



# 2014 Minerals Yearbook

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## SIERRA LEONE

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# THE MINERAL INDUSTRY OF SIERRA LEONE

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In 2014, Sierra Leone's mineral sector was adversely affected by the decrease in the international price of two of its key mineral export commodities, iron ore and rutile, and by the Ebola virus disease (EVD) outbreak in West Africa. Although output of other mineral commodities, such as bauxite, cement, diamond, and ilmenite, increased during the year, decreased iron ore output, resulting from the closure of the country's two iron ore mines, significantly contributed to the country's economic slowdown in 2014. Although Sierra Leone's mineral output—with the exception of rutile—was small in terms of its contribution to world production, the sector as a whole was a significant contributor to the gross domestic product (GDP) and to export revenues. In 2013, the iron ore industry had been the most significant component of economic growth, and growth prospects for 2014 and 2015 hinged on the expected ramping up and future development of this industry. The growth of real GDP in 2014 did not meet expected projections, however, and was estimated to be about 7% compared with 20% in 2013. The economic slowdown was not attributed solely to the underperformance of the iron ore industry but to other economic constraints imposed by the EVD outbreak. In 2014, Sierra Leone accounted for about 21% of world rutile output (Bank of Sierra Leone, 2015a, p. 4–6; Bermúdez-Lugo and Menzie, 2015; Bedinger, 2016).

In addition to the aforementioned mineral commodities, Sierra Leone also produced lignite, but available information was inadequate to make reliable estimates of output. The Bank of Sierra Leone reported that molybdenum, silver, and tin were also produced in the country but output data for these commodities were aggregated, and information by individual mine or mineral producer was unavailable. Available trade data was also inadequate to make reliable estimates of production for these three mineral commodities. Sierra Leone was estimated to have produced more than 20% of the world's rutile in 2014. The Bank of Sierra Leone reported that all the main sources of revenue for the country, including revenue from mining, did not meet Government targets; most notably revenue from the issuance of mining licenses decreased by 73.5% (Bank of Sierra Leone, 2015a, p. 6, 16; Bedinger, 2016).

The EVD outbreak had the effect of temporarily disrupting mining operations as the Government was forced to establish restrictions regarding the freedom of movement within the country in an attempt to contain the virus. These restrictions were imposed on 6 of Sierra Leone's 14 districts in early September, and were estimated to have affected more than one-half of the country's population, including several districts with active mining operations. The mining district of Tonkolili was among the districts affected by the ban. Although the Government had announced that the ban would be lifted by yearend, reports regarding Tonkolili citizens' reluctance to comply with nationwide burial guidelines for those killed by the EVD resulted in an extension of the ban beyond the yearend

deadline (Associated Newspapers Ltd., 2014; BBC News, 2014b; ReliefWeb, 2014; Sierra Rutile Ltd., 2014).

Sierra Leone's mineral sector was also affected by the temporary cancellation of flights to and from the country. Although statements issued by the International Civil Aviation Organization indicated that the risk of transmission of the EVD during air travel was low, several airlines suspended flights to and from the capital city of Freetown. These flight disruptions hindered business travel for mining company executives and other staff (BBC News, 2014a; British Airways, 2014; International Civil Aviation Organization, 2014; ReliefWeb, 2014; Sierra Rutile Ltd., 2014).

Despite the EVD challenges, mining activities continued mostly uninterrupted for the first half of 2014. The Marampa and Tonkolili iron ore mines, however, were closed during the second half of the year. Marampa Mine was placed on care and maintenance after its operating company, London Mining Plc, went into administration in October. The Tonkolili Mine was placed on care-and-maintenance status on December 1 owing to issues related to the sourcing of working capital (African Minerals Ltd., 2014; Armitage, 2014; Riseborough, 2014; Wilson, 2014a, b; Greve, 2015).

