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The Mineral Industry of Mozambique

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In 2012, Mozambique's share of world ilmenite production was about 6%; zircon, 3%, and aluminum, 1%. The country also played a significant role in the world's production of tantalum. Mozambique reportedly was the world's leading producer of ruby in 2012. Other domestically significant mineral processing operations included cement and natural gas. Mozambique was not a globally significant consumer of minerals or mineral fuels (Pardieu and Chauvire, 2012; Bedinger, 2013; Bray, 2013; Loferski, 2013; Papp, 2013).

Minerals in the National Economy

The manufacturing sector accounted for 12% of the gross domestic product in 2012, and the mining and quarrying sector, 1.7%. The value of output in the mining and quarrying sector increased by 40.7% in 2012. In 2012, national exports were valued at $3.47 billion, of which aluminum accounted for 31.5%; coal, 12.5%; ilmenite, rutile, and zircon, 7.3%; and natural gas, 4.9% (Bank of Mozambique, 2012, p. A-10; 2013, p. 74, 105–106).

Production

In 2012, the production of aquamarine increased by 880%; coal, by 656%; gold, by 60%; and cement, by 21%. Bentonite and diatomite output also increased sharply. The production of rutile decreased by 42%, and bauxite, by 19%.

Structure of the Mineral Industry

Most of Mozambique's mining and mineral processing operations were privately owned, including the cement plants, the coal mines, the Marropino and the Muiane tantalum mines, the Moma mineral sands mine, and the Mozal aluminum smelter. The Government held a 30% interest in the Temane gas project through Empresa Nacional de Hidrocarbonetos E.P. Artisanal miners produced gold and gemstones (table 2).

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 2012 compared with 562,000 t in 2011. Aluminum exports were valued at $1.09 billion in 2012 compared with $1.36 billion in 2011. Most of the decrease in the value of exports was attributable to lower aluminum prices (BHP Billiton Ltd., 2012, p. 6; 2013, p. 6; Bank of Mozambique, 2013, p. 105).

Gold.—In September 2012, Pan African Resources plc of the United Kingdom announced plans to sell its Manica project to Auroch Minerals NL of Australia. Contained gold resources at Manica were estimated to be about 93,000 kilograms (kg). Gold One Ltd. of South Africa explored for gold at Tulo (Wait, 2012).

Iron Ore and Vanadium.—In 2012, Baobab Resources plc of the United Kingdom was engaged in a prefeasibility study on a new mine located north of Tete, which is the capital of Tete Province. Titaniferous-vanadiferous magnetite from the mine was expected to be smelted into pig iron and ferrovanadium. For the estimated 37-year life of the mine, planned production was 1 million metric tons per year (Mt/yr) of pig iron and 3,200 metric tons per year (t/yr) of ferrovanadium. The prefeasibility study was likely to be completed by February 2013, after which Baobab planned to complete a feasibility study in 2014. Depending on the results of the studies, the construction of the project could require an additional 2 years to complete. Production was expected to ramp up to full capacity between mid-2016 and early 2017 (Alink, 2012; Baobab Resources plc, 2013).

Baobab and joint-venture partner North River Resources plc of the United Kingdom engaged in exploration at the Monte Muande magnetite and phosphate project in 2012. The companies hoped to identify resources of between 200 and 250 million metric tons (Mt) (Baobab Resources plc, 2013).

Niobium and Tantalum.—In 2012, Noventa Ltd. of the United Kingdom produced 24,918 kg of tantalum pentoxide (Ta_2O_5) in concentrate at the Marropino niobium and tantalum mine. The Ta_2O_5 content of concentrate produced at Marropino was about 25%. In May, Noventa started production at its new processing plant, which had a capacity of 270,000 kilograms per year (kg/yr) of Ta_2O_5. The commissioning of the plant was delayed in early 2012 by inclement weather. Production was constrained by low ore grades, power supply disruptions, and problems with the design of the new plant. Noventa planned to ramp up production at the new plant to full capacity in the third quarter of 2013 (Noventa Ltd., 2012a; 2012b, p. 5–6; 2013).

Noventa planned to update its estimate of resources at the Morrua Mine in February 2013. The company planned to complete a prefeasibility study on reopening Morrua, which was shut down during the 1980s, by the end of the first half of 2013 (Noventa Ltd., 2012a).

