

WORLD GOLD



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WEST AFRICA SPECIAL FOCUS

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SPECIAL FOCUS: WEST AFRICA



West Africa has been an important source of gold for more than 2,000 years and today, it is arguably the fastest growing gold producing region in the

world. This Special Focus examines some of the projects in the region that are undergoing expansion and a number of the more advanced exploration/development projects that are likely to come on stream over the next year or so. **11**

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Special Focus West Africa

by Des Clifford

West Africa has been an important source of gold for more than 2,000 years – the Phoenicians and Carthaginians probably reached there in the 5th or 6th Centuries BC in search of the yellow metal. Today, it is, arguably, the fastest growing gold producing region in the world.

The following overview examines, in particular, some of the already established projects in the region that are undergoing expansion and a number of the more advanced exploration/development projects that are likely to come on stream over the next year or so.

GHANA

Ghana, traditionally, has been West Africa's gold 'capital', earning it the reputation of Africa's Gold Coast. Geologically, large areas of the country are overlain by Pre-cambrian Birimian greenstones, which host vein and lode, conglomerate and placer deposits. The Birimian greenstone belt sequence occurs as irregular basins of predominantly metasedimentary strata, separated by a series of northeast trending belts of metavolcanics on which the majority of the major gold deposits are clustered and a NNW striking belt, the Lawra belt, which extends northwards into Burkina Faso.

Ghana's mining industry has seen gold output more than double in the past decade, comfortably placing it as Africa's second largest producer (after South Africa) at around 70 t/y.

Obuasi

Much of the production increase seen during the past decade can be attributed to **AngloGold Ashanti's** (JSE: ANG) operations within the Obuasi goldfield, a complex of open pits and underground operations some 200 km northwest of Accra. Original owner, Ghana's Ashanti Goldfields, was merged with AngloGold in 2004 to form the new pan-African company.

The Obuasi deposits occur along a zone of intense shearing and faulting within Pre-cambrian greenstones. Mineralisation comprises two main types: quartz veins containing high-grade free gold and the main sulphide ore in which narrow veins contain gold trapped within arsenopyrite.

Gold production of 513,163 oz during 2003 was derived from the sulphide treatment plant for underground ore, the tailings retreatment plant and the oxide treatment plant (OTP), which processed open-pit ore from a number of small deposits, and transition ores previously mined and stockpiled.

By end-2003, proven and probable reserves totaled 56.8 Mt at 6.19g/t gold (11.3 Moz contained), of which 37.7 Mt at 8.3g/t is underground, 2.6 Mt at 2.71g/t is on surface and 16.4 Mt at 1.9g/t is tailings. Measured and indicated resources totaled 117.1 Mt grading 8.71g/t gold.

The mine has worked surface and underground mineralisation along an 8 km NS strike length but mining is now mainly underground, extending to depths of 1,600 m. The mainly flat-back, cut-and-fill stopes used to exploit several ore blocks are being converted to mechanised open stopes and preparations are in hand to commence deep drilling for mineralisation down to 2,500 m and, ultimately, 3,000 m.

A scoping study has already been undertaken to review the miner-

al reserve potential from below 50 level down to 100 level. A dedicated project team will now undertake a feasibility study to confirm the extent and grade of mineralisation of the Obuasi Deeps ore deposit. In the short term, Obuasi mine will continue to operate at about 475,000-550,000 oz/y due to the cessation of surface-mining operations. The full potential of the mine, however, is still to be determined and will follow the Obuasi deeps drilling programme.

AngloGold Ashanti anticipates expenditure of US\$44 million on exploration and feasibility studies over the next four years. Including this amount, the total capital expenditure for Obuasi Deeps is estimated to be US\$570-million in real terms over the expected life of mine.

AngloGold Ashanti's other producing operations in the region are Bibiani, and Iduapriem.

At Bibiani, development and exploration activities continue in parallel with underground production studies. Exploration and underground studies will be reviewed during the second half of 2004. In respect of the current mine plan, open-pit mining and ore stockpile processing will be completed in 2005.

Old tailings reclamation is planned to commence by year-end and is expected to deliver 4.7Mt at 1.03g/t and at an anticipated recovery rate of 60% over three years.

At Iduapriem (85% attributable), production is restricted by crushing plant problems. To help resolve these issues, crusher and mill optimisation will be completed in the second half of the year, and with improved recoveries in the CIP plant, gold production will improve. Closure of the heap leach operations at Iduapriem, for economic reasons, was completed during the June quarter.

Tarkwa/Damang

Another South African gold producer, **Gold Fields** (JSE: GFI), has a relatively long history in this gold province. The Tarkwa open-pit, heap leach mine, originally an underground project when **Gold Fields** acquired a 71% interest in mid-1993, is an operation that has continued to expand and deliver on the original potential identified when surface mining commenced in 1998. Tarkwa reserves at end-2003 amounted to 232.0 Mt at an average grade of 1.3 g/t gold (9.83 Moz contained), plus resources of 471.9 Mt averaging 1.5 g/t gold (22.31 Moz contained).

The deposit is composed of a succession of stacked tabular palaeo-placer units, consisting of quartz pebble conglomerates, developed within Tarkwaian sedimentary rocks. Approximately 10 such separate economic units occur in the concession area within a sedimentary package ranging between 40 m and 110 m in thickness. Low grade to barren quartzite units are inter-layered between the separate reef units.

Five separate production areas are located on and around the Pepe Anticline, a gently north plunging fold structure that outcrops as a whaleback hill. The sedimentary sequence and the interlayered waste zones between the mineralised units thicken to the west.

The northern portion of the assets of the Teberebie mine and plant, which is directly adjacent to Tarkwa, was purchased from **Ashanti Goldfields** for US\$5 million during the 2001 financial year. The assets purchased, which are now referred to as the South facilities, were re-commissioned at a cost of US\$11 million in December 2000 and have



boosted Tarkwa's crushing and treatment capacity to 1.2 Mt/y. This acquisition, which has proved to be very cost-effective, has resulted in significant operational improvements at Tarkwa and serves as a spring-board for further potential acquisitions in the region.

During the last quarter of 2002 a feasibility study was completed for the determination of long-term operating strategy at Tarkwa. The exceptional performance of the ore body and latent prospectivity within the concession area has encouraged a number of major initiatives. After a review of the study, coupled with the exceptional performance of the orebody and potential prospectivity within the concession area, a decision was made to proceed with two significant investments at the mine.

The first involves the installation of a 4.2 Mt/y mill and CIL facility to operate alongside the existing facility at a cost of US\$85 million and the second, the acquisition of a new mining fleet and support equipment at a cost of US\$74 million in order to convert from contractor to owner mining.

Tarkwa is a joint venture between **Gold Fields** and Canada's **IAMGOLD Corp** (TSX: IMG, 18.9%). The JV partners intend to have the mill commissioned by the end of 2004 and the conversion to owner mining commenced in June 2004.

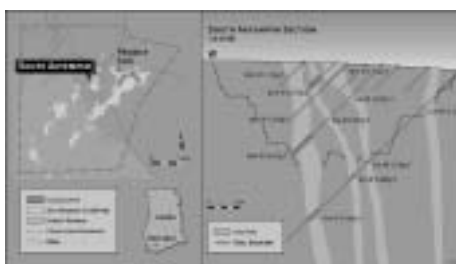
This expansion will increase annual throughput to 19 Mt/y, with annual gold production increasing from the current 525,000 oz to over 700,000 oz/y.

Just 35 km ENE of Tarkwa, and located on the same geological feature, is the Damang open-pit, CIL operation. Acquired by **Gold Fields** (71.1%) from **Ranger Minerals** in early 2002, Damang is centered on a stock-work sulphide deposit at the culmination of a regional anticline. The deposit occurs as hydrothermal mineralisation associated with dominantly east dipping thrusts and sub-horizontal quartz veins. Primary gold mineralisation also occurs in the conglomerates of the Tarkwaian Formation.

With mining within the original Damang pit scheduled for completion by mid-2005, concept studies are in progress to consider the option of establishing an underground mine from the final pit bottom. A significant up scaled exploration programme is also in progress within the Damang concession areas, and applications have been filed for prospecting licenses to cover the Bonsa Forest and Subiri areas, which lie to the northeast and east of Damang.

IAMGOLD owns the residual 18.9% in Damang.

Wassa/Bogusu



One of the few modern day greenfields projects in Ghana is the Wassa deposit, which was discovered and developed in the late 1990's by a joint venture

between **Glencar Mining** (LSE: GCM), **Moydow International Mines** (TSX: MOY) and the Government of Ghana.

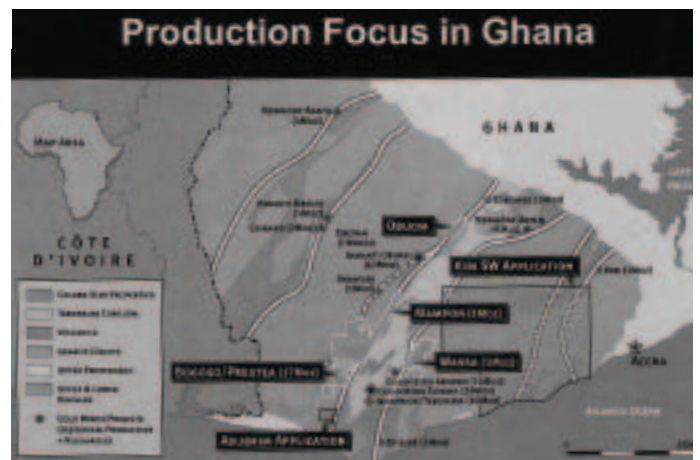
The project was developed in 1998 at a capital cost of about US\$43 million as a conventional open pit, heap leach operation. Gold produc-

tion commenced in January 1999 at a projected annual production rate of 95,000 oz over a six-year mine life at forecast cash costs of US\$161/oz.

However, gold recoveries from the heap leach were slower and lower than expected, adversely impacting on the project's economics. Consequently, in 2001, the secured lenders enforced their security over the project and agreed to sell Wassa to **Golden Star Resources** (TSX: GSC).

Wassa is situated along the eastern limb of the Tarkwa syncline, bounded between Tarkwaian sediments in the west and Cape Coast granites to the east. The gold deposits are hosted within altered Birimian metasedimentary and metavolcanic sequences. Mineral reserves at Wassa total 16.2 Mt at an average grade of 1.28 g/t of gold (665,000 oz contained), and include some 4.2 Mt at 0.66 g/t contained within the Phase 2 leach pads left by the previous operators.

Production will initially (for the first 1.5 years) come from the reclaimed Phase 2 heap leach material, supplemented by higher-grade oxide ore from the open pit. **Golden Star** intends to install a CIL plant at a cost of US\$25 million, which will treat heap leach material this year to produce 75,000 low-cost oz, with full production in 2005 of 140,000 oz/y at a cash cost of US\$200-US\$210/oz.



