

THE MINERAL INDUSTRY OF MOZAMBIQUE

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Mozambique is a well-mineralized country but few of its mineral deposits have been developed other than on a small scale. The multiparty elections held in October 1994, the country's first, brought expectations of long-term stability and security and increased foreign investment in the country. A great deal of exploration interest was shown in Mozambique, particularly for gold and gemstones. A new graphite mine was inaugurated at midyear, and a rehabilitated marble quarry and cutting factory was in full operation. Two major titaniferous sand projects were underway at an advanced level. Agreements were signed to advance the development of a natural gasfield, and large coal resources were being evaluated for potential development. A gold rush by artisanal miners was underway in the north of the country, an area not hitherto considered as having much gold potential. Revenues in 1994 from official sales of primary minerals were reported at about \$7.5 million but were incomplete and were likely closer to \$8 million—about 40% higher than official revenues in 1993. The increase largely was due to much higher gold sales in 1994. The only significant production of processed or secondary minerals was of cement, worth an estimated additional \$2 million. By comparison, Mozambique's gross domestic product in 1994 was about \$1.5 billion, and total exports of goods amounted to about \$164 million.²

Official data on primary mineral production and value do not take into account a significant amount of smuggling of gold and gemstones from the country. Although there were no data on the magnitude of this commerce, estimates of smuggled gold in 1994 were on the order of 4,000 to 5,000 kilograms (kg) or \$50 million to \$62 million. For gemstones, the Government estimated the value of smuggled stones at up to \$50 million per year.

Mozambique's ports and railways, now significantly rehabilitated, traditionally have been major components of the trade infrastructure of southern Africa. The transshipment of goods, particularly minerals, to and from the country's inland neighbors has been an important source of foreign exchange for Mozambique, averaging about \$25 million per year in recent years. About one-third of these revenues was believed to have been from mineral commodities.

Wages in Mozambique's mineral sector were estimated to have totaled about \$5 million in 1994. Far more important were wages earned by almost 50,000 Mozambique workers employed by mines in South Africa. Based on 1993 data from the South African Chamber of Mines, officially

repatriated wages from these miners likely totaled about \$50 million in 1994, with a similar amount unofficially repatriated. It was estimated that mining wages overall supported about 300,000 persons in Mozambique.

Mozambique has a wide variety of mineral deposits, many of which occur in Precambrian granitic terrane in the northern one-half of the country. A very large, world-famous pegmatite field occurring near Alto Ligonha and Nampula continues to produce a variety of gemstones and has produced tantalum minerals with associated subordinate columbium, antimony, and bismuth, and rare-earth element minerals, lithium minerals, and kaolin. Granitic gneisses in northern Mozambique host graphite deposits, and metasedimentary inliers to this crystalline terrane host some deposits of marble and garnet—the latter are mined from alluvial deposits. Near the Tanzania border along Lake Nyasa is a poorly known greenstone belt from which gold was being mined on an artisanal basis. Metasedimentary rocks near Manica host stratabound and vein gold deposits and some copper deposits. Small bauxite and subeconomic iron deposits also occur in this area. Large low-grade iron-titanium deposits occur in gabbroic rocks near Tete. Some gemstone and gold deposits are known near Tete, but the major mineral resource of the Tete area is of coal, which occurs in Permian (Karoo) rocks. Quaternary sands along the Indian Ocean coast north of Quelimane host large deposits of titaniferous minerals (ilmenite and rutile), zircon, and monazite, derived from the Precambrian granitic hinterland. The southern half of the country is dominated by Cretaceous and younger sedimentary rocks. These host a number of deposits of industrial minerals, especially clays and diatomite, and limestone suitable for cement. The coastal area near Beira has structural basins that are prospective for petroleum and which host significant reserves of natural gas.

The Government was seeking to increase foreign investment in Mozambique's mining sector and was revising the mining and related investment laws accordingly. In 1994, the mining law remained Law No. 2/86 of April 16, 1986, as amended by Law No. 5/94 of September 18, 1994, and as modified by the mining law regulations, Decree No. 13/87 of February 24, 1987 and Decree No. 53/94 of November 9, 1994. A new mining investment law was being drafted. Petroleum and natural gas exploration and exploitation were governed by Law No. 3/81 of October 3, 1981. The Government was attempting to improve its buying methodologies for gold and gemstones to reduce smuggling

of these valuable commodities.

As shown in table 1, the reported output of most mineral commodities increased in 1994. The reported output of gemstones was mixed but, as with gold, significantly under-represented true production because of widespread smuggling. There was no coal mining during the year, although some material was sold from stockpiles at the mine.

