

Burkina Faso emerges as a gold-mining powerhouse

One of the most extraordinary developments seen in West Africa in recent years has been the emergence of Burkina Faso as a major gold producer. Roughly a decade ago the country did not have a single modern commercial-scale gold mine – the government-operated Poura mine having closed in 1999 – and cotton was the country's main export commodity. Today there are 10 gold-mining operations in the country with another two gold mines under construction and gold now accounts for over 60 % of total exports. In this article, **Modern Mining's** Arthur Tassell looks at the gold mining scene in the country, including the prospects for further growth in the sector.

According to the country's Ministry of Mines, Burkina Faso is predicted to produce around 45 tonnes (1.44 Moz) of gold in 2017. If this is achieved, it could possibly make the country Africa's fourth biggest gold producer after South Africa, Ghana and Mali given that Tanzania (which normally holds the fourth ranking) produced 1.42 Moz in 2016 and may not exceed this figure in 2017. Prospects for Burkina Faso's production to grow even further over the next several years are good with several projects already at an advanced stage of development and in some cases deemed to be 'shovel ready'.

The country scores reasonably well in the Fraser Institute's annual survey of mining jurisdictions around the world, being rated (in the 2016 survey) as the eighth most attractive

investment destination in Africa – below some other West African countries such as Mali, Ivory Coast and Ghana but above Namibia, Tanzania and South Africa. The mining code of Burkina Faso entitles the state to a 10 % ownership of all mining operations on a free carry basis.

Of the existing mines, the biggest single producer is **Essakane** with an annual gold production in the 370 000 to 380 000 ounce range. Owned by Canada's IAMGOLD Corp, it is located in the far north-east of the country (and close to the border with Niger). IAMGOLD's involvement with Essakane dates back to its acquisition of Orezone Resources in 2009, when the project was in its development phase. Essakane began commercial production in July 2010. Mining is carried out using conventional open-pit methods by an owner fleet with the annual mining rate being in the



vicinity of 50 Mt. In the first quarter of this year, the mine's production was 93 000 ounces at an AISC of US\$973/oz.

IAMGOLD announced earlier this year that the mine had entered into an agreement for the development of a 15 MW solar power plant to complement the existing 57 MW heavy fuel oil power plant on site. Commissioning is expected by the end of this year.

Essakane has no major expansion on the

horizon but is currently drilling and evaluating the **Falagountou East** deposit, which has the potential to deliver low-cost, high-grade saprolite ore. A resource estimate is expected later this year.

Another major player in Burkina Faso's gold mining industry is Nordgold, now delisted from the LSE, which operates nine gold mines around the world including four in Russia. It has three mines in Burkina Faso – Taparko,

The GG2 pit at Endeavour Mining's Karma mine, which was commissioned last year (photo: Endeavour Mining).

The Taparko mine of Nordgold, opened in 2007, was the first of Burkina Faso's 'new generation' mines (photo: Nordgold).

Nordgold's Bouly mine, seen here, started production in September 2016 and has performed above expectations (photo: Nordgold).





Above: A very recent view of SEMAFO's Boungou project, which represents a US\$231 million investment by the Canadian company (photo: SEMAFO).

Right: Endeavour Mining's Houndé project showing the 3.0 Mt/a processing facility under construction (photo: Endeavour Mining).



Housing forming part of a resettlement project at Houndé has been completed (photo: Endeavour Mining).

Bissa and Bouly (although Bouly functions as a satellite of Bissa). The three operations produced around 324 000 ounces of gold in 2016 but this figure will grow in 2017 when a full year's production is registered by Bouly (which only came on line in September last year).

Taparko, located 200 km north-east of Ouagadougou, was the first 'new generation' gold mine to be built in Burkina Faso and poured its first gold in late 2007. Mining operations currently consist of three separate open pits located at Taparko and one satellite pit at **Bouroum** with the ore being processed in a conventional plant which includes three stages of crushing, ball milling and CIL circuits. Its gold production in 2016 totalled approximately 111 000 ounces – well up on the 2015 figure – at an AISC of US\$1 045/oz. The mine is currently working on the permitting of the satellite **Goengo** deposit in order to start its development and mining in H2 2017.