Golden Star has budgeted US\$2.5 million for exploration at Wassa this year, which will focus on infill drilling of inferred mineral resources, in-fill and extension drilling at Akyempim South to expand and better define an inferred mineral resource of approximately 2.0 Mt at an average grade of 2.19 g/t in this area, and deep auguring and initial drilling of soil anomalies within a southwest trending mineralised corridor, including the Bawdia Bosso and Ballyebo anomalies.

This drilling is ongoing, with 103 holes having been completed totaling 12,700 m of combined RC and diamond drilling. Results to date have been positive and are "highly likely" to result in an increase in the reserves and resources at Wassa.

In addition to Wassa, **Golden Star** holds a 90% interest in **Bogoso Gold Ltd**, which owns the 145 km² Bogoso concessions; the surface mining rights (to a depth of 200 m) of the adjoining 129 km² Prestea property; a joint venture interest in the Prestea underground mine, and contiguous properties to the west (Akropong) and to the north (Dunkwa) of the Bogoso property.



At end-December 2003, open-pit reserves at Bogoso/Prestea, 50 km to the west of Wassa, stood at 27.3 Mt at an average grade of 3.29 g/t gold (2.89 Moz contained), plus resources of 27.3 Mt at 2.50 g/t (2.19 Moz contained).

Since the acquisition of **BGL** in 1999, **Golden Star** has adopted a positive, forward looking approach to investment in the area, and during the extended downturn in the gold industry was able to acquire significant landholdings along this southern portion of the Ashanti Trend. It is the company's intention that the Bogoso/Prestea region will be developed into a significant gold producing complex through the consolidation and expansion of these properties.

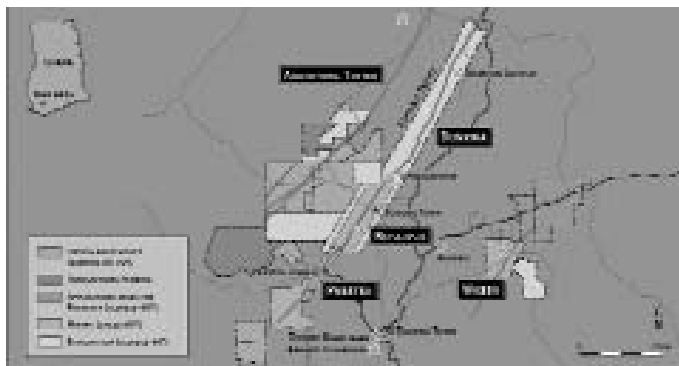
The first phase of the **Golden Star's** expansion plans includes the construction of second 1.5 Mt/y CIL processing facility (the Bondaye plant) at a cost of approximately US\$17.2 million, which is scheduled to produce between 100,000-140,000 oz/y. The project commenced in November 2003, and subject to permitting, is expected to be completed in the third quarter of 2005.

The Bondaye plant will be well located to treat material from the relatively new mineralised zones that the company is currently drilling in the southern extremity of the Prestea concession. Once operational, **Golden Star** expects to upgrade the facility over time to incorporate a flotation circuit and ultimately a bio-oxidation circuit to allow the processing of deeper sulphide material from these deposits.

The second phase of development involves the conversion of the existing Bogoso plant to a bio-oxidation facility capable of treating the refractory sulphide ores located on the Bogoso concession. Construction is scheduled to commence early next year and will be completed by the end 2005 at an estimated capital cost of US\$25 million.

With the completion of its Wassa project this year, and the construction of a second processing plant at Bogoso/Prestea, **Golden Star's** 2003 production of 174,300 oz of gold is expected to double to more than 350,000 oz by 2005.

Golden Star is currently attempting to acquire **IAMGOLD**, which will bring minority stakes in two mines in Ghana and two in Mali.



Newmont's Ahafo and Akyem Projects

100 km to the northwest of Obuasi, **Newmont Mining Corp** (NYSE: NEM) is proceeding with development of the Ahafo open-pit project, the first of at least two Ghanaian operations that together will establish the company's next core operating district. These projects were included in the package of assets through the acquisition of

Normandy Mining last year.

Located in the Brong Ahafo Region of western Ghana, the Ahafo land position totals almost 700 km², with several deposits identified along two shear structures that extend over a 75 km strike length. The deposits are open at depth and along strike, and Newmont has defined some 98.5 Mt of proven and probable reserves to date at an average grade of 2.4 g/t gold (7.6 Moz contained).

The current mine plan envisages a 100,000 st/d mining operation, recovering some 500,000 oz/y via a conventional milling/CIL circuit over a 15-year mine life. Total cash costs are estimated at US\$175-185/oz. Development costs are estimated at approximately US\$350 million, with gold production expected to commence in the second half of 2006.

Newmont's second Ghanaian operation is the Akyem project, some 160 km to the southeast of Ahafo, in the Birim North district of Ghana. **Newmont** holds an 85% in the project, with Ghanaian company **Kenbert Mines** owning the remaining 15%. Both interests are subject to the Ghanaian Government's 10% carried interest after capital is returned.

At the end of 2003, **Newmont** reported proven and probable reserves of 72.6 Mt at an average grade of 1.85 g/t gold (4.3 Moz contained), and the deposit remains open at depth and along strike.

It is estimated that a capital investment of between US\$220-245 million will be required to develop a 75,000 st/d open-pit operation, recovering between 350,000-400,000 oz/y at an average total cash cost of US\$150-160/oz over a 13-year mine life.

Newmont is currently engaged in ongoing optimisation work at the project, with a view to making a development decision by the end of 2004. If the project goes ahead, production could begin in 2007.

Junior Activity in Ghana

A number of junior companies have also taken an interest in the geological potential that Ghana has to offer.

During the 2003 financial year **Red Back Mining's** (TSXV: RBI) 95%-owned Chirano project also progressed towards a development decision with the achievement of two key milestones – the completion of a 'bankable' feasibility study and government approval for mining to take place within Chirano's Productive Forest Reserves. With the mining lease granted in April this year, **Red Back** anticipates a 15-month construction period with gold production commencing in mid 2005.

The feasibility study proposes an open pit mining operation focused along a 3 km long central pit complex and mining five satellite deposits within a 4 km radius. The waste to ore strip ratio averages 3.9:1 based on a gold price of US\$325/oz. Ore from the pits will be processed through an onsite, standalone 2 Mt/y CIL plant producing an average of 130,000 oz/y of gold over an initial life in excess of 6 years.

Consultants RSG Global ("RSG") have concluded a new resource estimate for Chirano, based on an additional 13,633 m RC percussion and diamond drilling programme completed in November 2002. Assuming a 1g/t cutoff grade, measured, indicated and inferred resources total 30.4 Mt grading 2.1g/t gold (2.05 Moz contained). Assuming a gold price of US\$325/oz, and based on pit optimisation and pit design studies of the measured and indicated resources only (and not taking into



account 8.3 Mt of inferred resources), RSG estimated a mineable reserves of 16.1 Mt at an average grade of 2.1 g/t (1.06 Moz contained).

Australian Mining Consultants were commissioned subsequently to re-run the pit optimisations on the measured and indicated resources (and not taking into account some 8.3 Mt of inferred resources) and to complete additional open pit design and mine scheduling studies. AMC concluded that at a gold price of US\$325/oz Chirano is optimised at a total mill feed of 12.8 Mt at an average grade 2.25 g/t (930,000 oz contained). The 'bankable' feasibility study is based upon a mining schedule that considers this mill feed inventory rather than the ore reserves. Life of mine cash operating costs, assuming contract mining is employed, are estimated at US\$211/oz.

In May this year, **Red Back Mining** completed a merger with Toronto-based **Champion Resources** to establish a new TSXV-listed gold company, **Red Back Inc.**, to focus on the development of the Chirano. Following the listing, **Red Back** completed an equity raising to partially cover the estimated US\$38 million capital development cost for Chirano.

Chirano represents only a small part of **Red Back's** extensive land holding in Ghana, including the majority of the 200 km of strike length of the Bibiani Shear structure which hosts the Chirano and Bibiani deposits. To date **Red Back** has only systematically explored 10 km of this structure.

Red Back's other key asset in Ghana comprises the 360 km² Akyem project, which lies within a few kilometers to the east of Newmont's Akyem project. Red Back has completed a first phase, 2,500 m percussion drilling programme at Akyem and assay results are pending.

On the same Sefwi-Bibiani Belt in the Ashanti region of southwest Ghana, which already hosts **Newmont's** Yanfo project, **AngloGold Ashanti's** Bibiani mine as well as Redback's Chirano development, UK-based **Cambrian Mining**, (LSE: CBM) has gained an initial exposure of 75% in the 139 km² Subranum property. **Cambrian** acquired its ownership (with an option to go to 90%) through the acquisition in mid-2003 of Metak Ltd, owner of the. Moreover, it has minimised the risks associated with exploration by a subsequent transaction with Australian company Investika Ltd to earn up to a 45% interest in the project by funding the first US\$1.0 million of exploration expenditure.

Previous work at Subranum outlined anomalous gold mineralisation over a distance of 9.5 km, and was subsequently confirmed in detail over 6.5 km as two parallel anomalies.

Last year, **Cambrian**, as operator, undertook a 230-hole, 8,000 m drilling campaign to test initial geochemistry and RC drilling results in oxide material down to about 30 m in depth. Subsequent drilling intersected high-grade gold mineralisation at depth at the Atakurom prospect, including 8.56 g/t of gold over 12 m from 76 m, and 10.21 g/t of gold over 8 m from 84 m hole depth.

Ongoing RC drilling has continued to intersect high grade gold mineralisation at depth at Atakurom and has defined a continuous gold bearing structure over a strike length of 350 m. Diamond drilling to a depth of 200 m is also being undertaken.

Meanwhile, **African Gold Group** (TSXV:AGG) has entered into an agreement with **Columbia River Resources** (in which AGG

holds a 69% interest) to earn up to an 85% interest in the 108 km² Mankranho concession, which also lies at the northern end of the Sefwi-Bibiani belt. **AGG** can earn an initial 51% interest in the project, which is contiguous with **Newmont Mining's** Ahafo project, by spending US\$1.25 million, with the right to earn an additional 34% by spending a further US\$1.0 million.

The primary mineralised structure of the Sefwi Gold Belt trends northeastwards from **Newmont's** Ahafo project and directly onto **AGG's** Mankranho concession. A previous work programme consisting of geochemical, geophysics and shallow drilling has identified 5 km of primary mineralised structure on the Mankranho concession and a further 4 km of strike above the Subriso Fault remain to be tested.

