



# 2012 Minerals Yearbook

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## YEMEN

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# THE MINERAL INDUSTRY OF YEMEN

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In 2012, Yemen was going through a period of political transition following a year of civil unrest and popular protests, which led to the departure of the incumbent President who had been ruling the country for more than three decades. A presidential election took place on February 21, 2012, in accordance with the Political Transition Initiative. The former Vice President won the election and was sworn in as the newly elected President on February 25 (U.S. Department of State, 2013).

Yemen's mineral commodity exports included mainly crude oil and liquefied natural gas (LNG) in addition to modest quantities of dimension stone, gypsum, and salt. At the end of 2012, the country's proved reserves of crude oil and natural gas were estimated to be 3.0 billion barrels and 479 billion cubic meters (16,900 billion cubic feet), respectively. According to the Yemen Geological Survey and Mineral Resources Board (GSMRB), the country has ample mineral resources that could be produced but were not yet being developed. They include metals, such as cobalt, copper, gold, nickel, platinum-group metal (PGMs), silver, and zinc, and industrial minerals, such as black mineral sands, celestine, clays, dolomite, feldspar, fluorite, gypsum, limestone, magnesite, perlite, pure limestone, quartz, salt, sandstone, scoria, talc, tantalum, and zeolites (Yemen Geological Survey and Mineral Resources Board, 2013b, c; BP p.l.c., 2013, p. 6, 20).

## Minerals in the National Economy

Yemen's gross domestic product (GDP) increased only by 0.1% in real terms in 2012 compared with a decrease of 10.5% (revised) in 2011. The slow growth in the economy was attributed to political unrest and the lack of security in many parts of the country throughout 2011 and 2012 (International Monetary Fund, 2013, p. 10).

Before the political crisis in 2011, the mineral industry in Yemen, which consisted mainly of crude oil and LNG production and export, made up 80% of the value of Yemeni exports, provided 50% of Government revenue, and contributed 14% of the country's GDP (Central Bank of Yemen, 2012, p. 31; International Monetary Fund, 2013, p. 10).

Exports by the United States to Yemen were valued at \$469 million in 2012 compared with about \$390 million in 2011. The value of U.S. imports from Yemen, however, decreased to \$87 million in 2012 from a revised \$562 million in 2011. The decrease was attributable to a sharp decrease in U.S. imports of crude oil, fuel oil, and LNG (U.S. Census Bureau, 2012).

## Government Policies and Programs

The GSMRB was the state agency responsible for mineral production under the Ministry of Oil and Minerals. It had been actively promoting the country's substantial mineral resources and facilitating foreign investment in the country's mineral

sector by adopting mining laws that adhere to international industry standards. The GSMRB also provided chemical analyses, drilling, geophysical, and geotechnical services, geologic maps, geo-environmental studies, information on mineral reserves and mineral occurrences in the country, and remote sensing studies (Yemen Geological Survey and Mineral Resources Board, 2013d).

## Production

Petroleum production decreased by 21% to 180,000 barrels per day (bbl/d) in 2012 from 228,000 bbl/d in 2011, which, in turn, was a decrease of about 22% from the average production of 291,000 bbl/d in 2010. Similarly, natural gas production (which was mainly exported as LNG) also decreased by 21% to 7,600 million cubic meters in 2012 from 9,600 million cubic meters in 2011. The decrease in crude oil production continued to follow the general downward trend in production since 2000 and was attributable to disruption of production following incidents of sabotage by rebels. On August 21, an attack on the pipeline that carried natural gas from Block 18 to the Balhaf LNG export terminal was confirmed by Yemen LNG Co. (table 1; Yemen LNG Co., 2012; BP p.l.c., 2013, p. 8, 22).

