



2008 Minerals Yearbook

GHANA

THE MINERAL INDUSTRY OF GHANA

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Gold continued to be a key industry to Ghana's economy. Information on the contribution of the mining sector to the country's gross domestic product (GDP) for 2008 was unavailable; in 2007, however, the mining sector contributed about 6.2% of the GDP, represented about 41% of export earnings, and was one of the leading contributors (14%) to the Internal Revenue Service through the payment of corporate taxes and ancillary levies, employee income taxes, and mineral royalties. Other mineral commodities produced in the country included bauxite, diamond, manganese, salt, and silver (Ghana Chamber of Mines, 2008). As of December 31, 2007, (the latest date for which data were available) direct employment by mineral-producing members of Ghana's Chamber of Mines was 12,658; 98% of those employed were reportedly Ghanaians. Small-scale mines employed about 600,000 people as of yearend 2006, and mining support services employed about 7,500 people (Ghana Chamber of Mines, 2009, p. 12, 23).

Government Policies and Programs

The legislative framework for the mining sector in Ghana is provided by the Minerals and Mining Act 703 of 2006. Under the law, all minerals are owned by the state. Under the Minerals and Mining Act, the holder of a mining lease or small-scale mining license must pay a royalty of no less than 3% and no more than 6% of their gross revenues. In the metals sector, reconnaissance licenses may be granted for an initial period not to exceed twelve months and may be extended only once for a period not to exceed an additional 12 months. A prospecting license may be granted for an initial period not to exceed 3 years and may be extended only once for a period not to exceed an additional 3 years. Upon the expiration of a reconnaissance or prospecting license, the holder may apply for a mining lease. A mining lease may be granted for an initial term not to exceed 30 years and may be extended only once for a period not to exceed an additional 30 years. The Government is entitled to a free-carried equity interest of 10% in all mineral ventures (Parliament of the Republic of Ghana, 2006, p. 12-23).

In the industrial minerals sector, reconnaissance and prospecting licenses and mining leases can be granted only to Ghanaian citizens unless the proposed investment exceeds \$10 million. Small-scale mining licenses are also reserved for Ghanaian citizens only and are granted for a period not to exceed 5 years and, upon the expiration of the license, it may be renewed for a period to be determined by the Minerals Commission (MC) (Parliament of the Republic of Ghana, 2006, p. 36-40).

A Government decision to cut back on electricity subsidies for mining companies went into force on July 1. Electricity rates for mining companies increased by 100% to 22 cents per kilowatt hour from 11 cents per kilowatt hour. Mining companies pressed for a reduced increase, stating that the new electricity tariff would result in increases in operational costs, in particular for

companies with underground mining operations, which are energy intensive (Kpodo, 2008a).

Airborne geophysical surveys and detailed geologic field mapping were being conducted on about one-third of Ghana's surface area with the support of the European Union under a program known as the Mining Sector Support Program (MSSP). The program was to include the development of an information management system, which would involve the development of various databases, and the creation of an intranet to link the various Government agencies involved in the mining sector, and the creation of a Ghanaian mining Web site (Ministry of Lands, Forestry and Mines, 2009a).

In 2008, the Government sponsored a 25-member delegation of small-scale Ghanaian miners to attend a 2-week study tour of the mining industry in China. The tour, which was facilitated by Shaanxi Mining Co. of China, was aimed at helping small-scale miners adopt modern and cost-effective technologies to help address environmental and health hazard issues associated with small-scale mining operations and to help the miners improve their managerial and organizational skills (Ghana MMA, 2008).

Production

Data on mineral production are in table 1.

Structure of the Mineral Industry

The Ministry of Lands, Forestry and Mines, through the MC, the Geological Survey Department (GSD), the Inspectorate Division of Minerals Commission (IDMC), and the Precious Minerals Marketing Co. Ltd. (PMMC), oversees all aspects of Ghana's mineral sector. The MC is responsible for regulating and managing the use of Ghana's mineral resources and for coordinating Government policy related to them. The GSD is responsible for the providing reliable and up-to-date geologic information and serves as the repository of the country's geoscientific data. The IDMC is responsible for instituting and enforcing health, safety, and environmental standards within the country's mines and for ensuring that mining companies and all mining-related activities comply with Ghana's mining and mineral laws and regulations through effective monitoring. The PMMC is responsible for the marketing of the country's precious minerals and jewelry industry. The National Petroleum Authority is the Government agency responsible for overseeing, monitoring, and regulating the activities in the petroleum downstream industry. Ghana National Petroleum Corp. (GNPC) is the Government-owned petroleum company in charge of exploration, development, and production of petroleum. The Volta River Authority (VRA) produced hydroelectric power from the Akosombo Dam. The VRA also obtains electricity from neighboring Côte d'Ivoire, which has intermittently experienced political instability and civil unrest. The VRA planned to increase its thermal power generation capacity by constructing

a 126-megawatt (MW) natural gas thermal powerplant at Tema (Ministry of Lands, Forestry and Mines, 2009b).