The company recently completed, ahead of schedule, a 3,000 m diamond-drilling programme at Mankranho, and assay results are awaited. In addition, the north eastern limb of the Mankranho concession (referred to as Area III) has been completely blanketed with infill soil sampling to further define previously identified gold anomalies and is anticipated to be a new drill target.

Elsewhere, **AGG** controls 100% of the Twedee and Moseaso gold concessions combining a strike length of 9 km and land position of 304 km². The concessions at the northern end of the Asankrangwa Gold Belt, which trends parallel to, and midway between the prolific Sefwi-Bibiani and Ashanti Gold Belts.

Historical exploration work at Moseaso identified gold mineralisation at both the Bierwu and Topy prospects. A resource calculation at Topy determined an open-pit infered resource (oxide and sulphide) of 957,000 t at an average grade of 1.34 g/t (using a 1 g/t cut-off) to a depth of 100 m. AGG believes that although near surface deposits offer potential, the sub-surface targets represent significantly greater potential as proven along the Ashanti and Sefwi-Bibiani Gold Belts.

Based on a review of the historical database, and in conjunction with ongoing data verification and groundwork, AGG has initiated a Phase I exploration programme at Moseaso that will include a 3,000 m diamond drilling campaign.

Also on the Asankrangwa Belt, Vancouver-based **PMI Ventures** (TSXV: PMV) is beginning to form a new geological model for regional gold mineralisation, having spent the past year testing a string of grass-roots prospects. Although there are numerous old showings and artisanal workings throughout the Asankrangwa belt, only one large, modern mine has ever been built – **Resolute Mining's** (ASX: RSG) million-ounce Obotan open-pit operation, which opened in the mid-1990s and closed in 2002 after reserves were exhausted.

PMI Venture's Fromenda concession is one of nine exploration concessions and applications which comprise the Ashanti II Gold project and which are located along a 50 km length of the axis of the Asankrangwa Belt. Drilling by PMI on the Fromenda Grid B and the School Zone areas during 2003 confirmed that the gold mineralisation is often related to a distinct stratigraphic unit that overlies, and is intimately associated with, a tightly folded, sulphide-bearing, green volcanic tuff.

The company's plans for 2004 include continuation of the current drill programme to expand known gold mineralisation zones both along



strike and at depth, together with a significant deep sensing 3D geophysical imaging programme. At end-June, the company began a 1,500 m diamond-drilling program to be funded from gross proceeds of C\$1 million raised through a brokered private placing of 3.5 million common shares and half share-purchase warrants.

Australian junior **Adamus Resources** (ASX:ADU) has completed the first resource estimate for its Southern Ashanti project, some 300 km west of Accra, after 18 months of exploration, including approximately 14,000 m of RC and 2,300m of diamond drilling. The project encompasses a substantial part of the southern Ashanti Trend and includes both the Salman and Anwia deposits (the latter was acquired from **Semafo** (TSX: SMF) earlier this year in a cash and share deal worth US\$5.5 million). Both of the deposits have been subject to previous exploration that identified substantial near-surface gold mineralisation extending over significant strike lengths.

The focus for Adamus at the Salman deposit is to drill test an extensive mineralised system known as the Main Salman Trend. Previous drilling completed by the company had already identified broad, consistent zones of gold mineralisation throughout the trend including the Central and Northern Zones. The company initiated a second drill programme in October 2003 consisting of 22,000 m of RC and diamond drilling, focused on extending the existing zones of mineralisation, identifying additional zones along strike and gathering data for a resource estimation.

Work during the June 2004 quarter was focused a preliminary resource estimate for Salman with the aim of quantifying the initial resource potential within the Central, Southern and Northern Zones. As the company's focus to date has been on targeting near surface mineralisation, the majority of the current resource of 5.8 Mt at an average grade of 2.2 g/t (410,000 oz contained) is located in the top 100 m. Adamus regards this initial resource figure for the Salman deposit as an interim estimate, with subsequent drilling expected to expand the current resource.

In addition to the resource work completed during the quarter the company's exploration team has continued targeting a number of prospects along strike from the current resource. Broad spaced exploration drilling is currently targeting extensions of mineralisation along strike from the Southern Zone, as well as geochemical anomalies at Nugget Hill and North Hill both of which are situated along strike from the Northern Zone.

The Anwia deposit, meanwhile, lies approximately 9 km west of Salman, and the surface expression of the deposit is comprised of extensive, shallow dipping quartz veining, extending over several hundred metres of strike. Previous explorers completed a number of exploration programs involving both RC and diamond drilling, which intersected multiple zones of gold mineralisation within the top 150 m.

The majority of the drilling data utilised to estimate the resource originated from previous explorers, who completed several phases of RC and diamond drilling. However, Adamus also completed a validation drill programme to confirm existing zones of mineralisation and to provide valuable geological data for the current resource estimate of 4.2 Mt at 2.3 g/t gold (310,000 oz contained), notably the depth potential of the

deposit. The company intends to drill test a number of other anomalies at Anwia during the coming months.

Moydow International Mines has been carrying out an exploration programme that includes geophysics, soil geochemistry, geological mapping and rock sampling programme at its Hwidem property, situated in the Asutifi region of Brong Ahafo. The results indicate a general geological and mineralisation scenario that strongly resembles **Newmont Mining's** adjoining Ntoroso license, which has been shown to contain a gold resource of approximately 2.0 Moz

The geochemical survey conducted on the property returned spotty gold anomalies in soils but interpretation of this data has been hampered by a thin but consistent covering of flood plain detritus over vast tracts of the tenure from the nearby Tano River. This has made geological prognosis of the area exceptionally difficult.

Because of the proximity of a number of multi-million ounce deposits, Hwidem has been assigned a top priority in Moydow's 2004 exploration budget. Consequently, the company initiated a 2,000 m shallow RAB drilling programme in May this year to further evaluate the potential of the concession, particularly Ntoroso-style targets, with deeper drilling to follow up any bedrock anomalies encountered.

St Jude Resources' (TSXV: SJD) Hwini Butre project is one of several occurrences that occur along a newly established mineralised trend on the eastern side of the Tarkwaian sedimentary basin at the southern end of the Ashanti Gold Belt. The Hwini Butre deposits occur in intrusive diorite and granodiorite associated with shear zones hosting quartz veining and minor sulphides. An earlier independent resource estimate blocked out 936,000 oz of gold within the southern deposits.

Follow up drilling after this report was published was very successful and an updated resource is pending. Additionally the deposits are open at depth and several other advanced targets remain to be explored in the future.

Immediately to the north, and adjoining the Hwini Butre concession, is St Jude's South Benso project. The Subriso East, West, and Central deposits have returned exceptionally high-grade drilling results, including a recent intersection of 12 m of 78.71 g/t. Additionally a new discovery at the nearby G Zone recently intersected 42 m of 6.9 g/t gold. An initial resource estimate is pending on the Subriso deposits and drilling continues.

Also on the Ashanti gold belt, **Axmin Inc.** (TSXV:AXM) may earn up to a 72% interest (net of the 10% carried interest of the Ghanaian Government) in the Cape Three Points property from joint venture partner Consolidated Minerals Ltd (Consmin) by carrying Consmin through to completion of a 'bankable' feasibility study. The 79 km² Cape Three Points property is located on the coast about 225 km west of Accra, and some 30 km west of the second city, Takoradi. Within the project area is a large exclusion area known as the Cape Three Points Forest Reserve.

The Cape Three Points property lies at the southern end of the Ashanti Belt within an area historically worked for narrow vein, high-grade gold deposits. The license covers at least 12 sites of historic workings focused on quartz reef hosted gold mineralisation, the most signifi-



cant being Satin Mine, Morrison Hill, Airback and Sefwi.

Axmin is currently seeking a joint venture partner for the property, with the objective of identifying near surface, high-grade resources that could be developed either on a stand-alone basis or to provide feed material to third party processing plants within trucking distance.

Axmin has completed more than 2,000 m of RC drilling in 30 holes to assess the strike and depth extent of the mineralised zone identified in the Satin Mine's underground workings. The drilling, supplemented by geological mapping and detailed ground magnetics, has identified a northerly plunging mineralised lens of approximately 100 m strike length and true width of about 2.0 m, with grades beneath the old workings including 55.8 g/t gold over 2.0 m, 41.1 g/t gold over 2.0 m and 23.0 g/t gold over 2.0 m.

During the first half of 2004, **African Gold** (LSE: OOO) has built up a portfolio of properties along the Ashanti Gold Belt.

Most recently, the company announced that is acquiring a 70% interest, with an option over an additional 10%, in three mining licenses covering 125 km² within the Konongo/Ogwere district on the northeast portion of the Ashanti Gold Belt. The acquisition includes an adjacent prospecting license covering some 76 km² and containing numerous gold exploration targets. Gold at Konongo/Owere occurs in the same host rocks and structural setting as the Obuasi and Prestea gold mines.

African Gold began a four-phase, diamond drilling programme at the project last month. The first phase will consist of 31 holes to test continuity of open mineralisation and to extend known mineralisation under the current open pit. Earlier drilling has defined a high-grade, shallow (35 m deep) wide ore body underlying the old open pit and extending for over 1.25 km. Grades encountered in the floor of the open pit are 20m @ 9.1g/t Au and 24m @ 4.4g/t Au.

This single reef has a defined gold resource of 243,000 oz at an average grade of 4.48 g/t gold, and is one of nine similar reefs all of which will be drilled by the company during the next two years. African Gold plans to increase the resource base significantly beyond the 960,000 oz (defined by RSG Consultants in a due diligence report in early 2004) already delineated at Konongo/Owere. The current drilling campaign is designed to take the reserve base to a level that will sustain a long-term, stand-alone mining operation within two years.

Earlier in the year, **African Gold** acquired an initial 52% controlling interest in the Akrokeri gold lease through a joint venture agreement with **Birim Goldfields** (TSX: BGI). The lease has a common boundary with the Obuasi gold mine, and past work has identified a shallow oxide gold shear zone, which extends from the Ashanti open-pit into the lease.

The historic Akrokeri gold mine is located within the lease and was last mined nearly 100 years ago at an average head-grade of 24.3 g/t gold. Quartz veins assaying between 10-25g/t gold are hosted in a granite intrusion with gold mineralised sediments wrapping the intrusive. Five targets have been identified and a detailed exploration programme is planned to prove up reserves.

At around the same time as its Akrokeri acquisition, **African Gold** also signed an exclusive option with **Ahanta Mining Co Ltd** to acquire an initial 80% interest in the Ahanta gold property, which is

located south and along strike from St. Jude's Hwini Butre and South Benso properties.

Soil and trench sampling at Ahanta have defined a 1.2 km zone of gold mineralisation open to the north and south, and the potential for a bulk-mineable open-pit gold deposit hosted in tuffaceous sediments will be evaluated in the coming months.

