

## 2007 Minerals Yearbook

## MOROCCO AND WESTERN SAHARA

# THE MINERAL INDUSTRIES OF MOROCCO AND WESTERN SAHARA

#### By Harold R. Newman

#### **MOROCCO**

Mining was significant to the Moroccan economy. The country was home to more than 90 mining companies that produced 20 different minerals. The mineral industry was dominated by phosphate production. Morocco was the world's third ranked producer of phosphate after China and the United States (Mbendi Information Services (Pty) Ltd., 2007). Morocco produced 8% of the world's production of barite, 2% of the world's production of fluorspar, 1% of the world's production of lead, and 19% of the world's production of phosphate rock (Jasinski, 2008; Miller, 2008a, b; Shedd, 2008; Smith, 2008). Morocco was the leading exporter of phosphate rock, phosphate derivatives, and phosphoric acid and accounted for about 27% of the overall world market (ABQ Zawaya Ltd., 2008).

#### Minerals in the National Economy

The mineral industry was Morocco's leading foreign exchange earning sector and accounted for about 35% of the gross domestic product. Morocco hosts several world-class deposits, including Bou-Azzer, which was the world's only deposit that had cobalt as a primary product; the Imiter silver deposit; and the Office Chérifien des Phosphates (OCP) phosphate deposits, which contain more than 30% of the world's total phosphate reserves. High international prices and rising external mineral demand were providing a stimulus to the mining industry. The Government indicated that it was aware of the need to bring about reforms in its tax structure and reduce trade bureaucracy in order to bring about significant growth in its mineral industry (Market Research, 2007).

#### **Government Policies and Programs**

The Government agency responsible for oversight of the mining industry was the Ministère de l'Industrie, du Commerce, de l'Énergie et des Mines (Ministry of Industry, Trade, Energy, and Mines). The Bureau de Recherches et de Participations Minières (BRPM) was responsible for the development of most mineral resources. La Centrale d'Achatt et de Développement de la Région Minière du Tafilalet et de Figuig (CADETAF) was responsible for promoting and supporting the interests of artisanal miners in the Figuig and the Tafilalet regions. Government policy has been to open up the mining sector to investment by both minor and major mining companies; however, phosphate production remains a state monopoly. OCP is responsible for managing and controlling all aspects of phosphate mining and beneficiation. Mining legislation is based on the Mining Code Bill No. 1-73-412 of August 13, 1973, and is enforced through executive orders and the Directorate of

Mines. All mineral resources are the property of the state, which issues permits and licenses for the exploration and exploitation of the resources.

#### **Production**

Morocco was one of the world's leading producers of phosphate rock. In terms of the value of production, phosphate rock was Morocco's most important mineral and accounted for 95% of mining volume. In addition to phosphate rock, the country produced a wide variety of minerals, which included barite, clays, coal, cobalt, copper, fluorspar, gold, iron ore, lead, nickel, petroleum, salt, silver, talc, and zinc (table 1).

#### Structure of the Mineral Industry

There was little change in the structure of the mineral industry in 2007. The Government continued to take steps, albeit slowly, to privatize selected state-owned mining assets and to launch reform programs within the mining sector to boost the sector's competitiveness. Table 2 is a list of major mineral industry facilities and their capacities and locations.

#### **Mineral Trade**

Morocco signed a free trade agreement with the United States on June 15, 2004, which went into effect on January 1, 2006. U.S. exports to Morocco were valued at about \$1,343 million in 2007 compared with \$876 million in 2006. This total included more than \$34 million for petroleum products, \$115 million for coal and other fuels, \$1.2 million for nonmetallic minerals, and \$3 million for iron and steel products (U.S. Census Bureau, 2007a). U.S. imports from Morocco were valued at about \$610 million in 2007 compared with \$521 million in 2006. This total included about \$104 million for sulfur and nonmetallic minerals, more than \$61 million for petroleum products and fuel, and \$24 million for miscellaneous nonferrous metals. The United States was a major trading partner and accounted for 21% of Morocco's exports and 13% of its imports (U.S. Census Bureau, 2007b).

#### **Commodity Review**

#### Metals

Cobalt.—Managem SA continued to mine cobalt ore at the Bou-Azzer underground mine. Bou-Azzer, which is translated as "where the fig tree stands," is located 35 kilometers (km) south of Ouarzazate in southern Morocco in the central Anti-Atlas Mountain range. The cobalt is associated with arsenic in narrow vein structures found at the contact of a serpentine and quartz-rich

diorite. The serpentines are the most obvious source rock for cobalt. The mineralized veins are vertically continuous for an estimated 200 meters (m). The ore has undergone several phases of brecciation and recrystallization related to late Pan-African and Hercynian deformations, which produced the various shapes of the ore bodies (flat lenses, lodes, stock works, and veins) (Leblanc and Billaud, 1982).

