THE MINERAL INDUSTRIES OF FRENCH GUIANA, GUYANA, AND SURINAME

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FRENCH GUIANA

French Guiana, which is an overseas department of France, is located on the northeastern coast of South America (bordering the North Atlantic Ocean) between Brazil and Suriname. It is subject to the laws of France and the European Union (EU). French Guiana’s economy is dependent on the economies of France and the EU through trade and subsidies. In 2012, gold was the most valuable mineral commodity; other valuable mineral commodities included cement, clays, crushed stone and sand, kaolin, niobium (columbium) and tantalum, and petroleum. Other significant industries in French Guiana were aerospace (mainly at the French space center in Kourou), fishing, and forestry. The mineral sector was administered by France. French Guiana’s leading mineral commodity export continued to be gold; the country imported chemicals, food, fuels, machinery, and transport equipment from France (U.S. Central Intelligence Agency, 2013; U.S. Department of State, 2013).

The local governments in French Guiana were working with the mining operations to prepare a Departmental mining plan that would guarantee the development of sustainable mining while taking into account French Guiana’s economy and its environmental issues. The plan was expected to be completed and adopted in the foreseeable future.

Minerals in the National Economy

French Guiana’s natural resources included clay, gold, kaolin, niobium, petroleum, sand, stone, and tantalum. In February 2009, the French Government declared a moratorium on all mining and exploration activities in French Guiana until a new mining framework was completed and assessed. This announcement also suspended the granting of mining licenses pending the outcome of environmental reviews of exploration on all French Guiana concessions. A draft mining framework was published by the French authorities in June 2009. Decree No. 2011–2105, which approved a plan for exploration and exploitation of minerals, and Decree No. 2011–2016, which defined the provisions for the implementation of Decree No. 2011–2105, were issued on December 30, 2011, and became effective on January 1, 2012 (IAMGOLD Corp., 2013a, b; Ministère de l’Économie, des Finances et de l’Industrie, 2011a, b).

The moratorium on the issuance of mining licenses continued to affect the proposed development of IAMGOLD Corp. of Canada’s Camp Caiman gold project, which is located 45 kilometers (km) southwest of Cayenne, the capital of French Guiana. Following the results of the January 10, 2010, referendum in which French Guiana rejected greater autonomy from France, IAMGOLD, which held 100% interest in the project, made the decision to record a noncash impairment for the net carrying value of the project. On August 26, 2010, the French Government, through the Prefect of French Guiana, released a decision that again denied a mining permit for the Camp Caiman project. IAMGOLD filed an appeal of this new decision on October 26, 2010, with the assistance of environmental experts. The company indicated that it would continue to work with Government officials and key stakeholders to develop a plan that would allow development of the Camp Caiman deposit, subject to appropriate restrictions and regulations. In February 2012, the Administrative Tribunal dismissed the second permitting appeal, and in May 2012, IAMGOLD appealed the decision to the Administrative Court of Appeal in Bordeaux, France. The company’s objective was to bring the Camp Caiman gold project into production in the foreseeable future (IAMGOLD Corp., 2013b, c).

Production

In 2012, the leading mineral commodities produced in French Guiana were cement, clays, crushed stone and sand, gold, kaolin, niobium (columbium) and tantalum, and petroleum. Data on mineral production are in table 1.

Structure of the Mineral Industry

In recent years, the mineral industry of French Guiana had been focused on gold and petroleum exploration. In 2012, Columbus Gold Corp. of Canada acquired 100% interest in the Paul Isnard gold property, which had been divested by Auaplata S.A. of France and Pelican Venture SAS of France. As of November 23, 2012, Coffey Mining Pty Ltd. (CMPL) of Australia estimated inferred resources for the Montagne d’Or gold prospect (part of the Paul Isnard property) to be 167 metric tons (t) of gold within 117.1 million metric tons (Mt) of ore grading 1.43 grams per metric ton (g/t) gold (Coffey Mining Pty Ltd., 2013, p. 105; Columbus Gold Corp., 2014).

The Paul Isnard project is located within the northernmost of two east-west trending Proterozoic greenstone belts that make up the French Guiana sector of the Guiana Shield. This greenstone terrane hosts significant gold deposits in French Guiana and neighboring countries, including the Rosebel Formation in Suriname, and is generally considered to represent an extension of the productive and much more extensively explored and developed Birimian System greenstone belts of West Africa. The property is located 200 km west of Cayenne in the western part of French Guiana, and it is accessible from Saint-Laurent-du-Maroni by air and road.
The Paul Isnard property covers rocks of the lower Proterozoic Paramaka Formation, which contains gold mineralization in the form of pyritic disseminated zones and sulfide-rich shear zones (Coffey Mining Pty Ltd., 2013, p. 1–5; Columbus Gold Corp., 2014).

According to the feasibility study for IAMGOLD’s Camp Caiman project, the deposit’s proven and probable minable reserves as of January 2009 were estimated to contain 34.6 t (1.1 million troy ounces) of gold within 12.3 Mt of ore averaging 2.8 g/t gold; measured and indicated reserves were estimated to contain 50.2 t (1.6 million troy ounces) of gold within 20.4 Mt of ore averaging 2.5 g/t gold; and inferred resources were estimated to contain 7.7 t (249,000 troy ounces) of gold within 3.8 Mt of ore averaging 2.1 g/t gold (IAMGOLD Corp., 2013a).

