



# 2005 Minerals Yearbook

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## MIDDLE EAST

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# THE MINERAL INDUSTRIES OF THE MIDDLE EAST

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In 2005, the continued international demand for mineral fuels, especially natural gas and oil, extended the Middle East region's hydrocarbon-based economic boom. The 15 nations of the Middle East that are covered in this volume encompass an area of more than 6 million square kilometers, which is about two-thirds the size of the United States, and about 4% of the world's land mass. In 2005, according to the World Bank Group (2006§<sup>1</sup>), the total population of the Middle East region was estimated to be about 262 million compared with 296 million for the United States and 6.4 billion for the world. Production and processing of crude oil and natural gas were the foundations upon which the economies of most of the countries in the region were based. Production of metals and industrial minerals was a significant factor in the economies of Iran and Turkey; metal production also was an increasingly notable factor in the economies of Bahrain, Oman, Saudi Arabia, and the United Arab Emirates.

## Acknowledgments

The U.S. Geological Survey (USGS) acknowledges and expresses its sincere appreciation to the Government agencies and organizations listed below for providing minerals production statistics and basic economic data.

For mineral production statistics—

- Bahrain—National Oil and Gas Authority;
- Cyprus—Mines Service of the Ministry of Agriculture, Natural Resource, and Environment;
- Iran—Iranian Mines and Mining Industries Development and Renovation Organization;
- Israel—Mines Authority of the Ministry of National Infrastructures;
- Jordan—Natural Resources Authority;
- Kuwait—Ministry of Planning;
- Qatar—Ministry of Energy and Industry;
- Saudi Arabia—Ministry of Petroleum and Mineral Resources; and
- Turkey—General Directorate of Mining Affairs, General Directorate of Petroleum Affairs, and State Institute of Statistics.

For basic economic and population data—

- The International Monetary Fund and the World Bank Group in the United States.

## General Economic Conditions

As a region, the Middle East was a major supplier of hydrocarbons to the world market. In the region, the economies of the oil-producing nations were buoyed and the economies of oil-import-dependant nations adversely affected by the continued high international market prices for crude oil and

natural gas. Merchandise exports of the nations that encircle the Persian Gulf were dominated by hydrocarbons; most of the region's exports of natural gas and oil were shipped to Asia.

In many countries in the region, the abundance of locally produced natural gas and the availability of low-cost electrical energy, coupled with convenient access to ocean transportation, provided the initial justification for the development of such value-added minerals facilities as direct-reduced iron plants, steel plants with electric arc furnaces for the production of crude steel, and steel-rolling mills; energy-intensive mineral-processing operations, such as aluminum smelting; and petrochemical establishments, which included fertilizer plants. Expansion of the nonfuel minerals sector was supported by the national Governments of the area, which strongly endorsed the diversification of their respective economies into nonoil sectors.

The booming demand for consumer products was driven in part by the fast-growing, youthful population of the Middle East. The regional trend toward increased population and the significant increase in regional income associated with the high international oil prices spurred numerous projects in the construction sector; these included commercial office buildings, industrial (especially petrochemical) facilities, retail centers, residential housing, and the infrastructure necessary to support the new buildings and facilities. The demands of the construction boom, however, resulted in significant price increases or outright shortages of construction materials [such as aggregate, aluminum, cement, glass, steel beams, and steel concrete-reinforcing bar (rebar)] and strained the ability of the regional labor force to supply trained personnel.

## Investment Data and Political Risk

In 2005, equipment and material cost increases and labor shortages began to impinge on the economic feasibility of the construction of new mineral industry projects or the expansion of existing facilities. Whereas few projects were cancelled or delayed, there was a noticeable trend of contractor cost estimates being significantly above what the Government or private industry client budgeted for or expected.

State-owned companies dominated the Middle East's mineral industry, although foreign investment was finding its way into the minerals sector. In 2005, the sustained international demand for minerals fueled the continued interest in the development or expansion of the mineral operations in the area. New aluminum smelters or smelter-production-capacity expansions, cement plants, hydrocarbon-processing plants, and iron-and-steel-processing facilities were proposed for several countries in the region. Government-funded expansion of copper mining and refining capacity continued in Iran. Progress was made on the privately funded development of copper reserves in Oman, internationally funded development of gold resources in Turkey, Government-funded development of gold resources in Saudi Arabia, foreign-investor-funded development of nickel

<sup>1</sup>References that include a section mark (§) are found in the Internet References Cited section.

resources in Turkey, Government-funded development of phosphate resources in Saudi Arabia, and internationally-funded development of zinc resources in Yemen.

The U.S. Government had instituted sanctions on international and U.S. company investment in Iran under Executive Order 12957 of March 15, 1995, Executive Order 12957 of May 6, 1995, Executive Order 13059 of August 19, 1997, Public Law 104-172 (The Iran-Libya Sanctions Act of 1996 [ILSA]), and Public Law 107-24 (ILSA Extension Act of 2001). During the period covered by the sanctions, several foreign companies had entered into natural gas or oil development projects in Iran. No companies formally had been sanctioned, although they (and the Governments of their home countries) had been made aware of U.S. Government concerns. The ILSA Extension Act, which was subject to renewal, was scheduled to expire in 2006.

## Legislation

In Bahrain, in accordance with Royal Decree Number 63 of September 26, 2005, the Ministry of Oil was renamed the National Oil and Gas Authority.

