



# 2008 Minerals Yearbook

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## SIERRA LEONE

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# THE MINERAL INDUSTRY OF SIERRA LEONE

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Diamond mining continued to be the most significant mineral commodity to the economy of Sierra Leone, accounting for about 46% of export revenues in 2008. Export revenues from all mining represented 79% of the country's total exports. Rutile exports accounted for 17% of export revenues; bauxite, 13%; gold, 2%; and ilmenite, 1%. Sierra Leone ranked among the world's five leading producers of rutile. Other minerals produced in the country included bauxite, cement, gold, and ilmenite. In 2008, the country continued to recover from years of civil unrest. Mining activities had increased since the end of the civil war in 2002; however, industrialized mining had led to increased competition for land between mining companies and artisanal miners. The estimated number of artisanal miners operating in the country in 2008 was 120,000 (Diamond Development Initiative, 2008, p. 5; Bank of Sierra Leone, 2009, p. 25; Gambogi, 2009).

## Government Policies and Programs

The Government of Sierra Leone owns the rights to all minerals in the country. The Ministry of Mineral Resources is the Government entity responsible for the administration of the mineral industry, which includes the issuance of mining licenses, field monitoring, enforcement of mining regulations, and the maintenance of mining records. The Gold and Diamond Department (GDD) within Sierra Leone's National Revenue Authority is responsible for implementing the country's participation in and compliance with the international diamond trade control requirements of the Kimberley Process Certification Scheme. The GDD values and levies export taxes on all diamond that is officially exported from Sierra Leone. The Mines Department monitors and regulates the mining and marketing of precious minerals, and the Geological Survey Division issues prospecting licenses and monitors the activities of exploration companies across the country. Other Ministries involved in the mining sector include the Ministry of Lands, Country Planning, and the Environment, which is responsible for all issues relating to land and property rights and the environment; the Ministry of Local Government and Community Development, which is also responsible for issues concerning land tenure, local Government administration, and disputes over property rights at the local level; and the Ministry of Gender and Children's Affairs, which deals with issues concerning child labor in the mining sector (Diamond Development Initiative, 2008, p. 4-14).

The decentralization of Government power has been ongoing, and local councils at the Provincial, district, and chiefdom levels were becoming increasingly important with regard to many mining-related issues. The Mines Department issues artisanal mining licenses but requires license holders to make subsequent arrangements with traditional rulers, who are the custodians of the land. In the case of leases granted to industrial-scale operations, the Mines Department informs the landowners or

community chiefs of the license granted. In districts where there is no cadastre system in place, artisanal mining licenses may be granted for the same locations where prospecting and exploration licenses have already been issued, which in the past has created land dispute problems between the parties involved (Diamond Development Initiative, 2008, p. 4-14).

The mining sector in Sierra Leone is regulated by the Mines and Minerals (Amendment) Act of 2004, which succeeded the Mines and Minerals Act of 1994. The Mines and Minerals Act, however, does not set out requirements for the granting of industrial-scale mining licenses as distinct from artisanal mining licenses. The Government also passed a Diamond Cutting and Polishing Act in 2007 in an attempt to establish an industry for the local beneficiation of the country's gem-quality diamond. The country's Law Reform Commission drafted comprehensive legislation concerning land and property rights, but this legislation was awaiting Parliament approval. The Government also created Chiefdom Mining Allocation Committees to address problems concerning the access by foreigners to artisanal mining licenses, to assist in the prevention of disputes concerning landholding claims involving mining sites, and to settle mining rights disputes at the community level in lieu of a cadastre system for mining that was in the process of being implemented (Diamond Development Initiative, 2008, p. 6-7, 11, 14; Ministry of Mineral Resources, 2009).

On August 11, 2007, Sierra Leone held nationwide Presidential and Parliamentary elections, and in March 2008, the new Government announced its intention to review all mining contracts in the country with the help of experts from the World Bank (Jalloh, 2008; Krawitz, 2008).

In June 2008, the World Bank approved a \$5.1 million grant and a \$5.9 million credit for the development of infrastructure projects in Sierra Leone. The assistance was mostly aimed at rehabilitating airport facilities, ports, and roads; supporting institutional and regulatory reforms; and assisting the management of the road, port, and airport sectors (Sheriff, 2008; World Bank, The, 2008).

