



# 2010 Minerals Yearbook

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THE GAMBIA, GUINEA-BISSAU, AND SENEGAL  
[ADVANCE RELEASE]

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# THE MINERAL INDUSTRIES OF THE GAMBIA, GUINEA-BISSAU, AND SENEGAL

By Yadira Soto-Viruet

## THE GAMBIA

Mining in The Gambia was limited to the production of clay, laterite, silica sand, and zircon, and it did not play a significant role in the country's economy. The Department of State for Trade, Industry, and Employment was the Government entity responsible for the administration of the mining sector. The country did not produce petroleum and depended upon imports to meet its domestic energy requirements.

The Gambia's exports to the United States were valued at about \$3.1 million in 2010 compared with about \$1.2 million in 2009. Imports from the United States were valued at about \$29 million in 2010 compared with about \$34 million in 2009. These included \$114,000 in drilling and oilfield equipment and \$167,000 in excavating machinery (U.S. Census Bureau, 2011a, b).

## Production

In 2010, laterite production increased by 69% to 174,000 metric tons (t) from 103,000 t (revised) in 2009; ilmenite production, by 28% to 69.9 million metric tons (Mt) from 54.6 Mt (revised); and silica sand production, by 6% to 1.12 Mt from 1.06 Mt (revised). Data on mineral production are in table 1.

## Structure of the Mineral Industry

Table 2 is a list of major mineral industry facilities.

## Commodity Review

### Metals

**Titanium, Titanium Dioxide, and Zircon.**—Carnegie Minerals (Gambia) Ltd. (CML) continued to wait for arbitration on its legal claim regarding the mining rights to the Batukunku, the Kartung, and the Sanyang mineral sands deposits in Brufut. CML was a joint venture of Australian companies Astron Ltd. and Carnegie Corp. Ltd. (Astron Ltd., 2010).

### Mineral Fuels

**Petroleum.**—In August, African Petroleum Corp. Ltd. of Australia through its wholly owned subsidiary African Petroleum Gambia Ltd. signed an agreement with Buried Hill Gambia B.V., under which African Petroleum would acquire a 60% interest and operatorship in the offshore Blocks A-1-Alhamdulillah and A-4. Buried Hill would hold the remaining 40% interest in the two exploration blocks, which

cover a total area of about 2,668 square kilometers (km<sup>2</sup>). The Government approved the agreement and the extension of the initial exploration period until December 2013. The agreement included a three-dimensional (3-D) seismic program and the drilling of the first exploration well. African Petroleum awarded TGS-NOPEC Geophysical Co. of Norway the right to acquire 2,500 km<sup>2</sup> of 3-D seismic data in the two blocks; the data acquisition was completed in December. The processing of the 3-D seismic data and the analysis of the existing seismic dataset were underway (African Petroleum Corp. Ltd., 2010a, p. 14, 58; 2010b).

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## GUINEA-BISSAU

Mining in Guinea-Bissau did not play a significant role in the country's economy. Mineral production was limited to small-scale production of construction materials, such as clay, granite, limestone, and sand and gravel, but information was inadequate to make reliable estimates of output. The country's prospective mineral resources included bauxite, diamond, gold, heavy minerals, petroleum, and phosphate rock. Guinea-Bissau did not produce petroleum and depended upon imports to meet its domestic energy requirements.

Guinea-Bissau's exports to the United States were valued at about \$885,000 in 2010 compared with about \$43,000 in 2009; rough diamond accounted for \$842,000 of these exports. Imports from the United States were valued at about \$4.3 million in 2010 compared with about \$1.5 million in 2009; these included \$110,000 in excavating machinery (U.S. Census Bureau, 2011a, b).

## Commodity Review

### Metals

**Bauxite and Alumina.**—Bauxite Angola S.A., which was partly owned by the Government of Angola, continued to work on the development of the bauxite project in the Boe region, which is located about 280 kilometers (km) east of the capital city of Bissau. Reserves were estimated to be 113 Mt of bauxite. The company planned to construct a deepwater port in Buba at a cost of about \$321 million and to build a road to connect the mine to the port facilities; however, no further details as to when this construction would take place were available (Bauxite Angola S.A., 2009, 2011).

