

THE MINERAL INDUSTRY OF

JORDAN

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Industrial minerals, including construction raw materials, are the major mineral commodities mined in Jordan. The country ranks sixth in global phosphate rock production and seventh in potash. Although the bulk of mineral production is exported, increasing quantities of phosphate and potash are consumed in the domestic manufacture of fertilizers. Limestone was consumed by the domestic cement industry and in the production of soda ash in the Dead Sea Chemical Industries' Complex.

In addition to the above mentioned minerals, Jordan was also a significant regional cement producer. (*See table 1.*)

The Jordan Natural Resources Authority (NRA) was the Government agency responsible for all activities related to the exploration and development of minerals and mineral fuels. The exploitation of the major mineral commodities of Jordan—cement, kaolin, phosphates, and potash—were all controlled by parastatals. Aggregates, basalt, calcium carbonate, dimensional stone, and glass sand were produced by private-sector firms. Foreign investors may own all or part of a business or project in most economic sectors; however, foreign ownership in the mining sector is limited to a maximum of 50%. Foreign entities were given the same rights under the law as Jordanian investors and may fully repatriate capital and profits. Fixed assets of a project and spare parts imported for the project were tax-exempt. The corporate income tax was 15% for companies in mining and 25% for companies in trade and transport.

Bulk phosphate and fertilizer exports accounted for about one-third of the nation's total export revenues. Other exports included aluminum can scrap, all of which were shipped to the United States. Virtually all petroleum requirements were imported from Iraq under a series of agreements that have been renewed annually since 1991 with the approval of the United Nations' Sanctions Committee. During this period, imports of crude oil from Iraq ranged from 40,000 to 60,000 barrels per day (bbl/d) and petroleum products between 17,000 and 25,000 bbl/d. All deliveries were made by tank truck.

The Arab Aluminium Industry Company (ARAL) commissioned two new extrusion presses in 1997, doubling its aluminum extrusion capacity to nearly 12,000 metric tons per year (t/yr), enabling the company to increase its exports to other Middle Eastern countries and Africa. Jordan's internal market had no price controls on aluminum which is sold based on London Metal Exchange prices plus a local premium. ARAL had a 10,000-t/yr capacity remelt foundry and received its primary ingot from Egypt's Egyptalum and Bahrain's Aluminium Bahrain.

Sharif Metals Trading & Smelting Co. of Jordan invested \$500,000 in the construction of a secondary aluminum smelter with a potential capacity of 7,000 t/yr. The smelter was expected to enter production in 1998.

Enhanced gold concentrations in felsic volcanic rocks in Wadi Araba were identified by the NRA. The structure has been

subdivided into the Aqaba Complex, comprised of a sequence of schistose and gneissic metamorphic remnants and plutonic rock, and the Araba Complex, made up of alkaline, rhyolitic lavas, and subvolcanic intrusions.

The Jordan Magnesia Company was established in 1997 as a subsidiary of the Jordan Dead Sea Industrial Company for the purpose of building and operating a magnesium oxide complex adjacent to the Dead Sea at Safi, about 120 kilometers (km) south of Amman. Final engineering designs place capacity at 50,000 t/yr of high-quality dead-burned magnesium oxide for the refractory industry and 10,000 t/yr of caustic calcined magnesia and magnesium hydroxide for the chemical and plastics industries. Construction was expected to begin in the first quarter of 1999 with production beginning a year later. The Jeddah-based Islamic Development Bank provided a \$28 million loan for the estimated \$90 million project (Middle East Economic Digest, 1998).

The Indo-Jordan Chemicals Company, Ltd. (IJC) was a joint venture among Southern Petrochemicals Industries Corporation of India (SPIC) (52.2%), Jordan Phosphate Mines Company (JPMC) (34.8%), and Arab Investment Company of Saudi Arabia (13%). The company commissioned a \$170 million fertilizer plant in late June 1997. The 690,000-t/yr-sulfuric acid unit used the Monsanto Enviro-Chem's double conversion/double absorption process. The 220,000-t/yr-capacity phosphoric acid unit used the HydroAgri International Licensing hemihydrate process, designed to handle multiple grades of phosphate rock with minimal consumption of water. Phosphate rock feedstock for the plant was supplied from the Ash Shidiya Mine. By the close of 1997, 130,000 metric tons (t) of phosphoric acid valued at \$23.6 million was shipped to SPIC's plants in India (Middle East Economic Digest, 1998).

The Nippon Jordan Fertilizer Company commissioned a compound fertilizer plant in May 1997 with a capacity to produce 300,000 t/yr of diammonium phosphate (DAP) and nitrogen-phosphorus-potassium (NPK) compound fertilizer. By yearend, 130,000 tons of DAP and NPK was produced. Of this number, 110,000 t valued at \$21 million was sent to Japan.

The IJC plant and the Nippon Jordan Fertilizer Company plant were supplied phosphates by JPMC whose production rose by 12% in 1997. (*See table 1.*)

Norsk Hydro and JPMC are planning the construction of a US\$500 million fertilizer complex, including a 440,000-t/yr-capacity phosphoric acid plant and an NPK fertilizer complex of 1-million-metric-tons per year (Mt/yr) capacity. Operations are expected to start in 2000. Norsk Hydro and other foreign investors will hold 60% of the venture, and the remainder will be owned by a group of Jordanian companies including JPMC and Arab Potash.

Jordan's infrastructure is sufficient to support current mining operations. Railroads within Jordan consist of 619 km of 1.05-meter-gauge single track. Crude oil pipelines within the country

totalled 209 km. Primary export terminals are at the port of Aqaba, where potash storage capacity is about 160,000 t.

