



2005 Minerals Yearbook

MOROCCO AND WESTERN SAHARA

THE MINERAL INDUSTRIES OF MOROCCO AND WESTERN SAHARA

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MOROCCO

Morocco is located in northern Africa and is bordered by Algeria to the east, the Atlantic Ocean to the west, the Mediterranean Sea to the north, and Western Sahara to the south. Morocco is one of the world's leading producers of phosphate rock. In addition to phosphate rock, the country produced a wide variety of such minerals as coal, cobalt, copper, gold, iron ore, lead, manganese ore, mercury, natural gas, nickel, petroleum, silver, steel, and zinc. Industrial minerals produced included arsenic, barite, cement, clay, feldspar, fertilizers, fluorspar, gypsum, phosphoric acid, salt, strontium, sulfuric acid, and talc.

Production and Trade

In 2005, Morocco's metals output registered mixed results, which included declines in the production of ores and concentrates of cobalt, copper, and iron and increases in the production of ores and concentrates of lead, manganese, and zinc. Among industrial minerals, phosphate rock (P_2O_3 content) production rose by 8% compared with that of 2004 (table 1). The latest available official Moroccan trade statistics (2004) show exports of phosphate rock and phosphoric acid to have amounted to 11.7 million metric tons (Mt) and about 2.1 Mt respectively, which were increases of 6.4% and 16.2%, respectively, compared with exports in 2003. Among exports of metals, silver exports (in terms of value) increased by 11% compared with those of 2003; exports of copper and zinc ores and concentrates amounted to 12,000 metric tons (t) and 180,000 t, respectively, which, when compared with exports in 2003, decreased by about 40% and 14%, respectively. Exports of petroleum refinery products amounted to 158,000 t, which was an increase of about 35% compared with that of 2003 (Statistical Directorate of the Kingdom of Morocco, 2005, p. 118-125). Selected mineral imports included coal (5.5 Mt of crude and agglomerate), crude petroleum (6.1 Mt), petroleum refinery products (2.1 Mt), and iron and steel (1.3 Mt). Petroleum, iron and steel, and coal imports registered increases of about 32%, 17%, and 12%, respectively, compared with those of 2003; refined petroleum imports declined by about 26% (Statistical Directorate of the Kingdom of Morocco, 2005, p. 118-125).

Of the countries that exported goods to Morocco in 2004, the United States ranked eighth (in terms of value); of the countries that imported goods from Morocco, the United States ranked fifth (Statistical Directorate of the Kingdom of Morocco, 2005, p. 118-125). According to the U.S. Census Bureau, Moroccan exports to the United States were valued at about \$442.5 million in 2005 compared with \$515 million in 2004. These included more than \$15.5 million of petroleum products and \$93 million

of nonmetallic minerals (U.S. Census Bureau, 2005b§¹). Imports from the United States were valued at about \$527.5 million in 2005 compared with more than \$525.7 million in 2004. These included about \$7.4 million of excavating machinery, more than \$10.5 million of petroleum products, \$3.8 million of coal, and \$880,000 of drilling and oilfield equipment (U.S. Census Bureau, 2005a§).

Structure of the Mineral Industry

The Office National des Hydrocarbures et des Mines (ONHYM) was the Government entity responsible for exploring for and promoting of national mineral resources. The state-owned Office Chérifien des Phosphates (OCP) managed phosphate mining and beneficiation and owned most of the phosphoric acid and phosphate fertilizer production facilities. The leading private mining company in the country was Groupe Omnium Nord Africain (Groupe ONA) of Morocco through its equity interests in Managem S.A. and Société Nationale d'Investissement S.A. (SNI). Managem operated six mines in Morocco: the Akka gold mine, the Bou-Azzer cobalt mine, the Draa Sfar and the Guemassa copper-lead-zinc mines, El Hammam fluorspar mine, and the Imiter silver mine (Mining Review Africa, 2005).

Commodity Review

Metals

Compagnie de Tifnout Tiranimine (CTT), which was a subsidiary of Managem, mined cobalt ore at Bou-Azzer. Cobalt concentrates and tailings from Bou-Azzer were refined at the Guemassa plant. The Guemassa plant also produced about 6,000 metric tons per year (t/yr) of arsenic trioxide (Mining Review Africa, 2005).

On November 21, 2005, Odyssey Resources Ltd. of Canada announced that it had completed a preliminary sampling program of tailings at two past-productive copper-silver deposits near the company's Anti Atlas copper-silver property. Samples were shipped to Florin Analytical Services in Reno, Nevada, for copper and silver analysis to determine the possible economic value of the tailings (Odyssey Resources Ltd., 2005).