Mineral Trade

Ghana was the United States' 101st ranked goods trading partner with about \$830 million in total goods traded in 2008 and was the United States' 89th ranked goods export market and the 111th ranked supplier of imported goods. Ghana's exports to the United States were valued at about \$222 million in 2008 compared with about \$199 million in 2007 and \$192 million in 2006; \$58.9 million of these exports was from petroleum products; \$3.1 million, gold; and \$1.6 million, gem-quality diamond. Total imports from the United States were valued at about \$608 million in 2008 compared with about \$416 million in 2007 and \$289 million in 2006. These included nearly \$63 million for petroleum products; \$53.9 million for excavating machinery; \$42.7 million for drilling and oilfield equipment; and \$6.2 million in specialized mining equipment (U.S. Census Bureau, 2008a, b; Office of the United States Trade Representative, 2009).

Commodity Review

Metals

Aluminum.—In June 2008, the Government acquired Alcoa Inc.'s 10% stake in Volta Aluminum Co. Ltd. (VALCO) for \$2 million. With this purchase, the Government became the sole owner of VALCO. VALCO was the company that operated the country's only aluminum smelter, which is located in the city of Tema in southeastern Ghana. Shortly after the purchase, the Government sought to sell a stake in VALCO to interested partners. In November, the Ghanaian Parliament approved the sale of 70% of the company, but the foreign companies mentioned in the deal—Norsk Hydro ASA of Norway and Companhia Vale do Rio Doce of Brazil—denied that they had agreed to buy a stake in the company. The Tema smelter had been struggling with fluctuating operating levels since 2003 mostly owing to restricted power allocations from the Volta River Authority hydroelectric plant because of low water levels in the Volta River. The smelter remained closed throughout 2008. The design capacity of the smelter was 200,000 metric tons per year (Kpodo, 2008b; Murphy, 2008; Thomson and others, 2008).

Gold.—Adamus Resources Ltd. of Australia held a 90% interest in the Southern Ashanti Gold Project (SAGP), which is located in southwestern Ghana about 280 kilometers (km) west of the capital city of Accra. The project, which covers a total area of 626 square kilometers, lies about 40 km south of the Bogoso/Prestea gold mine and comprises the Anwia and the Salman gold deposits. A bankable feasibility study for the project was completed in June 2007. Measured and indicated resources were estimated to be about 28.4 million metric tons (Mt) of ore at a grade of 1.78 grams per metric ton (g/t) gold, and inferred resources were estimated to be 6.43 Mt of ore at a grade of 1.64 g/t gold. As of yearend 2008, Adamus had obtained a mining license for the project for an initial 10 years with the option to renew the term for an additional 10 years. The

mine was expected to produce about 3,100 kilograms per year (kg/yr). Construction work at the mine was expected to begin in 2010 (Adamus Resources Ltd., 2009, p. 4-6).

AngloGold Ashanti Ltd. of South Africa held 100% ownership in the Iduapriem and the Obuasi gold mines. Iduapriem, which is located about 70 km north of the city of Takoradi, is an open pit mine and includes a carbon-in-pulp processing plant. The mine produced about 6,200 kilograms (kg) of gold in 2008 compared with about 5,800 kg in 2007. The increase in production was attributed to an increase in crushed tonnage owing to the commissioning of a new crusher and a marked improvement in blast fragmentation. Production at Iduapriem was projected to remain constant at about 6,200 kg in 2009. Obuasi, which is located in southern Ghana about 80 km from Kumasi, is an underground mine (although some surface mining does occur) and includes a sulfide processing plant, an oxide processing plant, and a tailings processing plant. Production at Obuasi decreased marginally to about 11,100 kg in 2008 compared with about 11,200 kg in 2007. The decrease in production was attributed to decreases in the volume processed and the grade mined, as well as to unscheduled repair and maintenance to the mill, water-quality issues, and the delay in the commissioning of a sulfide tailings plant. Production at Obuasi was projected to increase to about 12,400 kg in 2009. On October 23, the Ghanaian Parliament extended the term of the Obuasi mining lease until 2054 (AngloGold Ashanti Ltd., 2009, p. 64-67, 120).