### Industrial Minerals

**Phosphate Rock.**—Plains Creek Phosphate Corp. of Canada (formerly Resource Hunter Capital Corp.; the name was changed on May 6, 2011) entered into a share purchase agreement to acquire 100% interest of GB Minerals AG of Switzerland, which in turn owned a 100% interest in the Farim phosphate project. In February 2011, the company acquired a 50.1% ownership interest in the Farim project and had the right to acquire the remaining 49.9% interest through staged payments; the company expected the acquisition to be complete by 2013. The project was located about 5 km west of the town of Farim and about 120 km north of Bissau. In October, a preliminary economic assessment was conducted by United Kingdom companies GBM Minerals Engineering Consultants Ltd. and IMC Group Consulting Ltd. Measured and indicated mineral resources were estimated to be 84 Mt at an average grade of 29.9%  $P_2O_5$  with a cutoff thickness of 1.5 meters (m) and inferred mineral resources were estimated to be 44 Mt at an average grade of 29.6%  $P_2O_5$  with a cutoff thickness of 1.5 m. The assessment reported that Farim had the potential to be developed as a shallow open pit mine and to produce about 2.76 million metric tons per year (Mt/yr), or 7,885 metric tons per day (t/d), of ore during a mine life of 25 years. A bankable feasibility study was scheduled to be completed in April 2012 (Resource Hunter Capital Corp., 2010, 2011; Plains Creek Phosphate Corp., 2011).

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## SENEGAL

Senegal was among the world's leading producers of phosphate rock. Other mineral commodities produced in the country were basalt, cement, clays, gold, laterite, lime, limestone, natural gas, petroleum, salt, and sand.

Senegal's exports to the United States were valued at about \$5.1 million in 2010 compared with about \$6.9 million in 2009. Imports from the United States were valued at about \$218 million in 2010 compared with about \$176 million in 2009; these included \$17 million in petroleum products; \$2 million in drilling and oilfield equipment, and \$247,000 in alumina and aluminum (U.S. Census Bureau, 2011a, b).

### Production

Laterite production increased by 119% to 226 t from 103 t (revised) in 2009; crude petroleum production, by 60% to 398,000 barrels from 249,000 barrels (revised); and fuller's earth clays (attapulгите) production, by 13% to 204,000 t from 181,000 t (revised). Lime production decreased by 48% to 24,000 t from 46,000 t (revised) in 2009; gold production, by 13% to 4,381 kilograms (kg) from 5,055 kg (revised); and basalt production, by 12% to 1,167 t from 1,321 t (revised). Data on mineral production are in table 1.

### Structure of the Mineral Industry

Table 2 is a list of major mineral industry facilities.

## Commodity Review

### Metals

**Gold.**—Most gold mining activities in Senegal were concentrated around the Sabodala gold district, which is located in the northeast of the country. On November 23, Teranga Gold Corp. of Canada completed the acquisition of Sabodala Gold (Mauritius) Ltd. (SGL) by way of a demerger from Mineral Deposits Ltd. (MDL) of Australia. SGL held a 90% interest in Sabodala Gold Operations S.A. (SGO), and the remaining 10% interest was held by the Government. Teranga also acquired a 100% interest in the Sabodala Mining Company SARL, which was an exploration company, from MDL (Teranga Gold Corp., 2011).

The Sabodala gold mine, which is located 650 km east of the capital city of Dakar, produced its first gold in March 2009

and was operated by SGO. The mine produced a total of 4,381 kg of gold in 2010 compared with 5,055 kg (revised) in 2009. The Sabodala plant expansion was underway to increase the production capacity to about 4 Mt/yr from 2 Mt/yr by the first quarter of 2012. The plant was expected to produce about 6,220 kilograms per year of gold. As of June, measured and indicated mineral resources were estimated to be about 70,000 kg of gold (reported as 2.25 million troy ounces) and inferred minerals resources were estimated to be about 4,000 kg of gold (reported as 0.77 million troy ounces). Exploration works on the Sabodala mining concession were underway, and a total of 10 targets were selected for drilling tests. The company focused its exploration program on the Sambaya Hill prospect, which is located between the Masato deposit and the Sabodala deposit (Teranga Gold Corp., 2011).

Oromin Explorations Ltd. of Canada held a 43.5% interest in the Oromin Joint Venture Group Ltd. (OJVG) gold project in joint venture with private Saudi Arabian companies Bendon International Ltd. (43.5% interest) and Badr Investment and Finance Co. (13% interest). In July, a feasibility study was completed by Ausenco Solutions Canada Inc. and SRK Consulting Inc. of Canada. The study indicated that the OJVG project, which is located about 650 km east of Dakar, had the potential to be developed as an open pit and underground mine. The project included the Goulouma West, the Goulouma South, the Kerekounda, the Kourouloulou, and the Masato deposits. Indicated and inferred mineral resources for the Goulouma West, Goulouma South Kerekounda, and Kourouloulou deposits combined were estimated to be 10.5 Mt at an average grade of 3.59 grams per metric tons (g/t) gold and 1.1 Mt at an average grade of 4.15 g/t gold, respectively. Indicated resources for the Masato deposit were estimated to be 35.1 Mt at an average grade of 1.17 g/t gold and inferred resources were estimated to be 2.4 Mt at an average grade of 1.21 g/t gold. The study estimated that plant commissioning would take place in 2012 and that the daily throughput rates would range between 4,250 and 7,390 t/d during a mine life of 9 years. The study also estimated production of about 6,100 kg (reported as 196,000 troy ounces) of gold for the first 3 years of operation (Oromin Explorations Ltd., 2010).

