THE MINERAL INDUSTRY OF

SAUDI ARABIA

By Philip M. Mobbs

The Kingdom of Saudi Arabia maintained its position as the main oil producer in the world and accounted for 11.4% of the world’s crude oil production compared with Russia, which produced about 11.1%, and the United States, which accounted for about 8.6% (U.S. Energy Information Administration, 2003b). Saudi Arabia’s large annual production volume, excess production capacity, and low local consumption allowed it to be the swing producer of the Organization of the Petroleum Exporting Countries’ (OPEC) crude oil price support program.

The Kingdom’s population was estimated to be about 24 million. In 2002, the gross domestic product (GDP) based on purchasing power parity valuation was estimated to be more than $247 billion.1 The GDP growth rate was estimated to be 1% compared with 1.4% in 2001 and 4.9% in 2000 (International Monetary Fund, 2003§). Crude oil and natural gas production accounted for about 27% of the 2002 GDP, and petroleum refining accounted for about 3%; about 0.4% was attributed to other mineral production (Saudi Arabian Monetary Agency, 2003§). The Cooperation Council for the Arab States of the Gulf (GCC), which included Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates, was to institute a customs union on January 1, 2003. The GCC also continued its efforts to introduce a common currency by 2010.

In 2002, exports of crude oil and petroleum products from Saudi Arabia to the United States were reported to be about 1.55 million barrels per day (Mbbl/d) compared with 1.66 Mbbl/d in 2001. Saudi Arabia was the second leading source of total U.S. crude oil and petroleum product imports and accounted for about 13.5% of imports in 2002 compared with Canada, which was the leading source of U.S. crude oil and petroleum products imports in 2002; its 1.97 Mbbl/d accounted for 17.1% of the total import volume. Mexico was third largest supplier with 1.55 Mbbl/d, and Venezuela, fourth with about 1.4 Mbbl/d (U.S. Energy Information Administration, 2003a).

Production

In addition to petroleum-related minerals, such as carbon black, crude oil, natural gas, refined petroleum products, and sulfur, mineral and mineral-based commodity production in Saudi Arabia included barite, cement, other construction and industrial materials, nitrogenous and phosphatic fertilizers, ferroalloys, granite, base and precious metals, and salt. Steel was produced from scrap and imported iron ore pellets. Titanium dioxide pigment was produced from imported rutile.

In 2002, Saudi Arabian crude oil production again declined. The drop in oil production was attributed to continued reduction in the official OPEC production ceiling allocated to Saudi Arabia. OPEC constrained allowable production to 7.05 Mbbl/d in 2002 compared with a declining range from 8.67 Mbbl/d at the beginning of the year to 7.54 Mbbl/d at the end of 2001 (Organization of the Petroleum Exporting Countries, 2003, p. xi). Actual sustainable production capacity ranged from about 10.0 to 10.5 Mbbl/d (Mably, 2003§; U.S. Energy Information Administration, 2003§).

Structure of the Mineral Industry

All minerals and mineral fuels were owned by the Government. The state-owned Saudi Arabian Mining Co. (Ma‘aden) participated in and promoted mineral exploration and mining activities throughout the Kingdom. In 2002, Saudi Arabian Oil Co. (Saudi Aramco) and its subsidiaries were the only companies authorized to engage in oil and gas exploration and field development within Saudi Arabia, although the Gas Initiative Project, which was under negotiation, was expected to allow consortia of multinational oil companies into the natural gas exploration and production arena. Many industrial projects in the petrochemical and petroleum-refining sectors were joint ventures between Saudi firms and international companies.

Commodity Review

Metals

In 2002, much of Saudi Arabia’s metal ore production was from the underground Mahd Adh Dhahab Mine where Ma‘aden produced gold and silver bullion and a bulk concentrate that contained copper, gold, lead, silver, and zinc. The mine is expected to close in 2005 (MENAFN.COM, 2003§). Ma‘aden, which the Government proposed to privatize, also managed development operations at the underground Al-Amar and the open pit Al-Hajar gold mines. The loss of Mahd Adh Dhahab’s base–metal concentrates was expected to be offset eventually by base–metal production from the Al-Amar Mine. Saudi Company for Precious Metals (a subsidiary of Ma‘aden) operated the Sukhaybarat open pit gold mine and started operations at the open pit Bulghah gold mine in October. Heap-leach operations at Sukhaybarat were expected to end in 2003, but the mine’s carbon-in-leach facilities were expected to continue to process stockpiled ore and to handle carbon shipped 70 kilometers (km) from the Bulghah Mine (Saudi Arabian Mining Co., undated a§–d§).