AngloGold Ashanti continued to have clashes with artisanal miners operating illegally at the Obuasi Mine. The company reported that during 2008 there were 27 deaths and 1 injury because of landslides in the course of, in most cases, illegal artisanal mining, and the death of a person suspected of stealing fuel from a haul truck. Three people died and three community members were injured as a result of interactions with security personnel (AngloGold Ashanti Ltd., 2009, p. 136).

AngloGold Ashanti's mining operations in Ghana were dependent upon hydroelectric power from the VRA and, to a lesser extent, on a recently constructed smaller VRA thermal powerplant. To supplement the power generated by the VRA, AngloGold Ashanti, together with three other principal gold producers in Ghana (names not disclosed), acquired an 85-MW diesel-fired powerplant. The plant could be converted to gas supply once the anticipated West African gas pipeline (WAGP) is developed. AngloGold Ashanti was one of the companies negotiating with the Government to seek a reduction in electricity rates, which were raised during the year (AngloGold Ashanti Ltd., 2009, p. 167).

Gold Fields Ltd. of South Africa (71.1%) operated the Damang and the Tarkwa gold mines through a joint venture with IAMGOLD Corp. (18.9%). The Government held the remaining 10% interest in the mines. The Damang Mine is located in southwestern Ghana about 360 km west of Accra. Production at Damang is derived from several open pits, the newest of which was the Rex pit, which went into operation in 2008. Mine facilities included a carbon-in-leach plant. Production for the fiscal year that ended on June 30, 2008, was 6,041 kg compared with 5,843 kg produced in fiscal year 2007. The increase was owing to improved mill recovery to 93.8% from

92.2% following the installation of a seventh carbon-in-leach tank and a second gravity unit. The Damang Mine employed 407 permanent employees and 1,101 contractors. The company expected to produce about 6,800 kg for the fiscal year ending on June 30, 2009, and planned to complete a pit cutback at Damang by June 30, 2013. Gold Fields reported that in April 2008, about 2,000 illegal miners invaded the Rex and the Cinnamon Bippo project areas. As a result of consultations with the district and regional security committees for assistance with evicting the illegal miners, an agreement was reached with the illegal miners during the year and these reportedly eventually abandoned the project areas (Gold Fields Ltd., 2008, p. 17, 32-35).

The Tarkwa Mine, which is located in southwestern Ghana about 300 km west of Accra, comprises several open pits, including the North (Tarkwa) and the South (Teberebie) heap-leach operations and a carbon-in-leach plant. During fiscal year 2008, the mine produced a total of 20,095 kg compared with 21,684 kg in 2007. The Tarkwa Mine had 1,805 permanent employees, 44 temporary employees, and 2,846 contractors. Mining and processing operations were curtailed early in the year by fluctuations in power supply from the national grid followed by heavy rainfall (including a once-in-50-years event) during the first two quarters and unplanned fleet down time because of a shortage of quality tires. A tire-retreading facility was commissioned during the year in an attempt to extend the life of radial heavy-duty tires. Gold production was expected to increase to 23,300 kg/yr once a mill and heap-leach pad expansion is completed. A carbon-in-leach expansion project, which was scheduled to be in full production by the end of fiscal year 2009, was expected to increase ore throughput to 1 Mt of ore per month from 400,000 metric tons (t) (Gold Fields Ltd., 2008, p. 17, 32-35).

Golden Star Resources Ltd. (Golden Star) through its subsidiary Golden Star Bogoso/Prestea Ltd. held a 90% interest in the Bogoso/Prestea and the Wassa gold mines. The Bogoso/Prestea Mine comprises the adjoining Bogoso and Prestea mining concessions, a 3.5-million-metric-tons-per-year (Mt/yr)-processing facility that used bio-oxidation technology to treat refractory sulfide ore and a 1.5-Mt/yr carbon-in-leach processing facility that treated oxide ore. Production of gold at the Bogoso/Prestea Mine increased by about 43% to 5,300 kg in 2008 compared with about 3,700 kg in 2007 mostly owing to the commissioning of the bio-oxidation plant in mid-2007. The company planned to begin mining oxide ore from the Prestea South deposit in 2009 and eventually to source oxide ore from another deposit known as Mampon. The Prestea South and the Mampon deposits are located about 20 km southeast and 35 km north, respectively, of the Bogoso processing plants (U.S. Securities and Exchange Commission, 2009, p. 16-20, 44-48).