Copper.—Odyssey Resources Ltd. of Canada was the first foreign company to independently acquire exploration licenses in Morocco. Of its 25 licenses, 7 were 100% owned by Odyssey and 18 were acquired through lease with an option to purchase from the Government's Office National des Hydrocarbures et des Mine (ONHYM). A number of historical mines, defined deposits, and mineralized occurrences are located within the Anti-Atlas copper-silver region and are suggestive of the classic sediment and volcanic hosted "red bed" copper-silver style seen in other copper-rich districts. Odyssey's main advanced project was the Alous copper-silver deposit. In 2007, a drilling program was underway at the Alous property (Odyssey Resources Ltd., 2007).

Gold.—Another property owned by Odyssey was the Talouine gold deposit, which is located in the southern Anti-Atlas Mountains west of and on strike with the Taferent gold deposit, which was owned by the ONHYM. Taferent hosted an estimated resource of 5.6 million metric tons (Mt) of ore at an average grade of 1.22 grams per metric ton (g/t) gold. The Taferent property consisted of three exploration licenses that covered an area of 48 square kilometers (km²), and the deposit was hosted in Precambrian volcanic and intrusive rocks. Odyssey also expected to gain access to review the Tizintfirst gold property, which was a 16-km² exploration license that hosts a gold-bearing gossan. The property is located 80 km south of Midelt in the eastern Anti-Atlas Mountains and had not been previously explored (Mineweb, 2007a).

Kasbah Resources Ltd. of Australia won the international tender for the Tamlalt gold deposit, which is located about 300 km south of Oujda at the eastern end of the Moroccan High Atlas Mountains. The Tamlalt deposit was covered by eight exploration permits covering a surface area of 128 km². Drilling by the ONHYM showed that the deposit consisted of a multiple-veined quartz system developed within a chlorite-sericite—altered folded porphyritic intrusion. Within the 400 m of strike length that was drill tested, gold mineralization was intersected to within 12 m of the surface and to a maximum depth of 360 m vertical from the surface (Mining Review Africa, 2007a).

Silver.—Silver in Morocco occurs both as the principal metal in ore deposits at Igoudrane and Imiter and as a byproduct of 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 S.A.). The Imiter Mine is located about 25 km from Boumaine du Dades in central Morocco. Silver was Morocco's secondmost significant mineral product after phosphate (MinVision, 2007).

**Tin.**—Kasbah Resources acquired the rights to two tin deposits; one (the Achmmach Mine) is an advanced, large, hard rock project, and the other (the El Karit Mine) is a historic, hard rock open pit mine that the company was evaluating in 2007.

The El Karit Mine had been in operation for 49 years up to 1974. The project was planned to be a small-scale operation that would include an open pit mine attached to a small-scale mobile plant that would process about 200,000 metric tons per year (t/yr) of ore and would produce between 3,000 and 4,000 t/yr of tin concentrate. The Achmmach Mine, which was the larger of the two projects, was considered to be a significant tin deposit. Achmmach was estimated to have a resource of about 1 Mt of ore at a grade of 1% tin. Kasbah Resources initiated a study in 2007 to determine the feasibility of an open pit operation there that could be in operation by yearend 2009 (Mining Review Africa, 2007b).

#### **Industrial Minerals**

**Bentonite.**—S&A Industrial Minerals S.A. of Greece announced that it would construct a bentonite processing plant in the Nador region. The facility would have a capacity of 150,000 t/yr and was expected to be completed in 2008. S&B established a new subsidiary, S&B Industrial Minerals Morocco S.A.R.L., which would own the new facility. The investment in the plant was estimated to be \$3.9 million. The plant was intended for the initial processing of white bentonite coming from the new Trebia Mine (Capital Link, 2007).

**Cement.**—The Moroccan cement industry comprised the following 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 les Ciments du Maroc S.A. (CIMAR).

The Government signed contracts worth \$1,200 million to increase cement production in an attempt to keep up with economic development. The contracts would increase cement production by about 50%. Cement capacity was set to reach about 24.2 Mt/yr by yearend 2010 compared with 13.5 Mt/yr in 2007. In 2007, Société Holcim (Maroc) S.A. brought a 1.7-Mt/yr cement plant at Settat onstream at a cost of \$342 million (Middle East Economic Digest, 2007a).

**Phosphate Rock.**—Phosphate rock is found mainly in the western part of Morocco. Morocco's estimated phosphate reserves were 85,000 Mt and were hosted in Upper Cretaceous, Paleocene, and Eocene sediments. Morocco has the largest share of the world's known phosphate reserves. OCP was the country's sole producer of phosphate rock, most of which was exported; these exports accounted for about one-half of the country's income. Morocco was the world's leading exporter of phosphate rock and accounted for a 42% share of global exports (Mining Technology, 2007).

