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Copper

By Daniel M. Flanagan

Domestic survey data and tables were prepared by Hodan A. Fatah, statistical assistant.

In 2018, mine production of recoverable copper in the United States decreased for the second consecutive year, by 3% to 1.22 million metric tons (Mt) from 1.26 Mt in 2017 (tables 1, 3). Production declined because of lower ore grades and (or) reduced copper recovery rates at numerous mines, as well as a landslide at one major mine that affected operations throughout the year. Globally, the United States was the fifth-ranked mine producer of copper (fourth-ranked in 2017) behind Chile, Peru, China, and Congo (Kinshasa), in descending order of output, and accounted for 6% of global production. World mine output of copper rose slightly to 20.4 Mt in 2018 from 19.9 Mt (revised) in 2017, primarily owing to increases in production in Australia, Chile, Congo (Kinshasa), and Zambia. These increases were partially offset by decreased output in Canada and China (table 20).

Smelter production in the United States increased by 14% to 536,000 metric tons (t) in 2018 from 470,000 t in 2017, when output was affected by planned maintenance at multiple U.S. smelters and a 6-week shutdown at one smelter following a fatal accident. Domestic production of refined copper increased by 3% to 1.11 Mt from 1.08 Mt (table 1). The United States remained the fourth-ranked producer of refined copper, following China, Chile, and Japan (in descending order of production), and accounted for 5% of global output. World refinery production of copper increased slightly to a record-high 24.4 Mt from 23.9 Mt in 2017. Large production increases in China, Congo (Kinshasa), Iran, Japan, and Russia were partially offset by significantly decreased output in India (table 22).

Reported U.S. consumption of refined copper in 2018 was 1.82 Mt, a slight increase from 1.80 Mt in 2017 (tables 1, 4, 5). Domestic consumption of refined copper steadily decreased from a record high of 3.02 Mt in 2000 to 1.65 Mt in 2009 and remained at approximately 1.8 Mt in each year since 2009. In 2018, China accounted for 51% of world apparent consumption, which rose by 3% to a record-high 24.4 Mt from 23.7 Mt in 2017, according to data compiled by the International Copper Study Group (ICSG). Consumption in China increased by 654,000 t from that in 2017, and consumption in all other countries and localities collectively increased by 24,700 t. The ICSG calculation of China's apparent consumption was based on reported production, trade, and Shanghai Futures Exchange (SHFE) stock data and did not include unreported Government or industry stocks, which can fluctuate significantly on an annual basis. The United States remained the second-ranked consumer of refined copper and accounted for 7% of global refined copper apparent consumption, followed by Germany, Japan, and the Republic of Korea, in descending order of rank (International Copper Study Group, 2019, p. 9, 19–20).

In 2018, the average annual Commodity Exchange Inc. (COMEX) spot copper price rose for the second consecutive year, by 4% to $2.93 per pound from $2.80 per pound in 2017 (table 1). The increase was attributed by analysts primarily to rising global demand (particularly in China) and was partially offset by multiple factors, including appreciation of the U.S. dollar in the second half of the year, increased global mine supply of copper, and uncertainty in trade policies between the United States and China (Azzopardi, 2018; Dhokia, 2018; Imbert, 2018; Tilley and Saraf, 2018). The COMEX price reached a record-high $4.01 per pound in 2011 and decreased each year from 2012 through 2016.

Production

Domestic production data were compiled from U.S. Geological Survey (USGS) monthly canvasses of the mines, smelters, and refineries operating in the United States. In 2018, responses to the surveys and data reported in public company documents represented 98% of the mine production data, 100% of the smelter production data, and 96% of the refinery production data reported for these facilities in table 1. Statistics for individual companies that publicly reported operational data in 2018 can be found in the "Operating Property Reviews" section.

Mine.—Recoverable copper production in the United States decreased by 3% to 1.22 Mt in 2018 from 1.26 Mt in 2017, and the value of production increased slightly to $8.05 billion from $7.92 billion. Copper recoverable in concentrates and precipitates accounted for 56% of mine output and declined slightly to 690,000 t, and copper produced by solvent extraction (leaching) and electrowinning (SX–EW) represented 44% of mine production and fell by 5% to 532,000 t (tables 1, 3). Arizona was the leading copper-producing State and accounted for 66% of U.S. output, followed by, in descending order of production, Utah, New Mexico, Nevada, Montana, Michigan, and Missouri. A landslide on March 21 at the Mission Mine in Arizona affected operations throughout the year, and production declined at numerous other domestic mines because of lower ore grades and (or) reduced copper recovery rates. These decreases were partially offset by significantly increased output from the Bingham Canyon Mine in Utah, where mining activity progressed into a zone of higher copper ore grades. Although copper was recovered at 23 mines in the United States (including 13 SX–EW facilities), 17 mines accounted for more than 99% of production in 2018 (table 2). The remaining mines were either small leach operations or byproduct producers of copper.

Smelter and Refinery.—Owing to recovery from multiple temporary smelter shutdowns in 2017, smelter production in the United States (which consists of primary output only), increased by 14% in 2018 to 536,000 t from 470,000 t in 2017. Output of primary (from ore) electrolytically refined copper consequently rose by 12% to 538,000 t. Primary refined copper produced by electrowinning decreased by 5% to 532,000 t in 2018 as a result of lower ore grades at numerous mines, and secondary (from scrap) electrolytic and fire-refined copper increased by 3% to

41,200 t. Total refinery production was 1.11 Mt, 3% greater than 1.08 Mt in 2017. Primary copper accounted for 96% of total domestic refined output (48% each for electrolytic and electrowon copper), and secondary copper accounted for 4% (table 1). Three primary smelters, three electrolytic refineries, and four fire refineries operated in the United States during 2018.

