THE MINERAL INDUSTRY OF

MOROCCO AND WESTERN SAHARA

By Bernadette Michalski

Morocco is the world's third largest producer of phosphate rock, following the United States and China. The nation also has a significant capacity for conversion of phosphate rock into downstream chemicals. Other mineral production includes anthracite coal, antimony, barite, cobalt, copper, fluorspar, iron ore, lead, manganese, salt, silver, and zinc. The mineral industry is Morocco's largest foreign-exchange-earning sector and usually accounts for about 35% of foreign trade and about 6% of the gross domestic product. The mining sector employs 46,600 workers.

Current mining legislation in Morocco is based on Mining Code Bill No. 1-73-412 of August 13, 1973. Regulations concerning the management of petroleum and natural gas resources were revised in 1992 to provide further incentives for international companies. The revised law reduced the Government's share in agreements with international operators from 50% to 35%. Exploration costs are fully deductible for 10 years. Furthermore, the petroleum export duty was waived for the initial 3 years of production. No royalty is payable on the first 4 million metric tons (Mt) (about 30 million barrels) of output from any concession. Maximum total holdings are limited to 10,000 square kilometers (km^2) onshore and 20,000 km^2 offshore for each company. The minimum duration of an agreement was reduced from 15 years to 8 years. Concessionaires are not required to contribute a share of output to domestic needs.

The State's interests in metal and industrial mineral enterprises were represented by the Bureau de Recherches et de Participations Minières (BRPM). Government holdings successfully privatized in 1997 included Société Metallurgique d'Imiter's (SMI) silver mine with BRPM participation reduced from 69% to 13%, the Mohammedia and the Sidi Kacem petroleum refineries with Government equity in each refinery reduced from 100% each to 6.8% and 7.4%, respectfully; and the Société Nationale de Sidérurgie (SONASID) rebar and wire rod plant.

The most pressing environmental issue in Morocco was the pollution of the drinking water supply in the country's two most important river basins, the Sebou and the Qum Er Rabia. Silting of dams and the deterioration of other existing water infrastructure were a major concern. The World Bank therefore, recommended that investments should be made in repairing existing structures as opposed to financing new projects.

Although Morocco produced a variety of minerals, it is phosphate rock and fertilizers, including phosphoric acid, diammonium phosphate, and triple superphosphate, that remain significant on a global scale. *(See table 1.)*

Morocco is the world's foremost exporter of phosphate rock and phosphoric acid. These commodities account for 70% of the mineral exports, which also include copper, iron ore, lead, and zinc. In 1997, total exports rose by about 10%, from $442 million[1] to $488 million.

Phosphate exports rose by 45%, to $97 million from $67 million. Spain, the United States, and Mexico were the principal phosphate markets by order of volume. Phosphate exports accounted for nearly 31% of Morocco's total exports.

The major mineral commodity imports continued to be crude oil and petroleum products. In 1997, the principal source for imported crude oil was Nigeria and Saudi Arabia. About 900,000 barrels of Iraqi crude oil was purchased during the United Nations-approved Food for Oil Agreement between August and December 1997. The Islamic Development Bank was the source for financing oil imports (Arab Petroleum Research Center, 1998, p.280). Algeria was the principal source for liquefied petroleum gas. Other imported mineral commodities included sulfur and solid fuels.

The mining industry of Morocco is controlled by the Government, specifically the Directorate of Mines, which is a department in the Ministry of Energy and Mines. The Directorate of Mines is charged with the interpretation and application of the national mining policy. The Directorate also controls the various parastatals and public companies involved in the mining industry. The Directorate of Mines also manages mining properties, labor concerns, commercialization, and studies in mining, mineralogy, and metallurgy.

Established in 1928, BRPM is an autonomous public corporation involved directly or indirectly in the majority of all Moroccan mining enterprises, excluding hydrocarbons and phosphate. BRPM employed about 1,330 people, including 150 engineers. Founded in 1920, the parastatal Office Cherifien des Phosphates (OCP) manages and controls phosphate mining. OCP controls all aspects of the phosphate industry in Morocco, including research, exploitation, and the production of derivative products, such as fertilizers. It employed about 30,000 people, including some 700 engineers and technicians. Created in 1960, La Centrale d'Achat et de Développement de la Région Minière de Tafilalet et de Figuig (CADETAF) promotes the working of artisanal mines of barite, lead, and zinc in the regions of Tafilalet and Figuig. CADETAF provides technical, commercial, and social assistance to the artisanal miners. The Government parastatal that controls hydrocarbon exploration and production is the Office National de Recherches & d'Exploitations Pétrolières.