## Production

Output levels for most mineral commodities decreased during the year with the exception of ilmenite and cement, which showed increases of 11.3% and 7.8%, respectively. Bauxite production decreased by 18.4% to 954,000 metric tons (t) in 2008 from about 1.2 million metric tons (Mt) produced in 2007; diamond production decreased by 38.5% to 371,261 carats from a revised 603,623 carats in 2007 mostly owing to a decrease in the demand for diamond exports as a result of the global financial crisis and the cessation of operations at the Koidu Mine; gold production decreased by 7.5% to 196 kilograms (kg); and rutile production decreased by 4.4% to 78,908 t from a revised 82,527 t owing to the collapse of a dredge.

## Structure of the Mineral Industry

Koidu Holdings S.A. (KHSA) (BSG Resources Ltd., 65%, and Magma Diamond Resources Ltd., 35%) operated the Koidu kimberlite mine; Sierra Leone Cement Corp. Ltd. operated the country's sole cement plant; Sierra Mineral Holdings I Ltd. (Vimetco N.V.) operated the Sierra Mineral (SML) bauxite mine; and Sierra Rutile Ltd. (Titanium Resources Group Ltd.) operated the Sierra Rutile Mine. Table 2 is a list of major mineral industry facilities.

## Mineral Trade

Exports of diamond by volume decreased by 46% to 371,290 carats compared with exports in 2007; about 50% of these exports were gem-quality diamond. The Bank of Sierra Leone attributed the decrease in diamond exports to the drop in the world market price for rough diamond and to the cessation of operations at the Koidu Mine (Bank of Sierra Leone, 2009, p. 7).

## Commodity Review

### Metals

**Bauxite and Alumina.**—In July, Titanium Resources Group Ltd. sold the SML bauxite mine to Netherlands-based Vimetco N.V. for \$40.5 million. Vimetco mined bauxite from the Gbonge, the Gondama, the Jenega, the Konta, and the Wunde deposits and operated a wash plant at Gondama with a production capacity of 300 metric tons per hour and a recovery rate of 65%. Resources at SML were estimated to be 31 Mt at a grade of 53%  $Al_2O_3$  and 4%  $SiO_2$ . The production capacity of the mine was 1.2 million metric tons per year (Mt/yr) (Titanium Resources Group Ltd., 2008a; 2009, p. 2; Vimetco N.V., 2009, p. 10, 16, 32).

**Gold.**—Cluff Gold plc acquired 100% interest in the Baomahun gold project, which is located about 180 kilometers (km) east of the capital city of Freetown in Southern Province. On June 25, 2008, the company announced measured and indicated mineral resources at Baomahun to be 8.9 Mt of ore at a grade of 2.9 grams per metric ton (g/t) gold. The company held a 25-year mining lease for the project. More than 22,000 meters of core drilling were completed at Baomahun in 2008. Slope assessments and geotechnical studies were underway and a proposed plant and tailings dam site had been identified. The company planned to conduct a bankable feasibility study by the end of 2009 (Cluff Gold plc, 2008; Swanepoel, 2008).

Axmin Inc. continued to explore for gold at the Komahun gold project, which is located within the Nimini Hill concession. A new resource estimate for Komahun was announced in September. Indicated mineral resources were estimated to be 370,000 t at a grade of 9.1 g/t gold and inferred mineral resources were estimated to be 3.1 Mt at a grade of 4.3 g/t gold. The exploration license was held under a joint-venture agreement with AFCAN Barbados Ltd. (a subsidiary of Eldorado Gold Corp.). Axmin Inc. could increase its ownership in the project to 80% from 60% upon completion of a bankable feasibility study (Axmin Inc., 2008).

Other companies exploring for gold in the country included African Diamonds plc of the United Kingdom, Golden Star Resources Ltd. (GSR) of the United States, and London-based Target Resources plc.

