

# THE MINERAL INDUSTRY OF YEMEN

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The Republic of Yemen produced cement, crude petroleum, gypsum, limestone, marble, natural gas, refined petroleum products, salt, sand and gravel, and stone. The mining sector, which included oil and gas production, accounted for almost 14% of the gross domestic product (GDP) at constant prices. When current prices were used, the mining sector accounted for 31% of the GDP; construction, 6%; and oil refining, about 0.5%.

In 2004, the GDP at constant prices was estimated to have increased by 2.7% compared with a 3.1% increase in 2003 and a 3.9% increase in 2002. This gradual decline in the GDP's rate of increase was attributed to reduced oil production from aging oilfields. In 2004, the GDP based on purchasing power parity was estimated to be \$18.3 billion<sup>1</sup> and per capita GDP based on purchasing power parity was estimated to be about \$735. Income from the production and sale of crude oil and natural gas accounted for 72% of total Government revenue, which was significantly more than budgeted income because of the higher-than-expected international oil prices in 2004 (International Monetary Fund, 2005, p. 3-4; Central Bank of Yemen, 2005§2; International Monetary Fund, 2005§).

## Commodity Review

### Metals

**Cobalt, Copper, Nickel, and Platinum.**—In late 2003, the South African office of Bateman Engineering BV received 6-month exploration options on the Al-Humarah copper-nickel deposit and on various minerals in the Aden area.

Cantex Mine Development Corp. continued exploration on its Al Masna'a cobalt-copper-nickel-platinum project, which was located about 205 kilometers (km) north-northwest of Sana'a. An infill rock and soil sample program in 2004 supplemented data obtained from soil samples taken in 2003. The company also raised funds for future exploration and kept looking for a joint-venture partner for its projects in Yemen. Nearby armed conflict between the Government and dissidents resulted in the postponement of the planned drill program at Al Masna'a until 2005. Also in 2005, a drill program was scheduled on the Suwar prospect, which was located about 50 km north-northwest of Sana'a, and a rock and soil sampling program was expected to begin on the Wadi Qutabah prospect, which was located about 60 km northwest of Sana'a (Cantex Mine Development Corp., 2004).

**Gold.**—Cantex collected rock and soil samples on the Al Hariqah gold prospect, which was located about 130 km northwest of Sana'a. The Ministry of Oil and Minerals contracted out a gold project feasibility study in the Jabali area,

and the Al-Thani Group of the United Arab Emirates held an exploration license on the Wadi Maaden gold prospect, which was located about 50 km west of Mukalla.

**Steel.**—Construction of a 120,000-metric-ton-per-year-capacity rolling mill at Hodaidah for Al-Rahabi Trading Group was expected to be completed in 2005. The mill would produce reinforcing bar (MESteel.com, 2005§).

**Zinc.**—ZincOx Resources plc of the United Kingdom continued its feasibility study of the Jabaili zinc deposit for its joint-venture partners Anglo American plc and Ansan Wikfs (Hadramaut) Ltd. ZincOx advanced its leach-to-chemical (LTC) process and, in 2004, re-evaluated Jabaili as an LTC project that would produce 99.9% zinc oxide. Jabaili originally had been proposed as a zinc-concentrate-for-export project (ZincOx Resources plc, 2005, p. 7).

### Mineral Fuels

**Natural Gas.**—Because there was little gas-gathering infrastructure, most of the natural gas in Yemen was produced from gas caps associated with oilfields and was flared or reinjected for reservoir pressure maintenance. For a number of years, the gas production from fields on the Jannah and Marib al Jawf Blocks has been reinjected into the reservoirs in anticipation of the eventual development of a liquefied natural gas (LNG) plant. Yemen LNG Co. Ltd. (YLNG) was formed in 1997 to build and operate an LNG plant, but the company has been unable to finalize long-term gas-supply contracts with international buyers. Signed contracts would allow YLNG to seek funding for its proposed two-train 6.2-million-metric-ton-per-year-capacity plant. Construction of the plant was expected to take about 4 years. YLNG, which in 2004 was owned by Total S.A. of France (42.9%), state-owned Yemen Gas Co. (23.1%), Yemen Hunt LNG Co. (18%), SK Corp. of South Korea (10%), and Hyundai Corp. of South Korea (6%), continued to search for international natural gas buyers, especially in India and The Republic of Korea (Nichols and Avati, 2004).

As part of its Port Cities Development Program, the World Bank sought a contractor to perform a feasibility study of a 15- to 20-centimeter-diameter, 600-km natural gas pipeline from Marib to the ports of Aden and Hodaidah. Appropriate infrastructure would be needed to distribute natural gas to local industries and to a proposed 341-megawatt powerplant at Safir (Middle East Economic Digest, 2004c; Yemen Observer, 2005§).

**Petroleum.**—Companies that operated oilfields in Yemen for their partners included DNO ASA of Norway, Dove Energy Ltd. of the United Kingdom, Hunt Oil Co. of the United States, Nexen Inc. of Canada, Total S.A. of France, Vintage Petroleum, Inc. of the United States, and state-owned Yemen Investment Co. for Oil and Minerals. Exploration and production operations

<sup>1</sup>Where necessary, values have been converted from Yemeni rials (YR) to U.S. dollars (US\$) at the average rate of YR185.8=US\$1.00 for 2004 data.

<sup>2</sup>References that include a section mark (§) are found in the Internet References Cited section.

on concessions in Yemen were based on negotiated production-sharing agreements between the Government and the joint-ventures partners. In 2004, new exploration blocks were awarded to DNO (Block 72), Dove (Block 73), and Sinopec International Petroleum Exploration and Production Corp., which was a subsidiary of China Petroleum & Chemical Corp. (Blocks 69 and 71).