Since 1993, Omnium Nord Africain (ONA), the largest private company in Morocco, has acquired much of the Government equity offered for privatization. ONA's mining subsidiary, Pole Mines, was involved in seven significant Moroccan mining

[1]Where necessary, values have been converted from Moroccan dirhams (DH) to U.S. dollars at a rate of DH9.86=US$1.00.

ventures. Pole Mines' equity ventures included the polymetallic Douar Hajar Mine with Cie. Minière de Guemassa, the Bleida copper mine with Société Minière du Bou Gaffer (SOMIFER), the cobalt mine at Bou Azzer operated by Compagnie de Tifnout Tiranimine (CTT), the El Hammam fluorite mine operated by Société Anonyme d'Entreprises Minières (SAMINE); the Iourim gold mining venture, the silver mine at Imiter operated by SMI with equity ownership by BRPM, and the Guemassa zinc mine. *(See table 2.)*

CTT began cobalt recovery from the Bou Azzer mine tailings, which were leached in sulfuric acid, purified with solvent extraction, and then electrowon to produce 99.9% cobalt cathode. The company expects to produce 220 metric tons per year (t/yr) of cobalt cathode from reprocessed tailings. This production is in addition to the 700 tons of cobalt in mine concentrates that is exported to China for refining.

Morocco's leading barite producer, Compagnie Marocaine des Barytes, (COMABAR) produces drilling mud grade barite at about 150,000 t/yr from its Zelmau Mine and 80,000 t/yr from Safi. In 1997, the nation's second largest barite producer, Sté Nord Africaine de Recherches et d'Exploitation des Mines d'Argana (SNAREMA), opened a beneficiation plant with the capacity to produce 30,000 t/yr of chemical-grade barite. SNAREMA plans to continue to also produce between 80,000 and 120,000 t/yr of drilling-mud grade barite (Industrial Minerals, 1997).

OCP's Sidi Chennane phosphate rock mine was operational by yearend 1995 and is expected to have a capacity of 5 million metric tons per year by 1998. It will replace older mines now approaching depletion.

Agrupacion Minera de Investigaciones SA has signed an agreement with BRPM to develop zircon-bearing mineral sands and will invest $9.2 million on the development of a deposit near Guelmin on the Atlantic coast (Mining Journal, 1997).

Four petroleum exploration licenses were granted in 1997 for tracts off the Atlantic coast. Royal Dutch acquired a tract offshore Agadir, Taurus Petroleum of Sweden secured a tract offshore Tiznit, Enterprise Oil Exploration of the United Kingdom is exploring the 12,400-km^2 Cap Draa Haute Mer block, and Roc Oil Co. of Australia is licensed to explore the 6,000-km^2 Foum Draa block (Middle East Economic Digest, 1998).

Morocco's crude oil production was negligible, but the domestic consumption rate was steadily rising. Crude oil and petroleum product import costs approached $1 billion per year. Majority holdings in the Mohammedia refinery with a capacity of 129,000 barrels per day (bbl/d) and the Sidi Kacem refinery with a capacity of 26,000 bbl/d were purchased by Corral Petroleum AB for $400 million in 1997. Corral, a Swiss-based Saudi Arabian company, pledged to spend $416 million on renovating and expanding the two refineries. An expansion program raising capacity to 165,000 bbl/d was underway at the Mohammedia refinery and was partially completed when the majority equity was sold (Arab Petroleum Research Center, 1998, p.278).

In 1997, reserves of phosphate rock totaled 85.5 billion tons; coal, 17.5 Mt; copper, 8.4 Mt; lead, 23 Mt; and zinc, 8 Mt. Crude oil reserves were reported at 1.96 million barrels and natural gas at 1.4 billion cubic meters (Arab Petroleum Research Center, 1998, p. 271).

The railroad network in Morocco totaled 1,893 kilometers (km) of 1.435-meter standard-gauge single track. The highway infrastructure totaled 59,198 km, of which 27,740 km was paved. Crude oil and natural gas pipelines totaled 362 and 241 km, respectively. Morocco's merchant marine fleet comprised 51 ships totaling 487,479 deadweight tons. Of these ships, there were 3 petroleum tankers and 11 chemical tankers. The major Moroccan ports are Agadir, Casablanca, Jorf Lasfar, Kenitra, Mohammedia, Nador, Safi, and Tangier. The nation's electrical generation capacity was 3,700 megawatts.

Morocco has been pursuing an active structural adjustment strategy under the supervision of the International Monetary Fund. A privatization program that began in 1993 with the intention of transferring resources from the public sector to the private sector to promote business investment, to reduce public expenditure, and to improve industrial efficiency had limited success until 1997 when much of the offered equities in the mining industry were purchased by ONA, and petroleum refining and cement manufacturing interests were acquired by foreign investors. The European Union (EU) accord became effective in 1997. The EU has pledged $70 million in grants. Another $70 million was made available as loans from the European Investment Bank. The availability of additional capital through membership in the EU heightened privatization activity.