Diamond was produced from lodes at Koidu and from alluvial deposits throughout the country, which accounted for the majority of the country's diamond production. Like diamond, gold was produced from alluvial deposits by artisanal miners. Cement was manufactured from imported raw materials at a plant located in Freetown. Mineral projects under development in Sierra Leone in 2014 included the Baomahun gold project, for which exploration activities were carried out until August 28; the Kono diamond project, which continued to be on care-and-maintenance status pending the resolution of a mining license dispute; and the Tongo-Dike 1 diamond project, for which an updated resource estimate was completed in November (Amara Mining plc, 2014; Stellar Diamonds plc, 2014a; 2014b, p. 3–4, 8).

The response of mining companies to the EVD outbreak varied from one company to another, however, the most common approach was to take precautionary measures to safeguard mining assets by securing the perimeter of mining sites and to protect staff by establishing new health screening and operational protocol trainings to ensure safety in and around mining facilities. In August, a group of mining companies operating in Ebola-affected countries, including Sierra Leone, developed a platform to discuss the need for a coordinated effort to address the Ebola crisis. These discussions resulted in the creation of the Ebola Private Sector Mobilisation Group (EPSMG). The EPSMG, which was led by ArcelorMittal S.A., was created to assist in the mobilization of in-country resources to support humanitarian and health care efforts in Ebola-affected countries and to raise awareness of the EVD. The advocacy group included more than 80 companies operating in a broad

range of sectors, as well as governmental and nongovernmental organizations (ArcelorMittal S.A., 2014; Bermúdez-Lugo and Menzie, 2015).

In addition to signing a United Nations pledge to continue operations, to honor financial commitments, and to pay and train staff, many mining companies also donated funds and equipment to local Government and international organizations, which included disinfectants, food, fuel, medical equipment and supplies, and motor vehicles (including ambulances). Companies, such as Sierra Leone Cement Corp. Ltd., donated cement for the construction of Ebola treatment centers, and other mining companies, such as Sierra Rutile Ltd., engaged with local communities in local house-to-house Ebola screening efforts (ArcelorMittal S.A., 2014; Bermúdez-Lugo and Menzie, 2015; United Nations Global Compact, 2015).

As of December 31, 2014, the reported total number of cumulative cases of the EVD in the country was 9,446 or 46.8% of a total of 20,171 cases reported in Guinea, Liberia, and Sierra Leone as a whole. The total number of reported cumulative deaths in Sierra Leone resulting from the EVD was 2,758. Available information was inadequate to determine the full effect of the EVD outbreak on Sierra Leone's artisanal mining communities, and the total number of artisanal miners affected by the EVD outbreak was unknown. Reports from various international organizations provided insight into some of the measures taken by artisanal mining communities in response to the outbreak. The American Red Cross (ARC) reported that traditional healers in the diamond-rich district of Kono engaged with ARC staff to raise EVD awareness within their communities. Artisanal mining communities were not only directly affected by the EVD outbreak, but also by its indirect effect on the local economy, in particular the sharp increase in the price of consumer goods. The Diamond Development Initiative reported that the price of hygiene products and food provisions in the Kono District had increased between 35% to 50% since the onset of the EVD outbreak (American Red Cross, 2014; Diamond Development Initiative, 2014; Bermúdez-Lugo and Menzie, 2015; World Health Organization, 2015).

### Minerals in the National Economy

The Ministry of Mines and Mineral Resources of Sierra Leone (MMR) is the Government agency responsible for the administration of the mining sector, which is regulated by the Mines and Minerals Act of 2009. Under this law, all rights of ownership in and control of minerals in Sierra Leone are vested in the State. Petroleum exploration and production is regulated by the Petroleum (Exploration and Production) Act (2011). The Petroleum Directorate is the Government agency tasked with monitoring all petroleum operations in the country, including assisting in the assessment of prospective investors in the sector, participating in the bidding process, assessing royalties and bonuses due to the Government, and ensuring the establishment of a central database for petroleum-related activities, among other tasks. The Sierra Leone National Petroleum Company is responsible, on behalf of the Government, for the management of all commercial aspects of petroleum operations in the country. The National Minerals Agency (NMA), which was created

through the enactment of the National Minerals Agency Act in 2012, is tasked with implementing mining policies and mineral legislation as devised by the MMR, and is responsible for the enforcement of the Mines and Minerals Act of 2009, for the management of mineral rights, for the collection and dissemination of geological information, and for the regulation of trade in precious minerals (National Minerals Agency, 2014).

