

2017–2018 Minerals Yearbook

THAILAND

THE MINERAL INDUSTRY OF THAILAND

By Ji Won Moon

Note: In this chapter, information for 2017 is followed by information for 2018.

In 2017, Thailand was one of the world's leading producers of feldspar (ranking fifth in world production with 5.6% of the world total), gypsum (fifth-ranked producer with 6.0% of the world total), and rare earths (sixth-ranked producer with about 1% of the world total). Thailand's mining industries produced such metallic minerals as manganese, tin, and tungsten. The mining production of gold and silver were suspended in 2017 owing to negative environmental and health effects. In addition, Thailand produced a variety of industrial minerals, such as calcite, cement, clay, fluorspar, perlite, phosphate rock, quartz, salt, sand and gravel (construction and industrial), and stone (crushed and dimension) (table 1; Chandran, 2018; Crangle, 2019; Gambogi, 2019; Tanner, 2019).

Minerals in the National Economy

In 2017, the growth rate of Thailand's real gross domestic product (GDP) was 4.1%, which was supported by increased exports and growth of the global economy. The growth rate of the mining and quarrying sector decreased by 6%, however, owing to the suspension of gold and silver mine operations in 2017. The nominal GDP in 2017 was \$456 billion¹ (BHT 15.5 trillion). The net inflow of foreign direct investment (FDI) to Thailand increased to \$8.2 billion in 2017 from \$2.8 billion in 2016. The mining and quarrying industry received 1.2% of the country's net inflow of FDI in 2017. Japan accounted for 35% of the total FDI followed by Singapore, 15%; China (including Hong Kong), 9.3%; and the United States and the Netherlands, 6.6% each. Approximately 64,500 people, equivalent to about 0.17% of the total labor force, were employed in the mining and quarrying sector in 2017, which was a decrease of 3% compared with that of 2016 (Bank of Thailand, 2019a, e, f; 2020a, b).

Government Policies and Programs

Thailand made major changes in its mining legislation with the enactment of the Minerals Act, B.E. 2560 (2017) (Minerals Act) on August 29. The Minerals Act consolidated the Minerals Act, B.E. 2510 (1967), which was last amended in 2002, and the Mineral Royalty Rates Act, B.E. 2509 (1966), which was last amended in 1979, into one law. The Minerals Act is intended to achieve optimal economic, social, and environmental benefits from mineral management through such measures as the suspension of gold mining and the restrictions on agricultural land use. The Minerals Act decentralized the authority to issue exploration licenses depending on the type, period, and

specified area, and it significantly increased fees for exploration licenses, which vary depending on the type of license (Prior and Summacarava, 2017; Poonsombudlert, Wechsuwanarux, and Gulthawatvichai, 2019).

Production

In 2017, the most significant changes in metal production were that production of tin (mined, Sb content) was nearly six times that of 2016; that of tungsten (mined, W content) nearly doubled; and that of raw steel increased by 17%. Production of zinc (mined, Zn content) decreased by 96%; that of zinc smelter and alloys, by 59% each; rare earths (mined, oxide equivalent), by 19%; and manganese (mined, Mn content), by 11%. No mine production of antimony, gold, or silver was reported (table 1).

In the industrial mineral and mineral fuel sectors, production of quartz was more than three times that of 2016, and production of sand and gravel (industrial) increased by 59%; marble (dimension), by 38%; feldspar, by 19%; and ball clay, by 15%. The production of fluorspar (metallurgical grade) decreased by 73% followed by perlite, 63%; nonbeneficiated kaolin and barite, 52% each; pyrophyllite, 44%; fluorspar (acid grade), 32%; travertine, 24%; crushed marble (including fragments), 22%; shale for cement and crude petroleum, 14% each; and gypsum and kerosene, 11% each (table 1).

Structure of the Mineral Industry

Most of the nonfuel mineral mining and processing companies in Thailand were privately owned and operated. The Government-owned Electricity Generating Authority of Thailand (EGAT) operated domestic coal mines. Since depletion of their domestic coal reserves, privately owned coal companies Banpu Public Co. Ltd. and Lanna Resources Public Co. Ltd. had imported coal from mines in Indonesia that were owned by their subsidiaries or joint ventures (Banpu Public Co. Ltd., 2020; Lanna Resources Public Co. Ltd., 2020). PTT Exploration and Production Public Co. Ltd. (PTTEP), which was a subsidiary of Government-owned Petroleum Authority of Thailand (PTT), its joint ventures, and some foreign and Thailand-based international oil companies owned most of the country's petroleum and natural gas exploration projects and extraction businesses. Table 2 is a list of major mineral industry facilities in Thailand.

