

## REPUBLIC OF GUINEA

*By Leslie Wright  
Independent Consultant*

Following President Lansana Conté's re-election, the presidential term of office was extended from five to seven years and in parliamentary elections in 2002 the ruling party won a sizeable majority. In recent months, however, the President has not been in good health and there are signs of some within the ruling party 'looking for position'.

Problems still exist with relationships with neighbouring countries, most particularly Liberia, where Guinea has consistently accused the Liberian Government of supporting rebels in Guinea who are hostile to the central government. In turn, Guinea is accused by Liberia of supporting rebels fighting to remove President Taylor. Communication between the three Mano River countries (Guinea, Liberia and Sierra Leone) was re-established early in 2002, culminating in a summit held in Rabat, Morocco, in February, 2002, at which Presidents Conté, Kabbah and Taylor signed a joint communiqué pledging to respect each other's borders and to work towards the re-vitalisation of the Mano River Union. However, after initial signs of progress, the re-vitalisation of the LURD guerrillas in Liberia, through increased external assistance, led to an increase in border tension and rebel action de-stabilised a large part of Liberia. An added complication was the commencement of civil war in Côte d'Ivoire.

Resolution of the differences between the parties has now become a regional priority and a presidential summit was held this year in Accra, hosted by the President of Ghana and the Economic Community of West African States (ECOWAS). The process has been complicated by the indictment of President Taylor at a Special Court in Sierra Leone. International attention has now been focused on the problems of the region; the UK is involved in Sierra Leone and France in the Côte D'Ivoire, and pressure has built for the US to become involved in Liberia, either directly or in a supporting role to ECOWAS forces in a bid to halt the war. At the time of writing (July 2003), Liberia was in crisis, with rebel forces and government troops fighting for control of the capital, Monrovia.

The economy, after a decade of improvement, is now being adversely affected by the regional instability, with some investors now reluctant to commit major funding. Mineral resources are major contributors to the economy in terms of foreign-exchange earnings, chiefly Guinea's world-class bauxite deposits. There are also important deposits of base and precious metals and a world-class iron-ore deposit at Mont Simandou that has yet to be developed.

An efficient system is in place in Guinea for encouraging mining investment. The Centre de Promotion et de Developpement Minière (CPDM), deals with all aspects of mining investment and, in co-operation with the World Bank and

Co-opération Française, it has introduced a promotional programme that includes a database (SIGM) of mining investment-related information. Also, improvements have been made to the mining code, with assistance from the World Bank, including a reduction to 15% in the government's free-carried interest (now restricted to gold and diamond projects only).

The technical programme conducted by the Ministère des Mines has included:

1. The evaluation and inventory of mineral resources, maps of the whole country at 1:500,000 scale and compilation of geological and mineral occurrence data. New geological mapping of the Pre-Cambrian at 1:200,000 scale;
2. The preparation of geophysical and air photo data from programmes undertaken by Geosurvey International (1979-81) and Aerodat (1997); an airborne geophysical survey over 112,000 km<sup>2</sup> (sets for each one degree sheet comprising maps of geology, geophysics, and mineral distribution, plus an explanatory note); and summary maps at 1:500,000 scale.

The data are being made increasingly available to investors in a co-ordinated GMIS/SIGM database that can be used with GIS software.

In addition, a programme by Co-opération Française is aimed at institution building in the CPDM, improvement of the database, establishment of a CPDM website and a significant overseas training component for local technical staff. This programme began in July 2001, and is being conducted by BRGM. It includes satellite interpretation and geological mapping of the Dinguiraye, Tougué, Dabola and Kissidougou areas and north of Kerouane. The project is valued at €1.52 million, and is financed by the French Government through Fonds de Solidarité Prioritaire (FSP), a successor to FAC.

### **Geology and mineral potential**

Granite-schist belt terrain of Proterozoic age is found in the east of Guinea, where Archaean rocks to the south have been thrust northwards over a Birimian basin to the north. Sedimentary rocks of Proterozoic to Recent age cover the centre and west of the country. Swarms of Mesozoic dolerite and kimberlite dykes, and some basic intrusions along the coast, cut the Proterozoic rocks. Mesozoic and Cainozoic sediments on the continental shelf overlap the shoreline.