Some 20 km to the south of the prolific gold mining district of Tarkwa, in western Ghana, **Glencar Mining** is evaluating the Asheba project, where a short, shallow drilling programme completed at the end of last year indicated a NE-SW trending, near-surface mineralised zone with grades of up to 23.5 g/t gold over 3 m width. This so-called Atinasi North-Tanaya trend has now been traced over a strike length of some 3 km, and connects the Asheba-Cheriaman mine with the old Atinasi/Akoko mine to the southwest and the Tanaya prospect 1 km to the northeast. The gold is hosted in a series of persistently mineralised quartz vein swarms, which can locally contain bonanza grades of up to several ounces per tonne.

A 2,500 m follow-up drilling programme was carried out during May/June this year to test for lateral and down-dip continuity of mineralisation intersected in the earlier campaign. The recent phase of drilling at Asheba has encountered significant thicknesses of high-grade gold mineralisation at Atinasi North. The newly recognised and extensively developed quartz-carbonate stockwork presents a target for a larger tonnage orebody.

Assuming positive results from the current phase of drilling at Asheba, **Glencar** expects to embark on a sustained drilling programme during the second half of 2004, which will be directed towards delineating a gold resource within the mineralised structure.

Work is also progressing at the Atinasi South area, some 450 m south of Atinasi North, where mapping to date indicates a possible extension of the main mineralised zone.

With the closure of the Obotan mine in 2002, **Resolute Mining's** activities in Ghana over the past year have reverted to grass roots exploration, focusing on the Akoase, Weststar and Blue River projects.

Akoase, in the Nkawkaw area, approximately 140 km northwest of Accra, is located along strike from **Newmont Mining's** Akim discovery. Encouraging trench results, over more than 2 km, indicate broad zones of low-grade mineralisation within a sheared and altered argillite sequence. However, drilling of the project has been delayed due to poor drill rig availability.

The Weststar concession, meanwhile, is located approximately 60 km northwest of Takoradi and immediately north of **Adamus Resources'** Salman project. A number of soil anomalies in a similar structural and stratigraphic position to those at Salman have been identified, and ongoing work this year will include RAB drill testing of a number of these anomalies.

MALI

Mali is now the third largest gold producer in Africa and is home to some of lowest cost gold mines in the world. **AngloGold Ashanti**



has invested heavily in the country's three producing mines, which collectively host a resource base of around 18 Moz of gold.

Morila

Another foreign investor is **Randgold Resources Ltd** (LSE:RRS), part owner with **AngloGold Ashanti**, of the Morila mine. According to **Randgold**, since it went into production in 2001, Morila has created wealth of some US\$384 million for the country and its people in the form of investment, taxes, dividends, salaries, payments to local businessmen and contributions to community development.

In 2003 the Morila mine confirmed its status as one of the world's leading gold mines both in terms of ounces of gold produced and production costs. The mine produced almost 800 000 oz at a total cash cost of US\$100/oz. The Morila mine is owned by a Malian company, **Morila SA**, which, in turn, is owned 80% by **Morila Limited** and 20% by the State of Mali. **Randgold Resources** (40%) and **AngloGold Ashanti** (40%) jointly own **Morila Ltd**.

Estimated mineable reserves amount to 25.7 Mt at a grade of 3.74 g/t gold (3.10 Moz contained).

A US\$10 million plant expansion project was approved during 2003 and construction commenced in the first quarter of 2003. The expansion is designed to increase the plant throughput from its original nameplate 250,000 t/mth to 350,000 t/mth with the intention of allowing the processing of lower grade ore through reduced costs as a result of economies of scale.

However, in the first half of this year, production at Morila was affected negatively by the disruptions associated with the commissioning of the plant expansion and the opening up of new areas at the pit. This was exacerbated by a labour dispute.

The joint venture partners are working to correct operational inefficiencies but have warned that production for the year is likely to fall to 500,000 oz.

Exploration at Morila has identified potential for a significant extension to the existing pit at the MSZ Ext. In-fill drilling is underway to upgrade the 900,000 oz inferred resource.

Loulo 0

Meanwhile, **Randgold Resources** has just embarked on the next stage of its growth programme with the decision to build an US\$80 million open pit mine at Loulo (80% owned).

The Loulo mine project is situated in western Mali adjacent to the Falémé River, which forms the frontier with Senegal. Loulo falls within the Birimian sequence of the Kenieba inlier, a succession of volcano-sedimentary and clastic rocks that features several major regional shear structures hosting gold deposits such as Sadiola (**AngloGold Ashanti/IAMGOLD**), Segala and Tabakoto (**Nevsun Resources**). Loulo is situated 96 km from Sadiola and approximately 25 km from Segala and Tabakoto.

Reserves within the planned Loulo 0 and Yalea open pits total 11.7 Mt at an average grade of 3.77 g/t (1.42 Moz) contained, plus a further 3.5 Moz of gold in the resource category. The mine is scheduled to go into production in July 2005 and is expected to average 200,000 oz/y

over a six-year period at a cash cost in the region of US\$200-230/oz, based only on the reserves identified to date within the two pits.

Construction is progressing well and on schedule and the US\$60 million project financing is nearing completion.

Exploration results from deep drilling under the open pit reserves continue to demonstrate the strike and depth continuity of these orebodies and confirm the potential for underground operations. **Randgold** has received a positive pre-feasibility study on the underground potential of Loulo and Yalea from SRK and has commissioned the consultants to undertake a full feasibility study.

The pre-feasibility study demonstrates the potential for another 15 years mining. Initial capital costs for Loulo 0 and Yalea underground mines are US\$19.7 million and US\$30.5 million respectively, but these estimates are on a standalone basis and exclude optimisation between the two mines as well as open pit operations.

The **Randgold** board has approved a US\$2 million in-fill drilling programme at Yalea.

Sadiola

Meanwhile, the Sadiola mine (**AngloGold Ashanti** 38%, **IAMGOLD** 38%) referred to earlier, is located in the west of Mali, approximately 70 km south of the regional capital Kaves, and near the border with Senegal.

The Sadiola deposit itself lies within the Malian portion of the Kenieba-Kedougou window, a major early Proterozoic-Birimian inlier along the northeastern margin of the Kenema-Man shield. The deposit is hosted by sediments of the Kofi formation and occurs along the Sadiola fracture zone ("SFZ"). The gold mineralisation extends over a drilled strike length of approximately 2.5 km, and is associated with both arsenic- and antimony-dominated sulphide assemblages.

Since start-up, the mine has produced 3.59 Moz of gold (to end-March, 2004) and at 2003 year-end reserves totaled 26.4 Mt at an average grade of 3.2 g/t (2.69 Moz contained); plus resources of 43.2 Mt at 2.2 g/t (3.17 Moz contained), of which 1.1 Mt grading 2.9 g/t (0.95 Moz contained) are deep sulphides.

Key to the continued operation of Sadiola beyond 2008 is the Deep Sulphide project. A conceptual model, which was based on projections and assumptions made by the mine site technical staff, indicates that there is potential for a substantial amount of hard sulphide mineralisation below the soft saprolitic oxide ore body currently being mined, and that at a gold price of US\$325/oz, this mineralisation might be economically mined and possibly extend the life of mine by up to four years.

Drill testing of these deep sulphides is now at an advanced stage, with a 30,000 m drilling campaign initiated at the beginning of 2004 to upgrade inferred resources to the indicated category. This drilling campaign is scheduled for completion by October this year, and a preliminary feasibility study of the deep sulphide potential expected by the end of the first quarter 2005.

Yatela

Just 25 km to the north of Sadiola is the Yatela open-pit, heap leach operation (**AngloGold Ashanti** 40%, **IAMGOLD** 40%), which



recovered some 218,000 oz of gold in the year to end-2003, at a total cash cost of US\$235/oz. Recovered gold was some 19% lower than a year earlier as mining progressed through a lower grade area of the pit. Production was further impacted by problems experienced with the commissioning of a new crushing circuit, which adversely impacted tonnage stacked in the second half of the year.

The nearby Alamoutala pit was brought into production in August 2003, and supplemented ore from the main pit for in first half of 2004, but will be depleted, as planned, in the third quarter of the year.

Production in 2004 is expected to increase to around 278,000 oz at a total cash cost of US\$217/oz, as grades from Yatela return to historical levels, coupled with the hauling of higher-grade ore than expected from the Alamoutala pit.

At end-December 2003, reserves at Yatela, including Alamoutala, totaled 10.4 Mt at an average grade of 3.2 g/t gold (1.11 Moz contained).

Junior Developments in Mali

In addition to the well-established large and mid-tier producers, a number of junior companies are actively prospecting and developing mines in Mali.

Toronto-based **Nevsun Resources** (TSX: NSU) has been exploring and developing its Tabakoto project since 1994, culminating in the completion of a feasibility study in October 2002. In May this year, the company announced its construction decision, with production targeted for mid-2005.

Production is planned to start at Tabakoto at an annual mining and milling rate of 650,000 t of ore at a delivered to mill grade of 5.45 g/t. A three stage crushing plant has been sized at 1.2 Mt/y, however, in order to permit future flexibility in the management of the Tabakoto production programme and to be able to increase future milling rates with less need to re-design the crushing plant, which is often a bottle neck in mill expansion programmes. The CIL plant has been sized at a 48-hour leach capacity at the stated 650,000 t/y mill throughput. Cash operating costs are forecast at US\$230-US\$250/oz.

In addition to the 568,000 oz of mineable surface reserves that formed the basis of the construction decision, **Nevsun's** adjoining Segala mining license hosts a near surface reserve of 383,000 oz. These additional reserves are estimated based on approximately 870,000 t/y of Segala ore being treated through the Tabakoto mill at the end of life of the Tabakoto open pit. The higher treatment rate considered for the Segala ore is a result of the Segala ore being significantly softer than the Tabakoto ore.

Nevsun acquired Segala from **Semafo Inc** (TSX : SMF) in 2002 for a consideration of US\$9 million, the final tranche of which, 1.42 million **Nevsun** shares, was paid in August 2004.

Nevsun will review the positive impact of the Segala deposit during the first year of production from Tabakoto. Options will include maintaining sequential mining at Tabakoto and Segala, or expanding the operations to bring Segala on stream earlier by adding a second mill to the Tabakoto milling circuit.

After the commencement of production at Tabakoto, **Nevsun** also plans to re-evaluate the deposit's already identified underground potential. Exploration access will then be enhanced from depth within the

Tabakoto pit.

Further exploration opportunities also exist within the Tabakoto and Segala mining license areas where past exploration programs have outlined several mineralised zones that could provide satellite feed for a Tabakoto operation. Exploration of these areas will be conducted using cash flow from the Tabakoto Mine.