OCP mined phosphate rock from the Benguérir, the Khouribga, and the Youssoufia Mines. The Benguérir Mine, which is located 70 km north of Marrakesh, was the newest of OCP's phosphate mining centers. Mining was conducted at six benches of overburden material and phosphate rock by drilling and blasting. The phosphate rock was loaded by electric shovel onto trucks and hauled to the primary crusher. Only simple treatment of the phosphate rock was undertaken at the Benguérir Mine. Feeders removed chert and flint ahead of a Krupp primary jaw crusher, which discharged the phosphate to open storage. Benguérir phosphate was used mainly as feed for the Maroc

Phosphore II facility, which had four rock-washing lines and three 160,000-t/yr-capacity phosphoric acid plants (Mining Net, 2007).

#### Mineral Fuels, Related Materials, and Other Sources of Energy

Petroleum and Natural Gas.—As of January 2006 (the latest year for which data were available), Morocco had proven oil reserves of about 1 million barrels and natural gas reserves of about 1.7 billion cubic meters. The country produced small volumes of natural gas and petroleum from the Essaouira Basin and small amounts of natural gas from the Gharb Basin. Morocco was North Africa's leading importer of petroleum and natural gas, almost entirely from Middle Eastern countries and Algeria. The potential for hydrocarbon resources was thought to exist in large, yet-to-be-explored areas of Morocco. Morocco was a transit center for Algerian gas exports to Portugal and Spain; gas exports were transported across the Strait of Gibraltar via the Maghreb-Europe gas pipeline. Morocco's two refineries, which were located at Mohammedia and Sidi Kacem, had a combined capacity of about 155,000 barrels per day (U.S. Energy Information Administration, 2007).

Oil shale deposits had been identified in 10 localities, the most important of which were the Tarfaya and the Timahdit deposits. The Tarfaya deposit is located in southwestern Morocco near the border with Western Sahara and contains an estimated oil shale resource of 86 billion metric tons (Gt) within a 2,000-km² area. The Timahdit deposit is located 250 km southeast of Rabat with an estimated oil shale resource of 18 Gt. Petróleo Brasileiro S.A. (Petrobras) of Brazil signed an agreement with the ONHYM to undertake studies for the use of Petrosix® technology in the Timahdit field. Petrobras uses a conventional production process in which the shale is mined, crushed, and fed into a surface gas combustion retort for pyrolysis and processing. The Petrobras 11-m vertical shaft gas combustion retort was the largest surface oil shale pyrolysis reactor in operation in 2007 (Green Car Congress. 2007).

The Islamic Development Bank (IDB) signed a loan agreement with the National Electricity Office (ONE) worth \$187 million to finance construction of a 300-megawatt gas-powered electricity plant at Mohammedia. The project was aimed at helping to meet growing demand for electricity and ensure a reliable supply of power in the future. The IDB has financed other power projects in Morocco, such as the rural electrification program (Alexander's Gas & Oil Connections, 2007c)

The Government was investing more in petroleum exploration. The Government reported that it had signed four survey agreements and six prospecting agreements with oil companies. Two drilling projects in the northwestern region of Gharb led to two natural gas discoveries with estimated reserves of 10 million cubic meters (Alexander's Gas & Oil Connections, 2007b).

Island Oil and Gas Co. announced that its subsidiary Island International Exploration Morocco had signed a petroleum agreement with the ONHYM for seven exploration permits in the onshore Tarfaya Basin. The Tarfaya permit was valid for up to 8 years. The work program that had been committed to during the initial 2 years of the permit included seismic reprocessing and acquisition and geochemical modeling. A "drill or drop

decision" would be made at the end of the initial phase of the permit (Alexander's Gas & Oil Connections, 2007a).

Renewable Energy.—The Government was set to become the first Arab League country to use Government funds to encourage development of renewable energy sources. The Government was planning to raise its share of renewable resources to 10% from 2% by 2010. The dominant renewable resources in Morocco were solar energy and wind energy. The country could possibly sell electricity to Europe (Earth Times, 2007)

Uranium.—The ONHYM was encouraging exploration for uranium based on data developed by French and Russian geologists before 1982. The three areas under investigation were Haute Moulouya; Sirea, which contained the historic Zgrounder silver mine; and Wafagga, which was located 100 km southeast of Marakech. Haute Moulouya and Wafagga were paleochannel uranium deposits. Toro Energy Ltd. of Australia held 30 uranium permits in the three areas. Morocco's several uranium mineralization settings included paleochannel-type occurrences, granites with vein type occurrences, and occurrences in sedimentary and metamorphic terrains (World Nuclear Association, 2007).

