



# 2009 Minerals Yearbook

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## THE MIDDLE EAST

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# THE MINERAL INDUSTRIES OF THE MIDDLE EAST

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The Middle East region comprises 14 nations, which include Bahrain, Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, Syria, Turkey, the United Arab Emirates (UAE), and Yemen. The region encompasses an area of about 6.2 million square kilometers, or 4% of the world's land mass. The total population of the region in 2009 exceeded 278 million, or 4% of the world's population. The region includes the 6 members of the Cooperation Council for the Arab States of the Gulf [also known as Gulf Cooperation Council (GCC)], which is made up of Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the UAE, and one-half of the 12 member states that make up the Organization of the Petroleum Exporting Countries (OPEC), including Iran, Iraq, Kuwait, Qatar, Saudi Arabia, and the UAE (table 1; World Bank, The, 2010).

## Acknowledgments

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For mineral production statistics—

- Bahrain—National Oil and Gas Authority;
- Israel—Mines Department of the Ministry of National Infrastructures;
- Jordan—Department of Statistics; the Natural Resources Authority;
- Kuwait—Central Statistical Office of the Ministry of Planning;
- Qatar—Qatar Statistics Authority; the Ministry of Energy and Industry;
- Saudi Arabia—Central Department of Statistics and Information of the Ministry of Economy and Planning; Deputy Ministry for Mineral Resources of the Ministry of Petroleum and Mineral Resources;
- Turkey—General Directorate of Mining Affairs of the Ministry of Energy and Natural Resources.

For basic economic and population data—

- The International Monetary Fund and the World Bank Group.

## General Economic Conditions

With the exception of Kuwait and the UAE, the economies of all the countries in the Middle East region continued to grow in 2009, albeit at slower rates, than in the robust growth years of 2008 and 2007. The highest economic growth rate in the Middle East region was achieved by Lebanon [9.0% of the real gross domestic product (GDP)] whereas Kuwait had the lowest rate of economic growth (-4.8% of the real GDP) followed by the UAE (-2.5%) in the region. The contraction in these

economies was owing to lower crude oil prices and the world financial crises in 2009. In most Middle East countries, economic growth slowed significantly, especially in oil-exporting countries, which depended heavily on revenue from hydrocarbon exports to the world market. The world's average price of crude oil decreased by 35% to \$61.06 per barrel in 2009 from \$94.45 per barrel in 2008, which was a decrease of 36% (table 2; International Monetary Fund, 2010, p. 3; Organization of Arab Petroleum Exporting Countries, 2010, p. 87).

## Minerals in the Regional Economy

Saudi Arabia was considered to have the world's largest petroleum reserves and was the world's leading producer and exporter of petroleum. Iran, Iraq, and Kuwait were other major petroleum producers in the Middle East region. Qatar, which exported 68.2 billion cubic meters of natural gas in 2009 and had about 13.6% of the world's natural gas reserves, was the world's leading exporter of liquefied natural gas and the world's third ranked exporter of natural gas after Russia and Canada. Production and processing of crude petroleum and natural gas were the foundations upon which the economies of the region were based. Production of metals and industrial minerals was a significant factor in the economies of Iran and Turkey; metal production, particularly aluminum, also was a significant industry and helped provide economic diversity in Bahrain, Oman, Saudi Arabia, and the UAE. Israel, Jordan, and Syria were among the leading producers of phosphate rock in the world. Aside from bromine, chromite, coal, magnesium, natural gas, petroleum, phosphate rock, and sulfur, the Middle East region produced relatively small quantities of minerals (Organization of Arab Petroleum Exporting Countries, 2010, p. 59).

## Structure of the Mineral Industry

Turkey, which produced 25.3 million metric tons (Mt) of crude steel in 2009, was the Middle East region's leading crude steel producer and the world's 10th ranked producer of crude steel. Turkey was the world's leading importer of scrap in 2009. The majority of Turkey's steel production was from melting imported (15.6 Mt) and local (6.4 Mt) scrap; the imported scrap came mainly from the European Union (7.8 Mt), the United States (3.8 Mt), and Russia (1.3 Mt). Qatar was the leading country in the Middle East in terms of its per capita steel consumption in 2009, which totaled 2,036 kilograms (kg); it was followed by the UAE, 1,274 kg; Kuwait, 648 kg; Iran, 290 kg; Saudi Arabia, 283 kg; and Turkey, 250 kg (Odabasi, 2010; World Steel Association, 2011, p. 93).

