



# 2013 Minerals Yearbook

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## SIERRA LEONE

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# THE MINERAL INDUSTRY OF SIERRA LEONE

By Omayra Bermúdez-Lugo

Sierra Leone's real gross domestic product (GDP) grew by an estimated 20.1% in 2013. Economic growth was mostly driven by an increase in iron ore production resulting from the ramping up of mining operations at the Marampa and the Tonkolili Mines and the reported improved performance of the agriculture, construction, and services sectors. Nominal GDP was estimated to be \$4.9 billion. Although agriculture remained the mainstay of the economy, accounting for about 43% of the GDP and employing about 70% of the country's total workforce, the mineral sector was the country's principal income earner, accounting for 93.4% of export revenues in 2013. Sierra Leone was ranked among the world's top 10 producers of diamond and rutile by carat and tonnage, respectively. Other commodities produced included bauxite, cement, gold, and ilmenite and zirconium mineral concentrates. In 2013, Sierra Leone was open to foreign direct investment and adhered to global standards for transparency, which included participation in the Extractive Industries Transparency Initiative (EITI) and the Kimberly Process Certification Scheme (Bank of Sierra Leone, 2014, p. 1–3, 23; International Monetary Fund, 2014a, p. 4–5, 28; 2014b).

Economic growth continued despite frequent interruptions in electricity supply throughout the year. The Bank of Sierra Leone reported that electricity generation decreased by 7.98% to 164.13 gigawatt-hours (GWh) in 2013 from 178.38 GWh in 2012, which continued to limit industrial output. On June 20, 2013, however, the Government obtained a \$16 million grant from the World Bank to upgrade the electricity capacity and supply in the capital city of Freetown and for the development of rural electrification projects (Bank of Sierra Leone, 2014, p. 1, 7).

## Government Policies and Programs

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 and control of minerals in Sierra Leone are vested in the State. Petroleum exploration and production are 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 for the management, on behalf of the Government, of all commercial aspects of petroleum operations in the country (Ministry of Mines and Mineral Resources of Sierra Leone, 2010; Sierra Leone Web, 2013).

The National Minerals Agency (NMA), which was created through the enactment of the National Minerals Agency Act in 2012, was officially launched on March 7, 2013. NMA 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 geologic information, and for the regulation of trade in precious minerals (National Minerals Agency, 2014).

## Production

Output levels for gold, bauxite, cement decreased during the year by 27.4%, 20.6%, and 6.6%, respectively. Production increased, however, for all other mineral commodities, including iron ore, zirconium concentrate, ilmenite concentrate, rutile concentrate, and diamond, which increased by 208%, 184%, 43.2%, 27.4%, and 12.5%, respectively. The increase in diamond production was largely driven by improved performance from the Koidu Mine, and that of ilmenite, rutile, and zirconium was owing to the commissioning of a new dry mining facility. The significant increase in iron ore output was mainly the result of the ramping up of production at the Marampa and the Tonkolili iron ore mines. 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.

## Mineral Trade

Export revenues, as reported by the Bank of Sierra Leone, totaled \$1.92 billion in 2013, which was an increase of 70.9% compared with the total export revenues in 2012. The mineral sector accounted for the majority of these revenues, most of which came from increased earnings from the iron ore industry (56%). Iron ore exports increased by 161% to 13.6 million metric tons (Mt) valued at \$1.06 billion. Diamond exports, which were mainly gem-quality diamond, increased by 13.6% to about 605,000 carats, and were valued at \$186 million; industrial-quality diamond exports increased by about 16% in terms of weight, but decreased by about 5.2% in terms of value. Exports of rutile and ilmenite increased by 76.2% to 149,535 metric tons (t) and 21.6% to 12,169 t, respectively; rutile exports were valued at \$129.6 million, and ilmenite exports, at \$2.92 million. Bauxite and gold exports decreased by 37.4% to 447,849 t and by 31.6% to 96 kilograms, respectively; bauxite exports were valued at \$13.82 million, and gold exports, at \$3.68 million. The Bank of Sierra Leone also reported revenues from the export of other minerals such as molybdenum, silver, and tin, but it was not clear if these were revenues generated from reexports, as Sierra Leone did

not report production of these three minerals in 2013 (Bank of Sierra Leone, 2014, p. 23–24).

