

# THE MINERAL INDUSTRIES OF FRENCH GUIANA, GUYANA, AND SURINAME

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## FRENCH GUIANA

French Guiana (Guyane), which is located on the northern coast of South America, is bordered by Brazil to the south and southeast, Suriname to the west, and the Atlantic Ocean to the north. French Guiana has a total area of 91,000 square kilometers (km<sup>2</sup>) and had an estimated population of 187,000 as of 2003 (U.S. Central Intelligence Agency, 2003§<sup>1</sup>). French Guiana has been an overseas Department of France since 1946, and its economy was closely tied to that of France through imports and subsidies. The mineral sector was administered according to French law. Such goods as chemicals, food, fuels, machinery, and transport equipment were imported from France. Major exports from French Guiana included fish and shrimp, gold, and timber (Harben and Harris, 2003; U.S. Central Intelligence Agency, 2004§).

French Guiana's gross domestic product (GDP) based on purchasing power parity was estimated to be \$1.55 billion in 2003 (U.S. Central Intelligence Agency, 2004§). The leading economic developments in the country were the aerospace activity at the French space center in Kourou, fishing, and forestry. In 2003, the mining sector was dominated by gold mining; gold has been mined since 1853. French Guiana also produced cement, clays, columbite and tantalite, sand, and crushed stone. In recent years, the mineral industry has been focused on gold and petroleum exploration. Gold exploration was conducted by Cambior Inc. of Canada and Guyanor Ressources S.A. of France. Guyanor was a French precious-minerals exploration company owned by Golden Star Resources Ltd. (GSR) (73% interest). Guyanor focused on the development, exploration, and identification of mineral deposits, especially diamantiferous and gold-bearing deposits. The company held interests in the Bon Espoir, the Dorlin, the Paul Isnard, and the Yaou gold properties, which are located mostly to the west of French Guiana's capital of Cayenne. Cambior was a gold producer that focused mainly on project development and exploration activities in Canada, French Guiana, Guyana, Peru, and Suriname. During 2003, Cambior's main acquisition in French Guiana was the Camp Caiman Project, which was a former asset of Ariane Gold Corp. Hardman Resources Ltd. of Australia was the principal petroleum exploration company in French Guiana during 2003.

The majority interest in the Dorlin and the Yaou gold projects was acquired by GSR (86.5%) from Cambior in 2002. The geology in both project areas consists of folded and sheared greenstones from the Lower Proterozoic Paramaca Formation. Both projects were in the exploration stage during 2003. The

Dorlin Project is located 180 kilometers (km) southwest of Cayenne and about 55 km east-northeast of the village of Maripasoula near the Maroni River, which separates French Guiana and Suriname. The Dorlin gold project operated under an exploration permit (PER) that was held by Guyanor and covered a total area of 84 km<sup>2</sup>. Exploration at Dorlin identified an 11-km-long zone with soil geochemistry anomalies, which included the Montagne Nivre gold-mineralized system that trends north-south. By using core drilling and trenching, the gold-mineralized system was determined to be associated with pyritization, silicification, and tourmalinization. The Yaou Project is located 210 km southwest of Cayenne near the western border of French Guiana and approximately 12 km northeast of Maripasoula. Similar to the Dorlin Project, the 52-km<sup>2</sup> Yaou also operated under a PER. Exploration procedures, such as augering, core drilling, and trenching, identified three main gold-mineralization zones—Chaina, IJK, and Yaou Central. The Dorlin gold project's mineral resource was estimated to be 7.0 million metric tons (Mt) at a grade of 1.49 grams per metric ton (g/t) gold; the Yaou mineral resource was estimated to be 12.1 Mt at a grade of 2.63 g/t gold (RSG Global Pty. Ltd., 2004, p. iii-x, 6-10; Golden Star Resources Ltd., 2004§; InfoMine Inc., 2004b§, d§).