Golden Star expected to produce about 6,200 kg of gold at the Bogoso/Prestea Mine in 2009. Golden Star, through its subsidiary Golden Star (Wassa) Ltd. (GSWL), also owned 90% of the Wassa open pit gold mine and carbon-in-leach processing plant. The Wassa Mine produced 3,901 kg in 2008 compared with 3,920 kg in 2007. GSWL also owned the Benso and the Hwini-Butre concessions in southwestern Ghana. Golden Star invested \$40 million in the development of the Benso Mine in 2008. The mine began shipping ore to the Wassa processing

plant in the third quarter of 2008; during the fourth quarter, it began the construction of a 30-km haul road south to the Hwini-Butre ore deposit, from which the company expected to begin mining by the second half of 2009. The Benso and the Hwini-Butre concessions are located about 50 km and 80 km, respectively, from the Wassa Mine. The mineral resource at Benso was estimated to be 800,000 t of ore at an average grade of 2.24 g/t gold and at Hwini-Butre to be 1 Mt of ore at an average grade of 3.43 g/t gold. Golden Star expected to produce about 6,200 kg from the Wassa Mine, which would include ore processed from the Benso and the Hwini-Butre deposits (U.S. Securities and Exchange Commission, 2009, p. 16-20, 44-48).

Midlands Minerals Corp. held a 100% interest in the Kaniago, the Kwahu Praso, and the Nsuta gold properties, and a 65% interest in the Sian open pit gold mine. The Sian Mine and carbon-in-leach processing plant had been in operation between 2001 and 2003 but was closed in 2004 owing to low gold prices and operational problems. The inadequate design of the pit by the former owner of the mine (Sian Goldfields of China); the lack of spare parts for the 500-metric-ton-per-day (t/d) processing plant that was brought in from China; and language barriers within the mining team were some of the operational problems cited by Midlands for the closure of the mine. The company's mining lease for the Sian Mine is valid until 2026, and indicated resources at the mine were estimated to be about 2.6 Mt of ore at an average grade of 2.33 g/t gold. The company expected to have the Sian Mine at the prefeasibility stage by the end of 2009 and to reach a production decision stage by the end of 2010. Midlands planned to integrate the Sian and the Kwahu Praso properties, given that Kwahu Praso is contiguous to and was once part of the Sian Mine (Mining Review Africa, 2008; Midlands Minerals Corp., 2009, p. 2-3, 7-8).

Red Back Mining Inc. of Canada held a 100% interest in the Chirano gold mine, which is located about 100 km from Kumasi in southwestern Ghana. Drilling at the Akwaaba Deeps deposit in 2007 established a high-grade underground resource, which the company began to develop as an underground operation in 2008. To support the new Akwaaba Deeps development, the company planned to commission a new crushing circuit in the first quarter of 2009 and to expand the capacity at its processing plant to 3.5 Mt/yr by the third quarter of 2009. The Chirano gold mine produced 3,757 kg in 2008; production was expected to increase to about 5,300 kg in 2009 and to reach about 7,800 kg in 2010 when the upgrade of the processing plant is finalized and as a result of the addition of high-grade underground ore from the Akwaaba Deeps Mine (Red Back Mining Inc., 2009, p. 3-5, 14-15).

Other companies that conducted gold exploration in Ghana included Moydow Mines International Inc., Volta Resources Inc., and Xtra-Gold Resources Corp. of Canada, and Perseus Mining Ltd. of Australia.

Industrial Minerals

Cement.—Ghana imported clinker, gypsum, and limestone for the manufacturing of cement. Only two companies produced cement in the country—Diamond Cement Ghana Ltd. and Ghana Cement Co. Ltd. ((GHACEM). GHACEM operated

the country's two clinker-grinding plants at the port cities of Takoradi and Tema. The capacity of each plant was 1.2 Mt/yr. The Government announced that Barclays Gerdi Group Inc. planned to build a 500,000-t/d cement plant in Ghana at a cost of \$350 million.

Diamond.—Diamond was recovered by artisanal miners from alluvial deposits near Akwatia in the Birim Valley. The only formal commercial diamond production in the country came from a placer mine in Akwatia, which was operated by Government-owned Ghana Consolidated Diamonds Ltd. (GCD). GCD was idled in September 2007 and remained closed throughout 2008 reportedly owing to lack of capital, an obsolete plant, and inadequate machinery to sustain production. The Government was seeking a suitable investor to take over ownership of the company (Modern Ghana News, 2008a, c, e; Ministry of Lands, Forestry and Mines, 2009a).