## Exploration

Local and international exploration companies were allowed to explore for minerals in most of the countries of the region. Government agencies engaged in mineral prospecting and general exploration included the Geological Survey of Iran, the Department of Geological Survey of the Directorate General of Minerals in Oman, the Saudi Geological Survey, the General Directorate of Mineral Research and Exploration in Turkey, and the Geological Survey and Mineral Resources Board of Yemen. In 2005, metal exploration activity was most notable in Turkey. Exploration and prospecting also was underway in Cyprus, Iran, Oman, Saudi Arabia, the United Arab Emirates, and Yemen. As long as high international mineral prices are sustained, additional exploration activity would be expected.

In the Middle East region, crude oil and natural gas exploration was undertaken by Government and international oil companies. In 2005, hydrocarbon exploration continued in Bahrain, Iran, Israel, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, Syria, Turkey, the United Arab Emirates, and Yemen. Several field studies were underway to reevaluate oilfield reservoir conditions in Iraq.

## Commodity Overview

The Middle East has significant identified resources of boron minerals, bromine, helium, crude oil, natural gas, perlite, phosphate rock, and potash. In tables 5 through 19, estimates for production of major mineral commodities for 2007 and beyond have been based upon supply-side assumptions, such as announced plans for increased production/new capacity construction and bankable feasibility studies. The outlook tables in this summary chapter show historic and projected production trends; therefore, no indication is made about whether the data are estimated or reported and revisions are not identified. Data on individual mineral commodities in tables in

the individual country chapters are labeled to indicate estimates and revisions. The outlook segments of the mineral commodity tables are based on projected trends that could affect current (2005) producing facilities and on planned new facilities that operating companies, consortia, or Governments have projected to come online within indicated timeframes. Forward-looking information, which includes estimates of future production, exploration and mine development, cost of capital projects, and timing of the start of operations, are subject to a variety of risks and uncertainties that could cause actual events or results to differ significantly from expected outcomes. Projects listed in the following section are presented as an indication of industry plans and are not a USGS prediction of what will occur.

## Metals

**Alumina and Bauxite and Aluminum.**—Bahrain and the United Arab Emirates each accounted for more than 2% of world aluminum production in 2005; as a region, the Middle East accounted for more than 5% of the world's total aluminum production. Much of the produced aluminum was exported, although the increase in regional demand that was attributed to the construction sector had made additional aluminum rolling and fabrication plants more attractive investments in the region, so regional aluminum consumption was expected to increase.

Regional production capacity was expected to increase by about 14% by 2007 compared with that of 2005 and, by 2011, the planned construction of new potlines or expansion of existing facilities in Iran, Oman, Qatar, Saudi Arabia, and the United Arab Emirates was projected to increase regional aluminum capacity by about 140% compared with that of 2005 (table 6). Owing to the Middle East region's limited occurrences of bauxite and the associated limited production of alumina in the region, the proposed expansion of the region's aluminum smelter capacity was expected to greatly increase the region's demand for imports of alumina.

In Bahrain, the commissioning of Aluminium Bahrain B.S.C.'s (Alba) Line 5 increased the Alba smelter's design capacity to 830,000 metric tons per year (t/yr) in 2005. A feasibility study for Alba's proposed 310,000-t/yr-capacity Line 6 was completed, but the expansion project was on hold at yearend.

In Iran, aluminum production capacity was expected to more than double by 2011 with the construction of the proposed smelter for South Aluminium Corp. at Bandar Abbas. Other new aluminum smelters planned for the region included a plant that the Sohar Aluminium Co. proposed to build at Sohar, Oman; the proposed plant of the Qatalum joint venture of Hydro Aluminium AS and Qatar Petroleum at Mesaieed, Qatar; the planned facility of the Az Zabirah project of Saudi Arabian Mining Co. (Ma'aden) at Ras Az Zawr, Saudi Arabia; and the smelter of the Emirates Aluminium joint venture of Dubai Aluminium Co. and Mubadala Development Co. at Khalifa Port, Abu Dhabi, United Arab Emirates. Unlike most of the proposed aluminum projects in the region, which depend on imported alumina, Ma'aden's Az Zabirah project included a bauxite mine at Az Zabirah, Saudi Arabia, and an alumina refinery at Ras Az Zawr. Initial production from the mine was expected in 2010.

When at full production capacity in 2011, the Az Zabirah Mine would triple the region's bauxite output compared with that of 2009 (Middle East Economic Digest, 2006; Aluminium Bahrain B.S.C., 2006§).

**Copper.**—The Middle East region was a minor contributor to the world's copper stocks. Iran was the most notable copper producer in the region. The Government of Iran's Fourth Five-Year Development Program (2005 to 2009) accounted for much of the region's planned expansion of production capacity of copper ore (the proposed capacity expansions at the Dareh Zereshk and the Songun Mines) and refined copper (the planned expansion of the Sarcheshmeh Refinery).

Other proposed additions to regional copper output included the resumption of copper mining in Oman after a 12-year hiatus, the projected 2006 startup of mining at National Mining Co.'s Ajib pit, and the planned capacity expansion at Çayeli Bakir İşletmeleri A.Ş.' copper mine in Turkey.

**Gold.**—The Middle East was a significant gold trading region and the region's jewelry manufacturing sector was a noted consumer of gold; the Middle East's gold mines, however, were modest contributors to the world's supply of precious metals. Plans to significantly increase mine output of gold in Iran, Saudi Arabia, and Turkey could result in the region's gold production reaching an annual volume of about 29 metric tons by 2011, which is equivalent to slightly more than one month's gold production in South Africa, which was the world's leading gold producer in 2005.