The Paul Isnard Project, which consists of eight mining concessions and one PER area, is located in northwestern French Guiana approximately 200 km to the west of Cayenne. This property was acquired by Guyanor in 1994. Drilling confirmed that the material in the project area originates from the Lower Proterozoic Paramaca Formation. Analysis has also indicated the presence of gold mineralization in the form of pyretic disseminated zones and shear zones rich in sulfide. The Gold Mountain deposit, which is located on the southern boundary of the Paul Isnard Project, had estimated gold resources of about 8.2 Mt at a grade of 1.78 g/t gold (Golden Star Resources Ltd., 2004§; InfoMine Inc., 2004c§).

Guyanor held a 100% interest in the 150-km<sup>2</sup> western portion of the Paul Isnard mining concessions, which is valid until 2018. The 283-km<sup>2</sup> eastern portion of the property was covered by a 3-year PER that could be renewed twice; the first 3-year period ended in 2002. The renewal agreement signed by Guyanor in 2003 included a 30% reduction of the total project area (RSG Global Pty. Ltd., 2004, p. 5). In 2003, the Paul Isnard Project remained on care-and-maintenance because of difficulties in obtaining exploration funding. In the Paul Isnard concession and exploration permit areas, 16 exploitation authorizations (AEX) that measured 1 km<sup>2</sup> each were granted to small-scale alluvial miners. Between 2000 and 2002, Guyanor was to receive a percentage of the value of the gold extraction from these areas. Revisions to French mining laws, however, exempted the AEX holders from having to pay those royalties.

<sup>1</sup>References that include a section mark (§) are found in the Internet References Cited sections.

As a result, Guyanor received no earnings from this source during 2003 (Guyanor Ressources S.A., 2003a).

At yearend 2003, Guyanor announced the acquisition of the Bon Espoir PER from Gold Fields Exploration B.V. The acquisition agreement allowed Gold Fields to receive a 0.5% to 2.0% royalty and to retain a back-in right to acquire the 65% participating interest in the Bon Espoir property. This property was under an exclusive PER between October 2001 and October 2006. Bon Espoir covers a 466-km<sup>2</sup> area and is located north of the Paul Isnard property approximately 320 km west-southwest of Cayenne. The property is situated between two formations, the Lower Proterozoic Armina to the north and the Orapu to the south. Drilling revealed the presence of gold anomalies at the shared contact between the two formations called the Wayamaga Prospect. Further geochemical analysis was planned for mid-2004 (Guyanor Ressources S.A., 2003b; Golden Star Resources Ltd., 2004§; InfoMine Inc., 2004a§).

In November 2003, Cambior announced the merger with Ariane Gold Corp., which became Cambior's wholly owned subsidiary. The merger agreement offered Ariane's shareholders 1 Cambior share for every 2.91 Ariane shares. The Camp Caiman gold project, which was Ariane's principal asset, is located 45 km southeast of Cayenne. Cambior planned to continue the exploration phase of the project to increase mineral resources in Camp Caiman; in addition, feasibility studies and an environmental impact assessment were planned for 2004. The company anticipated that gold production from this project would begin in 2007. Preliminary studies determined that Camp Caiman has about 37,300 kilograms (kg) (reported as 1.2 million troy ounces) of gold resources (Cambior Inc., 2003).

Hardman Resources Ltd. held a 97.5% interest in an exclusive exploration permit for oil that covered the entire French Guiana's offshore basin of 65,000 km<sup>2</sup>. In February 2003, Hardman completed a two-dimensional seismic survey in a 7,500-km area along the offshore permit. The company planned to begin discussions with potential partners in 2004 to fund drilling, which was expected to start in 2005 (Hardman Resources Ltd., 2004§).

## Outlook

The gold exploration activity in French Guiana is set to continue to grow during the next few years mainly as a result of the identification of many gold-mineralized systems during 2003. Geochemical analyses in several ongoing gold project sites have been planned to start in 2004. The Camp Caiman gold project is expected to start production by 2007.

