



2007 Minerals Yearbook

MOZAMBIQUE

THE MINERAL INDUSTRY OF MOZAMBIQUE

By Thomas R. Yager

In 2007, Mozambique played a significant role in the world's production of aluminum; the country's share of global refined aluminum output amounted to about 1%. Other domestically significant mineral processing operations included cement and natural gas. Mozambique was not a globally significant consumer of minerals or mineral fuels (Bray, 2008).

Minerals in the National Economy

In 2006 (the latest year for which data were available), the manufacturing sector accounted for 15% of the gross domestic product, and mining and quarrying, 1.1%. The Mozambique Aluminum S.A.R.L. (Mozal) smelter accounted for about one-half of manufacturing output but had a much more modest effect on employment (Organisation for Economic Cooperation and Development, 2008, p. 463).

Production

The production of ilmenite, rutile, and zircon started at the Moma Mine in 2007. Brick clay production increased by 593% in 2006; garnet, by 164%; sand, 69%; gravel and crushed rock, 39%; gold, 35%; processed bentonite, 27%; morganite, 17%; bauxite, 16%; and natural gas, 15%. The production of aquamarine, coal, dumortierite, and tourmaline increased sharply. Beryl output declined by 89%; crude bentonite, by 80%; limestone, by 76%; niobium (columbium) and tantalum, by 72% each; and quartz, by 34%. Higher output of brick clay, gravel and crushed rock, and sand could be attributable to the growth of the construction sector.

Structure of the Mineral Industry

Most of Mozambique's mining and mineral processing operations were privately owned, including the cement plants, the Moma mineral sands mine, the Mozal aluminum smelter, and the Temane gas processing plant. Artisanal miners produced gold and gemstones. Carbomoc E.E., which was the country's only coal producer, was state-owned.

Commodity Review

Metals

Aluminum.—Mozambique was Africa's second ranked producer of aluminum after South Africa. The Mozal aluminum smelter, which used alumina imported from western Australia as raw material, produced 564,000 metric tons (t) in 2007. Output was unchanged from that of 2006. Mozal's rated capacity amounted to 506,000 metric tons per year (t/yr); BHP Billiton Ltd. of Australia planned to increase capacity by 250,000 t/yr. The expansion of Mozal was delayed by domestic power shortages (table 2; BHP Billiton Ltd., 2007; 2008, p. 6; Mozambique News Agency, 2007b).

Gold.—Pan African Resources plc of the United Kingdom (Metorex Ltd. of South Africa, 55%) was engaged in a prefeasibility study of the development of a mine at the Fair Bride deposit. The company planned to complete the study in the first quarter of 2008. The mine would produce an average of 2,600 kilograms per year (kg/yr) during an expected mine life of 8 years. Pan African revised its estimate of contained gold resources at Fair Bride to nearly 39,000 kilograms (kg) from 32,000 kg in 2007. Depending on the results of the feasibility study that Pan African planned to conduct in 2008, Pan African could start construction at the mine in the second half of 2008 (African Mining, 2007; Mining Review Africa, 2007a; Pan African Resources plc, 2008, p. 9).

In May 2007, Agrupamento Mineiro (a joint venture of Companhia Mineira de Gile and Metais de Moçambique of Angola) inaugurated its gold mining operation in the Manica District. Agrupamento planned to produce 720 kg/yr of gold during the 10-year life of the mine. The company planned to export its output to the Rand Refinery in South Africa (Machirica, 2007).

Great Basin Gold Ltd. (GBG) of South Africa formed a joint venture with G.S. Minas E Refinaria Limitada (GSR) in 2007. GBG agreed to spend about \$2 million on exploration during a 3-year period at the Tsetsera property and other properties held by GSR. Pan African Mining Corp. of Canada engaged in drilling at the former Machinga gold mine; the company also entered into a joint venture with African Eagle Resources plc of the United Kingdom for properties in Tete Province (African Mining, 2007; Pan African Mining Corp., 2008).

Iron and Steel.—In November 2007, ArcelorMittal of Luxembourg signed an agreement with the Government to build a new rolling mill with a capacity of 400,000 t/yr. ArcelorMittal also planned to restart the production of steel rods at Companhia Siderurgica de Mozambique and of wire and nails at Companhia Mozambique de Trefiloria (ArcelorMittal, 2008, p. 25).