Operating Property Reviews.—In 2018, ASARCO LLC (a subsidiary of Grupo México, S.A.B. de C.V.) produced a total of 118,000 t of copper at its three mines in Arizona (a decrease of 12% from 134,000 t in 2017) and 98,600 t of electrolytic copper cathodes at its refinery in Amarillo, TX (a decline of 20% from 124,000 t in 2017). At the Mission Mine, the company produced 43,500 t of copper in concentrates compared with 61,900 t in 2017; production was significantly lower in 2018 because of a landslide on March 21 that affected operations throughout the year. Output from the Ray Mine was 37,400 t of copper in concentrates (38,200 t in 2017) and 18,300 t of copper by SX–EW (15,000 t in 2017). The Silver Bell Mine produced 19,100 t of electrowon copper (18,600 t in 2017). In November 2015, the U.S. Environmental Protection Agency and the U.S. Department of Justice announced a settlement with ASARCO that required the company to install new pollution control equipment at its smelter in Hayden, AZ, to reduce emissions of arsenic, lead, particulate matter, and sulfur dioxide. The company completed the project in the fourth quarter of 2018 and expected that the upgrades would increase the annual copper concentrates processing capacity of the plant by 50,000 t (U.S. Environmental Protection Agency, 2015; Grupo México, S.A.B. de C.V., 2018, p. 3; 2019a, p. 4; 2019b, p. 164, 166, 173).

Copper production at the Pinto Valley Mine in Arizona (owned by Capstone Mining Corp.), decreased by 6% to 54,000 t in 2018 from 57,300 t in 2017, owing to lower copper recovery rates. Production at the mine primarily consisted of copper contained in concentrates with a small quantity of copper produced by SX–EW (Capstone Mining Corp., 2019, p. 14–15).

Total output of recoverable copper at Freeport-McMoRan Inc.'s U.S. operations in 2018 was approximately 757,000 t, down by 7% from about 817,000 t during the prior year because of lower ore grades. Combined copper in concentrates and (or) electrowon production at each of the company's mines in Arizona was as follows: Bagdad—90,300 t (78,500 t in 2017), Miami—7,260 t (8,620 t in 2017), Morenci (the seventh-ranked global copper mine by production quantity in 2018, 72%-owned by Freeport)—431,000 t (464,000 t in 2017), Safford—55,800 t (68,000 t in 2017), and Sierrita—68,900 t (72,600 t in 2017). In New Mexico, total copper output at the Chino Mine totaled 78,500 t (97,500 t in 2017), and SX–EW production at the Tyrone Mine was 24,900 t (27,700 t in 2017). Freeport also produced refined copper cathode at its electrolytic facility in El Paso, TX, but did not publicly report cathode output. In 2018, the company continued to develop significant copper resources at its Lone Star property near the Safford Mine. The project was expected to produce about 90,000 metric tons per year (t/yr) of copper, starting by yearend 2020 (Freeport-McMoRan Inc., 2019, p. 7, 25, 76).

KGHM International Ltd. (a subsidiary of KGHM Polska Miedź S.A.) produced 48,000 t of recoverable copper in concentrates at the Robinson Mine in Nevada. Output declined slightly compared with 48,800 t in 2017 because of lower ore grades and reduced copper recovery rates. In 2018, mining of ore recommenced at the company's Carlota Mine in Arizona, where operations had predominantly focused on leaching of copper ore stockpiles from 2014 through 2017. Electrowon production at Carlota was 3,200 t in 2018 and was not publicly reported in 2017 (KGHM Polska Miedź S.A., 2018, p. 13; 2019, p. 13, 35, 59).

In 2018, Lundin Mining Corp. produced 18,000 t of copper in concentrates at the Eagle nickel-copper mine in Michigan, 16% less than 21,300 t in 2017 as a result of planned mine sequencing. The company continued development work on the Eagle East expansion of the Eagle Mine and anticipated first production in the fourth quarter of 2019. As of yearend 2016, Eagle East contained roughly 46,300 t of probable copper reserves, enough to extend the mine life by 2 years to 2023 (Roscoe Postle Associates Inc., 2017, p. 1-6, 15-2; Lundin Mining Corp., 2019, p. 1, 17).

At the Bingham Canyon Mine in Utah (the 20th-ranked global copper mine by output), owned by Rio Tinto Kennecott (a subsidiary of Rio Tinto Group), production of copper in concentrates rose by 37% to 204,000 t in 2018 from 149,000 t in 2017, owing to higher ore grades and increased mill throughput. Publicly reported production of copper cathodes at the company's electrolytic refinery in Magna, UT, was 195,000 t, 55% greater than 126,000 t in 2017. The increase in refined production reflected higher output of copper in concentrates and a return to normal operations following a 6-week shutdown of the smelter in the fourth quarter of 2017. Total refinery output reported to the USGS was higher than that stated in company reports because smelter and refinery production from toll third-party concentrates (which are processed and returned to the owner) were not included in the company's public figures. In 2018, Rio Tinto processed 100,000 t of third-party concentrates at its smelter in Utah. The company continued a project to push back the south wall of the Bingham Canyon open pit, which was anticipated to result in higher and more consistent copper ore grades beginning in late 2020 (Rio Tinto Group, 2019a, p. 44–45, 269; 2019b, p. 7, 27).

Consumption

In 2018, copper was consumed (used) as refined copper and scrap at about 30 brass mills; 15 wire-rod mills; and 500 chemical plants, foundries, and miscellaneous manufacturers in the United States. Reported U.S. consumption of refined copper was 1.82 Mt, a slight increase from 1.80 Mt in 2017; consumption by wire-rod mills was 1.33 Mt (73% of total refined use), and consumption by brass mills was 419,000 t (23%). Domestic consumption of copper-base scrap in 2018 was 916,000 t (gross weight), slightly higher than 910,000 t in 2017. Brass mills consumed 645,000 t of copper-base scrap (equivalent to 70% of total use), followed by refineries and miscellaneous manufacturers—167,000 t (18%), and wire-rod mills—104,000 t (11%) (tables 1, 4, 5, 10, 11).