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TABLE 1
MOROCCO AND WESTERN SAHARA: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity 2/		1993	1994	1995	1996	1997
METALS						
Antimony concentrate:						
Gross weight		369	523	442	345	--
Sb content		167	235	198	152 e/	--
Cement e/		6,350	6,350	6,400 3/	6,530 3/	6,800
Cobalt concentrate:						
Gross weight		3,606	3,810	4,885	5,033 r/	7,137
Co content		397	419	537	565	722
Cobalt recovered from tailings		--	--	--	80	220 e/
Copper:						
Concentrates, gross weight		35,690	36,010	35,952	37,623	37,344
Matte, gross weight		1,548	1,689	1,933	1,671	2,682
Cu content, concentrates and matte		13,746	14,000	14,100	14,550	15,000 e/
Gold e/	kilograms	600	565 3/	580	482 r/ 3/	450
Iron and steel:						
Iron ore:						
Gross weight		66,318	63,517	47,192	11,842 r/	11,965
Fe content		41,117	39,380	31,518	8,257	8,260 e/
Metal: e/						
Pig iron		15,000	15,000	15,000	15,000	15,000
Steel, crude		7,000	7,000	7,000	7,000	7,000
Lead:						
Concentrate:						
Gross weight		111,896	104,520	101,631	107,577	110,507
Pb content		81,680	73,160	67,708	71,667	77,056
Cupreous matte, Pb content e/		402 3/	442 3/	500	500	500
Metal:						
Smelter, primary only		69,110	60,740	62,363	61,749	66,202
Refined:						
Primary e/		69,100	60,700	59,763 r/ 3/	62,700 r/	64,202 3/
Secondary e/		2,000	2,040 r/	2,600 r/	3,100 r/ 3/	3,000
Total		71,100	62,740 r/	62,363 r/	65,800 r/	67,202
Manganese ore, largely chemical-grade		42,585 r/	31,452	31,263	29,466	28,845
Silver:						
Ag content of concentrates and matte	kilograms	73,355	68,500	22,000	19,304	35,000
Ag content of mine and smelter bullion	do.	235,800	257,000	182,000	180,291	226,000
Total	do.	309,155	325,500	204,000	199,595	261,000
Zinc concentrate:						
Gross weight		125,737	147,213	153,125	152,580	171,796
Zn content		65,378	76,800	79,947 r/	79,662 r/	89,248
INDUSTRIAL MINERALS						
Barite		325,200	264,526	289,308	282,537 r/	338,096
Cement, hydraulic e/	thousand tons	6,350	6,350	6,401 3/	8,000	8,000
Clays, crude:						
Bentonite		10,802	24,919	29,308	39,680 r/	49,633
Fuller's earth (smectite)		38,700	22,800	15,027	17,223 r/	24,425
Montmorillonite (ghassoul)		2,440	3,329	3,311	3,169	2,933
Feldspar		1,000 e/	1,000 e/	17,233	12,659 r/	15,110
Fertilizers	thousand tons	2,600	2,000	2,100	2,200 e/	2,200 e/
Fluorspar, acid-grade		70,050	85,000	105,800	95,900	103,800
Gypsum e/		450,000	450,000	450,000	450,000	450,000
Mica e/		1,500	1,500	564 3/	600	600
Phosphate rock (includes Western Sahara):						
Gross weight	thousand tons	18,305	20,375	20,684	20,855	23,084
P_2O_5 content	do.	5,920	6,580	6,399	6,552	7,848
Phosphoric acid	do.	2,501	2,603	2,600 e/	2,583 r/	2,600 e/
Salt:						
Rock		103,525	142,258	137,910	138,290	210,000 e/
Marine		50,900	45,600	42,300	32,530	47,500 e/
MINERAL FUELS AND RELATED MATERIALS						
Coal, anthracite		603,800	650,400	649,600	505,600	505,600

See footnotes at end of table.

TABLE 1--Continued

MOROCCO AND WESTERN SAHARA: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity 2/		1993	1994	1995	1996	1997
MINERAL FUELS AND RELATED MATERIALS--Continued						
Gas, natural:						
Gross	million cubic meters	38	25	17	17	17 e/
Dry	do.	35	22	16	16	16 e/
Petroleum:						
Crude	thousand 42-gallon barrels	68	62 r/	36 r/	35	35 e/
Refinery products: e/ 4/						
Liquefied petroleum gas	do.	3,250 3/	3,300 3/	3,500	3,500	3,500
Gasoline	do.	3,285 3/	3,300 3/	3,300	3,300	3,300
Jet fuel	do.	2,190 3/	1,900 3/	2,000	2,000	2,000
Kerosene	do.	350 3/	390 3/	390	390	390
Distillate fuel oil	do.	14,435 3/	16,200 3/	16,200	16,200	16,200
Residual fuel oil	do.	17,150 3/	17,200 3/	17,300	17,300	17,300
Other	do.	6,500 3/	7,000 3/	7,000	7,000	7,000
Total	do.	47,160 3/	49,290 3/	49,690	49,690	49,690

e/ Estimated. r/ Revised.