Iran's gold output was expected to increase as the Agh Darreh Mine, which opened in late 2005, ramped up operations to full production capacity. In Saudi Arabia, Ma'aden expected to increase gold production from the Al-Hajar and the Bulghah Mines and, in 2006, to open the Al-Amar Mine. Ma'aden also planned to start mining operations at the Ad Duwayhi Mine in 2008.

In Turkey, the continued output of the Ovacık Mine, the projected startup of operations at the Kisladağ Mine in 2006 and at the Çöpler Mine in 2009, and the potential opening of the Mastra Mine, would increase the country's gold production capacity by 170% by 2011.

**Iron and Steel.**—In 2005, crude steel production in the Middle East region increased slightly compared with that of 2004; most of the increase was attributed to increased production in Turkey. The short-term demands of the regional construction boom, however, significantly increased Government and institutional investor interest in the construction of new plants to produce crude steel or rolled-steel products, such as rebar. The economic feasibility of expansions of the production capacities of existing crude steel plants also became more attractive.

Much of the planned expansion of iron and steel production capacities in the region was attributed to projects in the Government of Iran's Fourth Five-Year Development Program, which included the proposed construction of new crude steel plants at Ardakan, Azarbayjan, Bafq, and Sirjan, and the scheduled capacity expansions at the steel plants of Iranian Steel Industries National Group, Isfahan Steel Co., Khuzestan Steel Co., and Mobarekeh Steel Co. To help meet the expected increase in raw material demand by the Iranian steel sector,

which was dominated by Government-owned companies, expansions of Iranian iron ore mining and concentration capacities were planned at the Chadormalu, the Chah Gaz, the Chuqart, the Gol Gohar, the Jalal Abad-e-Zarand, and the Sangan iron ore operations.

Other proposed new crude steel facilities in the region included the Emirates Iron Industries plant in the United Arab Emirates, the Rajhi Steel Industries plant in Saudi Arabia, and the Shaded Iron & Steel LLC plant in Oman. Planned increases in crude steel production capacity included the expansions of the Al Azizia Steel Co. Ltd. plant in Saudi Arabia, the facilities of Emirates Steel Establishment in the United Arab Emirates, Hadeed's plant in Saudi Arabia, and the Qatar Steel Co. plant in Qatar.

**Lead and Zinc.**—Projects of the Government of Iran's Fourth Five-Year Development Program accounted for most of the planned expansion of zinc ore and metal production capacities in the region. Included in the five-year plan were the expansion of production from the Anguran lead-zinc mine and the anticipated construction of a 100,000-t/yr-capacity zinc plant in the Zanjan district. The slight projected increase in the regional lead ore production capacity was associated with the expansion of lead-zinc ore production capacity in Iran (Iranian Mines and Mining Industries Development and Renovation Organization, 2005, p. 195).

**Nickel.**—In late 2005, European Nickel PLC completed the feasibility study for the Çaldağ Mine in Turkey and, in early 2006, the Turkish Government approved the project's environmental impact assessment. Trial mining of the laterite ore was expected to continue intermittently through 2007. Construction of the mine's heap-leach facilities and processing plant was expected to begin in 2007, with initial production slated for 2008 and full production by 2009. Produced nickel was to be exported.

### *Industrial Minerals*

**Phosphate Rock.**—The Middle East region accounted for about 9% of the world's phosphate rock production in 2005. In Syria, the expansion of the Alsharqia Mine, which was operated by the General Co. of Phosphate and Mines, was completed. The renovation of the beneficiation plant of the Eshidiya Mine in Jordan was underway. Expected to be completed in 2006, Jordan Phosphate Mines Co.'s initial Eshidiya Mine capacity-expansion project would allow increased production from beds A1 and A3. By 2008, the planned development of the Upper Horizon zone, which was the second phase of the Eshidiya Mine expansion program, would offset the projected decline in production from the company's older mines at Al-Abiad and Al-Hassa.

In Saudi Arabia, the initial production of phosphate rock from the Al Jalamid deposit by Ma'aden was expected to begin in 2008. By 2011, the Al Jalamid Mine was expected to be at full production level, which was slated to be 11.3 million metric tons per year (Mt/yr) of ore with an average grade of 18.9% phosphorous pentoxide (P<sub>2</sub>O<sub>5</sub>). Ma'aden planned to beneficiate the crude phosphate rock to recover about 4.5 Mt/yr of shipping concentrate, which was expected to have an average grade of 32% P<sub>2</sub>O<sub>5</sub> (about 1.4 Mt/yr of P<sub>2</sub>O<sub>5</sub> content). Mine operations

were expected to continue for at least 27 years. Concentrate was to be shipped to a fertilizer complex to be built at Ras Az Zawr (Saudi Arabian Mining Co., undated§).

**Potash.**—The Middle East region was the source of about 10% of the world's potash output in 2005. Israel and Jordan recovered potash from the Dead Sea. In Israel, Dead Sea Works Ltd. (a subsidiary of Israel Chemicals Ltd.) had completed a processing plant expansion in 2004 and, in 2005, began a 3-year program to increase its carnallite production capacity of its Dead Sea evaporation ponds. Asia and North America were notable markets for Dead Sea Works potash.