## Exploration

State-owned and international oil companies continued exploration for hydrocarbons in almost all the countries in the region. Twenty-nine oil discoveries were reported by the Organization of Arab Oil Exporting Countries in the Middle East region, including nine discoveries in Yemen, five each in Oman and Saudi Arabia, three in Iraq, and one each in Kuwait and the UAE. Four natural gas discoveries were reported in Iraq, Saudi Arabia, Syria, and Yemen, respectively (Organization of Arab Petroleum Exporting Countries, 2010, p. 15-16).

In 2009, metal exploration activity was most notable in Iran, Saudi Arabia, Turkey, and Yemen. Government agencies engaged in mineral prospecting and general exploration included the General Directorate of Mineral Research and Exploration in Turkey, the Geological Survey and Mineral Resources Board of Yemen, the Geological Survey of Iran, and the Saudi Geological Survey. Exploration for gold took place extensively in Iran, Saudi Arabia, Turkey, and Yemen (table 3).

## Mineral Production

### Metals

In 2009, the Middle East region accounted for 12% of the world's chromite production, 7% of the world's primary aluminum production, and 3% of the world's crude steel production. Aluminum production helped support the economic diversification policies of Bahrain, Oman, Saudi Arabia, and the UAE. Bahrain and the UAE accounted for more than 2% each of the world's aluminum production in 2009. Other aluminum producers in the region included Iran and Turkey (table 4).

Crude steel production in the Middle East region decreased to 42.3 Mt in 2009 compared with 44 Mt in 2008. Turkey, which produced 25.3 Mt of crude steel (about 60% of the total Middle East crude steel production), was the world's 10th ranked steel producer. Iran, which was the second ranked steel producer in the Middle East region, accounted for about 24% of total production in the region, followed by Saudi Arabia, which accounted for 11% (table 4).

### Industrial Minerals

The Middle East region accounted for 17% of the world's gypsum production, 14% of the world's potash production, and 7% of the world's ammonia, cement, and phosphate rock production. Jordan was the region's leading producer of

phosphate rock, followed by Israel and Syria. Israel and Jordan were the only two countries in the region that produced potash. In 2009, the volumes of potash and phosphate rock production decreased significantly compared with that of 2008 owing to the decreased demand that resulted from the financial crisis that affected most of the world in 2009. Phosphate rock output by volume decreased by 23% in Syria, 16% in Jordan, and 13% in Israel. The volume of potash production in Jordan in 2009 was 40% less than that of 2008 (table 4; Jasinski, 2011a, b).

### Mineral Fuels

The Middle East region's production of crude oil decreased by 7.3% in 2009 compared with that of 2008. The region accounted for 29% of the world's total crude oil production compared with 31.3% in 2008. Natural gas production, however, increased by 6.5% compared with that of 2008. The region was responsible for 13.6% of the world's natural gas production compared with 12.4% in 2008. Saudi Arabia was the leading Middle Eastern country in terms of the the number of producing crude oil wells in 2009, which was 2,889 wells, followed by Iran, with 2,064 wells; the UAE, 1,488 wells; and Kuwait, 1,308 wells (table 4; BP p.l.c., 2010, p. 22; Organization of the Petroleum Exporting Countries, 2010, p. 27).

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TABLE 1  
MIDDLE EAST: 2009 TOTAL AREA AND POPULATION

Country	Total area <sup>1</sup> (square kilometers)	Estimated population <sup>2</sup> (millions)
Bahrain	665	0.8
Iran	1,648,000	72.0
Iraq	437,072	31.5
Israel	20,770	7.4
Jordan	92,300	5.9
Kuwait	17,820	2.8
Lebanon	10,400	4.2
Oman	212,460	2.8
Qatar	11,437	1.4
Saudi Arabia	2,149,690	25.3
Syria	185,180	21.1
Turkey	780,580	74.8
United Arab Emirates	83,600	4.6
Yemen	527,970	23.6
Total	6,177,944	278.1
World	148,940,000 <sup>3</sup>	6,777.1

<sup>1</sup>Source: The World Factbook 2009, U.S. Central Intelligence Agency.

<sup>2</sup>Source: The World Bank, 2009 World Development Indicators Database.

<sup>3</sup>Land area.