Niobium (Columbium) and Tantalum.—Noventa Ltd. operated the Marropino Mine, which produced 14,900 kg of concentrate in 2007. Production was inhibited by difficulties in recommissioning the processing plant. In 2008, Noventa planned to increase production to a rate of between 200,000 and 220,000 kg/yr of tantalum pentoxide (Ta_2O_5). Noventa also planned to reopen the Morrúa Mine in late 2008; the company planned to reach the full capacity of 200,000 kg/yr of Ta_2O_5 in 2009. The life of the Morrúa Mine was expected to be between 9 and 10 years, and the Marropino Mine, between 6 and 7 years (Tassell, 2007; Noventa Ltd., 2008, p. 7).

Titanium and Zirconium.—In April 2007, Kenmare Resources plc of Ireland started production at the Moma Mine; the production of ilmenite amounted to 86,000 t; zircon, 7,000 t; and rutile, 3,000 t. Kenmare planned to increase ilmenite production to its full capacity of 800,000 t/yr in late 2008; the output of zircon would be 60,000 t/yr, and rutile, 21,000 t/yr. The company also planned to expand capacity to 1.2 million

metric tons per year (Mt/yr) of ilmenite by the end of 2009 (Mining Review Africa, 2007b).

Kenmare updated its resource estimate at Moma in 2007. Contained inferred ilmenite resources were revised to 163 Mt from 101 Mt; zircon, to 12.4 Mt from 7.8 Mt; and rutile, to 3.6 Mt from 2.7 Mt. The titanium dioxide content of the inferred ilmenite resources was estimated to be between 52% and 59% (Mining Review Africa, 2007b).

In late 2006, BHP Billiton concluded that previous plans for the development of the Corridor Sands Project, which was based upon 10 deposits of heavy-mineral sands near Chibuto in southern Mozambique, were no longer viable because of higher capital costs. BHP Billiton was conducting a prefeasibility study on a new development plan for Corridor Sands in 2007; the company planned to start a feasibility study in 2008 (Industrial Minerals, 2007).

Industrial Minerals

Cement.—Cimentos de Mocambique SARL [Cimentos de Portugal, SGPS, SA (Cimpor), 82.46%] produced cement at its Dondo, Matola, and Nacala plants. ARJ Group opened a cement plant at Nacala in mid-2005. In November 2007, Aar Ess Exim Pvt Ltd. of India announced plans to build a new cement plant at Pambara with a capacity of 360,000 t/yr. Construction was expected to start in 2008; the plant was likely to be completed by late 2009 at a cost of more than \$65 million (Xavier, 2007).

National cement consumption increased to more than 850,000 t in 2007 from about 770,000 t in 2006. Cimpor's market share remained unchanged at 78% in 2007 (Cimentos de Portugal, SGPS, SA, 2008, p. 72).

Gemstones.—Aquamarine,morganite, tourmaline, and other gemstones were mined in Zambezia Province; dumortierite, in Tete Province; and garnet, in Niassa Province. The mine output of garnet increased to 5,730 kg in 2006 (the latest year for which data were available) from 2,172 kg in 2005; the increase may have been attributable to upgrades to the Cuamba Mine by Sociedade Mineira de Cuamba E.E. (Government of Mozambique, 2007, p. 17-18).

Copper-containing tourmaline was mined from an alluvial deposit near Mavuco in the Alto Ligonha District of Nampula Province. As of late 2007, artisanal miners using labor-intensive methods accounted for most of the production. Mozambique Gems planned to start mechanized mining operations at Mavuco in early to mid-2008 after building a washing plant with a capacity of between 150 and 200 metric tons per day (Laurs and Zwaan, 2007).

Morganite was produced at the Marropino Mine. Noventa mined 2,613 kg of morganite at Marropino in 2007; the company planned to increase production to 5,000 kg in 2008. Resources were estimated to be between 23,000 and 37,000 kg of contained morganite; the estimation of resources was difficult because of the erratic distribution (Noventa Ltd., 2008, p. 7, 9).