Copper recovered from refined or remelted scrap in the United States increased slightly to 861,000 t (83% from new scrap and 17% from old scrap) and accounted for 34% of

the total U.S. copper supply of 2.51 Mt (defined as primary refined production plus copper recovered from new and old scrap plus refined general imports minus refined exports, including adjustments for changes in refined copper stocks). The conversion of old (post-consumer) scrap to alloys and refined copper increased slightly to 149,000 t from 146,000 t, and recovery of new (manufacturing) scrap also rose slightly to 712,000 t from 702,000 t. The larger quantities of copper produced from scrap in 2018 were likely a consequence of decreased affordability of copper cathode owing to higher refined prices, as well as increased scrap availability; United States exports of copper scrap were lower than those in 2017 because of new import restrictions in China (discussed in the "China" and "Foreign Trade" sections). Brass and wire-rod mills accounted for 83% of copper recovered from scrap in 2018 (tables 1, 6, 7).

According to preliminary data from the Copper Development Association Inc. (2019, p. 18), copper and copper-alloy product shipments to the U.S. market by fabricators (brass mills, foundries, powder producers, and wire mills), consisting of domestic deliveries and net imports, increased by 4% to 2.62 Mt in 2018 from 2.52 Mt in 2017. Since 2000, when shipments reached a record high of 4.33 Mt, deliveries to the domestic market trended downward, and those in 2018 were 40% less than those in 2000. In 2018, wire-mill products accounted for 54% of total deliveries; brass mill products, 35%; net imports, 8%; and foundry and powder products, 3% combined. The building construction sector remained the leading end-use market and accounted for 43% of total shipments, followed by, in descending order of quantity, electrical and electronic products, 20%; transportation equipment, 20%; consumer and general products, 10%; and industrial machinery and equipment, 7%. Examples of product categories included in each sector are as follows: building construction—air conditioning, building wire, and heating and plumbing; consumer and general products—appliances, consumer electronics, and cords; electrical and electronic products—lighting and wiring devices, power utilities, and telecommunications; industrial machinery and equipment—industrial valves and fittings and plant equipment; and transportation equipment—aircraft, automobiles, railroad, and ships.

The increase in copper and copper-alloy product shipments to the domestic market corresponded with positive economic trends in major industrial sectors that use copper. Housing starts in the United States increased by 4% to 1.25 million units in 2018 from 1.20 million units in 2017. Manufacture of power transmission products rose by 9% compared with output in 2017, and fabrication of telecommunications equipment increased by 3%. Production of aircraft, automobiles, and ships; appliances and electrical equipment (batteries, generators, lighting components, wiring devices, and so on); and equipment for heating, ventilation, and air-conditioning (HVAC) were all slightly greater than that in 2017 (Federal Reserve Board, 2019; U.S. Census Bureau, 2019).

Prices and Stocks

The average annual COMEX spot copper price rose for the second consecutive year, by 4% to $2.93 per pound in 2018 from $2.80 per pound in 2017 (table 1). The increase was attributed by analysts primarily to rising global demand (particularly in China) and was partially offset by appreciation of the U.S. dollar in the second half of the year, increased global mine supply of copper, and uncertainty in trade policies between the United States and China (Dhokia, 2018; Imbert, 2018). The monthly average COMEX price ranged from a low of $2.69 per pound in August and September to a high of $3.19 per pound in January. The minimum monthly price closely coincided with an announcement that an expected labor strike had been avoided at the Escondida Mine in Chile, the leading global copper mine, and the maximum monthly price coincided with a period of U.S. dollar depreciation (Azzopardi, 2018; Tilley and Saraf, 2018).

Copper scrap prices generally followed the trend in refined copper prices, and prices for various types of scrap increased by 1% to 6% in 2018 (table 13). The refiners no. 2 scrap price averaged $2.55 per pound, 4% greater than $2.46 cents per pound in 2017. With higher refined prices, the average annual discount for refiners no. 2 scrap from the COMEX spot price rose to 37.7 cents per pound from 34.7 cents per pound, and the average monthly discount ranged between 33.6 cents per pound in December and 41.1 cents per pound in February.

Total refined copper stocks in the United States decreased by 20,800 t (8%) during the year to 244,000 t at the end of December from 265,000 t at the beginning of January. COMEX stocks fell by 91,800 t (48%), and wire-rod mill stocks declined by 5,910 t (21%). These decreases were partially offset by an increase in London Metal Exchange Ltd. stocks in U.S. warehouses, which were higher by 76,800 t (nearly fourfold). Combined stocks at brass mills, refineries, and other fabricators were essentially unchanged (table 1).

Foreign Trade

In 2018, net imports of refined copper into the United States were 588,000 t (778,000 t of imports and 190,000 t of exports), a decline of 18% from 719,000 t (813,000 t of imports and 94,200 t of exports) in 2017. Domestic refined copper replaced some refined copper imports, as the decrease in imports (35,100 t) was similar to the increase in U.S. refined production (31,800 t). Shipments to Canada, China, and Mexico accounted for nearly all refined copper exports from the United States and increased by a combined 96,100 t from those in 2017. These countries likely imported greater quantities of U.S. refined copper to counteract production shortfalls. In China, consumption of refined copper rose by 654,000 t, significantly more than the 376,000-t increase in refined production. In Canada and Mexico, consumption of refined copper increased by 1,000 t and 10,000 t, respectively, whereas refined copper output fell by 39,600 t and 26,400 t, respectively (tables 1, 14, 16, 22; International Copper Study Group, 2019, p. 19).

Refined copper accounted for 83% of domestic unmanufactured copper imports (refined copper, unalloyed copper scrap, and the copper content of alloyed copper scrap; blister and anodes; matte, ash, and precipitates; and ore and concentrates) and 15% of unmanufactured copper exports in 2018. Chile was the leading foreign source of refined copper for the United States and accounted for 62% of the total refined import quantity, followed by Canada (22%) and Mexico (8%).