Nordgold's **Bissa** mine is its flagship operation in the country and is located 85 km north of Ouagadougou, Burkina Faso's capital. In production since early 2013, it is a multi-pit operation served by a straightforward CIL plant. In 2016 it produced just short of 186 000 ounces, well down on the 2015 figure of 235 000 ounces with Nordgold attributing the decrease to lower ore mined volumes and head grade mainly related to higher waste stripping activities performed in order to facilitate open pit cutbacks for higher grade ore supply in 2017.

The Bissa complex was expanded in 2016 with the launch of a heap leach operation at the nearby **Bouly** deposit. According to Nordgold, the project – representing an investment of US\$140 million – has been a

huge success and has "delivered well ahead of expectations". It was built in 13 months, on schedule and under budget, and reached its full capacity within two months of commissioning. Bouly's average annual production will be approximately 120 koz over a mine life of 10 years. It produced 31,4 koz of gold in 2016, ahead of production guidance of 20 koz.

A company which is growing its footprint in Burkina Faso is Canada's SEMAFO, which operates the **Mana** mine, located 260 km south-west of Ouagadougou. Mana is reportedly the third largest mine in the country and has produced some 1,6 Moz since its first gold pour in 2008. The gold plant has been expanded four times since commissioning to a current capacity of over 7 200 tonnes per day. In 2016 Mana's gold production totalled 240 200 ounces.

A second mine in Burkina Faso for SEMAFO is on the way in the shape of **Boungou** (previously known as the **Natougou** project), which involves a capex of US\$231 million – which will be paid back in just 18 months. Located in the south-east of the country, Boungou will be a high-grade open-pit mine with the processing facility consisting of a 4 000 tonnes per day CIP plant.

It is expected to produce approximately 1,2 Moz over a projected life of mine in excess of seven years with average annual production of more than 226 000 ounces in the first three years. During these three years, the average total cash cost is estimated at US\$283/oz and the AISC at US\$374/oz with the average head grade being 5,72 g/t. The mine is set for commissioning in the second half of 2018.

Acquired by SEMAFO from Orbis Gold in 2015, Boungou is already in construction,

with the ground-breaking ceremony having been held at the end of March this year. In its quarterly report for the period ending 31 March 2017, SEMAFO said the bulk earthworks for the processing plant, water storage facility and the resettled village were underway and that both the mining contractor (African Mining Services or AMS) and EPCM contractor (Lycopodium) had mobilised to site. At the end of the reporting period, over 900 workers were active on the project.

Located in the same neck of the woods as Mana in the Houndé greenstone belt is one of the newest mines in the country, Roxgold Inc's **Yaramoko**. This is an underground operation – accessed by a dual ramp system – which poured its first gold in May last year, just a little over five years from initial discovery. According to Roxgold, a Canadian company listed on the TSX, it was built within its budget (approximately US\$111 million) and ahead of schedule and is one of the highest grade gold mines in the world (with the head grade during Q1 2017 being 17,3 g/t). The EPCM contractor for the project was a DRA/Group Five JV while the mining is in the hands of a subsidiary of African Underground Mining Services (AUMS).

Yaramoko produced 112 709 ounces of gold between its first gold pour and 31 March this year at an average cash cost of US\$384 per ounce produced and expects to produce between 105 000 and 115 000 ounces in 2017 at a cash operating cost of US\$445 to US\$490/oz (and an AISC of US\$740 to US\$790/oz).

The first growth project associated with Yaramoko is likely to be the development of the **Bagassi South** deposit, located 1,8 km south of the existing (Zone 55) mine and plant. A feasibility study on the project – estimated to involve a capex of US\$32 million – is due for completion in Q4 2017. Assuming it gets the go-ahead, Bagassi South will deliver approximately 185 000 ounces of gold over a five-year period at an estimated average grade of 9,5 g/t from a 350 tonnes per day (tpd) underground mining operation. To treat the ore, the existing plant would need to be upgraded from 750 tpd to 1 100 tpd. At this stage, it is envisaged that mine development could commence in Q1 2018 with first ore being delivered in Q3 2018.