Mineral Trade

The value of Thailand's total exports increased by 9.9% to \$237 billion in 2017 from \$215 billion in 2016 owing to the significant increase in merchandise sales and tourism and the growth of the agricultural sector, which recovered from a severe drought in 2015–16. In 2017, exports of steel and other metals accounted for 4.4% of Thailand's total exports and

¹Where necessary, values have been converted from Thai bahts (THB) to U.S. dollars (US\$) at the annual average exchange rate of BHT32.31=US\$1.00 for 2018 and BHT33.94=US\$1.00 for 2017.

were valued at \$10.5 billion; petroleum products, 3.2% and \$7.5 billion, respectively; and mining products, including crude petroleum and minerals, 0.5% and \$1.1 billion, respectively. The export values of these products in 2017 increased by 14.3%, 32.5%, and 22.7%, respectively, compared with those of 2016. Thailand's main export partners in 2017 were China (including Hong Kong), which received 17.7% of Thailand's total exports, by value; the United States, 11.2%; and Japan, 9.3% (Ariyaprichya and others, 2018, p. 3; Bank of Thailand, 2019b, d).

In 2017, the value of total imports increased by 14% to \$222 billion from \$194 billion in 2016. Fuels, including coal, coke, crude petroleum, natural gas, and petroleum products, accounted for 13.1% of Thailand's total imports. The total value of fuel imports increased by 26% to approximately \$29 billion from \$23 billion in 2016. Thailand's main import partners in 2017 were China (including Hong Kong), which supplied 21.3% of Thailand's total imports, by value; Japan, 14.5%; the United States, 6.7%; and Malaysia, 5.2% (Bank of Thailand, 2019b, c).

In 2017, the value of imported base metal materials totaled \$18.8 billion (8.5% of total imports), which was an increase of 83% from that of 2016. Thailand imported 3.0 million metric tons (Mt) of steel ingots and semifinished products and was the world's sixth-ranked importer in 2017. Leading steel producers included G-Steel Plc., Sahaviriya Steel Industries Plc., and Tata Steel (Thailand) Plc. Imported steel had supported from 81% to 94% of the country's apparent consumption since 2009 (International Trade Administration, 2017, p. 1; Bank of Thailand, 2019c; World Steel Association, 2019, p. 59–61).

Commodity Review

Metals

Gold.—Kingsgate Consolidated Ltd. (Kingsgate) operated the Chatree Mining Complex through its local unit Akara Resources Public Co. Ltd. On December 13, 2016, the National Council for Peace and Order issued Order No. 72/2559, which called for the suspension of all gold-mining operations and related activities effective as of January 1, 2017. In August, the Government lifted the temporary suspension, allowing for the application for a renewal of the mine's metallurgical processing license to proceed, although it was not approved by yearend. No monetary compensation for the losses the company suffered as a result of the closure and expropriation of Chatree was announced, and there was no indication of whether or when Kingsgate would be able to restart operations. Kingsgate was unable to reach a settlement after months of negotiation with the Government regarding the suspension order that terminated approximately 1,000 workers. Kingsgate commenced arbitration before an international tribunal in an attempt to recover the substantial losses under the Thailand-Australia Free Trade Agreement enacted in 2005, which contained provisions related to investment protection and the right to seek impartial resolution of disputes with the Government. In 2016, the Chatree Mine had produced 65% of Thailand's total gold production, or 2,795 kilograms (kg), and 70% of the country's total silver production, or 25,134 kg (Kebui, 2017; Kingsgate Consolidated Ltd., 2017, p. 2, 4).

Zinc.—Padaeng Industry Public Co. Ltd. (PDI) started operations at its zinc smelting plant for the production of zinc ingot in Tak Province in 1985; the plant was located 96 kilometers from the sole zinc mine in Thailand, the Mae Sot Mine. PDI stopped the extraction of ore from the Mae Sot Mine owing to depletion of ore in June 2016. In 2017, PDI's zinc smelting plant used the last remaining zinc ore from the Mae Sot Mine to produce 30,018 metric tons (t) of zinc metal. All core refining processes ceased in the second quarter, causing the complete halt in operations by the end of October. After the mine closed, PDI continued with the environmental restoration efforts that had begun in 1993. PDI's zinc smelting plant produced more than 3 Mt of zinc metal throughout the duration of its 33 years of operation (Padaeng Industry Public Co. Ltd., 2017, p. 11; 2018, p. 26, 30, 34).

Industrial Minerals

Cement.—In 2017, seven cement companies operating 12 plants in Thailand had a combined production capacity of 60.7 million metric tons per year. In 2017, Thailand reported total production of 33.6 Mt of cement, which was 4% less than the 34.9 Mt produced in 2016. The total production of cement fully satisfied the domestic consumption of 28.9 Mt in 2017. Global cement exports were 166.6 Mt in total in 2017, and Thailand was one of the leading exporters, along with China, Japan, Turkey, and Vietnam (tables 1, 2; Cemnet.com, 2018; GlobalCement.com, 2018).

Quartz.—The Ministry of Industry was in the process of facilitating the development of quartz mining to supply raw material for manufacturing solar panels. As of December 2016, the high-quality quartz reserves were estimated to be 25 Mt, which could be used to manufacture about 6 Mt of solar-cell-grade silicon for the production of solar panels. The production of quartz in 2017 more than tripled compared with that of 2016 (table 1; Nation Thailand, The, 2016).

