



2011 Minerals Yearbook

GHANA

THE MINERAL INDUSTRY OF GHANA

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Ghana was among the world's top 10 producers of gold and was ranked 13th among the world's leading producers of diamond, by volume. Other mineral commodities produced in the country included aluminum, crude petroleum and petroleum products, bauxite, cement, manganese, salt, and silver (George, 2012; Kimberley Process Rough Diamond Statistics, 2012b).

Minerals in the National Economy

In 2011, Ghana's total export receipts increased by 60.6% to about \$12.8 billion. This increase was driven mostly by an increase in export earnings from the gold sector and the commencement of crude petroleum exports. Gold export earnings, which accounted for 38% of total export earnings, increased by 29.4% to \$4.9 billion. Ghana's mineral sector accounted for about 14% of total tax revenues and 5.5% of the gross domestic product (GDP). Infrastructure to support mining activities, however, continued to be in need of rehabilitation and new infrastructure to support the emerging hydrocarbons sector was not yet in place. The trade of mineral commodities was conducted mainly at the Takoradi and Tema deepwater ports, and to a lesser extent, at the ports of Akosombo, Buipe, Debre, and Yapei. The Volta Lake Transport system was also used to transport petroleum products (Bank of Ghana, 2012, p. 20; National Development Planning Commission, 2010, p. 30, 57).

Government Policies and Programs

The Government introduced new tax measures for mining companies, which were to become effective in 2012, and established a National Renegotiation Team to review all mining agreements in Ghana with a view to ensuring that the country would benefit adequately and fairly from gains in the mining sector. Changes to the tax law included an increase in the corporate income tax for mining companies to 35% from 25%, the introduction of a windfall tax of 10%, and a new capital allowance rate of 20% from the previous 80% deduction (Ghana Web, 2011b).

The Government also created small-scale miners' associations in all mining districts of Ghana to help manage artisanal and small-scale mining in the country. During the year, new methods to carry out gold mining using direct smelting instead of mercury amalgamation were introduced to artisanal and small-scale miners. A total of 1,098 health and safety inspection visits were conducted by officials from the Ministry of Lands and Natural Resources at all exploration sites, mines under development, and operating mines, and 246 Government officials were also examined for the award of various certificates of competency to enhance safety standards and productivity (Ministry of Finance and Economic Planning, 2011, p. 82).

The enactment of a new Lands Act was underway. Under this new law, the administration of all state lands will be

decentralized and property valuation for purposes and payments of compensation for acquired land will be undertaken. Under phase I of the Land Administration Project, the Government launched a program to take inventory of all state lands.

A countrywide survey and mapping program was also to be launched. To help reduce environmental degradation the Government planned to relocate (to areas not yet specified) about 50,000 artisanal and small-scale miners (Ministry of Finance and Economic Planning, 2011, p. 83–84).

Ghana's salt industry was also in the process of development. Plans to establish a salt-winning enclave (a coastal salt pond farm) in Ghana's Keta district were underway. The Government also planned to modernize and convert the Songhor Salt Co. into a limited liability company. Salt was produced from the Amisa lagoon, the Benyah lagoon, the Densu Delta area, the Keta lagoon, the Nyanya lagoon, the Oyibi lagoon, and the Songhor lagoon. Ghana's current salt production capacity was estimated to be 250,000 metric tons per year (t/yr), but the country had the potential to produce more than 2 million metric tons per year (Mt/yr) of salt (Ghana Web, 2011a; Ministry of Finance and Economic Planning, 2011, p. 82–84).