Toro Energy signed a memorandum of understanding with the ONHYM to undertake field work as a prelude to negotiations for joint ventures on the three projects. Wafagga was believed to be the most promising site because it hosts a secondary uranium deposit that was estimated to contain from 0.1% to 0.15% uranium. Following the study, Toro Energy hoped to develop at least one uranium mine in Morocco (Middle East Economic Digest, 2007b).

Areva Group and OCP signed an agreement covering the extraction of uranium from phosphoric acid. The amount of uranium in Morocco's phosphates was reported to be very large. The International Atomic Energy Agency estimated that the uranium resources in phosphate deposits totaled about 6 Mt, which corresponds to twice the estimated world's resources in uranium deposits. Securing sources of uranium was critical to Areva, which was the sole supplier of the fuel to all France's nuclear plants (Mineweb, 2007b).

#### Outlook

The Government is expected to continue to establish joint ventures with international companies for mineral exploration and development. Government policies were being directed toward increasing the mining sector investments of both minor and major mining companies. The Government will likely take steps to privatize selected state-owned mining assets and launch reform programs within the mining sector to boost the sector's competitiveness. Morocco hopes to become a regional investment and trade platform between Europe, the countries of Southern Europe and Sub-Sahara Africa, and the United States and will invest heavily in infrastructure in the near future to accomplish this goal. The OCP is expected to continue to be the sole producer of phosphate, and the phosphate industry will likely continue to dominate Morocco's mineral sector for the next 6 to 8 years.

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#### WESTERN SAHARA

The issue of sovereignty for Western Sahara remained unresolved in 2007. The territory, a desert area that borders the Atlantic Ocean between Mauritania and Morocco, was contested by Morocco and the Popular Front for the Liberation of the Saguia el Hamra and Rio de Oro (Polisario), an independence movement based in Tindouf, Algeria. Western Sahara's economy was dependent on pastoral nomadism, fishing, and phosphate mining.

Interest in oil exploration contracts in areas offshore Western Sahara increased during 2007. The Saharawi Arab Democratic Republic awarded 6 offshore and 3 onshore exploration licenses out of the 18 that were offered. A joint venture between African companies Ophir Energy plc and Premier Energy plc won four of the licenses; the names of the other firms were not reported (Petroleum Economist, 2007).

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## ${\bf TABLE~1} \\ {\bf MOROCCO~AND~WESTERN~SAHARA: PRODUCTION~OF~MINERAL~COMMODITIES^1} \\$

(Metric tons unless otherwise specified)