**Iron Ore.**—African Minerals Ltd. announced the results of a resource estimate conducted by SRK Consulting Ltd. of the United Kingdom for the company's Tonkolili project, which is located in the Sula Mountains Greenstone Belt of Sierra Leone about 190 km from Tagrin Point. Indicated mineral resources at Tonkolili were estimated to be 2.8 billion metric tons (Gt) and inferred mineral resources were estimated to be 1.9 Gt. The resource estimates were based on exploration data available up to December 12, 2008. Previous metallurgical test work carried out on bulk samples of the primary Banded Iron Formation (BIF) at Tonkolili indicated that a concentrate assaying 68% iron or higher was achievable with a silica level in the magnetite concentrate of between 3% and 5%. A hematite-rich lateritic cap overlies the primary BIF, and the company estimated that because of this, there is potential to increase the resource at Tonkolili. Following the results of SRK's assessment, the company planned to expedite a prefeasibility study to assess the economic viability of the project (African Minerals Ltd., 2009).

**Titanium and Zirconium.**—In July, Titanium Resources Group Ltd. announced that dredge D2, which was used in the mining of rutile at the Sierra Rutile Mine, had capsized into the freshwater lagoon that was being mined. The company's main producing dredge, dredge D1, was unaffected by the incident and was moved into a higher grade mining area. The company planned to rehabilitate dredge D2 but announced that the rehabilitation would not take place until sufficient funding was secured. The estimated time to have the dredge operational again was 2 years. The Sierra Rutile Mine is located in southwestern Sierra Leone near the Imperri Hills, about 30 km from the Atlantic Ocean and 135 km from the capital city of Freetown. In addition to rutile, the mine produced ilmenite and small amounts of zircon (Titanium Resources Group Ltd., 2008b; 2009, p. 2, 5-6, 9).

### Industrial Minerals

**Diamond.**—Sierra Leone's diamond production was mainly from alluvial mining, the majority of which came from the Bo, the Kenema, and the Kono districts along the drainages of the Bafi, the Mano, the Moya, the Sewa, and the Woyie Rivers. About 60% of all mining licenses granted in 2006 were for mining operations in the Kono district. During the 1940s and 1960s, two of the world's largest rough diamonds, the Woyie River Diamond, which weighed 770 carats, and the Star of Sierra Leone, which weighed 968.9 carats, were recovered from the gravels of the Woyie River. The Woyie River flows through the town of Koidu, which is located within the Kono district. Throughout time, the Woyie River's tributaries drained kimberlite pipes and dykes at Koidu, and diamond from these pipes was washed and concentrated in surrounding alluvial deposits. The only kimberlite operation in the country was KHSA's Koidu Kimberlite Project (KKP), which was located within the Tankoro Chiefdom of the Kono district in Eastern Province about 2 km from the district capital of Koidu. KHSA

held a 25-year mining lease for the project; the lease was valid until 2020. The KKP comprised two kimberlite pipes and several dyke zones. Following the country's 2007 Presidential elections, about 1,000 illegal miners were estimated to have invaded diamond-bearing land that was held under concession by KHSA (Manson, 2007; Diamond Development Initiative, 2008, p. 7; Kamara, 2008; Koidu Holdings S.A., 2008).

In December 2007, more than 400 protesters in the town of Koidu allegedly looted mining equipment and destroyed a generator belonging to KHSA. Protests were reportedly staged by Koidu residents following the inaction of the pertinent authorities concerning resident frustrations over KHSA's noncommitment in fulfilling corporate responsibilities. The company reportedly had agreed to relocate residents to make way for its mining operations, but the slow implementation of the plan and claims by the Tankoro Chiefdom that citizens were coerced into accepting an inequitable surface rent for the use of the land, among other issues, prompted the demonstrations against the company. Following the incidents, the Government ordered the suspension of KHSA's diamond mining operations. The violence in Koidu was believed to have been prompted by the rising unemployment among the Kono district youth and the reduction in force of more than 500 KHSA employees. The Kono district reportedly hosted one of the highest numbers of civil war ex-combatants in the country (Manson, 2007; Awoko Newspaper, 2008, p. 3, 13; Gbenda, 2008; Kamara, 2008).

Mexivada Mining Corp. of Canada through its subsidiary Mexivada Gold and Diamond Mining Company (SL) Ltd. signed a memorandum of understanding with the Gbense Chiefdom of the Kono district for the mining of alluvial diamond at a site near Yarudu in the town of Koidu. Once operating, about 70% of the profits from the project would go to Mexivada, and the remaining 30% of profits was to be shared between the people of the Chiefdom and their local partner, Pink Diamond Exploration Company Ltd. Mexivada's investment in the project was \$25,000 (Tacy Ltd., 2008a, b).