Randgold Resources Ltd. of the United Kingdom held an 83.25% interest in the Massawa gold deposit in joint venture with Compagnie Senegalaise de Transports Transatlantiques Afrique de l'Ouest, which held 6.75% interest; the Government held the remaining 10% interest. During the year, the company completed studies for environmental and social impact assessments and a detailed ore characterization study for Massawa, which is located about 700 km southeast of Dakar. As of December 31, indicated mineral resources at Massawa were estimated to be 34.9 Mt at an average grade of 2.77 g/t gold, and inferred resources were estimated to be 3.4 Mt at an average grade of 3.92 g/t gold. The company planned to complete a feasibility study for Massawa in 2011 (Randgold Resources Ltd., 2011, p. 43–45).

**Iron and Steel.**—In 2010, Luxembourg-ArcelorMittal entered into a joint-venture agreement with National Mineral

Development Corp. Ltd. (NMDC) of India for the development of the Faleme iron ore project, which would be located in southeastern Senegal. Ore mineral reserves at Faleme were estimated to be 750 Mt of iron ore. The project would require the construction of port facilities near Dakar and a 750-km railway line to link the mine to the port facilities. In January 2011, the joint venture proposed to the Government the creation of a fund to support the construction of the railway line; however, no further details as to when this decision would take place were available. The joint venture planned to begin production of iron ore by 2014 (India Report Inc., 2011).

**Titanium and Titanium Mineral Concentrates and Zircon.**—The Grande Côte Mineral Sands Project (GCMSP) was operated by Grande Côte Operations SA, which was owned by a joint venture of MDL (90%) and the Government (10%). The GCMSP covers an area of about 446 km<sup>2</sup> and is located on a coastal dune system that averages 4 km in width. The dune system begins about 50 km northeast of Dakar and extends about 100 km northward. A definitive feasibility study was completed in June. The study indicated that the GCMSP had the potential to be developed as a large-scale dredge operation with a capacity to mine about 55 Mt/yr of sand. Total measured and indicated mineral resources for the Diogo, the Fass Boye, the Lompoul, and the Mboro heavy mineral deposits were estimated to be 1.03 Mt at an average grade of 1.7% heavy minerals. The study estimated an average production of about 575,000 t/yr of ilmenite, 80,000 t/yr of zircon, 11,000 t/yr of leucoxene, and 6,000 t/yr of rutile. The company expected to begin production at GCMSP by 2013 (Mineral Deposits Ltd., 2010).

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TABLE 1  
THE GAMBIA AND SENEGAL: PRODUCTION OF MINERAL COMMODITIES<sup>1</sup>

(Thousand metric tons unless otherwise specified)

Country and commodity		2006 <sup>e</sup>	2007	2008	2009	2010
<b>THE GAMBIA<sup>2</sup></b>						
Clay <sup>3</sup>	metric tons	13,700	6,713 <sup>4</sup>	NA <sup>4</sup>	NA <sup>4</sup>	NA <sup>4</sup>
Ilmenite		--	672 <sup>4</sup>	-- <sup>4</sup>	54,655 <sup>r,4</sup>	69,940 <sup>4</sup>
Laterite <sup>3</sup>		250	187 <sup>4</sup>	115 <sup>4</sup>	103 <sup>r,4</sup>	174 <sup>4</sup>
Silica sand <sup>3</sup>		1,390	712 <sup>4</sup>	1,065 <sup>4</sup>	1,062 <sup>r,4</sup>	1,121 <sup>4</sup>
Zircon/rutile concentrate	metric tons	410 <sup>5,6</sup>	355 <sup>4</sup>	-- <sup>4</sup>	-- <sup>4</sup>	-- <sup>4</sup>
<b>SENEGAL<sup>7,8</sup></b>						
Basalt <sup>3</sup>	metric tons	360	400 <sup>e</sup>	1,037 <sup>r</sup>	1,321 <sup>r</sup>	1,167
Cement, hydraulic		2,884 <sup>5</sup>	3,152	3,084	3,320 <sup>r</sup>	4,066
Clay <sup>3</sup>	metric tons	20	--	--	--	--
Clays, fuller's earth (attapulgitite)		140 <sup>5</sup>	150 <sup>e</sup>	167	181 <sup>r</sup>	204
Gold, mine output, Au content	kilograms	600 <sup>9</sup>	600 <sup>e,9</sup>	600 <sup>e,9</sup>	5,055 <sup>r</sup>	4,381
Laterite <sup>3</sup>	metric tons	300	300 <sup>e</sup>	71 <sup>r</sup>	103 <sup>r</sup>	226
Lime		NA	NA	82	46 <sup>r</sup>	24
Limestone <sup>3</sup>	metric tons	1,600	1,600 <sup>e</sup>	1,025 <sup>r</sup>	1,415 <sup>r</sup>	1,248
Natural gas <sup>e</sup>	thousand cubic meters	12,600	12,600	12,600	NA	NA
<b>Petroleum:<sup>10</sup></b>						
Crude oil	thousand 42-gallon barrels	388 <sup>5</sup>	317	99	249	398
Refinery products		313 <sup>5</sup>	648	896	739 <sup>r</sup>	617
Phosphate rock		584 <sup>5</sup>	691	645	948	976
Phosphoric acid, P <sub>2</sub> O <sub>5</sub> content		180 <sup>5</sup>	234	180	283	312
Calcium phosphate-based fertilizers		33 <sup>5</sup>	82	50	44	45
Salt		199 <sup>5</sup>	212	241	222	231
Sand <sup>3</sup>	metric tons	2,170	2,200 <sup>e</sup>	6,421	2,065 <sup>r</sup>	2,040