In June this year, **Resolute Mining Ltd** (ASX: RSG) completed the acquisition of an 80% stake in the Syama gold project, near the border with Cote D'Ivoire, in southern Mali, from **Randgold Resources** (the Government of Mali holds the remaining 20%) in a cash deal worth US\$13 million. **Randgold** will also receive a royalty on future Syama production.

To date, this major refractory project has produced more than 1.5 Moz of gold, but following a sustained fall in the gold price in the late 1990s, operations were suspended in early 2002 and the mine placed on care and maintenance.

The Syama mine is located along a structural and geological feature known locally as the Syama Shear that extends for some 200 km south into northern Cote D'Ivoire. Gold mineralisation is hosted within an overturned and thrust basalt-metasediment package that is in contact with a largely undeformed conglomeratic unit.

According to figures published by **Randgold**, Syama hosts a measured and indicated resource of 50.5 Mt grading 3.2g/t gold (5.2 Moz contained). Mineralisation in the main ore body occurs over 800 m of strike length, averages 40 m to 50 m in width, and has been confirmed by diamond drilling to be open at depths of 600 m below surface. Ore body modelling indicates a plunge to the northwest, where at depth the ore body widens to 100 m

A prefeasibility study completed by **Resolute** for the redevelopment of Syama concluded that a project is viable at current gold prices, based on a 12.8 Mt reserve at 3.9 g/t gold (1.63 Moz contained) producing some 220,000 oz/y at a total cash cost of US\$270/oz. Capital expenditure is estimated at US\$47.7 million.

The company is now proceeding with a 'bankable' feasibility study on the project, which it expects to complete by the end of this year.

Greenfields Activity

Fuelled by the discovery of these multi-million ounce deposits, greenfields exploration in Mali is once again on the up.

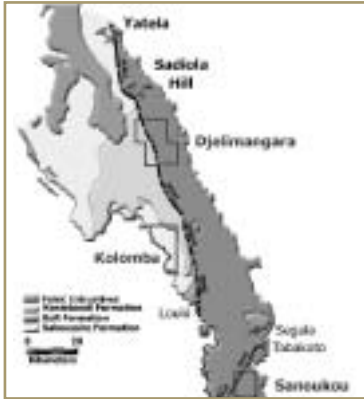
Axmin has entered into a JV agreement with a subsidiary of **Newmont Mining** to explore **Axmin's** Kofi permit areas within the prospective Senegal-Mali shear zone. **Axmin** has defined an initial inferred resource of 106,000 oz grading 2.3 g/t gold by earlier shallow drilling at Kofi, which is strategically located between and along the northern border of **Randgold Resources'** Loulo and **Nevsun Resources'** Tabakoto deposits.

A total of 636 m of follow-up drilling beneath this shallow resource has been completed to date, with four holes undercutting gold mineralisation at the Kofi SW Zone B and two holes undercutting shallow (30 m vertical depth) gold mineralisation at the Kofi SW Zone C, which appear to be extensions to the mineralisation seen at **Randgold's** adjacent Loulo project. A reconnaissance 12,000 m RC drilling programme has also been completed as part of the initial US\$1.0 million programme



funded by **Newmont**.

Axmin also initiated an RC drilling programme in the second quarter of 2004 at its Satifara permit, which is located approximately 100 km northwest of the Kofi project area and 10 km west of the Sadiola mine.



Elsewhere, **Etruscan Resources Inc** (TSX:EET) has assembled a portfolio of strategically located gold properties, with one project on the Mali South Shear Zone (Finkolo) and three properties along Mali West Shear Zone (Djelimangara, Kolomba and Sanoukou).

Finkolo, the most advanced of **Etruscan's** Malian projects, is situated just 15 km southwest of **Resolute's** Syama project. The company is focusing in the southern part of the 319 km² permit area where geochemical surveys have outlined a strong gold anomaly over an area of 3,000 m x 800 m. Previous drilling in this zone intersected broad disseminated mineralisation assaying 1-6 g/t gold and more discrete 1-3 m thick high-grade mineralisation assaying 15-40 g/t.

Resolute recently elected to exercise its option to earn an initial 50% interest in the project, under the terms of an option and joint venture agreement signed at the end of last year. As part of the agreement, **Resolute** completed a private placement in **Etruscan** for aggregate proceeds of US\$0.5 million at a subscription price of C\$2.60/share, US\$0.3 million of which was used to fund a drilling programme on the Finkolo permit during the due diligence period.

Some 18 km to the south of Sadiola, **Etruscan** has identified a gold anomaly on the Djelimangara Permit, which it acquired from **Barrick Gold** in 2001. Auger drilling has traced the anomaly for 2,300 m with values up to 11.6 g/t gold.

Etruscan will complete an additional 150 auger samples as part of the current programme to provide confirmation on the continuity and shape of the anomaly, and assist in planning for a reverse circulation (RC) drilling campaign in September 2004.

Close to the border with Guinea, **Glencar Mining** has entered into a farm-in agreement covering four exploration concessions, known collectively as the Sankarani project. Two of the concessions have already been issued and two, which have passed through all regulatory formalities, are expected to be issued shortly.

The concessions, originally held by BHP and then **Randgold Resources**, contain a reported resource of 280,000 oz of gold at Komana, which was reported by North Ltd, operating under a joint venture with **Randgold Resources**. The area is underlain by rocks of the Birimian system, the prolific host to most of Ghana's and Mali's huge gold resources.

Exploration has been concentrated initially on the Farasaba area, where field prospecting had discovered extensive artisanal workings and associated favourable geology and structure. Results show a broadly

anomalous NW-SE trending zone, some 2.5 km in length and 300-500 m wide, within which some exceptionally high values (28 g/t gold) were recorded.

In September 2002, **AfriOre** (TSX:AFO) concluded a joint venture agreement with **New Gold Mali SA** for the right to earn a 60% interest in **NGM's** 144 km² Banankoro exploration project near Kangaba, in southern Mali, by funding US\$2.5 million within four years or completing a bankable feasibility study, whichever is earlier.

An RC drilling carried out by NGM on a number of targets identified by earlier fieldwork led to the discovery of the Bagama prospect, which encompasses four zones of quartz veins within an altered volcano-sedimentary succession defined by a geochemical anomaly over a distance of some 700 m. Six diamond drill holes, which probed only 200 m of strike on one of the four quartz vein zones, intersected mineralised zones in fresh rock at depths of between 70-120 m below the surface.

During 2003, **AfriOre** completed an eleven-hole diamond drilling program, which identified a shallow dipping high grade zone within an assemblage of quartz veins, hosted by in Birimian-age metavolcaniclastics and metasediments close to an intrusive diorite stock. Most of the mineralisation within the shallow plunging zone is between 2-10 m thick and most intersections have grades in excess of 10 g/t gold.

AfriOre recently commenced a 2,500 m follow-up diamond drilling program, initially focusing on extending the high grade gold zone at Bagama, and thereafter commencing drilling on the untested A1 and A2 geochemical anomalies.

North Atlantic Resources Ltd (TSX:NAC) has just reported results from 3 RC drill holes at its A-1 anomaly at Foulaba. One hole intersected mineralisation over 8 m with average gold values of 1.74 g/t. At the A-3 anomaly, 3 km away, air-core drilling has also intersected gold values. Further drilling will be undertaken after the rainy season.

North Atlantic is also currently undertaking geochemical investigations at its Dalakan and Sinzini projects in the country.

GUINEA

Mineral resources are important contributors to the Guinean economy in terms of foreign exchange earnings, chiefly from the country's world-class bauxite deposits. However, Guinea also hosts a number of significant gold deposits and is the sixth largest gold producing country in Africa with 2003 output of 16.8 t.

Léro

To date, **Guinor Gold Corp.** (TSX:GNR), which emerged as the successor to Norwegian public company, **Kenor**, earlier this year, has recovered more than 650,000 oz of gold from the Léro gold mines on the Dinguiraye concession since production started in 1995. The company reported a total resource of 4 Moz of contained gold at end-2003, two thirds of which are in the measured and indicated categories.

The deposits currently being mined all lie within the Léro-Fayalala (LEFA) Corridor; an east-west trending structure, approximately 12 km long and 10 km wide, and located in the northeast of the concession. The corridor includes the Léro, Karta and Fayalala mines, as well as smaller deposits such as Kankarta, Banko, and Tambico.

Apart from younger sandstones and dolerites, the entire 1,500



km² Dinguiraye Concession area is devoid of fresh outcrop, lateritisation is extensive and weathering extends to down to a depth of around 100 m. 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. But with reserves sufficient to maintain operations only until 2005, Guinor is now looking to develop the deeper sulphide ores.

Between September 2002 and December 2003, **Guinor** invested some US\$9.3 million to define sufficient resources to support a large tonnage CIL operation that would be capable of treating both oxide and primary ores to recover approximately 350,000 oz/y of gold over a mine life of at least seven years.

This so-called Large Exploration Programme (LEP) resulted in the identification of a further 1.1 Moz of gold and in September last year, **Guinor** commissioned a feasibility study into the development of an 8 Mt/y CIL operation at an estimated cost of US\$124 million. The study is scheduled for completion in the fourth quarter of 2004.

During the first half of 2004, exploration has focused on resource definition drilling within and proximal to known deposits within the LEFA corridor, as part of the detailed feasibility study. In addition, significant infill drilling has been conducted to provide the data necessary for reserve calculations.

To assist with drill planning and scheduling, interim resource estimates, based on drilling to end-March 2004 were completed RSG Global of Australia, which reported measured and indicated resources totaling 54 Mt at an average grade of 1.6 g/t (2.7 Moz contained). This total excludes 2.3 Mt of stockpiled material grading 1.2 g/t gold (88,000 oz contained). The measured resource component of 25 Mt at 1.8 g/t (1.4 Moz contained) is at a higher than average grade, and depending on the mining schedule could provide the majority of production for the first three years of the new project.

Siguiri

Guinea's largest mine is **AngloGold Ashanti's** Siguiri mine.

Operations at Siguiri, which produced a total of 252,795 ounces at a cash operating cost of US\$279/oz in the year to end-December 2003, have also been hampered by a government embargo on gold sales, enforced during the second quarter of this year. Management continues to work with the government of Guinea toward a speedy resolution, so as to minimise the effect of the embargo on the full year's production.

In 2002, concluded a feasibility study to provide for the processing of predominantly saprolite (SAP) ores at Siguiri through a CIP processing plant. The company expects the CIP facility to have a capacity of 9.0 Mt/y and to produce approximately 300,000 oz/y of gold. The CIP plant will consist of a primary crusher followed by a scrubber where the plus 10 mm fraction will be separated and re-directed to the heap leach agglomeration plant.

