



# 2006 Minerals Yearbook

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THE GAMBIA, GUINEA-BISSAU, AND SENEGAL

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

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## THE GAMBIA

Mining in The Gambia, which was limited to the production of clay, laterite, silica sand, and zircon, 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. A new mineral and mining law proposed in 2001 was still under consideration for approval by the Government in 2006.

### Production

Data on mineral production are provided in table 1.

### Structure of the Mineral Industry

Table 2 is a list of major mineral industry facilities.

### Commodity Review

#### Metals

**Titanium Minerals and Zircon.**—In January 2006, Carnegie Corporation Ltd. (CCL) of Australia (50%), through its 45% owned subsidiary Carnegie Minerals plc, in joint venture with Astron Ltd. of China (50%) received final Government approval to begin mining at the Batukunku, the Kartung, and the Sanyang mineral sands deposits in Brufut. The mining license constituted the first mining license granted by the Government in more than 50 years. Three of the four dredges to be used to mine these deposits were commissioned in 2006; the remaining dredge was scheduled to be commissioned in 2007. On September 28, 2006, the company announced that it had started mining the Sanyang deposit and that it had shipped 1,320 metric tons (t) of concentrates to China (Carnegie Minerals plc, 2006).

The spiral concentration units used in conjunction with the dredges to mine the Batukunku, the Kartung, and the Sanyang mineral sands were expected to produce a combined heavy mineral concentrate that contains both the nonmagnetic minerals rutile and zircon and the magnetic mineral ilmenite. The combined concentrate was to be sold and shipped to Yingkou Astron Chemical Co. Ltd. of China, which was a subsidiary of joint-venture partner Astron. CCL expected to produce about 80,000 metric tons per year (t/yr) of heavy mineral concentrate, or about 15,000 t/yr of nonmagnetic concentrate, by 2007. The company's target thereafter would be 20,000 t/yr of nonmagnetic concentrate (rutile and zircon). In April 2006, CCL announced that Astron had signed an offtake agreement for the entire rutile and zircon production. The offtake agreement was for the entire economic life of the license. A magnetic separation plant was to be built to enable the separation of the magnetic and

nonmagnetic minerals before shipment to China. The washed sand byproduct was to be sold to the local construction industry. Carnegie believed that the mineral sands deposits in The Gambia extend into Senegal and therefore was pursuing exploration in Senegal throughout the year (Carnegie Corporation Ltd., 2006a, b; 2007, p. 2-7; Industrial Minerals, 2006).

Total measured, indicated, and inferred resources at the Batukunku, the Kartung, and the Sanyang deposits were estimated to be 18.8 million metric tons (Mt) containing about 1 Mt of heavy minerals at a cutoff grade of 1%. The heavy-mineral assemblage for these deposits was estimated to be about 71% ilmenite, 15% zircon, and 3% rutile (Carnegie Corporation Ltd., 2005, p. 7-9).

#### Mineral Fuels

**Petroleum.**—The Gambia did not produce petroleum and depended upon imports to meet its domestic energy requirements. Liquefied petroleum gas was imported from Senegal. In September 2006, Buried Hill Energy (Cyprus) Public Company Ltd., through its wholly owned subsidiary Buried Hill Gambia B.V., signed an exploration, development, and production agreement with the Government for offshore Blocks A1-Alhamdulillah and A4. Exploration drilling was to begin in 2008 (Buried Hill Energy (Cyprus) Public Company Ltd., 2006; Rigzone.com, 2006).

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## GUINEA-BISSAU

Mining in Guinea-Bissau was limited to small-scale production of construction materials, such as clays, granite,

limestone, and sand and gravel. The country's prospective mineral resources included bauxite, diamond, gold, heavy minerals, petroleum, and phosphate rock.

## Commodity Review

### Industrial Minerals

**Phosphate Rock.**—Red Back Mining Inc. reported that in July 2006, the Government of Guinea-Bissau intended to expropriate the company's rights to mine the Farim phosphate deposit, which is located about 100 kilometers (km) northeast of Bissau. The company had completed a technical and market evaluation of the Farim phosphate deposit in 2003 and concluded that the project had advanced to a stage where the level of developmental, operational, and marketing expertise required to move it forward was beyond that of Red Back Mining. Since then, the company had attempted to either locate a suitable partner to develop the deposit or sell the deposit. The company was unsuccessful in both endeavors and kept the project on care and maintenance status in 2005. In 2006, in light of the new developments, the company announced the writeoff of all expenditures related to the Farim deposit during the year and continued to keep the property on care and maintenance status. Red Back Mining estimated the phosphate rock resource at Farim to be more than 166 Mt at a grade of 29% P<sub>2</sub>O<sub>5</sub> (Red Back Mining Inc., 2006a, p. 6; 2006b, p. 3).