By 2005, Hardman Resources is expected to start oil-drilling operations in the French Guiana offshore basin.

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## GUYANA

Guyana is the fourth smallest country in South America after French Guiana, Suriname, and Uruguay. Located in northern South America, it is bordered by the Atlantic Ocean to the north, Brazil to the south, Suriname to the east, and Venezuela to the west. Guyana has a total area of 214,970 km<sup>2</sup> and, in 2003, had an estimated population of 702,100. Guyana was a British possession from 1815 to 1966 when independence was granted (U.S. Central Intelligence Agency, 2003§).

In 2003, the GDP based on purchasing power parity was estimated to be \$3.3 billion (International Monetary Fund, 2004§). Development of the mineral industry in Guyana has been affected in recent years by a shortage of skilled labor, deficiencies in the infrastructure, and border disputes with Suriname and Venezuela. During 2003, the unpredicted reduction in the production of two key Guyanese products, gold and sugar, slowed the economy. In 2003, production of gold decreased by 11% compared with that of 2002 (table 1; Comisión Económica para América Latina y el Caribe, 2004; U.S. Central Intelligence Agency, 2004§).

Guyana's main industries included bauxite, gold, rice, sugar, textiles, and timber. In 2003, exports of such goods as bauxite and alumina, gold, rice, rum, shrimp, sugar, and timber were estimated to be about \$512 million (U.S. Central Intelligence Agency, 2004§). Gold production has decreased by about 14% since 2001. Diamond production, however, has increased by 450% since 1999. Production of crushed stone, bauxite, and sand has decreased by about 62%, 28%, and 15%, respectively, since 1999 (table 1).

## Commodity Review

### Metals

**Bauxite and Alumina.**—In 2003, bauxite production increased by almost 1.0% to 1.7 Mt from 1.69 Mt in 2002. In July, Cambior negotiated an agreement with the Government of Guyana to assume the management of the bauxite mining operations of Linden Mining Enterprise Ltd. (Linmine) on a contractual basis through Cambior's subsidiary Omai Bauxite Co. (OBC) beginning on August 1, 2003. Linmine was located approximately 100 km south of Guyana's capital of Georgetown. Cambior had performed contract mining services at Linmine since 2000 through the use of surplus equipment from its subsidiary Omai Gold Mines Limited (OGML), which was owned by Cambior (95%) and the Government of Guyana (5%). Linmine was expected to reimburse Cambior for all its costs, and, according to Cambior, the new arrangement would have no financial impact on Cambior or OGML (Taylor, 2003; Cambior Inc., 2003§).

**Gold.**—The Omai Mine, which was Cambior's largest gold mine, produced 52% of the company's gold output in 2003. Gold production from Omai has been decreasing since 2001; the mine was scheduled to cease operations in the third quarter of 2005. The mine was jointly owned by Cambior (95%) and the Government of Guyana (5%). The Omai Mine produced about 8,400 kg (271,000 troy ounces) of gold during 2003. In 2003, the mill processed 5.7 Mt [the equivalent of 15,750 metric tons per day (t/d)] of ore at an average grade of 1.61 g/t gold. The estimate for minable reserves as of December 31, 2003, was 9.3 Mt at a grade of 1.21 g/t gold. Cambior's exploration division had spent about \$3 million exploring for new gold deposits at the Omai Mine; by the end of 2003, no new reserves had been discovered (Omai Gold Mines Limited, 2004, p. 4-6; Cambior Inc., 2004§).