## Structure of the Mineral Industry

Article 8 of Yemen's Constitution gives the state ownership of the country's mineral and energy resources. Metallic and industrial mineral exploration and production operations are governed by law No. 22 of 2010 Concerning Mining and Quarries, which became known as the Mines and Quarries law. The Mines and Quarries law, which was approved by the Government in 2010 and by the Parliament on December 16, 2011, regulates prospecting, exploration, and mining operations as well as artisanal mining. A royalty of 8% is applied on the gross value of produced precious and semiprecious stones; 5%, on the value of nonmetallic minerals produced; and 3%, on the value of metallic and other minerals produced. The law also imposes a 35% income tax on remitted dividends and grants an exemption on import duties during mine construction. Under the new law, a prospecting permit is granted for a period of 1 year for an area of up to 10,000 square kilometers (km<sup>2</sup>), and exploration permits are granted for an area of up to 1,000 km<sup>2</sup> for a period of 4 years and can be renewed twice for two 4-year periods for metallic and precious metals. Mining permits are issued for a 25-year period and can be renewed indefinitely in 10-year increments. Quarrying permits are issued for 10-year periods for areas between 0.5 km<sup>2</sup> and 2 km<sup>2</sup> and can be extended indefinitely in 10-year increments. Artisanal mining permits are issued for a period of 2 years for an area of 1 km<sup>2</sup> and can be renewed indefinitely for periods of 1 year at a time (Arab Industrial Development and Mining Organization, 2012, p. 242).

According to the GSMRB, the number of mining companies that had mining permits in Yemen decreased to 12 companies in 2012 from 16 companies in 2011. These companies were 3S Minerals Pvt. Ltd. of India and the United Kingdom, Ansan Wikfs (Hadramaut) Ltd. of the United Kingdom, Arab Mining Co. of Jordan, Cantex Mine Development Corp. of Canada, C.C. Mining S.A. of Panama, Jabal Salab Co. (Yemen) Ltd. of the Cayman Islands, Naine Minerals and Resources Pte. Ltd. of Singapore, Stone Resources (Yemen) Ltd. of China, Thani Dubai Mining Ltd. of the United Arab Emirates, Vale International S.A. of Brazil, Volrock Mining Ltd. of Saudi Arabia and the United Kingdom, and Yemen Iron Steel Ltd. Work by these companies was completely halted in 2011 and during most of 2012 because of the political crisis and lack of adequate security. Most of the companies were planning to resume their exploration activity once adequate security is in place (Yemen Geological Survey and Mineral Resources Board, 2013d).

## Commodity Review

### Metals

**Cobalt, Copper, Nickel, and Platinum-Group Metals.**—The GSMRB listed seven areas that are highly prospective for cobalt, copper, nickel, and platinum-group minerals (PGM) mineralization and were open for exploration and development. Three companies held six exploration permits on six properties. The companies included Ansan, Cantex, and Stone Resources. Ansan was prospecting for copper and nickel in northeastern Al Bayda city. The permit area, which contains amphibolite, gabbro, gabbro-norite, and pyroxenite rocks, has high potential for the occurrence of copper-nickel mineralization as indicated by geochemical anomalies for copper and nickel (Ansan Wikfs (Hadramaut) Ltd., 2013).

Cantex was exploring for cobalt, copper, nickel, and PGMs at three locations in northeastern Yemen. These locations included the Al Masna'a, the Suwar, and the Wadi Qutabah properties. The Al Masna'a project is located in the Saadah region about 205 kilometers (km) northwest of Sana'a, and 25 km south of Yemen's border with Saudi Arabia. The company planned to resume work at the Al Masna'a area as soon as the security situation in the permit area improves but decided not to renew its exploration license at the Suwar and the Wadi Qutabah properties as of June 2013 (Cantex Mine Development Corp., 2013; Yemen Geological Survey and Mineral Resources Board, 2013c).