Mineral Fuels

Coal, Natural Gas, and Petroleum.—Total energy consumption was from natural gas, 42%; petroleum products, 38%; coal, 18%; and hydroelectric and imported electricity combined, 2%. In 2017, total domestic output of condensate, natural gas, and petroleum decreased to 284.8 million barrels of crude petroleum equivalent, or by 4.7% compared with that of 2016 (Ministry of Energy, 2018, p. 6–7, 39–42).

MINERAL INDUSTRY HIGHLIGHTS IN 2018

Minerals in the National Economy

In 2018, Thailand's GDP continued to grow, increasing by 4.2%, which was higher than the global growth rate of 3.1%. The growth in Thailand's GDP was supported by a strong uptake in domestic expenditures. Mining and quarrying as a percentage of the GDP decreased by 3.0% as a result of the continued ban on gold mining. The nominal GDP in 2018 was \$507 billion (BHT 16.4 trillion). FDI outflow totaled \$302 million in 2018, and the country's net inflow increased by

61% to \$13.2 billion. Approximately 73,500 people, or about 0.19% of the total labor force, were employed in the mining and quarrying sector in 2018 (Bank of Thailand, 2019a, e; 2020a, b; World Bank Group, 2019, p. 11).

Thailand's total export value increased by 6.9% to \$253 billion in 2018. Metal and steel accounted for 4.7% of Thailand's total exports, or \$11.9 billion; petroleum products, 3.8%, or \$9.7 billion; and mining products (including crude petroleum and minerals), 0.5%, or \$1.3 billion. In comparison with those of 2017, the values of these product groups increased by 13.2%, 30.0% and 20.2%, respectively. In 2018, total imports increased by 12.0% to \$248 billion. Fuels (including coal, coke, crude petroleum, natural gas, and petroleum products), materials of base metals, and minerals accounted for 16.0%, 8.8%, and 1.6% of Thailand's total imports, respectively. Fuel imports totaled approximately \$39.7 billion, which was a 36.9% increase from those of 2017, and base metals totaled \$22 billion, which was a 16.6% increase (Bank of Thailand, 2019c, d).

Production

In 2018, the significant production increases included that of ball clay by 269%; marl for cement, 250%; fluorspar (metallurgical grade and acid grade), 204% and 68%, respectively; marble (including fragments), 53%; cement clay and ceramic clay, 36% each; granite (crushed), 25%; and dolomite, 15%. In contrast, the production of tin concentrate (Sn content) decreased by 86%, followed by granite (dimension), 76%; marble (dimension), 54%; travertine (dimension), 52%; manganese (Mn content), 51%; rare earth concentrates (gross weight), 23%; feldspar, 19%; and sand and gravel (industrial), 11% (table 1).

Structure of the Mineral Industry

In January, Metal Tiger Plc. of the United Kingdom divested its remaining 5% stake in the Chatree gold mine after failing to reach an agreement with the Government of Thailand. In December, Metal Tiger was able to complete the licensing and lease application for the Boh Yai lead-zinc-silver mine (Kemco project) and continued to explore legal options for implementation of exploration plans at the Boh Yai Mine (Hamer, 2018; Metal Tiger Plc., 2019, p. 14).

In December, PTTEP won the concession contracts for the offshore Erawan and Bongkot Blocks with a combined production of approximately 22 billion cubic meters of natural gas per year, effective as of 2022 and 2023, respectively. In 2018, PTTEP operated the Bongkot gas block and had a 2.7% stake in the Erawan Block, which was operated by Chevron Thailand Exploration and Production Ltd. (Praiwan and Sangwongwanich, 2018).

Commodity Review

Metals

Gold.—In May, Kingsgate filed for international arbitration after Kingsgate and the Government of Thailand failed to reach a resolution after suspension in 2017 of all gold-mining activities by Order No. 72/2559. Under the pending arbitration,

neither party was permitted to release any data on operation, damages, and potential compensation. Another company, Tungkom Co. Ltd., which had operated a gold mine in Loei Province since 2006, had ongoing disputes with local residents about the environmental effects of the mine and was declared bankrupt by a Bangkok court in February 2018 (Chandran, 2018; Phoonphonphiphat, 2018).

Tin.—Thailand Smelting & Refining Co. Ltd. (Thaisarco)—a subsidiary of Amalgamated Metal Corp. Plc. (AMC) of the United Kingdom—was a leading manufacturer of tin, specialty tin alloys, and other tin-related products. In 2018, a new furnace was under construction and was expected to be commissioned in the first half of 2019; the new furnace would expand the smelter's capacity and improve efficiencies, which were expected to restore profitability for the smelting business. Higher energy costs and wages had increased operating costs, and the competitive market made the basic smelting operations of Thaisarco unprofitable in 2018 (Amalgamated Metal Corp. Plc, 2019, p. 10, 18).