The Archaean in Guinea possesses iron ore, diamonds and gold deposits, and weathering has created economic bauxite deposits. The Birimian rocks, also, are highly prospective for gold. The Mesozoic and Cenozoic basin rocks along the coastline are prospective for hydrocarbons.

Guinea is best known however, for its historic association with gold. Gold from Guinea was found in the treasures of Carthage dating from 814 BC, and the region gave its name to the first British gold coin. On a pilgrimage to Mecca in the 14th century, the King of the Mali empire, Kankou Moussa Keita,

distributed 8 t of gold. In 1591, under the control of the Moroccan Empire, 1,500 kg of gold are known to have been produced in the Manden area.

### **Mining and exploration**

The mining sector in Guinea contributes around 25% of the country's income, with bauxite production by far the most important contributor. The past few years have been characterised by an ongoing programme to modernise and re-structure the aluminium industry to make it efficient and profitable, and to increase production. Three bauxite companies are in production. At the same time, efforts to diversify Guinea's bulk commodity mining base into iron ore are continuing, with Rio Tinto and BHP-Billiton active in their respective permits at Simandou and Mount Nimba.

For gold, three mines are now operating and a number of exploration companies are beginning to re-start work. All three existing gold mines intend to increase their production.

In the diamond sector, a De Beers' subsidiary, Debsam, has extended its search into other areas of the country, having completed an evaluation in Haute Guinea. Aredor First City Mining, in partnership with Rio Tinto, continues to explore for kimberlite in its concession at Banankoro, at the same time as mining the alluvial deposits there. As yet, there is no feasibility study in prospect for kimberlite mining.

Guinea is a participant in the Kimberley Process of diamond certification, and had inaugurated its own certification scheme on June 19, 2001.

In 1999, 102 mining and exploration companies registered seven mining concessions, 28 exploitation and 153 exploration permits (16 permits were granted in 2000). A review was completed in early 2003 and many companies who have not renewed their permits have been removed from the licence map. New licences are being issued to interested parties.

**Bauxite** production is divided between three operators:

- Compagnie des Bauxites de Guinée (CBG) produced 12.3 Mt in 2001, and is a 50:50 partnership between the government and Halco, a consortium of aluminium producers originally comprising Alcoa, Alcan, Comalco, Pechiney, Reynolds and VAW. High-grade ore (62%  $\text{Al}_2\text{O}_3$ ) is depleting and lower grade ore is now being mined. Alcoa has been implementing technical audits to increase production and efficiency.
- The government has formed Aluminium Co. of Guinea (ACG) to operate the Friguia bauxite mine (2.3 Mt in 2000) and equip it with its own alumina refinery. Investors (Pechiney, Noranda, Alcan and Hydro Aluminium) have a 51:49% relationship with the government. Reynolds Metals has managerial control. An efficiency and upgrading programme is designed to increase annual throughput at the refinery from 600,000 t to 1.4 Mt (700,000 t was produced in 2001).
- Société des Bauxites de Kindia (SBK) produced 1.6 Mt in 2001 and is under government ownership. Bauxite is exported to the Ukraine. Russian

Aluminium (RusAl) has managerial control and intends to increase production to 2.5 Mt/y. The 30 Mt reserve base is to be re-evaluated and the development by RusAl of the nearby Dian-Dian deposit (1,000 Mt averaging 50% Al<sub>2</sub>O<sub>3</sub>) is under discussion.

Guinea Aluminium Products Co. (Gapco) has three projects under consideration: construction of a hydro-electric barrage on the Konkouré River at Souapiti-Kaletta to produce 750 MW; the construction of a US\$2.2 billion, 2.6 Mt/y capacity aluminium refinery at Sangaredi to process 8 Mt/y of bauxite from CBG; and a doubling of capacity at the Friguia refinery to 1 Mt/y.

Gapco has a sign letter of intent for the projects and likely participants include: Marubeni, Mitsubishi, SFI and Investisseurs Aluminiens, along with the Government of Guinea. A delegation including Mitsubishi and BHP-Billiton visited Guinea in May 2002, with a view to the latter assessing its potential involvement in Gapco projects.