### Mineral Fuels

**Petroleum.**—Guinea-Bissau did not produce petroleum and depended upon imports to meet its domestic energy requirements. At least one company, Premier Oil plc of the United Kingdom, was conducting petroleum exploration during the year. Premier completed the processing of the three-dimensional (3-D) seismic survey data that it had acquired in 2005 for the Eirozes prospect and the reprocessing of the existing 3-D data for the Espinafre prospect and planned to drill two wells in 2007. The company also held exploration licenses for offshore Blocks 2, 4a, 5a, 7b, and 7c (Premier Oil plc, 2007, p. 15).

## References Cited

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- Premier Oil plc, 2007, 2006 annual report and accounts: London, United Kingdom, Premier Oil plc, 84 p.

## SENEGAL

Phosphate rock production, which was processed and converted to phosphoric acid, dominated Senegal's mining sector. Phosphoric acid production accounted for about 3% of the gross domestic product and 10% of exports in 2005. Other mineral commodities produced in the country were basalt,

cement, clays, gold, laterite, limestone, natural gas, petroleum, salt, and sand (International Monetary Fund, 2007, p. 9).

## Production

Production of phosphoric acid and phosphate rock decreased by 64% and 60%, respectively, while production of attapulgite, crude petroleum, and salt increased modestly. Data on mineral production are provided in table 1.

## Structure of the Mineral Industry

Table 2 is a list of major mineral industry facilities.

## Commodity Review

### Metals

**Gold.**—AXMIN Inc. (AXMIN), IAMGOLD Corp. (IAMGOLD), and Oromin Explorations Ltd. (Oromin) of Canada; Mineral Deposits Ltd. (MDL) of Australia; and Randgold Resources Ltd. (Randgold) of the United Kingdom continued to explore for gold in 2006. AXMIN held exploration permits for the Heremakono, the Sabodala NW, and the Sonkounkou properties, which lie within the Kedougou-Kenieba inlier of the Birimian gold belt that borders Mali. IAMGOLD, which had been exploring in Senegal since the early 1990s, reported that it had spent about \$1.6 million in 2006 to compile, review, and reinterpret historic data from its Bambadji and Daorala Boto gold project in the southeastern part of the country. The company also conducted a trenching and geochemical sampling program of six zones in the Bambadji corridor and the Boto zone and completed a large-scale geophysical survey for the areas (IAMGOLD Corp., 2007, p. 13, 49).

Oromin continued its \$8 million exploration program. During 2006, a total of 70 core holes and 10 reverse circulation holes were completed, primarily at the Golouma West, the Masato, the Niakafiri, and the South gold zones. As of yearend, the company was awaiting additional reverse circulation rigs to be used at its Sabodala concession (Oromin Explorations Ltd., 2006).

MDL held an exploration permit for the Niakafiri and the Sabodala gold deposits in southeastern Senegal. As of June 30, 2006, MDL had invested \$20.9 million in gold exploration in the country. An updated mineral resource estimate for the Sabodala gold deposit was completed by RSG Global Consulting Pty Ltd. of Australia in May 2006 and yielded a resource estimate of about 20 Mt at an average grade of 2.7 grams per metric ton (g/t) gold. A total of five drill rigs were operating at the company's properties throughout the year. In August 2006, the company began negotiations with the Government to obtain a mine lease for the Sabodala gold deposit. Preliminary resource estimates at the Niakafiri gold deposit were reported to be 9,900 kilograms of gold (reported as 317,000 troy ounces) (Mineral Deposits Ltd., 2007, p. 10-14).

Randgold held four exclusive exploration permits in Senegal for an area that covers 1,326 square kilometers (km<sup>2</sup>) within the Sabodala gold belt. In 2006, the company began a 10,000-meter

rotary air blast drilling program to test 12 targets (Randgold Resources Ltd., 2007, p. 37).

