THE MINERAL INDUSTRY OF

MADAGASCAR

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The Republic of Madagascar, which is the world's fourth largest island, is located about 420 kilometers (km) east of Mozambique in the Indian Ocean. Its mining industry has been chiefly noted for its production and export of chemical- and metallurgical-grade chromite ore, high-quality crystalline flake graphite, and mica. In addition to these minerals, small quantities of gold and rare earths have been produced, as well as some industrial mineral commodities, which included cement, feldspar, a variety of semiprecious gemstones, quartz, and salt.

Active exploration on the island has targeted sapphires and other semiprecious gemstones, gold, nickel, and titanium. Undeveloped deposits of bauxite at Manantenina, coal at Sakoa, and iron ore at Soalala also occur on the island nation. Deposits of copper, lead, labradorite, marble, platinum, rhodolite, rockcrystal, and uranium are sizable (Worldinformation.com, 2000, Madagascar country profile, accessed March 1, 2001, at URL http://www.worldinformation.com/World/Africa/Madagascar/ profile.asp?country=261). Production of refined petroleum from imported crude remained modest, and exploration for hydrocarbon resources continued. The Government had nationalized all mineral resources, except graphite and mica in 1975.

Two major nickel and titanium deposits have been identified by Phelps Dodge Corp. of the United States at Ambatovy and by QIT-Fer et Titane Inc., which was a Canadian subsidiary of Rio Tinto plc of the United Kingdom, in the Fort Dauphin region, respectively. Development of these deposits was pending favorable market and investment conditions and environmental assessments.

Although detailed production statistics were not readily available, estimates for 1999, which were based on historical levels for all mineral commodities, are listed in table 1. Smuggling of gold and semiprecious stones remained a problem.

The chromite industry, which was located in Andriamena, was controlled by the parastatal Société Kraomita Malagasy. Madagascar continued to be a producer and exporter of highquality crystalline flake graphite; production levels ran from 12,000 to 14,000 metric tons per year (t/yr) between 1996 and 1998. Graphite was produced in Madagascar by five main companies headquartered in Antananarivo. Société Minière de la Grande Ile's Ambatomitamba graphite mine was the largest single producer; it processed around 4,000 t/yr of 92% flake graphite. Graphite and mica production were owned and operated by foreign entities.

Office des Mines Nationales et des Industries Stratégiques is involved primarily in research, joint ventures, and promotion of Madagascar's mineral resources, which include hydrocarbons, and acts as the repository of the acquired exploration data. The Ministry of Energy and Mines (MEM), through the Directorate of Energy, has primary responsibility for the energy sector. MEM also directs Solitany Malagasy (SOLIMA) and the Electricity and Water Co. The distribution, importation, and refining of petroleum products are managed by SOLIMA.

In 1999, Madagascar's gross domestic product (GDP) amounted to about \$11.5 billion at purchasing power parity, which was an increase of 4.5% compared with that of 1998. Per capita income was \$780 in 1999. Industry accounted for about 12% of GDP (U.S. Central Intelligence Agency, 2000). Mining accounted for about 2% of GDP and employed 1% of the workforce (Worldinformation.com, 2000, Madagascar country profile, accessed March 1, 2001, at URL http://www.worldinformation.com/World/Africa/Madagascar/ profile.asp?country=261).

Madagascar consumed 698 million kilowatt-hours (MkWh) of electricity in 1998. Production of electricity totaled 750 MkWh. Hydroelectric power sources provided 66.67% of the country's electricity, and fossil fuel sources accounted for the remaining 33.33%. Madagascar had about 50,000 km of roads, of which approximately 5,800 km were paved; the rail network covered nearly 900 km (U.S. Central Intelligence Agency, 2000).

Madagascar's mineral industry has considerable potential, but its success ultimately depends upon the country's ability to reform the economy and to deal with chronic malnutrition, underfunded health and education facilities, a 3% per year population growth rate, and severe deforestation and erosion.