Commodity <sup>2</sup>	2003	2004	2005	2006	2007 <sup>e</sup>
METALS	500	<b>500</b>	500		
Antimony, sodium antimonate	500	500	500	500	500
Cobalt:	46450	10 110 5	12.020	12.000	12.000
Concentrates, gross weight	16,178	18,410 <sup>r</sup>	13,030	13,000	13,000
Co content	1,391	1,600	1,100	1,100	1,100
Metal <sup>3</sup>	1,431	1,594 <sup>r</sup>	1,613	1,405 4	1,591 4
Copper:	15.520	10.200 5	10 65 1 5	17.011	10,000 4
Concentrates, gross weight	17,539	10,308 <sup>r</sup>	12,654 <sup>r</sup>	17,811	19,900 4
Cu content, concentrates	4,900	4,400	3,800 <sup>r</sup>	4,500 <sup>r</sup>	4,500
Gold kilograms	1,863	1,493 <sup>r</sup>	1,786	1,800	1,600
Iron and steel:					
Iron ore:	( 200	0.000.4	0.120	0.100	0.400
Gross weight	6,300	9,900 <sup>4</sup>	8,130	8,100	8,400
Fe content <sup>e</sup>	3,400	5,300	4,400	4,601 <sup>r</sup>	4,800
Metal: <sup>e</sup>	15,000	15,000	15 000	15,000	15.000
Pig iron	15,000	15,000	15,000	15,000	15,000
Steel, crude	5,000	5,000	205,000 r, 4	314,000 <sup>r, 4</sup>	325,000
Lead:					
Concentrate:	E 4 770	50 010 f	50.000	50 107 <sup>1</sup>	(0.000
Gross weight	54,779	58,810 <sup>r</sup>	59,920	59,107 <sup>r</sup>	60,000
Pb content	38,600	41,400 <sup>r</sup>	42,200	41,370	44,800 4
Cupreous matte, Pb content <sup>e</sup>	600	600	600	600	600
Metal:	(2,000	40.712.5	54.460	55,000	55,000
Smelter, primary only	62,000	40,712 <sup>r</sup>	54,460	55,000	55,000
Refined:	(1.472	25,000,4	20,600 f	44.700	44.700
Primary	61,473	35,000 4	38,600 <sup>r</sup>	44,700	44,700
Secondary <sup>e</sup>	3,000	4,000 4	4,000	3,000	3,000
Total <sup>c</sup>	64,000	39,000	39,000	47,700 °	47,700
Manganese ore, largely chemical grade		9,050 <sup>r</sup>	11,267 <sup>r</sup>	4,815 <sup>r</sup>	4,160 4
Mercury <sup>e</sup>	10	10	10	10	10
Nickel content of nickle sulfate	126	130 <sup>r</sup>	99 <sup>r</sup>	80 4	80
Silver:					
Ag content of concentrates kilograms	25,400 e	26,000	26,000	50,700	51,000
Ag content of matte and smelter bullion do.	175,155	170,000 e	170,000	195,000	195,000
Total do.	200,529	195,952 4	195,952	245,700	246,000
Zinc concentrate:				_	4
Gross weight	136,433	146,200 4	151,270	148,690 <sup>r</sup>	111,100 4
Zn content	69,200	72,363 <sup>4</sup>	78,660 <sup>4</sup>	77,320 <sup>r</sup>	68,000
INDUSTRIAL MINERALS					
Arsenic trioxide	6,872	6,866 <sup>r</sup>	8,939	8,950	8,000
Barite, crude	325,000 <sup>r</sup>	313,000 <sup>r, 4</sup>	325,222 r, 4	454,738 <sup>r, 4</sup>	554,600
Cement, hydraulic thousand metric tons	10,400	11,000	11,000	11,000	12,000
Clays, crude:					
Bentonite	85,000	85,400 <sup>3</sup>	64,350	65,000	65,000
Fuller's earth (smectite)	14,944	28,700 <sup>r</sup>	29,060	30,000	30,000
Montmorillonite (ghassoul)	927	1,240 <sup>r</sup>	1,010	1,000	1,000
Feldspar	20,000	30,270 <sup>r</sup>	27,795	28,000	28,000
Fertilizers thousand metric tons	2,542	2,405 4	2,400	2,400	2,400
Fluorspar, acid-grade	81,255	112,100 4	114,740	94,254	78,900 <sup>4</sup>
Gypsum <sup>e</sup>	600,000	600,000	600,000	600,000	600,000
Phosphate rock:					
F					27.000
Gross weight <sup>5</sup> thousand metric tons	21,997 <sup>r</sup>	25,568 <sup>r</sup>	28,119 <sup>r</sup>	27,244 <sup>r</sup>	27,000
	21,997 <sup>r</sup> 7,400	25,568 <sup>r</sup> 8,507 <sup>r</sup>	28,119 <sup>r</sup> 9,195	27,244 <sup>1</sup> 8,718 <sup>r</sup>	27,000 8,700

See footnotes at end of table.

## $\label{thm:continued} \textbf{MOROCCO AND WESTERN SAHARA: PRODUCTION OF MINERAL COMMODITIES}^{1}$

(Metric tons unless otherwise specified)

Commodity <sup>2</sup>	2003	2004	2005	2006	2007 <sup>e</sup>
INDUSTRIAL MINERALS—Continued					
Salt: <sup>6</sup>					
Rock	236,700	253,800 <sup>r</sup>	283,896 <sup>r</sup>	301,061 3	300,000
Marine <sup>e</sup>	36,000	36,000	36,000	16,234 <sup>3</sup>	16,000
Total	272,700	289,800 <sup>r</sup>	319,896 <sup>r</sup>	$319,927^{-3}$	316,000
Strontium minerals, celestite	2,700	2,700	2,700	2,700	2,600
Sulphuric acid	8,900	9,500	9,500	9,500	9,500
Talc and pyrophyllite	1,959	255 <sup>r</sup>			
MINERAL FUELS AND RELATED MATERIALS					
Coal, anthracite	214				
Gas, natural:					
Gross million cubic meter	ers 61	40	40	40	42
Dry <sup>e</sup>	lo. 54	35	35	35	36
Petroleum:					
Crude thousand 42-gallon barre	els 90	246	245	240	245
Refinery products:					
Liquefied petroleum gas	lo. 1,000	2,500 <sup>r</sup>	2,435 <sup>r</sup>	2,500	2,500
Gasoline	lo. 1,500	3,200	3,172 <sup>r</sup>	3,200	3,200
Jet fuel	lo. 1,000	2,000 <sup>r</sup>	2,095 <sup>r</sup>	2,000	2,000
Kerosene	lo. 15	15 <sup>r</sup>	15 <sup>r</sup>	15	15
Distillate fuel oil	lo. 8,549 <sup>r</sup>	16,000	17,129 <sup>r</sup>	18,000	18,000
Residual fuel oil	lo. 8,022 <sup>r</sup>	15,000	15,345 <sup>r</sup>	16,000	16,000
Other	lo. 4,420 <sup>r</sup>	2,000	1,909 <sup>r</sup>	2,000	2,000
Total	lo. 24,506	51,000	42,100 <sup>r</sup>	52,000	52,000

<sup>&</sup>lt;sup>e</sup>Estimated; estimated data are rounded to no more than three significant digits. <sup>r</sup>Revised. do. Ditto. -- Zero.