Encouraged by substantial phosphate rock and potash reserves, the Government sought value-added opportunities with emphasis on the development of local processing facilities. The 1994-98 government plan called for phosphate production to increase to 1 Mt/yr of which 30-40% were to be processed within the country.

Plans for the construction of a regassification plant in Aqaba using liquefied natural gas from Qatar were abandoned. As an alternative, Amoco Corporation of the United States and the Tractebel Group of Belgium entered into agreement with the Ministry of Energy and Mineral Resources to manage the sale and distribution of natural gas throughout Jordan, including responsibility for the purchase, transport, and marketing of the natural gas. The companies undertook a feasibility study to determine the viability of using Egypt as the source of natural gas delivered via a pipeline across the Gulf of Aqaba (Middle East Economic Digest, 1997). The natural gas will be used in the fertilizer industry and for power generation.

The NRA has entered into a memorandum of understanding with Royal Dutch Petroleum Company to investigate the potential development of oil shale resources which have been estimated by the NRA to be 40 billion metric tons (Petroleum Economist, 1998).

Anadarko Jordan Co., a unit of Anadarko Petroleum Corp. of the United States, began test drilling in September on the 1.7-million-hectare Safawi block in northeastern Jordan. Anadarko was awarded the block in 1996 under a 25-year production-sharing accord in which Anadarko agreed to spend at least \$20 million. This included a minimum of \$5 million that will be spent during the first 2.5 years of exploration.

M.W. Kellogg Co. of the United States was selected by the Jordan Petroleum Refinery Co. to conduct a detailed feasibility study on expanding the Zerka Refinery capacity to enable the country to meet

demand for refined products through 2010.

The NRA estimated Jordanian phosphate rock reserves to be 1 billion tons. Potash was obtained primarily from Dead Sea brines. The World Bank estimated that of the dissolved solids contained in the Dead Sea, 33 billion tons was sodium chloride and magnesium chloride and about 2 billion tons was potassium chloride.

Jordan's strengthening economy, privatization program, strategic commitment to infrastructure development and favorable investment reforms may encourage additional interest in mineral industry development. Government investment incentives included reduced taxes and profit repatriation. The Jordanian-U.S. treaty eliminated performance requirements and grants most-favored-nation status to U.S. firms. The economic restructuring program supported by the International Monetary Fund succeeded in curbing inflation and fostered a 5.2% economic growth in 1996 and a 6.5% growth in 1997. In spite of these improving conditions, the uncertainties of the Middle East peace process cause hesitation in many potential investors.

References Cited

- Middle East Economic Digest, 1996, Jordan: Middle East Economic Digest, v. 42, no. 15, p. 27-28.
———1997, Jordan: Middle East Economic Digest, v. 41, no. 11, p. 28.
Petroleum Economist, 1998, Jordan: Petroleum Economist, v. 65, no. 4, p. 61.

Major Source of Information

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TABLE 1
JORDAN: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity	1993	1994	1995	1996	1997 e/
Carnalite	NA	NA	1,346	1,400 e/	1,400
Cement, hydraulic thousand tons	6,400	6,400 e/	3,508 r/	3,415 r/	3,251 2/
Feldspar e/	--	--	7,341	7,000	7,000
Gypsum	194,981	193,000 e/	166,575 r/	169,000 r/	170,000
Iron and steel, steel, crude e/	30,000	30,000	30,000	30,000	30,000
Kaolin	47,174	47,200 e/	50,000 e/	65,998	67,000
Lime	7,267	7,270 e/	8,888 r/	10,000 r/ e/	10,000
Natural gas million cubic meters	310	340	350	350 e/	350
Petroleum:					
Crude thousand 42-gallon barrels	11	36 r/	36 r/	36 r/	36
Refinery products:					
Liquefied petroleum gas do.	1,500 2/	1,500	1,500	1,500	1,500
Gasoline do.	4,100	4,130 e/	4,100 r/	4,300 r/	4,300
Jet fuel do.	1,600	1,650 e/	1,800 r/	1,900 r/	1,900
Kerosene do.	2,300	2,350 e/	1,800 r/	2,000 r/	2,000
Distillate fuel oil do.	5,500	6,050 e/	6,570 r/	6,000 e/	6,000
Residual fuel oil do.	5,240	6,390 e/	6,900 r/	7,000 r/	7,000
Other do.	2,350 2/	2,000	2,200	2,200	2,200
Total do.	22,590	24,070 e/	24,870 r/	24,900 r/	24,900
Phosphate:					
Mine output:					
Gross weight thousand tons	3,565 r/	4,218	4,983	5,424 r/	6,075 2/
P2O5 content do.	1,176 r/	1,399	1,655	1,790 r/	2,005 2/
Phosphatic fertilizers	490,788 r/	749,700	730,000 r/	729,000 r/	576,000 2/
Phosphoric acid			347,984	325,000	323,000 2/
Potash:					
Gross weight thousand tons	1,511	1,550	1,780 r/	1,765 r/	1,417 2/
K2O equivalent do.	822	930	1,075 r/	1,059 r/	849
Salt	26,000	26,000	21,500 r/	50,000 r/ e/	50,000
Stone:					
Limestone	5,336 2/	5,340	5,340	5,340	5,350
Marble	112,250 2/	112,000	112,000	112,000	112,000

e/ Estimated. r/ Revised. NA Not available.

1/ Table includes data available through June 1, 1998.

2/ Reported figure.