



# 2010 Minerals Yearbook

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BENIN, BURKINA FASO, AND SAO TOME E PRINCIPE  
[ADVANCE RELEASE]

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# THE MINERAL INDUSTRIES OF BENIN, BURKINA FASO, AND SAO TOME E PRINCIPE

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## BENIN

Mining did not play a significant role in Benin's economy. The country produced mostly industrial minerals, which included cement, clay, limestone, marble, and sand and gravel. Gold was produced in small quantities by artisanal miners. Agriculture was the mainstay of the economy, and cotton accounted for about 40% of the gross domestic product (GDP) and about 80% of export earnings (U.S. Department of State, 2011).

Benin's exports to the United States were valued at about \$276,000 in 2010 compared with about \$441,000 in 2009. Imports from the United States were valued at about \$466 million in 2010 compared with about \$397 million in 2009. These included nearly \$2 million of excavating machinery and \$590,000 of drilling and oilfield equipment (U.S. Census Bureau, 2011a, b).

### Production

Data on mineral production in table 1 have been estimated for 2010.

### Structure of the Mineral Industry

Cement was produced by Ciments du Benin S.A., Onigbolo Cement Co. (OCC), and Société des Ciments du Benin. These companies had a combined cement production capacity of 1.6 million metric tons per year (Mt/yr) (table 2).

### Commodity Review

#### *Industrial Minerals*

**Cement.**—In September, Dangote Industries Ltd. of Nigeria (formerly Obajana Cement Plc; the name was changed in July 2010) acquired 43% interest in OCC from the Nigerian Government. OCC was established in 1982 as a joint venture between the Government of Benin (51%) and the Government of Nigeria (43%). Also in September, the Government of Benin had ceded its 51% interest to Société des Ciments du Benin, which was a joint venture with the Lafarge Group of France. The OCC plant had a capacity to produce 600,000 metric tons per year of cement (Adaramola, 2010).

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## BURKINA FASO

Mining did not play a significant role in Burkina Faso's economy. The gold sector, however, was likely to become a significant contributor to the country's GDP owing to recent developments in the industry, which included the commissioning of commercial production at the Essakane Mine in 2010. About 80% of Burkina Faso's population relied on subsistence agriculture. The country was Africa's leading producer of cotton, which accounted for 5% to 8% of the Burkina Faso's GDP and 60% to 70% of its export earnings. Exploration for copper, gold, and zinc was ongoing throughout the year (U.S. Department of State, 2011).

In 2010, at least 60 international companies were engaged in exploration and mining, which included Australian, Canadian, and South African firms. As of November 2010, Burkina Faso had reduced the corporate income tax rate to 25% from 30%, and the tax on dividends to 7.5% from 12.5%. The Government limited state participation to a maximum of 10% in large-scale mining operations. During the year, the Government had been discussing new royalties rates and other profit-sharing initiatives with mining companies that were active in the region (Mining Journal, 2010).

### Production

Gold production increased by about 83% to 24,104 kilograms (kg) compared with 13,181 kg produced in 2009. Mineral production data provided in table 1 for other mineral commodities produced in Burkina Faso are estimated.

### Structure of the Mineral Industry

At least six international companies were engaged in gold exploration and production in Burkina Faso. These included Canadian companies High River Gold Mines Ltd., IAMGOLD Corp., and Semafo Inc.; Avocet Mining plc and Cluff Gold plc of the United Kingdom; and British West Indies-based Endeavor Mining Corp. Table 2 is a list of major mineral industry facilities.

## Commodity Review

### Metals

**Copper.**—Volta Resources Inc. of Canada held a prospecting license for the Gaoua copper-gold project, which included the Bouserra, the Dienemera, the Gongondy, and the Mt. Biri prospects. A mineral resource estimate completed by SRK Consulting Ltd. of the United Kingdom in 2010 indicated that the deposits at Gaoua hosted an initial inferred resource of 82.6 million metric tons (Mt) of ore at an average grade of 0.40% copper and 0.40 grams per metric ton (g/t) gold (Volta Resources Inc., 2011, p. 6–7).

