

REPUBLIC OF GUINEA

By Leslie Wright

In parliamentary elections in 2002, Guinea's ruling party won a sizeable majority and, following his re-election, President Lansana Conté's government extended the presidential term of office from five to seven years. In spite of a certain amount of ill health over the past few years, President Conté still appears to be in charge of the country.

The conflicts in neighbouring Sierra Leone and Liberia in recent years have had an adverse impact on the Guinean economy, with some investors reluctant to commit major funding. However, the ceasefire in Sierra Leone has served to reduce tensions along its border with Guinea, and the voluntary exile of the Liberian leader, Charles Taylor has significantly reduced tension along Guinea's border with that country.

Signs of a return to stability in both Sierra Leone and Liberia are benefiting Guinea, and there are positive signs in terms of the possibility of major investment in the country's main bulk mineral commodities, bauxite and iron ore. Mineral resources are major contributors to the economy in terms of foreign-exchange earnings, chiefly Guinea's world-class bauxite deposits. But there are also important deposits of base and precious metals, and world-class deposits of iron ore at Simandou and Nimba that have yet to be developed.

An efficient system is in place for encouraging mining investment. The Centre de Promotion et de Développement 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 and a regular series of international meetings and workshops. 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:

- evaluation and inventory of mineral resources; maps of the whole country at 1:500,000 scale; compilation of geological and mineral occurrence data; and new geological mapping of the Precambrian at 1:200,000 scale;
- 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 km² (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 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 an area north of Kerouane. The project is valued at €1.52 million, and is being financed by the French Government through Fonds de Solidarité Prioritaire (FSP).

Geology and mineral potential

Proterozoic granite-schist belt terrain occurs 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 are also highly prospective for gold, and the Mesozoic and Cenozoic basin rocks along the coastline are prospective for hydrocarbons.

Guinea is probably 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 eight tons 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. The possibility of constructing an aluminium smelter is under consideration. Three companies produce bauxite.

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 active. All three existing gold mines intend to increase their production.

In the diamond sector, the optimism of a year or two ago has largely evaporated. At that time De Beers' subsidiary, Debsam, was exploring in a number of areas, and Rio Tinto was also active (in partnership with Trivalence at Aredor and with Hymex further south).

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

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

There is increased interest by exploration and mining companies, in investing in Guinea but, rather than encourage them by offering incentives, the government seems more interested in maximising short-term revenue. For example, negotiations are in progress with Anglo Gold over royalties on the gold it exports from the Siguiri mine and, in the bauxite sector, negotiations with RusAl for a mining licence for the Kindia and Dian-Dian deposits have followed this trend.

Bauxite

Compagnie des Bauxites de Guinée (CBG) is the largest producer and operations are based on the Sangaredi mine near Boké where annual output is in excess of 12.0 Mt. The company is a partnership between the government (49%) and Halco (51%), a consortium of leading Western aluminium producers, including Alcoa, Alan, Comalco and VAW. High-grade ore (62% Al₂O₃) 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 Alumina Co of Guinea (ACG) to operate the 2.3 Mt/y Friguia bauxite mine and equip it with its own alumina refinery. Western aluminium companies have a 51% interest, with the government holding 49%. Reynolds Metals, now a wholly-owned subsidiary of Alcoa, 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).

State-owned Société des Bauxites de Kindia (SBK) produced 1.6 Mt of bauxite in 2001, which was exported to the Ukraine. Russian Aluminium (RusAl) has assumed managerial control and intends to increase annual production to 2.5 Mt. The 30 Mt reserve base is to be re-evaluated and the development by RusAl of the nearby Dian-Dian deposit, which has a resource of 1,000 Mt averaging 50% Al₂O₃, is under discussion.

Guinea Aluminium Products Co (Gapco) has been considering three projects; 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 alumina 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 signed letter of intent for the projects and likely participants include: Marubeni, Mitsubishi, SFI and Investisseurs Aluminiers, 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.