Rehabilitation of the Aden refinery and expansion of the Marib topping plant were proposed. The original design capacity of the Aden refinery was 170,000 barrels per day (bbl/d), but it has produced at a significantly lower rate in recent years. In 2004, agreements were signed for the construction of a 40,000-bbl/d-capacity oil refinery near Mukalla for Hadramaut Refineries Co. Ltd. that would supply petroleum products to eastern Yemen by 2007 and a 30,000-bbl/d-capacity facility at Ras Issa for Hoodoil Ltd. that was expected to begin to supply western Yemen in 2006 (Middle East Economic Digest, 2004a, b; Petroleum Economist, 2004).

### Reserves

Zinc resources at Jabali were calculated to be 12.6 million metric tons at a grade of 8.9% zinc. National natural gas reserves were estimated to be between 396 million and 479 million cubic meters. Estimates of oil reserves in Yemen ranged from 1.3 billion to more than 4 billion barrels (World Bank Group, 2004, p. 5; ZincOx Resources plc, 2005, p. 7; Ministry of Oil and Minerals, 2003§; U.S. Energy Information Administration, 2005§).

### Outlook

The Government's economic diversification program would be helped by the development of metal deposits and additional industrial mineral deposits. The construction industry and the economy would benefit from the expected increased cement production when the construction of proposed cement plants and the expansion of existing plants are completed during the next 3 to 4 years.

Security of mineral industry employees in Yemen remains a concern. Kidnappings, while rare, are not unheard of. In 2004, Government troops continued to constrain armed dissident activity in the Saadah Province. The Government and nongovernmental organizations also continued to remove landmines from the countryside. During 2001-04, 5,427 people were killed by landmines in Yemen (Yemen Gateway, 2001§; Middle East North Africa Financial Network, Inc., 2003§; Ahmed Al-Haj, 2004§; Sabanews.net, 2005§).

During the recent past, the decline in Yemen's oil production has not adversely affected export revenues because of the surge in international oil prices during 2003 and 2004. With no new significant finds, oil resources could be commercially depleted within 5 to 20 years at recent average extraction rates. The decline in production from the older oilfields, however, was expected to be partially offset by new production. New output expected in 2005 would include crude oil from the Nabrajah Field on Block 43 of the joint venture of DNO, Oil Search Ltd. of Papua New Guinea, and Government-owned The Yemen Co.,

and expanded production from fields that began to produce in 2004, such as the An Nagyah field on the Damis (S-1) Block of Vintage Petroleum, TransGlobe Energy Corp. of Canada, and Yemen Oil Co.; and the Bashair Al Khair-A and Bashair Al Khair-B Fields on the East Al Hajr Block of Nexen and The Yemen Co. The increase of international oil prices to nearly \$40 per barrel at yearend 2004 from about \$30 per barrel in January 2004 could be expected to encourage international oil company management to fund additional exploration in the future; about 10 exploration and 120 development wells were planned in 2005 (International Monetary Fund, 2005; Nexen Inc., 2004§; Yemen Times, 2004§).

The high international oil prices were not entirely a positive development for the Government. Because of limited in-country refining capacity, Yemen imported some petroleum products (primarily diesel and fuel oil) at international prices and sold them in Yemen at highly subsidized prices. The Government attempted to reduce the resultant smuggling of the subsidized fuels to other countries in the region. Output from the proposed new oil refineries would offset some of the costs of the subsidization program, but the continuation of the subsidy program at current (2004) levels and further increases in the international price of crude oil and petroleum products could adversely affect the Government's budget in the future (World Bank Group, 2004).

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## Major Source of Information

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TABLE 1  
YEMEN: PRODUCTION OF MINERAL COMMODITIES<sup>1</sup>

(Thousand metric tons unless otherwise specified)

Commodity <sup>2</sup>	2000	2001	2002	2003	2004 <sup>e</sup>
Cement metric tons	1,406,000	1,493,000	1,561,000	1,541,000	1,546,300 <sup>4</sup>
Gypsum do.	42,000	44,000	41,000	42,000	44,000
Marble thousand square meters	99	101	99	100	100
Natural gas: <sup>e</sup>					
Gross <sup>3</sup> million cubic meters	18,000	18,000	29,991 <sup>4</sup>	30,000	28,000
Flared and used do.	900	900	956 <sup>4</sup>	1,000	1,000
Liquids thousand 42-gallon barrels	2,400	2,400	2,400	2,400	2,400
Petroleum:					
Crude do.	167,000	165,000	159,924	157,000	149,000
Refinery products:					
Liquefied petroleum gas do.	670	910	1,100	1,100	1,100
Benzene do.	6,500 <sup>r</sup>	7,100 <sup>r</sup>	7,200 <sup>r</sup>	7,400 <sup>r</sup>	7,400
Kerosene do.	3,150	3,630	3,450	3,510	3,600
Distillate fuel oil do.	10,000	12,500	13,800	14,100	14,100
Residual fuel oil do.	4,920	9,320	6,770	6,910	7,000
Other <sup>e</sup> do.	315	420	420	430	400
Total do.	25,600 <sup>r</sup>	33,900 <sup>r</sup>	32,700 <sup>r</sup>	33,500 <sup>r</sup>	33,600
Salt metric tons	95,000	95,000	125,000	116,000	120,000
Sand and gravel	607	607	612	624	630
Stone, quarried	2,480	2,486	2,288	2,333	2,400

<sup>e</sup>Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. <sup>r</sup>Revised.

<sup>1</sup>Table includes data available through July 9, 2005.

in addition, tehspar and silica sand may have been produced and limestone for cement was produced, but available information is inadequate to make estimate

of output levels.

<sup>3</sup>Most natural gas that was produced was stripped of hydrocarbon liquids and reinjected.

<sup>4</sup>Reported figure.