**Gold.**—The Essakane gold project, which is located about 330 kilometers (km) northeast of Ouagadougou, began commercial production in July. Gold production at Essakane was 4,230 kg in 2010. IAMGOLD, through its subsidiary Essakane S.A., held a 90% interest in the Essakane Mine, and the Government held the remaining 10% interest. As of December 31, indicated and inferred resources at Essakane were estimated to be 122.1 Mt at an average grade of 1.2 g/t gold and 41.2 Mt at an average grade of 1.3 g/t, respectively. Probable reserves were estimated to be 107.5 Mt at an average grade of 1.3 g/t. IAMGOLD's mine plan included processing soft rock for the first 3 years at a rate of 9.0 Mt/yr, followed by processing of hard rock for about 9 years at a rate of 5.4 Mt/yr. The company estimated annual production of about 9,800 kg of gold. A feasibility study to expand the mine was underway and was expected to be completed in the third quarter of 2011. The study evaluated doubling hard rock processing capacity to 10.8 Mt/yr and increasing annual production to between 14,000 and 15,000 kg. The Essakane Mine was expected to produce up to between 11,500 and 12,100 kg in 2011 (IAMGOLD Corp., 2011a, p. 14; 2011b, p. 17, 28; 2011c, p. 1–2).

Gold production from the Inata open pit gold mine, which is located about 220 km north of the capital city of Ouagadougou, was 4,284 kg in 2010. Avocet held a 90% interest in the Inata Mine, and the Government held the remaining 10% interest. As of December 31, measured and indicated resources at Inata were estimated to be 24.5 Mt at an average grade of 1.58 g/t gold. The total mineral reserves were estimated to be 15.4 Mt at an average grade of 2.11 g/t gold. Avocet expected to increase the throughput of the plant to 340 metric tons per hour in the second half of 2011. The company also expected to increase gold production to about 5,100 kilograms per year. Based on the existing reserves and increased mining and plant capacity, the company reported that gold production was forecast to continue at the mine until 2016. A drilling program to look at the possibility of extending the life of the mine was underway in and around the existing mining license. The company envisioned doubling reserves in the third quarter of 2011 (Avocet Mining plc, 2011, p. 16, 20, 28).

Gold production from the Kalsaka Mine increased by 36% to 2,302 kg compared with 1,693 kg in 2009. The increase in production was attributed to an increase in the plant capacity to 1.6 Mt/yr from 1.2 Mt/yr. The mine was owned and operated by Kalsaka Mining S.A., which was a joint venture of Cluff Gold (78%), IMARB Indústria Metalúrgica of Brazil (12%), and

the Government (10%). The Kalsaka Mine was expected to produce about 2,200 kg of gold in 2011 (Cluff Gold plc, 2011, p. 12–14).

Gold production from the Mana Mine increased by 17% to 5,589 kg compared with 4,774 kg in 2009. The increase in production was mostly owing to the commissioning of the first phase of an expansion program, which was completed in the first quarter of 2010 and increased the plant's capacity to about 6,000 metric tons per day of saprolite ore or soft rock. Phase 2 involved the addition of a semiautogenous grinding mill. In December, phase 3 of the plant expansion, which was aimed at optimizing gold recovery, was completed. As of the end of the year, proven and probable reserves at Mana increased by 180% to 25.5 Mt at an average grade of 2.64 g/t gold (Semafo Inc., 2011, p. 10, 13).

At the Taparko-Boroum Mine, gold production increased by about 28% to 3,971 kg compared with 3,096 kg in 2009 mostly owing to increased throughput at the mill. High River was the company that operated the mine through its 90%-owned subsidiary, Société des Mines de Taparko S.A. The remaining 10% ownership was held by the Government (High River Gold Mines Ltd., 2011a, p. 3, 5; 2011b).

The Youga gold mine, which is located in Boulgou Province about 180 km from the capital city of Ouagadougou in southern Burkina Faso, produced a total of 2,563 kg of gold compared with 2,018 kg in 2009. The Youga Mine, which was acquired by Endeavor Mining from Etruscan Resources Inc. of Canada in 2010, was operated by the company's subsidiary Burkina Mining Company S.A. The mine was expected to produce about 2,600 kg of gold in 2011 (Endeavor Mining Corp., 2011, p. 1, 5–6).

In addition, at least 11 companies were engaged in gold exploration in Burkina Faso in 2010. These companies included Canadian companies Channel Resources Ltd., Goldrush Resources Ltd., Orezone Gold Corp., Riverstone Resources Inc., and Volta Resources Inc.; Australian companies Ampella Mining Ltd.; Carbine Resources Ltd., Gryphon Minerals Ltd., Middle Island Resources Ltd., and Mt. Isa Metals Ltd.; and Goldplat plc of the United Kingdom.

**Manganese.**—AMC Corp. of United States through its subsidiary Burkina Manganèse S.A. held a 100% interest in Kiere Mine. The mine, which is located in Tuy Province about 25 km north of Houde, began production in April. The mine was estimated to have about 600,000 t of ore at grades ranging from 44% to 45% manganese (U.S. Department of State, 2010; Conseil Présidentiel pour l'Investissement, 2012).