The leading destinations for refined copper exports from the United States, in decreasing order of quantity, were Mexico (54%), China (25%), and Canada (20%). Imports of copper ore and concentrates predominantly originated from Mexico (greater than 99%) and increased to 32,100 t in 2018 from 14,000 t in 2017. Exports of copper ore and concentrates rose by 7% and were primarily shipped to Mexico (58%), China (19%), Canada (7%), and Japan (5%) (tables 14, 16).

The United States imported an estimated 123,000 t of copper contained in scrap during 2018, a decrease of 5% from 129,000 t in 2017. Imports of copper in scrap primarily originated from Canada (56%) and Mexico (31%) (table 19). Shipments of copper scrap from the United States to international markets declined by 9% to a total gross weight of 913,000 t (509,000 t of unalloyed copper scrap and 404,000 t of copper-alloy scrap) compared with 1.00 Mt (494,000 t of unalloyed scrap and 510,000 t of alloyed scrap) in 2017. Domestic copper scrap exports in 2018 were affected by multiple new regulations in China and a nearly 3-week suspension of United States recyclable material shipments to China (discussed in the "China" section). In 2017, copper scrap cargoes to China totaled 688,000 t and accounted for 68% of United States copper scrap exports. China remained the leading destination for copper scrap exports from the United States in 2018, accounting for 30% of the total, but shipments to China declined by 61% (417,000 t) to 271,000 t. In contrast, exports of domestic copper scrap to multiple other countries and localities in Asia were higher than those in 2017, with the largest increases represented by Malaysia, where United States deliveries rose by 114,000 t; the Republic of Korea, by 40,400 t; Japan, by 34,800 t; Taiwan, by 26,800 t; and India, by 23,400 t. Shipments of copper scrap to multiple countries in Europe, such as Belgium, Germany, Greece, the Netherlands, and Spain, also rose significantly relative to those in 2017. Following China, the leading destinations for United States exports of copper scrap in 2018 were Malaysia (13%), Canada (10%), the Republic of Korea (8%), and Japan (6%) (table 18).

Changes in copper scrap trade flows also took place outside of the United States. Based on worldwide import data, China accounted for 40% of total global copper scrap imports (by gross weight) in 2018, down from 52% in 2017. The largest increases in copper scrap imports were, in descending order, in Malaysia, Italy, Hong Kong, Poland, and India (International Copper Study Group, 2019, p. 40–41).

World Industry Structure

Mine Production.—World mine production of copper increased slightly to 20.4 Mt in 2018 from 19.9 Mt in 2017. Copper in concentrates accounted for 81% of global mine output and rose slightly to 16.4 Mt from 16.1 Mt in 2017. Copper produced by SX–EW represented 19% of world mine production and increased by 3% to 3.97 Mt from 3.85 Mt. Chile was the leading producer of mined copper and accounted for 29% of total global production, followed by Peru (12%), China (8%), Congo (Kinshasa) and the United States (6% each), and Australia (5%). The remaining countries among the 10 leading producers, in descending order of output, were Zambia, Russia, Mexico, and Indonesia. In 2018, 54 countries and localities were known to have mined copper. The 10 leading producers accounted for 80% of production, and the 20 leading producers accounted for 95%. The largest increases in production took place in Chile, where output rose by 328,000 t (6% higher than country production in 2017); Congo (Kinshasa), by 131,000 t (12%); Australia, by 64,000 t (7%); and Zambia, by 60,000 t (8%). These increases were partially offset by significant decreases in China, where production declined by 119,000 t (7%), and Canada, where output fell by 52,100 t (9%) (table 20). Explanatory comments regarding production changes are provided in the "World Review" section. According to data compiled by the International Copper Study Group (2019, p. 9), global mine capacity was essentially unchanged at 23.8 Mt in 2018, and global mine capacity utilization increased to 86.5% from 84.2%.

Refined Production.—Global output of refined copper increased slightly in 2018 to a record-high 24.4 Mt from 23.9 Mt in 2017. Production of primary copper represented 83% of world refined production and totaled 20.2 Mt, 3% greater than 19.7 Mt in 2017; electrowon copper output (16% of worldwide refined production) and primary copper produced by electrolytic and fire refining (other primary, 67%) each rose by 3%. Production of secondary copper accounted for 17% of global refined output and was essentially unchanged from that in 2017 at 4.14 Mt. China was the leading producer of refined copper and accounted for 38% of world refinery production, followed by Chile (10%), Japan (7%), and the United States (5%). The remaining countries among the 10 leading producers, in descending order of output, were Russia, Congo (Kinshasa), the Republic of Korea, Germany, India, and Poland. In 2018, 45 countries and localities were known to have produced refined copper. The 10 leading producers accounted for 77% of worldwide output, and the 20 leading producers accounted for 92%. Most of the growth in refined copper production was in China, where output increased by 376,000 t (4% greater than country production in 2017). Large increases also took place in Congo (Kinshasa), by 123,000 t (15%); Japan, by 106,000 t (7%); Iran, by 78,400 t (49%), and Russia, by 75,300 t (8%). The most significant decrease was in India, where production declined by 275,000 t, 33% lower than that in 2017 (table 22). Explanatory comments regarding production changes are provided in the "World Review" section. Global refinery capacity rose slightly to 27.6 Mt in 2018 from 27.4 Mt in the prior year, and global refinery capacity utilization increased to 87.2% from 86.0% (International Copper Study Group, 2019, p. 9).