In Jordan, Arab Potash Co. began a 500,000-t/yr capacity-expansion program. By 2008, the company's total potash production capacity will be increased to about 2.45 Mt/yr. Most (about 70%) of the company's potash production was exported to Asia; India and China were the major destinations. Another 15% was shipped to Europe, and about 10% was consumed locally. The fertilizer company, Kemira Arab Potash Co. (a subsidiary of Arab Potash), has been a significant local consumer since it began commercial fertilizer production in 2003 (Arab Potash Co., 2006, p. 26, 28).

### *Mineral Fuels and Related Materials*

**Helium.**—Qatar joined the short list of helium producers in August 2005 when helium recovery was initiated at Ras Laffan. The Ras Laffan Helium project, which was operated by RasGas Co. Ltd., was a joint venture of Qatar Liquefied Gas Co. Ltd. (Qatargas 1), Ras Laffan Liquefied Natural Gas Co. Ltd. (RasGas I), and Ras Laffan Liquefied Natural Gas Co. Ltd. II (RasGas II). Crude helium was present at a concentration of about 0.04% in the North Field, which is located offshore Qatar. The helium was extracted at the seven natural gas liquefaction lines (trains) of Qatargas 1, RasGas I, and RasGas II that processed natural gas produced from the North Field. The crude helium subsequently was purified and liquefied at Ras Laffan, where seven additional liquefied natural gas (LNG) trains were under construction or scheduled to be built by 2010. The additional natural gas throughput associated with the processing capacity of the new LNG trains in Qatar were expected to significantly increase the volume of recoverable helium in the natural gas processing stream (RasGas Co. Ltd., 2007b§).

**Natural Gas.**—Unlike the crude oil sector, the Middle East was an intermediate natural gas producing region compared with Europe and North America. The Middle East accounted for about 11% of world natural gas production in 2005 with 5 of the top 30 leading natural gas producing nations located in the region. Iran was the 6th ranked natural gas producer in the world; Saudi Arabia, 9th; the United Arab Emirates, 15th; Qatar, 17th, and Oman, 29th (BP plc, 2006, p. 24).

Energy-intensive industries, such as aluminum smelters, direct-reduction iron facilities, and crude steel plants that use electric arc furnaces, were attracted to the Middle East by the abundance of natural gas and the development of industrial areas with easy access to marine transport. In 2005, of the estimated 290 billion cubic meters of gas produced in the region, 251 billion cubic meters were consumed or processed locally. A substantial volume of produced natural gas was liquefied

and exported by ship. The region supported a substantial petrochemical industry that used natural gas as a feedstock. The petrochemical sector included ammonia and methanol plants. Natural-gas-fueled stand-alone electricity-generating plants and generating plants that were associated with water desalination plants also pushed up the regional consumption of gas. Additional produced natural gas was compressed and exported via pipeline (BP plc, 2006, p. 24, 27).

Natural gas production capacity in the Middle East was expected to be about 35% higher by 2011 compared with that of 2005. The continued development of the North Field, which is located offshore Qatar, and the South Pars gasfield, which is located offshore Iran and which is a geological extension of the North Field, would account for much of the expected capacity expansion.

Construction of additional LNG trains in the Middle East region was planned. In Qatar, the seven LNG trains that were operational in 2005 had a total production capacity of 25.5 Mt/yr. Seven more LNG trains, which had a total production capacity of 51.5 Mt/yr, were under construction at Ras Laffan or were approved to be built by 2010. By 2007, Qatar also was scheduled to provide natural gas to the Dolphin Energy Ltd. pipeline, which was to link Qatar with the United Arab Emirates and Oman, and to the Oryx gas-to-liquids plant, which was under construction. The Government imposed a moratorium on new natural gas export projects in 2005. The moratorium was not scheduled to expire until 2012 (Qatar Liquefied Gas Co. Ltd., 2007§; RasGas Co. Ltd., 2007a§).

Other planned LNG plants in the region included the following three new South Pars projects in Iran: the two-train 10-Mt/yr-capacity Pars LNG project, which was scheduled to be online by 2009; the two-train 10-Mt/yr-capacity Iran LNG project (also known as the NIOC LNG project), which was scheduled to start up in 2010; and the two-train 16-Mt/yr-capacity Persian LNG project, which was planned to begin production in 2011. In recent years, however, the completion of many of the development phases of the South Pars natural gas development program have been delayed significantly (Daya, 2005; National Iranian Gas Export Co., undated§).

Typically, because of the expenditure of hundreds of million of dollars associated with the construction of an LNG facility, the LNG project owners must secure adequate long-term LNG-sales contracts to prove to funding institutions that there is a long-term demand for the plant's production. Importation of Iranian LNG, much of which initially would require a long-term sales contract, however, has been interpreted as not being an investment in the Iranian energy sector and, therefore, has not been subject to U.S. sanctions (Katzman, 2006).

In Oman, Oman Liquefied Natural Gas LLC planned to increase its two-train production capacity to 7.2 Mt/yr, which was a 600,000-t/yr expansion. In Yemen, Train 1 of the 6.7-Mt/yr-capacity Yemen LNG Co. Ltd. production facility at Balhat was expected to start operations in 2008, and Train 2 was scheduled to initiate production in 2009 (Gavin, 2005; Middle East Economic Digest, 2005).