Commodity Review

Metals

Gold.—Gold exploration and investment activities in French Guiana were ongoing at projects with significant gold anomalies, such as the Wayamaga contact between the Armina and the Orapu Formations and the Paul Isnard gold project. Extensive exploration had been conducted at Paul Isnard by Columbus Gold, including airborne topographic surveys, airborne geophysical surveys, metallurgical studies, and a soil geochemical survey. A resource estimate was prepared in 2012 for the Montagne d’Or gold deposit (part of the Paul Isnard property) (Coffey Mining Pty Ltd., 2013, p. 4; Columbus Gold Corp., 2014).

IAMGOLD was planning to develop the Camp Caiman gold deposit using an open pit mining method and gravity circuit and carbon-in-pulp gold recovery. The mill would process 5,500 metric tons per day of ore, or more than 2 million metric tons per year (Mt/yr), subject to the mining and milling capacities for the diverse categories of gold in the estimated reserves and resources. Development of the Camp Caiman project was on hold pending the passage by the Government of the new mining framework (IAMGOLD Corp., 2013a).

Mineral Fuels

Petroleum.—French Guiana relied completely on crude oil imports and consumed 8,000 barrels per day (bbl/d) in 2012. In South America, Tullow Oil plc of the United Kingdom had interests in the prospective Guyana-Suriname basin, which includes French Guiana, Guyana, and Suriname. According to Tullow, the Guyana-Suriname basin offers significant frontier exploration opportunities, including geologic structures that are similar to those of the Jubilee field of Ghana across the Atlantic Ocean. In 2012, Tullow discovered crude oil in the Zaedyus-1 basin in French Guiana. Followup drilling in French Guiana and the Guyana-Suriname basin in 2013 would be aimed at further establishing this area as a prospective petroleum province. Tullow’s joint-venture partners Royal Dutch Shell plc of the Netherlands and Total S.A. of France were discussing a comprehensive followup exploration and appraisal program. In addition to Tullow’s more than 9,000 km of two-dimensional (2-D) seismic data and 380 km of three-dimensional (3-D) seismic data in the basin’s Guyane Maritime Block, a drilling program in an area of 2,500 square kilometers (km²) based on the 3-D seismic data was completed in March 2010. More than 750 km² of 3-D seismic data were acquired for the southwestern portion of the block. An extensive program to collect additional 3-D seismic data was started in July 2012, and 4,000 km² of 3-D seismic data for the northwestern portion of the block was obtained in December 2012. The companies received a Ministerial Order granting Shell, Total, and Tullow approval for both the transfer and renewal of the Guyane Maritime permit on December 22, 2011. Shell took over as the operator of the project on February 1, 2012. Tullow retained a 27.5% nonoperational interest (Tullow Oil plc, 2013a, p. 16, 22, 70; 2013b; U.S. Energy Information Administration, 2013).

Outlook

The working document developed by the Government of France in June 2009 provides for a consultative process in which investors are to be active participants in the development of the new mining framework. Gold exploration and investment activities in French Guiana are expected to continue at projects with significant gold anomalies, such as the Wayamaga contact between the Armina and the Orapu Formations where Columbus Gold has outlined a potential for gold resources. Columbus Gold and IAMGOLD are likely to move forward with their Paul Isnard and Camp Caiman gold projects, respectively (Columbus Gold Corp., 2014; IAMGOLD Corp., 2013a–c).

Tullow’s petroleum exploration projects are expected to continue following the successful Zaedyus-1 discovery well. Followup appraisal and exploration are likely to be aimed at expanding the joint venture’s drilling program beyond the basin’s Guyane Maritime Block and the neighboring prospects (Tullow Oil plc, 2013a, p. 70).

References Cited


Government Policies and Programs

In Guyana, all mineral rights are vested in the state. The Guyana Geology & Mines Commission (GGMC) is the Government agency that regulates all activities of the Mines Division and the Petroleum Division in accordance with the Mining Act of 1989. The functions of the GGMC are to enforce the provisions of mining licenses, permits, and concessions, as well as of prospecting licenses (for large scale operations), prospecting permits (for medium- and small-scale operations), and quarry licenses, and to collect rentals, fees, charges, levies, and so forth, that are payable under the Mining Act. The GGMC also promotes mineral prospecting and exploration, as well as mineral development, mining, processing, and trade. The Mines Division of the GGMC provides services to the mining industry. Mining licenses are issued for a period of 20 years and may be renewed indefinitely. Operating plans must be filed with the GGMC. Annual dues are progressive, beginning at $0.50 per acre and increasing to a maximum of $3.00 per acre during the 6 years allowed for the prospecting phase. Once production begins, the prospecting license must be converted to a mining license, and the annual dues increase to $5.00 per acre. Gold production from all types of mineral concessions in Guyana is subject to a statutory 5% net smelter return royalty, which is payable to the Guyana Gold Board. From time to time, the Government of Guyana has reduced this royalty to a lesser figure—during periods of low gold prices and under individually negotiated tax concessions—to motivate development of major mineral projects (Guyana Geology & Mines Commission, 2013).