In August, the Ghanaian Parliament approved a \$3 billion loan from China Development Bank to finance a number of infrastructure projects. Among those projects was a gas pipeline that the Government considered to be urgently needed to avoid the significant risk of damage to the Jubilee oil wells and the environment from gas flaring or reinjection (Felix, 2011; Okine, 2011; International Monetary Fund, 2012, p. 11)

Production

Production of most mineral commodities, with the exception of bauxite, diamond, and silver, increased during the year. Aluminum production was estimated to be 35,000 metric tons (t); this estimate was based on information reported by Volta Aluminum Company Ltd. (VALCO), which indicated that the Tema smelter had restarted production in January and was operating at 20% capacity. Cement production increased by 21.4% to about 2.6 million metric tons (Mt). Gold production, which excluded production from small-scale and artisanal mining, increased by 8.7% to 82,993 kilograms (kg), and manganese ore production increased by 13.1% to 1.7 Mt. Data on mineral production are in table 1.

Structure of the Mineral Industry

The Ministry of Lands and Natural Resources (MLNR), through the Geological Survey Department (GSD), the Minerals Commission, and the Precious Minerals Marketing Co. Ltd. (PMMC), oversees all aspects of Ghana's mineral sector. The GSD is responsible for providing reliable and up-to-date geologic information and serves as the repository

for the country's geoscientific data. The Minerals Commission is responsible for regulating and managing the use of Ghana's mineral resources and for coordinating Government policy related to them. Through its Inspectorate Division, the Minerals Commission institutes and enforces environmental, health, and safety standards in the country's mines and ensures that mining companies and all mining-related activities comply with Ghana's Mining and Mineral law. The PMMC is responsible for marketing the country's precious minerals and jewelry industry. The National Petroleum Authority is the Government agency responsible for overseeing and regulating the activities of the downstream petroleum industry. Ghana National Petroleum Corp. (GNPC) is the Government-owned petroleum company that is in charge of the exploration for and the development and production of petroleum (Ministry of Lands and Natural Resources, 2011).

Mineral Trade

Based on statistics reported by the Kimberley Process Certification Scheme, a total of 291,934 carats of diamond worth \$16.4 million was exported from Ghana in 2011; this is a decrease of 11.2% compared with diamond exports in 2010 and an increase in value of 36.9%. Ghana's total exports of all goods and services to the United States were valued at \$779 million in 2011 compared with about \$273 million in 2010; \$341 million of this export value was from crude petroleum; \$99.5 million, from petroleum products; \$6.3 million, from gold; \$150,000, from excavating, paving, and construction machinery; \$134,000, from drilling and oilfield equipment and platforms; and \$25,000, from gem-quality rough diamond. Ghana's total imports from the United States were valued at about \$1.2 billion in 2011 compared with a revised \$989 million in 2010. This included nearly \$113 million for excavating machinery, \$109 million for petroleum products, \$91 million for drilling and oilfield equipment, \$82.7 million for fuel oil, \$9.98 million for iron and steel mill products, \$9.3 million for specialized mining equipment, and \$2.9 million for iron and steel products. Ghana was a member of the World Trade Organization and the Economic Community of West African States (Kimberley Process Rough Diamond Statistics, 2012a, b; U.S. Census Bureau, 2012a, b).

Commodity Review

Metals

Bauxite and Alumina and Aluminum.—Ghana's Tema aluminum smelter, which was 100% owned by the Government, restarted production in January. The smelter had been struggling with fluctuating operating levels, mostly as a result of restricted power allocations from the Volta River Authority hydroelectric plant. Then, in 2009, the Government announced that although favorable rainfall patterns in 2008 and 2009 had seen the water level at the Akosombo Dam rise, it was unable to reopen the smelter owing to the effects of the global financial crisis on the price and demand for aluminum worldwide. In 2011, the smelter operated at 20% of its installed capacity of 200,000 t/yr. The

smelter employed 500 people (Thomson Reuters, 2011; Volta Aluminum Co. Ltd., 2012).