Apparent Consumption.—In 2018, global apparent consumption of refined copper increased by 3% to a record-high 24.4 Mt from 23.7 Mt in 2017, according to the ICSG. The leading users of refined copper were China (which accounted for 51% of worldwide consumption), the United States (7%), Germany (5%), Japan (4%), and the Republic of Korea (3%). The remaining countries among the 10 leading consumers, in descending order of quantity, were Italy, India, Turkey, the United Arab Emirates, and Mexico. The 10 leading countries and localities accounted for 80% of global apparent consumption. Consumption of copper in China increased by 654,000 t, 6% higher than that in 2017. In all countries and localities except China, consumption collectively increased by 24,700 t. The ICSG calculation of China's apparent consumption

was based on reported production, trade, and SHFE stock data and did not include unreported Government or industry stocks, which can fluctuate significantly on an annual basis. By region, use of refined copper in Asia accounted for 74% of the global total in 2018 (23% excluding China), followed by Europe (14%); North America (10%); and South America, Africa, and Oceania (3% combined). Consumption increased by 3% in Asia (but decreased slightly if China is excluded) and rose slightly in Europe and North America (International Copper Study Group, 2019, p. 9, 19–20).

World Review

Australia.—Mined copper production in Australia increased by 7% to 920,000 t in 2018 from 856,000 t in 2017 (table 20). Newcrest Mining Ltd. increased copper production at the Cadia Valley Mine by 19,100 t (34%) from that in 2017, when an earthquake disrupted operations for several months. The Capricorn copper project (owned by EMR Capital Pty Ltd.) commenced production in late 2017 and was ramping up to an annual capacity of 30,000 t (Department of Industry, Innovation, and Science, 2018, p. 99; Newcrest Mining Ltd., 2018, p. 21; 2019).

Production statistics at the mine level were not available for two of the leading copper operations in Australia, the Mount Isa and Olympic Dam complexes. Glencore plc produced 152,000 t of refined metal (excluding production from third-party materials) at Mount Isa, a reduction of 8% from 165,000 t in 2017. At Olympic Dam, BHP Group produced 147,000 t of electrolytic and electrowon copper cathode in 2018, an increase of 4% from 142,000 t. Output was affected by a failure of several boiler tubes at the sulfuric acid plant in August, which supplied acid used in leaching operations (BHP Group, 2018, p. 15; 2019, p. 7, 16; Thomson Reuters, 2018; Glencore plc, 2019, p. 222).

Canada.—In 2018, production decreased at nearly all copper mines in Canada, and total mine output fell by 9% to 543,000 t of copper from 595,000 t in 2017 (table 20). The largest declines in production took place at the Sudbury complex (owned by Vale S.A.), where output fell by 26,000 t; at the Voisey's Bay Mine (Vale), by 7,800 t; and at the Gibraltar Mine [majority-owned by Taseko Mines Ltd. (75% share)], by 7,260 t. Vale attributed the decreases at the Sudbury complex and the Voisey's Bay Mine to a strategic decision to deprioritize its nickel operations, resulting in lower production of copper byproduct. At Gibraltar, copper ore grades were lower than those in 2017. The only significant increase in production was at the Highland Valley Mine (Teck Resources Ltd.), where mined copper output rose by 8,000 t (9%) from that in 2017 because of higher ore grades (Taseko Mines Ltd., 2019; Teck Resources Ltd., 2019, p. 21; Vale S.A., 2019).

Chile.—In 2018, 7 of the leading 20 copper mines in the world were located in Chile, the first-ranked global producer of mined copper since 1982. Mined copper production in Chile increased by 6% to 5.83 Mt from 5.50 Mt in 2017 (table 20). At the Escondida Mine [the first-ranked global copper mine by output in 2018, majority-owned by BHP (57.5%)], production rose by 34% to 1.21 Mt from 903,000 t in 2017, when operations were affected by a 43-day labor strike. The higher output also reflected the rampup to full capacity of a new concentrator that was commissioned in the second half of 2017 (BHP Group, 2018, p. 14; 2019, p. 15; Rio Tinto Group, 2019a, p. 44). At the Collahuasi Mine [second-ranked, Anglo American plc and Glencore (44% each)], production was 559,000 t in 2018, up by 7% from 524,000 t because of higher ore grades and improved copper recovery rates following planned maintenance and the installation of 24 new flotation cells in the first half of the year. Owing to higher ore grades, output rose by 20% at the Los Bronces Mine [11th-ranked, Anglo American (50.1%)], to 370,000 t from 308,000 t (Anglo American plc, 2019, p. 58, 212). At the Los Pelambres Mine [12th-ranked, Antofagasta plc (60%)], copper production was 358,000 t in 2018, an increase of 4% from 344,000 t in 2017 as a result of higher mill throughput. Antofagasta approved a project to expand the capacity of the copper concentrator at Los Pelambres, which was expected to increase production by 60,000 t/yr of copper beginning in 2021 (Antofagasta plc, 2019, p. 63, 207). In 2018, the state-owned Corporación Nacional del Cobre de Chile (Codelco) operated 7 mines in the country, 3 of which were ranked among the 20 leading global copper mines. An overall decrease of 3% in mined copper production at Codelco's operations, to 1.68 Mt compared with 1.73 Mt in 2017, partially offset the increases at other major copper mines in Chile. The company attributed the decline to lower copper ore grades (Corporación Nacional del Cobre de Chile, 2019, p. 27–28).

Refined copper output in Chile was 2.46 Mt in 2018, a slight increase from 2.43 Mt in 2017 (table 22). In 2018, Codelco's three electrolytic refineries and five electrowon refineries accounted for about 50% of the refined copper capacity in Chile, and other SX–EW operations accounted for the remainder (International Copper Study Group, 2018, p. 167–175). Codelco did not report refined copper production in 2018, but the company's refined sales rose slightly to 1.36 Mt from 1.33 Mt in 2017 (Corporación Nacional del Cobre de Chile, 2018, p. 46; 2019, p. 31). Output of refined copper also increased by 28,800 t at Escondida, where operations returned to normal following a prolonged labor strike in 2017; by 28,000 t at Antofagasta's Centinela division (70%-owned), where an electrowon tankhouse ramped up to design capacity after opening in 2017; and by approximately 12,000 t at Freeport's El Abra complex (51%-owned), which resumed operating at full capacity following several years of reduced mining rates (Antofagasta plc, 2019, p. 64–65; Freeport-McMoRan Inc., 2019, p. 15, 25; Rio Tinto Group, 2019b, p. 7, 26). In contrast, production of refined copper fell by 22,200 t at BHP's Spence facility because of a fire and subsequent production outage at the electrowon tankhouse in September, and by 8,800 t at the Zaldivar division [Antofagasta and Barrick Gold. Corp. (50% each)], owing to lower plant throughput resulting from multiple stoppages (BHP Group, 2018, p. 14; 2019, p. 7, 15; Antofagasta plc, 2019, p. 67). These 13 operations accounted for roughly 85% of refined copper production in Chile in 2018.