Alcoa World Alumina, which holds a 43% stake in the Halco consortium, signed an MoU with Alan Inc in May this year to study the feasibility of constructing a 1.5 Mt/y capacity alumina refinery, with a possible commissioning date of 2008.

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 such an investment is estimated at US\$2.8 billion.

Gold

The Siguiri region has been a gold-mining centre for 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, and its 85% interest in SAG in 1998. AngloGold merged with Ashanti in 2004.

The Koron mine was opened in April 1998, and exploits saprolitic and laterite deposits derived from vein stockworks and mineralised breccias in nine pits along a NNW trend. In 2003, production at Siguiri amounted to 252,795 oz at a cash operating cost of US\$279/oz. This compares with 269,292 oz produced in 2002 at a cost of US\$230/oz. Production and costs were impacted by lower-than-expected metallurgical recovery rates and higher costs for power, fuel, labour and reagents.

The resource at Siguiri is 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 additional reserves, with a new deposit at Tubani, and exploration has moved on to Kami where infill drilling is upgrading resources to reserves. AngloGold Ashanti is continuing the programme of step-out drilling to increase the resource of the existing pits.

In May 2004, the government placed an embargo on gold exports from Siguiri and on the supply of diesel to the mine. As a result AngloGold Ashanti suspended operations. A partial lifting of the ban took place in June but the resumption of gold sales did not take place until August and negotiations continue on matters of interest to both parties.

Kenor was founded in 1983 as a Norwegian public company, eventually listed on the Oslo Stock Exchange as a fully integrated mining and exploration

company. Guinor Gold Corp is Kenor's successor and has its primary listing in Toronto, with a secondary listing in Oslo.

The Company's main asset is its 85% interest in the Léro gold mines, comprising a number of open pits along a 10 km long zone within its 40 km x 45 km Dinguiraye concession. To date, some 650,000 oz of gold have been produced. Output peaked in 2002, with the production of 108,248 oz at a cash operating cost of US\$300/ oz, from processing 770,000 t of saprolite and 2.7 Mt of laterite, for heap leaching at an average grade of 1.47 g/t Au. In 2003, some 910,000 t were placed on leach pads and gold production was 92,733 oz.

The company has completed its major exploration programme on the Lero-Fayala 'corridor', which runs through the Dinguiraye concession, the objective being to find sufficient resources to allow a feasibility study in 2004 for an approximately 400,000 oz/y capacity CIP plant processing sulphide ores.

Total resources have grown to 3.7 Moz (including 2.8 Moz in the Measured/Indicated categories), and it is hoped that ongoing drilling will convert a large percentage to reserves soon after 2004. Also, a feasibility study for a major expansion to +300,000 oz/y should be completed by the end of 2004.

Following many years of discussions between the governments of Guinea and Morocco regarding Moroccan assistance in the development of Guinea's mineral and energy resources, the Moroccan company ONA (through Managem) commenced exploration in the Siguiri area. Subsequently, the company signed agreements with Semafo Inc, 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 with an annual production of 60,000 oz/y and a five-year mine life, based on a resource of 1.97 Mt at 6.43 g/t Au. The mine opened in April 2002. Mining was intended to be by open pit for the first three years, with annual ore throughput of 296,000 t of ore, followed by an underground mine for 1.8 years at processing 160,000 t/y. In 2003, Semafo produced 46,728 oz of gold at Kiniero at a cash operating cost of US\$232/oz

In 2003 an intensive delineation programme focussing on advanced targets in the near vicinity of active pits was successful in replacing the proven and probable mineral reserves already used, thus extending the life of the mine. The Banfara zone and a high grade East-West zone are now contributing to the short-term (two years) mine plan. Resources at Kiniero now stand at 5.07 Mt averaging 3.12 g/t Au.

At the new Banfara discovery, located 700 m west of the Jean A pit, mineralisation is linked to oxidised quartz veins and veinlets up to 1 m in thickness. Preliminary work shows that the structures are oxidised to depths

of up to 40 m. All dimensions remain open. The annual exploration budget is approximately US\$1 million.