Gold.—In December 2011, Endeavour Mining Corp. of Canada acquired all the issued ordinary shares of Adamus Resources Ltd. of Australia. With this transaction, Endeavour acquired the rights to the new Nzema Mine, which, in 2010, was under development by Adamus. The Nzema Mine, which is located in southwestern Ghana about 280 kilometers (km) west of the capital city of Accra, produced its first gold (2,871 kg) in April 2011. Exploration activities during 2011 included 39,762 meters of core and reverse-circulation drilling. Endeavour planned to explore for additional oxide resources and to evaluate the potential of the underlying sulfide mineralization along the Salman trend through a preliminary economic assessment, which was expected to be completed by the end of 2012 (Endeavour Mining Corp., 2011; 2012, p. 28; Mining Journal, 2011).

AngloGold Ashanti Ltd. of South Africa held 100% interest in the Iduapriem and the Obuasi gold mines. Iduapriem, which is located about 70 km north of the City of Takoradi, was an open pit mine and included a carbon-in-pulp processing plant. The mine produced 6,190 kg of gold during the year compared with 5,754 kg in 2010. Despite a 15% decrease in ore grade, production increased by 7.6% during the year mainly as a result of an increase in the volume of ore milled. A new tailings storage facility was commissioned during the year. Production from AngloGold's Obuasi underground mine decreased slightly to 9,735 kg from 9,860 kg produced in 2010. The Obuasi Mine is located in southern Ghana about 60 km south of Kumasi. About 360,000 metric tons per month of sulfide ore was treated at the mine's processing plant (AngloGold Ashanti Ltd., 2012, p. 52–55).

Noble Mineral Resources Ltd. of Australia acquired the Bibiani gold mine in July 2010. In 2011, the company undertook an extensive drilling program at Bibiani in hopes of growing its reserve base and upgraded the capacity of the processing plant to 3 Mt/yr from 2.7 Mt/yr. The Bibiani Mine was expected to reopen in 2012 and to produce a total of about 4,700 kilograms per year (kg/yr) of gold (Andrews, 2012; Noble Mineral Resources Ltd., 2012).

On May 13, Gold Fields Ltd. (Gold Fields) of South Africa acquired Canada-based IAMGOLD Corp.'s minority stake in the Damang and the Tarkwa gold mines at a cost of \$667 million. The acquisition raised Gold Fields interest in both operations to 90% from its previous 71.1% interest. Gold Fields reported that ongoing drilling resulted in an increase in the Damang Mine's mineral reserves to about 105,800 kg (reported as 3.4 million troy ounces) of gold from about 65,300 kg (reported as 2.1 million troy ounces). Production at Damang decreased by 4.5% to 6,771 kg during the year mostly as a result of a number of power supply interruptions, which resulted in an average loss in production of 31 kg of gold per quarter. Gold production from the Damang Mine was expected to range between 6,500 kg and 6,800 kg in 2012. The company was in the process of carrying out a prefeasibility study for the Damang Super Pit deposit, which was expected to double the mine's production capacity (Gold Fields Ltd., 2011; 2012, p. 92, 96–97).

Gold Fields completed a number of projects at the Tarkwa Mine in 2011, which included the commissioning of three

new tertiary crushers at the mine's north heap-leach facility and the optimizing of the high-pressure grinding roll at its south heap-leach circuit. The north heap-leach facility crushers were expected to help maintain existing recoveries and plant throughput, and the high-pressure grinding roll was expected to add about 1,500 kg/yr of output. Construction work was also completed on Tarkwa's TSF3 tailings storage facility to increase production capacity. During the year, production at the Tarkwa Mine decreased slightly, by 2.4%, to 22,311 kg. The decrease in production was attributed to the processing of harder ore, power supply interruptions, and higher rainfall, which slowed down mining activities. Gold Fields planned to produce between 22,400 kg and 23,300 kg of gold in 2012 and to further enhance the long-term sustainability of the mine by adding a secondary crusher to its carbon-in-leach plant and by increasing the tailings storage capacity (Gold Fields Ltd., 2012, p. 94–95).