Industrial Minerals

Potash.—In 2018, Asean Potash Chaiphaphum Plc. (APOT) was in talks with financial institutions to revive the APOT project. In 1991, Thailand had proposed building the potash mining and processing plant in Bamnet Narong District in Chaiphaphum Province to produce affordable and high-quality potash fertilizer for farmers in the Association of Southeast Asian Nations (ASEAN) member countries. APOT expected to produce 800,000 t of potassium fertilizer in 2019; the potash reserve was 430 Mt (Wipatayotin, 2017; Apisitniran, 2018).

Outlook

Thailand's GDP is expected to grow by 3.9% in 2019 and 3.7% in 2020 because of slowing global growth and trade conflicts. In addition, Thailand is expected to be slow in developing untapped mineral deposits in the Mekong area owing to the risk of political uprising and delays, cancellation of infrastructure projects, and resource nationalism sentiment. The future of gold mines remains uncertain as a result of the Government's resolution to forbid all gold-mining activities as of January 1, 2017 (Ariyaprichya and others, 2018, p. 3; Mining.com, 2018; Asian Development Bank, 2019, p. 298–302).

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TABLE 1
THAILAND: PRODUCTION OF MINERAL COMMODITIES¹

(Metric tons, gross weight, unless otherwise specified)

| Commodity ² | 2014 | 2015 | 2016 | 2017 | 2018 |
|---|----------------------|---------------------|----------------------|---------------------|------------------|
| METALS | | | | | |
| Antimony: | | | | | |
| Mine, ore, Sb content | -- | -- | 32 | -- | -- |
| Refinery | 706 | 700 ^e | 700 ^e | 700 ^e | 700 ^e |
| Copper, refinery | 229 | -- | -- | -- | -- |
| Gold, mine, Au content kilograms | 4,514 | 3,305 | 4,293 | -- | -- |
| Iron ore, mine: | | | | | |
| Gross weight | 347,918 | 16,483 | -- | 135 | -- |
| Fe content | 216,000 | 10,200 | -- | 84 | -- |
| Iron and steel, raw steel thousand metric tons | 4,095 | 3,720 | 3,824 | 4,471 | 4,315 |
| Lead, refinery, secondary, lead alloys | 79,250 | 86,000 | 86,000 ^r | 88,000 | 85,000 |
| Manganese, mine: | | | | | |
| Gross weight | 14,330 | 9,000 | 9,150 | 8,020 | 4,000 |
| Mn content ^e | 6,900 | 4,300 | 4,400 | 3,900 | 1,900 |
| Rare earths, mine, concentrates ^{e, 3} | | | | | |
| Gross weight ⁴ | 3,200 | 1,300 | 2,600 | 2,200 | 1,700 |
| Rare-earth-oxide equivalent | 1,900 | 760 | 1,600 | 1,300 | 520 |
| Silver, mine, Ag content kilograms | 31,046 | 21,047 | 35,954 | -- | -- |
| Tin: | | | | | |
| Mine, concentrates, Sn content | 156 | 72 | 92 | 541 | 75 |
| Smelter, primary | 16,494 ^r | 10,616 ^r | 10,807 ^r | 10,588 | 10,721 |
| Tungsten, mine, concentrates: | | | | | |
| Gross weight | 173 | 61 | 57 | 114 | 127 |
| W content ^e | 99 ^r | 35 ^r | 33 ^r | 65 | 69 |
| Zinc: | | | | | |
| Mine, ore: | | | | | |
| Gross weight | 226,893 | 181,025 | 175,632 | 7,877 | -- |
| Zn content | 39,140 | 34,738 ^r | 34,500 ^r | 1,460 | -- |
| Smelter, primary | 70,100 | 74,121 | 72,813 | 30,018 | -- |
| Alloys, Zn content | 21,000 ^r | 22,200 | 21,800 ^r | 9,010 | -- |
| INDUSTRIAL MINERALS | | | | | |
| Barite | 81,996 ^r | 72,000 ^r | 140,000 ^r | 67,000 ^e | 13,149 |
| Calcite | 991,981 | 1,281,765 | 1,452,235 | 1,456,747 | 1,467,822 |
| Cement, hydraulic thousand metric tons | 36,150 ^r | 36,216 | 34,860 ^r | 33,587 | 35,750 |
| Clay: | | | | | |
| Ball clay | 123,082 | 81,245 | 136,646 ^r | 157,093 | 579,565 |
| Cement clay | 4,124,016 | 4,792,683 | 4,506,878 | 4,301,793 | 5,837,807 |
| Ceramic clay | 312,963 | 514,044 | 371,686 | 357,982 | 485,853 |
| Kaolin: | | | | | |
| Beneficiated | 123,621 ^r | 102,763 | 101,618 ^r | 102,659 | 96,666 |
| Nonbeneficiated | 755,913 | 655,196 | 830,393 ^r | 401,450 | 403,225 |
| Diatomite ⁵ | 194 ^r | 188 ^r | 833 ^r | 800 ^e | 649 |
| Feldspar | 1,413,428 | 1,331,916 | 1,167,147 | 1,385,925 | 1,117,803 |
| Fluorspar: | | | | | |
| Metallurgical grade | 4,590 | 15,095 | 20,100 | 5,500 | 16,700 |
| Acid grade ^e | 33,000 | 34,000 | 37,000 | 25,000 | 42,000 |
| Gypsum, mine thousand metric tons | 12,445 | 11,267 | 10,407 ^r | 9,254 | 9,680 |
| Lime ^e | 800,000 | 780,000 | 780,000 | 820,000 | 810,000 |
| Perlite | 54,100 | 17,200 | 15,690 | 5,800 | 5,600 |
| Phosphate rock: | | | | | |
| Gross weight | 500 | -- | -- | 8,000 | -- |
| P ₂ O ₅ content | 150 | -- | -- | 2,400 | -- |
| Quartz | 194,831 | 188,650 | 50,160 | 176,083 | 67,802 |
| Salt | 1,381,067 | 1,385,911 | 1,390,548 | 1,497,233 | 1,487,364 |