On December 13, Codelco suspended operations at its Chuquicamata and Potrerillos smelters to complete delayed upgrades required to meet new national environmental standards. The company expected the closures to last for 75 days and 45 days, respectively. These facilities collectively

represented nearly 3% of global smelter capacity in 2018 (CRU International Ltd., 2018d, p. 14; International Copper Study Group, 2018; p. 144–145, 163).

China.—Beijing Antaike Information Co., Ltd. estimated that refined copper capacity in China increased by about 1.2 Mt in 2018 to 12.2 Mt. New capacity came online at a minimum of seven refineries in the country, either through the opening of new facilities or upgrades at existing facilities. Most notably, Chinalco Southeast Copper Co., Ltd. finished construction of a new refinery with an annual cathode production capacity of 400,000 t, and Guangxi Nanguo Copper Co. completed a 300,000-t/yr expansion (Beijing Antaike Information Co., Ltd., 2018a, p. 8–9; 2018b). Output of refined copper in China increased by 4% to 9.29 Mt in 2018 from 8.92 Mt in 2017 (table 22).

In January, the Ministry of the Environment issued a ruling that prohibited traders from importing copper scrap. Only consumers that directly used scrap, had the facilities necessary to process it, and obtained a pollution discharge license before receiving any material were permitted to import nonferrous scrap and other recyclable items. The Government of China also enacted a ban on nonferrous scrap imports with a contaminant content (such as mud, paper, plastic) exceeding 1%, effective March 1. From May 4 through May 22, all domestic scrap exports to China were halted while operations of the China Certification and Inspection Group (CCIC), which conducts inspections of cargo bound for China, were suspended in the United States. The agency that administered the CCIC attributed the shutdown to the discovery of numerous U.S. scrap shipments at Chinese ports that did not meet environmental protection requirements. Following the restart of CCIC inspections, the Government of China required every China-bound container of recyclable material from the United States to be examined. A 25% tariff on United States copper scrap imports into China went into effect on August 23 (CRU International Ltd., 2018a; 2018c, p. 13; 2019; Staub, 2018a, b).

Congo (Kinshasa).—Owing primarily to the restart of ore processing operations at the Kamoto complex [majority-owned by Glencore (75%) and operated by Katanga Mining Ltd.], output of mined copper in Congo (Kinshasa) increased by 12% to 1.23 Mt in 2018 from 1.09 Mt in 2017, and refined copper production rose by 15% to 953,000 t from 830,000 t (tables 20, 22). From September 2015 until November 2017, ore processing at Kamoto was suspended while Katanga Mining completed the first phase of a capacity expansion project. Cathode production resumed in December 2017, and the final components of the second phase of expansion were completed and began ramping up in the fourth quarter of 2018. Output of SX–EW cathode increased by 150,000 t in 2018 and was expected to increase by roughly 135,000 t in 2019 (Katanga Mining Ltd., 2018, 2019). Mined copper production also rose significantly at the Kolwezi Mine [Zijin Mining Group Co., Ltd. (72%)], to 53,200 t of copper in concentrates in 2018 from 21,900 t in 2017, owing to technological upgrades that resulted in increased capacity (Zijin Mining Group Co., Ltd., 2018, p. 12; 2019, p. 15, 18, 21). These production increases were partially offset by a decrease of 21% in output at the Tenke Fungurume Mine and electrowon facility [China Molybdenum Co., Ltd. (56%)], to 168,000 t in 2018 from 214,000 t in 2017 (China Molybdenum Co., Ltd., 2018, p. 18; 2019, p. 18).

India.—Refined copper production in India was an estimated 554,000 t in 2018, 33% less than 829,000 t in 2017 (table 22). In late May, the government of the State of Tamil Nadu ordered the permanent closure of Vedanta Ltd.'s Tuticorin smelter owing to violations of environmental laws. The plant had been closed since late March, when regulators rejected the company's request to restart production after a planned maintenance shutdown. In December, the National Green Tribunal, a court that handles cases pertaining to environmental issues in India, determined that the smelter shutdown was unjustified. The facility remained closed at yearend, pending a final ruling by the Supreme Court of India. In 2018, Tuticorin had an annual capacity of 400,000 t of copper, equivalent to about 40% of the copper smelter capacity in India and nearly 2% of global smelter capacity (CRU International Ltd., 2018b, p. 15; International Copper Study Group, 2018, p. 150–151, 163; Mughal, 2018).

Indonesia.—In December 2018, Freeport reached an agreement with the Government of Indonesia for an extension of the mining license at the Grasberg Mine (third-ranked) through 2031, which had been set to expire in 2021. The license would be valid through 2041 once the company constructed a new smelter in Indonesia and fulfilled other fiscal obligations. As part of the agreement, Freeport divested a portion of its 90.64% ownership in the mine to PT Inalum, an Indonesian state-owned firm, and held a 48.76% stake following the transaction. The company's license to export copper concentrates would require approval by the Government of Indonesia every 6 months, depending on smelter construction progress. Production of mined copper at Grasberg increased by 18% to 526,000 t in 2018 from 446,000 t in 2017, when operations were affected by multiple disruptions related to restrictions on copper concentrate exports. Freeport expected production from the underground portion of the mine to commence in the first half of 2019 and anticipated that mine output would be lower than that in 2018 during the transition from open pit to underground operations in 2019 and 2020 (Freeport-McMoRan Inc., 2019, p. 16–17, 25, 81, 83, 121).

