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The Mineral Industries of the Middle East

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The countries and territories of the Middle East region that are covered in this volume include Bahrain, Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, Syria, Turkey, the United Arab Emirates (UAE), the West Bank and Gaza Strip, and Yemen. This region covers an area of about 6.3 million square kilometers. In 2010, the population of the Middle East region was estimated to be about 289 million, or 4.2% of the world's population. The region included 2 members of the Organization for Economic Co-operation and Development (OECD) (Israel and Turkey), 6 members of the 12 countries that make up the Organization of the Petroleum Exporting Countries (OPEC) (Iran, Iraq, Kuwait, Qatar, Saudi Arabia, and the UAE), and 7 of the 11 member countries that make up the Organization of Arab Petroleum Exporting Countries (OAPEC) (Bahrain, Iraq, Kuwait, Qatar, Saudi Arabia, Syria, and the UAE). The Organization of the Arab States of the Gulf, also known as the Gulf Cooperation Council (GCC), which is made up of Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the UAE, is an important economic and trade organization in the Middle East region (table 1; World Bank, The, 2011).

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For mineral production statistics—

• Iraq—State Company of Geological Survey and Mining (GEOSURV-IRAQ), Ministry of Industry and Minerals, and Ministry of Oil;

• Israel—Mines Department of the Ministry of National Infrastructures;

• Jordan—Ministry of Energy and Mineral Resources, and the Natural Resources Authority;

• Kuwait—Central Statistical Office of the Ministry of Planning;

• Qatar—Qatar Statistics Authority and the Ministry of Energy and Industry;

• Saudi Arabia—Central Department of Statistics and Information of the Ministry of Economy and Planning, and 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.

• United Arab Emirates—National Bureau of Statistics.

For basic economic and population data—

• The International Monetary Fund and the World Bank Group.

General Economic Conditions

In 2010, the gross domestic product (GDP) of the Middle East region was $3,721 billion, which accounted for 5.4% of the world's GDP based on purchasing power parity. The economies of Middle Eastern countries grew at a faster rate in 2010 than in 2009 (the rate in 2009 was sluggish owing to the world financial crisis). The fastest economic growth rate in the Middle East region was achieved by Qatar (16.6%); Iraq had the slowest rate of economic growth (0.8%) in the region. Economic growth was driven mainly by exports of hydrocarbons to the world market. The economies of the oil-producing nations in the region were sustained by the high international market prices for crude oil and natural gas (table 2).

The mineral fuels industry affects the entire region, both through the wealth it creates and the movement of labor. Most of the countries in the region were undertaking efforts to diversify their economies. Production of metals and industrial minerals was a significant factor in the economies of Iran and Turkey; metal production also was a factor in the nonfuel economies of Bahrain, Oman, Qatar, Saudi Arabia, and the UAE. Oman had become a significant producer and exporter of chromite.

Low-cost electric energy from the region's abundant supply of natural gas (especially in Iran and most of the GCC countries) and the region's geographic location (which allows for access to ocean transportation) continued to provide a solid basis for the region's development of energy-intensive mineral industries to produce aluminum (primary and secondary), crude steel, direct-reduced iron (DRI), fertilizers, petrochemicals, and rolled steel. These industries were essential for the economic diversification efforts in the region, especially in the countries that depend heavily on hydrocarbon exports to sustain economic growth.

Legislation

In Iran, the Government continued to divest some of its interest in mineral-sector companies through sales of stock on the Tehran Stock Exchange or through tenders. By 2012, the Government planned to divest some of its interest in Almahdi Aluminum Corp., Azerbaijan Coal Co., East Alborz Coal Co., the Miduk copper mine, South Aluminum Co., and Zagros Steel Co., among others.

The United Nations Security Council adopted Resolution 1929, which required that questions about the purpose of Iran's nuclear program be resolved. The European Union (EU) (through the European Council Declaration of June 17, 2010) and the United States (through passage of the Comprehensive Iran Sanctions, Accountability, and Divestment Act of 2010) subsequently imposed additional sanctions based upon concerns about Iran's nuclear program.

As of yearend 2010, Iraq's draft gas and oil legislation known as the Hydrocarbon Law, which was first proposed in 2007, remained stalled because of disagreements among Iraqi parties on wider political issues, including revenue sharing. The proposed law would create an oil and gas council to oversee the country's oil and gas sector and would establish the Iraq National Oil Co. The proposed law also contains arrangements for petroleum revenue sharing through the creation of an Oil Revenue Fund and a Future Fund.

In May, the U.S. Government renewed economic sanctions on Syria for another year. The sanctions, which restrict the export of most U.S. goods to Syria, were first imposed by the United States in 2004 under the Syria Accountability and Lebanese Sovereignty Restoration Act (Aljazeera, 2010; International Atomic Energy Agency, 2010).

In Turkey, law No. 5995 was enacted on June 24, 2010, to address the issuance of environmental permits (which had been suspended after the Constitution Court decision of January 15, 2009, to abolish Article 7 of the Mining Law). Law No. 5995 also addresses labor law liabilities and penalties for illegal mine production, and increases the royalties on the value of gold, platinum and silver production to 4%; the law also reduces the royalty on the value of produced stone to 1% and clarifies the sand and gravel licensing procedures (Önder, 2010).

The Yemen Geological Survey and Mineral Resources Board (GSMRB) under the Yemen Mining Policy Reform Project [with the support of the International Finance Corp. (IFC) of the World Bank Group and Yemen's Ministry of Oil and Minerals] prepared a draft of a new mines and quarries law. The proposed law would apply an 8% royalty on the production of precious stones, a 5% royalty on the production of nonmetallic minerals, and a 3% royalty on the production of metallic and other minerals. The law also proposes a 30% to 35% income tax on remitted dividends and an exemption of import duties during mine construction. The Government approved the mining law but the Parliament had not given its approval as of yearend 2010 (Pamuk, 2010).