A project is also under discussion with the United Arab Emirates concerning the construction of a 2.6 Mt/y capacity refinery to treat bauxite ore from the Dian Dian bauxite deposits north of Boké. The cost of this investment is estimated at US\$2.8 billion.

**Gold** is produced at three mines. The Siguiri region has been a gold-mining centre for many centuries. Golden Shamrock Mines of Australia commenced an exploration programme in partnership with Société Aurifère de Guinea (SAG) in 1993. Ashanti Goldfields acquired Golden Shamrock in 1998 and its 85% interest in SAG.

The Koron mine opened in April, 1998. The deposit consists of saprolitic and laterite deposits derived from vein stockworks and mineralised breccias in nine pits along a NNW trend. Production of 220,211 oz in 2000 was at a cash cost of US\$180/oz and included some of the higher-grade ore. Production in 2001 was 283,199 oz but at a higher cash cost. In the third quarter of 2002, production was 60,940 oz at a cost of US\$226/oz, making a nine-month total of 209,159 oz.

The resource is now estimated at 107.6 Mt, including 60.4 Mt of proven and probable reserves averaging 1.21 g/t Au. Step-out and along-strike drilling has added 250,000 oz/y, with a new deposit at Tubani, and exploration has moved on to Kami where infill drilling is upgrading resources to reserves.

The Norwegian mining company Kenor is undertaking its 'Large Exploration Programme' on the Lero-Fayala 'corridor', which runs through its 2,200 km<sup>2</sup> Dinguiraye concession, for completion in 2003. The intention is to find resources to allow a feasibility study in 2004 for an approximately 400,000 oz/y capacity CIP plant processing sulphide ores. The current operation is based on open-pit mining of saprolite and other oxide ores, which are either heap- or dump-leached at Fayalala and Banko. The mines at Lero, Karta and Kankarta are on care-and-maintenance.

A total of 108,248 oz were produced in 2002 at a cash operating cost of US\$300/oz, from processing 770,000 t of saprolite and 2.70 Mt of laterite, for heap leaching at an average grade of 1.47 g/t Au. Reserves, as at December 1, 2002, totalled 349,000 oz of gold, enough to sustain the mining operation until at least 2005, by which time attention must turn towards the sulphide ore which makes up the bulk of the estimated global resource of 3.0 Moz.

The exploration programme is budgeted to cost US\$9 million and is being funded from the proceeds of a recent US\$20 million placement of Kenor shares in the Norwegian and North American markets.

Soc. Minière de Dinguiraye was established in 1992 as a result of a co-operation programme between Norway and the Republic of Guinea. The company is acting in association with a number of other partners, including BRGM of France. Production commenced in 1995 and more than 550,000 oz of gold have been produced to date. In 1998, Kenor increased its holding in the project to 85%; the balance being held by the Guinean Government. Kenor is listed on the Oslo Stock Exchange and is planning an overseas listing later in 2003.

Following many years of discussions between the governments of Guinea and Morocco regarding assisting in the development of Guinea's mineral and energy resources, the Moroccan company ONA (through Managem) commenced exploration in the Sigiri area. Subsequently, the company signed agreements with Semafo, a Canadian company, in which it now holds a majority interest.

The partners have developed the Jean and Gobélé vein deposits in the prefecture of Kouroussa, to form the Kiniero gold mine which opened in April 2002 an annual production of 60,000 oz/y and a five-year mine life. Mining will be by open pit for the first three years, with a production of 296,000 t of ore, followed by an underground mine for 1.8 years at an annual ore production rate of 160,000 t.

It is hoped to extend the reserve base from 1.14 Mt. The feasibility study defined resources of 1.97 Mt at 6.43 g/t Au. Initial investment was US\$12.4 million, with an expected production cost of US\$157/oz. Some 80,000 oz of gold were sold forward at US\$295/oz on May 24, 2001, part of a programme to sell forward a total of 160,000 oz by 2006. A third mineralised structure, Gobele D, has been drilled with encouraging results and an expansion programme is planned.