Source: Fédération de l'Industrie Minérale

<sup>&</sup>lt;sup>1</sup>Table includes data available through July 31, 2008.

<sup>&</sup>lt;sup>2</sup>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.

<sup>&</sup>lt;sup>3</sup>Cobalt electrowon from cobalt concentrates and tailings from the Bou-Azzer Mine.

<sup>&</sup>lt;sup>4</sup>Reported figure.

<sup>&</sup>lt;sup>5</sup>Reported production.

<sup>&</sup>lt;sup>6</sup>May include production from Western Sahara.

## ${\it TABLE~2} \\ {\it MOROCCO~AND~WESTERN~SAHARA: STRUCTURE~OF~THE~MINERAL~INDUSTRIES~IN~2007}$

(Metric tons unless otherwise specified)

Country and commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity
MOROCCO	<u></u>		
Arsenic trioxide	Compagnie de Tifnout Tiranimine (CTT) (Managem S.A., 55.2%, and Société Metallurgique d'Imiter, 20%)	Guemassa, Marrakech	6,100
Barite	Central d'Achat et de Développement de la Région Minière du Tafilalet et de Figuig (CADETAF) (artisanal miners)	Errachidia, Figuig, and Ouarzazate	16,000
Do.	Compagnie Marocaine des Barytes (COMABAR) [Norbar Minerals AS, 55%, and Bureau de Recherches et de Participations Minières (BRPM), 45%]	Tlet Ighoud, Safi	160,000
Do.	do.	Zelmou, Figuig	110,000
Do.	Morocco Minerals Co.	Chemaia, Safi	NA
Do.	Ouiselsat Mines S.A.	Tazzarine, Ouarzazate	NA
Do.	Société de Commerialisation et d'Exploitation Miniere d'Imoulasse (SCEMI)	NA	NA
Do.	Société Commerciale et Miniere du Sahara (SOCOMIS)	Tichka	NA
Do.	Société de Recherches et d'Exploitation Minieres Nadia	Tinitine, Marrakech	NA
Do.	Société Industrie Miniere Marocaine (IMM)	Tichka, Marrakech	NA
Do.	Société Miniere des Barytines d'Asni (SMBA)	NA	NA
Do.	Société Nord Africaine de Recherches et d'Exploitation des Mines d'Argana (SNAREMA)	Seksaoua, Marakech	120,000
Do.	Société Nouvelle Union des Metaux Maroc (SNUMM)	Jbel Abdellah, Errachidia	12,000
Do.	Société Zenaga	Tinjdad, Errachidia	NA
Barite, chemical grade	Société Nord Africaine de Recherches et d'Exploitation des Mines d'Argana (SNAREMA)	Argana	30,000
Bentonite	Société Miniere Bentonite d'Afarha S.A. [Grupo Tolsa of Spain, 80%, and Bureau de Recherches et de Participations Minières (BRPM), 20%]	Aferha	9,200
Do.	Société d'Exploitation des Mines du Rif (SEFERIF) [Bureau de Recherches et de Participations Minières (BRPM), 100%]	Bou Hoed, near Ouixane	15,000
Do.	Compagnie Marocaine des Barytes (COMABAR) [Norbar Minerals AS, 55%, and Bureau de Recherches et de Participations Minières (BRPM), 45%]	Azzouzet-Tidiennit	5,000
Do.	North African Industrial Minerals Exploration S.A.R.L. (S&B Group)	Trebia Mine	NA
Celestite	Société Karia Mines	Jbel Kifane, Taounate	NA
Cement, portland	Asment de Temara (Cimentos de Portugal, 57.4%)	Kiln and mill at Temara	845,000
Do.	Société Lafarge Ciments S.A. (Lafarge Maroc, 69.2%; general public, 12.23%; Caisse de Dépôt et de Gestion, 8.25%; Islamic Development Bank, 5.46%)	Douar Laaouameur kiln and mill south of Casablanca	2,000,000
Do.	do.	Cadem clinker mill at Meknes	1,000,000
Do.	do.	Tamuda kiln and mill, Tetouan	800,000
Do.	do.	Kiln and mill at Tangier	250,000
Do.	do.	Tetouan II kiln and mill	(1)
Do.	Société Holcim (Maroc) S.A. (Holcim Ltd. of Switzerland, 51%; general public, 35.2%; Islamic Development Bank, 13.8%)	Kiln and mill at Oujda	1,000,000
Do.	do.	Settat kiln and mill	1,700,000
Do.	do.	Fes, Ras El Ma kiln and mill	1,200,000
Do.	do.	Fes, Doukkarat clinker mill	600,000
Do.	do.	Nador clinker mill	400,000
Do.	Société les Ciments du Maroc S.A. (CIMAR) (Ciments Français S.A., 58.3%; general public 8.97%; Caisse Interprofessionnelle Marocaine des Retraites, 7.78%; Banque Nationale pour le Developpement Economique, 5.65%; Fonds d'Abu Dhabi pour le Développement	Kiln and mill at Agadir	1,220,000
	Economique Arabe, 5.38%)		
Do.	Economique Arabe, 5.38%)	Kiln and mill at Marrakech	1,300,000
Do. Do.	do. do.	Kiln and mill at Marrakech Kiln and mill at Safi	1,300,000 850,000