Mineral Fuels

Coal.—Companhia Vale do Rio Doce (CVRD) of Brazil announced plans to spend \$70 million on the development of

the Moatize coalfield in 2007. The company planned to produce 12 Mt/yr of coking and thermal coal at the Moatize Mine starting in 2010. The coking coal was likely to be consumed by steel plants in Brazil; thermal coal would be consumed by a new coal-fired powerplant built by CVRD in Mozambique with a capacity of 1,500 megawatts. In the second phase of the project, CVRD planned to increase coal production to 20 Mt/yr. The life of the Moatize Mine was expected to be 35 years. Capital costs of the project were estimated to be between \$1.2 billion and \$2 billion (Mining Review Africa, 2007c).

Central African Mining and Exploration Company plc (CAMEC) of the United Kingdom hoped to identify sufficient coal resources at its properties in the Tete Province to start a new mine by 2012. The company engaged in drilling at these licenses in 2007. CAMEC also formed a joint venture with Belde Empreendimentos Mineiros Limitada of South Africa for three licenses in the Zambezi Coal Basin in Tete Province (Mining Review Africa, 2007d).

In November 2007, ArcelorMittal acquired a 35% interest in Black Gold Mining (Moc) Ltd.'s coal projects when the companies signed a joint-venture agreement. In December 2007, Riversdale Mining Ltd. of Australia announced the signing of a joint-venture agreement with Tata Steel Ltd. of India to develop a mine in the Moatize coalfield. Tata purchased a 35% share in the Benga and the Tete licenses that were held by Riverside. Resources at Benga were estimated to be about 1.23 billion metric tons (Mining Journal, 2007a, b).

Natural Gas.—Production of natural gas from the Temane Gas Project increased to 2.75 billion cubic meters in 2006 from 2.39 billion cubic meters in 2005. Sasol Ltd. of South Africa, which operated the project, exported about 95% of Temane's output through an 865-kilometer pipeline to supply its South African chemical plants. In 2007, Sasol operated at 84% of capacity; the company planned to start production at the Pande gasfield in 2008 (Sasol Ltd., 2007, p. 123; Mozambique News Agency, 2007c).

Sasol engaged in exploration at offshore Blocks 16 and 19 in 2007. The company planned to increase its production capacity to 6.57 billion cubic meters per year by 2010 from 3.28 billion cubic meters per year in 2007. The capacity increase would depend on the results of Sasol's exploration activities (Mozambique News Agency, 2007b; Sasol Ltd., 2007, p. 62).

Petroleum.—Mozambique produced neither crude petroleum nor refined petroleum products and relied on imports. In October 2007, the Government approved a plan by Ayr Logistics Ltd. of the United States and its joint-venture partners to build a new refinery at Nacala. The refinery was expected to have a capacity of 300,000 barrels per day (bbl/d) and to be completed in 6 years. Costs were estimated to be \$5 billion. About 100,000 bbl/d was likely to be consumed domestically and the remainder was to be exported (Mozambique News Agency, 2007a).

Outlook

Higher production from the Moma Mine is likely to contribute to higher economic growth from 2008 to 2010; the outlook for titanium minerals in Mozambique depends heavily

upon global market trends. The opening of the Moatize coal mine was also likely to boost economic growth in 2010; the development of the coal mine depends upon the rehabilitation of rail and port infrastructure. Tantalum production is likely to increase because of increased production from the Marropino Mine and the reopening of the Morrua Mine. Gold production is expected to increase because of the development of the Fair Bride deposit and Agrupamento Minerio's new mine. Morganite and tourmaline production is likely to increase in 2008. Development of the Corridor Sands and the Mozal 3 projects depends upon reliable power supplies. New mines and related infrastructure could lead to increased consumption of steel and construction materials.