1Where necessary, values have been converted from Saudi riyals (SR1s) to U.S. dollars at the rate of SR1s3.75=US1.00.
2References that include a section mark (§) are found in the Internet References Cited section.
Iron and Steel.—The Al-Rajhi Steel Industries factory of Al-Rajhi Co. for Industry and Trade installed a 150,000-metric-ton-per-year (t/yr)-capacity cold-rolling mill. Mill feed was to be sourced from Saudi Iron & Steel Co. (Hadeed). Al-Rajhi also conducted a feasibility study on the construction of a 1-million-metric-ton-per-year (Mt/yr) steel meltshop in Riyadh (Metal Bulletin, 2003). Hadeed planned to expand the flat products production capacity at its Al-Jubayl plant to 2 Mt/yr from 850,000 t/yr (Al-Jabr, undated§).

Magnesium.—Gulf Das Co. was reported to have received permission from the Saudi Arabian General Investment Authority to build a $213 million plant in Dammam. Planned production capacity of the plant was 20,000 t/yr of magnesium and 48,000 t/yr of potassium chloride (Saudi Arab Information Resource, 2002§).

Tantalum.—In January 2002, Tertiary Minerals plc of the United Kingdom acquired a 5-year exploration license on the Ghurayyah tantalum deposit, which is about 85 km southwest of Tabuk. In December, the company commissioned a scoping study on the deposit, which was estimated to contain resources of 385 million metric tons (Mt) of ore with an average grade of 245 grams per metric ton (g/t) tantalum pentoxide (Ta₂O₅), 2,840 g/t niobium pentoxide, and 8,915 g/t zircon oxide. The relative size of the 900-meter granite plug at Ghurayyah becomes apparent when compared with the measured reserves and estimated resources of the Abu Dabbab project, which was under evaluation in Egypt (40 Mt with an average grade of 251 g/t Ta₂O₅), and the world’s two largest hard-rock tantalum mines in Australia—Greenbushes (220 Mt with an average grade of 221 g/t Ta₂O₅) and Wodgina (about 87 Mt with an average grade of 316 g/t Ta₂O₅) (Gippsland Ltd., 2002; Mining Journal, 2002; Sons of Gwalia Ltd., undated a§, b§).

Zinc.—ZincOx Resources plc of the United Kingdom pursued plans to build a 100,000-t/yr zinc plant in Yanbu. The company had completed a prefeasibility study in 2001 and began a 15-month feasibility study in January 2002. In December, the proposed plant was approved by British Offset, which represented United Kingdom’s interests in the Al Yamamah Economic Offset program. A projected source of zinc ore was ZincOx’s proposed mine at Jabali, Yemen (ZincOx Resources plc, 2002, 2003).

On July 19, 2000, the Arabian Shield Development Co. of the United States changed its name to the Arabian American Development Co.; the operating company in Saudi Arabia retained the Arabian Shield Development Co.’s name. In March 2002, Arabian American was notified by the Ministry of Petroleum and Mineral Resources that the Ministry considered that the company had failed to implement a work program on the Al Masane zinc prospect. The company held a mining lease on the property that did not expire until 2023. Attempts in the 1990s to obtain a viable joint-venture partner to develop the property were unsuccessful. In 1999, Arabian Shield had notified the Ministry that it intended to defer the Al Masane project until zinc prices improved; in 2000 and again in 2001, however, the Ministry requested that implementation of the project begin immediately or the mining lease would be terminated. Arabian American was attempting to resolve the situation satisfactorily (Arabian American Development Co., 2002).

Industrial Minerals

Nitrogen.—Saudi Arabian Fertilizers Co. (SAFCO) [a joint stock company in which the Saudi Basic Industries Corp. (SABIC) held a 43% equity interest] proposed a 91-metric-ton-per-day (t/d) expansion of the No. 2 ammonia plant and a 126-t/d expansion of the No. 2 urea plant at Al-Jubayl. SAFCO also requested bids on the construction of a 1.07-Mt/yr urea plant and 990,000-t/yr-capacity ammonia plant at Al-Jubayl (plant No. 4). The estimated $400 million plant No. 4 was tentatively scheduled to be operational in 2005 (Asian Chemical News, 2002b; Middle East Economic Digest, 2002).

Sulfur.—In May, Saudi Aramco awarded a contract to build two 70-t/d sulfur recovery units at the Riyadh refinery (Oil & Gas Journal, 2002). The units were expected to be operational in April 2004.