See footnotes at end of the table.

TABLE 1—Continued
THAILAND: PRODUCTION OF MINERAL COMMODITIES¹

(Metric tons, gross weight, unless otherwise specified)

| Commodity ² | 2014 | 2015 | 2016 | 2017 | 2018 |
|--|------------------------|------------------------|------------------------|-----------|-----------|
| INDUSTRIAL MINERALS—Continued | | | | | |
| Sand and gravel, industrial, unspecified | 1,133,906 ^r | 1,191,612 | 1,102,699 | 1,756,308 | 1,557,218 |
| Stone, sand, and gravel, construction: | | | | | |
| Stone: | | | | | |
| Crushed: | | | | | |
| Dolomite, for ceramic | 2,471,486 | 2,432,853 | 3,034,860 | 2,988,336 | 3,440,193 |
| Granite thousand metric tons | 7,591 | 8,075 | 9,459 | 9,036 | 11,281 |
| Limestone do. | 94,710 ^r | 103,388 ^r | 106,923 ^r | 108,480 | 116,292 |
| Marble, including fragment | 1,636,503 ^r | 2,629,588 ^r | 2,568,888 ^r | 1,995,310 | 3,060,329 |
| Marl, for cement | 1,200 | -- | -- | 8,200 | 28,707 |
| Shale, for cement thousand metric tons | 5,409 | 6,277 | 7,590 ^r | 6,506 | 6,716 |
| Dimension: | | | | | |
| Granite | 8,005 | 13,878 | 14,860 | 14,437 | 3,535 |
| Marble | 28,475 | 31,619 | 30,986 | 42,639 | 19,663 |
| Travertine | 5,103 | 1,350 | 2,600 | 1,969 | 949 |
| Talc and related materials: | | | | | |
| Pyrophyllite | 49,100 | 45,500 | 96,800 ^r | 54,000 | 50,920 |
| Talc | 8,208 | 6,768 | 7,126 | 7,436 | 7,756 |
| MINERAL FUELS AND RELATED MATERIALS | | | | | |
| Coal, lignite thousand metric tons | 17,982 ^r | 15,151 | 16,979 | 16,259 | 14,852 |
| Natural gas million cubic meters | 42,071 ^r | 39,769 ^r | 39,014 ^r | 37,394 | 36,432 |
| Petroleum: | | | | | |
| Condensate thousand 42-gallon barrels | 34,430 | 34,905 ^r | 34,583 ^r | 35,979 | 36,139 |
| Crude do. | 50,560 ^r | 55,621 ^r | 59,687 ^r | 51,556 | 47,158 |
| Refinery: | | | | | |
| Diesel do. | 151,384 | 170,700 | 161,625 | 169,233 | 174,176 |
| Fuel oil do. | 35,647 | 35,953 | 35,634 | 36,971 | 37,609 |
| Gasoline do. | 62,184 | 70,141 | 76,285 | 79,431 | 82,812 |
| Jet fuel do. | 41,525 | 44,298 | 44,145 | 46,760 | 51,163 |
| Kerosene do. | 6,906 | 8,520 | 13,983 | 12,390 | 13,483 |
| Liquefied petroleum gas do. | 64,135 | 64,209 | 66,607 | 70,538 | 72,762 |
| Total do. | 362,000 | 394,000 | 398,000 | 415,000 | 432,000 |

^rEstimated. ^rRevised. do. Ditto. -- Zero.

¹Table includes data available through September 26, 2019. All data are reported unless otherwise noted. Totals and estimated data are rounded to no more than three significant digits; may not add to totals shown.

²In addition to the commodities listed, gemstones, kaolin filler, silicon, and tantalum may have been produced in Thailand, but available information was inadequate to make reliable estimates of output.