Exploration

Exploration activities for natural gas continued in such countries as Israel, Kuwait, Saudi Arabia, Syria, Turkey, and Yemen. State-owned and international oil companies continued with exploration for hydrocarbons in almost all the countries in the region. In 2010, crude oil discoveries were reported in Iran, Iraq, Oman, Syria, and the UAE, and natural gas discoveries were reported in Iran, Iraq, Oman, and Saudi Arabia (Organization of Arab Petroleum Exporting Countries, 2011, p. 20–22).

Local and international exploration companies were allowed to explore for nonfuel minerals in most of the countries of the region. Exploration for such precious metals as gold and silver was the focus of exploration activity in the region. Other metals that were of interest to mining companies included cobalt, copper, iron ore, lead, molybdenum, nickel, and zinc. In 2010, metal exploration activity was most notable in Iran, Saudi Arabia, Turkey, and Yemen. 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 of Oman, the Saudi Geological Survey, and the General Directorate of Mineral Research and Exploration of Yemen.

In Oman, Mawarid Mining Co. L.L.C. held an exploration and production permit in Blocks 1 and 2, which are located in northwestern Sohar City, and the Ghuzayn Block, which is located in southeastern Sohar City. Mawarid explored for volcanic massive sulfide copper-gold deposits in the volcanic sequence of the Semail ophiolite. The company completed a feasibility study for the development of the Mandoos Mine and the Safwa Mine, which are located northwest of Sohar City. The company was also conducting a feasibility study for the Ghuzayn 1, 2 and 3 copper prospects (Mawarid Mining Co. L.L.C., 2010).

In Saudi Arabia, Citadel Resource Group Ltd. of Australia explored for copper, gold, silver, and zinc at the Jabal Shayban deposit, which is located in northeastern Saudi Arabia. Equinox Resources Ltd. of Canada, which was a subsidiary of Equinox Minerals, had secured 50% of Citadel's equity interest, and by February 2011, it had secured 100% of Citadel's equity interest. London Mining p.l.c. of the United Kingdom and National Mining Co. of Saudi Arabia completed a feasibility study for the Wadi Sawawin iron ore project (Equinox Minerals Ltd., 2011).

In Turkey, several international and local companies conducted exploration activity mainly for gold and silver but also for cobalt, copper, lead, molybdenum, nickel, and zinc. These companies included Australian companies, such as Alacer Gold Corp. and Chesser Resources Ltd.; Canadian companies, such as Alamos Gold Inc., Aldridge Minerals Inc., Anatolia Minerals Development Ltd., Centerra Gold Inc., Eldorado Gold Corp., Empire Mining Corp., Inmet Mining Corp., Mediterranean Resources Ltd., Nuinsco Resources Ltd., and Teck Resources Ltd; United Kingdom companies, such as Ariana Resources p.l.c., European Goldfields Ltd., European Nickel p.l.c., KEFI Minerals plc., Stratex International p.l.c., and the Turkish company Koza Altin Işletmeleri A.S. (table 3).

Commodity Overview

In 2010, the Middle East region was responsible for about 31% of the world's total crude oil production and 14.4% of the world's natural gas output. Additionally, the region accounted for 16% of the world gypsum production; chromite, 12%; potash, 10%; refinery petroleum products, 9%; aluminum, 8%; ammonia, cement, and phosphate rock, 7% each; and steel, 3% (table 4).

In tables 5 though 17, estimates for the production of major mineral commodities for 2013 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 production 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 the 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 (2010)

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 take place.

Metals

Bauxite and Alumina and Aluminum.—In 2010, the Middle East region's share in the world's aluminum production increased to about 8% from 5% in 2009 (table 4). About 400,000 metric tons (t) of aluminum was produced at Emirates Aluminium Co. Ltd.'s (Emal's) newly built 740,000-metric-ton-per-year (t/yr)-capacity aluminum smelter at Abu Dhabi in the UAE, and 190,000 t at Qatar Aluminium's 585,000-t/yr-capacity smelter in Mesaieed Industrial City (table 6; Emirate Aluminium Co. Ltd., 2011).

Aluminum production capacity in the Middle East is expected to increase by 87% from about 3.1 million metric tons per year (Mt/yr) in 2010 to about 5.8 Mt/yr by 2017. The Middle East region's contribution is expected to increase to about 10% of the world production from the current 8% following the completion of the new smelters in the region [which included those being built by South Aluminum Corp. in Iran, Sohar Aluminum Co. in Oman, Qatar Aluminium Ltd. in Qatar, Saudi Arabian Mining Co. (Ma'aden) in Saudi Arabia, and Abu Dhabi Basic Industries Corp. and the second phase of Emal in the UAE] and the expansion of the Arak and the Al Mahdi smelters in Iran and the Sohar smelter in Oman. In addition to primary aluminum production, there were a number of existing downstream facilities in such countries as Bahrain, Oman, Qatar, and the UAE that produced value-added aluminum products (table 6; Bains, 2010, p. 30).

The joint venture of Ma'aden (74.9% equity interest) and Alcoa Inc. of the United States (25.1%) began the construction of a 740,000-t/yr-capacity aluminum smelter in the country. The smelter, which was located at Ras Az Zawr (about 90 kilometers northwest of Jubail), was expected to start operations in 2013, and initially was slated to use imported alumina, which would be supplied by Alcoa. Construction of a 1.8-Mt/yr-capacity alumina refinery and a 380,000-t/yr-capacity aluminum rolling mill at Ras Az Zawr was expected to begin in 2011. After initially processing imported bauxite, the alumina refinery was expected to be supplied by a proposed 4-Mt/yr-capacity bauxite mine at Al Ba'aitha. Alcoa held the right to acquire up to a 40% equity interest in the project (table 5; Bechtel Corp., 2010; Sell, 2010; Alcoa Inc., 2011).

Development activities for three other proposed aluminum smelter projects in Saudi Arabia were inactive by yearend 2010. These projects included a 1-Mt/yr-capacity smelter that was proposed to be built in Jizan Economic City by Sino Saudi Jazan Aluminum Ltd., which was a joint venture of Aluminum Corporation of China Ltd. (40%), Saudi Binladin Group of Saudi Arabia (40%), and Malaysian Mining Corporation Berhad (20%); and a 700,000-t/yr smelter proposed to be built in the planned King Abdullah Economic City by the joint venture of Emaar Properties PJSC, The Economic City of Saudi Arabia, Emal, and the Saudi Arabian General Investment Authority. Development plans for both projects were suspended in 2010 owing, in part, to the lack of an assured fuel supply allocation. Work on a 700,000-t/yr-capacity smelter for Western Way for Industrial Development Co. of Saudi Arabia had been suspended prior to 2010 (Al Shaikh and Chahine, 2010, p. 6; Baxter, 2010).