Mineral Fuels

Methanol.—Saudi Methanol Co. (Ar-Razi) (a subsidiary of the Mitsubishi Gas Chemical Co. Inc. of Japan and SABIC) evaluated the addition of a 1.65-Mt/yr methanol train to its existing four-line, 2.9-Mt/yr facility at Al-Jubayl. The proposed line could be completed in 2004. Ar-Razi also expected to increase capacity with planned modifications to methanol trains II, III, and IV (Asian Chemical News, 2002a).

Natural Gas.—The initial agreements for the Gas Initiative Project were signed in 2001. The negotiations that continued during 2002 between the Government and the consortia were unable to reach an satisfactory conclusion. The consortia included BP plc, ExxonMobil, Phillips Petroleum Co., and the Royal Dutch/Shell Group for the development of Core Venture I—the Haradh (South Ghawar Area) project; ExxonMobil Corp., Marathon Oil Corp., and Occidental Petroleum Corp. for the development of Core Venture II—the Rabigh/Midyan (Red Sea Area) project; and Conoco Inc., Total S.A. (formerly the TotalFinaElf Group), and Royal Dutch/Shell for the development of Core Venture III—the Kidan/Shaybah project.

Additional information on the oil and gas sector in Saudi Arabia is provided in the U.S. Energy Information Administration’s (2003§) June 2003 Saudi Arabia Country Analysis Brief.

Reserves

Saudi Arabian Oil Co. (2003§) reported that the country’s crude oil reserves were 259.4 billion barrels. This represented about 25% of the total proven world reserves compared with Iraq (10.7% of world crude oil reserves), the United Arab Emirates (9.3%), Kuwait (9.2%), Iran (8.5%), Trinidad and Tobago (7.4%), Russia (5.7%), and the United States (2.9%)
The bulk of the Kingdom’s reserves were contained in a few fields in the northeast, especially the onshore Ghawar Field and the offshore Safaniya Field. Most of Saudi Arabian natural gas reserves were associated with the country’s oilfields. The Ghawar Field accounted for about 35% of the total gas reserves, which were reported to be about 6.4 trillion cubic meters (Saudi Arabian Oil Co., 2003, p. 41).

**Outlook**

Despite diversification efforts, most of the Saudi Arabian income remained dependent upon the international oil markets. The Kingdom’s economy remained vulnerable to sudden changes in volume and pattern of worldwide trade in crude oil, petrochemicals, and refined petroleum, which were exacerbated by the country’s variable production as OPEC’s swing producer. Cement and clinker exports from Saudi Arabia have grown in recent years and are expected to continue to increase.

**References Cited**


Middle East Economic Digest, 2002, Four bid for Safco expansion: Middle East Economic Digest, v. 46, no. 40, October 4, p. 16.


ZincOx Resources plc, 2003, Annual report—2002: Bagshot, United Kingdom, ZincOx Resources plc, June, 36 p.


**Major Sources of Information**

Ministry of Petroleum and Mineral Resources
P.O. Box 247
Riyadh, 11191, Saudi Arabia
Telephone: +(966) 1-478-1661
Fax: +(966) 1-478-0552

Deputy Ministry for Mineral Resources
P.O. Box 345
Jeddah, 21191, Saudi Arabia
Telephone: +(966) 2-669-1216
Fax: +(966) 2-667-2265

Saudi Geological Survey
P.O. Box 54141
Jeddah, 21514, Saudi Arabia
Telephone: +(966) 2-619-5000
Fax: +(966) 2-619-6000
E-mail: SGS@SGS.ORG.SA

**Major Publications**

Arab Petroleum Research Center. Arab Oil & Gas Directory, annual.


**TABLE 1**

SAUDI ARABIA: PRODUCTION OF MINERAL COMMODITIES

(Metric tons unless otherwise specified)