In 2006, a report released by the United Nations Group of Experts on Côte d'Ivoire indicated that Ghana was being used as a conduit for the export of conflict diamond originating from rebel-controlled areas in Côte d'Ivoire. According to the report, although Ghana's diamond output was in decline, exports by volume and by value had almost doubled since 2000. The United Nations had recommended that Ghana look into implementing internal control systems that would allow for the tracking of diamonds from mine site to the point of export. At the 2006 Kimberley Process Plenary in Botswana, Ghana agreed to tighten internal controls in the diamond sector, and as a result, Ghana's Minerals Commission began the process of registering artisanal diamond miners in the Lower Birim area in 2008. The country was also in the process of establishing a database for rough diamond (Partnership Africa Canada, 2006a, b; United Nations Security Council, 2006; Modern Ghana News, 2008b).

Ghana's first diamond cutting and polishing school, The Natural Diamond Training Institute, opened in Accra in 2008. The institute was to run a 2-month intensive course, which included rough diamond identification, sorting, cutting, polishing, and marketing (Modern Ghana News, 2008d; Rapaport Diamond Report, 2008).

Mineral Fuels

Natural Gas.—The Government planned to build a new natural gas plant at Atuabo. The plant, which was to be built in multiple stages, was to include a 4-million-cubic-meter (reported as 150-million-cubic-feet) natural gas processing plant. The cost of the project was estimated to be \$775 million, and the gas was to be processed into dry gas for electricity generation at the Effasu powerplant and into liquefied petroleum gas for domestic consumption (United Press International Inc., 2008).

In November 2008, the West African Gas Pipeline Company Ltd. (WAPCo) resumed the commissioning of the WAGP facilities at the Itoki natural gas export terminal in Nigeria. In December, natural gas was introduced into the offshore pipeline from Lagos Beach to Takoradi in Ghana. WAPCo had commissioned the Itoki terminal in April 2008 but the commissioning was suspended owing to the appearance of moisture content in the gas, which did not meet the required

WAGP specification. The Itoki terminal is the segment of the WAGP that meets the Nigerian Gas Co.'s Escravos-to-Lagos system from which supply is taken. The WAGP, which runs offshore for about 620 km from Badagry in Lagos, Nigeria, to Aboadzi in Sekondi, Ghana, was owned and operated by WAPCo. WAPCo was a joint venture between public and private sector companies from Benin, Ghana, Nigeria, and Togo and included Chevron West African Gas Pipeline Ltd. (36.7%), Nigerian National Petroleum Corp. (25%), Shell Overseas Holdings Ltd. (18%), Takoradi Power Company Ltd. (16.3%), Société Togolaise de Gaz (2%), and Société BenGaz S.A. (2%) (West African Gas Pipeline Company Ltd., 2008, 2009).

Petroleum.—The Jubilee oilfield, which lies about 65 km off the coast of Ghana, was discovered in June 2007 and its appraisal was still underway in 2008. Drilled and undrilled structures into which Jubilee extends are estimated to have the potential to hold more than 3 billion barrels (Gbbbl) of petroleum. Texas-based Kosmos Energy LLC and Tullow Oil plc of the United Kingdom held the majority interest in the Jubilee oilfield. The first offshore petroleum discovery, Mahogany-1, was made by Kosmos in June 2007. Tullow, which was awarded the adjoining Deepwater Tano license in 2006, made a second discovery, the Hyedua-1, 2 months after the Kosmos find. Hyedua-1 showed a pressure-connection with Mahogany-1, which indicates a structure extending to about 5.3 km between the two wells. In May 2008, Kosmos drilled Mahogany-2 and proved a structure of at least 11 km in width, with crude of 37 degrees API and combined hydrocarbon columns of more than 600 meters. Although both Kosmos and Tullow claimed the discovery, Tullow emerged as the unit operator with overall responsibility for the field and Kosmos emerged as the technical operator of the integrated project team. The Jubilee oilfield was estimated to hold recoverable reserves of about 500 million barrels of petroleum with the potential of 1.8 Gbbbl. The oilfield was to be developed in phases at a total cost of \$3.1 billion. In February, Kosmos made another petroleum discovery at the Odum-1 exploration well offshore in the West Cape Three Points Block. Odum-1 is located about 13 km east of the Mahogany-1 well but is part of a different geologic structure (Kosmos Energy LLC, 2008a-c; Petroleum Economist, 2008).