A number of exploration companies have re-started operations in Guinea:

Cassidy Gold Corp has continued its diamond drill programme to test a number of quartz-vein-hosted gold targets on its contiguous permits at Kouroussa. Drilling continued until the end of the season on the Sanu Filanan, Sanu Folo and JJ veins with a total of 82 holes completed. Results so far have confirmed continuity where initial results on the Sanu Filanan vein identified by workings over a strike length of 500 m included 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 the JJVein results included 6.5 m at 21.57 g/t, 6.25 at 21.97 g/t and 4.2 m at 12.87 g/t.

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 and a diamond drilling programme is envisaged.

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

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. However, most activity is within the artisanal sector from which a 182 ct stone was reported in July 2004.

Historically, the most interesting deposit is at Aredor where 4.9 Mct have been recovered from within a 1,112 km² concession area. Alluvial mining began in the 1930s and between 1983 and 1994, Bridge Oil of Australia operated a mine that produced 1.3 Mct worth US\$377/ct. The diamonds recovered from Aredor have been some of the most valuable in the world and each year stones weighing 100 ct or more are recovered (in 1989, a 255.61 ct stone sold for just over US\$10 million and in 1993, a 284.96 ct stone sold for

US\$8.1 million). In 1996, Trivalence Corp purchased an 85% stake in the mine.

Existing resources are estimated at 8.7 Mt indicated, containing 461,282ct, and 10.4 Mt inferred, containing an estimated 864,927 ct. Following gradual renovation and upgrading of the processing plants at Aredor, production in 2000 reached 36,893 ct, with a sale price average of US\$381/ct. In 2001 output exceeded 40,000 ct. Production of stones from processing of the alluvial deposits is programmed to increase to some 65,000 ct in 2004 and to 100,000 ct in 2005, once the production profile at all three existing processing plants is optimised. During the five years to December 31, 2003, over US\$65.0 million worth of rough diamonds have been sold.

In 2001, Rio Tinto signed an agreement to earn a 58% interest in any kimberlite deposit identified on the property for a commitment of US\$6 million. Eleven kimberlite pipes and a number of dykes were identified, and a 3,200 m drilling programme plus a 10,000 t bulk sample was completed on K23 (a 4.9 ha kimberlite). However, after spending US\$4 million, Rio Tinto withdrew from the JV.

Hymex has now ceased activities in 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 Mm³. 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 utilise fully 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/m³ 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 km² 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. These 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 been completed in a second large regional area in the northeast of the country; Quatro C, a company run by a Guinean entrepreneur, has been 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

Rio Tinto signed a letter of intent in 1997 to undertake evaluation and drilling of known iron-ore 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, and detailed negotiations are still in progress.

EuroNimba (originally 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 the facilities being located 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 in developing a project in a very environmentally-sensitive area.

Nickel

Exploration of Cretaceous layered igneous intrusions is continuing on 295.5 km² of licences at Kakoulima Hill, near Conakry. The licences are held in trust by Les Minéraux SGV SA, a Guinean company owned 47% by Semafo and 53% by Afcan. An option agreement has been signed with FNX Mining Company Inc of Canada, whereby FNX has the option to acquire a 100% interest in the licences by spending US\$2.4 million on exploration over five years, and by completing a bankable feasibility study or spending a further US\$2 million on exploration or development.

The option will be exercised once FNX has incurred aggregate expenditures of US\$4.4 million. Les Minéraux SGV's interest will be replaced by a 3% net smelter return. The FNX programme will focus on nickel-rich sulphide targets at the basal contact of the igneous complex.

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 was in a JV with the government (Soguip). The JV completed 6,350 line km of seismic traversing, took up 5,000 km² of ground and drilled one well to a depth of

3,353 m. 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 km²).

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 to Buchanan and Monrovia in Liberia, with a traffic-flow in both directions. A link northeast 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.

A number of potential users are now looking at the options for re-habilitating the Liberian railroad now that Liberia's stability problems appear to be over.