**Petroleum.**—In 2005, 5 of the top 14 leading oil-producing nations were located in the Middle East. Saudi Arabia was ranked 1st in oil production in the world; Iran, 4th; the United

Arab Emirates, 10th; Kuwait, 11th; and Iraq, 14th. In 2005, regional crude oil production increased by about 2% compared with that of 2004. Most of the region's crude oil was exported, although about 23% of production was refined locally. Iran, Iraq, Kuwait, Saudi Arabia, and the United Arab Emirates were among the world's leading oil exporters. In 2005, countries of Asia were the primary destination of regional oil exports and received about 67% of exported oil. Europe received 16% of Middle East oil exports; North America, 13%; and Africa, 4% (BP plc, 2006, p. 8, 11, 20; Kuwait Petroleum Corp., 2006, p. 29; Saudi Arabian Oil Co., 2006, p. 31; U.S. Energy Information Administration, 2006a, b).

In 2005, the countries of the Middle East accounted for about 22% of the crude oil and 18% of total petroleum (crude oil and refined products) imported by the United States compared with 26% and 21%, respectively, in 2003. The average free-on-board (f.o.b.) cost of crude oil imports entering the United States from Persian Gulf nations was \$47.21 per barrel in 2005 compared with \$33.08 per barrel in 2004, and \$25.17 per barrel in 2003 (U.S. Energy Information Administration, 2007a§-c§).

Saudi Arabian Oil Co. continued a program to expand its crude oil production capacity to 12.5 million barrels per day (Mbbbl/d) by 2009. The increased production capacity would allow Saudi Arabia to maintain from 1.5 to 2 Mbbbl/d of production capacity in excess of expected demand that could be used to offset unexpected disruptions to the international petroleum supply. Most of the other planned increase in production capacity in the region was attributed to new oilfield development in Iran, which planned to increase production capacity to 5 Mbbbl/d by 2010. In other oil-producing countries in the region, planned oilfield production capacity expansion programs called for increases in the 100,000- to 500,000-barrel-per-day range (Turkish Petroleum Corp., 2006, p. 7; U.S. Energy Information Administration, 2005§; 2006a§, b§).

**Uranium.**—In Iran, production of uranium began at the Saghand Mine in 2005 and at the Gchine Mine in 2004, but available information is inadequate to estimate output. In the past, Iraq had recovered uranium during processing of phosphate rock from the Akashat Mine at the Al Qaim phosphoric acid plant, but available information is inadequate to estimate output.

The phosphate rocks of the Al Jalamid phosphate deposit in Saudi Arabia, which was under development, were similar to those of the Akashat Mine, which is located about 200 kilometers north of Al Jalamid. The secondary uranium mineralization associated with the phosphate at the Akashat Mine, however, was not observed during the evaluation of the Al Jalamid phosphate deposit in Saudi Arabia (Wynn, 1996§).

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TABLE 1  
MIDDLE EAST: AREA AND POPULATION (2005)

Country	Area <sup>1</sup> (square kilometers)	Estimated population <sup>2</sup> (millions)
Bahrain	665	0.7
Cyprus	9,250	0.8
Iran	1,648,000	67.7
Iraq <sup>1</sup>	437,072	26.1
Israel	26,990	10.5
Jordan	92,300	5.4
Kuwait	17,820	2.5
Lebanon	10,400	3.6
Oman	212,460	2.6
Qatar	11,437	0.8
Saudi Arabia	1,960,582	24.6
Syria	185,180	19.0
Turkey	780,580	72.6
United Arab Emirates	82,880	4.5
Yemen	527,970	21.0
Total	6,003,586	262.3
United States	9,631,418	296.5
World	148,940,000 <sup>3</sup>	6,437.8

<sup>1</sup>Source: U.S. Central Intelligence Agency, World Factbook 2005.

<sup>2</sup>Source: World Bank Group, World Development Indicators Database, April 2006.

<sup>3</sup>Land area.

TABLE 2  
MIDDLE EAST: ECONOMY IN 2005<sup>1,2</sup>

Country	Gross domestic product based on purchasing power parity		Real gross domestic product growth rate (percentage)
	Total (billion dollars)	Per capita (dollars)	
Bahrain	\$16	\$21,565	6.9
Cyprus	17	21,177	3.7
Iran	555	7,980	5.4
Iraq <sup>3</sup>	94	1,900	3.1
Israel	158	23,474	5.2
Jordan	28	5,096	7.2
Kuwait	47	16,301	8.5
Lebanon	24	6,681	1.0
Oman	41	16,862	6.7
Qatar	25	31,397	6.5
Saudi Arabia	352	15,229	6.6
Syria	72	3,847	2.9
Turkey	569	7,950	7.4
United Arab Emirates	131	27,957	8.5
Yemen	19	751	3.8
Total	\$2,148	XX	XX
United States	12,278	41,399	3.2
World	61,028	XX	4.9

XX Not applicable

<sup>1</sup>Source: International Monetary Fund, World Economic Outlook Database, September 2006.

<sup>2</sup>Table data compiled February 9, 2007; may be different from that presented in individual country chapters.

<sup>3</sup>Source: U.S. Central Intelligence Agency, World Factbook 2005.

TABLE 3  
SELECTED EXPLORATION SITES IN 2005

Country	Type <sup>1</sup>	Prospect	Commodity	Companies	Resource notes <sup>2</sup>	Exploration notes
Turkey	D	Çaldağ	Nickel, cobalt	European Nickel PLC	380,000 metric tons of nickel, 22,000 metric tons of cobalt	Feasibility study completed; initial construction to start in late 2006.
Do.	F	Çöpler	Gold	Anatolia Minerals Development Ltd.	118,000 kilograms of gold	Drilled 29,564 meters in 2005.