Vannessa Ventures Ltd. was a Canadian company engaged in the acquisition and exploration of mineral interests in Central America and South America. In December 1998, the company signed an agreement to acquire the exploration license for the Marudi Mountain gold project, which is located in southwestern Guyana and is one of Guyana's major gold mining areas. In July 2003, however, the agreement was replaced by a purchase-and-royalty agreement with the property's former owner Sutton Resources Ltd. According to Vannessa's financial statements of March 31, 2004, a final payment of 50,000 common shares was made to the vendor at a rate of \$0.40 per share (price established at the date of the agreement). During the last quarter of 2003, Vannessa announced the approval for a program to drill approximately 2,500 meters (m) in the Marudi Mountain gold project area; drilling was scheduled for the first quarter of 2004. The program would include interpretation of geochemical, geologic, and geophysical data and mapping of drill-hole locations at Marudi Mountain. In 2003, results identified four main zones that were believed to be composed of gold-bearing saprolite and alluvial deposits. The identified zones were Marudi Ridge, Mazoa, and Toucan, and the alluvial resources contained within them (Vannessa Ventures Ltd., 2003, 2004a§; British Columbia Securities Commission, 2004, p. 15-16).

Vannessa held a 50.6-km<sup>2</sup> license for the Marudi Mountain area through its 100% owned subsidiary Romanex Inc. Analyses in which a 1-g/t gold cut-off grade was used indicated estimated gold resources of about 9,950 kg (320,000 troy ounces) at an average grade of 2.94 g/t gold and inferred resources of about 2,080 kg (67,000 troy ounces) of gold at an average grade of 2.45 g/t gold (Vannessa Ventures Ltd., 2003).

In July 2003, the Government of Guyana through its wholly owned subsidiary Vannessa (Guyana) Inc. granted Vannessa an exclusive right to occupy and conduct geologic and geophysical surveys of all minerals in an area adjacent to Marudi Mountain. As a result of the survey, a prospecting license for an area known as "Paint Mountain" adjacent to Marudi Mountain was granted to Vannessa (British Columbia Securities Commission, 2004, p. 16).

Reports from the first quarter of 2003 indicated that Sennen Resources Ltd. through its wholly owned subsidiary Sennen Resources (Barbados) Ltd. entered into an agreement to acquire an option to purchase a share of Makapa Mining Inc. (a subsidiary of Makapa Minex Inc.). Makapa was a Guyanese company that owned mineral rights in northwestern Guyana. The acquisition included the Five Star Geological and Geophysical Survey Permit that covered 3,092 km<sup>2</sup> and the Makapa Prospecting License that covered 10 km<sup>2</sup>. The Five Star/Makapa Mining Project is located in northwest Guyana close to the Venezuelan border; it is surrounded by the Guiana Shield, the Central Guiana Shear Zone, and the Makapa/Kuribrong Shear Zone. Mapping and exploration in the area confirmed the presence of intrusions in a sequence of greenstone and led to the discovery of large gold deposits, which included Cambior's Omai Mine (Sennen Resources Ltd., 2003).

### Industrial Minerals

**Diamond.**—Vannessa owned several diamond and gold properties in Guyana; these included the Maple Creek alluvial diamond and gold mine and the Potaro I-V Claims. In late 2003, development of the Maple Creek Mine was completed. The mine encompasses the Potaro and the Uewang River drainages. Bulk sampling of the site revealed gem-quality diamond. In 2003, a preproduction inspection of the mine was performed by the Government of Guyana. Vannessa owned a 60% share in the Maple Creek Mine; the other 40% was held by Rohanni & Associates, which was a Qatar-based diamond and investment group, through a \$2.2 million joint-venture agreement with Vannessa to cover development expenses at the mine. In addition to funding the project to production, Rohanni & Associates was committed to purchase Maple Creek's output up to a value of \$5 million per month (Vannessa Ventures Ltd., 2003§).

The Potaro claims property is located 200 km southwest of Guyana's capital in the Potaro Diamond and Gold District of central Guyana, which is known historically for its diamond. The property consists of a five-block claim of 162 km<sup>2</sup> in a large ancient riverbed that includes Vannessa's Maple Creek Mine. In 2003, Claims I, II, and III from the Potaro property were in exploration stages that included bulk sampling, ground-penetrating radar surveys, mapping, and trenching. Exploration

results identified diamondiferous and gold-bearing paleochannel prospects in the Maple Creek Mine area (Vannessa Ventures Ltd., 2004b§).