The Petroleum Division regulates all activities in the crude oil industry; provides economic, environmental, and technical advice; and supports competitiveness and efficiency in the petroleum sector. The GGMC issues three types of licenses—the petroleum prospecting license, which is issued for a period of 4 years, with two optional renewals to extend the exploration period for 3 more years each; the petroleum production license, which runs for 20 years; and the production-sharing agreement, which offers such incentives as 75% cost recovery, a 50% profit share, and a 10% reduced consumption tax on fuel for petroleum exploration operations, among other incentives (Guyana Geology & Mines Commission, 2013).

Production

Guyana produced more than 2.2 Mt of bauxite, 40,764 carats of diamond, and 13,643 kilograms (kg) of gold. The output of common sand increased by 119%, and that of crushed stone decreased to 483,858 t from a revised 534,058 t in 2011 (table 1; Bank of Guyana, 2013, p. 10).

Structure of the Mineral Industry

Table 2 includes a list of the major mineral industry facilities in Guyana. The table provides the location and production capacities of these facilities.
**Commodity Review**

**Metals**

**Bauxite and Alumina.**—In 2012, production of bauxite increased to more than 2.2 Mt compared with more than 1.8 Mt in 2011. The metallurgical-grade bauxite was to be used for the production of alumina (table 1; Bank of Guyana, 2013, p. 10).

Under an agreement between the Government of Guyana and United Company RUSAL of Russia, the Bauxite Company of Guyana Inc. (BCGI) was established in December 2004. RUSAL owned a 90% stake, and 10% belonged to the Government of Guyana. In 2006, RUSAL acquired the assets of Aroaima Mining Co. from the Government and transferred them to BCGI; RUSAL also owned licenses to develop the Linden, the Kwakwani, and the Ituni bauxite deposits in Guyana. In 2013, BCGI planned to develop a new deposit, the Kurubuka-22 deposit, which is located in Aroaima. The project would encompass the construction of a mine, a service road, and a production complex to crush, dry, and ship commercial bauxite. By 2012, BCGI had begun the implementation of the Kurubuka-22 project. BCGI had also obtained licenses to extract bauxites from the Block 38 deposit in Guyana. In 2012, BCGI’s total bauxite resources amounted to about 88.5 Mt (United Company RUSAL 2013a, p. 15, 33; 2013b).

The Bosai Minerals Group owned the Omai bauxite mine (which had estimated reserves of 200 Mt) and a processing operation in Linden, which produced refractory aggregate super-calcined bauxite, as well as the chemical-grade and metal-grade bauxites. In 2012, the Linden plant produced and exported about 600,000 t of bauxite (InfoMine Inc., undated; Nanchuan Minerals Group, undated).

**Gold.**—In 2012, production of gold increased to 438,645 troy ounces (13,643 kg) from 363,083 troy ounces (11,293 kg) in 2011. Gold production in Guyana was accomplished by small- and medium-scale miners that benefited from the high gold prices on the international market. Several major gold ventures had been commissioned by foreign investors in the past 10 years, including the world-class Omai gold mine, which was a joint venture of two Canadian mining companies, Golden Star Resources Ltd. and IAMGOLD (table 1; Bank of Guyana, 2013, p. 10).

Guaya Goldfields Inc. (GGI), which was a junior mineral company based in Canada, was focused on the exploration and development of gold deposits in the Guiana Shield in South America. GGI’s properties amounted to more than 1,600 km² (400,000 acres). The company was in the predevelopment stage for its Aurora gold project in Guyana; a definitive feasibility study was scheduled to begin in early 2013. GGI’s current gold resources in Guyana amounted to 261,300 kg (8.4 million troy ounces). GGI planned to begin production at the Aurora gold project by 2013 and to produce an average of 7,800 kilograms per year (250,000 troy ounces per year) during a 17-year mine life with a cash operating cost of $364 per troy ounce. Guyana Goldfields expected that the Aurora gold project would be a large, highly profitable world-class gold mine that would be developed and come online by 2015. GGI’s Aranka gold project was in the prospecting and exploration stage.

Current activities at Aranka included field mapping, geochemical sampling, and testing of potential zones by trenching and exploratory drilling (Guyana Goldfields Inc., 2013).

Sacre-Coeur Minerals, Ltd. of Canada had been exploring for gold in Guyana and held five leading gold permits—the Kartuni regional block, the Kurupung regional block, the Lower Puruni regional block, the Northwest regional block, and the Potaro-Kuribrong regional block. The company narrowed its exploration focus to two major holdings, which together composed 859 km² of the most highly prospective permits. The two large holdings—the Lower Puruni Block and the Northwest regional block—were both targets for hard-rock gold resources, and they also contain large volumes of alluvial material. Zones on the Million Mountain trend within the Lower Puruni Block are characterized by a silica-rich intrusive body intruded into brittle greenstones (Sacre-Coeur Minerals, Ltd., 2013).

Guyana Frontier Mining Corp. of Canada held 100% interest in the Marudi Mountain gold project, which covers an area of 54.67 km² (13,509 acres). The project is located in the Marudi Mining District of southwestern Guyana and was divided into the following four zones: the Marudi Ridge, the Mazoa, the Paint Mountain Ridge, and the Peace Creek-Toucan Hill. According to Guyana Frontier, the Marudi property warranted continued systematic exploration and development (Guyana Frontier Mining Corp., 2011).