Panama.—A partial strike at the Cobre Panama project [First Quantum Minerals Ltd. (90%)] began on March 9 and ended on March 26. First Quantum had previously anticipated that the mine (the only copper operation in Panama and the only major worldwide copper project expected to initiate production in 2018) would begin ramping up in the fourth quarter of the year. The project was nearing completion at yearend 2018, with first production expected in early 2019. First Quantum projected that Cobre Panama would produce 300,000 t/yr of copper in concentrates by 2021 (Keen, 2018; Luk, 2018; First Quantum Minerals Ltd., 2019, p. 3–4).

Peru.—In 2018, 4 of the leading 20 copper mines in the world were located in Peru, and mine production of copper was essentially unchanged at 2.44 Mt (table 20). At the Antamina Mine [sixth-ranked, BHP and Glencore (33.75% each)], copper output rose by 6% (23,600 t) to 446,000 t because of increased copper ore grades compared with those in 2017 (Teck Resources Ltd., 2019, p. 21). Higher production at Antamina was offset by reduced output from other leading copper mines in Peru. Owing to lower copper recovery rates, production at the Cerro Verde

Mine [fourth-ranked, Freeport (53.56%)] decreased slightly (by roughly 6,000 t) to 476,000 t (Freeport-McMoRan Inc., 2019, p. 15, 25, 79). At the Las Bambas Mine [10th-ranked, MMG Ltd. (62.5%)], slippages in the walls of the open pit restricted access to zones of higher ore grades in the first and third quarters. Copper output from the mine, which fell by 15% (68,500 t) to 385,000 t in 2018, was also affected by a planned major maintenance shutdown in April (MMG Ltd., 2018, p. 23; 2019, p. 4, 20). Glencore produced 205,000 t of copper at the Antapaccay Mine (19th-ranked), a slight decline from that in 2017 (Glencore plc, 2019, p. 222). In 2018, these four operations accounted for about 60% of mined copper production in Peru.

Russia.—Refined copper production rose by 8% in 2018 to an estimated 1.03 Mt from 956,000 t in 2017 (table 22). PJSC MMC Norilsk Nickel, which owned multiple refineries that accounted for roughly 40% of the refined copper capacity in Russia, reported refined output of 426,000 t from its Russian operations, an increase of 47,300 t (13%) from that in 2017. The company attributed the higher production to upgrades at one of its concentrators and increased processing of third-party concentrates. At the Kyshtym refinery, Russian Copper Company ZAO was working on a project to increase its copper cathode production capacity by 15% to 140,000 t/yr (International Copper Study Group, 2018, p. 192–193; Russian Copper Company ZAO, 2018; PJSC MMC Norilsk Nickel, 2019).

Zambia.—In 2018, output of mined copper increased by 60,000 t (8%) to 854,000 t from 794,000 t in 2017 (table 20). Production at some of the leading copper mines in Zambia was as follows: the Kansanshi Mine [16th-ranked, First Quantum (80%)]—252,000 t (251,000 t in 2017); the Sentinel Mine (17th-ranked, First Quantum)—224,000 t (191,000 t in 2017); and the Lumwana Mine (Barrick Gold)—102,000 t (116,000 t in 2017). The combined output of these three operations was equivalent to 68% of the country's total mined copper in 2018 and rose by 19,200 t compared with production in 2017. First Quantum attributed the higher production at Sentinel to increased plant throughput and improved copper recovery rates, whereas production declined at Lumwana owing to mill shutdowns and lower ore grades and recoveries. Production likely also increased at the Mopani mining units in Zambia [Glencore (73.1%)]. Excluding production from third-party feed materials, Glencore reported that output of refined copper from its Mopani operations increased by 42% to 59,300 t in 2018 from 41,700 t in 2017; production statistics at the mine level were not reported (Barrick Gold Corp., 2019, p. 31, 39; First Quantum Minerals Ltd., 2019, p. 13, 23; Glencore plc, 2019, p. 221).

Outlook

Based on production guidance published by companies that operate in the United States, domestic mine output in 2019 will likely be slightly higher than that in 2018. The Gunnison project in Arizona and the Pumpkin Hollow project in Nevada are expected to start producing in the fourth quarter of 2019. Globally, mine and refinery production capacities are projected to increase slightly, and commercial operations at the Cobre Panama project will likely begin in early 2019. Worldwide and domestic copper consumption will continue to depend on economic trends in sectors such as automobiles, housing and building construction, HVAC, power utilities, and telecommunications.

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TABLE 1
SALIENT COPPER STATISTICS[1]

(Metric tons, copper content, unless otherwise specified)