On February 29, 2012, Pacific Wildcat Resources Corp. (PAW) of Canada announced the commissioning of its secondary processing plant, which upgraded concentrates produced in the primary plant, at the Muiane Mine. PAW planned initial production of between 16,000 and 34,000 kg/yr of Ta_2O_5 in concentrate. Indicated resources at Muaine were 1.4 Mt at a grade of 250 grams per metric ton Ta_2O_5. At yearend, the company was seeking a buyer for Muiane (Pacific Wildcat Resources Corp., 2012; Rare Earth Elements Letter International, 2012).

Titanium and Zirconium.—Kenmare Resources plc of Ireland produced ilmenite, rutile, and zircon at the Moma Mine. In 2012, ilmenite concentrate production decreased to

574,500 t from 636,800 t in 2011 because of power supply disruptions resulting from the rainy season and lower ore grades. Zircon production increased to 46,900 t in 2012 from 43,600 t in 2011 because of the reprocessing of stockpiles. Rutile output remained below planned levels. Kenmare was engaged in the expansion of its capacity to 1.2 Mt/yr of ilmenite, 75,000 t/yr of zircon, and 21,000 t/yr of rutile in 2012. The company planned to complete the expansion and to ramp up production to full capacity in 2013. Reserves at Moma were estimated to be 842 Mt at grades of 3% ilmenite, 0.2% zircon, and 0.061% rutile (Globe Metals & Mining Ltd., 2012b; Kenmare Resources plc, 2013, p. 2, 7, 8, 14, 81).

Depending on favorable results of its prefeasibility and feasibility studies, Baobab could start production of a titanium-containing slag byproduct at the Tete project by 2016. The byproduct of the pig iron process was expected to be used in road construction or by the cement industry (Baobab Resources plc, 2013).

In May 2011, Pathfinder Minerals plc of the United Kingdom released the results of a scoping study on the Moebase/Naburi project. Pathfinder was considering the development of a new mine that could produce 1.24 Mt/yr of ilmenite, 65,000 t/yr of zircon, and 24,000 t/yr of rutile. Capital costs of the project were estimated to be $533 million. In late 2012, the company was engaged in an ownership dispute with J.V. Consultores Internacionais regarding the Moebase/Naburi project (Mining Journal, 2011; Pathfinder Minerals plc, 2012).

Industrial Minerals

Cement.—Cimentos de Portugal, SGPS, SA (Cimpor) produced cement at four plants in Dondo, Matola, and Nacala, which had a combined capacity of about 2 Mt/yr. Cimpor planned to increase its clinker-grinding capacity at Dondo to 715,000 t/yr from 240,000 t/yr by the second half of 2013 (table 2; International Cement Review, 2011; Cimentos de Portugal, SGPS, SA, 2013, p. 17, 31).

In 2012, several Chinese companies were engaged in the construction of new cement plants in Mozambique. China International Fund was building a new plant at Salamanga with a capacity of 800,000 t/yr; GS Cimento's 550,000-t/yr-capacity plant at Maputo was under construction; and Africa Great Wall Cement Manufacturer Lda. planned to complete a new plant in the Magude District with a capacity of 500,000 t/yr by yearend (International Cement Review, 2012).

Consolidated General Minerals plc (CGM) of the United Kingdom was planning to build a new cement plant at Beira with a capacity of 800,000 t/yr. Depending on financing and the approval of the plant's environmental license, CGM could start production in December 2013 (Consolidated General Minerals plc, 2012; International Cement Review, 2012).

National cement consumption increased to an estimated 1.76 Mt in 2012 from 1.25 Mt in 2011. Cimpor's market share was about 67% in 2012 compared with 78% in 2011 (Cimentos de Portugal, SGPS, SA, 2013, p. 31).

Fluorspar and Rare Earths.—Monazite, which is a phosphate mineral containing rare-earth elements, was found at the Moma Mine. Heavy sands reserves at Moma were estimated to be 842 Mt at a grade of 0.02% monazite. Kenmare completed a study on recovering monazite from mine tailings in 2012; the project was on hold at yearend because of plans to focus on expanding ilmenite, rutile, and zircon production capacity (Kenmare Resources plc, 2013, p. 8).

Construction aggregate was mined at Xiluvo, which had a niobium- and rare-earth-enriched carbonatite deposit. Southern Crown Resources Ltd. of Australia had a joint-venture agreement with the owners of the mining permit for the rights to the rare-earth elements. In November 2011, Southern Crown estimated that resources at Xiluvo were 1.1 Mt at a grade of 2.05% rare-earth oxides. Galileo Resources Ltd. of South Africa acquired a 50% interest in Xiluvo in 2012 (Southern Crown Resources Ltd., 2011).