United Kingdom-based West African Diamonds plc (WAD) held a 60% interest in a mining lease for a tailings dump that was prospective for gold and diamond and a kimberlite pipe and dyke that were prospective for diamond. During the first quarter of 2008, a processing plant (Plant 11) was commissioned to treat the tailings material. The tailings dump was the result of 23 years of processing diamond and gold-rich material from the Meya, the Moinde, and the Woyie Rivers by Sierra Leone's National Diamond Mining Co., which operated between 1969 and 1992. Kimberlite samples from Pipes 1 and 2 (now owned by KHSA) were also treated at Plant 11 during this period. Preliminary results from the processing of material in 2008 indicated a gold grade of 0.04 g/t gold and a diamond grade of 1.6 carats per hundred metric tons (West African Diamonds plc, 2009, p. 10-11).

Other companies exploring for diamond in the country included the joint venture of Petra Diamonds Ltd. (51%) of South Africa and Stellar Diamonds Ltd. (49%) of Canada, which explored for diamond in the Kono district; Canada-based Cream Minerals Ltd. in joint venture with Casierra Development Fund Inc.; and Target Resources plc of the United Kingdom (Cream Minerals Ltd., 2008; Target Resources plc, 2008; Petra Diamonds Ltd., 2009, p. 54-55).

## **Mineral Fuels**

**Petroleum.**—Sierra Leone did not produce or refine petroleum and was dependent upon imports for its petroleum requirements.

## **Outlook**

Despite the slowdown in mineral production during 2008, Sierra Leone's economy is likely to continue to depend greatly on revenues from the diamond sector. Although already a world leading producer of rutile, export earnings from the production of this mineral commodity are likely to be hindered in the short run by the temporary shutdown of operations at the Sierra Rutile Mine. The Sierra Rutile Mine, however, is expected to become operational again sometime after 2010. Potential also exists for the country to become a world-class iron ore producer. The Government's plan to review all mining contracts in the country may hinder potential mineral exploration and prospecting activities in the country owing to investor uncertainty concerning the guarantee of an adequate legislative framework that defines mining rights and obligations.

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TABLE 1  
SIERRA LEONE: PRODUCTION OF MINERAL COMMODITIES<sup>1</sup>

(Metric tons unless otherwise specified)

Commodity		2004	2005	2006	2007	2008
Bauxite	thousand metric tons	--	--	1,072	1,169	954
Cement		180,460	172,120	234,440	235,830	254,160
Diamond <sup>2,3</sup>	carats	691,757	668,710	603,566	603,623 <sup>r</sup>	371,261
Gold, mine output, Au content	kilograms	27	53	71	212	196
Ilmenite, gross weight <sup>4</sup>		--	--	13,819	15,750	17,528
Rutile, gross weight		--	--	73,802	82,527 <sup>r</sup>	78,908
Salt		827	--	--	--	--

<sup>r</sup>Revised. -- Zero.

<sup>1</sup>Table includes data available through October 6, 2009.

<sup>2</sup>Source: Kimberley Process Certification Scheme.

<sup>3</sup>About 60% gem quality and 40% industrial quality.

<sup>4</sup>In addition to ilmenite and rutile, the country produced small amounts of zircon.

TABLE 2  
SIERRA LEONE: STRUCTURE OF THE MINERAL INDUSTRY IN 2008

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity
Bauxite	Sierra Mineral Holdings I Ltd. (Vimetco N.V.)	Sierra Mineral Mine, 150 kilometers southeast of Freetown	1,200
Cement	Sierra Leone Cement Corp. Ltd.	Freetown plant	NA
Diamond	thousand carats Koidu Holdings S.A. (KHS) (BSG Resources Ltd., 65%, and Magma Diamond Resources Ltd., 35%)	Two kimberlite pipes, 2 kilometers from the district capital of Koidu	120
Titanium, ilmenite	Sierra Rutile Ltd. (Titanium Resources Group Ltd.)	Sierra Rutile Mine, 130 kilometers southeast of Freetown	15
Titanium, rutile concentrate	do.	do.	100

do. Ditto. NA Not available.