**Gold.**—Exploration studies conducted by the GSMRB indicated the presence of 50 deposits prospective for gold and silver throughout Yemen. The GSMRB listed 17 locations in Yemen that were open for foreign investment. In 2012, five companies held gold exploration permits in seven locations. In December 2011, Cantex signed an option agreement with WCP Resources Ltd. (WCP) of Australia, which would enable WCP to earn up to 70% interest in the Al Hariqah gold project by funding advanced exploration and mine development to commercial production. The Al Hariqah gold deposit is located 130 km northwest of Sana'a (Cantex Mine Development Corp., 2011, 2012; Yemen Geological Survey and Mineral Resources Board, 2013c).

Ansan held a prospecting permit for the Shatbah property (Abyan Province), which was known from earlier exploration studies carried out by geologists from the Soviet Union and their Yemeni counterparts for its potential for gold, base-metal, and rare-earth element mineralization. Studies indicated the presence of gold in quartz veins and alteration zones that range from 0.1 to 35 grams per metric tons (g/t) gold, 18 to 100 g/t silver, 0.3 to 1.5% lead, 0.1% to 1% Zn, and up to 0.3% copper. The company was conducting followup exploration work that included mapping and sampling of quartz veins and alteration zones [Ansan Wikfs (Hadramaut) Ltd., 2013].

**Iron Oxide Pigments and Titanium.**—Nine sites had been identified by the GSMRB as potential locations for iron oxide pigments and titanium mining in Yemen. The GSMRB awarded a permit to Yemen Iron Steel Co. to explore for iron oxide in the Thanyiah property, which is located in Ma'rib Province, and Shabbir Metals Co. was exploring in the Sabah site (Al Bayda Province) and reported 800,000 metric tons (t) of ore that contains 74% iron oxide pigments. The National Cement Co. was awarded a permit to explore for iron oxide pigments at the Um Halwal (Majil) property in Abyan Province. Estimates for resources at this site were 46,000 t grading 68% iron oxide (Yemen Geological Survey and Mineral Resources Board, 2013c).

**Lead and Zinc.**—Eleven areas were available for lead and zinc exploration and production in Yemen. Two companies held mining permits—Jabal Salab and Naine Minerals and Resources. The Jabali zinc and silver mine site remained idle during 2011 and 2012 pending the arrangement of about \$100 million in replacement finance. The project, which was owned by Jabal Salab, was the first large-scale metal mine planned in Yemen. The Jabali Mine is located near Nehim about 110 km northeast of Sana'a. Jabal Salab was jointly owned by ZincOx Resources p.l.c. (52% interest) and Ansan (48%). The deposit was estimated to contain 12.6 million metric tons (Mt) of oxide resources grading 18.9% zinc, 1.2% lead, and 68 g/t silver, and reserves were estimated to be 8.7 Mt grading 9.2% zinc with a cutoff grade of 4.4%. In March 2013, ZincOx sold its interest in Jabal Salab to its joint-venture partner Ansan, which made Ansan the sole owner of the project [Ansan Wikfs (Hadramaut) Ltd., 2013; Yemen Geological Survey and Mineral Resources Board, 2013c; ZincOx Resources p.l.c., 2013].

**Niobium and Tantalum.**—Rare-earth element mineralization, as well as tantalum and niobium mineralization, have been reported by the GSMRB within carbonatite and pegmatite formations in the Precambrian basement rocks in the following areas: the Lawdar (Al Bayda Province), the Nisab and the Marbone (Shabwah Province), the Sabab and the Burha (Abyan Province) and in Tertiary granitic intrusions in the Malhan (Al Mahwit Province). The GSMRB invited investors to develop mining projects in the Kitaf area (Sa'adah Province), which contained 0.04% tantalum. The Mubeen-La'ah Valley (Hajjah Province), which had anomalies that contained 0.15% tantalum and 0.74% tungsten. At Malhan Mountain in Al Mahwit Province, concentrations of tantalum (0.013% to 0.29%) were reported. At the Sabab-Burha property (Abyan Province), anomalies of up to 0.12% tantalum and 0.01% to 0.85% niobium were measured. Resources at the Lawdar area in Abyan Province were estimated to contain 14.5% beryllium and

27,700 t grading 3.8% total rare-earth oxides (REOs). Another deposit at the Lawdar site was estimated to contain between 100,000 and 120,000 t of REOs, 10,000 t of niobium oxide, and between 100,000 and 250,000 t of barium (Arab Industrial Development and Mining Organization, 2012, p. 108; Yemen Geological Survey and Mineral Resources Board, 2013c).

