

# THE MINERAL INDUSTRY OF EGYPT

By Bernadette Michalski

The Egyptian economy has been, for the most part, traditionally sustained by mineral and mineral-related industries, particularly by revenues from petroleum and natural gas, and the Suez Canal, and Suez-Mediterranean (Sumed) oil pipeline. In recent years, the hydrocarbons sector accounted for more than 15% of the gross domestic product (GDP); other extractive mineral industries accounted for about 1% of the GDP. Suez Canal revenues were \$1.88 billion, a drop from \$1.94 billion in 1995<sup>1</sup> (Arab Oil and Gas Directory 1997, p. 109). According to the Central Bank of Egypt, the GDP was \$65.48 billion in the fiscal year ending June 30, 1997. In addition to hydrocarbons, Egypt produced a wide variety of metals and industrial minerals. Production levels of these nonfuel minerals, however, remained relatively low when compared with global levels.

Mining legislation dates back to the Mining and Petroleum Code Law 66 of 1953 and the Mining Code Laws 86, and 151 of 1956. These laws provide the legal basis for mineral exploration and exploitation. Law Nos. 43 of 1979 and 50 of 1981 provide the governorates and local councils the power of administration for quarries in their particular districts. Ministerial Decree 8 of 1990 was designed to assist the private sector in obtaining the required permits for mining. The Egyptian General Petroleum Corp. (EGPC) was created under law No. 20 of 1976. Recent petroleum policy requires exploration permits to be awarded as production-sharing agreements and the conversion of all joint ventures into production-sharing agreements.

Law No. 4 of 1994, the unified environmental legislation, empowered the Egyptian Environmental Affairs Agency with the right to enforce environmental regulations and standards at all levels of Egyptian industry. The law also provides for the caveat that any new mining or quarrying projects initially will require an environmental impact assessment. Extant mining operations have a 3-year grace period to conform to the new law, and the Government reserves the right to extend this period for 2 years if progress is made toward compliance with the law.

Egypt is not a member of the Organization of Petroleum Exporting Countries. A Government commission sets the price per barrel of crude oil to be exported. A long-standing pricing formula was discarded and a new pricing system was in effect as of January 1, 1996. The Government's monthly pricing formula for each of its crudes is now expressed as a differential relative to the North Sea Brent crude oil. Oil revenues were \$1.323

billion (fiscal year 1995), \$1.379 billion (fiscal year 1996), and \$1.397 billion (fiscal year 1997).

Efforts at privatization continued with plans to offer possibly as much as a 45% equity in the Aluminium Co. of Egypt (Egyptalum) and a 20% stake valued at \$124 million in the Egyptian Iron and Steel Company (Hadisob).

In 1996, Egypt produced a variety of minerals from more than 600 mines, quarries, and salt deposits. Among nonfuel minerals produced in Egypt, phosphate rock and iron ore remained the most important in terms of value. (*See table 1.*)

Crude petroleum and refined products (mostly fuel oil and naphtha) were Egypt's leading exports. Asia remained the biggest market for Egyptian crude oil. Israel has been a major importer of Egyptian crude oil ranging from deliveries of 15 million barrels per year (Mbbbl/yr) to as much as 25 Mbbbl/yr. The United States imported more than 14 Mbbbl/yr of crude oil and petroleum products from Egypt.

Egyptian natural gas exports via a 250-kilometer (km) pipeline to Israel, considered to be a primary outlet owing to its proximity and energy requirements, was closer to realization in 1995 than it has been in the succeeding months. An agreement in principal was concluded with Israel in April 1995 followed by a commitment from Amoco Egypt Oil Company (AEOC) and EGPC to supply Israel with 2 billion to 2.5 billion cubic meters per year of natural gas, during a 20-year period starting in 1999, via a connecting pipeline between the East Mediterranean fields and Israeli and Palestinian consuming centers. The Egypt Trans-Gas Co. was established in November 1995 to manage the export operation. Further negotiations conducted in 1996, however, came to a deadlock reportedly over the price and volume of natural gas. As a possible alternative, a memorandum of understanding was signed between Botas Co. of Turkey, EGPC, and Amoco providing for Egypt to export as much as 10 billion cubic meters per year of liquefied natural gas (LNG) to Turkey beginning in 2000.

Commerce transiting the 193.5-km-long Suez Canal is critical to the Egyptian economy. The Suez Canal generated revenues of \$1.88 billion, despite operating below capacity in 1996.