Another mine to come on stream last year is **Karma**, now within the stable of TSX-listed Endeavour Mining after Endeavour absorbed True Gold Mining in April 2016. Karma is a 4 Mt/a shallow open-pit, heap leach operation which now has a plus 10-year mine life (following the conversion of a major part of the previous inferred resource at the North Kao deposit into the reserve category). It is expected to produce between 100 000 and 110 000

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ounces of gold in 2017 at an AISC of US\$750 to US\$800/oz.

Endeavour is busy building a second mine, **Houndé**, in Burkina Faso. This will be an open-pit operation equipped with a 3,0 Mt/a gravity circuit/CIL plant and has an initial capital cost of US\$328 million, inclusive of US\$46 million for the owner-mining fleet. Construction – Lycopodium is the EPCM contractor – began in April 2016 and the first gold pour is expected in the fourth quarter of this year. The mine will have an average annual production of 190 000 ounces at an AISC of US\$709/oz over an initial 10-year mine life and will rank as Endeavour's flagship low-cost mine.

Endeavour recently reported that the project was running on time and within budget. It also noted that the site had achieved 4 million hours without a lost time injury (LTI). Mining of ore has started and Endeavour is planning to have 600 000 tonnes of ore stockpiled on the ROM pad for plant commissioning.

An established mine which has encountered problems is **Inata**, located 200 km north of Ouagadougou and owned by Avocet Mining. In production since late 2009, it is a multi-pit operation served by a 1,6 Mt/a CIL plant that produced 72 485 ounces of gold in 2016. The mine has, however, faced a multitude of challenges in recent months including creditor pressure, tight margins, the seizure last year by bailiffs (acting on behalf of disaffected workers) of a 1 400-ounce gold shipment, and the mechanical availability of the mine fleet and the plant.

Avocet has said that the mine will produce between 75 000 and 85 000 ounces of gold in 2017 but it is not clear at the moment to what extent the mine is operational as Avocet announced on 10 May this year that the majority of workers had been put on what it terms "technical unemployment" for a period of three months. The company's shares on the LSE and the Oslo Børs were recently suspended after the company failed to publish its annual report within the stipulated time frame. The latest development is that the company has advised that it has reached a 'standstill' agreement with its major creditors for a two-month period.

Inata has roughly three years of reserves remaining but – should it overcome its present problems – its life could be extended via three satellite deposits. Under current plans, the first



The processing plant at Roxgold's Yaramoko mine, an underground operation accessed by a ramp system (photo: Roxgold).

to be brought into operation would be **Souma**, located 20 km from the Inata plant, which has measured, indicated and inferred resources of 11,63 Mt at a grade of 1,81 g/t for 675 000 ounces of gold. Avocet says that to bring Souma into production would require US\$5 to US\$7 million of funding to cover drilling and a feasibility study and a further US\$5 million in capex to cover pit works, a haul road and enhancements to the crusher.

A relatively new entrant to Burkina Faso is Avesoro Holdings (formerly MNG Gold Holdings), a Turkish group, which purchased the advanced **Balogo** project from Australia's Golden Rim Resources in 2015 and the operating **Youga** mine – which produced around 68 000 ounces in 2015 – from Endeavour Mining in 2016. Both Balogo and Youga are situated in the south of the country near the border with Ghana and are now logistically linked via a 160 km road rehabilitated in 2016 by Avesoro. Low-cost owner-operator mining began in March this year at Balogo (in the Netiana starter pit) with the ore being transported to Youga for processing by a fleet of 30 Volvo trucks purchased at a cost of US\$2,5 million. The trucking costs are reported to be US\$19/ton.

Both Youga and Balogo could become part of Avesoro Resources (formerly Aureus Mining), a company that runs the New Liberty gold mine in Liberia. Avesoro Resources – whose cornerstone shareholder is Avesoro Holdings – announced in May this year that it was considering a range of growth opportunities, including the acquisition of Youga and Balogo.