The Government planned to expand the production capacity at the Tema Oil Refinery to 145,000 barrels per day (bbl/d) of petroleum from its current 45,000 bbl/d as the country moved into commercial petroleum production in the near future. The Tema refinery was 100% owned by the Government. The expansion of the refinery was expected to cost between \$150 million and \$200 million and would be financed by syndicated international loans and by local banks. In June, Ghana's National Petroleum Authority announced that Barclays Gerdi Group had expressed interest in establishing a \$1.7 billion oil refinery in Takoradi with a capacity to process 100,000 bbl/d (National Petroleum Authority, 2008; Reuters, 2008).

Outlook

Owing to the recent discovery of petroleum offshore Ghana, the Government is likely to shift its priorities from

the nonfuel minerals sector to the fuels sector. Petroleum is likely to displace gold as the country's leading mineral export earner in the next 3 to 5 years if plans to develop the Jubilee oilfield come to fruition. The country's favorable political climate, a legislative framework that adequately defines the rights and obligations of investors, and the fact that Ghana was being considered as a candidate country to join the Extractive Industries Transparency Initiative, suggest that the Government is interested in providing a transparent investment climate to attract foreign direct investments in the mineral sector. Mineral prospecting is likely to increase owing to ongoing efforts aimed at completing airborne geophysical surveys and detailed geologic field mapping of the country. Electricity shortages are likely to continue in the short run, although the construction of a new petroleum refinery is expected to aid the sector by providing excess electricity generated by the refinery to the national grid.