After identifying the potential of the region, Mahdia Gold Corp. of Canada acquired three gold properties—the Omai property in the Omai District; the Tiger River property that consists of 10 prospecting permits and is located to the south-southwest of Georgetown city; and the White Creek property, which is located in the Barima-Waini District, northwestern Guyana. Historically, the Omai Mine had produced about 120,000 kg (4 million troy ounces) of gold from two open pits (Mahdia Gold Corp., 2013).

**Industrial Minerals**

**Diamond.**—In 2012, diamond production in Guyana decreased to 40,764 carats from 52,273 carats in 2011. Diamond production in Guyana was performed by small-scale mining operations and artisanal miners (table 1). Sacre-Coeur held prospecting permits for the Kurupung River region, which is a historic diamond-producing area in Guyana (Sacre-Coeur Minerals, Ltd., 2013).

**Mineral Fuels and Related Materials**

**Petroleum and Natural Gas.**—To satisfy its domestic petroleum consumption, Guyana imported 11,000 bbl/d of petroleum in 2012. The Canada-based oil and gas exploration company CGX Energy Inc. was focused on exploration for oil in the Guyana-Suriname basin. CGX held interest in 39,659 km² (9.5 million acres) offshore Guyana. The company had interest in the following four offshore properties: the Corentyne License, the Corentyne License Annex, and the Pomeroon License (100% ownership in each); and the Georgetown License (25% equity interest). Several significant targets had been identified in the Corentyne Petroleum Prospecting License (PPL),
including the Eagle prospect, which covers 117.4 km² (29,000 acres) and had estimated resources of 610 million barrels (Mbbl) of oil. CGX announced the results of the drilling of the Eagle-1 exploratory well on the company’s Corentyne PPL. The Eagle-1 well reached a total depth of 4,328 meters (m) (in the Upper Cretaceous geologic zone) and encountered oil and gas. On February 9, 2012, CGX announced that the Jaguar-1 well was being drilled on the company’s 25%-owned Georgetown PPL and that the company expected to begin further tests in 2012. The partners to the Georgetown PPL included Repsol Exploración S.A. (Repsol) of Spain (15%), as operator, along with YPF Guyana Ltd. of the United States (30%), and Tullow Oil plc of the United Kingdom (30%) (CGX Energy Inc., 2012; U.S. Energy Information Administration, 2013).

Tullow had significant exploration acreage in French Guiana, Guyana, and Suriname, and the company was attempting to replicate in South America the success of the West African Jubilee operation. Following the drilling of the Zaedyus-1 well in French Guiana, which successfully discovered oil in September 2011, Tullow was conducting followup drilling in Guyana aimed at establishing the area as a new petroleum province. The Georgetown license expired on November 25, 2012, and although Tullow was continuing to evaluate oil exploration opportunities in Guyana and the wider region, the company decided not to continue as a partner in the next phase of the Georgetown license (Tullow Oil plc, 2013, p. 7, 70–71).

According to the GGMC, four companies were licensed to undertake exploratory work in Guyana: Century Guyana Ltd., CGX, Exxon Mobil Corp. of the United States, and Repsol. Other companies interested in Guyana’s petroleum sector included CGX’s ON Energy and Groundstar Resources Ltd. of Canada, and Sadhna Petroleum Inc. of Trinidad and Tobago. ExxonMobil planned to commence seismic work to determine whether to conduct drilling offshore. Sadhna planned to drill several wells along the coastal areas of Berbice and Demerara in the Takutu basin in the Rupununi region. GGMC planned to drill at three places in the northwest that had historical reports of gas emissions. GGMC also anticipated that Groundstar Resources would be doing work in the Takutu basin, and that ON Energy would be drilling in Berbice and Canje; CGX would also be doing work offshore (Guyana Geology & Mines Commission, 2013).

**Uranium.**—U3O8 Corp. of Canada obtained exclusive uranium exploration rights from the GGMC for two permitted areas in western Guyana (the Kurupung Batholith and the Roraima basin) for a total of 1.3 million hectares. U3O8 Corp.’s drilling had defined multiple uranium-bearing structures in the Kurupung Batholith, which is located in the basement near the Roraima basin, which in turn was considered to be a promising uranium district. According to U3O8 Corp., uranium in the Kurupung Batholith has the geologic characteristics of a class of sizable deposits similar to Canada’s Michelin, Australia’s Valhalla, the United States’ Coles Hill, and Brazil’s Lagoa Real deposits, many of which contain resources in the range of 60 million to 130 million pounds of equivalent yellowcake-uranium concentrate (U₃O₈) at a 0.100% cutoff rate (U3O8 Corp., 2013).