References Cited

- African Mining, 2007, Getting all manic about Manica: African Mining, v. 12, no. 5, November/December, p. 70-75.
- ArcelorMittal, 2008, Form 20-F—2007: Luxembourg City, Luxembourg, ArcelorMittal, 337 p.
- BHP Billiton Ltd., 2007, BHP Billiton production report for the quarter ended 31 December 2006: Melbourne, Australia, BHP Billiton Ltd. press release, January 25, 14 p.
- BHP Billiton Ltd., 2008, BHP Billiton production report for the half year ended 31 December 2007: Melbourne, Australia, BHP Billiton Ltd. press release, January 23, 15 p.
- Bray, E.L., 2008, Aluminum: U.S. Geological Survey Mineral Commodity Summaries 2008, p. 22-23.
- Cimentos de Portugal, SGPS, SA, 2008, Annual report 2007: Lisbon, Portugal, Cimentos de Portugal, SGPS, SA, 232 p.
- Government of Mozambique, 2007, Plano económico e social para 2006: Maputo, Mozambique, Government of Mozambique, 137 p.
- Industrial Minerals, 2007, BHP not ready for Corridor Sands: Industrial Minerals, no. 478, July, p. 19.
- Laurs, B.M., and Zwaan, J.C., 2007, Field study of Cu-bearing tourmaline mines in Mozambique: *Gems & Gemology*, v. 43, no. 4, Winter, p. 383-384.
- Machirica, Victor, 2007, Em Manica—PR inaugura empresa de produção de ouro: *Noticias* [Maputo, Mozambique], May 25, 2 p.
- Mining Journal, 2007a, ArcelorMittal's African deals: *Mining Journal*, November 23, p. 4.
- Mining Journal, 2007b, Moatize venture confirm: *Mining Journal*, December 7, p. 9.
- Mining Review Africa, 2007a, Manica gold forges ahead: *Mining Review Africa*, no. 6, p. 8.
- Mining Review Africa, 2007b, Moma on line—US\$390M Mozambique project takes off: *Mining Review Africa*, no. 3, p. 56-57.
- Mining Review Africa, 2007c, Mozambique coal—US\$2 billion project: *Mining Review Africa*, no. 3, p. 24-25.
- Mining Review Africa, 2007d, Mozambique—Two coal projects by 2012: *Mining Review Africa*, no. 2, p. 32-33.
- Mozambique News Agency, 2007a, Agreement to build refinery in Nacala signed: *Mozambique News Agency*, October 17, 2 p.
- Mozambique News Agency, 2007b, Billions needed to solve energy crisis: *Mozambique News Agency*, March 30, 1 p.
- Mozambique News Agency, 2007c, Sasol planning doubling of Inhambane gas [sic] production: *Mozambique News Agency*, October 30, 1 p.
- Noventa Ltd., 2008, Annual report 2007: Jersey, Channel Islands, Noventa Ltd., 56 p.
- Organisation for Economic Cooperation and Development, 2008, Mozambique, in *African Economic Outlook 2008*: Paris, France, Organisation for Economic Cooperation and Development, p. 459-474.
- Pan African Mining Corp., 2008, Corporate overview—February 2008: Vancouver, British Columbia, Canada, Pan African Mining Corp., 4 p.
- Pan African Resources plc, 2008, Pan African annual report 2007: London, United Kingdom, Pan African Resources plc, 49 p.
- Sasol Ltd., 2007, Form 20-F—2007: Rosebank, South Africa, Sasol Ltd., 462 p.
- Tassell, Arthur, 2007, Noventa develops new mines in Mozambique: *Modern Mining*, v. 3, no. 12, December, p. 16-19.
- Xavier, Victorino, 2007, Avaliada em 65 milhões de USD—Inhambane vai ter fábrica de cimento: *Noticias* [Maputo, Mozambique], May 25, 2 p.

TABLE 1
MOZAMBIQUE: PRODUCTION OF MINERAL COMMODITIES¹

(Metric tons unless otherwise specified)