**Zinc.**—In November, Blackthorn signed a joint-venture agreement with Glencore International AG for the development of the Perkoa zinc project, which is located in Sanguie Province about 120 km from Ouagadougou and 35 km from the town of Koudougou. Under the agreement, the project would be managed and operated by Glencore (50.1%) in joint venture with Blackthorn (39.9%) and the Government (10%). In December, the joint venture resumed construction and mining activities at Perkoa, which included underground drilling and surface works, such as installation and repairs of ventilation, onsite road maintenance, pumps, and piping. The joint venture also initiated a mine optimization study to evaluate further

opportunities to decrease operating and production costs at the mine. Total measured and indicated resources at Perkoa were estimated to be 6.7 Mt at a grade of 16.4% zinc and 35.4 g/t silver (Blackthorn Resources Ltd., 2010a, p. 2, 9; 2010b, c).

### **Mineral Fuels and Related Materials**

**Uranium.**—Crosscontinental Uranium Ltd. of Canada withdrew from its Oursi uranium project, citing unfavorable exploration results and the uncertainty about whether the Government would approve the company permit applications. Crosscontinental was a subsidiary of Pancontinental Uranium Corp. and held a 35% interest in the Oursi project. The Oursi project was a joint venture of Crosscontinental (operator), Longreach Oil Ltd. of Australia (20%), and Southern Cross Exploration NL of Australia (45%) (Longreach Oil Ltd., 2010, p. 5; Pancontinental Uranium Corp., 2011, p. 8).

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### **SAO TOME E PRINCIPE**

Mining did not play a significant role in Sao Tome e Principe's economy. Mineral production was limited to clay and volcanic rock, although information was inadequate to make reliable output estimates for these commodities. Potential exists for the development of the country's petroleum industry. All other mineral product requirements were imported. Sao Tome e Principe's economy has traditionally relied on foreign assistance from various donors, including the African Development Bank, the European Union, Portugal, Taiwan, the United Nations Development Program, and the World Bank (U.S. Department of State, 2011).

### **Commodity Review**

#### **Mineral Fuels**

**Petroleum.**—On March 2, the Government through the Agência Nacional do Petróleo de São Tomé e Príncipe [National Petroleum Agency of Sao Tome e Principe] (ANP-STP) opened its first licensing round for seven offshore blocks within Sao Tome e Principe's exclusive economic zone (EEZ). The EEZ covers an area of about 160,000 square kilometers (km<sup>2</sup>) south and east of the Nigeria-Sao Tome and Principe Joint Development Zone (JDZ) and the surrounding volcanic islands of Principe and Sao Tome. The agency announced that seismic data and technical reports were to be made available to all interested bidders in London and Sao Tome. In November, the ANP-STP received applications from six companies, and in December, two companies were disqualified from the auction process. The companies that participated in the bidding round included South Africa-based Afex Global Ltd., O.G. Engineering S.A. of Sao Tome e Principe, and Oranto Petroleum Ltd. and Overt Energy Ltd. of Nigeria. In February, the ANP-STP awarded to Houston-based ERHC Energy Inc. a 100% interest in Blocks 4 (zone A) and 11 (zone B) of the EEZ. The ANP-STP also awarded a 100% interest in Blocks 5 (zone A) and 12 (zone B) to Equator Exploration Ltd.



of the United Kingdom. The awarded blocks were subject to successful negotiation of production-sharing contracts, which would include a competitive work program. In addition, ERHC and Equator would have rights to acquire up to 15% interest in any other two blocks of their choosing (Agência Nacional do Petróleo de SãoTomé e Príncipe, 2010a–c; Energy-pedia, 2010; ERHC Energy Inc., 2010; Equator Exploration Ltd., 2011, p. 1–2, 9).

In July, Total S.A. of France announced the acquisition of 45.9 % interest in Block 1 from United States-based Chevron Corp.; Block 1 is located in the JDZ and covers an area of about 700 km<sup>2</sup> in water ranging in depth from 1,600 to 1,800 meters. The block would be operated by Total in partnership with Addax Petroleum JDZ1 Ltd. [a subsidiary of the China Petroleum and Chemical Corp. (SINOPEC)], Dangote Energy Equity Resources Ltd., and Sasol Exploration and Production Nigeria Ltd (Total S.A., 2010).

