

## THE MINERAL INDUSTRY OF

# OMAN

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Petroleum and natural gas continued to underwrite Oman's developing economy in 1994, providing more than 85% of Government revenues. Commercially solid mineral ventures included the mining of chromite, the mining and refining of copper with gold and silver as byproducts, the manufacture of cement, and the production of crushed and dimension stone and sand and gravel. The main industrial facilities also included a petroleum refinery and natural gas processing plants. The mineral industry accounted for about one-half of the gross domestic product (GDP), estimated at nearly \$12 billion<sup>2</sup> by the Omani Development Council.

Oman, which is not a member of the Organization of Petroleum Exporting Countries (OPEC), plays a prominent role in the Independent Petroleum Exporting Countries group, often acting as a liaison between that group and OPEC. The Sultanate has on several occasions cut oil production in support of OPEC. In the first quarter of 1994, Oman announced a 5% production cut from 800,000 barrels per day (bbl/d) to 760,000 bbl/d to help bolster world prices.

The Government has engaged in several international ventures to diversify and broaden its hydrocarbon revenue base. These include the Government's participation in the Caspian Pipeline Consortium, which will transport crude oil from the Tengiz Field in Kazakhstan to the Black Sea; an Omani natural gas liquefaction project to supply growing Asian markets; construction of an undersea pipeline capable of delivering 50 million cubic meters per day (Mm<sup>3</sup>/d) of Omani natural gas to India's west coast industries; the construction of two 120,000-bbl/d petroleum refineries in partnership with India's Hindustan Petroleum Co. and Baharat Oil Co.; and the construction of a 130,000-bbl/d refinery in Thailand in partnership with Caltex and the Petroleum Authority of Thailand for which Oman is to provide 60% of crude oil throughput.

Crude oil production increased to record levels as development activity and enhanced recovery operations continued. In spite of first quarter cutbacks, crude oil production averaged about 805,000 bbl/d in 1994. Less than 10% of the crude oil production was refined in Oman. One-half of the resulting product yield was absorbed by the domestic market. Surplus refined products, mostly fuel oil, were exported.

Chromite production, entirely destined for export markets, was hampered by diminished prices during the year. Copper ore output was reduced to approximately one-half of the production levels of recent years, largely because of declining

grade at the older surface mines and difficult conditions at the underground Aarja Mine. The smelter and refinery operated by the Oman Mining Co. supplemented domestic copper production with imported concentrates for toll and custom smelting. (*See table 1.*)

Oman exported more than 90% of its crude oil production in 1994. Both the heavier crudes of the south and the lighter crudes of the north are gathered and blended into the Omani Export Blend. The Asian nations were the destination for the bulk of Oman's petroleum exports. Japan alone received more than one-third of the Oman's petroleum exports. Other importers, by order of magnitude, included Korea, Singapore, China, Thailand, and India. The United States imported 19 Mbbbl of crude and unfinished oils in 1994.

The Petroleum and Mineral Law of Oman, effective since January 1, 1975, governs mineral activities in the country. All minerals are considered Government property until extracted. The royalty tax rate is fixed by a 1976 decree at 20% of the value of production. A 1972 Royal Decree fixed Oman's territorial waters at 12 nautical miles, or 22.2 kilometers (km) from the coast, and established sovereignty over the continental shelf to a depth of 200 meters (m).

The Government maintains a majority interest in most companies; however, foreign partnerships are encouraged. The Oman Chromite Co. has limited government participation with major equities held by private companies and private share distributions.

Oman's copper ore production was extracted from several operations near Sohar. The bulk of copper ore production was derived from the Lasail underground mine. Mining activity was transferred from the Aarja open pit mine to underground operations in early 1993; however, production from this source was disappointing due to poor underground conditions. The blended ore from all mines was beneficiated to yield a concentrate that was processed at the smelter and refinery. Copper cathodes, the bulk of which are processed from imported concentrates to more fully utilize the refining capacity, are exported from the port of Majis, about 17 km northwest of Sohar.

About 7 Mm<sup>3</sup>/d of natural gas was produced from the Yibal Field, while the Fahud and Sayh Nuhydah Fields each accounted for almost 1 Mm<sup>3</sup>/d. The Bukha natural gasfield started production at yearend 1993 at the initial rate of 5,600 bbl/d of natural gas liquids (NGL) and 1.1 Mm<sup>3</sup>/d of dry natural gas. Natural gas from this field will be transported by underwater pipeline to the Khor Khwair plant in Ras Al

Khaimah, one of the United Arab Emirates, for processing.

The collection and processing of natural gas in Oman is networked to three plants: the Fahud gas processing plant, the 2.2-Mm<sup>3</sup>/d-capacity Sayh Nuhaidah gas treatment plant, and the 16.6 Mm<sup>3</sup>/d-capacity Yibal gas processing plant. The Government Gas System received more than one-third of production, which is primarily used as fuel for electric power generation. It is also piped to the Sultan Qaboos University, and connecting lines extend up the Batinah Coast to Sohar at the site of the copper refinery. The Government Gas System includes a pipeline that carries gas from Yibal to the Ghubrah desalinization and powerplant and to the Rusayl Industrial Estate, near Muscat. A pipeline also extends south from Sayh Nuhaidah to Zufar, transporting gas for use in the southern oilfields. Field operations, including reinjection, absorbed about one-half of the natural gas produced. Less than 10% is flared or lost in transmission.

The Government, reserving a majority equity, formed a consortium responsible for natural gas liquefaction, shipping, and marketing. The group's proposed \$6 billion natural gas liquefaction project is expected to yield 5 Mmt of liquefied natural gas (LNG) annually with a proposed startup date in 1999. The LNG plant site is to be at Bimmah, 150 km southeast of Muscat.