TABLE 2  
MIDDLE EAST: GROSS DOMESTIC PRODUCT<sup>1,2</sup>

Country	Gross domestic product based on purchasing power parity		Real gross domestic product growth rate (percentage)		
	Gross value (million dollars)	Per capita (dollars)	2007	2008	2009
Bahrain	28,124	27,068	8.4	6.1	2.9
Iran	827,858	11,172	7.8	1.0	1.8
Iraq	111,500	3,569	1.5	9.5	4.2
Israel	202,562	26,175	5.2	4.0	3.8
Jordan	38,290	5,620	8.5	7.6	2.3
Kuwait	135,429	38,304	4.5	5.5	-4.8
Lebanon	54,874	14,226	7.5	9.3	9.0
Oman	28,124	27,068	6.8	12.8	3.6
Qatar	126,518	88,233	26.8	25.4	8.6
Saudi Arabia	592,586	23,814	2.0	4.2	0.6
Syria	99,544	4,887	4.3	5.2	4.0
Turkey	958,300	12,300	4.7	0.9	7.3
United Arab Emirates	179,321	36,537	6.1	5.1	-2.5
Yemen	58,218	2,458	3.3	3.6	3.9
Total	3,441,248	XX	XX	XX	XX
World total	74,264,080	10,958	5.2	3.0	3.2

XX Not applicable.

<sup>1</sup>Source: International Monetary Fund, World Economic Outlook Database, October 2010.

<sup>2</sup>Gross domestic product listed may differ from that reported in individual country chapters owing to differences in source or date of reporting.

TABLE 3  
SELECTED MIDDLE EAST EXPLORATION ACTIVITY IN 2009

Country	Type <sup>1</sup>	Prospect	Commodity	Companies	Resource notes <sup>2,3</sup>	Exploration notes
Iran	D	Ardakan	U	Government of Iran	850 t U <sub>3</sub> O <sub>8</sub> (T)	Site under development.
Do.	E	Dalli	Cu, Au	Persian Gold plc.	Data not released	Ongoing exploration and permitting.
Do.	P	Gehine	U	Government of Iran	Data not released	Ongoing production.
Saudi Arabia	E	Jabal Sayid	Cu, Au, Ag	Citadel Resource Group Ltd.	537,000 t Cu, 196,000 oz Au, 6.9 Moz Ag (R)	Completed feasibility study.
Do.	E	Lahuf	Au	Citadel Resource Group Ltd.	107,000 oz Au (D)	Ongoing exploration program.
Do.	F	Wadi Sawawin	Fe	London Mining plc.	98.5 Mt Fe (ID)	Completed feasibility study.
Turkey	E	Agi Dagi	Au, Ag	Alamos Gold Inc.	1.3 Moz Au, 10.7 Moz Ag (D)	Placed on care and maintenance in 2008.
Do.	E	Akarca	Au, Ag	Centerra Gold Inc.	Data not released	Ongoing exploration.
Do.	E	Ardala	Au, Cu, Mo	European Goldfields Ltd.	289,000 oz Au, 50,000 t Cu, 1,400 t Mo (IF)	Ongoing exploration.
Do.	D	Cevizlidere	Cu, Au, Mo	Anatolia Minerals Development Ltd.	1.7 Mt Cu, 1.6 Moz Au, 22,000 t Mo (IF)	Ongoing exploration.
Do.	E	Corak (Yusufeli)	Au, Ag, Zn, Pb	Mediterranean Resources Limited	630,000 oz Au, 1.3 Moz Ag, 150,000 t Zn, 64,000 t Pb—	Ongoing drilling.
Do.	F	Efemqkuru	Au	Eldorado Gold Corp.	1.5 Moz Au (R)	Ongoing drilling.
Do.	E	Hallaga	Au, Cu	Teck Resources Ltd.	Data not released	Ongoing exploration.
Do.	E	Inlice	Au	Stratex International plc.	164,000 oz Au (D)	Ongoing exploration.
Do.	E	Karakartal	Cu, Au	Anatolia Minerals Development Ltd.	84,000 t Cu, 360,000 oz Au (ID)	Ongoing exploration.
Do.	E	Kestanelik	Au	Chesser Resources Ltd.	Data not released	Ongoing exploration.
Do.	E	Kirazli	Au, Ag	Alamos Gold Inc.	350,000 oz Au, 1.9 Moz Ag (D)	Project sold and incorporated into Agi Dagi project in January 2010.
Do.	P	Kisladag	Au	Eldorado Gold Corp.	6.8 Moz Au (R)	Ongoing drilling.
Do.	E	Oksut	Au	Stratex International plc.	128,000 oz Au (ID)	Ongoing exploration.
Do.	E	Sayacik	Au	Eldorado Gold Corp.	Data not released	Site considered part of Kisladag mine.
Do.	E	Sisorta	Au, Ag	Chesser Resources Ltd.	91,000 oz Au, 377,000 oz Ag (ID)	Ongoing drilling.
Do.	E	Tac (Yusufeli)	Au, Cu	Mediterranean Resources Limited	950,000 oz Au, 29,000 t Cu (ID)	Ongoing drilling.
Yemen	E	Suwar	Ni, Cu, Co	Cantex Mine Development Corp.	Data not released	Ongoing exploration.
Do.	Ditto.					