Compagnie Minière de Guemassa (CMG), which was a subsidiary of Managem, operated the underground polymetallic Hajar Mine at Guemassa. Managem's industrial processing complex at Guemassa produced about 160,000 t

¹References that include a section mark (§) are found in the Internet Reference(s) Cited sections.

of zinc concentrates, 30,000 t of lead, and 10,000 t of copper concentrates annually (Mining Review Africa, 2005).

Silver in Morocco occurs both as the primary mineral in ore deposits at Igoudrane and Imiter and as a byproduct of cobalt, copper, lead, and zinc mining operations. Most of the country's silver production came from the Imiter Mine, which was owned and operated by Société Metallurgique d'Imiter (SMI) (a subsidiary of Managem).

Industrial Minerals

The Moroccan cement industry comprised four companies: Asment de Temara; Holcim (Maroc) S.A.; Lafarge S.A. (Lafarge) through Lafarge Ciments (Maroc), which was a 50% owned subsidiary of the Lafarge Group of France; and Société des Ciments du Maroc S.A. According to International Energy Agency (2005) statistics, in 2004, the combined cement and clinker production capacity of these companies was 11.1 million metric tons per year (Mt/yr) and about 9.8 Mt/yr, respectively.

Metalex Ventures Ltd. of Canada continued to explore for diamond in southern Morocco during the year. The company's concession covered an area of 24,800 square kilometers (km²) of Archean cratonic and Proterozoic rocks, which the company considered to be highly prospective for diamond-bearing kimberlite and for base and precious metals, including platinum-group metals and iron ore.

OCP mined phosphate ore from the Ben Guerir, the Khouribga, and the Youssoufia mines. The company's Khouribga operations were spread out over a radius of 30 kilometers (km) and included three mines: the Sidi Chennane Mine, the Mera El Arech Mine, and the Sidi Daoui Mine, which had production capacities of 8 Mt/yr, 6 Mt/yr, and 4 Mt/yr, respectively. Sidi Daoui Mine was being gradually depleted of ore. Operations at Khouribga switched from underground methods to open pit methods in 1993.

The Government was considering cooperative ventures with foreign companies to further develop the phosphates industry. Construction work was scheduled to begin in December at the Jorf Lasfar 375,000-t/yr phosphoric acid plant and at a 1.5-Mt/yr sulfuric acid plant. The Government had signed a 50-50 joint-venture agreement in 2004 with Fauji Fertiliser Bin Qasim Ltd. of Pakistan to develop the integrated plant at Jorf Lasfar at a cost of about \$200 million. The plant, which will use about 1.3 Mt/yr of phosphate rock from OCP's Khouribga Mine, was scheduled to be completed by 2007 and would feed Fauji's 450,000 t/yr diammonium phosphate plant in Pakistan (Middle East Economic Digest, 2005b).

OCP continued with its plans to establish a 50-50 joint-venture with Bunge Fertilizantes S.A. of Brazil for the development of a 365,000-t/yr integrated phosphates fertilizer and phosphoric acid plant at Jorf Lasfar at a cost of \$265 million. Construction was expected to take 30 months, and commissioning was scheduled for 2008. Bunge and OCP had agreed in May on a long-term strategic alliance under which OCP would supply about 70% of Bunge's phosphate import requirements for the Latin America market (Middle East Economic Digest, 2005c).

In September, OCP signed a memorandum of understanding (MOU) with Sinochem Corporation of China to conduct a feasibility study for a new phosphoric acid plant at Jorf Lasfar and for the supply of 750,000 t/yr of diammonium phosphate to Sinochem from 2007 to 2011. The phosphate will come from a new 850,000-t/yr plant that was to be commissioned at Jorf Safar in December (Middle East Economic Digest, 2005c).

Mineral Fuels

According to the U.S. Energy Information Administration (2006§), as of January 2006, Morocco had proven oil reserves of about 1 million barrels and natural gas reserves of about 60 billion cubic feet. The country produced small volumes of natural gas and petroleum from the Essaouira Basin and small amounts of gas from the Gharb Basin and was North Africa's leading importer of petroleum and natural gas. Morocco was a transit center for Algerian gas exports to Portugal and Spain; exports were transported across the Strait of Gibraltar via the Maghreb-Europe Gas (MEG) pipeline.