<sup>1</sup>D--Development approved or ongoing. F--Feasibility work completed or ongoing.

<sup>2</sup>Resources reported where available based on data from various public sources. Data were not verified by the U.S. Geological Survey.

TABLE 4  
MIDDLE EAST: PRODUCTION OF SELECTED MINERAL COMMODITIES IN 2005<sup>1</sup>

(Thousand metric tons unless otherwise specified)

Country	Metals		Industrial minerals							Mineral fuels and related products	
	Aluminum, metal, primary	Chromite, mine output, gross weight	Steel, crude	Ammonia, N content	Cement, hydraulic	Gypsum	Phosphate rock, gross weight	Potash, K <sub>2</sub> O equivalent	Petroleum		
									Crude, including condensate (thousand 42-gallon barrels)	Refinery products (thousand 42-gallon barrels)	
Bahrain	751	--	--	330	191	--	--	--	13,348	97,716	
Cyprus	--	--	--	--	1,805 <sup>P</sup>	210 <sup>P</sup>	--	--	--	--	
Iran	220	224	7,405	1,020	32,650	13,000	250	--	1,350,000 <sup>e</sup>	545,000 <sup>e</sup>	
Iraq	--	--	--	30 <sup>e</sup>	3,015	--	3 <sup>e</sup>	--	660,000	100,000 <sup>e</sup>	
Israel	--	--	350 <sup>e</sup>	--	5,093	107	3,000	2,260	23	81,358	
Jordan	--	--	140 <sup>e</sup>	--	4,046	140	6,375	1,115	8	31,800 <sup>e</sup>	
Kuwait	--	--	--	467	2,700 <sup>e</sup>	--	--	--	939,276	313,000 <sup>e</sup>	
Lebanon <sup>e</sup>	--	--	--	--	4,500	2	--	--	--	--	
Oman <sup>e</sup>	--	19	90	--	2,500	60	--	--	282,616 <sup>2</sup>	31,573 <sup>2</sup>	
Qatar	--	--	1,057	1,750	1,400 <sup>e</sup>	--	--	--	290,000 <sup>e</sup>	43,500 <sup>e</sup>	
Saudi Arabia	--	--	4,185	1,780	26,064	713	--	--	3,398,000 <sup>2</sup>	720,640	
Syria <sup>e</sup>	--	--	70	120	4,700	440	3,850 <sup>2</sup>	--	171,185 <sup>2</sup>	88,300	
Turkey	60 <sup>e</sup>	700 <sup>e</sup>	20,960	330	42,787	250	--	--	16,500 <sup>e</sup>	179,000 <sup>e</sup>	
United Arab Emirates <sup>e</sup>	722	NA	70	360	8,000	100	--	--	830,000	200,000	
Yemen <sup>e</sup>	--	--	--	--	1,550	38	--	--	149,000	40,000	
<b>Total</b>	<b>1,750</b>	<b>943</b>	<b>34,300</b>	<b>6,190</b>	<b>141,000</b>	<b>15,100</b>	<b>13,500</b>	<b>3,380</b>	<b>8,100,000</b>	<b>2,470,000</b>	
Share of world total	5%	5%	3%	5%	6%	13%	9%	10%	30%	9%	
United States	2,480	--	93,300	8,040 <sup>3</sup>	101,000	17,200	35,800	1,300	1,890,000	5,690,000	
World total	31,900	18,800	1,130,000	123,000	2,310,000	116,000	149,000	33,300	27,300,000	26,600,000	

<sup>e</sup>Estimated; estimated data, U.S. data, and world totals are rounded to no more than three significant digits. <sup>P</sup>Preliminary. -- Zero or zero percent.

<sup>1</sup>Totals may not add due to independent rounding. Percentages are calculated on unrounded data. Table includes data available as of March 2007.

<sup>2</sup>Reported figure.

<sup>3</sup>Synthetic anhydrous ammonia; excludes coke oven byproduct ammonia.

TABLE 5  
MIDDLE EAST: HISTORIC AND PROJECTED BAUXITE MINE PRODUCTION, 1990-2011

(Metric tons)

Country	1990	1995	2000	2005	2007 <sup>c</sup>	2009 <sup>c</sup>	2011 <sup>c</sup>
Iran	100,000	148,000	485,130	365,000	400,000	500,000	710,000
Saudi Arabia	--	--	--	--	--	--	2,800,000
Turkey	773,000	232,278	458,537	475,349	460,000	460,000	460,000
Total	870,000	380,000	944,000	840,000	900,000	1,000,000	4,000,000

<sup>c</sup>Estimated; estimated data and totals are rounded to no more than three significant digits; may not add to totals shown. -- Negligible or no production.