However, construction work on the project was temporarily suspended during 2003 following irreconcilable differences with the contractor. In the third quarter, the feasibility study was revised and a new contractor engaged. The project recommenced in the 4th quarter of 2003 at a revised capital cost currently estimated to be in the region of

US\$75-US\$80 million, with the commissioning expected to be in the fourth quarter of 2004/first quarter of 2005.

Although construction of the CIP plant is continuing, commissioning of the project is likely to be delayed as a result of the government embargo.

Elsewhere at Siguiri, **AngloGold Ashanti** completed resource definition drilling on the new Sorofe and Kalamagna deposits during 2003, resulting in the delineation of some 300,000 oz of measured and indicated mineral resources for these two deposits.

During the December 2003 quarter, a new area of bedrock mineralisation was also discovered at Kosise North, associated with structures linking the Kosise and Soloni pits. By year-end, total mineral resources of 370,000 oz had been outlined. Drilling is continuing to fully delineate this new deposit.

At 2003 year-end, total resources at Siguiri stood at 113.7 Mt at an average grade of 1.16 g/t (4.3 Moz contained).

Kiniero

Semafo began production at its Kiniero mine (formerly known as Jean Gobélé) in April 2002, and last year produced 46,728 oz of gold at an operating cash cost of US\$232/oz.

An intensive delineation programme during 2003 that focused on advanced targets in the near vicinity of deposits that are currently being mined at Kiniero resulted in the discovery of a new mineralised structure, the Banfara zone, 700 m west of the Jean A pit, the westernmost open pit of the company's ongoing operation. Together with the high-grade East West zone, these areas are now contributing to Kiniero's short-term (two year) mine plan.

The exploration programme also provided for a 24% increase in the mineral resource inventory at Kiniero which now stands at 5.07 Mt at an average grade of 3.12 g/t gold (508,900 oz contained).

Some 500 km east of Conakry, near the border with Mali, **Mano River Resources** (TSXV: MNO) is undertaking regional exploration on two permit areas that were the focus of mining activity for thousands of artisanal miners in the late 1980s, following the discovery of gold-bearing quartz veins close to the surface.

The presence of artisanal workings at the Missamana prospect rapidly led to the identification of further targets at Brouni to the ENE and Madou, to the WSW of Missamana. Regional exploration on the two permits is almost complete with Landsat interpretation, photo-interpretation, geological mapping, geochemistry, fixed-wing aeromagnetic and radiometric geophysical programmes.

The main area of interest within the two permits, as defined by tectonic analysis, airborne geophysics and the known position of artisanal workings, is an ESE trending gold belt stretching from the Brouni prospect, through Missamana and into the Gueliban Permit. All the important target areas lie within this zone, or exist on related structures, which branch out from this zone.

Mano River's exploration programme has now defined six high priority prospect areas. These are at Missamana, Brouni and East Kerkour, within the Missamana permit, and Madou, Diamona and Gueliban East within the Gueliban permit.



Drilling and trenching have defined an indicated gold resource of 530,000 t at an average grade of 2.4 g/t gold within a total indicated resource of 1.0 Mt at 1.8 g/t.

The area so far studied is around the site of the main artisanal mine where quartz-sulphide veins were exploited with grades up to 100 g/t gold. However, although the granodioritic host rock is rich in sulphides and anomalous in gold (0.1-0.5 g/t), the rock is not strongly sheared and the economic mineralisation is generally confined to secondary shear zones. These shear zones cut the centre of the granodioritic body, which for the most part has resisted the deformation. Intuitively, higher levels of disseminated gold mineralisation are expected to be found on the edges of porphyries, which have been more strongly sheared.

BURKINA FASO

Burkina Faso is a minor gold producer but is the focus of much exploration activity given its proximity to the greenstone belts of neighbouring Ghana.

Axmin has completed a 'bankable' feasibility study for the Bouroum permit that incorporates 109,896 oz of Bouroum reserves into **High River Gold Mine's** (TSX: HRG) Taparko project, 49 km to the southeast. The mineable reserves at Bouroum are derived from three open pits – F12, Welcome Stranger and Bissinga – which contain an aggregate 861,000 t at an average grade of 3.97 g/t gold.

Completion of the Bouroum feasibility gave **Axmin** an additional 65% undivided interest in the project from Toronto-listed **Channel Resources** (TSXV: CHU), increasing Axmin's total interest in the project to 73%. **Axmin** subsequently acquired the remaining 27% of the project from **Channel** and then sold its entire 100% stake in Bouroum to **HRG** for a total consideration of US\$3.3 million.

The sale agreement with HRG covers an area of 11 km² within the Bouroum Permit. The remainder of the permit, plus the adjacent Yeou and Ankouna permits, are subject to an exploration joint venture between **Axmin** and **HRG** whereby **High River** may earn a 100% interest in the permits by spending US\$1.5 million on exploration over three years. **Axmin** retains a back-in option up to the time of completion of a feasibility study for a 50% interest in one or all of the permits by paying HRG a multiple of 1.5 times its expenditure on the relevant permit(s).

Meanwhile, **HRG** is to commence development of its 80%-owned Taparko gold project. The project entails the construction of a mill and infrastructure to process ore from three open pits on the Taparko deposit and ore from Bouroum. The combined operation will process approximately 1.0 Mt/y with gold production averaging more than 90,000 oz/y over an eight-year period at an average cash cost of US\$204/oz, starting in the fourth quarter of 2005. Capital expenditure for the project is estimated at US\$51.9 million.

The necessary "exploitation permit" was granted by the Burkina Faso Government in July. Negotiations for bank financing are "well advanced".

Subsequent to the completion of the Taparko/Bouroum feasibility study, a sensitivity study instigated by the **HRG** doubled the resource estimate for Taparko, based on a gold price of US\$400/oz. Previously estimated at 680,000 oz of contained gold at an average grade of 2.78

g/t, Taparko's resource has been increased to 1.32 Moz at the higher gold price, at an average grade of 2.55 g/t gold.

HRG has designed the Taparko facility with a longer-term operation in mind, in the belief that there is "excellent" potential to define additional satellite deposits.

Through a separate agreement with **Jilbey Gold Exploration** (TSXV: JLB), **HRG** now controls, directly and indirectly, in excess of 3500 km² of prospective property within trucking distance of the planned Taparko mill. The agreement with **Jilbey** provides **HRG** with back-in and operator rights on discoveries within trucking distance of the planned Taparko mill, and a right of first refusal on discoveries outside trucking distance.

In early 2003, **Jilbey** completed the acquisition of two key properties – Taranga and Nongo Fayere – that cover the extensions of anomalous gold zones striking off **HRG's** Taparko permit. **HRG** relinquished the properties in exchange for 9.95% of Jilbey's common shares outstanding at the time.

Since the completion of this initial agreement, **Jilbey** has acquired other key properties elsewhere in Burkina Faso. These include 650 km² surrounding the company's Bissa deposit and 1,083 km² along the Houde Belt, south of **Orezone Resources'** (TSX: OZN) Bondi discovery. Exploration programs have started on all three area plays.

Jilbey has acquired a total of nine exploration permits in the Bissa area and is earning an interest in two additional permits, which total nearly 2,000 km² in the Bissa area. These permits include the Bissa gold deposit where the company is currently preparing a resource estimate.

Orezone Resources, too, has built up a substantial portfolio of properties throughout Burkina Faso, although its primary focus is on the Essakan, Bondi and Segha projects.

Essakan, some 300 km northeast of Ouagadougou, near the border with Niger, is **Orezone's** flagship project. It hosts over 10 prospective drill targets, and a measured and indicated resource of 18.9 Mt at 2.14 g/t gold (1.3 Moz contained) had previously been outlined in the Main Zone, making it one of the largest gold resources currently identified in the country.

Orezone is aggressively exploring the property with the financial backing of **Gold Fields**, which is spending US\$8 million over five years to earn an initial 50% interest, increasing to 60% on completion of a 'bankable' feasibility study. The partners are aiming to delineate at least 2.0 Moz of gold at an average of 3.0 g/t, and in early August announced a 45% resource increase to 1.9 Moz (30.5 Mt at 1.95 g/t) plus inferred resources of 300,000 oz.

Drilling at three regional prospects surrounding the Essakan Main Zone (EMZ) has identified a significant new zone of mineralisation at Falagountou, 6 km east of the EMZ. Falagountou hosts a mafic body that has intruded the surrounding sediments and is currently being mined by local artisanal workers. **Orezone** has also completed a 25-hole RC hole programme, which targeted the projected down plunge extension of the EMZ.

Orezone's Segha exploration permit covers an area of 400 km², in northwest Burkina Faso, about 200 km north of Ouagadougou. Drilling by the previous owners (**Repadre/Iamgold**) delineated an inferred



resource of 3.3 Mt grading 2.82 g/t (300,000 oz contained) in the Gambo Zone, and **Orezone's** goal is to build Sega towards one million ounces of open-pit material by combining this zone with the Bakou and RZ zones. All three zones lie within a relatively small 2.5 km² area of the property, which contains extensive artisanal workings and gold in soil anomalies that have yet to be fully tested.

The latest results from infill drilling at the company's wholly-owned Bondi project, in southwestern Burkina Faso, continue to confirm the width and continuity of Zone 2, the main zone of interest on the property. In addition, there are at least two parallel zones of similar size and signature that could also substantially increase the total oxide resource. Together, these structures form a mineralised system that has been traced over a strike length of some 4 km.

As a result, **Orezone** is commencing construction of a permanent camp and an all weather road to facilitate drilling right through the rainy season. Furthermore, the company has also initiated work on many of the elements required for a prefeasibility study so that the project can be developed as quickly and as efficiently as possible."

Etruscan Resources (TSX: EET), meanwhile, has signed a mandate with RMB Resources to arrange up to US\$30 million in project debt financing for the development of the Youga project, in the south-eastern part of the country, near the border with Ghana. Prior to **Etruscan's** acquisition of the project, the previous owners, **Ashanti** and **Echo Bay Mines** completed 30 km of trenching and core and reverse circulation drilling totaling 31,927 m (455 holes) resulting in the discovery of five gold deposits. The largest of these is the A2 Main Deposit and contains approximately 80% of the total reported gold resource of more than 1.2 Moz.

Etruscan completed a 10,000 m of core drilling programme at Youga in June this year, which focused on improving the geological model and, in particular, the continuity of the higher-grade zones in the A2 Main and A2 West deposits.

Results from 15 of 23 new diamond drill holes subsequently completed at Youga continue to expand the deposit. This most recent drilling campaign has focused on testing the strike extensions of the Northwestern Zone, the Southern Extension of the A2 Main deposit, and the northern plunge of the A2 Main deposit; and to begin drilling on the A2 East deposit.