Gold production at the Ahafo Mine increased by 3.4% to 17,605 kg. The increase in production was a result of higher throughput and recovery. Colorado-based Newmont Mining Corp., which was the company that operated the mine, planned to produce between 17,700 kg and 18,700 kg of gold in 2012. The company also held interest in the Akyem gold project, which is located about 125 km northwest of the capital city of Accra. The project consisted of the development of an open pit gold mine with a capacity to produce between 10,900 kg and 14,000 kg/yr of gold. As of yearend 2011, the company reportedly had awarded 95% of all mine construction contracts and had commenced bulk earthworks and major civil engineering work at the mine. First production was scheduled to begin in either late 2013 or early 2014. As of December 31, the mine's gold reserves were estimated to be about 230,000 kg of gold (reported as 7.4 Mt) (Newmont Mining Corp., 2012, p. 31, 74).

The Bogoso/Prestea Mine produced a total of 4,370 kg of gold during the year; this represented a 17.8% decrease in production from that of 2010. Colorado-based Golden Star Resources Ltd. of Canada, which was the company that operated the mine, reported that during the past few years, production from the mine had been hindered by power supply interruptions, which led to mechanical failures and lower oxidation efficiency at its sulfide processing plant. Golden Star also operated the Wassa Mine, which had a 12.7% decrease in production during the year owing to higher than normal rainfall. The company planned to carry out a drilling program for the Wassa Mine in 2012 and to conduct a definitive feasibility study for underground operations at the Prestea Mine, which were expected to result in the production of about 2,800 kg/yr of gold (Golden Star Resources Ltd., 2012, p. 7, 18–20).

Other companies exploring for gold in Ghana included Australian companies Azumah Resources Ltd., Perseus Mining Ltd., PMI Gold Corp., and Signature Metals Ltd.; Canadian companies Abzu Gold Ltd., African Queen Mines Ltd., Edgewater Exploration Ltd., Pelangio Exploration, and X-tra Gold Resources Corp.; LionGold Corp. Ltd. of Singapore, and Gold Stone Resources Ltd. of the United Kingdom.

Industrial Minerals

Diamond.—The majority of Ghana's diamond production was from small-scale and artisanal miners who operated in the Bonsa River valley near the town of Tarkwa and in the Birim River valley between the towns of Akwatia and Oda. Other small diamond occurrences had been reported elsewhere throughout the country. All diamond production in Ghana was from secondary deposits, and there were no known diamondiferous kimberlites in the country.

In August, Great Consolidated Diamond Ghana Ltd. of Ghana, took over the operation of Ghana Diamond Co. (GDC), which had been closed since 2007. Great Consolidated Diamond Ghana planned to invest more than \$100 million in a 5-year multiphase program, which was expected to create about 2,000 jobs and produce about 1 million carats per year of diamond (Ghana News Agency, 2011).

Mineral Fuels

Petroleum.—Ghana became a petroleum producing country on November 28, 2010, after producing its first crude oil from the \$3.3 billion Jubilee oilfield. The Jubilee oilfield, which is located about 60 km offshore Ghana in water depths of between 991 meters (m) and 1,707 m, was the first petroleum discovery made within the West Africa transform margin. The West African transform margin extends nearly 1,500 km along the coast from eastern Ghana to the west of Sierra Leone. Shortly after its commissioning, Jubilee produced 88,000 barrels per day (bbl/d), but by yearend, production had decreased to about 70,000 bbl/d. Average production in 2011 was 66,000 bbl/d, although the design capacity of Jubilee was 120,000 bbl/d. The cause of the decline in well productivity was reportedly a technical issue related to the design of the well and not to the dwindling of oilfield reserves. Crude petroleum reserves were estimated to be 1.8 billion barrels, and average production was expected to be between 70,000 and 90,000 bbl/d by 2012. The next phase of development (phase 1A) would focus on the development of eight new wells at an estimated cost of \$1.1 billion. The drilling of these wells was scheduled to begin in February 2012 (Tullow Oil plc., 2012; U.S. Securities and Exchange Commission, 2012, p. 15–20).