Globe Metals & Mining Ltd. engaged in exploration at the Mount Muambe fluorite and rare-earths deposit in 2012. Mount Muambe is a carbonatite deposit located 20 kilometers (km) southeast of the Moatize coal property in Tete Province. In early 2012, Globe estimated that resources were 1.6 Mt at a grade of 19% fluorite. Globe also explored for rare earths (Globe Metals & Mining Ltd., 2012a, p. 1).

Gemstones.—Gem-quality ruby was found in eluvial and primary deposits in Niassa Province and at Montepuez in Cabo Delgado Province. The Government shut down artisanal mining operations in Niassa in 2009; artisanal miners continued to produce every year during the rainy season when enforcement was much more difficult (Pardieu and Chauvire, 2012).

The Montepuez deposit was discovered in May 2009; Mwiriti Lda. was granted the license for Montepuez shortly after the discovery. In 2011, Mwiriti and Gemfields plc of the United Kingdom formed the joint-venture company Montepuez Ruby Mining (MRM) to mine at Montepuez. MRM's bulk sampling operations started in August 2012; ruby production amounted to 22 kg by yearend. Gemfields and Mwiriti planned to start large-scale production at Montepuez by the end of 2013 (Gemfields plc, 2013, p. 6, 9).

Artisanal miners accounted for most of the production at Montepuez; illegal mining operations continued on MRM's concession from 2009 through 2012. Between June and September 2012, about 4,000 miners produced at Namujo/Torro, which was part of MRM's concession. After being evicted, many artisanal miners moved to Nacaca, which was a newly discovered deposit located about 10 km southeast of MRM's concession (Pardieu and Chauvire, 2012).

In November 2011, Mozambique Gems Ltd. produced about 300 kg of aquamarine at Mavuco in northern Mozambique, of which about 10 kg was gem quality. The aquamarine was mined from quartz-rich granitic pegamatites that were adjacent to alluvial copper-bearing tourmaline mines (Laurs, 2012). Garnet was produced at the mechanized Cuamba Mine. Other gemstones mined in Mozambique included amazonite, dumortierite, and topaz.

Graphite.—The Ancuabe graphite mine in Cabo Delgado Province, which operated from 1994 to 1999, shut down because of high power costs and decreasing graphite prices. In 2012, AMG Advanced Metallurgical Group N.V. of the Netherlands purchased Graphit Kropfmuhl AG (GK) of Germany, which held Ancuabe. AMG received a 15-year mining

license in early November; the company was conducting an environmental impact assessment and a feasibility study on reopening Ancuabe. Depending on the results of the assessment and the study, AMG could produce 6,000 t/yr of graphite (AMG Advanced Metallurgical Group N.V., 2012).

Syrah Resources Ltd. of Australia engaged in exploration for graphite at Balama in northern Mozambique. The company hoped to identify resources of between 400 and 500 Mt at a grade of 10% graphite at Balama East and between 300 and 400 Mt at a grade of 11% at Balama West (Syrett, 2012).

Phosphate Rock.—Vale S.A. of Brazil was engaged in a prefeasibility study on a new phosphate mine at the Evate deposit. Depending on the results of the study, Vale could produce 2 Mt/yr of phosphate rock at Evate (Globe Metals & Mining Ltd., 2012b).

Mineral Fuels

Coal.—In September 2011, Vale started production at the Moatize Mine in Tete Province. The company produced 3.77 Mt of salable coal in 2012 compared with 617,000 t in 2011. Output was expected to reach the full capacity of 8.5 Mt/yr of coking coal and 2.5 Mt/yr of thermal coal in 2013. Vale planned to increase capacity to 22 Mt/yr of salable coal in 2014, of which 17 Mt/yr would be coking coal and 5 Mt/yr would be thermal coal. In November, Vale announced that its planned coal exports for 2013 would be revised to 4.9 Mt because of capacity constraints on the Sena railway (Tex Report, The, 2012a, c; 2013b).