Chromium.—The Middle East region accounted for 12% of the world's production of chromite compared with 10% in 2008. Iran, Oman, and Turkey were the three countries that produced chromite in the Middle East region (table 4). In Oman, which had 71 chromite producers, Gulf Mining and Materials Co. inaugurated the country's first chromite ore concentration plant at Wadi Mahram in the Governorate of Samayil; the plant had an intake capacity of 180,000 t/yr. Al Tamman Trading Establishment L.L.C. of Oman and Indsil Group of India announced a plan to build a $70 million chromite smelter at the Sohar Industrial Estate. The 75,000-t/yr-capacity smelter would export its ferrochromium (Industrial Minerals, 2010; Al Tamman Trading Establishment L.L.C., 2011).

Copper.—The Middle East region was a minor contributor to the world's copper supply. Iran was the most notable copper producer in the region and the leading Middle Eastern country in terms of the size of its copper deposits, which were estimated by the National Iranian Copper Industries Co. (NICICO) to be 1.9 billion metric tons (Gt) of ore containing 14 million metric tons (Mt) of copper, or about 3% of the world's reserves. The country was pursuing plans to increase its production capacity to 440,000 t/yr by 2013 from 255,000 t/yr in 2010 (table 7, 8; Gavin, 2010; MEED, 2010, p. 29).

In Saudi Arabia, Al Masane Al Kobra Mining Co. (AMAK), which was a venture of local investors and the Arabian American Development Co. of the United States, continued work on the Al Masane project, which was located in southwestern Saudi Arabia. In 2010, AMAK awarded China National Geological and Mining Corp. a 5-year contract for underground mine development, which was expected to begin in 2011, and mine operations, which were expected to begin in 2012. The mine's surface plant was designed to produce about 51,000 t/yr of zinc concentrate with an average content of about 53% zinc, 35,000 t/yr of copper concentrate with an average content of about 25% copper, and a dore that was expected to contain about 6,000 kilograms per year (kg/yr) of silver and 200 kg/yr of gold (Desautels and others, 2009, p. 5).

Oman produced a relatively small amount of copper, but copper emerged as a significant contributor to the country's exports. Oman's copper exports in 2010 were valued at about $67 million, which was about 10% of the country's nonoil exports. Mawarid continued to produce copper from the Shinas Mine's open pit in the Al Batinah region, where the company had been mining copper since 2008. The company had produced about 500,000 t of ore by yearend 2010. Operations at the Hatta South pit, which started in May, reached full capacity in 2010. Mawarid owned and operated a copper concentrator at Lasail. The concentrator increased copper content in the mined copper

ore from between 2% and 3% to between 18% and 24% and had a throughput of 140 metric tons per hour. Copper concentrates were refined and sold by Government-owned Oman Mining Company L.L.C. (Mawarid Mining Co. L.L.C., 2010).

In Yemen, Cantex completed an 11-hole drilling program at the Wadi Qutabah nickel-copper-cobalt-platinum-group metals project and had begun drill tests at the Suwar nickel-copper-cobalt deposit, in which Cantex was the sole owner of the exploration license. Cantex planned to complete a prefeasibility study of the Suwar project by mid-2012. Vale S.A. of Brazil, which funded the Suwar project and the Wadi Qutabah projects, and had an option to purchase them, conducted a 1,624-line-kilometer helicopter-borne geophysical survey of the Suwar and Wadi Qutabah project area and identified three new anomalies that indicated massive-sulfide mineralization and a copper-nickel-cobalt massive-sulfide zone (Cantex Mine Development Corp., 2011).

Gold.—The Middle East's gold mines were modest contributors to the world's supply of precious metals. Turkey and Saudi Arabia were the major gold producers in the region. Minor producers included Iran and Oman. Plans to increase mine output of gold significantly in Iran, Saudi Arabia, and Turkey could result in the region's gold production reaching an annual volume of about 38.6 t by 2013 (table 9).

The UAE was a significant global gold trading center, and the region's jewelry manufacturing sector was a noted consumer of gold. The value of gold trade at the Dubai Gold Centre in 2010 was $41.3 billion, which was 18% more than that of 2009, which was $35 billion. In 2010, the volume of gold imports to Dubai increased to 707 t from 576 t in 2009. The volume of gold exports increased to 418 t from 403 t in 2009. India remained Dubai's leading gold trading partner (Dubai Multi Commodities Centre Authority, 2011b).

Iron Ore and Iron and Steel.—*Iron Ore.*—Iran and Turkey were the Middle East region's only producers of iron ore whereas Qatar, Saudi Arabia, and the UAE produced beneficiated iron ore (such as DRI, pig iron, and ferroalloys). Several iron ore deposits in Saudi Arabia had been explored in the past, and some of the deposits of the Wadi Sawawin formation in northwestern Saudi Arabia were reevaluated. London Mining acquired a 25% interest in National Mining Co., which would retain the exploitation and exploration licenses for the Wadi Sawawin project. The companies continued to attempt to secure funding for the project's proposed iron ore mine and 5-Mt/yr-capacity seaside iron ore pelletizing plant (table 10; London Mining p.l.c., 2011, p. 116–17).

Iran, which produced 35 Mt in 2010, was the region's leading producer of iron ore. Significant increases in production capacity were planned for Iranian iron ore mines, including expansions of the mines of Chadormalu Mining and Industrial Co., Gol-e-Gohar Iron Ore Co., and Sangan Iron Ore Co.; development of the Jalal Abad Mine; and the opening of the new facilities at Bafgh, at the Bafgh North Anomaly, and at Chahgaz and Mishdovan.

