

SENEGAL

By Dr Kevin Leahy

Environmental Resources Management Ltd, Oxford, UK

Located at the western extremity of Africa's tropical zone, Senegal is bounded to the west by the Atlantic Ocean and to the north, east and south by Mauritania, Mali, Guinea and Guinea Bissau. It surrounds Gambia on three sides. French is the official language, with Wolof the most widely spoken Senegalese language. Dakar, the capital, is located on the Atlantic coast, and is an important commercial centre for the region. Senegal has high eastern and southern borderlands, but otherwise consists of relatively fertile coastal and alluvial plains, with the north-central plains suffering from encroaching desertification. There are two main seasons: a hot, humid rainy season from May to November, and a dry season from December to April dominated by the hot, dry, harmattan winds.

Senegal is one of Africa's most politically stable countries - a multi-party democracy since independence from France in 1960. The country's veteran opposition leader, Abdoulaye Wade, became President in 2000, ending 40 years of *de facto* one-party rule, and is now on his third Prime Minister in the past two years with the appointment of former Minister of Mines, Macky Sall.

Separatist violence in the southern Casamance region has rumbled on over the past two decades. The peace deal signed in 2001 split the rebels, with moderates now engaged in political discourse, and other factions relatively quiet in 2003. The domestic economy is dominated by the service sector, with the agriculture sector next most important, currently affected by persistent droughts. Senegal has recently implemented various economic reforms designed to encourage foreign investment, including in the mining sector. Drought, separatist violence and the general global downturn have had little effect on the Senegalese economy, with GDP growth set to develop from modest levels (2% to 5%) in the past five years to over 6% in 2004, while inflation remains below 2%.

Mineral resources consist primarily of phosphates, but interest in gold, iron and hydrocarbon resources is growing. Senegal's geology includes a large Middle Jurassic to Recent coastal basin, where important reserves of alumina and calcium phosphate are found. In the higher land to the south and east of the country, Archaean basement and Proterozoic supracrustals (mainly Birimian volcanoclastics) are exposed. This Proterozoic arc-accretionary complex contains several major shear zones, including the Senegal-Mali Structural Corridor (SMSC), and hosts the bulk of the country's gold, copper, iron and diamond occurrences.

In a reflection of the cyclical nature of the industry, the Ministry of Mines has been buzzing with activity in the past year, with several new government initiatives and the high gold price leading to renewed interest from the exploration sector. President Wade first raised the curtain on the new drive to

develop the mining sector in June 2003, quickly followed by an announcement from the Environment Minister, Modou Fada Diagne, indicating a determination that the sector would be developed in the most sustainable way. The Minister stated that, in an effort to preserve Senegal's shrinking forests, there will be no new permits in designated forest conservation areas, and future exploration or mining permits anywhere in the country will be based on social and environmental impact studies. A Ministerial reshuffle in August 2003 saw the appointment of Madické Niang, a recent Minister of the Environment, as the new Minister of Mines and Energy. The new impetus drove through the long-planned revised mining legislation, with a new Mining Code winning parliament approval on November 12, 2003.

In the new Mining Code, which awaits final ratification by Presidential Decree, the philosophy has been to encourage international investment. On the positive side, exploration permit holders will be free from corporate tax and other levies, whilst miners will enjoy a waiver on VAT, exoneration from a fixed minimum tax, and freedom to export without royalty or other taxes being imposed. However, in a move against the general trend of mining legislation reform, the government has virtually full rights to set the level of its own stake in a mining operation, with up to a 10% free carried interest, and the remainder by negotiation with the operator.

How the new Code will affect industry sentiment towards Senegal is unclear, but the level of interest in the government sell-off of the Sabodala gold mine suggests that most regard it as a positive step. Throughout 2003 the government had been tendering interest in the Sabodala mine, the subject of a legal wrangle that eventually sunk the Australian junior company, Paget Mining, in 1998. The developed mine, located in the prolific SMSC in southeastern Senegal, has at least 15 t of proven gold in place, with up to 30 t probable, and good prospects for more.

The mine has become somewhat of a *cause célèbre* within government circles, with statements issued about the importance of the immediate development of the mine. Indeed, the ability of bidders to get the gold pouring in the shortest possible time has been one of the key criteria of the tender. Bidders have flocked in, with submissions from explorers already in Senegal, such as Randgold Resources Ltd and Iamgold Corp, as well as attracting bids from Placer Dome Inc, Cluff Mining plc, Defiance Mining, MA Consulting, Managem and Newmont Mining Corp.