Morocco's two petroleum refineries, which were located at Mohammedia and Sidi Kacem, had a combined capacity of about 155,000 barrels per day (bbl/d). In 2005, a \$614 million engineering, procurement, and construction contract was awarded to Samprogetti SPA of Italy and Tekfen Company of Turkey for the first phase of a refurbishing project at the 126,000-bbl/d Mohammedia refinery. The supervision contract for the project was awarded to Foster Wheeler of the United States. Engineering and procurement work was expected to begin in July and to last between 18 and 24 months; construction work was set to begin in mid-2006 and commissioning was scheduled for mid-2008. Société Anonyme Marocaine de l'Industrie du Raffinage (Samir) was to finance \$306 million of the estimated \$760 million project. Moroccan banks would finance \$227 million; the African Development Bank, \$81.4 million; international banks, \$261 million; and the remainder would be financed by Attijari Wafabank, Banque Marocaine du Commerce Extérieur, Barclays Capital, and BNP Paribas (Middle East Economic Digest, 2005a). A tender was to be released in September for the construction of a 25-megawatt (MW) powerplant at the refinery and, later in the year, for a 250-km pipeline that would link the refinery to the Gazoduc Maghreb Europe pipeline (Middle East Economic Digest, 2005c).

Outlook

According to the Organisation for Economic Co-operation and Development (2006, p. 371) Morocco's real gross domestic product (GDP) was expected to grow by 5.3% in 2006 compared with a growth of 2.1% in 2005; growth in the energy and mining sectors was expected to be 4.5% in 2006. The Government's plans to establish joint ventures with foreign companies to further develop the phosphates industry, plans to bring the Jorf Lasfar phosphoric acid and sulfuric acid plants online by 2007 and 2008, and signing of an MOU with Sinochem of China for the development of yet another phosphoric acid plant at Jorf Lasfar by 2011 suggest that the phosphates industry is likely to continue to dominate Morocco's minerals sector for the next 5 to 6 years.

More-extensive coverage of the mineral industry of Morocco can be found in the 2003 and 2004 U.S. Geological Survey Minerals Yearbook, volume III, Area Reports—International—Africa and the Middle East, which are available on the World Wide Web via URL <http://minerals.usgs.gov/minerals/pubs/country>.

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WESTERN SAHARA

According to the U.S. Department of State (2005§), the issue of sovereignty over Western Sahara remained unresolved in 2005. The territory, a desert area that borders the Atlantic Ocean between Mauritania and Morocco, is contested by Morocco and the Popular Front for the Liberation of the Saguia el Hamra and Rio de Oro (Polisario), which is an independence movement based in Tindouf, Algeria. Western Sahara's economy was dependent on pastoral nomadism, fishing, and phosphate mining.

More-extensive coverage of the mineral industry of Western Sahara can be found in the 2003 and 2004 U.S. Geological Survey Minerals Yearbook, volume III, Area Reports—International—Africa and The Middle East, which are available on the Internet at URL <http://minerals.usgs.gov/minerals/pubs/country>.

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TABLE 1
MOROCCO AND WESTERN SAHARA: PRODUCTION OF MINERAL COMMODITIES¹

(Metric tons unless otherwise specified)