Reference Cited

U.S. Central Intelligence Agency, 2000, Madagascar, *in* World factbook 2000: U.S. Central Intelligence Agency, p. 301-303.

Major Sources of Information

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

(Kilograms unless otherwise specified)

Commodity 3/		1995	1996	1997	1998	1999 e/
METALS						
Beryllium, beryl in quartz concentrates, industrial and ornamental e/		31,666 4/	11,000 r/	28,000 r/	32,000	32,000
Chromium:						
Chromite concentrate, gross weight	metric tons	49,702	54,900	55,900	41,700 r/	40,000
Chromite ore, lumpy	do.	56,405	82,310	83,800	62,600 r/	60,000
Total	do.	106,107	137,210 4/	139,700 4/	104,300 r/4/	100,000
Gold, mine output, Au content e/ 5/		38 4/	50	50	50	50
INDUSTRIAL MINE	RALS					
Abrasives, natural (industrial only) e/		10,000	10,000	10,000	10,000	10,000
Cement, hydraulic e/	metric tons	40,000	80,000	120,000	120,000	120,000
Clay, kaolin e/	do.	1,545 4/	1,500	1,500	1,500	1,500
Feldspar e/		2,120 4/	2,000	2,000	2,000	2,000
Gemstones: e/ 6/						
Amazonite		2,000	2,000	2,000	2,000	2,000
Amethyst:						
Gem		1,700	1,700	1,700	1,700	1,700
Geodes		80	80	80	80	80
Graphite, all grades, shipments	metric tons	16,119	12,134	13,975	13,087 r/	13,000
Mica, phlogopite: e/						
Block	do.	1	1	1		
Scrap	do.	389	400	582	212 r/	212
Splittings and sheet	do.	42	49	21		
Total	do.	432	450	603	212 r/	212
Ornamental stones: e/ 7/						
Jasper		68,000	68,000	68,000	68,000	68,000
Labradorite		61,000	61,000	61,000	61,000	61,000
Quartz: e/ 8/						
Crystal		32,000	32,000	32,000	32,000	32,000
Piezoelectric		66,000	66,000	66,000	66,000	66,000
Rose quartz		27,000	27,000	27,000	27,000	27,000
Smelting		180,000	180,000	180,000	180,000	180,000
Salt, marine e/	metric tons	51,307	50,000	50,000	50,000	50,000
Stone: e/						
Calcite, industrial	do.	2,000	2,000	2,000	2,000	2,000
Dimension stone	do.	3,000	3,000	3,000	3,000	3,000
Marble, cipoline		1	1	1	1	1
MINERAL FUELS AND RELATI	ED MATERIALS					
Petroleum refinery products: e/						
Gasoline	thousand 42-gallon barrels	200	200	200	200	200
Kerosene and jet fuel	do.	85	85	85	85	85
Distillate fuel oil	do.	60	60	60	60	60
Residual fuel oil	do.	100	100	100	100	100
Other	do.	5	5	5	5	5
Total	do.	450	450	450	450	450

e/ Estimated. r/ Revised. -- Zero.

1/ Estimated data are rounded to no more than three significant digits.

2/ Includes data available through February 2000.

3/ In addition to the commodities listed, modest quantities of unlisted varieties of crude construction materials (other clays, sand and gravel, and stone) presumably were produced, but output was not reported quantitatively, and available information was inadequate to make reliable estimates of output levels. 4/ Reported figure.

5/ Does not include an estimate of smuggled artisanal production.

6/ Reported output of other gemstones for 1996, in kilograms: cordierite, 3,942; garnet, 31,607; and tourmaline, 176,256. Most emerald and sapphire production was unreported.

7/ Other ornamental stones produced in 1996 for which data were reported, in kilograms: agate, 9,335; apatite, 16,982; aragonite, 569; calcite, 43,419; ruby, 48,194; and sapphire, 94.

8/ Other forms of quatrz mined historically and estimated production, in kilograms: geodes, 2,500; hematoid, 300; and other ornamental quartz, 3,000.