<sup>1</sup>D—Approved for development; E—Active exploration; F—Feasibility work ongoing/completed; P—Exploration associated with producing site.

<sup>2</sup>Abbreviations used for commodities in this table include the following: Ag—silver; Au—gold; Co—cobalt; Cu—copper; Fe—iron ore; Mo—molybdenum; Ni—nickel; Pb—Lead; U—uranium; Zn—zinc. Abbreviations used for units of measure include the following: Moz—million troy ounces; Mt—million metric tons; oz—troy ounces; t—metric tons.

<sup>3</sup>Based on 2009 data reported from various sources; D—measured + indicated; ID—indicated; IF—inferred; R—proven + probable; T—total resource. Resource data not verified by the U.S. Geological Survey.

TABLE 4  
MIDDLE EAST: PRODUCTION OF SELECTED MINERAL COMMODITIES IN 2009<sup>1</sup>  
(Thousand metric tons unless otherwise specified)

Country	Metals				Industrial minerals				Petroleum	
	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	Crude, including condensate	
									(thousand 42-gallon barrels)	Refinery products (thousand 42-gallon barrels)
Bahrain	848	--	--	390	700	--	--	--	66,510	95,508
Iran <sup>e</sup>	250	110	10,000	2,000	50,000	13,000	330	--	1,300,000	619,000
Iraq	--	--	--	30 <sup>e</sup>	8,500	1,364	--	--	905,930	187,245
Israel <sup>f</sup>	--	--	380	--	4,300	9	2,697 <sup>2</sup>	2,100	14	103,000
Jordan	--	--	150 <sup>e</sup>	--	3,799	304	5,282	743	9	26,540
Kuwait <sup>f</sup>	--	--	450	470	2,000	--	--	--	880,000	329,000
Lebanon	--	--	--	--	4,900	30 <sup>e</sup>	--	--	--	--
Oman	351	636	84 <sup>e</sup>	1,000 <sup>e</sup>	4,000 <sup>e</sup>	333	--	--	296,600	38,245
Qatar	--	--	1,028	2,035	4,100	135	--	--	291,270	113,406
Saudi Arabia	--	--	4,700	2,600 <sup>e</sup>	40,000 <sup>e</sup>	2,100	--	--	2,972,000	637,183
Syria	--	--	70 <sup>e</sup>	180 <sup>e</sup>	5,497	403	2,271	--	137,576	93,112
Turkey	35	1,574	25,304	--	53,000 <sup>e</sup>	4,370 <sup>e</sup>	1	--	16,900 <sup>e</sup>	122,000 <sup>e</sup>
United Arab Emirates	955	24	100 <sup>e</sup>	380 <sup>e</sup>	18,997	40 <sup>e</sup>	--	--	818,000	140,000 <sup>e</sup>
Yemen	--	--	--	--	2,118	100 <sup>e</sup>	--	--	103,700	35,843
Total	2,440	2,340	42,300	9,090	202,000	22,200	10,600	2,840	7,790,000	2,540,000
Share of world total	7%	12%	3%	7%	7%	17%	7%	14%	29%	8%
United States	1,730	--	59,400	7,700 <sup>3</sup>	64,900	9,400	26,400	715	1,960,000	6,530,000
World total	37,100	18,800	1,230,000	130,000	3,000,000	130,000	159,000	20,800	26,700,000	30,000,000

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

<sup>f</sup>Totals may not add due to independent rounding. Percentages are calculated on unrounded data. Table includes data available as of February 28, 2011.

<sup>2</sup>Reported figure.

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