**Outlook**

The outlook for Guyana’s economic growth in the near term is positive. The country plans to continue to manage its expansion by retaining its open market operations, by seeking to maintain low inflation, and by ensuring that credit to private investors is encouraged to facilitate growth in the national economy. Bauxite, diamond, and gold are likely to continue to be the dominant mineral commodities in Guyana’s mineral industry. Prospecting for diamond is likely to continue in the Kurupung River and Maple Creek regions, which are important historic diamond-producing regions, and in the Potaro-Kuribrong regional blocks, which are located in north-central Guyana. Gold exploration activities are likely to continue as a result of several gold exploration projects that progressed in 2012. In Guyana, the Kurupung project is emerging as a large uranium district; thus, uranium exploration in western Guyana will likely intensify. The future plans of Prometheus Resources (Guyana) Inc. (a subsidiary of U3O8 Corp.) in Guyana include a detailed exploratory program in its uranium permit areas. Offshore hydrocarbon exploration in Guyana will likely increase because of the progress in the resolution of the maritime boundary disputes between Guyana and Suriname. Also, the GGMC foresees positive prospects for the production of biodiesel, ethanol, hydropower, and natural gas. ESSAR Steel Group of India is continuing to work with the GGMC to evaluate iron ore bodies in Guyana (Guyana Geology & Mines Commission, 2013; U3O8 Corp., 2013).

**References Cited**


**SURINAME**

Suriname is bordered by French Guiana to the east and Guyana to the west. In 2012, Suriname’s mineral sector included production of bauxite and alumina, building materials, crude oil, gold, natural stones, and some byproducts of copper, nickel, and platinum. An increase in the GDP in 2012 was attributed to growth of the mining and quarrying sector. Inflation was 6% in 2012 compared with a revised 17.7% in 2011. According to the U.S. Central Intelligence Agency, the value of Suriname’s exports was about $2.7 billion in 2012 compared with almost $2.5 billion (revised) in 2011. Suriname’s export partners included the United States (which received 23.9% of Suriname’s exports, by value), Canada (19.5%), Belgium (17.2%), the United Arab Emirates (8.9%), Norway (6.2%), Guyana (4.8%), and France (4.1%). Imports were valued at almost $1.8 billion compared with a revised $1.7 billion in 2011 and included such products as, in order of value, capital equipment, petroleum and derivatives, and food. Suriname’s import partners included the United States (which supplied 26.1% of Suriname’s imports, by value), the Netherlands (15.6%), the United Arab Emirates (8.9%), China (8.2%), Antigua and Barbuda (7.4%), Brazil (4.4%), and Japan (4.1%) (Central Bank of Suriname, 2013; U.S. Central Intelligence Agency, 2013).

Suriname has been one of the leading bauxite and alumina producers in the world for more than 90 years. Alcoa Inc. (which until 1999 was known as Aluminum Company of America) mined bauxite, from which alumina can be extracted and used to make aluminum (Alcoa Inc., 2013a). The country’s leading petroleum producer was the Government-owned Staatsolie Maatschappij Suriname N.V., which was founded on December 13, 1980, as a limited-liability company under Surinamese law. Since then, and with the introduction of joint ventures between the public and the private sectors, the petroleum industry has continued to develop (table 2).

On November 26, 2012, IAMGOLD announced that it had reached a definitive agreement with the Government of Suriname in regard to future resource development and related energy costs. On April 13, 2013, the agreement was approved by the legislative authority of Suriname, the National Assembly. The agreement, once executed, would amend the existing mineral agreement with respect to the company’s Rosebel Mine. Under this new agreement, IAMGOLD could maintain all its existing entitlements in the Rosebel Mine operations and in the entire Rosebel exploitation concession and could extend the term of its existing mineral agreement by 15 years to 2042. The new agreement would also establish a new joint venture in which IAMGOLD would hold a 70% interest and the Government would hold a 30% interest (IAMGOLD Corp., 2013e, p. 17, 93, 114).

**Minerals in the National Economy**

In Suriname, the contribution of its leading minerals (alumina, gold, and petroleum) to its total exports of goods amounted to 95% and accounted for 35% of Government revenues, making the economy highly vulnerable to mineral price volatility. Suriname’s bauxite deposits had been among the world’s richest. Owing to the world economic recession that began in 2008, the mining sector continued to struggle, and alumina declined in importance to the Surinamese economy. Suriname Aluminum Co. (Suralco) held interests in bauxite mines in northeastern Suriname and south of Paranam, in hydroelectric facilities at Afbaka Lake, and in an alumina refinery at Paranam. The hydroelectric facilities at Afbaka Lake supplied electricity to the Paranam alumina refinery and also sold electricity to the Suriname Government. Suralco owned the Moengo bauxite mine, which is located in northeastern Suriname; bauxite ore was shipped 200 kilometers (km) to the refinery at Paranam, which had the capacity to produce 2.2 Mt/yr of alumina. At current rates of production, the supply of bauxite from existing sources in eastern Suriname was likely to be exhausted in the next several years. Consequently, alternative sources of bauxite to supply the Paranam refinery were being evaluated for potential development during 2013 to 2014; specifically, the Lelydorp I bauxite deposits, which lie southeast of the Lelydorp II and Lelydorp III areas. These deposits are located about 12.2 km northwest of the Paranam alumina refinery and were previously mined in the 1980s. Approximately 3 Mt of high-grade bauxite remained available at Lelydorp I, and the proposed project would recover bauxite from areas north and west of the original open pit. In January 2012, the Government of Suriname officially announced that it was interested in resuming negotiations with Suralco regarding 40 years’ worth of bauxite reserves in the Bakhuy area in western Suriname (Alcoa Inc., 2013b; Alumina Ltd., 2013).