³Estimated based on trade data.

⁴Monazite concentrates.

⁵Production estimated by reported exports; domestic mined amount could be higher.

TABLE 2
THAILAND: STRUCTURE OF THE MINERAL INDUSTRY IN 2018

(Thousand metric tons unless otherwise specified)

| Commodity | | Major operating companies and major equity owners | Location of main facilities | Annual capacity |
|------------------------|-------------------------|---|--|--------------------|
| Antimony | metric tons | Amco Thai Mining Co. (Hibino Metal Industry) | Antimony smelter, Ban Pin, Phrae Province | 500 |
| Barite | | Asian Mineral Resources Co. Ltd. | Amphoe Chalermprakiat, Saraburi Province | 60 |
| Do. | | Kia Energy Co. Ltd. | Crushing plants in Saraburi Province | 25 |
| Do. | | P&S Barite Mining Co. Ltd. (Pands Group) | Chaing Mai, Kanchanaburi, Nakhon Si Thammarat, and Tak Provinces | 70 |
| Cement | | Asia Cement Public Co. Ltd. | Pukrang plant, Pra Buddhabat, Saraburi Province | 5,000 |
| Do. | | Globe Cement Co. Ltd. | Plant in Chaloem Phrakiat, Saraburi Province | 820 |
| Do. | | Jalapathan Cement Plc. (Asia Cement Public Co. Ltd., 88.84%) | Takli plant, Takli District, Nakhon Sawan Province | 1,200 |
| Do. | | do. | Cha-Am plant, Cha-Am District, Petchaburi | 1,200 |
| Do. | | Siam Cement (Kaeng Khoi) Co. Ltd. (SCG Cement-Building Materials Co. Ltd.) | Plant in Kaeng Khoi District, Saraburi Province | 7,300 |
| Do. | | Siam Cement (Lampang) Co. Ltd. (SCG Cement-Building Materials Co. Ltd.) | Plant in Chaehom District, Lampang Province | 2,100 |
| Do. | | Siam Cement (Ta Luang) Co. Ltd. (SCG Cement-Building Materials Co. Ltd.) | Ta Luang plant, Ban Mo District, Saraburi Province | 3,100 |
| Do. | | do. | Khao Wong plant, Saraburi Province | 3,840 |
| Do. | | Siam Cement (Thung Song) Co. Ltd. (SCG Cement-Building Materials Co. Ltd.) | Plant in Thung Song District, Nakorn Sri Thammarat Province | 6,900 |
| Do. | | Siam City Cement Public Co. Ltd. (Sunrise Ecology Co., Ltd., 34.81%; Jardine Cycle & Carriage Ltd., 25%; Ratanarak Group, 9.43%) | Kaeng Koei District, Saraburi Province | 14,800 |
| Do. | | Thai Pride Cement Co. Ltd. | Saraburi plant, Kaeng Khoi, Saraburi Province | 1,000 |
| Do. | | TPI Polene Public Co. Ltd. | Kaeng Koei District, Saraburi Province | 13,500 |
| Coal, lignite | | Electricity Generating Authority of Thailand (EGAT) (Government, 100%) | Mae Moh Mine, Lampang Province | 16,000 |
| Copper, metal | | Thai Copper Industries Public Co. Ltd. (PM Group) | Rayong Industrial Park, Rayong Province | 165 ¹ |
| Feldspar | | Asia Mineral Processing Co. Ltd. | Nakhon Si Thammarat Province | 1,500 |
| Fluorspar | | Asian Mineral Resources Ltd. | Mae Hong Son Province | 14 |
| Do. | | S.C. Mining | Ban Pin, Phrae Province | 12 |
| Gas, natural | million cubic meters | Chevron Thailand Exploration and Production Ltd. (35% to 80% depending on operating areas) | 35 operating areas in Pattani Basin and Malay Basin, all in the Gulf of Thailand | 10.3 |
| Do. | do. | Esso (Thailand) Public Co. Ltd. (Exxon Mobil Corp.), operating jointly with PTT Exploration and Production Public Co. Ltd. (Petroleum Public Co. Ltd.) | Namphong gas production plant, Namphong District, Khon Kaen Province | 1.5 |
| Do. | do. | PTT Exploration and Production Public Co. Ltd. (PTTEP) (Government, 65.3%; Thai NVDR Co. Ltd., 8%; State Street Europe Ltd., 2.2%) | Nam Phong and Phu Horm gasfields, Gulf of Thailand | 13.4 |
| Do. | do. | TOTAL Exploration and Production (Thailand), 33.3% | Bongkot gas field (33%), Gulf of Thailand | 18.4 |
| Gold: | | | | |
| Mine, Au content | kilograms | Akara Resources Public Co. Ltd. (Kingsgate Consolidated Ltd., 100%) | Chatree Mining Complex, Phichit Province | 5,000 ² |
| Do. | | Tungkum Co. Ltd. | Wang Saphung District, Loei Province | NA ² |
| Refined, secondary | | Umicore Precious Metals Thailand, Ltd. (Umicore Group, 91.21%) | Refinery in Dokmai Subdistrict, Pravet District, Bangkok Province | NA |
| Gypsum, mine | | General Mining and Trading Co. Ltd. | Talad, Muang, Surat Thani Province | NA |
| Do. | | Lotus Mines Co. Ltd. | Nakornsawan Province | 180 |
| Do. | | Vanich Gypsum Co. Ltd. | Mai Rieng and Thoong Yai, Nakhon Si Thammarat Province and Khlong Prab, Surat Thani Province | 8,500 |
| Iron ore, gross weight | | P.T.K. Mining Co. Ltd. (Siam Iron and Steel Co., Ltd.) | Phu Ang, Loei Province | 720 ³ |