Ansan held two mining permits in the Nisab and the Mujab properties, which are located in Shabwah Province in southern Yemen. Earlier geochemical analyses from differentiated pegmatite's samples indicated the presence of lithium, niobium, tantalum (0.006% to 0.04%), and tin (more than 0.05%). Ansan estimated the mineral resources to be 30,000 to 40,000 t of niobium oxide and REO each. The company measured concentrations of between 0.01% and 0.13% niobium and between 0.005% and 0.01% tantalum at the Nisab site, and between 0.02% and 0.05% tantalum and between 0.01% and 0.02% niobium at the Mujab site (Ansan Wikfs (Hadramaut) Ltd., 2013).

### **Industrial Minerals**

Yemen hosts a substantial number of industrial mineral deposits. The resource estimates include limestone, 27 billion metric tons (Gt); sandstone, 10 Gt; pure limestone, 9.7 Gt; dolomite 8.5 Gt; gypsum and pure sandstone, 4.6 Gt each; scoria, 4.3 Gt; pumice, 2.3 Gt; rock salt, 975 Mt; perlite, 850 Mt; black sands and zeolite, 500 Mt each; basalt, more than 370 Mt; clays, 280 Mt; kaolin, more than 10 Mt; magnesite, 140 Mt; feldspar, 115 Mt; and quartz, 30 Mt. Additionally, the country hosts substantial but still undetermined resources of talc and an estimated 720,000 t of fluorite (Arab Industrial Development and Mining Organization, 2012, p. 109; Yemen Geological Survey and Mineral Resources Board, 2013b).

Production of industrial minerals for 2009 (the latest year for which reliable data were available) included 5.9 Mt of limestone, 2.5 Mt of pumice, 683,000 t of clays, 498,000 t of scoria, 200,000 t of gypsum, and 79,000 t of rock salt. The number of employees in the construction sector and in industrial quarries and mines in 2009 exceeded 12,000 employees.

**Cement.**—Cement production from the state-owned plants decreased to 951,000 t in 2011 (the latest year for which reliable data were available) compared with 1.86 Mt produced in 2010 and 2.1 Mt in 2009. The decrease was attributed to halts in production at three of the country's five cement plants because of protests and political unrest. Production at Amran Cement Factory and National Cement Co. continued without interruption (Global Cement, 2012; Economic Bulletin, The, 2013, p. 10).

**Stone, Dimension.**—Yemen holds abundant resources of dimension stone and other construction materials. The GMSRB estimated the dimension stone resources throughout the country to be 14.3 Gt for limestone; 7.3 Gt for granite and gabbro; 926 million cubic meters for volcanic tuff and ignimbrite; 370 Mt for basalt; 484 Mt for marble; and 6 Mt for travertine. The GMSRB also reported that 12.5 Mt of limestone was produced in 2009 (the latest year for which reliable data were available); volcanic tuff, 2.7 Mt; basalt, 899,000 t; marble, 690,000 t; granite, 220,000 t; and sandstone, 123,000 t (Arab Industrial

Development and Mining Organization, 2012, p. 110; Yemen Geological Survey and Mineral Resources Board, 2013a).