In the formal gold sector, the Government of Suriname announced that it planned to sign an agreement in late 2012 with Suriname Gold Company, LLC (Surgold), which was a joint venture of U.S. companies Alcoa Inc. and Newmont Mining Corp., to allow for the mining of gold in the Merian project, which is located approximately 75 km south of the town of Moengo and about 30 km to the north of the Nassau Mountains. Newmont was the manager of Surgold and had the right to own up to an 80% interest in Surgold; Surgold owned and operated the Merian gold project. Surgold anticipated that the project, if approved and constructed, would be similar to the Rosebel Mine and could possibly be an open pit operation with gold ore processing and refining facilities (Suriname Gold Company, LLC, 2013).

The Government had begun regulating the informal gold sector in January 2011. Once considered small scale, this untaxed and
unregulated sector was valued at an estimated $1 billion annually. The Government set up commissions that would deal with organizing and registering miners, develop legislation to regulate the sector, and work on making the sector environmentally sustainable (Suriname Gold Company, LLC, 2013).

In 2012, state-owned petroleum company Staatsolie reported a consolidated gross income of $1.05 billion, which was up by almost 31% compared with a gross income of $800 million in 2011. Staatsolie was in the midst of implementing a $1 billion expansion project. Of this amount, 75% would come directly from domestic investments. Although Suriname’s energy supply situation had improved, the country continued to have a shortage of energy to support expansion of its economy. The bauxite refinery at Paramaribo depended primarily on diesel-generated energy to support its refining operations. According to Surgold, any new refinery built in southeastern Suriname would also have to be powered by diesel-generated energy. The doubling of the capacity of the power-generating plant at Tout Lui Faut that was owned and operated by Staatsolie was scheduled to be completed in January 2014 and was expected to help meet the demand for power in Paramaribo. Also, actualization of the Tapa-Jai hydropower project would further help ease energy supply issues (Staatsolie Maatschappij Suriname N.V., 2013, p. 8, 13; U.S. Central Intelligence Agency, 2013).

## Production

The leading mineral commodities produced in Suriname continued to be alumina, bauxite, cement, crushed stone, gold, and sand in 2012. Data on mineral production are in table 1.

### Structure of the Mineral Industry

In 2012, the main bauxite and alumina producers in Suriname were Alcoa Inc. of the United States and Alumina Ltd. of Australia. Suralco, which was owned jointly by Alcoa (60%) and Alumina (40%), mined bauxite, and refined alumina in Suriname. Table 2 includes a list of the major mineral industry facilities in Suriname.

### Commodity Review

#### Metals

**Bauxite and Alumina.**—In 2012, alumina production in Suriname increased to 1.5 Mt from more than 1.4 Mt (revised) in 2011; bauxite production increased to 3.4 Mt from more than 3.2 Mt in 2011, or by about 6.3%. Production centers in Suriname included two bauxite mines and one alumina refinery. The Coermotibo Mine, which is an open pit bauxite mine, is located 23 km southeast of Paramaribo (the capital of Suriname) and 11 km east of the Paranam refinery (table 1; Bray, 2013).

Alcoa managed the Afoabaka hydroelectric facility and the Paranam alumina refinery operations in Suriname. With its 2.2-Mt/yr alumina refinery and 100-megawatt (MW) hydroelectric facility, Suralco, which mined bauxite and refined alumina, was the leading private enterprise in Suriname. Suralco was a key supplier of alumina to Alcoa facilities and to markets throughout Europe and the United States (Alcoa Inc., 2013c, p. 12).

**Gold.**—The Rosebel gold mine is located in the mineral-rich Brokopondo District in northeastern Suriname. In 2012, gold production amounted to almost 12.5 t compared with almost 12.6 t (revised) in 2011. Gold was Suriname’s leading export product, accounting for approximately 67% of all exports in 2012. Small-scale gold miners accounted for an estimated 60% of total gold exports in 2012. Most of the gold was in the greenstone belt in eastern Suriname. The gold production capacity at the Rosebel gold mine (which was 100% owned by Canada’s IAMGOLD) amounted to 12.5 t/yr for a mine life of at least 20 years. As of December 31, 2012, Rosebel’s proven and probable gold reserves amounted to 167.6 Mt grading 1.0 g/t containing more than 5.4 million troy ounces (169.4 t) of gold; measured and indicated resources were 239.7 Mt grading 1.0 g/t containing more than 7.4 million troy ounces (231.0 t) of gold; and inferred resources were 12.4 Mt grading 0.7 g/t and containing 268,000 troy ounces (8.3 t) of gold. The Rosebel Mine was expected to be operating until 2032 (IAMGOLD Corp., 2013a–d; 2013e, p. 98).