**Iron and Steel.**—Société des Mines de Fer du Senegal Oriental (MIFERSO) was the Government-owned company in charge of the development of the Faleme iron ore deposit, which is located in southeastern Senegal. Kumba Iron Ore (KIO) (formerly Kumba Resources Ltd.; name was changed in November 2006) of South Africa had signed an agreement with MIFERSO in July 2004 to explore the resources at Faleme. Upon completion of a prefeasibility study in November 2005, the company had planned to exercise its option to acquire an 80% interest in the Faleme project and subsequently to begin a bankable feasibility study for the integrated development of a 12 million-metric-ton-per-year (Mt/yr) mine and related infrastructure project. The Government, however, did not acknowledge the company's rights to the project and reportedly had signed a memorandum of understanding to allocate an option for the deposit to Arcelor Mittal (formerly Mittal Steel Company NV; name was changed in June 2006 after the merger with Arcelor S.A.). In 2006, KIO decided to terminate all work related to the Faleme deposit and announced that it would pursue the necessary legal actions to preserve its contractual rights to the deposit. As of yearend, the issue remained unresolved (Metal Bulletin, 2006; Kumba Iron Ore, 2007, p. 32).

**Titanium Minerals and Zircon.**—MDL was pursuing the development of the Grand Côte Zircon Project (GCZP), which is a mineral sands deposit located on the northern coast of Senegal about 100 km north of Dakar. As of June 30, 2006, the company had spent \$12.1 million on the project, had completed an environmental impact study, and was in negotiations with the Government for the issuing of a mining lease. MDL planned to produce about 85,000 t/yr of zircon beginning in the first half of 2009. Inferred resources at GCZP were reported to be 801 Mt of ore at a grade of 2.6% heavy minerals, of which about 70% was ilmenite and 11% zircon (Mineral Deposits Ltd., 2006, p. 3, 5-6, 8-10, 18-20).

In December 2006, Carnegie Minerals plc, a subsidiary of CCL, announced that it had completed infill drilling at the Niafarang prospect. The company held an exclusive exploration license to explore for mineral sands at Niafarang in southern Senegal near the border with The Gambia. Drilling samples were shipped to independent Australian laboratories (not specified) and assaying results were expected to be available by the first quarter of 2007 (Carnegie Minerals plc, 2006).

### **Industrial Minerals**

**Phosphate Rock.**—Industries Chimiques du Sénégal (ICS) was Senegal's phosphate rock mining and processing company.

The Government of India, through Indian Farmers Fertilizer Cooperative Ltd. (IFFCO), and Southern Petrochemicals Industries Corporation Ltd. (SPIC) were equity partners in ICS (table 2). Phosphate ore was mined from the Keur Mor Fall and the Tobene deposits within the Taiba Mine. Part of the marketable phosphate rock was sent to ICS's phosphoric acid plants in Darou Khoudoss, and the remaining was sent to Dakar Port for export. The facilities at Darou consisted of two adjacent phosphoric acid production plants that had a combined production capacity of 660,000 t/yr of P<sub>2</sub>O<sub>5</sub>. Most of the phosphoric acid produced was exported to India. Owing to financial difficulties, ICS temporarily interrupted operations during 2006, which resulted in a 64% decline in phosphoric acid production and approximately 60% decline in phosphate rock production. The Government was considering reducing its stake in ICS from its current 46.38% to about 10% (table 1; Industries Chimiques du Sénégal, 2006; International Monetary Fund, 2007, p. 9).

In August 2006, the U.S. Trade and Development Agency granted about \$300,000 to the Ministry of Energy and Mines to fund an investment analysis of the cost and viability of mining and transporting phosphate rock from the Matam phosphate rock deposit in northern Senegal (U.S. Trade and Development Agency, 2006).