### **Mineral Fuels**

**Petroleum.**—In 2003, the Canada-based company CGX Energy Inc. was involved in four petroleum exploration licenses in Guyana—three offshore (Corentyne, Georgetown, and Pomeroon) and one onshore (Berbice). The Pomeroon license is located in the East Venezuela Basin, and the Berbice, the Corentyne, and the Georgetown licenses are located in the Guyana/Suriname Basin. All four projects were at different stages of drilling and geochemical and seismic survey. Guyana was involved in border (onshore and offshore) disputes with Suriname, which caused the suspension of exploration activities in the Corentyne and the Georgetown licenses; CGX had a 100% interest in the Corentyne project and a 25% interest in the Georgetown project. Guyana and Suriname were signatories to the United Nations Convention on the Law of the Sea, which requires peaceful resolution of border disputes. CGX agreed to assist Guyana financially with the legal costs incurred in seeking a resolution of the maritime dispute (CGX Energy Inc., 2003, p. 1, 5; 2005§).

CGX entered into an agreement in December 2003 to acquire a 100% interest in the Pomeroon license; the acquisition was subject to the approval of the Government of Guyana. Venezuela's border dispute with Guyana included the onshore boundary established in 1899, which was being challenged by Venezuela; the dispute could affect Guyana's maritime boundary and the Pomeroon license. The situation was being arbitrated through the United Nations Good Officer process. In 2003, CGX's Berbice license had advanced through the exploration phase, which included completing the identification of basement highs, fault structures, and hydrocarbons. Results confirmed one reservoir with approximate resources of 15 million barrels (Mbbbl). According to the USGS World Petroleum Assessment for 2000, the Guyana/Suriname Basin ranked 12th among the world's explored and unexplored oil basins. The mean estimate of undiscovered resources for the basin was 15 billion barrels of recoverable oil. This basin also ranked 27th for gas in the world with estimated resources of 1,190 billion cubic meters in 20 fields (CGX Energy Inc., 2003, p. 2, 5; 2005§; U.S. Geological Survey, 2000§).

### **Outlook**

Guyana's economy was expected to grow by 4.5% in 2004 and 7.3% in 2005. The growth potential of the mining sector will depend on the success of ongoing exploration activities. In 2004, the Marudi Mountain gold project area was scheduled for drilling and interpretation of geochemical, geologic, and geophysical data following the discovery of gold-bearing saprolite and alluvial deposits in the area.

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### **SURINAME**

Suriname, which is located on the northern coast of South America, is bordered by the Atlantic Ocean to the north, Brazil to the south, French Guiana to the east, and Guyana to the west. Suriname has a total land area of 163,270 km<sup>2</sup> and had an estimated population of 435,449 in 2003 (U.S. Central Intelligence Agency, 2003§). Suriname, which was formerly known as Dutch Guiana, was integrated into the Kingdom of the Netherlands in 1948, but owing to such problems as unemployment and inflation, independence from

the Netherlands was granted in 1975 (U.S. Central Intelligence Agency, 2004§).

Suriname's GDP based on purchasing power parity was estimated to be \$2.5 billion in 2003 (International Monetary Fund, 2004§). Industries in Suriname included fishing, food processing, and lumbering and the production of alumina, bauxite, gold, and oil. The bauxite industry accounted for at least 15% of the GDP and about 70% of export earnings (U.S. Central Intelligence Agency, 2004§).

In recent years, mineral production in Suriname has been focused on alumina, bauxite, and petroleum. In 2003, the production of alumina and bauxite increased by 5.5% and 5.3%, respectively, compared with that of 2002; the production of petroleum and petroleum products decreased by 4.4% and 3.7%, respectively (table 1).