### Petroleum and Natural Gas

**Petroleum and Natural Gas.**—Crude oil production was exclusively by state-owned Staatsolie. The country’s proven reserves as of December 31, 2012, were estimated to be 76.7 Mbbl. The products of Staatsolie included crude oil, diesel oil, fuel oils, and asphalt bitumen. In 2012, Staatsolie had three petroleum fields in operation, which provided on average 16,200 bbl/d, or 5.94 million barrels per year (Mbbl/yr), which was lower than the production of 5.99 Mbbl/yr in 2011. In 2012, Staatsolie exported 3.4 Mbbl consisting of asphalt, bitumen, diesel, and fuel oil with an export value of $365 million. Surinamese crude oil consumption was estimated to average about 14,000 bbl/d. Refinery production was 2.31 Mbbl in 2012 compared with 2.63 Mbbl in 2011, which was a decrease of about 12.2%. In 2012, Staatsolie’s refinery processing capacity was 7,350 bbl/d of crude oil; however, investments in the expansion of the refinery capacity to 15,000 bbl/d were ongoing. The Italian company Saipem Società per Azioni was awarded the expansion contract, and construction was scheduled to be completed by the end of 2015. Once the expansion was completed, Staatsolie’s refinery products would include, in order of value, diesel, fuel oil, and asphalt bitumen. The expanded refinery would also produce premium-quality diesel and gasoline. Most of these derivatives would be consumed in the local market, and the surplus would be exported to the Caribbean region (Staatsolie Maatschappij Suriname N.V., 2013, p. 8, 11–13, 16; U.S. Central Intelligence Agency, 2013).

Staatsolie actively promoted the hydrocarbon potential of Suriname and monitored petroleum agreements on behalf of the Government. Besides being engaged in crude oil exploration, drilling, production, refining, marketing, and transport, Staatsolie was involved in the generation of biofuels, electricity, and steam. The U.S. Geological Survey in 2000 estimated that the Guyana-Suriname basin was the second...
most promising unexplored basin in the world. The Survey estimated that the basin contains 15.2 billion barrels (Gbbl) of crude oil, 11.9 trillion cubic meters (42.1 trillion cubic feet) of natural gas, and 2.3 Gbbl of natural gas liquids. The offshore basin is located in the coastal regions of Guiana and Suriname (U.S. Geological Survey World Energy Assessment Team, 2000; Staatsolie Maatschappij Suriname N.V., 2013, p. 8, 11–13, 16; U.S. Central Intelligence Agency, 2013).

Staatsolie’s petroleum operations started onshore in the Saramacca District, which is located 55 km west of Paramaribo. In 2012, Staatsolie’s crude production from the Calcutta and the Tambaredjo oilfields totaled about 6 Mbbbl. The majority of the production was from the Tambaredjo field. In the neighboring Calcutta field, full-scale production activities continued in 2012. As of 2012, proven reserves were 13 Mbbbl in the Calcutta field, 57 Mbbbl in the Tambaredjo field, and 18 Mbbbl in the Tambaredjo North-West area (Staatsolie Maatschappij Suriname N.V., 2013, p. 12; U.S. Energy Information Administration, 2013).

Staatsolie’s 28-MW-capacity powerplant at Tout Lui Faut supplied power to Suriname; the powerplant’s capacity was planned to be expanded to 62 MW by January 2014. The Tout Lui Faut refinery used the steam that the powerplant generated. The electricity was sold to the local power company for further distribution within the country. The Tout Lui Faut powerplant was to be incorporated as a separate entity named Staatsolie Power Company Suriname N.V. by early 2014 (Staatsolie Maatschappij Suriname N.V., 2013, p. 9, 13).

In South America, Tullow had exploration licenses in the prospective Guyana basin (which included French Guiana, Guyana, and Suriname) with a total acreage of 46,238 km². In December, in Suriname, Tullow finalized a production-sharing contract for a 30% interest in Block 47 with Staatsolie, which would enhance Tullow’s portfolio of exploration areas in the Suriname-Guyana basin. Planning started for a 3,000-km² 3-D seismic program across the license area for the second quarter of 2012. Early results were encouraging, and the company expected the final processed volumes for the prospects to be available by 2014. In the first half of 2012, according to Staatsolie, Tullow and Kosmos Energy Ltd. of Bermuda acquired, respectively, 3,000 km² of 3-D seismic data in Block 47 and 5,500 km² of 3-D seismic data in Blocks 42 and 45. Processing of these datasets was expected to be completed in late 2013, subject to the necessary environmental approvals. Tullow anticipated that wells would be drilled as part of its medium-term exploration program in the Equatorial Atlantic region of South America as well. Tullow planned to operate the license full time and to finance it during the exploration phase. Staatsolie, however, had the option to participate during the development and production phases by contributing 20% of the total cost (Tullow Oil plc, 2013, p. 7, 68, 70–71; Staatsolie Maatschappij Suriname N.V., 2013, p. 10).

Outlook

Suriname’s economy is expected to continue to be dominated by the mineral resource sector, particularly the bauxite industry, followed by, in order of value, crude oil, gold, and diamond mining. Proposals for exploration in the country’s undeveloped regions of the interior traditionally inhabited by indigenous communities, however, have raised the concerns of environmentalists and human rights activists in the country and abroad (Central Bank of Suriname, 2013).

Gold production at the Rosebel Mine in the years ahead is expected to increase owing to IAMGOLD’s investments in resource delineation, mine exploration programs, and additional leach tanks to improve recoveries. More than 104,000 meters (m) of diamond drilling was completed on the Rosebel Mine lease and the Charmagne concession, with positive results, which increased the confidence in the existing resource inventory and targeted resource expansions at the J-Zone, the Koolhoven, the Mayo, the Roma, the Overman, and the West Pay Caro deposits. Results will be incorporated into an ongoing expansion feasibility study scheduled for completion in the first half of 2013. Some 72,000 m of diamond drilling was planned in 2013, directed principally to resource delineation and expansion. Also, the mill expansion is expected to increase the mill feed to about 9 Mt/yr of ore from 8 Mt/yr and to provide the option of an additional 20% increase in gold output pending market conditions (IAMGOLD Corp., 2013d; 2013e, p. 114).