Turkey produced about 5.2 Mt of iron ore in 2010 from mines in Sivas Province that were owned and operated by Erdemir Madencilik Sanayi ve Ticaret A.Ş. (a subsidiary of Ereğli Demir ve Çelik Fabrikalari T.A.Ş.) and in Malatya Province by Hekimhan Madencilik İthalat İhracat San. ve Tic. A.Ş. (a subsidiary of Kolin İnşaat Turizm San. ve Tic. A.Ş.).

DRI production has been steadily increasing in the region as new capacities were installed in Iran, Qatar, Saudi Arabia, and the UAE. In 2010, the volume of DRI production in the Middle East region was 18.2 Mt, which accounted for about 26% of the world's DRI production (Midrex Technologies, Inc., 2011, p. 7).

Steel.—The Middle East's share of world steel production remained at 3%. Turkey was the Middle East region's leading steel producer and exporter and was responsible for about 58% of the region's total production followed by Iran, which produced about 24%, and Saudi Arabia, which produced about 10% of the region's steel production (table 11).

Demand for rebar by the construction industry for residential and commercial housing projects was the main driver for steel in the region. In the past few years, the highest demand was from Iran, Saudi Arabia, Turkey, and the UAE. In Iran, the Government's Fourth Five-Year Development Program included expanding the capacity of the steel plants at Bafgh in Yazd Province, Miyaneh in Azarbayjan-e Sharqi [East Azarbaijan] Province, Neiriz in Fars Province, Qaenat (Ghaenat) in Khorasan-e Jonubi [South Khorasan] Province, Sefid Dasht in Chahar Mahal va Bakhtiari Province, Shadegan in Khuzestan Province, and Sirjan in Kerman Province. Additional crude steel plants were planned to be built at Bandar Abbas and Hamadan, and production capacity expansions were scheduled to be completed at the steel plants of Isfahan Steel Co., Khuzestan Steel Co., and Mobarekeh Steel Co. Other new facilities in the region that began producing crude steel included the Shadeed Iron & Steel LLC plant in Oman; the Al Atoun Steel Industries Co. plant at Yanbu, Saudi Arabia; the Rajhi Steel Industries plant at Jeddah, Saudi Arabia; and Emirates Steel Industries plant at Musafah, UAE; the Essar Group's plant at the Hamriya Free Zone, UAE; and the United Steel Holding Co. (Foulath) plant at Al Hidd, Bahrain.

Lead and Zinc.—Iran, Saudi Arabia, and Turkey were the three countries in the Middle East that produced lead and zinc in 2010. Projects of the Government of Iran's Fourth Five-Year Development Program accounted for most of the planned expansion of lead and zinc ore and zinc metal production capacities in the region. Included in Iran's 5-year development plan were the expansion of production from the Anguran lead and zinc mine and the anticipated construction of a 100,000-t/yr-capacity zinc plant in the Zanjan district (table 14, 15).

In 2010, The Iranian Mines and Mining Industries Development and Renovation Organization (IMIDRO) divested 45.6% of its equity interest in Mehdiabad Zinc Co. to Karoun Dez Dasht and an additional 2.4% interest to two individuals. Mehdiabad's other joint-venture partners (Itok GmbH of Austria and Union Resources Ltd. of Australia) resumed negotiations with IMIDRO, which held the exploitation license for the Mehdiabad zinc deposit (Union Resources Ltd., 2011, p. 4).

Zinc production from the Jabali Mine, which is located northeast of Sana'a, Yemen, and had been scheduled to begin production in 2010, was delayed indefinitely. The Jabali bondholders withdrew from the bond after ZincOx Resources p.l.c. of the United Kingdom defaulted on

the terms of the bond in October 2009 by being late with the construction work at the Jabali Mine. The Jabali deposit was estimated to contain 12.6 Mt of oxide ore grading 18.9% zinc, 1.2% lead, and 68 grams per metric ton silver, and minable reserves were estimated to be 8.7 Mt grading 9.2% zinc with a cutoff grade of 4.4%. The mine was owned by Jabal Salab Co., which was a joint venture of ZincOx (52% interest) and Ansan Wikfs (ZincOx Resources p.l.c., 2011).

Molybdenum.—Iran was the only producer of molybdenum in the Middle East region. Some exploration activity for molybdenum was reported in Turkey (tables 3, 12).

Nickel.—Turkey was the sole producer of nickel in the Middle East region. Meta Nikel Kobalt A.Ş. of Turkey (a subsidiary of Meta Madencilik Limited Şti.) operated the Yunusemre open pit nickel mine in Eskisehir Province, which had started production in 2009. The dramatic decline in nickel prices during the last three quarters of 2010 resulted in the significant slump in nickel exploration activity in Turkey, which was the only country in the region that had notable nickel reserves. The Caldag Mine, which is located in western Turkey and had been expected to produce 24,500 t/yr of nickel, was placed on care-and-maintenance status owing to the merger of European Nickel and Rusina Mining MNL of Australia. The new company focused its attention on developing a nickel project in the Philippines (table 13; European Nickel p.l.c., 2010).

Industrial Minerals

Diamond.—Although the Middle East did not produce any rough diamond from mines in 2010, diamond cutting and trading was a significant activity of the economies of Israel, Lebanon, and the UAE, all of which were Kimberley Process Certification Scheme participants. Lebanon had substantial diamond trade activity with such countries as the Democratic Republic of the Congo [Congo (Kinshasa)], the EU, Guinea, Sierra Leone, Tanzania, and the UAE. Lebanon reported exporting about 849,000 carats of rough diamond worth $117.2 million in 2010 compared with 929,000 carats worth about $58.7 million in 2009. The total volume of carats exported in 2010 decreased by about 9% compared with that of 2009 whereas the total value of diamond exports in 2010 was nearly double that of 2009. In 2010, Lebanon reported importing 775,000 carats worth $120 million compared with 542,000 carats worth $57.9 million in 2009. This was an increase of 43% in volume and 107% in value (Kimberley Process Certification Scheme, 2011).