New Alpha Refinery-Ghana of South Africa was to build a \$6 billion petroleum refinery in Ghana that would have a capacity to produce 200,000 bbl/d. The refinery, which would be located in Takoradi, was expected to be commissioned by 2015 and to employ between 4,800 and 5,000 people. Refinery facilities would also include the construction of a powerplant, which was expected to generate surplus electricity to be added to the national grid. Petroleum products, which would include gasoil, gasoline, jet fuel, and liquefied petroleum gas, among others, would be exported to neighboring countries. In 2010, the company signed a 20,000-bbl/d offtake agreement with Port Harcourt-based Ross International Nigeria. Offtake agreements to purchase crude oil from Mali and Nigeria were being negotiated (Business Monitor International, 2010; Ghana Ministry of Information, 2011).

Outlook

The emergence of the hydrocarbons sector in the past 2 years is likely to enhance Ghana's position as a world mineral producer, but in the short run, petroleum is unlikely to displace gold as Ghana's leading mineral export earner. Changes to the tax law, which are scheduled to begin in 2012, are expected to further increase the Government's receipts from royalties and dividends but could decrease foreign investments in the mineral sector. Furthermore, the coming online of at least two new gold operations together with planned increases in gold production at existing mines is expected to maintain gold's leading role as a major income earner for the country.

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TABLE 1
GHANA: PRODUCTION OF MINERAL COMMODITIES¹

(Thousand metric tons unless otherwise specified)

Commodity ²		2007 ^e	2008 ^e	2009 ^e	2010	2011
Aluminum, primary		--	--	--	--	35 ^e
Bauxite, gross weight		748 ³	796 ³	490 ³	595 ^r	408
Cement, hydraulic ^{e,4}		1,800	1,800	1,800	2,100 ^{r,e}	2,550
Diamond ⁵	thousand carats	895	643	376	334	302
Gold, mine output, Au content	kilograms	72,209 ³	72,980 ^{3,6}	79,883 ^{3,6}	76,332 ⁷	82,993 ⁸
Manganese: ⁹						
Ore, processed		1,854 ^{r,3}	914 ^{r,3}	882 ^{r,3}	1,529 ^r	1,729
Mn content ^e		515 ^{r,3}	256 ^{r,3}	248 ^{r,3}	426 ^r	484
Petroleum:						
Crude	thousand 42-gallon barrels	--	--	--	2,050 ^e	24,100
Refinery products ^e	do.	16,000	16,000	16,000	16,000	16,400
Salt		124	239	250	85 ^r	100 ^e
Silver, Ag content of exported dore	kilograms	3,300	3,200	3,928 ³	3,313 ^r	3,088

^eEstimated; estimated data are rounded to no more than three significant digits. ^rRevised. do Ditto. -- Zero.

¹Table includes data available through October 4, 2012.

²In addition to the commodities listed, a variety of crude construction materials (clays, lime, limestone, sand and gravel, and stone) are produced. Output of these commodities is not reported, however, and information is inadequate to make reliable estimates of output.

³Reported figure.

⁴All from imported clinker.

⁵Reported by Kimberley Process Certification Scheme.

⁶Excludes artisanal and small-scale mining output.

⁷Excludes artisanal and small-scale output, which in 2010 was estimated to be more than 25,000 kilograms.

⁸Excludes artisanal and small-scale output, which in 2011 was estimated to be more than 30,000 kilograms.

⁹Reported by the International Manganese Institute.