The 320-km-long Sumed pipeline complements the Suez Canal by linking Ain al-Sokhna on the Gulf of Suez to Sidi Krir on the Mediterranean coast. The pipeline's capacity was increased to 2.4 million barrels per day (Mbbbl/d) in late 1995, following a long series of improvements since the Sumed opened in 1977 with a 1.5-Mbbbl/d capacity. The pipeline is operated by the Arab Petroleum Pipeline Co. whose net income was \$74 million compared with \$66 million in 1995.

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<sup>1</sup>Where necessary, values have been converted from Egyptian pounds (£E) to U.S. dollars at a rate of £E3.40=US\$1.00.

Total Egyptian exports were reported to be nearly \$5 billion in 1996. Of this amount, exports of crude petroleum and products accounted for \$2.69 billion. Rolled aluminum product exports totaled 6,000 metric tons (t) with exports principally to the United States and Europe.

Petroleum products also were Egypt's principal mineral import, totaling \$1.36 billion. Imports from the United States included 300,000 barrels of petroleum products. Other mineral imports included asbestos, barite, chromite, copper, graphite, iron and steel products, lead, nickel, pumice, silver, sulfur, tin, titanium, tungsten, and zinc. The total value of imports was \$14.9 billion.

Most mining and mineral processing in Egypt is carried out by Government-owned mining companies. (See table 2.) Privatization has not progressed as rapidly as was originally planned; nearly \$0.5 billion were, however, realized from the sale of state-owned assets in 1996.

Egyptalum was on target with its extensive refurbishment and modernization of the Nag Hammadi primary smelter, its rolling mills, and a new aluminum extrusion facility. The modernization project was expected to increase production capacity from 179,000 metric tons per year (t/yr) to 300,000 t/yr by 2000. A possible seventh potline was under consideration. If implemented, then capacity would be increased to 350,000 t/yr by 2005. The alumina supply has been secured by long-term contracts with Billiton, a subsidiary of South Africa's Gencor Ltd., and with the Swiss-based Glencore group; the contracts began in 1996 and will run for 5 and 10 years, respectively.

Although equity in Egyptalum was scheduled for further public offering in 1996, the partial privatization was delayed as the process of valuation of the company had only been completed at yearend.

The Egyptian Geological Survey & Mining Authority identified an oolitic hematite iron ore deposit with proven ore reserves of 100 million metric tons (Mt) of 86% iron oxide in the Eastern Desert about 85 km south of Aswan. Egyptian iron ore was mined in the El Gedida area of El Bahariya Oasis in the Western Desert. Primarily high-grade iron ore, at 55% iron, was mined. All iron ore produced from the El Bahariya Oasis deposit was destined for the Helwan Iron and Steel Works near Cairo.

Alexandria National Iron and Steel Co. has embarked on a \$350 million expansion and modernization program that will increase output capacity to 1.5 million metric tons per year (Mt/yr). The expansion program included a \$115 million second module of the Midrex direct reduction plant, a \$46 million expansion of the steelmaking plant, and a \$40 million expansion at the rod-mill plant. Completion is scheduled for 1997. Hadislob is expected to be the first of Egypt's steel mills to transfer to partial private ownership. A minority stake in the company is expected to be offered on the Cairo stock exchange in 1998. The public offering receipts are to be applied to the revamping of the 30-cubic-meter-capacity No. 3 blast furnace at the Helwan plant.

The nation's eight cement companies have a combined installed cement production capacity of about 20 Mt/yr. Egypt

continued to be virtually self-sufficient in the mineral commodities needed to manufacture cement. The industry has been under increasing pressure, however, to address environmental problems associated with the industry.

Egypt has four nitrogenous fertilizer complexes, the largest of which is in Abu Qir. The others are in Kima, Suez, and Talkha. The nation's three other fertilizer complexes produce phosphate-base fertilizers. Egypt currently imports about 70,000 t/yr of potassium fertilizers with demand projected to rise to 200,000 t/yr by the turn of the century. BHP Minerals International Exploration Inc. continued exploration for potash deposits in a 14,800-square-kilometer (km<sup>2</sup>) area near Ras Gharib on the Gulf of Suez, and Botas continued exploration over a 14,000-km<sup>2</sup> area in the region of the Gulf of Suez and the Red Sea.

The Government opened the Abu Tartor phosphate mine, about 50 km west of the Kharga Oasis in the Western Desert. When at full production, scheduled for 1997, the annual crude phosphate rock output should reach 4.5 Mt at 31% P<sub>2</sub>O<sub>5</sub>, yielding 2.2 Mt of concentrate. The 680-km railway to transport the phosphate from Abu Tartor to Safaga on the Red Sea coast was completed in 1996.