A number of exploration companies are beginning to revive their activities in Guinea:

- Cassidy Gold Corp. has drilled six diamond drillholes to test three of a number of quartz-vein hosted gold targets on its permit at Kouroussa. Results included: 1.9 m averaging 7.7 g/t Au on the first easterly-trending vein identified by workings over a strike length of 500 m; 8 m at 16.87 g/t Au, 3.52 m at 100.91 g/t and 3.24 m at 9.16 g/t on a second southwest-trending vein;

and 10.7 m at 0.8 g/t Au and 23.25 m at 0.84 g/t, plus 10.7 m at 0.2 g/t on the third target. A reverse-circulation (RC) drilling programme, to test saprolitic and lateritised zones defining geochemical anomalies, is planned for next season;

- Mano River Resources Inc. is targeting quartz veins and porphyry mineralisation in shear zones in its properties at Missamana and Gueliban, east of Kankan. In 1996-97, airborne geophysics and structural interpretation identified a number of targets in a major anastomosing east-southeasterly shear zone system. Geochemistry has identified a number of anomalies, and RC drilling to test extensive areas of artisanal workings identified a resource but failed to intersect the extension of the mineralisation into the main shear zone system where porphyry style mineralisation is suspected. An extension of artisanal workings in the past five years, and ground surveying, has now defined a number of targets for follow up.
- Mincor Resources, in joint venture with Cie Minière Atlantique, on its Bankole concession, 50 km southwest of Siguiri, is planning a 4,000 m rotary airblast (RAB) drilling programme to test a 5 km long soil anomaly, with values of 3.58 g/t Au, identified in 1999.

**Diamonds** are found throughout much of the Archaean exposures of central, eastern and southeastern Guinea, and are considered to be related to the intrusion of kimberlites of Cretaceous or older age.

The main mining areas are of alluvial and eluvial deposits above generally deeply-weathered rocks in which kimberlite dykes and some pipes are found. Companies involved include Trivalence at Aredor and Quatro C in the Banankoro region of Kerouane.

Historically the most interesting deposit is at Aredor where 4.9 Mct are recorded as recovered from within the 1,112 km<sup>2</sup> concession area. Between 1983 and 1994, Bridge Oil of Australia operated a mine that produced 1.3 Mct worth US\$377/ct. The diamonds recovered from the area have been some of the most valuable in the world and each year stones weighing 100 ct or more are recovered. In 1996, Tri-valence Corp. purchased an 85% stake in the mine.

Present resources at Aredor are estimated at 8.7 Mt containing 461,282 ct indicated and 10.4 Mt inferred containing an estimated 864,927 ct. Following gradual renovation and upgrading of the processing plant at Aredor, production in 2000 reached 36,893 ct, with a sale price average of US\$381/ct. In 2001, its output exceeded 40,000 ct.

Following the signing of a joint-venture agreement with Rio Tinto, which can earn up to a 58% interest in any kimberlite deposit on commitment of US\$6 million, 11 kimberlite pipes and a number of dykes have been identified since 2001. Assessment of the kimberlites is at various stages, with drilling of some targets. Following a 3,200 m drilling programme on K23 (a 4.9 ha kimberlite) and a 10,000 t bulk sample, encouraging results have led to the planning of a diamond-drilling programme.

Hymex has now withdrawn from Guinea. It commenced alluvial mining in the Diani Valley in the Macenta district after a 1992 study identified a reserve of 1.0 Mct valued at US\$100 million. From 1993 until 1996, 700,000 ct were produced. Remaining reserves of gravel are estimated as sufficient for 11 years at an annual mining rate of 7.7 Mm<sup>3</sup>. Production in 2000 was 15,580 ct, with a sale price average of US\$166/ct but Hymex encountered problems with the design and installation of a new processing plant and ran into financial difficulties. Hymex had also commenced operations on its Milo property, 150 km north of Diani in the Kerouane area, purchased from International Mining Co. Production at Milo commenced in 1998 but not at a sufficient level to allow Hymex to meet its financial targets or fully utilise its processing plant. The company then negotiated to process the tailings from the Aredor mine left by Bridge Oil and began trial processing in 2001. The grade averaged 0.06 ct/m<sup>3</sup> and the exercise yielded just 520 ct worth some US\$108/ct.

Rio Tinto had an arrangement to explore and develop hard-rock potential on Hymex's 1,032 km<sup>2</sup> concession, with a commitment to spend US\$3 million. An indicator mineral survey was completed over the Milo property, and a number of other permits, at Kindia for instance, were acquired.