Few trade data were available for 1994. Official exports of goods were reported at about \$164 million. Minerals accounted for about 6% of this total, but would be much higher if smuggled material were included. Formal exports were dominated by gold, marble, gemstones, and bauxite. Exports to the United States in 1994 amounted to \$15.3 million but included only \$0.144 million in mineral commodities. Transshipments of minerals from neighboring countries included coal, ferrochromium, and asbestos from South Africa and Zimbabwe, copper from Zambia, and granite from Zimbabwe. The ore ports were Maputo-Matola and Beira; Matola's coal terminal was the most important facility and reportedly shipped 800,000 metric tons (mt) of coal in 1994. Annually, about 8.5 million barrels of refined petroleum products is offloaded at Beira for transshipment by pipeline to Zimbabwe.

Mozambique had two operating gold mines in 1994. The Chua placer gold mine near Manica was operated by a South African company, Benicon Earthworks & Mining (Pty.) Ltd. A number of technical problems that hurt output in 1993 appeared to have been resolved and production in 1994 almost doubled to about 243 kg. Mincor Resources Inc. of Canada operated the Monarch Mine, near Manica, which it had reopened in 1993. Output was reported by the company at about 93 kg. The company reported plans to double output capacity and to increase underground ore reserves through a drilling program. Unregulated artisanal mining occurred to a modest degree in the Manica and Tete areas and to a much greater degree from a relatively new gold field in Niassa Province near the Tanzania border. According to the Government, both placer and lode gold production commenced in the Niassa region in late 1992, with an estimated annual output subsequently of 4,000 to 5,000 kg. The gold was being smuggled into Tanzania. The Manica, Niassa, and Tete areas were being targeted for exploration by a number of international companies.

BHP International Minerals of Australia had an option from Kenmare Resources Plc. of Ireland to acquire up to a 75% equity stake in the Congolone titaniferous sands concession near Angoche. Reserves earlier delineated by Kenmare were reported by the company as 166 million mt (Mmt) grading 3.4% heavy minerals, mostly ilmenite, plus an inferred resource of 750 Mmt. According to Kenmare, BHP was seeking to increase proven reserves to justify a titania slag plant; slag was viewed as being more marketable than the heavy mineral concentrates envisioned by Kenmare. On the Pebane titaniferous sand concession near Pebane, Gencor Ltd. of South Africa continued infill reserve delineation drilling, begun in 1993, as part of an earn-in agreement with Edlow Resources Ltd. of the United States.

According to Edlow, resource estimates for the Pebane concession, per prefeasibility work completed in 1990, were about 250 Mmt grading 5% heavy minerals, mostly ilmenite.

The Ancuabe graphite mine north of Montepuez was inaugurated in June. The operating company was Grafites de Ancuabe S.A.R.L., a joint venture among Kenmare Resources Plc. of Ireland, 65%; the Government, 25%; and the United Kingdom's Commonwealth Development Corp., 10%. According to Kenmare, the mine's plant had an annual capacity of 10,000 mt of a coarse flake graphite concentrate grading more than 98% carbon. Production in 1994 continued to be on a test basis, albeit at a higher level than in 1993. Kenmare reported reserves of about 24 Mmt of ore grading from 3% to 11% graphite; the mine was developed on proven reserves of weathered ore of about 1 Mmt grading 11% to 12% graphite.

Most formal mining of gemstones was by Hagura Mining Mozambique Ltd., an Israeli-owned company, which operated a garnet mine near Cuamba and the Niame and Maria III emerald mines near Alto Ligonha. The company also bought gemstones from artisanal miners, as did the state-owned or parastatal cutting agency Gemas e Pedras Lapidades. The parastatal Companhia de Desenvolvimento Mineiro, S.A.R.L., mined some dumortierite near Tete.

Bentonite production from the state-owned Luzinda Mine near Maputo increased significantly in 1994 as a result of rehabilitation work begun in 1993 by the leasor-operator, PIDICO Bentonite de Moçambique, Ltd. Likewise, output from the state-owned marble quarry near Montepuez and cutting plant at Pemba increased as a result of rehabilitation and expansion work. The Government reported that quarry output continued to be constrained by poor road conditions to the cutting plant.

Of Mozambique's three cement plants, only the Nacala plant was operating, albeit at reduced capacity and using imported clinker. The Dondo plant was described as being almost operational, and the Matola plant was undergoing rehabilitation. It was planned to reopen the local limestone quarries that formerly supplied the plants but which had been closed for many years owing to security problems. In 1994, the Government reportedly sold a majority interest in the cement plants' holding company, Cimentos de Moçambique, to Cimentos de Portugal.