Israel was one of the world's leading diamond cutting and trading centers. Domestic diamond cutting and polishing companies specialized in large, high-value gemstones. In 2010, cut and polished diamond exports increased to $5.8 billion from $3.9 billion in 2009; the value of Israel's cut and polished diamond exports produced from domestic cutting and polishing operations increased to $1.6 billion from $1.4 billion. The United States was Israel's leading market for cut and polished diamond. Improved market conditions in 2010 for the Israeli diamond industry were attributable to increased demand from China and India (Even-Zohar, 2011; Israeli Diamond Industry, 2011; Krawitz, 2011).

The UAE had become an increasingly significant center for diamond trade in the world. Dubai Diamond Exchange (DDE), which was a subsidiary of Dubai Multi Commodities Centre (DMCC), was the leading diamond trade center in the world. The value of the diamond trade at the DDE in 2010, which included both rough and polished diamond trade, was almost double that of 2009 and amounted to $35.1 billion compared with $17.9 billion. The volume of the UAE's diamond trade increased by 51% to 268.7 million carats from 178.1 million carats in 2009. The country exported 73.6 million carats of polished diamond valued at $14.6 billion in 2010 and imported 90 million carats of polished diamond valued at about $13.3 billion. The UAE imported 50.4 million carats of rough diamond and exported 54.7 million carats. The UAE's top diamond trade partners were Belgium, Hong Kong, India, and Switzerland (Dubai Multi Commodities Centre Authority, 2011a).

Mineral Fuels and Related Materials

Coal.—Iran and Turkey were the only countries in the Middle East region that produced coal. Iran planned to double its output capacity of coal to more than 4.5 Mt/yr by yearend 2013. In Turkey, coal production was used primarily for electrical power generation. Although the Turkish Government encouraged the use of natural gas for new power generation projects and retained control of hydroelectric generating facilities, many of Turkey's lignite and subbituminous coal operations had been divested to the private sector in the past decade. Coal production was expected to vary, depending on the demand for electric power not met by imported natural gas (table 16).

Natural Gas.—The share of the Middle East region in the world's total natural gas output increased to 14.4% in 2010 from about 13.7% in 2009 and 12.6% in 2008. The region's natural gas reserves were estimated to be about 76 trillion cubic meters, or 40.5% of the world's total reserves (excluding shale gas reserves). Iran and Qatar were the second and third ranked countries in the world in terms of the size of their natural gas reserves after Russia. Iran's natural gas proved reserves were estimated to be 29.6 trillion cubic meters (15.8% of the world's natural gas reserves), and Qatar's proved reserves were 25.3 trillion cubic meters (13.5% world's natural gas reserves). Production of natural gas in the region was 460.7 billion cubic meters in 2010, which was an increase of 14.4% compared with that of 2009. Iran was the region's leading producer of natural gas followed by Qatar and Saudi Arabia. Although natural gas was produced by all the countries of the Middle East in 2010, only four countries were net natural gas exporters. The region's natural gas exports totaled 79.5 billion cubic meters in 2010; 71.4% of the gas was exported by Qatar, which was the world's leading exporter of natural gas; 13.7%, by Oman; 9.6% by the UAE; and 5.3% by Iran. The Middle East region dominated liquefied natural gas (LNG) exports, which accounted for more than 30% of global natural gas trade. Qatar, which was the world's leading LNG supplier, increased its LNG exports by 53.2% (BP p.l.c., 2011, p. 20, 22, 29).

Petroleum.—The share of the Middle East region in the world's crude oil production increased to about 31% in 2010

from 29% in 2009. The region's proved crude oil reserves were estimated to be 752.6 billion barrels (Gbbl), or about 54.40% of the world's total crude oil reserves. Iran held 15.8% of proved worldwide natural gas reserves and 9.9% of proved oil reserves in 2010. In October, Iran announced an increase in its crude oil reserves to 150.3 Gbbl from 137.6 Gbbl. Iraq's proved crude oil reserves of 115 Gbbl, which accounted for 8.6% of the world's total reserves, were the fourth in the world in terms of volume after Saudi Arabia, Venezuela, and Iran, and had been known for decades. In October, Iraq's Ministry of Oil increased the country's proved crude oil reserves by 24% to 143.1 Gbbl from the 2001 estimates of 115 Gbbl. This increase came primarily from 12 giant oilfields, which included a 71% increase in the proven reserves of the southern oilfields of Basrah, a 20% increase in the northern oilfields of Kirkuk, and a 9% increase in the central fields in East Baghdad (Rigzone.com, 2010).

Saudi Arabia was the leading petroleum producing country in the world and the region, in terms of the volume of production, followed by Iran, the UAE, Kuwait, and Iraq. The Middle East region's crude oil exports averaged 16.6 million barrels per day in 2010, 70% of which came from the GCC countries (BP p.l.c., 2011, p. 8, 19).

Uranium.—Iran was the Middle East's only producer of uranium. It was estimated that Iran produced 50 t of uranium metal in 2010. In Turkey, Aldridge Minerals Inc. acquired mineral licenses for properties that had the potential for uranium mineralization. At yearend 2010, ownership of the uranium properties was transferred to Aldridge Uranium Inc., which was a newly formed company owned by Aldridge Minerals shareholders (table 17).

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TABLE 1
MIDDLE EAST: AREA AND POPULATION IN 2010

Country/Territory	Area[1] (square kilometers)	Estimated population[2] (millions)
Bahrain	760	1.3
Iran	1,648,195	74.0
Iraq	438,317	32.0
Israel	20,770	7.6
Jordan	89,342	6.0
Kuwait	17,818	2.7
Lebanon	10,400	4.2
Oman	309,500	2.8
Qatar	11,586	1.8
Saudi Arabia	2,149,690	27.4
Syria	185,180	20.4
Turkey	783,562	72.8
United Arab Emirates	83,600	7.5
West Bank and Gaza Strip	6,220	4.0
Yemen	527,968	24.1
Total	6,282,908	288.7
World	510,072,000	6,840.5

[1]Source: U.S. Central Intelligence Agency, The World Factbook 2011.

[2]Source: The World Bank, 2011 World Development Indicators Database.