In early 2012, Rio Tinto plc of the United Kingdom and its joint-venture partner Tata Steel Ltd. of India started production at the new Benga Mine, which is adjacent to the Moatize Mine. By yearend, output at Benga amounted to 710,000 t of salable coal. In the first stage of mining, production was likely to be 1.6 Mt/yr of salable coking coal and 800,000 t/yr of salable thermal coal. Rio Tinto and Tata planned to increase production to 12 Mt/yr in the second stage of mining, of which 6 Mt/yr would be salable coking coal for export, 4 Mt/yr would be salable thermal coal for export, and 2 Mt/yr would be consumed in a new coal-fired power station near Tete. The second stage of mining was expected to start by 2015. Rio Tinto planned an initial capacity of between 500 and 600 MW at the power station and to increase capacity to 2,000 MW (African Mining, 2011; Tex Report, The, 2012b, 2013b).

Rio Tinto also planned to develop the Zambeze coal project, which was adjacent to the Benga project. The company planned to start production at Zambeze in the first quarter of 2015. Rio Tinto planned to increase run-of-mine production to 42 Mt/yr by 2019, of which 10 Mt/yr would be salable coking coal and 6 Mt/yr would be salable thermal coal (Tex Report, The, 2012b).

Beacon Hill Resources plc (BHR) of the United Kingdom operated the Minas Moatize Mine; the company started mining coking coal in March 2012. By yearend, BHR planned to export 100,000 t of coking coal. BHR planned to increase capacity at Minas Moatize to 2.35 Mt/yr of salable coal by late 2014, which included 920,000 t/yr of coking coal for export, 880,000 t/yr of thermal coal for export, and 550,000 t/yr of thermal coal for domestic consumption (Tex Report, The, 2012b).

Jindal Steel & Power Ltd. of India started mining at its Changara project in western Tete Province in November 2012. The company planned to increase production to 3 Mt/yr between early 2014 and early 2015; output could increase to 10 Mt/yr in a subsequent phase of the project. Coking coal from Changara was expected to be consumed in Jindal's steel plants in India, and thermal coal, at a new coal-fired power station in Mozambique with a capacity of 2,640 MW. Jindal had no shipping quota on the Sena railway at yearend; its production would be transported to Beira by trucks (Tex Report, The, 2013a).

In 2013, Talbot Group of Australia and its Japanese and Korean joint-venture partners planned to start development at the Revuboe project, which is adjacent to the Moatize Mine. By 2014, mining was expected to start at Revuboe. Planned production was 5 Mt/yr of coking coal, which would be exported, including to Japan and the Republic of Korea. Anglo American plc of the United Kingdom purchased Talbot's share in Revuboe in September 2012 (Tex Report, The, 2012b).

In September 2012, Ncondezi Coal Company Ltd. of the British Virgin Islands completed its feasibility study on a coal-fired power station; the feasibility study on a new mine was completed in December. Ncondezi Coal planned to start construction on the mine and the 300-MW power station in 2014; commissioning for the mine and power station were planned for 2016 and 2017, respectively. The power station was expected to consume about 1.2 Mt/yr of thermal coal. Ncondezi Coal planned to increase the capacity of the power station in increments of 300 MW until reaching the final capacity of 1,800 MW by 2023. Thermal coal production would increase to 7.2 Mt/yr for consumption in the power station and between 1 and 3 Mt/yr for export. The estimated life of the mine was 25 years (Ncondezi Coal Company Ltd., 2012).

Natural Gas.—Production of natural gas from the Pande and the Temane gasfields increased to an estimated 3.5 billion cubic meters in 2012 from 3.44 billion cubic meters in 2011. Sasol Ltd. of South Africa, which operated the project, exported most of its output through a pipeline to supply its South African chemical plants. Natural gas exports were valued at $170 million in 2012 compared with $153 million in 2011. In 2012, Sasol and its joint-venture partner Shanduka Group of South Africa opened a temporary gas-fired power station at Ressano Garcia. Until its planned closure in July 2014, the plant was expected to supply South Africa and Mozambique with 92.5 MW and 15 MW of capacity, respectively (Bank of Mozambique, 2012, p. A10; 2013, p. 106; Energize, 2012; Sasol Ltd., 2012, p. 46).

In 2012, Anadarko Petroleum Corp. of the United States and its joint-venture partners revised their estimate of recoverable reserves at Offshore Area 1, which is located in the Rovuma basin. Reserves at Prosperidade in Area 1 were estimated to be between 481 billion cubic meters and 850 billion cubic meters, and at Golfinho-Atum, to be between 283 billion cubic meters and 850 billion cubic meters. Anadarko and its partners were considering the development of a liquefied natural gas (LNG) plant in Mozambique with a capacity of 10 Mt/yr (or 13.8 billion cubic meters per year of natural gas) that would use natural gas from Offshore Area 1. The final investment decision

on the LNG plant was expected by the end of 2013; production could start in 2018 (Petroleum Economist, 2012a, b).