Petroleum production grew constantly during the past decade. The Petroleum Development Oman Co. (PDO) accounted for more than 95% of the Nation's total petroleum production. The company operates 1,600 crude oil production wells from 72 producing fields, which are linked to 40 gathering stations.

The Omani-sponsored Caspian Pipeline Consortium awarded contracts to build a pipeline system linking the Caspian and Black Seas. The 750-km-long pipeline will carry oil from Kazakhstan, Azerbaijan, and Russia, terminating at the port of Novorossiysk on the west coast of the Black Sea. Initial capacity will be 300,000 bbl/d, rising eventually to 1.5 Mbbl/d. Each of the four members of the consortium has an equal interest in the company. The Omani Government took a 20% interest in a 120,000-bbl/d refinery to be constructed in Rayong, Thailand. The new refinery was expected to accept Omani crude for processing.

The Ministry of Petroleum and Minerals has reported proven copper ore reserves at 8 million metric tons (Mmt) and proven chromite ore reserves at 1.6 Mmt. Recoverable petroleum reserves were estimated by the Ministry of Petroleum and Minerals at 5.2 billion bbls. Reportedly, at least an additional 1.5 billion bbls could be recovered through steam soak, polymer and steam flooding, hot-water injection and/or electromagnetic heating of the reservoirs. Recoverable reserves of natural gas were reported at 700 billion m<sup>3</sup>, most of which is nonassociated natural gas.

Petroleum and natural gas pipelines total more than 1,600 km. The bulk of crude oil production is serviced by the central pipeline running from the Dhiab Field in the south to the Mina al-Fahal export terminal near Muscat. This terminal can accommodate tankers up to 550,000 deadweight tons. The port has eight storage tanks with a combined capacity of

3.6 Mbbl.

An agreement was signed with the Kuwait Fund for Arab Economic Development for \$20.4 million to help finance an expansion of the Port of Mina Qaboos at an estimated total cost of \$65 million. The port's annual handling capacity is to be expanded from 1.6 Mmt to 2.6 Mmt. In view of the anticipated increased traffic, the port entrance channel and basin were to be dredged to a depth of 13 m. A cargo storage area of 15 hectares will be created by using landfill from the dredging to level the existing terrain. New port complexes also are being considered near Sohar and Bimmah.

Projects augmenting the central grid generating capacity and extending the power network are in various stages of implementation. Expansion work at Ghubra, Oman's largest power station, is to be completed in 1995, including the installation of two additional 125-megawatt-capacity natural gas turbines.

Foreign workers make up about 65% of Oman's labor force of 422,000. The Government has introduced legislation to minimize dependence on expatriate workers. The legislation bans expatriates from taking a range of jobs in an attempt to create job opportunities for nationals. Jobs now restricted only to Omanis include mechanical equipment operation.

The Sultanate of Oman has enjoyed a stable economy sustained by hydrocarbon revenues for more than a decade, and the economy is expected to continue in this vein. Improving technology augmented reserves that continued to outpace reservoir withdrawals, affording a substantial economic base for at least the next 17 years at the current rate of production. Increasing overseas investments should help place Oman in a more secure position when its own petroleum reserves are depleted.

The formation of the Oman Chromite Co., 15% state owned, 45% allocated to local companies, and the remainder floated on the stock exchange, reflects the Government's interest in encouraging private involvement in major mineral industries.

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<sup>1</sup>Text prepared May 1995.

<sup>2</sup>Values were converted from Omani rial (RO) to U.S. dollars at the rate of RO.385=US\$1.00.

## Major Sources of Information

Ministry of Petroleum and Minerals

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TABLE 1  
OMAN: PRODUCTION OF MINERAL COMMODITIES 1/ 2/

(Metric tons unless otherwise specified)

Commodity	1990	1991	1992	1993	1994 e/
Cement, hydraulic thousand tons	1,000	995	970	1,000	1,000
Chromite, gross weight	--	--	1,760	10,200	6,170
Copper:					
Mine output, Cu content	14,000	14,000	13,600	12,000	6,500
Metal:					
Smelter	12,100	12,200	15,000	27,700 3/	24,200 5/
Refinery	12,000	11,400	16,200	20,540 4/	22,000 5/
Gas, natural:					
Gross million cubic meters	5,300	5,300	5,300	5,400	5,500
Dry do.	3,000	3,030	3,110	3,150	3,200
Gold kilograms	54	58	94	90	75
Natural gas liquids thousand 42-gallon barrels	2,130	2,200	2,300	2,300	2,300
Petroleum:					
Crude do.	250,000	259,000	271,000	293,000	294,000
Refinery products:					
Gasoline do.	4,060	4,080	4,440	4,500	4,600
Jet fuel do.	2,170	2,380	2,370	2,500	2,500
Kerosene do.	85	85	80	90	90
Distillate fuel oil do.	4,570	4,570	4,580	4,600	4,800
Residual fuel oil do.	11,300	11,300	12,100	12,500	12,500
Other do.	800	800	850	900	900
Total do.	23,000	23,200	24,400	25,100	25,400
Sand and gravel thousand tons	5,899	5,900	6,540	6,500	6,500
Silver kilograms	3,000	2,830	3,205	3,300	3,300
Stone:					
Marble thousand tons	35	35	54	76	70
Other do.	1,970	2,000	1,960	1,930	2,000
Sulfur e/	30,000	40,000	40,000	40,000	40,000

e/ Estimated.

1/ Previously published and 1994 data are rounded by the U.S. Bureau of Mines to three significant digits; may not add to totals shown.

2/ Table includes data available through June 1, 1995.

3/ Reported figure. Includes 17,800 metric tons of anode as toll/custom output.

4/ Reported figure. Includes 12,600 metric tons of cathode as toll/custom output.

5/ Includes toll/custom output.