References Cited

- Adamus Resources Ltd., 2009, 2008 annual report: Perth, Australia, Adamus Resources Ltd., 15 p.
- AngloGold Ashanti Ltd., 2009, 2008 annual financial statements: Marshalltown, South Africa, AngloGold Ashanti Ltd., 348 p.
- Ghana Chamber of Mines, 2008, The performance of the mining industry in 2007: Accra, Ghana, Ghana Chamber of Mines, 9 p.
- Ghana Chamber of Mines, 2009, Factoid 2008: Accra, Ghana, Ghana Chamber of Mines, 26 p.
- Ghana MMA, 2008, Small-scale miners arrive from China: Ghana MMA, December 4. (Accessed December 16, 2009, at <http://www.ghanamma.com/latest-news/1641-small-scale-miners-arrive-from-china.html>.)
- Gold Fields Ltd., 2008, 2008 annual report: Johannesburg, South Africa, Gold Fields Ltd., 214 p.
- Kosmos Energy LLC, 2008a, Kosmo's Energy Mahogany-2 appraisal well confirms Jubilee field discovery offshore Ghana: Dallas, Texas, Kosmos Energy LLC press release, May 5, 2 p.
- Kosmos Energy LLC, 2008b, Kosmo's Energy Mahogany-2 appraisal well flows 5,200 barrels of oil during drillstem test offshore Ghana: Dallas, Texas, Kosmos Energy LLC press release, June 10, 2 p.
- Kosmos Energy LLC, 2008c, Kosmo's Energy makes second oil discovery offshore Ghana: Dallas, Texas, Kosmos Energy LLC press release, February 25, 2 p.
- Kpodo, Kwasi, 2008a, Mining firms haggle with Ghana over power rate rise: Thompson Reuters, July 1. (Accessed December 16, 2008, at <http://www.reuters.com/article/idUSL014211920080701>.)
- Kpodo, Kwasi, 2008b, Update 3—Ghana assembly clears VALCO sale; "buyers" say no: Thompson Reuters, November 7. (Accessed December 8, 2008, at <http://www.reuters.com/article/idUKL765668520081107?symbol=KALU.OQ>.)
- Midlands Minerals Corp., 2009, Management's discussion and analysis for the year ended December 31, 2008: Toronto, Ontario, Canada, Midlands Minerals Corp., 16 p.
- Mining Review Africa, 2008, African countries selected for prospectivity and stability: Mining Review Africa, November, no. 6, p. 49-52.
- Ministry of Lands, Forestry and Mines, 2009a, Mineral policy and fiscal regime—Geology and mineral resources: Accra, Ghana, Ministry of Land Forestry and Mines. (Accessed December 14, 2009, at <http://www.ghana-mining.org/ghweb/en/ma/mincom/mcminingnews.html>.)
- Ministry of Lands, Forestry and Mines, 2009b, The Ministry of Lands, Forestry and Mines and its agencies: Accra, Ghana, Ministry of Land Forestry and Mines. (Accessed December 14, 2009, at <http://www.ghana-mining.org/ghweb/en/ma.html>.)
- Modern Ghana News, 2008a, American investor to take over GCD: Modern Ghana News, December 6. (Accessed December 9, 2009, at <http://www.modernghana.com/193696/1/american-investor-to-take-over-gcd.html>.)
- Modern Ghana News, 2008b, Entry of Ivorian diamonds into Ghana—Security to be tightened: Modern Ghana News, April 23. (Accessed December 9, 2009, at <http://www.modernghana.com/news/163397/1/entry-of-ivorian-diamonds-into-ghana-security-to-b.html>.)
- Modern Ghana News, 2008c, Government to pay Ghanaian cedis to GCD workers to pave way for a new investor: Modern Ghana News, April 16. (Accessed December 9, 2009, at <http://www.modernghana.com/news/162883/1/govt-to-pay-gh-16m-to-gcd-workers-to-pave-way-for-a.html>.)
- Modern Ghana News, 2008d, School to add value to raw diamonds opens: Modern Ghana News, January 4. (Accessed December 9, 2009, at <http://www.modernghana.com/news/152142/1/school-to-add-value-to-raw-diamonds-opens.html>.)
- Modern Ghana News, 2008e, Strategic investor for GCD—Minister: Modern Ghana News, April 9. (Accessed December 9, 2009, at <http://www.modernghana.com/news/162218/1/strategic-investor-for-gcd-soon-minister.html>.)
- Murphy, Peter, 2008, Valco says had interest in Ghana but not in VALCO: Thompson Reuters, November 11. (Accessed December 8, 2008, at <http://www.reuters.com/article/idUKN1153310720081111>.)
- National Petroleum Authority, 2008, American firm to build refinery in Ghana: National Petroleum Authority, June 1. (Accessed December 24, 2009, at <http://www.npa.gov.gh/2008/06/01/american-firm-refinery/>.)
- Office of the United States Trade Representative, 2009, U.S.-Ghana trade facts: Office of the United States Trade Representative, August 24. (Accessed, December 10, 2009, at <http://www.ustr.gov/countries-regions/africa/west-africa/ghana>.)
- Parliament of the Republic of Ghana, 2006, The minerals and mining act—2006: Accra, Ghana, Parliament of the Republic of Ghana, March 22, 51 p.
- Partnership Africa Canada, 2006a, Conflict diamonds transit Ghana—UN report calls for tough action: Partnership Africa Canada, Other Facets, October, no. 21, p. 1.
- Partnership Africa Canada, 2006b, Côte d'Ivoire and Ghana—KP takes tough stand on conflict diamonds: Partnership Africa Canada, Other Facets, December, no. 22, p. 3.
- Petroleum Economist, 2008, Ghana—Big time oil in two years: Petroleum Economist, December, p. 14-16.
- Rapaport Diamond Report, 2008, News briefs—Ghana opens first diamond cutting school: New York, New York, Rapaport Diamond Report, February 1, v. 31, no. 5, p. 16.
- Red Back Mining Inc., 2009, Annual report for the year ended December 31, 2008: Vancouver, British Columbia, Canada, 38 p.
- Reuters, 2008, Ghana to expand Tema oil refinery: Reuters, April 21. (Accessed October 8, 2009, at www.reuters.com/articlePrint?articleId=USL2179133520080421.)
- Thomson, Alistar, Norton, Karen, Musa, Tansa, and Manson, Katrina, 2008, Factbox—Africa's aluminum industry: Thompson Reuters, June 19. (Accessed December 8, 2008, at <http://www.reuters.com/article/idUKL1910303920080619>.)
- United Nations Security Council, 2006, Security Council renews Côte d'Ivoire arms and diamond bans until October 31, 2007 unanimously adopting resolution 1727 of 2006: United Nations Security Council press release, December 15, 4 p.
- United Press International Inc., 2008, Ghana is planning a natural gas plant: UPI Energy Watch, United Press International Inc., December 19. (Accessed December 4, 2009, at http://www.upi.com/Science_News/Resource-Wars/2008/12/19/UPI_Energy_Watch/UPI-725112297102.)
- U.S. Census Bureau, 2008a, U.S. exports to Ghana from 2004 to 2008 by 5-digit end-use code: U.S. Census Bureau. (Accessed December 10, 2009, at <http://www.census.gov/foreign-trade/statistics/product/enduse/exports/c7490.html>.)
- U.S. Census Bureau, 2008b, U.S. imports from Ghana from 2004 to 2008 by 5-digit end-use code: U.S. Census Bureau. (Accessed December 10, 2009, at <http://www.census.gov/foreign-trade/statistics/product/enduse/imports/c7490.html>.)
- U.S. Securities and Exchange Commission, 2009, Golden Star Resources Ltd—Form 10-K: Washington DC, U.S. Securities and Exchange Commission, 103 p.
- West African Gas Pipeline Company Ltd., 2008, First gas reaches Ghana: West African Gas Pipeline Company Ltd. press release, December 11, 1 p.
- West African Gas Pipeline Company Ltd., 2009, Company profile: West African Gas Pipeline Company Ltd. (Accessed December 23, 2009, at <http://41.204.59.211:81/ind.php?hpd=1>.)