TABLE 6  
MIDDLE EAST: HISTORIC AND PROJECTED PRIMARY AND SECONDARY ALUMINUM PRODUCTION, 1990-2011<sup>1</sup>

(Metric tons)

Country	1990	1995	2000	2005	2007 <sup>c</sup>	2009 <sup>c</sup>	2011 <sup>c</sup>
Bahrain <sup>1</sup>	213,000	450,709	509,308	750,710	873,000	875,000	880,000
Iran	60,000	119,400	140,000	220,000	220,000	220,000	500,000
Oman	--	--	--	--	--	350,000	350,000
Qatar	--	--	--	--	--	50,000	585,000
Saudi Arabia	--	--	--	--	--	--	300,000
Turkey	61,000	61,514	61,000	60,000	60,000	60,000	60,000
United Arab Emirates	174,000	247,400	470,000	722,000	861,000	920,000	1,560,000
Total	510,000	879,000	1,180,000	1,750,000	2,000,000	2,500,000	4,200,000

<sup>c</sup>Estimated; estimated data and totals are rounded to no more than three significant digits; may not add to totals shown. -- Negligible or no production.

<sup>1</sup>May include some secondary aluminum produced from used beverage cans.

TABLE 7  
MIDDLE EAST: HISTORIC AND PROJECTED COPPER MINE PRODUCTION, 1990-2011<sup>1</sup>

(Metal content of concentrate in thousand metric tons)

Country	1990	1995	2000	2005	2007 <sup>c</sup>	2009 <sup>c</sup>	2011 <sup>c</sup>
Iran	66	102	125	208	210	280	350
Oman	14	--	--	--	10	20	20
Saudi Arabia	1	1	1	1	1	1	1
Turkey	33	24	70	48	56	58	60
Total	114	127	196	257	280	360	430

<sup>c</sup>Estimated; estimated data and totals are rounded to no more than three significant digits; may not add to totals shown. -- Negligible or no production.

<sup>1</sup>Copper content of mined ore (gross weight).

TABLE 8  
MIDDLE EAST: HISTORIC AND PROJECTED REFINED COPPER METAL PRODUCTION, 1990-2011<sup>1</sup>

(Metric tons)

Country	1990	1995	2000	2005	2007 <sup>c</sup>	2009 <sup>c</sup>	2011 <sup>c</sup>
Cyprus <sup>2</sup>	--	--	5,197	--	--	--	--
Iran	47,800	90,400	155,856	152,000	155,000	250,000	400,000
Oman	12,000	33,900	24,281	24,000	25,000	25,000	25,000
Turkey	84,200	100,300	64,100	95,000	95,000	95,000	95,000
Total	144,000	225,000	249,000	270,000	280,000	370,000	520,000

<sup>c</sup>Estimated; estimated data and totals are rounded to no more than three significant digits; may not add to totals shown. -- Negligible or no production.

<sup>1</sup>May include secondary.

<sup>2</sup>Electrowon.

TABLE 9  
MIDDLE EAST: HISTORIC AND PROJECTED GOLD MINE PRODUCTION, 1990-2011

(Metal content of ore in kilograms)

Country	1990	1995	2000	2005	2007 <sup>c</sup>	2009 <sup>c</sup>	2011 <sup>c</sup>
Iran	500	630	216	200	1,800	2,000	3,500
Oman	54	591	551	--	--	--	--
Saudi Arabia	3,540	8,080	3,800	7,456	8,000	11,000	12,000
Turkey	1,010	1,200	500	5,000	7,000	9,000	13,500
Total	5,100	10,500	5,100	12,700	17,000	22,000	29,000

<sup>c</sup>Estimated; estimated data and totals are rounded to no more than three significant digits; may not add to totals shown. -- Negligible or no production.

TABLE 10  
MIDDLE EAST: HISTORIC AND PROJECTED BENEFICIATED IRON ORE PRODUCTION, 1990-2011

(Metal content of ore in thousand metric tons)

Country	Average grade	1990	1995	2000	2005	2007 <sup>c</sup>	2009 <sup>c</sup>	2011 <sup>c</sup>
Iran	49%	1,800	4,500	5,800	9,000	10,000	15,000	30,000
Turkey	53%	2,690	2,750	2,200	2,450	2,500	2,600	3,000
Total		4,500	7,300	8,000	11,000	13,000	18,000	33,000

<sup>c</sup>Estimated data and totals are rounded to no more than three significant digits; may not add to totals shown.

TABLE 11  
MIDDLE EAST: HISTORIC AND PROJECTED CRUDE STEEL PRODUCTION, 1990-2011

(Thousand metric tons)

Country	1990	1995	2000	2005	2007 <sup>c</sup>	2009 <sup>c</sup>	2011 <sup>c</sup>
Iran	1,425	4,696	6,600	7,405	14,500	20,000	29,000
Iraq	150	300	50	--	--	--	--
Israel	144	200	270	350	380	380	380
Jordan	179	30	30	140	340	410	410
Oman	--	--	--	90	90	600	1,200
Qatar	580	614	744	1,057	1,200	1,500	1,500
Saudi Arabia	1,833	2,451	2,973	4,185	5,200	5,200	6,500
Syria	76	70	70	70	70	70	70
Turkey	9,322	12,744	14,325	20,960	21,000	22,000	25,000
United Arab Emirates	--	--	70	70	100	1,700	1,700
Total	13,700	21,100	25,100	34,300	43,000	52,000	66,000

<sup>c</sup>Estimated; estimated data and totals are rounded to no more than three significant digits; may not add to totals shown. -- Negligible or no production.