See footnotes at end of table.

TABLE 2—Continued
THAILAND: STRUCTURE OF THE MINERAL INDUSTRY IN 2018

(Thousand metric tons unless otherwise specified)

| Commodity | | Major operating companies and major equity owners | Location of main facilities | Annual capacity |
|--------------------------------|----------------------------------|--|---|--------------------|
| Iron and steel: | | | | |
| Raw steel | | Bangkok Iron and Steel Works Co. Ltd. (Chiew Xanh Group) | Phrapradaeng, Samutprakarn Province | 500 |
| Do. | | Bangkok Steel Industry Plc. | Phrapradaeng, Samutprakarn Province | 360 |
| Do. | | Chow Steel Industries Plc. | Kabinburi Industrial Estate, Prachinburi | 750 |
| Do. | | N.T.S. Steel Group Public Co. Ltd. [Tata Steel (Thailand) Public Co. Ltd. (TSTPCL), 99.76%] | Hemaraj Chonburi Industrial Estate, Sriracha | 550 |
| Do. | | Siam Construction Steel Co. Ltd. [Tata Steel (Thailand) Public Co. Ltd. (TSTPCL), 99.99%] | Ta Phut Industrial Estate, Rayong | 550 |
| Do. | | Siam Iron and Steel Co. Ltd. [Tata Steel (Thailand) Public Co. Ltd. (TSTPCL), 99.99%] | Tambon Bang Khamode, Saraburi | 300 |
| Do. | | TBS Steel Co. Ltd. | Sri Maha Pho District, Prachinburi Province | 350 |
| Do. | | UMC Metals Ltd. | Muang District, Chonburi Province | 550 |
| Products | | Asian Wire Products Co. Ltd. (Bangkok Steel Industry Group) | Muang, Nakornrachasima Province | 466 |
| Do. | | Bangkok Steel Industry Plc. | Phrapradaeng, Samutprakarn Province | 735 |
| Do. | | Bangsaphan Barmill Plc. | Bang Saphan District, Prachuapkhirikhan | 720 |
| Do. | | GJ-Steel Plc (G-Steel Plc) | Sriracha, Chonburi Province | 1,500 |
| Do. | | G-Steel Plc (formerly Siam Ystrip Mill Plc) | Bann Khai, Rayong Province | 1,800 |
| Do. | | LPN Plate Mill Plc. | Pra Samut Jedi District, Samutprakarn | 500 |
| Do. | | MillCon Steel Plc. (Sittichai Leeswadtrakul, 37.3%, and General Engineering Public Co. Ltd., 18%) | Bang Khun Thian District, Bangkok; and Nikhom Pattana, Rayong Province | 600 |
| Do. | | Namheng Steel Co. Ltd. | Lopburi Province | 300 |
| Do. | | NS-Siam United Steel Co. Ltd. (Nippon Steel & Sumitomo Metal Corp. Group) | Map Ta Phut, Muang, Rayong Province | 1,360 |
| Do. | | Primes Steel Ltd. | Pluak Daeng District, Rayong Province | 840 |
| Do. | | Racthasima Steel Works Co. Ltd. (Bangkok Steel Industry Group) | Muang, Nakornrachasima Province | 710 |
| Do. | | Sahaviriya Plate Mill Plc. (SPM) | Bankpakong District, Chachoengsao Province | 1,000 |
| Do. | | Sahaviriya Steel Industries Plc. (SSI) | Bangsaphan, Prachuap Khiri Khan Province | 4,000 |
| Do. | | Siam Yamato Steel Co. Ltd. | Map Ta Phut, Rayong Province | 1,100 |
| Do. | | Tata Steel (Thailand) Plc (Tata Steel Global Holding PTE Ltd., 67.9%) | Map Ta Phut, Rayong Province; Sriracha, Chonburi Province; Ban Mon, Saraburi Province | 1,700 |
| Do. | | TY Steel Co. [Tycoons Worldwide Group (Thailand) Public Co. Ltd.] | Wire rod and rebar plant located in Rayong Province | 180 |
| Lead, refined, lead alloys | | T.K Metal Trading Ltd. Partnership | Nakornprathom Province | 15 |
| Lime | | Chemicals Public Co. Ltd. | Kaeng Khoi factory in Saraburi Province | 456 |
| Do. | | do. | Phra Phutthana factory in Saraburi Province | 365 |
| Do. | | Golden Lime Plc. | Lopburi Province | 170 |
| Petroleum: | | | | |
| Crude, including condensate | thousand 42-gallon barrels | Chevron Thailand Exploration and Production Co., Ltd. (Chevron Corp.) | Pattani Basin and Malay Basin in the Gulf of Thailand | 43,300 |
| Do. | do. | Ophir Energy | Bualuang field in the Gulf of Thailand | 3,300 |
| Do. | do. | Mubadala Petroleum (Mubadala Investment Co., 100%, owned by the Government of Abu Dhabi) | Jasmine, Manora, and Nong Yao fields in the Gulf of Thailand | 11,700 |
| Do. | do. | TOTAL Exploration and Production (Thailand) | Bongkot, offshore in the Gulf of Thailand | 3,300 |
| Do. | do. | PTT Exploration and Production Public Co. Ltd. (PTTEP) (Government, 65.3%; Thai NVDR Co. Ltd., 8%; State Street Europe Ltd., 2.2%) | Arthit, Songkhla, Gulf of Thailand | 32,100 |