<table>
<thead>
<tr>
<th>Commodity</th>
<th>1998</th>
<th>1999</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
</tr>
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<tbody>
<tr>
<td><strong>METALS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ferroalloys</td>
<td>83,000</td>
<td>83,000</td>
<td>83,000</td>
<td>78,000</td>
<td>75,000</td>
</tr>
<tr>
<td>Iron and steel:</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Direct-reduced iron</td>
<td>2,268</td>
<td>2,343</td>
<td>3,090</td>
<td>2,880</td>
<td>3,290</td>
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<td>Steel, crude do.</td>
<td>2,356</td>
<td>2,610</td>
<td>2,973</td>
<td>3,413</td>
<td>3,800</td>
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<tr>
<td>Ore, mine output:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gross weight</td>
<td>1,700,000</td>
<td>1,680,000</td>
<td>1,700,000</td>
<td>2,000,000</td>
<td>2,000,000</td>
</tr>
<tr>
<td>Copper content of concentrate and bullion</td>
<td>782</td>
<td>821</td>
<td>900</td>
<td>800</td>
<td>800</td>
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<tr>
<td>Gold content of concentrate and bullion</td>
<td>5,100</td>
<td>4,570</td>
<td>3,800</td>
<td>5,000</td>
<td>5,000</td>
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<tr>
<td>Lead content of concentrate</td>
<td>60</td>
<td>50</td>
<td>50</td>
<td>60</td>
<td>60</td>
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<tr>
<td>Silver content of concentrate and bullion</td>
<td>13,840</td>
<td>10,470</td>
<td>9,300</td>
<td>15,000</td>
<td>14,000</td>
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<tr>
<td>Zinc content of concentrate</td>
<td>3,550</td>
<td>3,161</td>
<td>3,000</td>
<td>3,300</td>
<td>3,000</td>
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<td><strong>INDUSTRIAL MINERALS</strong></td>
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<tr>
<td>Barite</td>
<td>8,000</td>
<td>7,000</td>
<td>8,000</td>
<td>9,000</td>
<td>9,000</td>
</tr>
<tr>
<td>Cement, hydraulic</td>
<td>15,786</td>
<td>16,313</td>
<td>18,107</td>
<td>20,608</td>
<td>22,000</td>
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<tr>
<td>Fertilizer, phosphatic, P₂O₅ content</td>
<td>130</td>
<td>145</td>
<td>147</td>
<td>150</td>
<td>150</td>
</tr>
<tr>
<td>Gypsum, crude do.</td>
<td>330,000</td>
<td>380,000</td>
<td>400,000</td>
<td>450,000</td>
<td>450,000</td>
</tr>
<tr>
<td>Lime</td>
<td>200,000</td>
<td>340,000</td>
<td>350,000</td>
<td>350,000</td>
<td>350,000</td>
</tr>
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<td><strong>MINERAL FUELS AND RELATED MATERIALS</strong></td>
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<tr>
<td>Gas, natural:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gross</td>
<td>83,000</td>
<td>89,000</td>
<td>96,000</td>
<td>91,500</td>
<td>97,000</td>
</tr>
<tr>
<td>Dry</td>
<td>48,875</td>
<td>49,555</td>
<td>54,623</td>
<td>58,163</td>
<td>62,014</td>
</tr>
<tr>
<td>Natural gas liquids:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Propane</td>
<td>159,000</td>
<td>153,000</td>
<td>163,000</td>
<td>166,000</td>
<td>179,400</td>
</tr>
<tr>
<td>Butane</td>
<td>69,000</td>
<td>66,200</td>
<td>69,000</td>
<td>72,000</td>
<td>78,000</td>
</tr>
<tr>
<td>Natural gasoline and other</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>279,163</td>
<td>269,134</td>
<td>285,008</td>
<td>292,385</td>
<td>316,938</td>
</tr>
<tr>
<td><strong>Petroleum</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crude oil</td>
<td>3,022</td>
<td>2,761</td>
<td>2,962</td>
<td>2,879</td>
<td>2,589</td>
</tr>
<tr>
<td>Refinery products:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Liquefied petroleum gases</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gasoline and naptha</td>
<td>11,929</td>
<td>12,533</td>
<td>9,634</td>
<td>13,230</td>
<td>10,340</td>
</tr>
<tr>
<td>Jet fuel and kerosene</td>
<td>142,606</td>
<td>148,853</td>
<td>155,556</td>
<td>152,230</td>
<td>153,240</td>
</tr>
<tr>
<td>Distillate fuel oil</td>
<td>53,243</td>
<td>60,638</td>
<td>66,920</td>
<td>60,050</td>
<td>59,700</td>
</tr>
<tr>
<td>Residual fuel oil</td>
<td>193,328</td>
<td>188,848</td>
<td>198,176</td>
<td>193,770</td>
<td>192,720</td>
</tr>
<tr>
<td>Total</td>
<td>6,533</td>
<td>6,625</td>
<td>8,083</td>
<td>8,650</td>
<td>9,180</td>
</tr>
</tbody>
</table>

1Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. 2Revised.

1In addition to commodities listed, the following were produced: basalt, carbon black, clays, granite, limestone, marble, methanol, and silica sand; available information is inadequate to estimate output.

3Mahd Adh Dhahab Mine produced a concentrate that contains copper, gold, lead, silver, and zinc and a crude bullion that contains copper, gold, and silver.

4Reported figure.

5Includes asphalt.

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**Note:** Table includes data available through October 24, 2003.