<sup>e</sup>Estimated; estimated data are rounded to no more than three significant digits. <sup>r</sup>Revised. NA Not available. -- Zero.

<sup>1</sup>Table includes data available through October 28, 2011.

<sup>2</sup>In addition to the commodities listed, The Gambia also produced a variety of construction materials (laterite, sand, and shell), but information is inadequate to make reliable estimates of output.

<sup>3</sup>Values converted from cubic meters to metric tons. Specific gravity, in grams per cubic meter—basalt, 2.8; clay, 2.55; laterites, 2.55; limestone, 2.6; and sand, 2.6.

<sup>4</sup>Source: Geology Department of the Republic of The Gambia.

<sup>5</sup>Reported figure.

<sup>6</sup>From sales.

<sup>7</sup>In addition to the commodities listed, Senegal also produced sand and gravel, and stone for local construction purposes, but information is inadequate to make reliable estimates of output.

<sup>8</sup>Source: Direction des Mines et de la Géologie, Republic of Senegal. The major source of information for the Senegal 2006 to 2010 figures is Agence National de la Statistique et de la Démographie.

<sup>9</sup>Government estimate of unreported production of artisanal gold.

<sup>10</sup>Crude petroleum values have been converted from metric tons to 42-gallon barrels using a conversion factor of 7.4 barrels of crude petroleum per metric ton.

TABLE 2  
THE GAMBIA AND SENEGAL: STRUCTURE OF THE MINERAL INDUSTRY IN 2010

(Thousand metric tons unless otherwise specified)

Country and commodity		Major operating companies and major equity owners	Location of mine facilities	Annual capacity
THE GAMBIA				
Zircon/rutile concentrate		Carnegie Minerals plc and Astron Ltd.	Sanyang district	20.
SENEGAL				
Attapulгите		Senegal Mines (Government, 49%)	240 kilometers south of Dakar	100.
Do.		Société Senegalaise de Phosphates de Thies S.A.	Lam Lam	NA.
Cement		Les Ciments du Sahel S.A.	Kirene plant	600.
Do.		Sococim Industries (Vicat S.A.)	Rufisque, east of Dakar	2,600.
Gold	kilograms	Sabodala Gold Operations S.A. (Teranga Gold Corp., 90%, and Government, 10%)	650 kilometers east of Dakar	5,400.
Petroleum products		Total S.A. (54%), Royal Dutch Shell plc (23%), Exxon Mobil Corp. (13%), Government (10%)	Refinery, 23 kilometers from Dakar	1,226.
Phosphate rock, calcium		Industries Chimiques du Sénégal Group (Archean Group, Government of India, and Indian Farmers Fertilizer Cooperative Ltd., 85%; and Government of Senegal, 15%)	Taiba Mine, 50 kilometers from Dakar	2,000.
Do.		Société Senegalaise de Phosphates de Thies SA	Lam Lam, Sebikhotane, and Allou-Kagne	NA.
Phosphoric acid		Industries Chimiques du Sénégal Group (Indian Farmers Fertilizer Cooperative Ltd., 85%, and Government, 15%)	Darou I plant, Darou Khoudoss	660 P <sub>2</sub> O <sub>5</sub> .

NA Not available.