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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		2002	2003	2004 <sup>e</sup>	2005 <sup>e</sup>	2006 <sup>e</sup>
<b>THE GAMBIA<sup>2</sup></b>						
Clay <sup>3</sup>	metric tons	11,814 <sup>4</sup>	12,375 <sup>4</sup>	13,655 <sup>4,5</sup>	13,700	13,700
Laterite <sup>3</sup>		410	227 <sup>4</sup>	245 <sup>4,5</sup>	250	250
Silica sand <sup>3</sup>		1,508 <sup>4</sup>	1,534 <sup>4</sup>	1,389 <sup>4,5</sup>	1,390	1,390
Zircon/rutile concentrate	metric tons	--	13,000 <sup>4,6</sup>	-- <sup>4,5</sup>	--	410 <sup>5,6</sup>
<b>SENEGAL<sup>7</sup></b>						
Basalt <sup>3</sup>		116	363 <sup>8</sup>	360	360	360
Cement, hydraulic		1,653	1,694	2,391 <sup>r,5</sup>	2,623 <sup>r,5</sup>	2,884 <sup>5</sup>
Clay <sup>3</sup>		19	21 <sup>8</sup>	20	20	20
Clays, fuller's earth (attapulgitite)		138	195	200	127 <sup>r,5</sup>	140 <sup>5</sup>
Gold <sup>e,9</sup>	kilograms	600 <sup>5</sup>	600 <sup>5,8</sup>	600	600	600
Laterites <sup>3</sup>		112	304 <sup>8</sup>	300	300	300
Limestone <sup>3</sup>		1,461	1,588 <sup>8</sup>	1,600	1,600	1,600
Natural gas <sup>e</sup>	thousand cubic meters	3,368 <sup>5</sup>	12,638 <sup>5,8</sup>	12,600	12,600	12,600
Petroleum: <sup>10</sup>						
Crude oil	thousand 42-gallon barrels	726 <sup>r,5</sup>	290 <sup>r,5</sup>	202 <sup>r,5</sup>	374 <sup>r,5</sup>	388 <sup>r,5</sup>
Refinery products		854 <sup>r,5</sup>	1,091 <sup>r,5</sup>	1,106 <sup>r,5</sup>	870 <sup>r,5</sup>	313 <sup>5</sup>
Phosphate rock and related products: <sup>11</sup>						
Calcium phosphate-based fertilizers <sup>12</sup>		201	251	210 <sup>5</sup>	186 <sup>r,5</sup>	33 <sup>5</sup>
Crude rock:						
Aluminum phosphate		4	4 <sup>8</sup>	4	4	4
Calcium phosphate <sup>12</sup>		1,547	1,499 <sup>r,5</sup>	1,576 <sup>5</sup>	1,451 <sup>5</sup>	584 <sup>5</sup>
Phosphoric acid, P <sub>2</sub> O <sub>5</sub> content <sup>12</sup>		638 <sup>r,5</sup>	511	570 <sup>r,5</sup>	504	180 <sup>5</sup>
Salt		172	235	168 <sup>r,5</sup>	134 <sup>r,5</sup>	199 <sup>5</sup>
Sand <sup>3</sup>		860	2,168 <sup>8</sup>	2,170	2,170	2,170

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

<sup>1</sup>Table includes data available through October 2007.

<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. The major source of information for the Senegal 2006 statistics is Agence Nationale de la Statistique et de la Démographie.

<sup>8</sup>Source: Direction des Mines et de la Géologie, Republic of Senegal.

<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.

<sup>11</sup>Industries Chimiques du Sénégal was the main producer of phosphate rock in Senegal. Phosphate rock production excludes about 200,000 metric tons per year, which is estimated to be produced from other Senegalese sources.

<sup>12</sup>Source: Industries Chimiques du Sénégal.

TABLE 2  
THE GAMBIA AND SENEGAL: STRUCTURE OF THE MINERAL INDUSTRIES IN 2006

(Thousand metric tons)

Country and commodity	Major operating companies and major equity owners	Location of mine facilities	Annual capacity
THE GAMBIA			
Zircon/rutile concentrate <sup>1</sup>	Carnegie Minerals plc and Astron Ltd.	Sanyang district	20.
SENEGAL			
Attapulгите	Senegal Mines (Government, 49%, and private, 51%)	240 kilometers south of Dakar	100.
Do.	Société Senegalaise de Phosphates de Thies SA (private, 100%)	Lam Lam	NA.
Cement	Les Ciments du Sahel S.A. (private, 100%);	Kirene plant	600.
Do.	Société Ouest Africaine des Ciments (private, 100%)	Rufisque plant	1,600.
Phosphate rock, calcium	Industries Chimiques du Sénégal Group (Government, 46.38%, and Indian Farmers Fertilizer Cooperative Ltd. and Southern Petrochemicals Industries Corporation Ltd., collectively, 20.31%)	Taiba Mine	2,000.
Do.	Société Senegalaise de Phosphates de Thies SA (private, 100%)	Lam Lam, Sebikhotane, and Allou-Kagne	NA.
Phosphoric acid	Industries Chimiques du Sénégal Group (Government, 46.38%, and Indian Farmers Fertilizer Cooperative Ltd. and Southern Petrochemicals Industries Corporation Ltd., collectively, 20.31%)	Darou I plant, Darou Khoudoss	330 P <sub>2</sub> O <sub>5</sub> .

NA Not available.

<sup>1</sup>Mine under development.