See footnotes at end of table.

## ${\it TABLE~2--Continued}\\ {\it MOROCCO~AND~WESTERN~SAHARA:~STRUCTURE~OF~THE~MINERAL~INDUSTRIES~IN~2007}$

#### (Metric tons unless otherwise specified)

Country and commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity
MOROCCO—Continued	J 1 U 1 J 1 J		
Clay	Société du Ghassoul et de ses Derives SEFRIOUI SA	Tamdafelt	NA
Do.	Antonio Reyes Mine	Haddou Ammar, Nador	NA
Coal, anthracite	Charbonnages du Maroc [Bureau de Recherches et de	Jerada <sup>2</sup>	650,000
	Participations Minières (BRPM), 98.89%]		
Cobalt:			
Ore, gross weight	Compagnie de Tifnout Tiranimine (CTT) (Managem S.A., 55.2%, and Société Metallurgique d'Imiter, 20%)	Bou-Azzer, Ouarzazate	17,000
Metal	do.	Guemassa, Marrakech	1,400
Copper, concentrate	Société Minière de Bou Gaffer (SOMIFER) [Bureau de	Bleida	50,000
	Recherches et de Participations Minières (BRPM), 34.2%;		
	Société Metallurgique d'Imiter, 36%; Managem S.A., 7.6%]		
Do.	Compagnie Minière de Guemassa (CMG) [Managem S.A., 74%, and Bureau de Recherches et de Participations Minières (BRPM), 23.08%]	Douar Hajar Mine, Guemassa, Marrakech	18,000
Do.	Société de Développement du Cuivre de l'Anti-Atlas (SODECAT)	Tiouit	4,500
	[Bureau de Recherches et de Participations Minières (BRPM), 100%]		
Fluorspar, concentrate	Société Anonyme d'Entreprises Minières (SAMINE)	El Hammam, Khemisset	120,000
	(Managem S.A., 58%, and Société Metallurgique d'Imiter, 42%)		
Gold	Akka Gold Mining Company [Managem S.A., 70%, and	Iourim, Tiznit	3
	Bureau de Recherches et de Participations Minières (BRPM), 16.07%]		
Liquefied petroleum gas million metric	Société d'Exploitation des Mines du Rif (SEFERIF)	Bouhoua, Nador	12
tons	[Bureau de Recherches et de Participations Minières (BRPM), 100%]		
Lead:			
Concentrate	Compagnie Minière de Guemassa (CMG) [Managem S.A., 74%, and	Douar Hajar Mine, Guemassa	29,900
	Bureau de Recherches et de Participations Minières (BRPM), 23.08%]		
Do.	Compagnie Minière de Touissit (CMT) (Compagnie	Touissit, Jerada	73,000
	Royale Asturienne des Mines S.A. of Belgium, 100%)		
Metal <sup>2</sup>	Société des Fonderies de Plomb de Zellidja (SFPZ) (Zellidja S.A., 50.4%)	Oued El Heimer	70,000
Manganese, concentrate	Société Anonyme Chérifienne d'Etudes Minières (SACEM)	Imini, Ouarzazate	14,000
manganese, concentrate	[Bureau de Recherches et de Participations Minières (BRPM), 43%,	mmi, Guarzazate	11,000
	and Compagnie Minière de l'Ogooué SA (COMILOG), 30%]		
Perlite	Perlite Roche [Roche Investments, 70%, and Bureau de Recherches	Tidiennit	20,000
Terme	et de Participations Minières (BRPM), 20%]	Traicinit	20,000
Do.	Perlite Inc. (Roche Investments)	Expansion plant at Berrechid, near Casablanca	NA
Petroleum, refinery thousand	Société Anonyme Marocaine de l'Industrie du Raffinage (SAMIR)	Mohammedia	47,000
products 42-gallon barrels	(Group Corral Petroleum, 64.7%, and general public, 35.3%)	Wonammedia	47,000
Do. do.	do.	Sidi Kacem	9,500
Phosphate rock	Office Chérifien des Phosphates (OCP) (Government, 100%)	Sidi Daoui Mine, Khouribga	10,000,000
Thosphale rook	onice chemical des racopames (corr) (coverament, 100%)	mining center	10,000,000
Do.	do.	Mera El Arech Mine, Khouribga mining center	6,000,000
Do.	do.	Benguerir open pit mine, Gantour mining center	4,000,000
Do.	do.	Youssoufia underground	3,000,000
Б0.	uo.	mine, Gantour mining center	3,000,000
Do.	do.	Sidi Chennane Mine, Khouribga	2,000,000
Phoenhoria said P.O. content	India Marca Dhaanhara C. A. [Office Oblinition des Dhambar. (OCD)	mining center	220.000
Phosphoric acid, P <sub>2</sub> O <sub>5</sub> content	Indio Maroc Phosphore S.A. [Office Chérifien des Phosphates (OCP), 50%, and K.K. Birla Group of India, 50%]	Jorf Lasfar	330,000
Do.	Office Chérifien des Phosphates (OCP)	Maroc Chimie I and II, Safi	270,000
Do.	do.	Maroc Phosphore I and II, Safi	1,100,000
Do.	do.	Maroc Phosphore III and IV,	1,400,000
		Jorf Lasfar	-,