Commodity ²	2003	2004	2005	2006	2007 ^e
Aluminum:					
Bauxite	11,793	6,723	9,518	11,069 ^r	12,000
Metal, refined	407,000	549,000	555,000	564,000	564,000 ³
Beryl kilograms	78,300	45,200	146,000 ^r	16,000 ^r	21,000
Cement, hydraulic thousand metric tons	600	570	560	720 ^c	850
Clays:					
Bentonite:					
Crude	--	3,336	17,318 ^r	3,515 ^r	6,300
Processed	684	578	547	692 ^r	810
Brick	100,176	108,231	32,031	222,052 ^r	230,000
Coal, bituminous	36,742	16,525	3,417	40,953 ^r	72,000
Diatomite ^e	-- ³	3,000	4,500	6,000	6,000
Gemstones:					
Aquamarine kilograms	8	18	16	5,222 ^r	6,100
Dumortierite	65	113	10	664 ^r	730
Garnet kilograms	440	2,686	2,172	5,730 ^r	7,200
Morganite do.	NA	NA	1,750	2,052	2,613 ³
Tourmaline do.	581	1,570	245	25,138 ^r	32,000
Gold ⁴ do.	63	56	63	85 ^r	450
Natural gas million cubic meters	1	1,295	2,393 ^r	2,751 ^r	2,800
Niobium (columbium) and tantalum, columbite-tantalite, ore and concentrate:					
Gross weight kilograms	188,695	712,095	281,212	80,132 ^r	97,000
Nb content ^e do.	23,000	87,000	34,000	9,700 ^r	12,000
Ta content ^e do.	54,000	205,000	81,000	23,000 ^r	28,000
Quartz do.	30,985	173,478	294,668 ^r	195,100 ^r	200,000
Salt, marine ^e	80,000	80,000	80,000	80,000	80,000
Sands cubic meters	1,372,032	1,429,743	833,113	1,404,184 ^r	1,500,000
Stone:					
Granite do.	539	521	2,198	2,200 ^{r,c}	2,200
Gravel and crushed rock do.	740,501	779,581	850,919	1,178,998 ^r	1,200,000
Limestone	1,348,372	1,593,450	654,179	155,871 ^r	250,000
Marble:					
Block cubic meters	452	617	509	472 ^r	500
Slab square meters	10,227	13,666	12,318	12,825 ^r	15,000
Titanium:					
Ilmenite concentrate	--	--	--	--	86,000 ³
Rutile concentrate	--	--	--	--	3,000 ³
Zirconium concentrate	--	--	--	--	7,000 ³

^eEstimated; estimated data are rounded to no more than three significant digits. ^rRevised. do. Ditto. NA Not available. -- Zero.

¹Table includes data available through August 1, 2008.

²Other gemstones, such as amethyst and topaz, were produced, but information is insufficient to estimate production.

³Reported figure.

⁴Does not include unreported production; total output of gold was estimated to be roughly 600 to 900 kilograms per year.

TABLE 2
MOZAMBIQUE: STRUCTURE OF THE MINERAL INDUSTRY IN 2007

(Metric tons unless otherwise specified)

Commodity		Major operating companies	Location of main facilities	Annual capacity ¹
Aluminum		Mozambique Aluminum SARL (Mozal) (BHP Billiton Ltd., 47%)	Beluluane	506,000.
Bauxite		E.C. Meikles (Pty) Ltd.	Monte Snuta	12,000. ^c
Bentonite		Cia Desenvolvimento Mineira	Boane	30,000.
Cement		Cimentos de Moçambique, SARL (Cimentos de Portugal, SGPS, SA (Cimpor), 82.46%)	Dondo, Matola, and Nacala	735,000.
Do.		ARJ Group	Nacala	250,000.
Coal, bituminous		Carbomoc E.E. (Government owned)	Chipanga XI Mine at Moatize	72,000. ^c
Garnet	kilograms	Sociedade Mineira de Cuamba E.E.	Cuamba	7,200. ^c
Gold	do.	Agrupamento Mineiro (joint venture of Companhia Mineira de Gile and Metais de Moçambique of Angola)	Manica District	720.
Do.	do.	Artisanal miners	do.	600.
Graphite		Kenmare Resources plc ²	Ancuabe	10,000.
Marble, block	cubic meters	Marmonte E.E.	Montepuez	1,500.
Morganite	kilograms	Noventa Ltd.	Marropino	5,000. ^c
Natural gas	million cubic meters	Sasol Ltd. (70%)	Temane	3,280.
Niobium (columbium) and tantalum, columbite-tantalite, ore and concentrate	kilograms	Noventa Ltd. (Highland African Ventures Ltd., 36.7%)	Marropino	210,000 Ta ₂ O ₅ .
Do.	do.	Hegemony Resources	Naquissupa	NA.
Titanium		Kenmare Resources plc	Moma Mine in Nampula Province	800,000 ilmenite; 21,000 rutile.
Tourmaline	kilograms	Artisanal miners	Mavuco	NA.
Zirconium		Kenmare Resources plc	Moma Mine in Nampula Province	56,000 zircon.

^cEstimated; estimated data are rounded to no more than three significant digits. Do., do. Ditto. NA Not available.

¹Abbreviations used in this table for commodities include the following: Ta₂O₅--tantalum oxide.

²On care and maintenance since 1999.