### **Mineral Fuels**

**Petroleum.**—In 2012, 11 oil companies produced crude oil from 12 blocks—Calvalley Petroleum Ltd. of Cyprus (Block 9); Canadian Nexen Yemen Ltd. (a subsidiary of Nexen Inc. of Canada) (Block 51); DNO Yemen (a subsidiary of DNO International ASA of Norway) (Blocks 32 and 43); Dove Energy Ltd. of the United Kingdom (Block 53); Jannah Hunt Oil Co. (a subsidiary of Hunt Oil Co. of the United States) (Block 5); Korea National Oil Co. (KNOC) (Block 4); Masila Petroleum Exploration and Production Co. (PetroMasila) (Block 14); Occidental Petroleum Yemen (a subsidiary of Occidental Petroleum Corp. of the United States) (Block S1); OMV A.G. of Austria (Block S2); state-owned Safer E&P Operations Co. (Block 18); and Total E&P Yemen (a subsidiary of Total S.A. of France) (Block 10) (table 2; Petroleum Exploration and Production Authority, 2013).

In 2012, 11 international oil companies were exploring for crude oil in 26 exploration blocks, and an additional 66 blocks were open for exploration in Yemen. C.C.C. for Oil & Gas (a subsidiary of Consolidated Contractor Co. of Greece) was exploring for oil at the Al-Furt area (Block 33) and the South Al-Furt area (Block 49). Gallo Oil (Jersey) Yemen Inc. (a subsidiary of PT Bumi Resources Tbk of Indonesia) was exploring for oil at the Al-Armah area (Block 13) and the East Al-Mabar area (Block R2). Kuwait Energy Yemen (a subsidiary of Kuwait Energy Co.) had exploration licenses at the Mukallah area (Block 15), the Hood area (Block 35), the Qusa area (Block 74), and the Southeast Al-Mabar area (Block 49). Oil Search (Roy) Ltd. (a subsidiary of Oil Search Ltd. of Papua New Guinea) was exploring for oil at the Jardan (Block 3) and the Barq (Block 7) areas. Occidental Petroleum Yemen was exploring for crude oil at Markha (Block 75). OMV had an engineering and procurement and construction contract at the Al-Mabar area (Block 2) and the South Sanu area (Block 29). PT Medco Energi Internasional Tbk of Indonesia had a permit to explore for oil at the Wadi Amed area (Block 82) and the Wadi Arat area (Block 83). Reliance Industries Ltd. of India was exploring for oil at the Jeza area (Block 34) and the Marait area (Block 37). Safer E&P Operations Co. had a permit to explore in Al Sabatain (Block 20). Sinopec of China had exploration and production-sharing agreements for the Mashaf area (Block 69), the Al-Qarn (Block 71), and the Amakeen area (Block 1). Total E&P Yemen was exploring at Al-Ain (Block 72) and Ataq (Block 70) (Petroleum Exploration and Production Authority, 2013).

### **Outlook**

The Government planned to conduct a new round of bids for crude oil and natural gas exploration for twenty offshore and onshore open blocks in 2013. The approval of the Mines and Quarries law by the Government and Parliament and the gradual return to political stability and security to the country are likely to increase foreign investment to develop the country's mineral sector and create additional employment around the country.

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

(Thousand metric tons unless otherwise specified)