See footnotes at end of table.

TABLE 2—Continued
THAILAND: STRUCTURE OF THE MINERAL INDUSTRY IN 2018

(Thousand metric tons unless otherwise specified)

| Commodity | | Major operating companies and major equity owners | Location of main facilities | Annual capacity |
|--------------------------------------|----------------------------------|--|---|---------------------|
| Petroleum:—Continued | | | | |
| Refinery | thousand 42-gallon barrels | Bangchak Corporation Public Co. Ltd. | Refinery in Phra Khanong, Bangkok | 43,800 |
| Do. | do. | Esso (Thailand) Public Co. Ltd. (Exxon Mobil Corp.), operating jointly with PTT Exploration and Production Public Co. Ltd. (Petroleum Public Co. Ltd.) | The complex refinery in Sriracha, Chonburi Province | 63,500 |
| Do. | do. | IRPC Public Co. Ltd. | Refinery in Rayong Complex, Rayong Province | 78,500 |
| Do. | do. | PTT Global Chemical Public Co. Ltd. | Refinery in Map Ta Phut Industrial Estate, Rayong Province | 102,000 |
| Do. | do. | Star Petroleum Refining Co. Ltd. (Chevron South Asia Holdings Pte. Ltd., 60.6%, and public, 39.4%) | do. | 63,900 |
| Do. | do. | Thai Oil Public Co. Ltd. [PTT Public Co. Ltd., 48.0%; State Street Europe Ltd., 3.5%; South East Asia UK (Type C) Nominees Ltd., 2.9%] | Refinery in Tungsukla, Sriracha, Chonburi Province | 75,500 |
| Potash | | Asean Potash Chaiyaphum Plc. (ASEAN members, 29%; Ministry of Finance Thailand, 20%; private sector, 51%) | Mine and processing plant in Bamnet Narong District, Chaiyaphum Province | 1,100 |
| Silicon, metal | | G.S. Energy Co., Ltd. | Ratchaburi silicon plant | 45 |
| Silver, mine, Ag content | kilograms | Akara Resources Mining Ltd. (Kingsgate Consolidated Ltd., 100%) | Chatree Mining Complex, Phichit Province | 31,000 ² |
| Tantalum, metal powder and oxides | metric tons | JX Metals Deutschland GmbH (JX Nippon Mining & Metal Corp.) | Map Ta Phut, Rayong Province | 250 |
| Tin: | | | | |
| Concentrate, Sn content | do. | Numerous small companies | Nakhon Si Thammarat, Phangnga, Phuket, and Rayong Provinces | 1,000 ⁶ |
| Smelter, primary | | Thailand Smelting & Refining Co. Ltd. (Thaisarco) (Amalgamated Metal Corp. Plc., 77.1%) | Phuket, Phuket Province | 30 |
| Tungsten | metric tons | SC Mining Co. Ltd. (Som Chai family, 100%) | Ban Pin, Phrae Province | 150 |
| Zinc: | | | | |
| Ore, Zn content | | Padaeng Industry Public Co. Ltd. (Bali Ventures Ltd., 21.7%; Thai Ministry of Finance, 13.81%; RAK Minerals & Metals Investments, 12.5%; others, 52%) | Mae Sot District, Tak Province | 30 ⁴ |
| Refined | do. | | Smelter and refinery (leaching and cell house) plants in Tak Province; roaster plant in Rayong Province | 110 ⁵ |

⁶Estimated. Do., do. Ditto. NA Not available.

¹Facility inactive since 2015.

²All gold-mining operations were banned on January 1, 2017.

³Not active in 2018.

⁴Closed in 2016.

⁵Closed in 2017.