## Government Policies and Programs

The administration of the mining sector is the responsibility of the Geological and Mining Service of Suriname. Mining policy, however, is subject to the Government's regulations; for example, the acquisition of exploration rights must be submitted to local Governments for approval and granted by each state. Over the years, mining policy has changed to include a plan for maintaining an open-market economy mainly to attract foreign investment and to encourage development by the private sector. This policy allows privatization and joint-venture projects. The Government has also approved a standard mineral agreement that allows production and sale of minerals in the open market without restriction and access to foreign exchange at competitive rates, provides for tax deductions on reinvestment, and guarantees the repatriation of capital and profits. The agreement includes a royalty rate reduction to 2.25%, nominal license fees for exploration and production, and exemptions for mineral-rights holders from import duties on equipment used for mining, milling, and future expansions. Expenditures on prospecting, exploration, and other preproduction costs can be written off during the first 5 years of operations (Register of South American Mining, 2003).

## Commodity Review

### Metals

**Aluminum.**—Alcoa Inc. through Alcoa World Alumina and Chemicals (AWAC) [a global alliance between Alcoa (60%) and Alumina Limited (40%)] began an expansion project at the Paranam alumina refinery of Suriname in August 2003. The project was expected to be finished by July 2005. The \$65 million expansion project will increase the smelter-grade alumina production by 250,000 metric tons per year to a total production of 2.2 million metric tons per year. The project was also approved by BHP Billiton (the parent company of Alcoa's joint-venture partner in Suriname). Affiliates of Alcoa and BHP Billiton owned a 55% and 45% interest, respectively, in the Paranam facility (Alcoa Inc., 2003, 2003§; Mining Journal, 2003).

Alcoa's subsidiary [Suriname Aluminum Company, L.L.C. (Suralco)] was owned by AWAC. The company, which began mining bauxite in Suriname in 1916, specialized in the production of alumina, primary aluminum, and fabricated aluminum. In 1958, Suralco signed an agreement with the Government of Suriname to develop hydropower in the county; in 2003, an average of 75 megawatt-hours of electricity was produced, which met about 75% of Suriname's electricity needs. Suralco began a new \$10 million exploration program in Bakhuis in the western region of Suriname and expected to complete it by 2005. Previous studies had determined that there was an estimated 300 to 400 Mt of bauxite in the area, which is characterized by an abundance of bauxite plateaus (Alcoa Inc., 2003, 2003§).

**Gold.**—Canarc Resources Corp., which was a Canadian gold exploration and mining company, owned the Benzdorp Property and the Sara Kreek Mine. The Benzdorp Property is located in a prolific gold-producing region about 300 km southeast of the capital city of Paramaribo. The property has been explored in recent years by hundreds of small-scale miners who produced gold in the area (Canarc Resources Corp., 2004a§). Exploration activities in 2003 at Benzdorp's five prospect areas (JQA, JQS, JQW, Pointu Kreek, and Roche Kreek) included a 38-hole Phase 1 drilling program. Two gold anomalies were defined by geochemical sampling—JQW assayed up to 12.8 g/t gold in soils, and Pointu Kreek, up to 44.4 g/t gold in saprolite. A lower grade anomaly was also identified in Roche Kreek with 0.8 g/t gold in soils (Canarc Resources Corp., 2003a, c). Testing in the JQA prospect suggested that the porphyry-style gold target ranges in grade from 0.5 to 1.5 g/t gold. Copper and porphyry-type gold mineralization has also been delineated for the JQA prospect area (Canarc Resources Corp., 2003a, b).

As of December 2003, Canarc owned 40% and held an option to earn up to 80% of the voting shares of Benzdorp Gold N.V., which was the local company that held the Benzdorp concession titles. Grasshopper Aluminum Company (Grassalco), which was a state-owned mining company and Canarc's partner in Suriname, had the option to increase its equity to 20% of the voting shares and the right to receive either a floating net revenue interest (1.5% to 6%) based on the price of gold or a net profit interest of 20% after Canarc recovers all its capital investment (Canarc Resources Corp., 2003a).