TABLE 2
GHANA: STRUCTURE OF THE MINERAL INDUSTRY IN 2011

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity
Aluminum	thousand metric tons	Volta Aluminum Co. Ltd. (VALCO) (Government, 100%)	Aluminum smelter at Tema	200.
Bauxite	do.	Ghana Bauxite Company Ltd. (GBCL) (Bosai Minerals Group Co. Ltd., 80%, and Government, 20%)	Bauxite mine at Awaso	600.
Cement	do.	Ghana Cement Company Ltd. (GHACEM) (HeidelbergCement AG, 93.1%)	Clinker grinding plant at Takoradi	1,200.
Do.	do.	do.	Clinker grinding plant at Tema	1,200.
Do.	do.	Diamond Cement Ghana Ltd.	Cement plant at Aflao; uses imported clinker	600.
Do.	do.	Savanna Cement Company Ltd. (SAVACEM) and Diamond Cement Ghana Ltd.	Town of Buipe, Central Gonja District	350. ¹
Diamond	thousand carats	Great Consolidated Diamond Ghana Ltd. (Government, 100%)	Placer mine at Akwatia, Birim Valley	360.
Do.	do.	Artisanal diamond miners	Birim Valley	500 to 900.
Gold	kilograms	AngloGold Ashanti Ltd., 100%	Obuasi surface and underground mine, 60 kilometers south of Kumasi	17,000.
Do.	do.	do.	Iduapriem Mine, 70 kilometers north of Takoradi	8,800.
Do.	do.	Investec Bank, 100%	Bibiani Mine, 250 kilometers northwest of Accra	3,400.
Do.	do.	Golden Star (Bogoso/Prestea) Ltd. (Golden Star Resources Ltd., 90%, and Government, 10%)	Bogoso/Prestea open pit mine, 300 kilometers west of Accra	7,300.
Do.	do.	Golden Star (Wassa) Ltd. (GSWL) (Golden Star Resources Ltd., 90%, and Government, 10%)	Wassa Mine, 30 kilometers northwest of Tarkwa	7,000.
Do.	do.	Gold Fields Ltd., 90%, and Government, 10%	Tarkwa open pit mine and carbon-in-leach and heap-leach plants, 300 kilometers west of Accra	21,800.
Do.	do.	do.	Damang Mine and carbon-in-leach plant, 360 kilometers west of Accra	6,000.
Do.	do.	Newmont Mining Corp., 100%	Ahafo Mine, 290 kilometers northwest of Accra, Brong Ahafo region	17,100.
Do.	do.	Endeavour Mining Corp., 90%, and the Government, 10%	Nzema Mine, 280 kilometers west of Accra, East municipal district	3,100.
Do.	do.	Chirano Gold Mine Ltd. (Kinross Gold Corp., 90%, and Government, 10%)	Chirano Mine, 100 kilometers from Kumasi, southwestern Ghana	8,000.
Do.	do.	do.	do.	3,800.
Do.	do.	Artisanal gold miners	Throughout Ghana	4,000 to 8,000.
Limestone and lime	metric tons	Carmeuse Lime Products (Ghana) Ltd. (Carmeuse SA)	Takoradi	NA.
Manganese ore	thousand metric tons	Ghana Manganese Company Ltd. (Ghana International Manganese Co., 90%, and Government, 10%)	Open pit mine at Nsuta-Wassaw Western region	1,500.
Petroleum, crude	thousand barrels	Tullow Oil plc, 34.71%; Anadarko Petroleum Corp., 23.49%; Kosmos Energy LLC, 23.49%; Ghana National Petroleum Corp. (GNPC), 13.75%; Sabre Oil & Gas Holdings Ltd., 2.81%; E.O. Group Ltd., 1.75%	Jubilee oilfield, 60 kilometers offshore	43,800.
Petroleum products	do.	Tema Oil Refinery (Government, 100%)	Refinery at Tema	16,425.
Salt	metric tons	Panbros Salt Industry Ltd.	Salt pan at Mendskrom, near Accra	250,000.
Do.	do.	Elmina Salt Producers Association	Artisanal salt pan mining near Elmina	NA.

Do., do. Ditto. NA Not available.

¹Under construction.