The alumina industry in Suriname is expected to grow with the completion of the $65 million, 250,000-t/yr expansion of the Paramam facility. The expanded facility will support alumina storage, refining, and shipping facilities, thermal power, and the head office of Suralco (Alcoa Inc., 2013a, b).

Crude petroleum production in Suriname is expected to continue to increase. Staatsolie’s exploration strategy is driven by its objective to increase onshore crude production to 16,000 bbl/d by 2015 (Staatsolie Maatschappij Suriname N.V., 2011).

Increased investments in Suriname’s mining and petroleum sectors could lead to higher growth prospects for the economy as well as higher levels of exports and Government revenues. Additionally, sound macroeconomic policies could attract more foreign direct investment.

Suriname’s economic prospects for the medium term will depend on continued commitment to responsible monetary and fiscal policies and reforms to liberalize markets and promote competition (Alcoa Inc., 2013b; IAMGOLD Corp., 2013e, p. 114; Staatsolie Maatschappij Suriname N.V., 2013, p. 12–13).

References Cited


Bray, E.L., 2013, Bauxite and alumina: U.S. Geological Survey Minera-

Commodity Summaries 2013, p. 26–27.

<table>
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<tr>
<th>Country and commodity</th>
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<th>2009</th>
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<th>2011</th>
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<td>62,000</td>
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<td>2</td>
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<td>168,926</td>
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<td>Bauxite, gross weight</td>
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<td>Gold, mine output, Au content</td>
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<td>11,975</td>
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<td>Crude</td>
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1Estimated; estimated data are rounded to no more than three significant digits. 2Revised. 3Do. Ditto. 4Table includes data available through May 31, 2013. 5Reported figure. 6Source: Direction Regionale de l’Industrie, de La Recherche et de l’Environment and Bureau de Recherches Geologiques et Minières and Minerals Questionnaire 2011 and 2012. 7In addition to the commodities listed, Guyana also produced loam. 8Source: Guyana Geology and Mines Commission, the Bank of Guyana, and U.S. Geological Survey Minerals Questionnaire 2011 and 2012. 9Source: Staatsolie Maatschappij Suriname N.V. and U.S. Energy Information Administration, 2013.
### GUYANA AND SURINAME: STRUCTURE OF THE MINERAL INDUSTRIES IN 2012

(Thousand metric tons unless otherwise specified)

<table>
<thead>
<tr>
<th>Country and commodity</th>
<th>Major operating companies and major equity owners</th>
<th>Location of main facilities</th>
<th>Annual capacity</th>
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<tbody>
<tr>
<td><strong>GUYANA</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Bauxite</td>
<td>Bauxite Company of Guyana Inc. (United Company RUSAL, 90%, and Government, 10%)</td>
<td>Kwakwani, East Berbice District</td>
<td>2,000</td>
</tr>
<tr>
<td>Do.</td>
<td>Bosai Minerals (Guyana) Inc. (Bosai Minerals Group Company Ltd., 70%, and Government of Guyana, 30%)</td>
<td>Omai bauxite mine and processing plant located close to Linden on the Demerara River about 100 kilometers south of Guyana’s capital city of Georgetown</td>
<td>2,000</td>
</tr>
<tr>
<td>Gravel</td>
<td>Baracara Quarries (Rahaman Group)</td>
<td>Quarry near Bartica, Mazaruni-Potaro District</td>
<td>100</td>
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<td>Silica sand</td>
<td>Minerals and Technology Ltd. [Minerals and Chemicals of Texas (United States)]</td>
<td>Sand Hills, Demerara River, West Demerara District</td>
<td>300</td>
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<td>Stone</td>
<td>BK Quarries Inc. (BK International Inc.)</td>
<td>Mazaruni River</td>
<td>3,650</td>
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<td><strong>SURINAME</strong></td>
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<td>Alumina</td>
<td>Suriname Aluminum Co. (Suralco) (Alcoa, Inc., 60%, and Alumina Ltd., 40%)</td>
<td>Refinery at Pararam</td>
<td>2,200</td>
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<td>Bauxite</td>
<td>do.</td>
<td>Coermotibo Mine,^1^ open pit mine, 23 kilometers southeast of Paramaribo</td>
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<td>Cement</td>
<td>Vensur N.V. (private, 100%)</td>
<td>Paramaribo, Para District</td>
<td>60</td>
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<td>Gold</td>
<td>kilograms</td>
<td>Rosebel Gold Mines N.V. (IAMGOLD Corp., 95%, and Government of Suriname, 5%)</td>
<td>Brokopondo District, 100 kilometers south of Paramaribo</td>
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<tr>
<td>Petroleum</td>
<td>thousand 42-gallon barrels</td>
<td>Staatsolie Maatschappij Suriname N.V. (Government, 100%)</td>
<td>Tambaredjo, Saramacca District</td>
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<td>Do.</td>
<td>do.</td>
<td>do.</td>
<td>Calcutta field (58 wells)</td>
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<td>Tambaredjo, Saramacca District</td>
</tr>
<tr>
<td>Do.</td>
<td>do. Ditto.</td>
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^1May include operations at Moengo.