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TABLE 1  
BENIN AND BURKINA FASO: ESTIMATED PRODUCTION OF MINERAL COMMODITIES<sup>1, 2</sup>

(Metric tons unless otherwise specified)

Country and commodity	2006	2007	2008	2009	2010	
<b>BENIN</b>						
Cement, hydraulic	thousand metric tons	1,489 <sup>3</sup>	1,550 <sup>3</sup>	1,500	1,500	1,500
Clay		72,196 <sup>3</sup>	77,295 <sup>3</sup>	77,000	77,000	77,000
Gold	kilograms	24 <sup>3</sup>	19 <sup>3</sup>	20	20	20
Gravel	cubic meters	10,558 <sup>3</sup>	25,348 <sup>3</sup>	25,000	25,000	25,000
Limestone	thousand metric tons	915 <sup>3</sup>	1,057 <sup>3</sup>	1,000	1,000	1,000
Marble		278 <sup>3</sup>	342 <sup>3</sup>	300	300	300
Sand	thousand cubic meters	5,250	5,500	5,500	5,500	5,500
<b>BURKINA FASO<sup>4</sup></b>						
Cement		30,000	30,000	30,000	30,000	30,000
Dolomite	cubic meters	3,000	3,000	3,000	3,000	3,000
Gold	kilograms	1,571 <sup>3</sup>	2,250 <sup>3</sup>	7,633 <sup>3,5</sup>	13,181 <sup>3,5</sup>	24,104 <sup>3,5</sup>
Granite	cubic meters	300,000	300,000	300,000	300,000	300,000
Manganese:						
Ore, processed		--	--	--	--	40,000
Mn content		--	--	--	--	18,000
Phosphate rock:						
Gross weight		2,400	2,400	2,400	2,400	2,400
P <sub>2</sub> O <sub>5</sub> content		650	650	650	650	650
Pumice and related volcanic materials		10,000	10,000	10,000	10,000	10,000
Salt		5,000	5,000	5,000	5,000	5,000
Stone, marble		100,000	100,000	100,000	100,000	100,000

<sup>1</sup>Estimated data are rounded to no more than three significant digits.

<sup>2</sup>Table includes data available through January 26, 2012.

<sup>3</sup>Reported figure.

<sup>4</sup>In addition to the commodities listed, sand and gravel and other construction materials are produced, but information is inadequate to make reliable estimates of output.

<sup>5</sup>Includes artisanal mining, which was estimated to be 1,600 kilograms.

TABLE 2  
BENIN AND BURKINA FASO: STRUCTURE OF THE MINERAL INDUSTRIES IN 2010

(Metric tons unless otherwise specified)

Country and commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity
<b>BENIN</b>			
Cement	Ciments du Benin S.A. (HeidelbergCement AG, 52.51%, through its subsidiary Scancem International SA)	Cotonou plant	300,000 cement.
Do.	Onigbolo Cement Co. (OCC) (Dangote Industries Ltd., 43%, and Société des Ciments du Benin, 51%)	Onigbolo plant	600,000 cement.
Do.	Société des Ciments du Benin (Government, 50%, and LaFarge Group, 50%)	do.	700,000 cement.
<b>BURKINA FASO</b>			
Cement	Diamond Cement Burkina S.A. (West African Cement S.A.)	Ouagadougou	700,000.
Gold	kilograms Avocet Mining plc, 90%, and Government, 10%	Inata Mine, 220 kilometers north of Ouagadougou	3,700.
Do.	do. Burkina Mining Company S.A. (Endeavour Mining Corp., 90%, and Government, 10%)	Youga Mine, 180 kilometers southeast of Ouagadougou	3,100.
Do.	do. Essakane S.A. (IAMGOLD Corp., 90%, and Government, 10%)	Essakane Mine, 330 kilometers northeast of Ouagadougou	9,800.
Do.	do. Kalsaka Mining S.A. (Cluff Gold plc, 78%; IMARB Indústria Metalúrgica, 12%; Government 10%)	Kalsaka Mine, 150 kilometers west of Ouagadougou	1,900.
Do.	do. Semafo Burkina Faso S.A. (Semafo Inc., 90%, and Government, 10%)	Mana Mine, 200 kilometers west of Ouagadougou	3,700.
Do.	do. Société des Mines de Taparko S.A. (High River Gold Mines Ltd., 90%, and Government, 10%)	Taparko-Boroum Mine, 200 kilometers from Ouagadougou	3,100.
Manganese	AMC Corp. (Burkina Manganèse S.A., 100%)	Kiere Mine	60,000 ore.
Do., do. Ditto.			