TABLE 2
MIDDLE EAST: GROSS DOMESTIC PRODUCT[1, 2]

Country/Territory	Gross domestic product based on purchasing power parity		Real gross domestic product growth rate (percentage)		
	Gross value (million dollars)	Per capita (dollars)	2008	2009	2010
Bahrain	29,800	26,932	6.3	3.1	4.1
Iran	888,355	11,883	0.6	3.5	3.2
Iraq	113,703	3,548	9.5	4.2	0.8
Israel	219,954	29,602	4.0	0.8	4.8
Jordan	35,255	5,767	7.2	5.5	2.3
Kuwait	138,893	38,775	5.0	-5.2	3.4
Lebanon	59,548	15,239	9.3	8.5	7.5
Oman	75,995	25,492	12.9	1.1	4.1
Qatar	149,977	77,568	17.7	12.0	16.6
Saudi Arabia	623,109	22,607	4.2	0.1	4.1
Syria	107,718	5,126	4.5	6.0	3.2
Turkey	968,604	13,577	0.7	-4.8	8.9
United Arab Emirates	247,534	47,439	5.3	-3.2	3.2
West Bank and Gaza Strip	7,400	1,827	7.1	7.4	9.3
Yemen	55,393	2,606	3.6	3.9	8.0
Total	3,721,238	XX	XX	XX	XX
World total	69,489,850	XX	5.1	5.2	3.0

XX Not applicable.

[1]Source: International Monetary Fund, World Economic Outlook Database, September 2011.

[2]Gross domestic product listed may differ from that reported in individual country chapters owing to differences in the source or date of reporting.

TABLE 3
SELECTED MIDDLE EAST EXPLORATION ACTIVITY IN 2010

Country	Type[1]	Prospect	Commodity[2]	Company	Resource notes[3, 4]	Exploration notes
Saudi Arabia	E	Jabal Shayban	Zn, Cu, Ag, Au	Citidel Resource Group Ltd.	70,000 t Zn, 35,000 t Cu, 4.6 Moz Ag, 392,000 oz Au (T)	Ongoing drilling.
Do.	F	Wadi Sawawin	Fe	London Mining p.l.c.	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)	Ongoing drilling.
Do.	E	Akarca	Au	Centerra Gold Inc.	Data not released	Ongoing exploration.
Do.	E	Altintepe	Au	Stratex International plc.	321,000 oz Au (D)	Ongoing drilling.
Do.	E	Ardala	Au, Cu	European Goldfields Ltd.	289,000 oz Au, 50,000 t Cu, 1,400 t Mo (IF)	Ongoing exploration.
Do.	E	Artvin	Au, Ag, Cu	KEFI Minerals plc.	Data not released	Ongoing drilling.
Do.	E	Bakir Tepe	Cu, Au, Ag	do.	Data not released	Ongoing drilling.
Do.	E	Berta	Cu, Au	Nuinsco Resources Ltd.	Data not released	Ongoing exploration.
Do.	E	Bursa	Cu, Mo, Au	Empire Mining Corp.	Data not released	Ongoing exploration.
Do.	F	Caldag	Ni, Co	European Nickel p.l.c.	375,000 t Ni, 23,000 t Co (P)	Placed on care and maintanence (permit pending).
Do.	P	Cayeli	Cu, Zn, Au, Ag	Inmet Mining Corp.	275,000 t Cu, 368,000 t Zn, 122,000 oz Au, 10 Moz Ag (R)	Limited exploration drilling.
Do.	D	Copler	Au, Ag, Cu	Alacer Gold Corp. and Anatolia Minerals Development Ltd.	4.6 Moz Au, 13 Moz Ag, 103,000 t Cu (R)	Commenced production at end of year.
Do.	D	Cukuralan	Au, Ag	Koza Altin Işletmeleri A.S.	743,000 oz Au, 351,000 oz Ag (R)	Commenced production at end of year.
Do.	E	Diyadin	Au, Ag	do.	1.8 Moz Au, 8 Moz Ag (D)	Ongoing prefeasibility study.
Do.	D	Efemçukuru	Au	Eldorado Gold Corp.	1.5 Moz Au (R)	Ongoing drilling during construction.
Do.	E	Elmaalan	Zn, Cu	Nuinsco Resources Ltd.	Data not released	Ongoing exploration.
Do.	E	Halilaga	Cu, Au	Teck Resources Ltd.	Data not released	Ongoing drilling.
Do.	E	Inlice	Au	Stratex International p.l.c.	164,000 oz Au (D)	Ongoing prefeasibility study.
Do.	D	Kaymaz	Au, Ag	Koza Altin Işletmeleri A.S.	511,000 oz Au, 510,000 oz Ag (R)	Ongoing drilling during construction.
Do.	E	Kestanelik	Au	Chesser Resources Ltd.	Data not released	Ongoing exploration.
Do.	E	Kirazli	Au, Ag	Alamos Gold Inc.	Resources included in Agi Dagi	Project incorporated into Agi Dagi project.
Do.	P	Kisladag	Au	Eldorado Gold Corp.	10.4 Moz Au (D)	Ongoing drilling.
Do.	P	Mastra	Au, Ag	Koza Altin Işletmeleri A.S.	390,000 oz Au, 239,000 oz Ag (R)	Commenced production at end of year.
Do.	E	Oksut	Au	Stratex International plc.	163,000 oz Au (ID)	Ongoing drilling.
Do.	P	Ovacik	Au, Ag	Koza Altin Işletmeleri A.S.	1.2 Moz Au, 800 oz Ag (R)	Open pit mining ceased, developing underground.
Do.	F	Sindirgi/Kiziltepe	Au, Ag	Ariana Resources p.l.c.	167,000 oz Au, 2.5 Moz Ag (D)	Ongoing drilling.
Do.	E	Tavsan	Au, Ag	do.	87,000 oz Au, 230,000 oz Ag (ID)	Ongoing exploration.
Do.	E	Yenipazar	Au, Ag, Cu, Pb, Zn	Aldridge Minerals Inc.	877,000 oz Au, 26 Moz Ag, 80,000 t Cu, 280,000 t Pb, 268,000 t Zn (ID)	Completed prefeasability study.
Do.	E	Tac (Yusufeli)	Au, Cu, Ag, Pb, Zn	Mediterranean Resources Ltd.	1.6 Moz Au, 59,000 t Cu, 2.5 Moz Ag, 124,000 t Pb, 297,000 t Zn (D)	Ongoing drilling.
Yemen	E	Al Hariqah	Au	Cantex Mine Development Corp.	1.9 Moz Au (ID)	Ongoing drilling.

