

SENEGAL

By Dr Kevin Leahy

Exploration Consultants Ltd, Henley-on-Thames, UK

Located at the western extremity of Africa's tropical zone, Senegal is bounded to the north by the Senegal River which separates it from Mauritania, to the east by Mali, to the south by Guinea and Guinea Bissau, and surrounds The Gambia on three sides. French is the official language, with Wolof the most widely spoken Senegalese language. The capital city of Dakar is located on the westernmost point of Africa, and is referred to by many as the Paris of West Africa.

Senegal is a gateway to the continent; it has some of the best commercial facilities in West Africa, with good international and domestic transportation links. Although its industrial base is smaller than that of rival Côte d'Ivoire, many companies use Senegal as a regional centre for West African operations.

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.

The domestic economy remains heavily dependent on agriculture, primarily the peanut crop. Other major exports are phosphates, fish and cotton. Senegal has phased out most quantitative restrictions on imports, has reduced tariffs, dismantled monopolies, liberalised the labour market, and is slowly privatising state-owned industries to re-establish the conditions for sustained growth and increased private investment. Mineral resources consist primarily of phosphates. Significant mineral reserves include petroleum discovered off the

Casamance coast, and iron-ore in the upper Faleme Valley.

Senegal is also known as one of Africa's most politically stable countries - a functioning multi-party democracy has evolved since independence from France in 1960. The country's veteran opposition leader, Abdoulaye Wade, was sworn in as President in April 2000, ending 40 years of *de facto* one-party rule. One year on, Wade has secured a landslide victory at the parliamentary election, and looks set to build on the steady economic growth of the past year. In March 2001, the Senegalese Government and the separatist Casamance Movement of Democratic Forces cemented a peace deal that should end the war that has rumbled on in the south of the country for two decades.

The mining industry is regulated by the Ministry of Mines, now led by Eugene Ngor Faye, after the stepping-down of long-time Minister, Professor Abdoulaye Dia. Under Senegal's mining code, general prospecting requires a simple authorisation from the Director of Mines. Exploration licences are granted for four years and can be renewed twice, with each renewal lasting for three years. Agreements are negotiated between the parties to define the basic conditions of exploration and the key terms for exploitation. After minerals are discovered through exploration, the holder of the research permit has absolute priority when applying for an exploitation permit or a mining concession. Exploitation licences last five years and can be renewed every five years. A mining concession has a duration of 25 years and is renewable for 25 years. There has recently been an initiative to standardise the mining tax arrangements of a number of francophone West African States. This means that Senegal, which is not currently a

prime exploration destination, will offer the same fiscal exploration package as more established countries for exploration, such as Mali.

Senegal's geology is marked by a large coastal basin of mid-Jurassic to recent age, where important reserves of alumina phosphate and calcium phosphate are found. In the higher land to the south and east of the country, the Archaean basement and Proterozoic supracrustals (mainly Birimian volcanics) outcrop. This Proterozoic continental-arc terrane contains several major shear zones, and hosts the bulk of the country's gold, copper, iron and diamond occurrences.

The phosphates production sector dominates the mining industry in Senegal; 1.5 Mt of phosphate is produced each year, accounting for up to 17% of export earnings. Value addition takes place with a large quantity of phosphate production converted to phosphoric acid and fertiliser within Senegal. Phosphate production has declined by approximately 30% since the early 1990s and export levels remain restricted as a result of increased domestic conversion of rock into phosphoric acid for export. A new phosphoric acid plant is due to be completed this year, substantially increasing local rock requirements. Industries Chimiquet du Senegal (ICS) is planning a new US\$100 million phosphate mine in the Matam area, which hosts a 40.5 Mt deposit of dry phosphates. This will eventually replace the existing Taiba operation and support the new phosphoric acid plant. Further ahead, ICS is looking at the possibility of increasing rock export levels, again in conjunction with the expansion planned in mine capacity when its new chemicals expansion takes place.