Ilmenite is produced from the Abu Ghalaga Mine in the Red Sea region by El Nasr Phosphate Co. Most of the ilmenite is exported with Europe as the principal destination.

The nation's first coal mine opened in December 1995 in the northern Sinai. The Maghara Mine was expected to ultimately produce 600,000 t/yr for the domestic steel and power industries. The main coal-bearing seam at Haghara was 2 meters (m) thick. The first coal face is 150 m across.

Natural gas accounts for 35% of total energy consumption in Egypt. The Government planned to further utilize natural gas resources through improvements in production, transportation, and infrastructure. EGPC predicted a 12% increase in natural gas production during the next 5 years.

More than one-half of the nation's total natural gas production is derived from two fields—the Abu Madi and the Badreddin-3 Fields. Agip's International Egyptian Oil Co. (IEOC) was the country's leading natural producer at 14.87 million cubic meters per day (Mm<sup>3</sup>/d) followed by AEOC producing 2.55 Mm<sup>3</sup>/d. Twelve natural gas plants, with a total capacity of nearly 48 Mm<sup>3</sup>/d, operate in three different regions of the country) the Mediterranean region (with more than 50% of the total output), the northern edge of the Western Desert (with more than 30% of the output), and the Nile Delta. Some associated natural gas fields also were in production in the Gulf of Suez and the Sinai peninsula. Amoco and EGPC are considering using a string of recent gas finds on the Nile Delta by developing a LNG export project. A memorandum of understanding was signed in November 1996 to this affect. Under study is a single train plant with capacity to produce 4 billion cubic meters per year of LNG. A site west of Port Said has been selected to build the liquefaction plant and export facilities. The gas is to be eventually delivered to Botas to supply planned gas-fired power stations in the Izmir region. Natural gas sales negotiations are under way among Amoco, EGPC, and Botas.

Crude oil output has held steady at about 900,000 barrels per day (bbl/d) for the past decade (Energy Information Administration, 1997). About four-fifths of the country's total output is derived from within the 20,000-km<sup>2</sup> Gulf of Suez basin. AEOC, through the Gulf of Suez Petroleum Co., its joint venture with EGPC remained the largest oil producer in the country, producing about 360,000 bbl/d. The second largest producer is IEOC, producing about 290,000 bbl/d. Declining yields in more-mature fields have been offset by improved recovery rates in other fields after artificial lift systems were installed.

Egypt's seven refineries process just over 500,000 bbl/d. The existing refineries produce a disproportionately high volume of fuel oil, which accounts for almost 50% of total refinery output. New refining projects are directed toward increasing production of lighter products and decreasing the need for imports. Among these is the Middle East Oil Refinery, a joint venture with Israel. The export refinery, under construction in Alexandria, is scheduled for completion in 1999. It is to process 100,000 bbl/d of crude oil and will include a 25,000-bbl/d hydrocracker geared to produce light products.

Egypt's first petrochemical complex, to be constructed in Alexandria, is being developed by a newly created joint stock firm Sidi Krier Petrochemicals in partnership with banks and insurance companies.

Egypt's crude petroleum reserves were reported to be 3.1 billion barrels. Egypt's natural gas reserves are 680 billion cubic meters and include recent new discoveries in the Nile Delta and the eastern Mediterranean Sea. Natural gas reserves increased by nearly 70% in the last 3 years and represent nearly three-fifths of the country's total hydrocarbon reserves (Arab Oil and Gas Journal, 1997, p. 95).

Phosphate rock reserves are 1,270 Mt, iron ore reserves are 450 Mt, and manganese ore reserves total about 1.5 Mt.

Railways within Egypt totaled 5,110 km. There were more than 51,925 km of roadways and 1,171 km of crude oil pipelines. Installed electrical generation capacity was 14,000 megawatts divided among 37 thermal power stations and 4 hydroelectric plants. About 80% of the electrical output was generated by natural gas with the remainder generated by hydroelectric means. Egypt has embarked on a program that interconnects its power grid with neighboring countries. The first of these projects interconnected with the Libyan power grid in 1994. Plans include future Egyptian power grid connections with Jordan, Syria, and Turkey.

The allowance of 100% cost recovery on mineral-resource concession agreements should favor future foreign investment. The country is suffering from high levels of unemployment, and foreign investment and private sector development will be required if further progress is to be made. Private investment continues to make significant contributions in the mining and metallurgical segments of the Egyptian economy. Egypt's reduced government equity in favor of private capital by 20%, while continuing its expansion program to raise annual smelter capacity to 240,000 t by 1997 from 180,000 t. More natural gas fields than oil fields are under development. Three new Mediterranean nonassociated gas fields entered production in 1996, and two Western Desert fields are scheduled to enter production in 1997 and 1999. Coal exports are expected to begin in the near future.