The Bank of Sierra Leone reported total exports of bauxite to be about 1.15 million metric tons (Mt) in 2014. The majority of these exports were destined for Romania. Exports of titanium mineral concentrates (ilmenite, rutile, and zircon) totaled 157,120 metric tons (t); the majority of these exports were destined for Belgium, the United Kingdom, and the United States. Iron ore exports, which were mainly destined for China, Poland, and the Republic of Korea, were reported to be about 18.9 Mt. Export earnings from the mineral sector totaled \$1.4 billion and accounted for about 76.9% of Sierra Leone's total export earnings in 2014, which represented a 21.4% decrease in export earnings from the sector in 2013 (Bank of Sierra Leone, 2015a, p. 24–25; 2015b).

### Production

Production of zircon and of two of the country's main mineral export commodities, iron ore and rutile, decreased by 20.1%, 12.9% and 5.1%, respectively. Gold production decreased by 56.2%. Production of other minerals, such as bauxite, ilmenite, cement, and diamond, increased by 88.5%, 10.8%, 7.3%, and 1.8%, respectively. The decrease in the production of iron ore was the result of the closure of the country's two iron ore mines. Decreased rutile production resulted from the mining of lower grade ores, maintenance shutdowns, and operational challenges caused by the EVD outbreak (Sierra Rutile Ltd., 2015a, p. 8). Data on mineral production are in table 1.

### Structure of the Mineral Industry

Sierra Leone's mining and mineral processing operations were privately owned. Table 2 is a list of major mineral industry facilities.

### Commodity Review

#### Metals

**Bauxite and Alumina.**—In 2014, Sierra Minerals Mine produced a total of 1.16 Mt of bauxite, compared with 616,000 t in 2013. The increase in production was attributed to the implementation of a reorganization program at Vimetco N.V., which included among other things the outsourcing of mining and transportation activities and the refurbishing of the mine's bauxite washing equipment. The refurbishing of the washing equipment doubled washing capacity to 4,000 metric tons per day (t/d) from 2,000 t/d. Vimetco operated Sierra Minerals Mine through its subsidiary, Sierra Mineral Holdings I Ltd. (SMHL). All bauxite produced by SMHL was shipped to Romania for refining into alumina at Vimetco's alumina refinery in Tulcea and into aluminum at the company's aluminum smelter in Slatina (Vimetco N.V., 2015, p. 5, 8–9, 10–15).

**Gold.**—Amara Mining plc continued to evaluate the potential of developing the Baomahun gold project. The company was in the process of re-examining and relogging core data to evaluate the potential of developing a mine with a production capacity of between 10,000 to 12,000 kilograms per year of gold. Indicated mineral resources for Baomahun were estimated to be 38.4 Mt at an average grade of 1.81 grams per metric ton (g/t) gold and inferred mineral resources to be 6.6 Mt at an average grade of 2.2 g/t gold. A feasibility study for Baomahun was completed during the second quarter of 2013, and the results of the first phase of optimization work, which established the potential for the development of both an open pit and underground mining operation, was announced in January 2014. Amara reported having provided chlorine, medicines, food, and educational pamphlets to local citizens living in the vicinity of the Baomahun project and donating funds and vehicles to the Government in support of the local and international effort to fight the EVD outbreak in Sierra Leone (Amara Mining plc, 2015, p. 7, 12–15).

**Iron Ore.**—The closure of the Marampa and the Tonkolili Mines was expected to severely hinder Sierra Leone's mineral sector and affect the country's economy as a whole. London Mining, which operated the Marampa Mine, was among several iron ore companies that took on debt to expand their respective businesses. The international price of iron ore had decreased to \$68/t by yearend from \$130/t in early 2014, which put financial pressure on the company. London Mining failed to secure funding to operate the mine and was forced into administration (Armstrong, 2014; Gleeson, 2014; Wilson, 2014b; Bermúdez-Lugo and Menzie, 2015).