In 2013, Sierra Leone was the United States 155th-ranked export market for goods and its 144th-ranked supplier of import goods. Total exports to the United States were valued at about \$41.6 million compared with about \$17.8 million in 2012; \$27.1 million of these exports were steelmaking materials, \$6.9 million were rough diamond, and \$1.1 million were sulfur. Imports from the United States were valued at about \$82.4 million compared with a revised \$100.8 million in 2012; these included \$12.9 million in excavating machinery, \$287,000 in petroleum products; \$71,000 in iron and steel products, and \$26,000 in iron and steel mill products. Sierra Leone was an active member of the Economic Community of West African States (U.S. Census Bureau, 2014a, b).

## Commodity Review

### Metals

**Bauxite and Alumina.**—The Sierra Minerals Mine produced a total of 616,000 t of bauxite during the year compared with 776,000 t in 2012. The mine was operated by Netherlands-based Vimetco N.V. through its subsidiary Sierra Mineral Holdings I Ltd. Vimetco attributed the decrease in production to the “difficult climate in Sierra Leone” and to “social and cultural differences”; however, the company did not qualify these difficulties or differences in its annual report. All bauxite produced at the mine 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. During the year, the company completed the refurbishing of the mine’s bauxite washing equipment, which doubled the washing capacity to 4,000 metric tons per day (t/d) from 2,000 t/d and the productivity to 100,000 metric tons per month (t/mo) from an average of 50,000 t/mo (Vimetco N.V., 2014, p. 10, 15).

**Gold.**—London-based Amara Mining plc completed a definitive feasibility study for its Baomahun gold project during the second quarter of 2013. The project is located about 180 kilometers (km) east of Freetown in Southern Province. The study yielded indicated resources of 38.4 Mt at an average grade of 1.81 grams per metric ton (g/t) gold and inferred resources of 6.6 Mt at an average grade of 2.53 g/t gold. Once in operation, the Baomahun Mine was expected to produce about 4,600 kilograms per year of gold during the first 6 years of production. As of yearend 2013, Amara Mining planned to conduct a small-scale, near-surface drilling campaign to further evaluate the possibility of developing Baomahun’s underground resources (Amara Mining plc, 2014, p. 6–7).

**Iron Ore.**—African Minerals Ltd. (AML) of the United Kingdom continued to ramp up production at its Tonkolili iron ore mine towards its phase I target of 20 million metric tons per year (Mt/yr). In 2013, Tonkolili Mine produced a total of 16.9 Mt of crude ore at an average grade of 57.6% Fe compared with a revised 5.3 Mt at a grade of 58% Fe in 2012. Despite the marked increase in production, AML reported having had some operational problems during the year. The operational problems mostly affected shipping activities and

included the breakdown of the mine’s principal conveyor belt and insufficient transshipment vessels. AML used transshipment vessels to transfer iron ore from the Port of Pepel onto bulk carriers located at the offshore terminal; the ore was then exported to China. As of yearend, the company increased its transshipment fleet to four from three contracted vessels in order to avoid future shipment delays. A total of 12.1 Mt of direct-shipping ore was exported during the year. AML planned to continue with the optimization of the Tonkolili Mine and to reach phase II of its expansion plans, which targets the further ramping up of production to 25 Mt/yr by 2016. About 80% of AML’s employees were Sierra Leonean nationals. The company held a 25-year mining license for the Tonkolili Mine with the right to renew the license for an additional period of 15 years effective from the date of expiration of the original license (African Minerals Ltd., 2014, p. 5, 18–19, 22).