### References Cited

- Arab Oil and Gas Directory 1997, Egypt: Paris, Arab Petroleum Research Center, 624 p.  
Energy Information Administration, 1997, International Petroleum Statistics Report: DOE/EIA-0520 (9706) p. 40.

### Major Sources of Information

Egyptian Geological Survey and Mining Authority

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TABLE 1  
EGYPT: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity	1992	1993	1994	1995	1996 e/
<b>METALS</b>					
Aluminum metal	177,800 r/	178,477 r/	188,464	180,300 r/	176,700
Chromite e/	600	600	600	600	600
Copper, refined, secondary	4,000	4,600 r/	4,300 r/	4,400 r/	4,400
Iron and steel:					
Iron ore and concentrate	2,400	2,190	3,870 r/	2,043 r/	2,100
Metal:					
Pig iron	1,062 r/	1,325 r/	1,148 r/	1,062 r/	1,100
Ferrous alloys: Ferrosilicon	7,900	40,100 r/	40,000 e/	40,000 e/	40,000
Direct Reduction	826	837	774	850	830
Steel, crude	2,524	2,772	2,622	2,642	2,618
Ferromanganese e/	10,000	30,000	35,000	35,000	35,000
Ferrosilicon	36,038	40,136	44,000	44,000	44,000
Manganese	11,000	15,000	15,000 e/	15,000 e/	15,000
<b>INDUSTRIAL MINERALS</b>					
Asbestos	373	604	514	427 r/	500
Barite	7,841	2,535	419	500 r/	500
Cement: Hydraulic	17,000	16,000	17,000 r/	17,665 r/	18,000
Clays:					
Bentonite	4,215	4,994	2,379	1,930 r/	2,500
Fire clay	475,000	421,000 r/	420,000 e/	420,000 e/	420,000
Kaolin	203,473	184,004	180,000	293,381 r/	295,000
Feldspar, crude	49,623	53,649	39,745	39,000	39,000
Fluorspar	1,290	773	514	5,510 r/	800
Gypsum and anhydrite, crude	1,425	1,199	1,200	2,030 r/	0
Ilmenite	--	--	--	57,000	60,000
Lime e/	749,000	748,000 r/	750,000	750,000	750,000
Nitrogen: Ammonia, N content	943	941	900 e/	900 e/	900
Phosphate:					
Phosphate rock	2,000	1,590 r/	1,600	1,596	1,596
P <sub>2</sub> O <sub>5</sub> content	404	302	300	400	400
Salt	1,096	986	1,008	1,990 r/	2,000
Sodium compounds:					
Soda ash	51,000	51,000	50,000 r/	50,000 e/	50,000
Sodium sulfate	41,000	25,600	26,000 e/	26,000 e/	26,000
Stone, sand and gravel: e/					
Basalt	1,000 2/	551 2/	600	600	600
Dolomite	900	952	1,000	1,000	1,000
Granite, dimension	10,000 2/	12,900 r/ 2/	13,000	13,000	13,000
Gravel	11,000 2/	7,180 r/ 2/	7,200	7,200	7,200
Limestone and other calcareous n.e.s.	18,000 2/	18,100 r/ 2/	18,000	18,000	18,000
Marble blocks (including alabaster)	57,000 2/	15,800 r/ 2/	16,000	45,000	45,000
Sand:					
Industrial sand (glass sand)	500 2/	743	740	740	750
Construction sand	26,000 2/	21,700 r/ 2/	22,000	22,000	22,000
Sandstone	180 2/	180	200	200	200
Sulfur: e/					
Elemental, byproduct	7,600	4,100	8,000 r/	10,000 r/	10,000
Sulfuric acid	100,000	100,000	100,000	591,000 r/	680,000
Talc, steatite, soapstone, pyrophyllite	8,908 r/	5,297 r/	4,125 r/	4,000 r/	4,000
Vermiculite	463	942	1,659 r/	483	1,000
<b>MINERAL FUELS AND RELATED MATERIALS</b>					
Coke: Oven and beehive	1,000	1,180	1,200 e/	1,200 e/	1,200
Gas, natural:					
Gross production	9,600	11,100 r/	11,900 r/	12,536 r/	14,000
Dry e/	8,000	8,800 r/	9,000 r/	9,500 r/	10,000
Petroleum:					
Crude	321,565	324,850	327,040	335,800	336,500
Refinery products:					
Liquefied petroleum gas	3,825	4,460	4,755 r/	5,325 r/	6,000
Gasoline and naphtha	31,500	33,800	36,900 r/	38,450 r/	39,000
Kerosene and jet fuel	18,400	18,750	17,155 r/	15,770 r/	19,000
Distillate fuel oil	32,825	36,050	39,200 r/	43,550 r/	45,000
Residual fuel oil	74,700	77,700	90,080 r/	80,350 r/	90,000
Lubricants	1,440	1,400	1,580 r/	1,645 r/	2,000
Asphalt	3,480	3,700	4,130 r/	4,485 r/	4,500
Unspecified	2,375	2,430	2,250 r/	2,550 r/	2,600
Total	168,545	178,290	196,050 r/	192,125 r/	208,100