Eni S.p.A. of Italy and its joint-venture partners drilled the Mamba Northeast-2 well in Offshore Area 4. In August 2012, the companies estimated that natural gas in place in Area 4 was 1.76 trillion cubic meters (Petroleum Economist, 2012b).

Petroleum.—OILMOZ Investimentos e Participacoes Lda. of planned to start construction on a new petroleum products refinery at Nacala in mid-2013. The refinery was expected to have a capacity of 350,000 barrels per day (Mining Review Africa, 2012).

Outlook

The mineral industry of Mozambique is likely to have substantial growth in the near future. Growth is expected to be broadly based, with increased production of ilmenite, rutile, and zircon planned for 2013 and 2014; cement, for 2013 through 2015; niobium and tantalum, for 2013 and 2014; natural gas, for 2018 through 2020; and coal, for 2013 through 2023. A new iron ore and vanadium mine could open in 2016. Graphite production could also restart.

The outlook for coal, gemstones, ilmenite, natural gas, niobium, rutile, tantalum, and zircon will likely depend heavily upon conditions in the world economy. The success of large-scale ruby mining operations depends on MRM's ability to secure its concession. Recent ruby discoveries at Nacaca may reduce conflict between MRM and artisanal miners. Development of new coal mines will also likely depend on the expansion of the rail network. The Sena railway had a capacity of 6 Mt/yr; a new railway from the Tete coalfields to the Port of Nacala that passed through Malawi would be necessary to export the planned production from the new coal mines. The Government planned to complete the new railway by 2014. The development of new mines and related infrastructure could lead to increased consumption and production of local construction materials (Pardieu and Chauvire, 2012; Tex Report, The, 2012a).

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TABLE 1
MOZAMBIQUE: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity[2]		2008	2009	2010	2011	2012[e]
Aluminum:						
Bauxite		5,443	3,612	8,556	10,352	8,352 [3]
Metal, refined		536,000	545,000	557,000	562,000	564,000 [3]
Beryl	kilograms	7,600	45,100	56,700	57,800	58,000
Cement, hydraulic[4]	thousand metric tons	744	777	884	976	1,184 [3]
Clays:						
Bentonite:						
Crude		17,661	92,098	11,417	423	24,000 [3]
Processed		614	577	459	493	1,459 [3]
Brick		80,000 [e]	15,661	43,143	99,561	100,000
Coal, bituminous		37,700	25,924	38,260	648,220	4,900,000 [3]
Diatomite		379	213	123	48 [r]	541 [3]
Gemstones:						
Aquamarine	kilograms	2,549	592	1,579	60	588 [3]
Dumortierite		142	63	27	58	58 [3]
Garnet	kilograms	5,398	2,648	16,355	17,000 [e]	17,000 [e]
Morganite[e]	do.	7,274 [4]	2,600	--	--	--
Tourmaline	do.	34,165	6,078	14,669	26,279	26,000
Gold[5]	do.	298	511	106	111	178 [3]
Natural gas	million cubic meters	3,037	2,833	3,261	3,438	3,500
Niobium (columbium) and tantalum, columbite-tantalite, ore and concentrate:						
Gross weight	kilograms	395,646	404,668	55,054	139,145	140,000
Nb content[e]	do.	28,000	29,000	3,900	10,000	10,000
Ta content[e]	do.	110,000	113,000	15,000	39,000	39,000
Quartz	do.	157,254	140,600	707,411	838,684	840,000
Salt, marine[e]		110,000	110,000	120,000 [r]	120,000 [r]	130,000
Sand		718,577	1,260,492	1,150,052	1,678,736	1,700,000
Steel, semimanufactured		21,000 [e]	20,000 [e]	--	--	--
Stone:						
Granite[e]	cubic meters	5,500	350	--	--	--
Gravel and crushed rock	do.	115,524	2,942,830	824,316	951,069	950,000
Limestone		47,754	234,135	263,908	415,883 [r]	420,000
Marble:						
Block	cubic meters	301	--	--	225,144	230,000
Slab	square meters	7,932	250	--	-- [e]	--
Titanium:						
Ilmenite concentrate		328,875	471,500	678,400	636,800 [r]	574,500 [3]
Rutile concentrate		6,552	1,800	4,700	6,455 [r]	3,713 [3]
Zircon concentrate		32,985	21,100	37,100	43,600	46,900 [3]