| Commodity <sup>2</sup>                                 | 2008                       | 2009                  | 2010                  | 2011                 | 2012                 |                    |
|--|----------------------------|-----------------------|-----------------------|----------------------|----------------------|--------------------|
| <b>INDUSTRIAL MINERALS</b>                             |                            |                       |                       |                      |                      |                    |
| Cement   | 2,111                      | 2,118                 | 1,864 <sup>r</sup>    | 951 <sup>r</sup>     | 2,000 <sup>e</sup>   |                    |
| Gypsum <sup>e</sup>                                    | 100                        | 200 <sup>r,3</sup>    | 200 <sup>r</sup>      | 100                  | 100                  |                    |
| Salt <sup>e</sup>                                      | 65                         | 79 <sup>r,3</sup>     | 75                    | 75                   | 75                   |                    |
| Sand and gravel <sup>e</sup>                           | 12,000 <sup>r</sup>        | 12,360 <sup>r,3</sup> | 12,500 <sup>r</sup>   | 6,000 <sup>r</sup>   | 6,000                |                    |
| Stone: <sup>e</sup>                                    |                            |                       |                       |                      |                      |                    |
| Basalt   | 900                        | 899 <sup>3</sup>      | 900                   | 500                  | 500                  |                    |
| Granite  | 220                        | 220 <sup>3</sup>      | 220                   | 100                  | 100                  |                    |
| Limestone  | 5,500                      | 5,900 <sup>3</sup>    | 6,000                 | 3,000                | 3,000                |                    |
| Marble   | 650 <sup>r,3</sup>         | 690 <sup>r,3</sup>    | 250                   | 250                  | 250                  |                    |
| Volcanic tuff  | 2,600                      | 2,657 <sup>3</sup>    | 2,700                 | 1,400                | 1,400                |                    |
| <b>MINERAL FUELS AND RELATED MATERIALS<sup>4</sup></b> |                            |                       |                       |                      |                      |                    |
| Natural gas:   |                            |                       |                       |                      |                      |                    |
| Gross  | million cubic meters       | 29,632                | 29,600 <sup>r,e</sup> | 29,200               | 29,600               | 29,600             |
| Marketed   | do.                        | 776                   | 800                   | 6,200                | 9,600 <sup>r</sup>   | 7,600              |
| Liquids <sup>e</sup>                                   | thousand 42-gallon barrels | 3,650 <sup>3</sup>    | 7,300 <sup>r</sup>    | 7,300 <sup>r</sup>   | 7,300 <sup>r</sup>   | 7,300              |
| Petroleum:   |                            |                       |                       |                      |                      |                    |
| Crude, including condensate                            | do.                        | 114,975               | 111,690               | 106,215 <sup>r</sup> | 83,220               | 65,700             |
| Refinery products:                                     |                            |                       |                       |                      |                      |                    |
| Liquefied petroleum gas <sup>e</sup>                   | do.                        | 438                   | 438                   | 438                  | 438                  | 475                |
| Naphtha <sup>e</sup>                                   | do.                        | 888 <sup>3</sup>      | 645                   | 645                  | 645                  | 645                |
| Gasoline   | do.                        | 5,110                 | 5,110                 | 5,110                | 4,964 <sup>r</sup>   | 5,074              |
| Kerosene <sup>e</sup>                                  | do.                        | 4,050 <sup>r</sup>    | 4,050 <sup>r</sup>    | 4,050                | 3,395 <sup>r,3</sup> | 3,686 <sup>3</sup> |
| Distillate fuel oil                                    | do.                        | 7,775                 | 7,780 <sup>r,e</sup>  | 7,373 <sup>r</sup>   | 5,913 <sup>r</sup>   | 6,351              |
| Residual fuel oil                                      | do.                        | 14,750                | 14,800 <sup>r,e</sup> | 14,272 <sup>r</sup>  | 11,753 <sup>r</sup>  | 11,060             |
| Asphalt <sup>e</sup>                                   | do.                        | 703 <sup>3</sup>      | 564 <sup>3</sup>      | 564                  | 564                  | 564                |
| Other  | do.                        | 84 <sup>r</sup>       | 213 <sup>r</sup>      | 150 <sup>r,e</sup>   | 1,900 <sup>r,e</sup> | 2,000 <sup>e</sup> |
| Total <sup>e</sup>                                     | do.                        | 33,800 <sup>r</sup>   | 33,600 <sup>r</sup>   | 32,600 <sup>r</sup>  | 29,600 <sup>r</sup>  | 29,900             |

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

<sup>1</sup>Table includes data available through February 28, 2014.

<sup>2</sup>In addition to the commodities listed, aggregate, feldspar, mica, rolled-steel bars, silica sand, talc, and zeolites may have been produced, but available information is inadequate to make reliable estimates of output.

<sup>3</sup>Reported figure.