See footnotes at end of table.

## ${\it TABLE~2--Continued}\\ {\it MOROCCO~AND~WESTERN~SAHARA:~STRUCTURE~OF~THE~MINERAL~INDUSTRIES~IN~2007}$

#### (Metric tons unless otherwise specified)

MOROCCO—Continued  Phosphoric acid (purified), Euro-Maroc Phosphore Co. [Office Chérifien des Phosphates (OCP), Jorf Lasfar³  P <sub>2</sub> O <sub>5</sub> content 33%; Société Chimique Prayon-Rupel of Belgium, 33%;	f main facilities capacity  120,000
Phosphoric acid (purified), Euro-Maroc Phosphore Co. [Office Chérifien des Phosphates (OCP), Jorf Lasfar³  P <sub>2</sub> O <sub>5</sub> content 33%; Société Chimique Prayon-Rupel of Belgium, 33%;	120,000
P <sub>2</sub> O <sub>5</sub> content 33%; Société Chimique Prayon-Rupel of Belgium, 33%;	,
2 3	
Chamicaha Enghailt Dudanhaim VC of Campany 220/	
Chemische Frabrik Budenheim KG of Germany, 33%) Salt:	
Rock Société de Sel de Mohammedia (SSM) [Bureau de Recherches et de Aîn Tekki, N Participations Minières (BRPM), 100%]	ohammedia 226,500
Marine Société Chérifienne des Sels (SCS) [Bureau de Recherches et de Lac Zima, Sa Participations Minières (BRPM), 50%, and Société Nouvelle des Salins du Sine Saloum (SNSSS), 50%]	fi 30,000
Silver, ore Société Metallurgique d'Imiter (SMI) (Managem S.A., 75.72%, and Near Quarza general public, 24.28%)	ate 525
Steel products:	
Bars and sections  Société Nationale de Sidérurgie (Sonasid) (general public, Jorf Lasfar 31.14%; Société Nationale d'Ivestissement S.A., 21.07%;  Axa Assurances Maroc, 8.53%; Aceralia Redendos, 8.5%)	300,000
Rebar and wire rod do. Nador	540,000
Do. do. Casablanca	80,000
Cold-rolled sheet Maghreb Steel S.A. do.	250,000
Talc and pyrophilite:	
Pyrophilite Société Industrie Minière Marocaine (IMM) Khenifra	NA
Talc Société Zenaga Tinjdad, Erra	chidia NA
Do. do. Taliouine, O	arzazate NA
Zinc, concentrate  Compagnie Minière de Guemassa (CMG) [Managem S.A.,  74%, and Bureau de Recherches et de Participations  Minières (BRPM), 23.08%]	Mine, Guemassa 170,000
Do. do. Draa Sfar	(1)
Do. Société des Mines de Tennous (SOMITE) Aguerd N'Ta	zoult, Azilal NA
Do. Société Mineral et Substances Lalla Mimou	na, Taza NA
WESTERN SAHARA	
Phosphate rock Phosphates de Boucraa S.A. [Office Chérifien des Phosphates Open pit min (OCP), 65%] center	e, Boucraa mining 2,000,000

Do., do. Ditto. NA Not available.

<sup>&</sup>lt;sup>1</sup>Under construction.

<sup>&</sup>lt;sup>2</sup>SFPZ also refines silver and produces copper matte and sodium antimonate.

<sup>&</sup>lt;sup>3</sup>A second purified phosphoric acid plant with a capacity of 120,000 metric tons per year was under construction.