MADAGASCAR

By Paul Crankshaw

Madagascar's news-making developments leading into 2004 were both in heavy minerals: the feasibility study at Tulear and the on-going QIT Madagascar ilmenite project near Talagnaro.

In the first of these developments, Madagascar Resources NL (MRNL) is to conduct a feasibility study at its Tulear mineral sands deposits after it signed a deal in late 2003 with Kumba Resources and Ticor, giving the latter two companies the option to purchase the property after the study is completed. The deposit, located in the southwest of the country, could supply ilmenite feedstock to Kumba's smelting facilities at Empangeni in South Africa. These facilities would be expanded if the additional feedstock was available.

Second on the news front was Rio Tinto's Canadian subsidiary, QIT Madagascar, which continues to work through environmental and other regional development issues as part of the evaluation of its ilmenite project near Talagnaro (formerly Fort Dauphin) in the southeast of Madagascar. The company was awarded an environmental permit in late 2001, which paved the way for a series of detailed and lengthy studies on social, environmental, economic and technical issues. These studies are still expected to take some time, and must involve broad consultation with local people.

If the outcome of these studies is positive, the Malagasy Government would then review the project in the light of regional development priorities. Only if this review supported mining could the project initiate final feasibility and project-financing studies.

QIT Madagascar began work at Talagnaro, one of the world's few high-quality deposits, in 1986. Delineated ore reserves are over 600 Mt, with average grades of 4.3% ilmenite and 0.2% zircon. At the Mandena site, deposits contain the largest free-flowing, high-grade ilmenite body in the world amenable to the chlorine processing route. The ilmenite contains 62% TiO_2, a feature that makes the ore suitable for the production of either slag or synthetic rutile, or for use directly as a pigment feedstock.

It is estimated that the Talagnaro project would require some US$350 million in capital investment, with much of this dedicated to a new port (the current port facilities would not cope with the tonnages envisaged in the mining plans) and a new road from Mandena to the port.

While Madagascar holds considerable interest for large projects from world-class players in the industry, there are a number of smaller explorers in the country who occasionally report interesting finds. Among these is London-listed Jubilee Platinum plc, which also has ongoing work in South Africa and

Sierra Leone. Jubilee's Londokomanana project is an earn-in option in the Mahajanga province in the north of Madagascar. Platinum group metals were first encountered here between 1960 and 1971 by the Bureau des Recherches Geologique et Minière (BRGM) of France, during its exploration for gold and base metals in the region. Jubilee has carried out soil sampling and has outlined a zone of mineralisation 700 m long and 300 m wide; it plans to start further soil sampling, trenching and ground geophysics to identify drill targets. Encouraged by results so far, the company has also acquired additional properties where previous reconnaissance exploration has yielded geochemical soil-sample anomalies.

The project which probably holds the most potential for Madagascar continues to be Phelps Dodge Corp's Ambatovy nickel-cobalt deposit, where feasibility studies indicate mineable reserves of over 80 Mt. The wider area surveyed is thought to host over 250 Mt averaging 1% Ni and 0.1% Co, and could support a mining operation in excess of 40 years.

The capital required to fund the project amounts to over a billion dollars, much of which will be required to install or upgrade infrastructure; the property is about 120 km from the port at Tamatave and 100 km from the capital, Antananarivo. Mining plans envisage an open-pit, free-digging operation using shovels and trucks. Over 3 Mt/y of material would be processed to deliver 36,000 t/y of nickel and 3,000 t/y of cobalt.

Investor-friendly conditions introduced by the Malagasy Government in 2001 would give large projects (those with investment exceeding US$150 million) certain tax and import duty incentives. Import duty on capital goods has been reduced from 10% to as low as 1%, and income taxes could be reduced from 35% to 25%. An investment tax credit was to be allowed, based on a formula related to the capital expenditures. Furthermore, if value is added to the nickel or titanium metal within the country, the income tax rate is further reduced.

Future prospects aside, the formal mining sector in Madagascar is not a substantial contributor to the country's economy. Excluding gold and gem production by artisanal miners, mining makes up less than 1% of GDP and employs just 1% of the workforce. If the informal sector is included, however, the contribution to GDP is around 3%.

Madagascar is the world's tenth-largest chromite producer. The state-owned Societe Kraomita Malagasy (Kraoma), which is Madagascar's main chromite producer, outputs around 40,000 t/y of concentrates plus 80,000 t/y of lumpy ore from the Andriamana complex, and a further 20,000 t/y from the Befandriana mine.

The country's graphite reserves are estimated at some 960,000 t. The main producer of flake graphite is Etablissement Gallois which operates three mines (Ambalafotaka, Antsirakambo and Marovintsy) on the east coast near Toamasina. There are a number of other smaller producers and important

graphite resources also occur in central and southwestern Madagascar. Production last year is estimated by the US Geological Survey to have been around 10 t.
Mica deposits, in the form of phlogopite (or brown mica), occur in sheeted form, and annual production averages 300-500 t.

The country is an important producer of gemstones, particularly of the beryllium-group varieties (the world's largest known emerald cluster was discovered in Madagascar in 1996). Small quantities of semi-precious stones (garnets and amethysts) are mined for export, and sapphire mining started in southern Madagascar in 1998.

Gold is mined informally, with current output at an estimated 3-4 t/y from some 100,000 individual miners and small syndicates. The government is concerned about the environmental impact of this sector, and has set up the Mining Sector Reform project which it hopes will lead to better control of small scale mining.

There is some gold potential if new explorers can apply modern exploration technology and techniques to the number of small, closed-down mines. These were often worked only for higher-grade ore, and mining only went down to the level of the water table.

Madagascar has identified deposits of bauxite, uranium, quartz, copper, lead, labradorite, rock-crystal, rhodolite and marble. There are also known deposits containing 400 Mt of iron ore, and resources of coal at Sakoa in the southeast of the island where the total resource is probably in excess of 500 Mt.