<sup>4</sup>Sources of hydrocarbon data are PB Statistical Review of World Energy June 2013 and Organization of Arab Petroleum Exporting Countries' Annual Statistical Report 2012.

TABLE 2  
YEMEN: STRUCTURE OF THE MINERAL INDUSTRY IN 2012

(Thousand metric tons unless otherwise specified)

| Commodity    |                            | Major operating companies and major equity owners   | Location of main facilities                                      | Annual capacity <sup>e</sup> |
|--------------|----------------------------|---|--|------------------------------|
| Basalt       |                            | Local private companies   | Hadramaout, Sanna, Taiz, Dhamar                                  | 900                          |
| Cement       |                            | Amran Cement Factory [Yemen Corporation for Cement Industry and Marketing (YCC), 100%]  | Kilns and mills at Amran   | 1,500                        |
| Do.          |                            | Al Burh Cement Factory [Yemen Corporation for Cement Industry and Marketing (YCC), 100%]  | Kilns and mills at Mafraq  | 800                          |
| Do.          |                            | Bajil Cement Factory [Yemen Corporation for Cement Industry and Marketing (YCC), 100%]  | Kilns and mills at Bajil near Taiz                               | 500                          |
| Do.          |                            | National Cement Co. (Hayel Saeed Anam & Co. Ltd., 100%)   | Kilns and mills at Wadi Saim, Lahj                               | 1,600                        |
| Do.          |                            | Arabian Yement Cement Co. Ltd. (Eastern Province Cement Co., 30%; Al-Amoudi Group, 15%; Bagshan Group, 15%; Saudi Binladin Group, 10%; Baroom Investment Holding Co. Ltd., 10%; Ali Ali Hussain Miksa, 10%; Sara Development Co. Ltd., 5%; Yemeni Group for Development of Yemen, 5%) | Kilns and mills at Al-Oyoun, Hadramaout                          | 1,500                        |
| Clays        |                            | Local private companies   | Al Hudaydah, Lahj, Ebb, Hijja, Jawf, Marib, Samaa, Shabwah, Taiz | 700                          |
| Gypsum       |                            | do.   | Al Hudaydah, Hadramaout, Sanaa, Shabwah                          | 200                          |
| Limestone    |                            | do.   | Amran, Hadramaout, Sanaa, Taiz                                   | 4,000                        |
| Do.          |                            | 3S Minerals Pvt. Ltd  | Hadramaout   | 1,000                        |
| Do.          |                            | Naine Minerals and Resources Pte. Ltd.  | Hadramaout, Yathmoon   | 1,000                        |
| Marble       |                            | do.   | Hijja, Marib, Taiz   | 700                          |
| Natural gas: |                            |   |  |                              |
| Associated   | million cubic meters       | Jannah Hunt Oil Co. (Yemen General Corporation for Oil and Gas, 71%, and Hunt Oil Co., 29%)   | Jannah field (Block 5)   | 227                          |
| Liquefied    | thousand metric tons       | Yemen LNG Co. (Total E&P Yemen, 39.6%; Hunt Oil Co., 17.2%; Yemen Gas Co., 16.7%; SK Energy, 9.6%; Korea Gas Corp., 6%; Hyundai Corp., 5.9%; Yemen General Authority for Social Security and Pensions, 5%)  | Marib field (Block 18), LNG plant in Belhaf                      | 6,700                        |
| Petroleum:   |                            |   |  |                              |
| Crude        | thousand 42-gallon barrels | Occidental Petroleum Yemen (Occidental Petroleum Corp., 65%, and Yemen General Corporation for Oil and Gas, 35%)  | Damis field (Block S1)   | 4,000                        |
| Do.          | do.                        | OMV A.G., 68%, and Yemen General Corporation for Oil and Gas, 32%   | Al-Uqla field (Block S2)   | 1,560                        |
| Do.          | do.                        | Calvalley Petroleum Ltd., 59%, and Yemen General Corporation for Oil and Gas, 41%   | Malik field (Block 9)  | 2,000                        |
| Do.          | do.                        | DNO Yemen (Yemen General Corporation for Oil and Gas, 52%, and DNO International ASA, 48%)  | Hwarim field (Block 32)  | 3,300                        |
| Do.          | do.                        | DNO Yemen (DNO International ASA, 62%, and Yemen General Corporation for Oil and Gas, 38%)  | South Hwarim field (Block 43)                                    | 2,600                        |
| Do.          | do.                        | Yemen General Corporation for Oil and Gas, 51%, and Dove Energy Ltd., 49%   | East Saar field (Block 53)                                       | 4,000                        |
| Do.          | do.                        | Jannah Hunt Oil Co. (Yemen General Corporation for Oil and Gas, 71%, and Hunt Oil Co., 29%)   | Jannah field (Block 5)   | 15,700                       |
| Do.          | do.                        | Korea National Oil Co. (KNOC), 82%, and Yemen General Corporation for Oil and Gas, 18%  | West Ayad field (Block 4)  | 123                          |
| Do.          | do.                        | Total E&P Yemen (Yemen General Corporation for Oil and Gas, 59%, and Total S.A., 41%)   | East Shabwah field (Block 10)                                    | 13,700                       |
| Do.          | do.                        | Safer E&P Operations Co. (Government, 100%)   | Marib field (Block 18)   | 22,000                       |