In terms of mineral fuels, Mozambique's largest resources are those of the Moatize coalfield near Tete. Near Moatize itself, proven reserves, according to the Government, amount to several hundred Mmt, but the true exploitable resources of the Moatize and similar sedimentary basins in the region were estimated as at least 2 billion mt. A recent prefeasibility study by Brazil's Companhia Vale do Rio Doce established that Moatize's reserves were adequate to support a long-term annual coal output of 22 Mmt, of which 9 Mmt would be salable annually, but that extensive new mine, railing and port coal-loading infrastructure would be required. The existing coal mine was not considered expandable.

Considerable interest was expressed by foreign companies in developing the Pande natural gasfield near Beira. The

Government had signed an initial agreement in 1992 with SASOL Ltd. of South Africa to this end but, in late 1994, it was reported that the Government had signed a development agreement with Enron Development Corp. of the United States. Both companies envisioned piping the gas to South Africa, and possibly some to Maputo, for sale. According to the Government, proven reserves at Pande were about 55 billion cubic meters. Additional drilling was planned to increase the reserves.

Large-scale investment in Mozambique's mining sector is dependent on political developments, including the perception of long-term improved security conditions. Likely developments are for the country to become a significant producer of titanium minerals and possibly natural gas, and a modest producer of gemstones, gold, and graphite, and, possibly, tantalum. Large-scale development of coal in Mozambique would necessitate large investments in rail and port infrastructure, for which funding is uncertain.

If the ongoing negotiations to restore significant electrical generation at the 2,040-megawatt Cabora Bassa hydroelectric plant reach fruition, Mozambique stands to earn significant

revenues from electricity sales to South Africa and Zimbabwe. There is potential, too, for hydroelectricity to be available for new industry in Mozambique; more than one international aluminum company has discussed the future building of an aluminum smelter in the country.

¹Text prepared June 1994.

²Where necessary, values have been converted from Mozambique meticaís (M) to U.S. dollars at the rate of M6,039=US\$1.00.

Other Sources Of Information

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TABLE 1
MOZAMBIQUE: PRODUCTION OF MINERAL COMMODITIES 1/ 2/

(Metric tons unless otherwise specified)

Commodity 3/		1990	1991	1992	1993	1994
Bauxite		7,190	7,760	8,340	6,000	9,620
Cement, hydraulic e/	thousand tons	79 4/	80	30	20	20
Clays, bentonite		--	664	20	100 e/	3,350
Coal, bituminous		40,400	50,800	12,600	663	--
Copper:						
Concentrate:						
Gross weight		133 5/	--	--	--	--
Cu content e/		28	--	--	--	--
Gemstones:						
Cut stones, all types	carats	13,400	12,900	8,450	7,690	6,450
Beryl:						
Aquamarine	grams	-- 6/	-- 6/	-- 6/	181,000	38,500
Morganite	do.	NA 6/	NA 6/	5,000 e/	5,000 e/	NA 6/
Emerald	do.	-- 6/	--	75,000	33,800	11,400
Other	kilograms	--	--	--	--	375
Dumortierite		--	73	70 e/	34	100 e/
Garnet 7/	kilograms	2,560	1,280	588	273	1,170
Tourmaline	do.	-- 6/	-- 6/	--	35	5,270
Gold 8/	do.	63	394	296	149	336
Graphite, concentrates		--	--	--	10	430
Marble:						
Block	cubic meters	488	279	919	1,380	1,500
Slab	square meters	--	--	--	34	52,300
Salt, marine e/		40,000	40,000	40,000	40,000	40,000
Tantalum, microlite concentrates	kilograms	--	266	--	--	--

e/ Estimated. r/ Revised. NA Not available.

1/ Previously published and 1994 data have been rounded by the U.S. Bureau of Mines to three significant figures.

2/ Data available through June 9, 1995.

3/ In addition to the commodities listed, modest quantities of unlisted varieties of crude construction materials (other clays, sand and gravel, and stone) presumably are produced, as is a small amount of natural gas. For these commodities, output is not reported quantitatively and information is inadequate to make reliable estimates of output levels.

4/ Reported. Capacity is for Nacala plant only. The Dondo and Matola plants have a combined installed capacity of 900,000 metric tons but are closed and are believed to require rehabilitation to attain this output level.

5/ No mining occurred at the Mundonguara Mine, the country's sole copper producer, during 1990. Copper concentrate was produced from stockpiled ore.

6/ Production was reported as nil or as not available. It is surmised that some artisanal production, perhaps from dump material or from placer deposits, took place. Information is inadequate to make reliable estimates of output levels.

7/ Facet-grade. In addition, there was waste garnet production, in kilograms, as follows: 1990--4,786; 1991--2,400 (estimated); 1992--1,000; 1993--600 (estimated); and 1994--924.

8/ Does not include artisanal gold production, for which there were no data, but which the Government has estimated at about 4,000 kg/a for 1993 and 1994.