De Beers' subsidiary Debsam has completed a regional reconnaissance programme over the whole southeastern diamond field and has shown interest in developing some of the deposits found which include one pipe and 20 dykes, plus other known targets. Some are being drilled in joint venture with pre-existing licence holders. Regional exploration has also commenced in a second large regional area in the northeast of the country.

Quatro C, a company run by a Guinean entrepreneur, was mining at Somassania in Kerouane. It reported production of 14,400 ct in 2000 up from 492 ct in 1998 when a value of US\$298/ct was reported. A number of other companies are involved in test mining of alluvial gravels for diamonds.

**Iron ore** is not currently mined in Guinea but Rio Tinto signed a letter of intent in 1997 to undertake evaluation and drilling of known deposits in the Simandou Range. Thick horizons of haematite averaging 65% Fe are present and a resource of over 1,200 Mt has been estimated, capable of supporting a 40 Mt/y mine. A 'Convention de Base' was signed with the government in December 2002 for a 50-year mining licence to develop the mine.

EuroNimba (comprising Normandy La Source, BHP-Billiton and Sumitomo) has investigated the possibility of mining the Mount Nimba iron ores. The project area, forested and rich in wild life, belongs to the State but a 1,550 ha area has been allocated for mining and a 20 Mt/y operation costing US\$300 million to develop is envisaged. The Guinean Government wishes to move quickly towards production with all facilities in Guinea. However, without recourse to an existing railway in Liberia, transporting ore/concentrates to the coast for export would necessitate construction of a costly trans-Guinean rail route terminating at a port near Conakry. Estimated reserves exceed 800 Mt at an average grade of more than 67% Fe. Difficulties are envisaged, not only concerning the length and cost

of the rail route, but also the development of a project in a very environmentally-sensitive area.

**Nickel** exploration in Cretaceous layered igneous intrusions is being undertaken by Rio Tinto and Semafo/Afcan at Kakoulima Hill, near Conakry. Drilling is testing anomalies identified by airborne geophysics, ground geophysics and geological surveying. Results to date, while interesting, do not explain the extent of the recorded anomalies, hence work continues.

**Petroleum** exploration in Guinea has been active in the past and the country has considerable potential. Shell withdrew from Guinea after nationalisation of its petrol outlets in 1970. From 1974 until 1979, Buttes Gas Oil formed a joint venture with the government (Soguip), which completed 6,350 line km of seismic traversing, took up 5,000 km<sup>2</sup> of ground and drilled one well to a depth of 3,353 m well. Union Texas Petroleum and Superior Oil (1979-1985) completed 6,591 km of geophysical lines and planned two wells.

In the late 1990s, with assistance from the World Bank, a promotional campaign was conducted based on 16,340 line km of data for the shallow-water part of the continental shelf. In December 1999, Western Geophysical was contracted to complete 5,200 line km of two-dimensional seismic surveying in the deeper parts of the basin. These data are now available to interested parties wishing to bid for around 33 blocks (each of around 5,000 km<sup>2</sup>).

### **Transport and logistics**

The development of bulk commodities such as bauxite and iron ore depends on suitable transport. Rehabilitation of the Buchanan to Nimba railroad in Liberia would provide a link to the iron ore deposits but the development of bauxite deposits in central Guinea requires a new rail route. The construction of a Trans-Guinea railway linking Conakry, through Kindia, Dabola and Kankan, to the Simandou and Nimba areas has been proposed. The government is determined to pursue this option but the Trans-Guinean railway would be more feasible if connected by a southern link south to Buchanan and Monrovia, with a traffic-flow in both directions. A link northeastwards to Bamako, the Malian railway and the River Niger, could also be an option, to create a true West African railway.

A prefeasibility study for the 800 km Trans-Guinean railway by Nippon Koei (with contributions by Sogramcan, SNC-Lavalin and De Consult), suggests a cost of US\$3 billion for the whole route, with a new port at the island of Matakang in the prefecture of Forecariah. Rio Tinto and EuroNimba intend to finance a study of other options, such as a route via Sierra Leone, in an attempt to reduce the capital investment.