African Minerals Ltd. (AML) of the United Kingdom placed the Tonkolili Mine on a care-and-maintenance status on December 1st pending the release of funds by its operating partner Shandong Iron and Steel Group of China. AML reported having insufficient working capital to continue with mining operations at Tonkolili as a result of the decrease in the international price of iron ore and of operational challenges caused by the onset of the EVD outbreak (African Minerals Ltd., 2014; Wilson, 2014a).

**Titanium and Zirconium.**—In 2014, despite the 21.6% decrease in the average price of rutile and the challenges presented by the EVD outbreak, Sierra Rutile Ltd. of the United Kingdom continued to operate its Sierra Rutile Mine. The mine, which was the country's sole producer of mineral sands, produced a total of 35,838 t of ilmenite concentrate, 114,163 t of rutile concentrate, and 2,357 t of zircon concentrate during the year. The company reported that its mineral sands supply chain in Sierra Leone was mostly unaffected by the EVD outbreak but that there were longer than normal maintenance shutdowns at the mine owing to an increase in the lead time for delivery of parts and materials. Sea freight deliveries were also restricted and the limited number of commercial airlines flying into Sierra Leone affected company travel. Other factors affecting Sierra Rutile's mineral sands operation included Ebola-related inflationary pressures on certain locally sourced products and services (Sierra Rutile Ltd., 2014; 2015a, p. 8; 2015b).

## *Industrial Minerals*

**Diamond.**—Two workers from the Koidu Kimberlite Mine (Table 8, no. 15), which is located in the Kono District about 360 kilometers east of Freetown, contracted Ebola in early December. The entire Kono District was locked down from December 10 to December 23 after nearly 90 bodies were found in Kono by international health workers earlier in the month. The entire Kono district was declared a new Ebola virus hot spot shortly after the incident. BSG Resources Ltd., which was the company that owned the Koidu Mine announced that it expected to miss its annual production target by 20% in 2014 (BBC News, 2014b; Biesheuvel, 2014; International Federation of Red Cross and Red Crescent Societies, 2014).

Operations at Tongo-Dike 1 were reported to be unaffected by the Ebola outbreak. Stellar Diamonds plc, which was the company that operated the mine, reported that although the number of cases of EVD increased in the west of the country during the second half of the year, as of November 28, there were no new identified EVD cases in the Kenema and Tongo areas where the company operated. An updated resource estimate for Tongo-Dike 1 was completed in November and a definitive feasibility study was underway (Stellar Diamonds plc, 2014c).

## *Mineral Fuels*

**Petroleum.**—Sierra Leone did not produce or refine petroleum and was dependent upon imports to meet its domestic petroleum requirements. In 2014, at least two international companies explored for petroleum offshore Sierra Leone, including African Petroleum Corp. Ltd. of Australia and Tullow Oil plc of the United Kingdom. African Petroleum held 100% operating interest in offshore Blocks SL-03 and SL-4A-10 for which it acquired three-dimensional seismic data in 2014. The company planned to continue with its petroleum exploration campaign in 2015 in order to identify prospective targets. Tullow on the other hand ended its petroleum exploration campaign in Sierra Leone in August after deciding not to renew its exploration license (African Petroleum Corp. Ltd., 2015, p. 3, 15; Tullow Oil plc, 2015, p. 53).

## **Outlook**

The prospects for future foreign direct investment in Sierra Leone's bauxite, iron ore, and titanium minerals industries, and hence that of the country's economic growth, are likely to remain vulnerable to changes affecting the international price of these key commodities. Decreased demand from China—Sierra Leone's main iron ore trading partner—together with oversupply from the world's largest iron ore producers, may continue to exert financial pressure on African Minerals Ltd. hindering the likelihood that the Tonkolili Mine will resume operations in the short run. Uncertainty remains as to when, if at all, the Marampa Mine will be back online and as to whether other mining development projects, such as Baomahun, Kono, and Tongo-Dike 1 proceed to production. A prolonged delay in the opening of the Marampa and Tonkolili Mines and the delay



or cancellation of other mineral development projects would be a major setback for Sierra Leone as its economy has not yet diversified from a mining-intensive economic base.