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

[2]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; Zn—zinc.

[3]Abbreviations used for units of measure include the following: Moz—million troy ounces; Mt—million metric tons; oz—troy ounces; t—metric tons.

[4]Based on 2010 data reported from various sources; D—measured + indicated; ID—indicated; IF—inferred; P—proven; R—proven + probable; T—total resource.

Resource data not verified by U.S. Geological Survey.

TABLE 4

MIDDLE EAST: PRODUCTION OF SELECTED MINERAL COMMODITIES IN 2010[1]

(Thousand metric tons unless otherwise specified)

	Metals			Industrial minerals					Mineral fuels and related materials	
									Petroleum	
Country	Aluminum, metal, primary	Chromite, mine output, gross weight	Steel, crude	Ammonia, N content	Cement, hydraulic	Gypsum	Phosphate rock, gross weight	Potash, K_2O equivalent	Crude, including condensate (thousand 42-gallon barrels)	Refinery products (thousand 42-gallon barrels)
Bahrain	851	--	--	581	700	--	--	--	66,376	99,362
Iran[e]	270	250	12,000	2,500	55,000	13,000	330	--	1,470,000	627,000
Iraq	--	--	--	126	6,500	583	--	--	897,900	187,320
Israel	--	--	430	--	5,139	100	3,135	2,080	12	91,600 [e]
Jordan	--	--	150 [e]	--	3,929	292	6,529	1,185	9	25,423
Kuwait[e]	--	--	500	485	2,000	--	--	--	950,000	340,000
Lebanon	--	--	--	--	5,227	105 [e]	--	--	--	--
Oman	367	802	84 [e]	1,119	4,500	395	--	--	315,575	33,859
Qatar	190	--	1,975	1,883	3,780	135	--	--	572,685	122,707
Saudi Arabia[p]	--	--	5,000	2,500 [e]	42,300	2,100	--	--	2,887,000	563,980
Syria	--	--	63 [e]	169 [e]	6,000 [e]	540	3,608	--	140,525	93,199
Turkey[e]	65	1,904 [2]	29,030 [2]	--	62,737 [2]	4,000	--	--	17,800	143,000
United Arab Emirates	1,400	(3)	1,180	392	18,000	40 [e]	--	--	1,040,000	154,200
Yemen	--	--	--	--	3,500 [e]	100 [e]	--	--	96,360	35,843
Total	3,140	2,960	50,400	9,760	219,000	21,400	13,600	3,270	8,450,000	2,520,000
Share of world total	8%	12%	3%	7%	7%	16%	7%	10%	31%	9%
United States	1,730	--	80,500	8,290 [4]	67,200	8,840	25,800	930	2,000,000	4,570,000
World total	40,900	24,000	1,440,000	134,000	3,360,000	132,000	182,000	34,100	27,400,000	28,400,000

[e]Estimated; estimated data, U.S. data, and world totals are rounded to no more than three significant digits. [p]Preliminary. -- Zero.

[1]Totals may not add due to independent rounding. Percentages are calculated on unrounded data. Table includes data available as of February 3, 2012.

[2]Reported figure.

[3]Negligible or no production.

[4]Synthetic anhydrous ammonia; excludes coke oven byproduct ammonia.

TABLE 5

MIDDLE EAST: HISTORIC AND PROJECTED BAUXITE MINE PRODUCTION, 2000-2017[1]

(Metric tons)

Country	2000	2005	2010	2013[e]	2015[e]	2017[e]
Iran	485,130	437,595	600,000	710,000	710,000	710,000
Saudi Arabia[2]	--	--	--	--	3,500,000	4,000,000
Turkey	458,537	475,349	1,500,000	1,500,000	1,500,000	1,500,000
Total	944,000	913,000	2,100,000	2,200,000	5,700,000	6,200,000

[e]Estimated. -- Negligible or no production.

[1]Estimated data and totals are rounded to no more than three significant digits; may not add to totals shown.

[2]Does not include production of low-grade bauxite for cement, which began in 2008.

TABLE 6

MIDDLE EAST: HISTORIC AND PROJECTED PRIMARY AND SECONDARY ALUMINUM PRODUCTION, 2000-2017[1]

(Metric tons)

Country	2000	2005	2010	2013[e]	2015[e]	2017[e]
Bahrain[2]	509,308	750,710	850,700	870,000	870,000	870,000
Iran	140,000	220,000	270,000	600,000	823,000	823,000
Oman	--	--	367,000	360,000	360,000	360,000
Qatar	--	--	190,000	585,000	585,000	585,000
Saudi Arabia	--	--	--	200,000	740,000	740,000
Turkey	61,000	60,000	65,000	65,000	80,000	80,000
United Arab Emirates	470,000	722,000	1,400,000	2,400,000	2,400,000	2,400,000
Total	1,180,000	1,750,000	3,140,000	5,080,000	5,860,000	5,860,000

[e]Estimated. -- Negligible or no production.

[1]Estimated data and totals are rounded to no more than three significant digits; may not add to totals shown.

[2]May include some secondary aluminum produced from used beverage cans.

TABLE 7

MIDDLE EAST: HISTORIC AND PROJECTED COPPER MINE PRODUCTION, 2000-2017[1]

(Metal content of concentrate in thousand metric tons)

Country	2000	2005	2010	2013[e]	2015[e]	2017[e]
Iran	125	190	255	350	350	400
Oman	--	--	2	1	1	1
Saudi Arabia	1	1	2	16	65	65
Turkey[2]	65	46	82	85	85	85
Total	190	240	340	450	500	550

[e]Estimated. -- Negligible or no production.

[1]Estimated data and totals are rounded to no more than three significant digits; may not add to totals shown.

[2]Concentrate production estimated to be about 85% of mined ore (gross weight).