TABLE 1
GHANA: PRODUCTION OF MINERAL COMMODITIES¹

(Thousand metric tons unless otherwise specified)

Commodity ²	2004	2005	2006	2007 ^e	2008 ^e
Aluminum, primary	--	-- ^r	-- ^r	--	--
Bauxite, gross weight	498	727	886	748 ^{r,3}	738 ³
Cement, hydraulic ^{5,4}	1,800 ^r	1,800 ^r	1,800 ^r	1,800 ^r	1,800
Diamond ⁵ thousand carats	920	1,013	973	895 ³	643 ³
Gold, mine output, Au content kilograms	63,139	66,852	69,817	83,558 ^{r,3}	80,503 ³
Manganese:					
Ore, processed	1,597	1,715	1,659	1,173 ^{r,3}	1,090 ³
Mn content ^e	559 ³	600	580	410	380
Natural gas ^{6,7} million cubic meters	9 ^e	--	--	--	--
Petroleum:					
Crude ⁶ thousand 42-gallon barrels	400 ^e	--	--	--	--
Refinery products ^e do.	16,000	16,000	16,000	16,000	16,000
Salt	265	250	123 ^r	124 ^r	150 ^e
Silver, Ag content of exported dore kilograms	3,329	3,571	3,142	3,300 ^r	3,200
Steel, secondary, rebar ^e	25	25	25	-- ^r	-- ³

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

¹Table includes data available through October 8, 2009.

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

³Reported figure.

⁴All from imported clinker.

⁵Kimberley Process Certification Scheme.

⁶Ghana did not produce natural gas nor petroleum in commercially sustainable quantities.

⁷Reported by Ghana Energy Commission.

TABLE 2
GHANA: STRUCTURE OF THE MINERAL INDUSTRY IN 2008

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 (on care and maintenance)	200.
Bauxite	do.	Ghana Bauxite Co. Ltd. (Rio Tinto Alcan, 80%, and Government, 20%)	Bauxite mine at Awaso	600.
Cement	do.	Ghana Cement Co. Ltd. (GHACEM) (HeidelbergCement AG, 94.5%)	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.
Diamond	thousand carats	Ghana Consolidated Diamonds Ltd. (GCD) (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, 80 kilometers from Kumasi	17,000.
Do.	do.	do.	Iduapriem Mine, 70 kilometers north of Takoradi	8,800.
Do.	do.	Central African Gold plc, 100%	Bibiani Mine, 250 kilometers northwest of Accra	3,400.
Do.	thousand metric tons	Golden Star Resources Ltd., 90%, and Government, 10%	Bogoso carbon-in-leach processing plant, 300 kilometers west of Accra	1,500 ore.
Do.	do.	do.	Bogoso sulfide ore processing plant 300 kilometers west of Accra	3,500 ore.
Do.	kilograms	do.	Bogoso/Prestea open pit mine, 300 kilometers west of Accra	5,300.
Do.	thousand metric tons	do.	Wassa carbon-in-leach processing plant, 250 kilometers west of Accra	3,000 ore.
Do.	kilograms	do.	Wassa Mine, 30 kilometers northwest of Tarkwa	5,200.
Do.	do.	do.	Butre Mine, 50 kilometers south of Wassa Mine	NA.
Do.	do.	Golden Star Resources Ltd., 81%	Prestea underground mine (on care and maintenance)	1,100.
Do.	do.	Gold Fields Ltd., 71.1%; IAMGOLD Corp., 18.9%; 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.	thousand metric tons	Chirano Gold Mine Ltd. (Red Back Mining Inc., 100%)	Chirano Mine, 100 kilometers from Kumasi, southwest Ghana	2,100 ore.
Do.	kilograms	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 of Belgium)	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 products	thousand barrels	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.