Gold is mined in very minor amounts but, in common with Mali, has had a long and important history in the commerce of the region. The area of greatest interest for gold is the extreme south-east of the country bordering Mali and Guinea, where a large

inlier of Precambrian (Birimian) metamorphic rocks is 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 lies only 10 km north of the IAMGOLD Bambadji concession. On the Bambadji permit, significant gold values in drill holes include an intersection of 21.5 m at an average grade of 17.7g/t, which is the target of on-going follow-up drilling. Ashanti Goldfields has yet to earn-in a 50% interest at Bambadji by spending US\$5.9 million on exploration, where in excess of US\$4 million has been spent to date.

Ashanti Goldfields and IAMGOLD have a joint venture project on the Mako concessions. Drilling on the Tomboronkoto anomaly within the Mako concession outlined an inferred resource of 150,000 oz at an average grade of 2.0 g/t. The Ashanti-IAMGOLD Alliance is looking for a joint venture partner to develop the project, and has also applied for another concession at Soukouta, near Mako.

Ashanti Goldfields also owns the Daloto-Toundifara concession, originally owned by Samax Gold. Exploration was focussed on the two large artisanal fields and drilling confirmed potential for economic grades and mineralisation. IAMGOLD continued exploration work on the Daorala-Boto property, once part of the Ashanti-IAMGOLD Bambadji agreement, but now solely owned by IAMGOLD since mid-1998. Work was concentrated close to the Senegalo-Malian fault, a splay-fault which was believed to be an important control on the gold mineralisation at Mali's Sadiola mine.

The rights of ownership of the Sabodala property, with indicated gold reserves of 30 t, remains in the hands of the state-run Société Minière de Sabodala (SMS) after Australian junior, Paget Mining, dropped ownership claims. This followed a costly six-year battle, abandoned when the company moved from resource exploration to a dot.com travel service in March last year. The Ministry of

Mines has received several expressions of interest from exploration companies operating in Senegal, but as yet the fate of this permit remains unresolved.

Etruscan Resources acquired a 90% equity interest in Secor Geomin Mining and Development Corp., which held the 450 km² Bousankoba Permit, and also made application to the Ministry of Mines for the adjacent Baitilaye permit. Exploration identified a regional gold-arsenic anomaly that has been traced across the entire permit over a distance of 30 km. The geochemical anomaly is coincident with a unique geophysical trend that is apparent from the airborne magnetic data and may represent a structural break or a distinct lithology within the sedimentary sequence. The property remained inactive during 2000 as the company focused its attention on the development of the Samira Hill deposit in Niger. Discussions are ongoing to seek a capable joint-venture partner to continue exploration on these permits.

Activity at the Souroumdou permit is thought to have ceased after Randgold Resources withdrew in 1999. Airborne geophysical, magnetic and radiometric surveys were conducted by Avgold over the Sonkounkou property in mid-1999. Results were to be integrated with ground exploration results to identify targets for follow-up work. However, in line with Avgold's policy of reducing

exploration expenditure, the company's interest was to be disposed of.

The licence for the Madina-Foulbe permit, previously held by the AngloGold-Barrick Consortium, was granted in mid-1999 to Takoradi Gold of Ghana and the Australian company, Tarcoola Ltd. The latter also has an interest in the Moura concession, owned by Prospector International Resources Inc. and Sengold Mining NL, although a second phase of trenching work is still on hold owing to market conditions. Cluff Mining was awarded the 380 km² Niokolo gold and base metal permit in May 1999, and Australian junior Hargraves Resources NL secured an exploration licence in June.

Two associated copper and gold prospects are being explored. BHP is exploring in the Bakel area close to the borders with Mauritania and Mali. The other prospect is near Diabal, where former workings indicate copper potential, and occurrences are possible in a sector near the Mauritanian copper mine of Akjout.

The total available iron ore reserves at the Faleme iron ore project are estimated at 391 Mt, sufficient for mining over 30 years at the planned production rate of 12 Mt/y of marketable products. In addition, there are further reserves of about 250 Mt in the Farangalia and Goto deposits.