Results from these latest campaigns are being used to upgrade the existing feasibility study prepared by the previous owners, with a view to commence mine construction at the beginning of 2005. The project is fully permitted for mine development by the Government of Burkina Faso.

As part of an ongoing feasibility study on **Semafo's** Mana property, some 150 km west of Ouagadougou, detailed RC and diamond drilling were completed during 2003. This work allowed **Semafo** to improve the quantity and the quality of the mineral resources estimates for the Wona and Nyafe deposits, which now total 10.9 Mt at an average grade of 2.91 g/t gold (1.02 Moz contained). This represents a 39% increase in contained ounces from a year earlier, with most of the increase attributable to the growth of the Wona deposit.

The detailed drilling program on the Nyafe deposit, meanwhile, was still in progress at 2003 year-end and the mineral resources estimate

used is the same as of December 31, 2002.

All the results from both Wona and Nyafe delineation drilling will be included into an internal feasibility study planned for completion any time now. It is Semafo's intention to commence mine construction at Mana before 2004 year-end.

St. Jude Resources recently reported further drill results from its 90%-owned Goulagou project, in northern Burkina Faso. Drill results were focused on the GG1 zone where the company is delineating the extent of the mineralisation. Highlights from the latest round of drilling include 32 m of 2.02g/t, 26 m of 2.16 g/t, 34 m of 1.66 g/t and 45 m of 1.60 g/t gold. C\$1.0 million will be spent on Goulagou in 2004, for about 10,000 m of drilling.

The latest holes drilled appear to have grades closer to 2 g/t gold compared to a previously reported resource estimate in the GG1 and GG2 zones by **Channel Resources** of 19.4 Mt at an average grade of 1.12 g/t (700,000 oz contained). Results continue to support an oxide resource down to 75 m that may be amenable to low cost heap leach mining techniques. **St Jude's** engineering team has begun baseline engineering for a feasibility study.

Earlier this year, **St Jude** entered into an option agreement to purchase a heap leach gold plant capable of producing up to 120,000 oz/y of gold. A review of the plant is nearly complete and the company expects to make a decision on the equipment this summer. The Goulagou project is likely to be the first and easiest project to bring into production.

In March this year, **Goldbelt Resources** (TSXV:GLD) reached agreement with **Resolute Mining** to purchase **Resolute (West Africa) Ltd**, the owner of the Belahouro project and other exploration properties in Burkina Faso, for US\$1.5 million in cash and Goldbelt shares and warrants worth C\$5.0 million. Resolute will receive cash of US\$1.5 million and Goldbelt shares and warrants to a value of C\$5.0 million.

Following completion of the transaction **Resolute** will become a major shareholder of **Goldbelt** and will assist the company in identifying other gold exploitation opportunities in West Africa where it does not conflict with **Resolute's** activities.

Belahouro is located approximately 220 km NNE of Ouagadougou, along the western part of the Djibo greenstone belt near the Mali-Burkina Faso border. The belt comprises essentially intermediate volcano-sedimentary formations intruded by syn- to post-tectonic granitoids.

Exploration by previous companies, including **BHP Corp.** and **Resolute**, has been concentrated mainly in and around known artisanal workings where a number of areas of gold mineralisation have been identified. To date, some 8.93 Mt of resources have been outlined, at an average grade of 2.8 g/t gold (810,000 oz contained).

Goldbelt intends to undertake a major capital raising to advance the Belahouro project and has committed to immediate exploration expenditure of at least US\$250,000 on the tenements.

NIGER

Historically known for its uranium deposits, Niger is soon to join the ranks of the West African gold producing countries when the Samira Hill project comes on stream later this year. The initial commissioning



of the plant facilities has already commenced and the first gold pour is expected in early September.

In May 2003, the joint venture partners, **Etruscan Resources** (40%) and **Semafo** (40%) owners raised US\$27 million in debt financing to construct a 6,000 t/d CIL plant for processing of the initial oxide and 4,000 t/d for the transition ores from open pits at Samira Hill and Libiri. With currently defined mineable reserves of 10.1 Mt at an average grade of 2.21 g/t gold (716,000 oz contained), the operation is scheduled to produce an average of 100,000 oz/y of gold at an average cash operating cost of US\$203/oz over a six-year mine life.

The mine opening is scheduled for October 2004.

Significantly, a further 1.49 Moz of measured and indicated resources, plus 505,000 oz of indicated resources have been estimated by RSG Global of Australia.

The Samira Hill development will be the first phase of what **Etruscan** and **Semafo** hope will expand into a regional gold mining province as a number of other targets have been identified with a 15 km radius of Samira Hill that may have the potential to feed a centralised milling facility.

COTE D'IVOIRE

Underlain almost completely by Archaean and early Proterozoic rocks, Côte D'Ivoire has considerable mineral potential, with important occurrences of gold, diamonds, iron, nickel, cobalt, copper and manganese, and bauxite having been identified. Like much of West Africa, however, it is gold that has been at the forefront of exploration since the introduction of a new favourable mining investment code in 1995.

The largest deposit outlined to date is **Randgold Resources'** Tongon project, 628 km north of Abidjan within the 671 km² Nielle Permit, in central northern Côte d'Ivoire. **Randgold** has held the exploration permit since November 1996 and has carried out exploration activities on the project in several phases.

Based on the results of 62 holes drilled in the target area, of which 35 are diamond drill holes (for a total of 6,712 m) and 27 are RC holes (for a total of 2,486 m), **Randgold** has outlined an inferred resource of some 34.0 Mt at an average grade of 2.65 g/t gold (2.89 Moz contained) to a depth of 120 m.

This initial resource estimate was used as a basis for a prefeasibility, 'Type 2' study completed in 2002, which concluded that the project looked sufficiently attractive, albeit at an early stage of understanding of the orebody, to further progress feasibility investigations.

However, all on-site work at the project was suspended in early 2003 pending a lasting resolution to the political conflict in the area, although the company has maintained its presence in Côte d'Ivoire and is capable of recommencing its activities without delay once the political and security environment returns to acceptable levels.

A standstill agreement has been reached with the Côte d'Ivoire government whereby, as a result of the existing force majeure conditions, **Randgold** will be credited with all lost time during which it was unable to fulfill the exploration permit conditions.

Another company that has been on the ground since the mid-1990s is Australian junior **Equigold** (ASX: EQI), which has made a

significant gold discovery at its Bonikro project, approximately 250 km northwest of Abidjan. To date, a resource of some 25.1 Mt at an average grade of 1.6 g/t gold (1.30 Moz contained) has been outlined.

It was originally the company's intention to complete a reserve drill out of the Bonikro deposit during 2003 with a view to expediting completion of a bankable feasibility study into development of the project. However, field work had to be put on hold after the failed coup attempt in September 2002 led to fighting between rebel groups and government forces, with the rebel groups controlling the northern half of the country. Whilst the Bonikro project is located well within the territory that was held by the government it was deemed prudent to suspend work to ensure the safety of **Equigold** and contractor personnel.

Given the "significant improvement" in the civil situation, the board commenced reserve definition drilling in October 2003, and by end-June this year, the company had completed a programme of more than 16,700 m of RC and diamond core drilling.

Part of this drilling campaign was designed to provide geotechnical data to assist resource estimation and pit optimisation for a feasibility study that is currently in progress. An additional programme of RC drilling has also been initiated to sterilise areas of proposed infrastructure and to provide hydrological data to assist dewatering planning of the proposed pit area. A total of 2,063 m of this drilling was completed during the three months to end-June, and work is continuing.

Re-estimation of the Bonikro resource will be completed in the September 2004 quarter and the resulting mining resource will form the basis of the feasibility study. Preliminary indications are that the Bonikro deposit has the potential to become a robust gold mining project and the company intends to expedite the completion of more comprehensive scoping studies this year, in parallel with the reserve definition drilling programme.

A more recent entrant to Côte d'Ivoire is **Etruscan Resources**, which was officially granted the 592 km² Agbaou permit in December last year. The permit area encompasses the Agbaou deposit, some 200 km northwest of Abidjan where previous operators, including **Durban Roodepoort Deep** (JSE: DUR), historically have completed a total of more than 18,000 m drilling. An independent resource estimate prepared in April 2002 reported an indicated and inferred resource of 12.3 Mt at an average grade of 2.2 g/t gold, containing 1.1 Moz using a 0.5 g/t cut-off.

The Agbaou deposit occurs within a well-defined regional shear zone extending over 40 km across the entire permit and limited exploration has taken place outside of the immediate deposit area.

Etruscan has noted that there are exceptionally high-grade zones at Agbaou that have the potential to significantly increase the overall grade of the deposit, and the company believes that with further drilling, a higher-grade reserve can be developed with an average grade nearer 3.5 g/t gold.

The first step in **Etruscan's** programme to advance the deposit to production will be to undertake sufficient drilling to demonstrate the continuity of these high-grade zones within the deposit.



SIERRA LEONE

The highly prospective Archaean granite-schist belt terrain of the Leonean Shield makes up 70% of the country and between 1930 and 1955, artisanal and semi-mechanised alluvial gold mining was widespread in the Sula Mountains, Kangari Hills, Nimini Hills, Loko hills and Gori Hills. However, artisanal gold mining largely ceased with the introduction of the Alluvial Diamond Mining Scheme in 1956, which allowed local people to mine diamonds legally for the first time.

Gold exploration recommenced in the 1960s when the Geological Survey undertook drilling programmes for gold and base metals at Baomahun, Dalakuru and Komahun in the Nimini Hills.

Following the election of President Kabbah in 1996, exploration and prospecting licences for gold were granted over almost all the known areas in the country prospective for gold. However, only a few companies commenced work, **Mano River Resources** being the most active. Through its local subsidiary, **Golden Leo Resources**, the company has assembled a portfolio of gold licences targeting some of the most prolific gold producing areas and significant structural settings within Sierra Leone.

Towards the end of last year, **Mano River** signed a comprehensive Letter of Agreement with **Golden Star Resources** regarding a proposed joint venture whereby **Golden Star** can earn an initial 51% interest in **Mano River's** Pampana (which includes the Yirisen gold project), Sonfon and Nimini license packages. The joint venture requires staged expenditure of US\$6m over four years by GSR in order to earn its interest. Mano River, meanwhile, retains the option to co-fund through to production to maintain its 49% interest in the properties.

The Pampana Exclusive Prospecting Licences (EPLs) lie 150 km east of Freetown and cover an area of 139km² at the southern end of the Sula Mountains greenstone gold belt. Gold targets exist within an extensive zone of imbricated tectonic rock slices at the intersection of four crustal scale shear zones. Historically the Pampana River and its tributaries supported some of the richest alluvial gold workings in the Sula Mountains.