Sara Kreek, which was the only legally operating gold mine in Suriname in 2003, is located 160 km south of Paramaribo. Canarc owned a 100% interest in the subsurface mineral rights and an 80% interest in the surface mineral rights in Sara Kreek. Suriname Wylap Development Corp. was Canarc's private partner. Gold production from Sara Kreek in 2003 was about 160 kg (5,000 troy ounces) (Canarc Resources Corp., 2004b§).

In 2002, Cambior became the 100% owner of the Rosebel Project, which is located 80 km south of Paramaribo. During the same year, a feasibility study was accepted and approved by the Government of Suriname, insurance to cover financing and political risk was obtained, and a 25-year renewable right of exploration was granted by the Government. In 2003, through its subsidiary Rosebel Gold Mines N.V., Cambior initiated

the development of the Rosebel Mine. The Government of Suriname received a 2% royalty payment on gold production at Rosebel, 6.5% participation in the excess gold price over \$425 per ounce, and 5% of the dividends paid by the operating company after full payment of the capital. The mine has an expected mine life of 10 years and a probable reserve of 47 Mt at a grade of 1.6 g/t gold. Rosebel was expected to produce about 8,400 kg (270,000 troy ounces) of gold in 2004 and to process 14,000 t/d of ore during the first year of mine production (Cambior Inc., 2004§).

### **Mineral Fuels**

**Petroleum.**—In 2003, the national oil company of Suriname Staatsolie Maatschappij Suriname N.V. explored 200 km of coastal region between Corentyne and the Tambaredjo River. Staatsolie was established by the Government in 1980 as a limited-liability fully Government-owned company. The company conducted exploration, marketing, production, and refining of petroleum; it also operated an oil refinery with a capacity of 7,000 barrels per day (bbl/d) that produced asphalt-bitumen, diesel, fuel oil, and heavy-vacuum gas-oil. The Corentyne River is part of the area involved in an inland territory dispute between Guyana and Suriname. Onshore northern Suriname, approximately 185 Mbbl of oil has been discovered so far; of that total, 170 Mbbl was located in the Tambaredjo oilfield, District of Saramacca, and the remaining 15 Mbbl was located in the Calcutta oilfield west of Tambaredjo. In 2003, the Tambaredjo oilfield produced approximately 12,300 bbl/d and had an estimated reserve density of 1.2 million barrels per square kilometer. In 2004, Staatsolie planned to carry out a detailed study at the Calcutta oilfield to determine its exact size, thickness, and number of oil columns (CGX Energy Inc., 2003, p. 4-5; Staatsolie Maatschappij Suriname N.V., 2003a§, b§).

In 2003, Staatsolie produced 4.3 Mbbl of crude oil from the Saramacca area properties; the decline of production compared with that of 2002 was due to below-target production from the new wells and depleting reserves. Major exploration projects in 2003 carried out by Staatsolie, such as the second phase of geochemical survey in the Nickerie blocks that confirmed previously identified anomalies, achieved successful results. In addition, exploration and appraisal drilling in Calcutta and Tambaredjo-West, respectively, identified several oil reservoirs in the Eocene Upper Saramacca Formation; the oil reserves were estimated to be 8 Mbbl (Staatsolie Maatschappij Suriname N.V., 2003a, p. 8-9).

In December 2003, Staatsolie and Spanish oil company Repsol YPF S.A. signed a heads of agreement that permits the parties to negotiate and sign an exploration and production contract for offshore block 30. Block 30 covers an area of 18,600-km<sup>2</sup> and is located about 100 km off the Suriname coastline; water depths range from 50 to 2,500 m (Staatsolie Maatschappij Suriname N.V., 2003b). Repsol planned to

acquire an exploration concession in early 2004 and to carry out a seismic program that would cover 1,800 km of the offshore area (CGX Energy Inc., 2003, p. 4).