TABLE 12  
MIDDLE EAST: HISTORIC AND PROJECTED LEAD MINE PRODUCTION, 1990-2011

(Metal content of concentrate in metric tons)

Country	1990	1995	2000	2005	2007 <sup>c</sup>	2009 <sup>c</sup>	2011 <sup>c</sup>
Iran	11,000	15,900	18,000	22,000	23,000	23,000	26,000
Saudi Arabia	250	50	50	30	50	50	50
Turkey	11,000	1,196	8,500	21,000	20,000	20,000	20,000
Total	22,000	17,100	27,000	43,000	43,000	43,000	46,000

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

TABLE 13  
MIDDLE EAST: HISTORIC AND PROJECTED PRIMARY REFINED LEAD PRODUCTION, 1990-2011

(Metric tons)

Country	1990	1995	2000	2005	2007 <sup>c</sup>	2009 <sup>c</sup>	2011 <sup>c</sup>
Iran	--	4,000	15,000	20,000	20,000	20,000	20,000
Turkey	5,400	2,000	--	--	--	--	--
Total	5,400	6,000	15,000	20,000	20,000	20,000	20,000

<sup>c</sup>Estimated; estimated data and totals are rounded to no more than three significant digits; may not add to totals shown. -- Negligible or no production.

TABLE 14  
MIDDLE EAST: HISTORIC AND PROJECTED SECONDARY REFINED LEAD PRODUCTION, 1990-2011

(Metric tons)

Country <sup>1</sup>	1990	1995	2000	2005	2007 <sup>c</sup>	2009 <sup>c</sup>	2011 <sup>c</sup>
Iran	10,000	41,200	35,000	48,000	40,000	30,000	30,000
Israel	--	8,200	13,000	27,000	27,000	27,000	27,000
Turkey	3,600	2,000	4,000	6,000	5,000	5,000	5,000
Total	14,000	51,000	52,000	81,000	72,000	62,000	62,000

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

-- Negligible or no production.

<sup>1</sup>In addition to the countries listed, Saudi Arabia also produces secondary lead, but information is inadequate to estimate production.

TABLE 15  
MIDDLE EAST: HISTORIC AND PROJECTED NICKEL MINE PRODUCTION, 1990-2011

(Metal content of ore in metric tons)

Country	1990	1995	2000	2005	2007 <sup>c</sup>	2009 <sup>c</sup>	2011 <sup>c</sup>
Turkey	--	--	--	1,000	1,500	20,000	20,000

<sup>c</sup>Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. -- Negligible or no production.

TABLE 16  
MIDDLE EAST: HISTORIC AND PROJECTED ZINC MINE PRODUCTION, 1990-2011

(Metal content of ore in metric tons)

Country <sup>1</sup>	1990	1995	2000	2005	2007 <sup>c</sup>	2009 <sup>c</sup>	2011 <sup>c</sup>
Iran	29,000	145,100	90,000	125,000	130,000	130,000	150,000
Saudi Arabia	2,470	500	3,000	1,500	2,000	3,000	3,000
Turkey	39,000	9,118	39,000	50,000	55,000	60,000	60,000
Total	71,000	155,000	132,000	177,000	190,000	190,000	210,000

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

<sup>1</sup>In Yemen, zinc ore with an estimated metal content of 40,000 metric tons (t) was expected to be produced in 2009. The volume was expected to increase to 75,000 t of zinc content in 2011. The ore will be treated hydrometallurgically and not concentrated.

TABLE 17  
MIDDLE EAST: HISTORIC AND PROJECTED ZINC METAL PRODUCTION, 1990-2011

(Metric tons)

Country	1990	1995	2000	2005	2007 <sup>c</sup>	2009 <sup>c</sup>	2011 <sup>c</sup>
Iran	--	--	51,475	120,000	120,000	150,000	230,000
Turkey	21,100	17,050	--	--	--	--	--
Total	21,100	17,100	51,500	120,000	120,000	150,000	230,000

<sup>c</sup>Estimated; estimated data and totals are rounded to no more than three significant digits; may not add to totals shown. -- Negligible or no production.

TABLE 18  
MIDDLE EAST: HISTORIC AND PROJECTED PHOSPHATE ROCK PRODUCTION, 1990-2011

(P<sub>2</sub>O<sub>5</sub> content of ore in thousand metric tons)

Country	1999	1995	2000	2005	2007 <sup>c</sup>	2009 <sup>c</sup>	2011 <sup>c</sup>
Iran	NA	NA	20	30	20	30	40
Iraq	270	300	200	1	--	--	--
Israel	1,104	1,264	1,305	800	800	800	800
Jordan	2,010	1,655	1,824	2,100	2,700	2,500	2,500
Saudi Arabia	--	--	--	--	--	1,000	1,400
Syria	511	477	646	1,190	1,190	1,190	1,190
Total	3,900	3,700	4,000	4,100	4,700	5,500	5,900

<sup>c</sup>Estimated; estimated data and totals are rounded to no more than three significant digits; may not add to totals shown. NA Not available. -- Negligible or no production.

TABLE 19  
MIDDLE EAST: HISTORIC AND PROJECTED SALABLE COAL PRODUCTION, 1990-2011<sup>1</sup>

(Thousand metric tons)

Country	1990	1995	2000	2005	2007 <sup>c</sup>	2009 <sup>c</sup>	2011 <sup>c</sup>
Iran	1,440	1,640	2,002	2,500	3,000	3,200	4,500
Turkey	52,530	59,408	64,645	58,676	55,000	50,000	50,000
Total	54,000	61,000	66,500	61,200	58,000	53,000	55,000

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

<sup>1</sup>Includes anthracite, bituminous, and lignite.