Commodity ²	2001	2002	2003	2004 ^c	2005 ^c
METALS					
Antimony, sodium antimonate	436	532	500	500	500
Cobalt:					
Concentrates, gross weight	15,725	16,896	16,178	18,410 ^r	13,030 ³
Co content	1,242	1,453	1,391	1,600	1,100
Metal ⁴	1,341	1,354	1,431	1,594 ^r	1,613 ³
Copper:					
Concentrates, gross weight	19,120	17,799	17,539	14,200 ³	12,650 ³
Matte, gross weight	1,580	2,016	2,505	1,600	714 ^e
Cu content, concentrates and matte	5,400	5,000	4,900	4,400	2,800
Gold kilograms	1,191	2,747	1,863	1,493 ^r	1,786 ³
Iron and steel:					
Iron ore:					
Gross weight	7,976	8,736	6,300	9,900 ³	8,130 ³
Fe content ^c	4,300	4,700	3,400	5,300	4,400
Metal: ^c					
Pig iron	15,000	15,000	15,000	15,000	15,000
Steel, crude	5,000	5,000	5,000	5,000	5,000
Lead:					
Concentrate:					
Gross weight	110,906	88,582	54,779	58,810 ^r	59,920 ³
Pb content	76,747	62,400	38,600	41,400 ^r	42,200
Cupreous matte, Pb content ^c	500	600	600	600	600
Metal:					
Smelter, primary only	58,178	71,840	62,000	40,712 ^r	54,460 ³
Refined:					
Primary	58,178	71,840	61,473	35,000 ³	35,000
Secondary ^c	3,000	3,000	3,000	4,000 ³	4,000
Total ^c	61,000	75,000	64,000	39,000	39,000
Manganese ore, largely chemical-grade	13,757	18,064	--	9,050 ^r	11,270 ³
Mercury ^c	10	10	10	10	10
Nickel content of nickel sulfate	151	109	126	348 ^r	499 ³
Silver:					
Ag content of concentrates and matte kilograms	42,400 ^e	57,000 ^e	25,400 ^e	26,000	26,000
Ag content of mine and smelter bullion do.	238,043	220,000 ^e	175,155	170,000 ^e	170,000
Total do.	280,000 ^e	277,000	201,000	196,000 ³	196,000
Zinc concentrate:					
Gross weight	174,831	178,476	136,433	146,200 ³	151,270 ³
Zn content	89,339	90,487	69,200	74,600 ³	77,100
INDUSTRIAL MINERALS					
Arsenic trioxide	6,026	5,469	6,872	6,866 ^r	8,939 ³
Barite	471,102	469,934	358,500	415,200 ^r	475,575 ³
Cement, hydraulic thousand metric tons	10,000 ^e	10,200 ^e	10,400	11,000	11,000
Clays, crude:					
Bentonite	71,741	58,754	67,700	85,400 ³	64,350 ³
Fuller's earth (smectite)	40,664	43,243	14,944	28,700 ^r	29,060 ³
Montmorillonite (ghassoul)	2,270	2,329	927	1,240 ^r	1,010 ³
Feldspar	8,979	19,401	20,000	30,270 ^r	27,795 ³
Fertilizers thousand metric tons	2,719	2,602	2,542	2,405 ³	2,400
Fluorspar, acid-grade	96,500	94,911	81,255	112,100 ³	114,740 ³
Gypsum ^e	550,000	600,000	600,000	600,000	600,000
Phosphate rock:					
Gross weight ⁵ thousand metric tons	21,983	23,038	22,877	26,675 ^r	28,788 ³
P ₂ O ₅ content do.	7,400	7,700	7,400	8,507 ^r	9,195 ³
Phosphoric acid do.	2,819	2,921	2,930	3,254 ³	3,392 ³

See footnotes at end of table.

TABLE 1--Continued
MOROCCO AND WESTERN SAHARA: PRODUCTION OF MINERAL COMMODITIES¹

(Metric tons unless otherwise specified)

Commodity ²	2001	2002	2003	2004 ^e	2005 ^e
INDUSTRIAL MINERALS--Continued					
Salt: ⁶					
Rock	233,816	266,903	236,700	278,880 ^r	319,900 ³
Marine ^e	40,000	27,622 ³	36,000	36,000	36,000
Total	273,816	294,525	272,700	314,880 ^r	356,000
Strontium minerals, celestite	1,879	3,780	2,700	2,700	2,700
Sulfuric acid	NA	8,600	8,900	9,500	9,500
Talc and pyrophyllite	27,246	39,612	1,959	255 ^r	-- ³
MINERAL FUELS AND RELATED MATERIALS					
Coal, anthracite	1,908	322	214	200	200
Gas, natural:					
Gross million cubic meters	49 ^e	63	61	40 ³	40 ³
Dry ^e do.	43	55	54	35	35
Petroleum:					
Crude ⁷ thousand 42-gallon barrels	95 ^e	49	90	246 ³	245 ³
Refinery products:					
Liquefied petroleum gas do.	2,710	2,690	1,000	3,000	3,000
Gasoline do.	2,960	3,210	1,500	3,200	3,300
Jet fuel do.	900	1,090	500	1,000	1,000
Kerosene do.	880	620	300	900	900
Distillate fuel oil do.	21,970	17,330	9,000	24,000	24,000
Residual fuel oil do.	16,000	14,000	7,000	17,000	18,000
Other do.	1,500	1,450	700	2,000	2,000
Total do.	46,920	40,390	20,000	51,000	52,000 ³

^e Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. ^r Revised. NA Not available. -- Zero.

¹ Table includes data available through November 28, 2006.

² In addition to the commodities listed, perlite and a variety of crude construction materials are produced, but information is inadequate to make estimates of output.

³ Reported figure.

⁴ Cobalt electrowon from cobalt concentrates and tailings from the Bou-Azzer Mine.

⁵ Reported production from Morocco and Western Sahara.

⁶ May include production from Western Sahara.

⁷ Data for 2000 are based on crude oil and condensate production, which was reported as 13,106 metric tons.

Source: Fédération de l'Industrie Minérale.