The Yirisen gold system, **Mano's** most advanced gold project in Sierra Leone, as defined by a combination of mapped sites of in situ mineralisation, artisanal workings and soil geochemical anomalies, trends NNE with a current inferred strike length of 3.75 km, open in both directions. Several bands of high-grade gold mineralisation occur over a total width of up to 200 m. Gold mineralisation occurs within a series of en-echelon and steeply dipping quartz/sulphide vein stockworks, typical of similar Archaean gold deposits elsewhere in the world. Artisanal workings, extending to depths of up to 5 m, confirm that the gold is not solely restricted to the high-grade veins and that within both the oxide and sulphide zones, it is partially free milling.

The joint venture partners recently announced encouraging assay results from the first five diamond drill holes on the Yirisen project. Significant intersections include 14 m at an average grade of 7.77g/t and 9.07 m at an average grade of 15.99 g/t. As yet, there is insufficient geological information to enable true widths to be calculated with confidence and, furthermore, all assays are uncut.

This ongoing diamond drilling campaign is being supported by a

US\$1.0 million, one-year budget funded by **Golden Star**, and which will also cover work on the Sonfon and Nimini Licences.

Further to the east, **Axmin Inc.** has signed a heads of agreement with **Afcan Mining** (TSX: AFK) regarding the latter's 98 km² Nimini East and West properties. The properties, 220 km east of Freetown, are underlain by a complex of ultra-mafic and mafic volcanics with associated sedimentary and banded ironstones formations.

Axmin will pay **Afcan** US\$20,000 for an exclusive six-month option period to confirm and, where possible, extend existing targets through follow-up sampling and trenching. If Axmin elects to exercise the option, it will commit to a minimum expenditure of US\$0.5 million in the first year and will be able to earn a 60% interest by spending US\$2.25 million over a three-year period.

Thereafter **Afcan** has the right to participate or if it elects not to then **Axmin** can earn an additional 20% by producing a 'bankable' feasibility study. The monies spent on **Afcan's** behalf to earn this additional 20% will be recovered by **Axmin** from **Afcan's** share of future production.

LIBERIA

Hampered by its prevailing political problems, Liberia remains largely unexplored. But, as in Sierra Leone, **Mano River Resources** has probably made the greatest contribution to exploration in the country in recent times.

In May this year, the company announced that it had signed a three-year Mineral Co-operation Agreement with the government, allowing **Mano River** to undertake exploration within a 15,000 km² area of western Liberia. Significantly, the area is contiguous with **Mano River's** Exclusive Prospecting License in neighbouring Sierra Leone, thereby creating a contiguous, cross-border land holding in excess of 25,000 km².

The new MCA is contiguous with **Mano's** existing Bea project areas where a 25-year Mineral Development Agreement was signed in early 2002, targeting gold. A preliminary gold resource approaching one million ounces has been defined from the first two projects drilled, namely King George-Larjor (KGL) and Weaju. The Bea MDA includes several further gold prospects that have yet to be tested by **Mano**.

Each gold prospect falls within a series of en echelon ENE trending crustal-scale shear zones, which attain a length of 70 km in some cases. Mano has so far drill tested barely 10% of the overall strike length of these major mineralised structures in Bea.

The KGL deposit is located on an ESE-trending, highly sheared and mylonitised schist-belt within which the zone of pyritisation, veining and alteration attains a confirmed strike length of at least 2 km, over widths of up to 100 m. An extensive area of intensive alluvial gold mining, known as Gold Camp, has been worked for many years at the eastern end of the deposit.

The Weaju prospect, meanwhile, situated some 30 km to the north-east of KGL on the same shear system, has been the focus of intermittent mining activity by small companies and artisanal workers over the past 50-60 years. Mineralisation is concentrated in shear zones, along a contact zone between granite and schist-belt lithologies, into which quartz-tourmaline veins and pegmatites have been intruded.



In July 2000, independent consultants ACA Howe International Limited estimated combined geological resources at KGL and Weaju as 768,000 oz contained gold at 6.9 g/t. With both deposits open at depth and along strike, the existence of soil geochemical anomalies and the development of new artisanal workings, it can be expected the current resource estimates have the potential to be substantially increased with further drilling.

In parallel with prospect evaluation, in addition to the aforementioned prospects, regional exploration has identified four further gold prospects at Butter Hill, Benjeh, Ndablama, and Soso Camp.

Mano's overall conclusion, drawn from the results of its gold exploration work to date is that, with considerable further investigation, western Liberia has the potential to develop into a major new gold province conceivably on a scale to match that which emerged during the 1990s in the geologically comparable Lake Victoria area of Tanzania, where major gold mines such as Geita, Bulyanhulu and Golden Pride are now in production.

MAURITANIA

In July this year, the Government of Mauritania signed an agreement approving the involvement of **First Quantum Minerals** (TSX: FM) in the development of the Guelb Moghrein copper-gold deposit located near Akjoujt in western Mauritania. The agreement clears the way for a new company to be formed, which will be beneficially owned 80% by **First Quantum Minerals** and 20% by **Guelb Moghrein Mines d'Akjoujt SA**.

Guelb Moghrein is hosted by gently dipping mafic volcanics and sediments, adjacent to a small gabbroic intrusive. Copper-gold mineralisation, which comprises coarsely disseminated chalcopyrite and cubanite, with minor free gold, cobaltite and arsenopyrite, is associated with disseminated magnetite and intense siderite alteration of a mafic volcanoclastic unit. The deposit has an average thickness of 50 to 70 m, and has been defined by drilling over a strike length of 600 m and to a depth of 190 m.

The Guelb Moghrein deposit is located 250 km northeast of the nation's capital, Nouakchott, near the town of Akjoujt, and is accessible by paved highway. This open pit deposit hosts a measured and indicated resource of 23.7 Mt at an average grade of 1.88% copper and 1.41 g/t gold, as estimated by Kilborn-SNC Lavalin Europe Limited in 1998, for a previous owner. However, **First Quantum** intends to establish a new resource under National Instrument 43-101 guidelines in due course.

First Quantum is currently conducting an engineering study to assess Guelb Moghrein's potential to produce a minimum of 30,000 t/y of copper and 50,000 oz/y of gold, in the form of a copper-gold concentrate, over a 10 year period commencing in late 2005. The concentrate will be trucked to the port of Nouakchott and exported to smelters in Europe and Asia. The trucking and ship loading will involve local companies using existing port facilities.

There appears to be excellent exploration potential, both in the immediate vicinity of the deposit, and in the surrounding concession area, which totals 7,300 km².

In June this year, **Rio Narcea Gold Mines** (TSX: RNG) and **Defiance Mining Corp.** (TSX: DM) signed a definitive agreement whereby **Rio Narcea** will acquire all of the shares of **Defiance** on the basis of one **Rio Narcea** share for every 5.25 shares of **Defiance**. In so doing, Rio Narcea hopes to bring its development record and operating expertise to bear in advancing **Defiance's** principal asset, the Tasiast gold project, with a view to achieving production in 2006.

Tasiast is located within the Archaean-age Aouéouat greenstone belt, a 70 km long by 15 km wide NS trending belt of mostly supracrustal rocks situated within the southwest sector of the Reguibat Shield. The rocks to either side of the greenstone belt consist of granitoids and gneisses, which are typical of such Archaean terrains.

A 'bankable' feasibility study completed by SNC-Lavalin in April this year contemplates an open-pit operation that will produce an average of 105,000 oz/y at average direct cash cost of US\$226/oz over a period of less than 8 years. According to the feasibility study, diluted proven and probable reserves from four pits are estimated at 9.0 Mt at an average grade of 3.06 g/t (886,000 oz contained). The deposit hosts an additional inferred resource of 12.4 Mt at 2.25 g/t (899,000 oz contained) based upon a 1.0 g/t cut-off, but which has been considered as waste for the purposes of the feasibility study.

The existing drill hole data indicates increasing grades of the mineralised zones beneath the lowest levels of the designed pits, which could potentially be mined by underground methods. The project will take 18 months to build at a capital cost of some US\$48.4 million.

SENEGAL

Gold is mined in very minor amounts in Senegal, but, in common with neighbouring Mali, it has had a long and important history in the commerce of the region. The area of greatest interest for gold is the extreme southeast of the country bordering Mali and Guinea, where a large inlier of Precambrian (Birimian) metamorphosed arc, back-arc and accretionary rocks are exposed. The Senegalo-Malian fault zone, which runs through the Sadiola Hill permit in Mali, trends north-south through several permits on the Senegalese side of the border, and the Loulo deposit in Mali lies only 10 km north of the Bambadi concession.

Similar to the company's Malian properties, **Axmin's** permits in Senegal also lie within the prolific Kédougou-Kéniéba Inlier of the Birimian close to the border between Mali and Senegal and the two permits Sonkounkou and Sabodala NW lie within 10 km of each other.

Axmin has a 100% interest in the Sonkounkou permit from joint venture partner **Harmony Gold Mining** (JSE: HAR, formerly **Avgold**). **Avgold** may, at any time prior to a decision to mine or within three months of a decision to mine, claw-back up to a 51% participating interest in the project by paying **Axmin** an amount equal to two times the funds expended to that date by **Axmin**, multiplied by the percent interest to be clawed back by **Harmony**. The government of Senegal retains the right at the time of a decision to mine from the property, to elect to participate in the project for a 15% free carried interest and has a further right to purchase an additional 5% participating interest. The government's interest is subject to reduction upon negotiation at the mining stage.



At the Sonkounkou permit, infill soil sampling and mapping, supplemented by limited float sampling has identified initial drill targets. One target includes an abandoned artisanal excavation on a quartz vein from which a grab sample yielded 17 g/t Au, while a silicified wall rock sample yielded 13 g/t Au.

At the second target, Diabougou, soil sampling has identified a northwest trending anomaly at 100 ppb gold threshold of at least 1,400 m strike length. The area is underlain by a complex of felsic volcanics, basic intrusives and sediments within which occur zones of silicification and quartz veins trending northeast. Grab samples of quartz vein and silicified felsitic surface float within and adjacent to the anomaly give results that include: 77 g/t Au, 17 g/t Au, 10 g/t Au, 5.7 g/t Au, 4.7 g/t Au and 3.5 g/t Au as well as 5 further samples lying in the range of 0.5 to 1.3 g/t Au.

Axmin also holds a 100% interest in the Sabodala NW permit, some 22 km southwest of Sonkounkou, which was awarded on January 18, 2002 by the government of Senegal. The government retains a right to take a 10% free carried interest.

At the Sabodala NW permit a zone of quartz stockworks of at least 12 m width has been identified within a zone of abandoned artisanal workings occurring over a 120 m strike length within a 1,500 m long soil anomaly (50 ppb Au threshold). A grab sample of weathered and altered granodiorite, presumed to represent wallrock graded 3.6 g/t Au while a float sample of the quartz vein material graded 22 g/t Au.