Moving from mines to advanced projects, a promising fully permitted, high grade, open-pit

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project is **Banfora** in the south-west of Burkina Faso, acquired by Teranga Gold Corporation last year as part of its acquisition of ASX-listed Gryphon Minerals. Teranga, a Canadian-based company which owns Sabodala, the only commercial scale gold mine in Senegal, is expecting to complete a feasibility study on Banfora by mid-year and anticipates a construction and financing decision later this year. If the project is approved, the anticipated first gold pour would be in H1 2019. Gryphon had intended to develop Banfora – which has a roughly 3 Moz resource – utilising a 2 Mt/a heap leach facility but Teranga's preferred development path is based on an optimised CIL flowsheet.

Also on line for a 2019 startup is **Sanbrado** (formerly known as **Tanlouka**), which is being developed by Perth-based West African Resources, listed on the ASX and the TSX-V. The company claims to be the largest ASX landholder in Burkina Faso controlling roughly 1 000 km² of the country's greenstone belts and recently completed an open-pit feasibility study for the project, which has probable reserves of 894 000 oz (16,8 Mt at 1,7 g/t Au) and indicated resources of 1,3 Moz (29,75 Mt at 1,4 g/t Au) using a 0,5 g/t cut-off.

Sanbrado is located approximately 90 km east-south-east of Ouagadougou. Another fully-permitted project in this area is **Bomboré**, controlled by Canada's Orezone Gold Corporation, which is listed on the TSX-V. Bomboré has a measured and indicated resource of 4,77 Moz. Orezone's plan is to develop a combined heap leach/CIL operation that does not require any grinding or cement agglomeration and should yield overall recoveries of 87 %. The initial focus would be on the shallow oxide resource although the company points out that the standard CIL circuit could be expanded to process the large underlying sulphide resource. The company is reviewing and updating the feasibility study on the



A drill rig working at Banfora, a promising, fully permitted, high grade, open-pit project in the south-west of Burkina Faso (photo: Teranga Gold Corporation).

project. This has been delayed slightly and is now expected in the third quarter of this year.

Finally, it should be stressed that the country's exploration scene remains very active. Among the companies with projects in the exploration phase are Canada's Nexus Gold, Sarama Resources and B2Gold and Australia's Golden Rim Resources, Centamin Mining and Predictive Discovery. In terms of resources, probably the biggest of the projects is B2Gold's **Kiaka**, which is low in grade but has a 4,6 Moz measured, indicated and inferred inventory, and Centamin's **Konkera**, which hosts a 3,2 Moz indicated and inferred resource. Also very promising are Sarama's **South Houndé**, **Karankasso** and **Bondi** projects in the Houndé gold belt which collectively have 3,2 Moz in inferred resources. Sarama is in joint venture with Acacia (Tanzania's biggest gold miner) at South Houndé and with Savary Gold, listed on the TSX-V, at Karankasso. ■

Sanbrado project nears a development decision

As detailed in the interim open-pit feasibility study released by West African Resources earlier this year, the Sanbrado project is to be developed as an open-pit operation with processing via a conventional 2 Mt/a CIL/gravity plant. A production of plus 150 000 koz/a is anticipated over the first three years and 93 koz/a over the nine-year life of mine (LOM). The mine will have low all-in sustaining costs of US\$708/oz over the first three years and US\$759/oz over

the LOM. The study estimates a two-year payback on the US\$131 million capex (including pre-production mining and contingency).

Sanbrado is 'shovel ready' with mining and environmental permits already approved. An optimised DFS is underway which, among other things, will examine the viability of underground mining in the M1 South portion of the deposit. West African Resources is expecting to make a decision on whether to proceed

with mine development shortly and anticipates that construction could start late this year, allowing the mine to commission in 2019.

Latest diamond drill results from the project have been spectacular with West African Resources reporting in mid-May that high-grade results from depth at the M1 South deposit have included 29,5 m at 20,67 g/t Au from 349,5 m including 0,5 m at 472,2 g/t Au. It said that it had five drill rigs working on site on a double shift with an additional rig on the way. ■