See footnotes at end of table.

TABLE 2—Continued  
YEMEN: STRUCTURE OF THE MINERAL INDUSTRY IN 2012

(Thousand metric tons unless otherwise specified)

| Commodity            |                               | Major operating companies and major equity owners  | Location of main facilities                     | Annual capacity <sup>e</sup> |
|----------------------|-------------------------------|--|---|------------------------------|
| Petroleum—Continued: |                               |  |   |                              |
| Crude—Continued      | thousand<br>42-gallon barrels | Masila Petroleum Exploration and Production Co.<br>(PetroMasila)                                     | Masila field (Block 14)                         | 42,000                       |
| Do.                  | do.                           | Canadian Nexen Yemen Ltd. (Nexen Inc., 63%, and Yemen<br>General Corporation for Oil and Gas, 37%)   | East Al-Hajr oilfield<br>(Block 51)             | 5,500                        |
| Refined              | 42-gallon<br>barrels per day  | Aden Refinery Co. (Government, 100%)   | Refinery at Aden                                | 120,000                      |
| Do.                  | do.                           | Yemen Oil Refining Co. (Yemen Hunt Oil Co. and<br>Exxon Yemen, Inc., 75.5%, and Yukong Group, 24.5%) | Topping plant at Marib                          | 20,000                       |
| Pumice               |                               | Local private companies  | Dhamar  | 2,500                        |
| Salt:                |                               |  |   |                              |
| Crude:               |                               |  |   |                              |
| Marine               |                               | Local private companies  | Eleven saltworks near Aden                      | 150                          |
| Rock                 |                               | do.  | Five salt mines near Salif                      | 140                          |
| Refined              |                               | Salt Refining and Packing Factory (Government)   | Salif   | 50                           |
| Do.                  |                               | Aden Salt Factory (Government)   | Aden  | 150                          |
| Scoria               |                               | Local private companies  | Dhamar, Maarib, Shabwah                         | 500                          |
| Steel, rolling mills |                               | Arab Iron and Steel Corp.  | do.   | 100                          |
| Do.                  |                               | Mukalla Iron and Steel Co.   | Rayan   | 500                          |
| Do.                  |                               | Yemen Steel Manufacturing Company Ltd. (Al-Rhabi<br>Trading Group, 100%)                             | Al Hodaydah                                     | 500                          |
| Stone                |                               | About 1,900 local private companies  | Dhamar, Mayana, Sana'a,<br>Taiz, and Wadi Marek | 16,000                       |

<sup>e</sup>Estimated; estimated data are rounded to no more than three significant digits. Do., do. Ditto.