1/ Includes data available through September 15, 1998.

2/ In addition to the commodities listed, a variety of crude construction materials are produced, including, possibly, a substantial amount of limestone; information is, however, inadequate to make reliable estimates of output levels.

3/ Reported figure.

4/ Refinery fuel and losses have been included in the output of individual products and is estimated to be about 1.8 million barrels per year.

TABLE 2
MOROCCO AND WESTERN SAHARA: STRUCTURE OF THE MINERAL INDUSTRY IN 1997

(Metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity
Anthracite		Charbonnages du Maroc (CdM) (Bureau de Recherches et de Participations Minières (BRPM), 98.89%)	Jerada	650,000.
Barite		Compagnie Marocaine des Barytes (COMABAR) (BRPM, 22.5%; Norbar Minerals, 55%)	Zelmou Safi	150,000. 80,000.
Do.		Sté Nord Africaine de Recherches et d'Exploitation des Mines d'Argana (SNAREMA)	Argana do.	30,000 chemical grade. 120,000.
Bentonite		Tolsa, Sp (Tolsa, 100%)	Iboughardain	20,000.
Cement		Asment de Temara (Cimentos de Portugal, 57.4%)	Temara	830,000.
Do.		Lafarge Ciments (Société Nationale d'Investissment, 50%)	Casablanca Meknes Tangier	1,850.000. 1,000,. 350,000.
Do.		Cimenterie de l'Oriental (CIOR) (Holderbank, 51%; private, 35%)	Oujda Fes	1,000,000. 700,000.
Cobalt		Compagnie de Tifnout Tiranimine (CTT) (Omnium Nord Africain (ONA), 55.2%; SMI, 20%)	Bou Azzer	150,000 ore. 50,000 concentrate.
Copper		Société Minière de Bou Gaffer (SOMIFER) (BRPM, 34.2%, SMI, 36%; ONA, 7.6%)	Bleida	50,000 concentrate.
Do.		Société de Développement du Cuivre de l'Anti-Atlas (SODECAT) (BRPM, 100%)	Tiouit	4,500 Cu, Au, Ag concentrate.
Fluorspar		Société Anonyme d'Entreprises Minières (SAMINE) (ONA, 58%; SMI, 42%)	Meknes	120,000 concentrate.
Gold		Akka Gold Mining (ONA, 70%; BRPM, 30%)	Iourim	NA
Iron ore	million metric tons	Société d'Exploitation des Mines du Rif (SEFERIF) (BRPM, 100%)	Nador	12.
Lead		Compagnie Minière de Guemassa (CMG) (ONA, 74%; BRPM, 26%)	Hajar	150,000 Zn concentrate. 32,000 Pb concentrate.
Do.		Compagnie Minière de Touissit (CMT) (50%	Touissit	73,000 concentrate.
		Compagnie Royale Asturienne des Mines S.A., Belgium)		
Do.		Société de Développement Industrien et Minière (BRPM, 50%)	Zeida	40,000 concentrate.
Manganese		Société Anonyme Chérifienne d 'Etudes Minières (SACEM) (BRPM, 43%; COMILOG, 30%)	Quarzazate	130,000 concentrate.
Petroleum refinery products	thousand 42 gallon barrels	Société Marocaine de l'Industrie du Raffinage (Government, 6.77%; Corral Petroleum AB, 92%)	Mohammedia	47,000.
Do.	do.	Société Chérifienne des Pétroles (SCP) (Government, 7.39%; Corral Petroleum AB, 91%)	Sidi Kacem	9,500.
Phosphate	million metric tons	Office Chérifien des Phosphates (OCP) (Government, 100%)	Youssoufia, Benguerir Khouribga Sidi Chenan BouCraa	6 concentrate. 6 concentrate. 4 concentrate. 5 concentrate. 6 concentrate.
Salt, rock		Société de Sel de Mohammedia (SSM) (BRPM, 100%)	Mohammedia	150,000.
Salt, marine		Société Chérifienne des Sels (SCS) (BRPM, 50%; SNSSS, 50%)	Zima	50,000.
Silver	kilograms	Société Metallurgique d'Imiter (SMI) (ONA, 67%; private, 20%; BRPM, 13%)	Near Quarzazate	210,000
Steel rebar, wire rod		Société Nationale de Sidérurgie (SONASID) (private, 65%)	Nador	480,000.
Zinc		Omnium Nord Africain mine and plant (ONA, 100%)	Guemassa	265,000 concentrate.
Zircon		Agrupacion Minera de Investigaciones SA	Guelmin	NA

NA Not available.