Newmont has a long history with Sabodala stretching back to the Paget Mining fiasco, which has come back to haunt the tender process. Newmont and the operating Senegalese mining firm, Eeximcor, were former combatants in the long-running land rights dispute between themselves, Paget Mining and the government, which was never fully resolved and is now blocking the award of the Sabodala mining permit. Despite various manoeuvres and offers of nearby properties to the injured parties, the government has deferred the award date from December 2003 until late 2004.

In the minerals sand sector, exploration by the Australian miner Mineral Deposits Ltd (MDL) culminated in the award of a four-year permit to exploit ilmenite, zircon and rutile in coastal sands north of Dakar. The deposits were previously delineated by DuPont Chemicals of the US in the early 1990s, with a declared reserve of 723 Mt averaging 2.66% target heavy minerals, based on a 1.5% cut-off. DuPont also defined a core of high-grade mineralisation comprising 150 Mt averaging 4.9% target heavy minerals, including 400,000 t of high-quality zircon (MDL's priority mineral). The permit compels MDL to spend at least US\$950,000 on exploration and production over the next four years, and gives the Senegal Government a 19% stake.

The phosphates sector dominates the mining industry in Senegal; Industries Chimiques du Senegal (ICS) produced 1.47 Mt of phosphate rock in 2003, declining from levels around 2.5 Mt in the early 1990s. Other Senegalese phosphate producers are thought to contribute about 200,000 t/y. Almost all of the ICS production is converted to phosphoric acid and fertiliser within Senegal, before being exported to India, Iran and Japan. ICS upgraded one of its phosphoric acid plants in 2001, and has since doubled its acid production. The increased local phosphate-rock requirements are being met in the Tabia mining district by the opening of the Tobene mine site in October 2003. Tabia production has been pegged at up to 2.2 Mt/y, and there are plans to raise this to 2.5 Mt/y. The Tobene site will supplement the Keur Mor Fall deposit which has seen waning production figures.

Gold exploration in Senegal is now at levels not seen since the mid-1990s, with active exploration in 2003 and 2004 from Randgold Resources, Iamgold and Axmin, and several other groups are lining up for permits. The area of interest 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 SMSC, which runs through the Sadiola Hill and Loula deposits in Mali, trends south through several permits on the Senegalese side of the border.

Randgold is now four years into an exploration programme on the SMSC at its Kounemba, Kanoumering and Tomboronkoto permits, which total 1,200 km². Randgold has defined several targets, including five significant gold intersections with multiple gold-in-soil anomalies. The Makana target in the Kounemba permit comprises a gold-in-soil anomaly extending 4km along structure from the Sabodala Mine, with values up to 8.9 ppm Au, and near-surface bedrock samples yielding up to 3.9 g/t Au. Makana runs south into two further key targets in the Kanoumering permit. Further south still the 'BA' target on the Tomboronkoto Permit is located in north-trending silicified zones in granodiorite over a 300 m strike length, with one drill hole intersecting 11 m at 2.6 g/t Au. Tomboronkoto was previously operated by the Iamgold-Ashanti alliance that outlined an inferred resource of 150,000 oz at an average grade of 2.0 g/t Au. Randgold has applications outstanding for further exploration permits in contiguous areas.

Iamgold is currently evaluating prospects on the Bambadji and Daorala-Boto permits, where the search for both typical Birimian greenstone gold, and Olympic Dam-type deposits continues. The 2003 exploration budget was US\$1.1 million. The year saw the completion of a 12,000 m, 186-hole drill programme on the Bambadji project. The best results came from the structurally complex 'BA' target where significant mineralisation was intersected in two areas 800 m apart: highlights included 10 m at 16.1 g/t Au and 16 m averaging 6.5 g/t Au.

Canadian-listed Axmin has taken a 100% interest from former partners Avgold in the active Sonkounkou and Sabodala-NW permits located close to the Mali border in the SMSC. The geology comprises a complex of felsic volcanics, basic intrusives and sediments, with quartz veins and silicification in northeast-trending structural zones. Drill targets at Sonkounkou have been identified from infill soil sampling and mapping, supplemented by limited float sampling. At the Sabodala-NW permit, a zone of quartz stockworks exceeding 12 m width has been identified within a zone of abandoned artisanal workings occurring over a 120 m strike length.

Cluff Mining has long held an exploration permit at Niokolo in southeastern Senegal, which has become one of the assets transferred to Cluff Gold as part of the recent company re-organisation. This transfer may yet see exploration renewed, although the permit is likely to be near the end of its duration.

In the iron ore sector, Kumba Resources' due diligence study of the Faléme deposit concluded that the property could only have commercial potential if infrastructure development were to be funded by government or international organisations. The total available iron ore reserves at Faléme are estimated at 350 Mt, in addition to further reserves of about 250 Mt in the Farangalia and Goto deposits.