e/ Estimated. r/ Revised.

1/ Table includes data available through Aug. 1, 1997.

2/ Reported figure.

TABLE 2  
EGYPT: STRUCTURE OF THE MINERAL INDUSTRY FOR 1996

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity
Aluminum		Aluminium Co. of Egypt (Government, 80%; private interests, 20%.)	Nag Hammadi	179
Carbon black		Alexandria Carbon Black Co. (Egyptian Holding Co. for the Chemical Industry, 49%; Inco-Bharat, 36%, Grasim Industries 15%.)	Alexandria	20
Cement		Al Ameriyah Cement Co.	Ameriya	2,100
Do.		Asiut Cement Co.	Assiut	2,600
Do.		Helwan Portland Cement Co. (Government, 73%; private interests, 27%.)	Helwan	2,800
Do.		Egyptian Cement Co. (Orascom Group, 40%; private interests, 40%; Holderbank Financiere Glaris Ltd., 20%)	El Minya	200
Do.		Suez Cement Co. (Government 77%; private interests, 23%).	70 kilometers east of Cairo	1,400
Do.		Alexandria Portland Cement Co. (Government 77%; private interests, 23%).	Ain Sukhna	1,700
Do.		National Cement Co. (Government 77%; private interests, 23%).	Qattamia	1,200
Fertilizers, nitrogenous		Société El-Nasr d Engrais et d'Industries Chemiques (Government, 100%)	Waddi Hagoul	1,200
Do.		do.	El Mex	800
Do.		do.	El Tabbin	4,000
Do.		do.	Beni Suef	1,000
Do.		do.	Abu Qir	660
Do.		do.	Suez	760
Do.		do.	Talkha	146
Do.		do.		450
Do.		do.		365
Do.		do.	Talkha	330
Do.		do.		570
Do.		do.	Kimi	330
Do.		do.		600
Do.		do.		800
Iron and Steel		Egyptian Iron and Steel Co. (Government, 100%)	Helwan steel plant	1,500
Do.		Alexandria National Iron and Steel Co. (Government, 100%)	El Dikheila plant	1,100
Natural gas	million cubic meters	Egyptian General Petroleum Corp. (EGPC) (Government, 100%)	Abu Madi	3,800
Do.		do.	Badreddin- 3	3,000
Do.		do.	Abu Qir/Naf	1,900
Do.		do.	Ras Shukheir	1,600
Do.		do.	Khalda	24
Petroleum, crude				
million 42-gallon barrels		Gulf of Suez Oil Co. (EGPC , 50%; Amoco, 50%)	October, Suez Gulf	45
Do.		do.	El Morgan, Suez Gulf	27
Do.		Belayim Petroleum Co. (EGPC, 50%; IEOC, 50%)	Belayim, Suez Gulf	65
Do.		Suez Oil Company (EGPC, 50%; Deminex, 25%; Repsol, 25%)	Ras Budran, Suez Gulf	15
Petroleum, pipeline				
million 42-gallon barrels		Arab Petroleum Pipeline Co. (Egypt, 50%; Saudi Arabia, 15%; Kuwait, 15%; United Arab Emirates, 15%; Qatar, 5%)	Ain al-Sokhna to Sidi Kir	875
Petroleum, refined				
		Cairo Petroleum Refining Co. (Government, 100%)	Mostorod	42
Do.		do.	Tanta	15
Do.		Alexandria Petroleum Co. (Government, 100%)	Alexandria	42
Do.		El-Nasr Petroleum Refining Co. (Government, 100%)	Suez	36
Do.		Ameriya Petroleum Refining Co. (Government, 100%)	Ameriya	27
Do.		Suez Petroleum Processing Co. (Government, 100%)	Suez	21
Do.		Asyut Petroleum Refining Co. (Government, 100%)	Asyut	18
Phosphate rock		Egyptian Organization of Industrial and Mining Complexes (Government, 100%)	Abu Tartur	2,200