### **Outlook**

Suriname's economy was expected to grow by 7.2% in 2004 and 12% in 2005. In 2004, Suriname's economy is likely to continue the recent up trend, which has been dominated by the alumina, bauxite, and petroleum sectors. The alumina and bauxite industry is expected to increase production in the near future following an expansion project at the Paranam aluminum refinery and a \$10 million exploration program in the western region of Suriname. Growth potential in the petroleum sector will depend on the success of ongoing onshore and offshore exploration activities and a reasonable solution to the territorial dispute between Guyana and Suriname.

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TABLE 1  
FRENCH GUIANA, GUYANA, AND SURINAME: PRODUCTION OF MINERAL COMMODITIES<sup>1</sup>

(Thousand metric tons unless otherwise specified)

Country and commodity		1999	2000	2001	2002	2003 <sup>e</sup>
FRENCH GUIANA <sup>c</sup>						
Cement	metric tons	88,000	88,000	58,000	62,000	62,000
Clays	do.	5,000	5,000	5,000	5,000	5,000
Columbite and tantalite	kilograms	1,100	1,100	1,500	1,500	1,500
Gold, mine output, Au content	do.	2,819 <sup>2,3</sup>	3,469 <sup>2,3</sup>	3,971 <sup>2,3</sup>	2,971 <sup>2,3</sup>	3,000
Sand		1,500	1,500	1,500	1,500	1,500
Stone, crushed		1,500	1,500	1,500	1,500	1,500
GUYANA						
Bauxite, dry equivalent, gross weight		2,359 <sup>4</sup>	2,471 <sup>4</sup>	1,950	1,690	1,701 <sup>3,5</sup>
Diamond	carats	45,440 <sup>4</sup>	81,706 <sup>4</sup>	178,698 <sup>4</sup>	248,436	250,000
Gold, mine output	kilograms	12,905	13,510	14,186	13,581	12,170 <sup>3,5</sup>
Sand	metric tons	211,300 <sup>4</sup>	262,000 <sup>4</sup>	240,083	180,672	180,000
Stone, crushed	do.	129,000 <sup>e,4</sup>	120,000 <sup>e,4</sup>	117,814	49,356	49,000
SURINAME <sup>c</sup>						
Aluminum:						
Bauxite, gross weight		3,715 <sup>3</sup>	3,610 <sup>3</sup>	4,394 <sup>3</sup>	4,002 <sup>3</sup>	4,215 <sup>3,5</sup>
Alumina		1,600	1,800	1,900 <sup>3</sup>	1,900	2,004 <sup>3,6</sup>
Metal, primary		6	--	--	--	--
Cement, hydraulic		60	60	65	65	65
Clays, common		20	20	20	20	20
Gold, mine output, Au content	kilograms	300	300	300	300	300
Petroleum:						
Crude <sup>7</sup>	42-gallon barrels	4,400,000 <sup>3</sup>	4,500,000 <sup>3</sup>	4,700,000 <sup>3</sup>	4,500,000 <sup>3</sup>	4,300,000
Products	do.	--	--	2,550,000 <sup>3</sup>	2,700,000	2,600,000 <sup>7</sup>
Sand and gravel:						
Gravel		35	35	35	35	35
Sand, common		160	160	160	160	160
Stone, crushed and broken		50	50	50	50	50

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

<sup>1</sup>Table includes data available through September 30, 2004.

<sup>2</sup>Source: Direction Régionale de l' Industrie, de la Recherche et de l' Environnement, Guyane.

<sup>3</sup>Reported figure.

<sup>4</sup>Source: Guyana Geology and Mines Commission.

<sup>5</sup>Source: World Bureau of Metal Statistics.

<sup>6</sup>Source: BHP Billiton Group.

<sup>7</sup>Source: Staatsolie Maatschappij Suriname N.V.