TABLE 8

MIDDLE EAST: HISTORIC AND PROJECTED REFINED COPPER METAL PRODUCTION, 2000-2017[1, 2]

(Metric tons)

Country	2000	2005	2010	2013[e]	2015[e]	2017[e]
Iran	155,856	178,000	210,000	440,000	440,000	700,000
Oman	24,281	24,543	15,000	20,000	20,000	20,000
Turkey	64,100	95,000	47,000	200,000	200,000	200,000
Total	244,000	298,000	274,000	660,000	660,000	920,000

[e]Estimated.

[1]Estimated data and totals are rounded to no more than three significant digits; may not add to totals shown.

[2]May include secondary production.

TABLE 9

MIDDLE EAST: HISTORIC AND PROJECTED GOLD MINE PRODUCTION, 2000-2017[1]

(Metal content of ore in kilograms)

Country	2000	2005	2010	2013[e]	2015[e]	2017[e]
Iran	216	1,000	341	500	1,000	3,000
Oman	551	384	82	100	100	100
Saudi Arabia	3,800	7,456	4,476	8,000	8,000	7,000
Turkey	500	4,170	17,000	30,000	40,000	40,000
Total	5,000	13,000	22,000	39,000	49,000	50,000

[e]Estimated.

[1]Estimated data and totals are rounded to no more than three significant digits; may not add to totals shown.

TABLE 10

MIDDLE EAST: HISTORIC AND PROJECTED BENEFICIATED IRON ORE PRODUCTION, 2000-2017[1]

(Metal content of ore in thousand metric tons)

Country	2000	2005	2010	2013[e]	2015[e]	2017[e]
Iran	5,800	9,162	16,500	30,000	30,000	35,000
Qatar	800	800	2,200	2,400	2,400	2,400
Saudi Arabia	--	--	--	--	500	4,700
Turkey	2,200	2,450	2,700	2,700	2,700	2,700
United Arab Emirates	--	--	1,180	3,400	3,400	3,400
Total	8,800	12,400	22,600	38,500	39,000	48,200

[e]Estimated. -- Negligible or no production.

[1]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, 2000-2017[1]

(Thousand metric tons)

Country	2000	2005	2010	2013[e]	2015[e]	2017[e]
Iran	6,600	9,400	12,000	18,000	30,000	35,000
Iraq	50	--	--	1,500	2,000	2,000
Israel	280	480	480	480	480	480
Jordan	30	150	150	390	390	390
Kuwait	--	450	500	500	500	500
Oman	--	84	84	1,200	1,200	1,200
Qatar	744	1,057	1,975	2,000	2,000	2,000
Saudi Arabia	2,973	4,185	5,000	6,500	6,500	6,500
Syria	70	70	63	590	590	590
Turkey	14,325	20,960	29,030	35,000	43,000	43,000
United Arab Emirates	90	90	1,180	3,400	6,500	6,500
Total	25,000	37,000	50,000	70,000	93,000	98,000

[e]Estimated. -- Negligible or no production.

[1]Estimated data and totals are rounded to no more than three significant digits; may not add to totals shown.

TABLE 12

MIDDLE EAST: HISTORIC AND PROJECTED MOLYBDENUM MINE PRODUCTION, 2000-2017[1]

(Metal content of concentrate in thousand metric tons)

Country	2000	2005	2010	2013[e]	2015[e]	2017[e]
Iran	1,900	2,476	3,900	4,000	5,000	5,000

[e]Estimated.

[1]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 NICKEL MINE PRODUCTION, 2000-2017

(Metal content of ore in metric tons)

Country	2000	2005	2010	2013[e]	2015[e]	2017[e]
Turkey	--	1,000	400	20,000	20,000	20,000

[e]Estimated; estimated data are rounded to no more than three significant digits. -- Negligible or no production.

TABLE 14

MIDDLE EAST: HISTORIC AND PROJECTED ZINC MINE PRODUCTION, 2000-2017[1]

(Metal content of ore in metric tons)

Country	2000	2005	2010	2013[e]	2015[e]	2017[e]
Iran	90,000	167,000	180,000	180,000	180,000	180,000
Saudi Arabia	3,000	--	3,000	3,000	3,000	3,000
Turkey	39,000	36,000	50,000	50,000	50,000	50,000
Total	132,000	203,000	233,000	233,000	233,000	233,000

[e]Estimated. -- Negligible or no production.

[1]Estimated data and totals are rounded to no more than three significant digits; may not add to totals shown.

TABLE 15

MIDDLE EAST: HISTORIC AND PROJECTED ZINC METAL PRODUCTION, 2000-2017[1]

(Metric tons)

Country	2000	2005	2010	2013[e]	2015[e]	2017[e]
Iran	51,475	120,000	230,000	230,000	230,000	230,000
Turkey	--	--	--	--	--	--
Total	51,500	120,000	230,000	230,000	230,000	230,000

[e]Estimated. -- Negligible or no production.

[1]Estimated data and totals are rounded to no more than three significant digits; may not add to totals shown.

TABLE 16

MIDDLE EAST: HISTORIC AND PROJECTED SALABLE COAL PRODUCTION, 2000-2017[1, 2]

(Thousand metric tons)

Country	2000	2005	2010	2013[e]	2015[e]	2017[e]
Iran	2,002	1,898	2,300	4,500	4,500	4,500
Turkey	64,645	58,676	78,104	80,000	90,000	90,000
Total	66,650	60,600	80,400	84,500	94,500	94,500

[e]Estimated.

[1]Estimated data and totals are rounded to no more than three significant digits; may not add to totals shown.

[2]Includes anthracite, bituminous, and lignite.

TABLE 17

MIDDLE EAST: HISTORIC AND PROJECTED URANIUM MINE PRODUCTION, 2000-2017

(Metal content of ore in metric tons)

Country	2000	2005	2010	2013[e]	2015[e]	2017[e]
Iran[1]	--	NA	50	50	50	50

[e]Estimated; estimated data are rounded to no more than three significant digits. NA Not available. -- Negligible or no production.

[1]Uranium may have been produced in 2005 and 2008, but information is inadequte to estimate output.