[e]Estimated; estimated data are rounded to no more than three significant digits. [r]Revised. do. Ditto. -- Zero.
[1]Table includes data available through November 13, 2013.
[2]Other gemstones, such as ruby, were produced, but available information is insufficient to estimate production.
[3]Reported figure.
[4]Reported cement sales by Cimentos de Moçambique SARL only.
[5]Does 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 2012

(Metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity[1]
Aluminum		Mozambique Aluminum SARL (BHP Billiton Ltd., 47%)	Mozal smelter at Beluluane	563,000.
Bauxite		Mina Alumina Lda.	Vila de Manica	12,000.[e]
Bentonite		Minerais Industriais de Moçambique Lda	Mine at Mufiane	30,000.
Cement		Cimentos de Moçambique SARL [Cimentos de Portugal, SGPS, SA (Cimpor), 82.46%]	Plant at Matola	1,300,000.
Do.		do.	Plant at Dondo	240,000.
Do.		do.	Plant at Nacala	120,000.
Do.		Cimentos de Nacala S.A. [Cimentos de Portugal, SGPS, SA (Cimpor), 100%)	do.	350,000.
Coal, bituminous		Vale S.A.	Moatize Mine near Tete	11,000,000.
Do.		Jindal Steel & Power Ltd.	Changara Mine in Tete Province	3,000,000.
Do.		Rio Tinto plc, 65%, and Tata Steel Ltd., 35%	Benga Mine near Tete	2,400,000.
Do.		Beacon Hill Resources plc (BHR)	Minas Moatize Mine near Tete	220,000.
Diatomite		Diatomites de Moçambique Lda	Diana quarry near Manica	4,800.
Gemstones:				
Aquamarine	kilograms	Mozambique Gems Ltd.	Mine near Mavuco	3,600.[e]
Garnet	do.	Sociedade Vision 2000 Lda	Cuamba Mine	8,000.[2]
Morganite	do.	Noventa Ltd.	Mine at Marropino[3]	5,000.[e]
Ruby	do.	Montepuez Ruby Mining (MRM) (Gemfields plc, 75%, and Mwiriti Lda., 25%)	Montepuez Mine in Cabo Delgado Province	55.[e]
Do.	do.	Artisanal miners	Nacaca Mine in Cabo Delgado Province	NA.
Do.	do.	do.	M'sawize Mine in Niassa Province	NA.
Tourmaline	do.	do.	13 kilometers northeast of Mavuco[3]	2,600.[e]
Do.	do.	do.	3 kilometers northeast of Mavuco[3]	NA.
Do.	do.	Mozambique Gems Ltd.	Mine near Mavuco	1,200.[e]
Do.	do.	Miranda Gems Hong Kong Ltd.	do.	NA.
Gold	do.	Agrupamento Mineiro (joint venture of Companhia Mineira de Gile and Metais de Moçambique)	Manica District[3]	720.
Do.	do.	Artisanal miners	do.	600.
Graphite		AMG Advanced Metallurgical Group N.V.	Mine at Ancuabe[3]	10,000.
Marble, block	cubic meters	Marmonte Moçambique	Quarry at Pemba[3]	1,500.
Natural gas	million cubic meters	Sasol Ltd., 70%, and Empresa Nacional de Hidrocarbonetos, E.P., 30%	Temane and Pande	4,780.
Niobium (columbium) and tantalum, columbite-tantalite, ore and concentrate		Noventa Ltd.	Mine at Marropino	270 Ta_2O_5.
Do.		Pacific Wildcat Resources Ltd.	Mine at Muiane	34 Ta_2O_5.
Steel, semimanufactured		ArcelorMittal South Africa Ltd.	Trem de Varao plant at Maputo[3]	35,000.
Titanium		Kenmare Resources plc	Moma Mine in Nampula Province	800,000 ilmenite; 14,000 rutile.
Zirconium		do.	do.	50,000 zircon.

[e]Estimated; estimated data are rounded to no more than three significant digits. Do., do. Ditto. NA Not available.
[1]Abbreviations used in this table for commodities include the following: Ta_2O_5—tantalum oxide.
[2]Gem-quality only.
[3]Not operating at the end of 2012.