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TABLE 1  
SIERRA LEONE: PRODUCTION OF MINERAL COMMODITIES<sup>1,2</sup>

(Metric tons unless otherwise specified)

Commodity		2010	2011	2012	2013	2014
Bauxite <sup>3</sup>	thousand metric tons	1,090	1,300	776	616	1,161
Cement <sup>4</sup>		300,980	310,890	335,400	313,360	336,300
Diamond <sup>5</sup>	carats	437,516 <sup>6</sup>	357,161 <sup>7</sup>	541,166 <sup>7</sup>	608,955 <sup>7</sup>	620,181 <sup>7</sup>
Gold, mine output, Au content <sup>4</sup>	kilograms	270	164	135	98	43
Iron ore:						
Gross weight	thousand metric tons	--	1,300 <sup>8</sup>	6,800 <sup>r</sup>	20,300	17,689 <sup>4</sup>
Fe content	do.	--	800 <sup>9</sup>	3,600	11,900 <sup>10</sup>	10,300 <sup>e</sup>
Titanium:						
Ilmenite concentrate		18,206	15,946	22,590	32,349	35,838
Rutile concentrate		68,198	67,916	94,493	120,349	114,163
Zirconium, zircon concentrate		7,092	8,496 <sup>4</sup>	1,120	2,951 <sup>r</sup>	2,357

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

<sup>1</sup>Table includes data available through October 7, 2015.

<sup>2</sup>In addition to the commodities listed, lignite, molybdenum, silver, and tin reportedly were produced, but available information was inadequate to make reliable estimates of output.

<sup>3</sup>Production in dry metric tons.

<sup>4</sup>Source: Bank of Sierra Leone.

<sup>5</sup>Source: Kimberley Process Certification Scheme.

<sup>6</sup>About 60% gem quality and 40% industrial quality.

<sup>7</sup>About 80% gem quality and 20% industrial quality.

<sup>8</sup>Excludes production from the Marampa Mine, which began operating in December 2011.

<sup>9</sup>Iron content of ore for Marampa Mine [1.5 million metric tons (Mt)] estimated to be 32%; iron content of ore for Tonkolili Mine (5.1 Mt) estimated to be 58%.

<sup>10</sup>Iron content of ore for Marampa Mine (3.4 Mt) estimated to be 63.6%; iron content of ore for Tonkolili Mine (16.9 Mt) estimated to be 57.6%.

TABLE 2  
SIERRA LEONE: STRUCTURE OF THE MINERAL INDUSTRY IN 2014

(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., 100%)	Sierra Minerals Mine, 150 kilometers southeast of Freetown	1,700
Cement		Sierra Leone Cement Corp. Ltd. (HeidelbergCement AG, 100%)	Leocem cement plant, Freetown	600
Diamond	thousand carats	OCTÉA Diamond Group (BSG Resources Ltd., 100%)	Two kimberlite pipes, 2 kilometers from the district capital of Koidu	540
Gold	kilograms	Artisanal miners	Various locations throughout the country	NA
Iron ore		Tonkolili Iron Ore (SL) Ltd. (African Minerals Ltd., 75% and Shandong Iron and Steel Group Co. Ltd., 25%)	Tonkolili Mine, 190 kilometers northeast of Freetown	20,000 <sup>1</sup>
Do.		London Mining plc	Marampa Mine, 150 kilometers northeast of Freetown	5,400 <sup>1</sup>
Titanium, ilmenite concentrate		Sierra Rutile Ltd.	Sierra Rutile Mine, 130 kilometers southeast of Freetown	41
Titanium, rutile concentrate		do.	do.	200
Zirconium, zircon concentrate		do.	do.	10

Do., do. Ditto. NA Not available.

<sup>1</sup>Under care-and-maintenance status.