Mining operations also continued to ramp up at the Marampa Mine, which was operated by London Mining plc of the United Kingdom. The mine produced a total of 3.42 Mt of iron ore sinter concentrates at an average grade of 63.6% Fe compared with 1.5 Mt at a grade of 32% Fe in 2012. Production, which was from the mining of highly weathered primary ore and from tailings, fell short of the company’s forecast for 2013 of 3.9 Mt/yr. This was owing to delays in the completion of processing plant upgrades and an unexpected prolonged rainy season. During the year, a second processing plant was commissioned at the Marampa Mine, which increased the production capacity to 5.4 Mt/yr. London Mining contracted two transshipment vessels to draw down iron ore stockpiles and completed a feasibility study to expand the production capacity further to 6.5 Mt/yr by 2015. The feasibility study yielded a life-of-mine plan of more than 40 years based on reserves of more than 500 Mt at an average grade of 31% Fe. London Mining planned to produce between 4.9 and 5.4 Mt of iron ore concentrates in 2014 at an average grade of 64% to 65% Fe. Another planned mine development project included the upgrading of the electricity-generating capacity of the mine’s powerplant to 50 megawatts (MW) from 15 MW, which was expected to provide electricity for the processing of unweathered ore in the future (London Mining plc, 2014, p. 16, 24–25).

**Titanium and Zirconium.**—Sierra Rutile Mine, which was operated by Sierra Rutile Ltd. of the United Kingdom, was the country’s sole producer of ilmenite, rutile, and zirconium concentrates. In 2013, the mine produced a total of 120,349 t of rutile concentrate, 32,349 t of ilmenite concentrate, and 3,185 t of zirconium concentrate byproduct. The company reported that its new Lanti dry mining plant was operating at nameplate capacity throughout the year and announced that it had signed a 70,000-metric-ton-per-year rutile supply agreement with a major pigment producer, whose name was not disclosed. During the year, Sierra Rutile also signed a memorandum of understanding with Smol Pawa Sierra Leone Ltd. for the purchase of electrical power from its 14-MW-capacity Moyamba hydroelectric powerplant project. The project, which was to be developed in partnership with the Government of Sierra Leone, would be located at the Singimi Falls along the Gbangba River about 20 km from the Sierra Rutile Mine. Once commissioned, the powerplant was also expected to serve the community of

Moyamba and the Njala University. A feasibility study for the project was underway in 2013. Sierra Rutile also planned to continue with its resource expansion program in 2014 and to continue its exploration program for other targets, including the Gbangbaia, the Jagbwema, and the Semabu deposits, which were adjacent to Sierra Rutile. 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 (Sierra Rutile Ltd., 2014, p. 6, 9, 11–12).

### *Industrial Minerals*

**Diamond.**—Diamond in Sierra Leone was mined mainly from secondary (alluvial) deposits at the Bo, the Kenema, and the Kono districts along the drainages of the Bafi, the Mano, the Moa, the Sewa, and the Woyie Rivers. At least one company, BSG Resources Ltd. (BSGR) of the United Kingdom mined diamond from primary (kimberlite pipes) deposits in the Tankoro chiefdom of the Kono district, which is located in Eastern Province about 360 km east of the capital city of Freetown. The project, known as the Koidu Kimberlite Project (KKP), consisted of two kimberlite pipes, four kimberlite dike zones, and four small blows (small pipe-like primary diamond deposits that form along kimberlitic dike systems), which the company mined through its subsidiary OCTÉA Diamond Group (formerly known as Koidu Holdings S.A.). BSGR planned to expand capacity at KKP to about 550,000 carats per year from its existing capacity of 120,000 carats per year. The company also held the exploration rights for an area that hosts several kimberlite dike zones known as the Tonguma diamond project. The project is located about 68 km south of Koidu in the Lower Bambara chiefdom, Kenema district. In 2013, the Kimberley Process Certification Scheme reported Sierra Leone's total rough diamond production to be 608,955 carats, which represented a 12.5% increase from production in 2012. The average value per carat remained about the same as that of 2012, or \$302.95 per carat (Kimberley Process Rough Diamond Statistics, 2014; BSG Resources Ltd., [undated]).

