l'Afrique de l'Ouest (private, 100%)	do.	2,400,000.	
Phosphate rock	International Fertilizer Group Togo (Government, 50%, and Brifco Ltd. 50%)	Akoumape and Hahotue	2,000,000.	