### *Mineral Fuels*

**Petroleum.**—Sierra Leone did not produce or refine petroleum and was dependent upon imports to meet its domestic petroleum requirements. Several international petroleum companies continued to explore for petroleum offshore Sierra Leone, including African Petroleum Corp. Ltd. of Australia; Anadarko Petroleum Corp. of Houston, Texas; Repsol S.A. of Spain; Lukoil Group of Russia; and Tullow Oil plc of the United Kingdom (FirstEnergy Capital LLC, 2013, p. 6, 22; U.S. Securities and Exchange Commission, 2014, p. 12; Repsol S.A., 2014, p. 68–69; Tullow Oil plc, 2014, p. 61).

### **Outlook**

The International Monetary Fund reported that iron ore mining, agriculture, and services are expected to remain the key drivers of growth in Sierra Leone during the next several years. A projected decline in the price of iron ore could slow

down economic growth, however, and, if sustained, could hinder growth in the longer term given the country's growing dependence on iron ore export revenues. A decline in the price of iron ore could also serve as a deterrent to foreign direct investment in the country's iron ore industry. It is unlikely that increased production from planned expansion projects in the bauxite and mineral sands sector could counterbalance the loss of Government revenues were iron ore projects to come to a halt as a consequence of the continued decline in global prices (International Monetary Fund, 2014a, p. 4–6).

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

(Metric tons unless otherwise specified)

Commodity <sup>2</sup>		2009	2010	2011	2012	2013
Bauxite <sup>3</sup>	thousand metric tons	757	1,090	1,300	776	616
Cement <sup>4</sup>		236,240	300,980	310,890	335,400	313,360
Diamond <sup>5</sup>	carats	400,843 <sup>6</sup>	437,516 <sup>6</sup>	357,161 <sup>7</sup>	541,166 <sup>7</sup>	608,955 <sup>7</sup>
Gold, mine output, Au content <sup>4</sup>	kilograms	157	270	164	135 <sup>r</sup>	98
Iron ore:						
Gross weight	thousand metric tons	--	--	1,300 <sup>8</sup>	6,600	20,300
Fe content (32% to 64%)	do.	--	--	800 <sup>9</sup>	3,600 <sup>9</sup>	11,900 <sup>10</sup>
Titanium:						
Ilmenite concentrate		15,161	18,206	15,946	22,590	32,349
Rutile concentrate		63,864	68,198	67,916	94,493	120,349
Zirconium concentrate		5,560	7,092	8,496	1,120 <sup>r</sup>	3,185

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

<sup>1</sup>Table includes data available through December 18, 2014.

<sup>2</sup>In addition to the commodities listed, lignite reportedly was produced, but available information is inadequate to make a reliable estimate 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 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 2013

(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	1,500
Cement	Sierra Leone Cement Corp. Ltd. (HeidelbergCement AG, 100%)	Leocem cement plant, Freetown	600
Diamond	thousand carats OCTÉA Diamond Group (BSG Resources Ltd., 100%)	Koidu kimberlite project (two kimberlite pipes, four kimberlite dike zones, and four blows) 2 kilometers from the district capital of Koidu	120
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
Do.	London Mining plc	Marampa Mine, 150 kilometers northeast of Freetown	5,400
Titanium, ilmenite concentrate	Sierra Rutile Ltd.	Sierra Rutile Mine, 130 kilometers southeast of Freetown	33
Titanium, rutile concentrate	do.	do.	135
Zirconium concentrate	do.	do.	10
Do., do. Ditto.			