		2014	2015	2016	2017	2018
United States:						
Mine production:						
Copper ore concentrated, gross weight		175,000,000	164,000,000	155,000,000	151,000,000	138,000,000
Average copper yield of concentrated copper ore	percent	0.47	0.47	0.50	0.44	0.48
Recoverable copper:[2]						
Arizona		893,000	961,000	969,000	868,000	801,000
Other States		464,000	422,000	461,000	391,000	421,000
Total		1,360,000	1,380,000	1,430,000	1,260,000	1,220,000
Total value[3]	millions	$9,510	$7,810	$7,090	$7,920	$8,050
Smelter production:						
Primary (from ore)[4]		522,000	527,000	563,000	470,000	536,000
Byproduct sulfuric acid, sulfur content		545,000	605,000	636,000	489,000	633,000
Refinery production:						
Primary materials (ore):						
Electrolytic		535,000	503,000	561,000	482,000	538,000
Electrowon		514,000	588,000	615,000	557,000	532,000
Total		1,050,000	1,090,000	1,180,000	1,040,000	1,070,000
Secondary materials (scrap), electrolytic and fire-refined		46,000	48,800	46,300	40,100	41,200
Grand total, primary and secondary refinery		1,090,000	1,140,000	1,220,000	1,080,000	1,110,000
Secondary production:[5]						
Recovered from new (manufacturing) scrap		672,000	640,000	690,000	702,000	712,000
Recovered from old (post-consumer) scrap		173,000	166,000	149,000	146,000	149,000
Total		845,000	806,000	838,000	847,000 r	861,000
Copper sulfate production, gross weight		22,900	18,500	18,400	18,400	18,200
Exports, refined[6]		127,000	86,200	134,000	94,200	190,000
Imports for consumption, refined[6]		620,000	687,000	708,000	813,000	778,000
General imports, refined[6]		614,000	665,000	701,000	820,000	748,000
Stocks (closing), December 31:						
Blister and anodes		9,860	13,900	14,400	12,600	9,230
Refined copper:						
Refineries		9,540	12,000	4,190	5,840	3,850
Wire-rod mills		42,000	36,200	26,700	27,800	21,800
Brass mills		7,400	7,580	7,380	7,870	8,210
Other industry		5,090	5,730	5,430 r	5,360 r	7,070
Commodity Exchange Inc. (COMEX)[7]		23,900	63,200	80,700	191,000	99,600
London Metal Exchange Ltd. (LME), U.S. warehouses[7]		102,000	83,800	98,900	27,100	104,000
Total		190,000	209,000	223,000	265,000	244,000
Consumption:						
Reported, refined copper		1,760,000	1,810,000	1,800,000	1,800,000	1,820,000
Apparent, primary refined copper and copper from old scrap[8]		1,780,000	1,820,000	1,880,000	1,870,000	1,800,000
Price, annual average:[7]						
U.S. producer cathode[9]	cents per pound	318.05	256.15	224.87	285.39	298.74
COMEX, first position	do.	312.00	250.81	219.73	280.43	292.57
LME, grade A cash	do.	311.13	249.53	220.57	279.52	295.96
World, production:						
Mine		18,600,000	19,200,000	20,400,000	19,900,000 r	20,400,000
Smelter		18,000,000	18,400,000 r	18,800,000 r	19,100,000 r	19,500,000
Refinery		22,800,000	23,200,000	23,600,000 r	23,900,000	24,400,000

rRevised. do. Ditto.

[1]Table includes data available through July 7, 2021. Data are rounded to no more than three significant digits, except prices; may not add to totals shown.

[2]Copper recoverable in concentrates (of copper and other metals) and precipitates plus copper produced by solvent extraction and electrowinning.

[3]Calculated with the U.S. producer cathode price.

[4]May contain small amounts of scrap.

[5]Copper converted to refined metal and alloys by refineries and manufacturers (brass mills, chemical plants, foundries, wire-rod mills, and so on).

[6]Source: U.S. Census Bureau.

[7]Source: Platts Metals Week.

[8]Primary refined production plus copper recovered from old scrap plus general refined imports minus refined exports, including adjustments for changes in refined stocks.

[9]Sum of the COMEX price and average New York dealer cathode premiums; reflects the delivered price of copper to domestic consumers by domestic producers.

TABLE 2

LEADING COPPER-PRODUCING MINES IN THE UNITED STATES IN 2018, IN ORDER OF OUTPUT[1, 2]

Rank	Mine	County and State	Operator	Source of copper	Capacity (thousand metric tons)
1	Morenci	Greenlee, AZ	Freeport-McMoRan Inc.	Copper-molybdenum ore, concentrated and leached	580
2	Bingham Canyon	Salt Lake, UT	Rio Tinto Kennecott[3]	Copper-molybdenum ore, concentrated	220
3	Bagdad	Yavapai, AZ	Freeport-McMoRan Inc.	Copper-molybdenum ore, concentrated and leached	110
4	Chino	Grant, NM	do.	Copper ore, concentrated and leached	145
5	Sierrita	Pima, AZ	do.	Copper-molybdenum ore, concentrated and leached	110
6	Safford	Graham, AZ	do.	Copper ore, leached	110
7	Ray	Pinal, AZ	ASARCO LLC[4]	Copper ore, concentrated and leached	133
8	Pinto Valley	Gila, AZ	Capstone Mining Corp.	Copper-molybdenum ore, concentrated and leached	65
9	Robinson	White Pine, NV	Robinson Nevada Mining Co.[5]	Copper-molybdenum ore, concentrated	65
10	Mission	Pima, AZ	ASARCO LLC[4]	Copper ore, concentrated	75
11	Continental Pit	Silver Bow, MT	Montana Resources LLP	Copper-molybdenum ore, concentrated	40
12	Tyrone	Grant, NM	Freeport-McMoRan Inc.	Copper ore, leached	45
13	Silver Bell	Pima, AZ	ASARCO LLC[4]	do.	21
14	Eagle	Marquette, MI	Lundin Mining Corp.	Nickel-copper ore, concentrated	25
15	Phoenix	Lander, NV	Newmont Mining Corp.	Gold-copper ore, concentrated and leached	30
16	Miami	Gila, AZ	Freeport-McMoRan Inc.	Copper ore, leached	90
17	Carlota	do.	Carlota Copper Co.[5]	do.	35

do. Ditto.

[1]Table includes data available through July 7, 2021.

[2]The mines listed accounted for more than 99% of U.S. mine production in 2018.

[3]Wholly owned subsidiary of Rio Tinto Group.

[4]Wholly owned subsidiary of Grupo México, S.A.B. de C.V.

[5]Wholly owned subsidiary of KGHM International Ltd.

TABLE 3

MINE PRODUCTION OF COPPER-BEARING ORES AND RECOVERABLE COPPER CONTENT OF ORES PRODUCED IN THE UNITED STATES, BY SOURCE AND TREATMENT PROCESS[1]

(Metric tons)

Source and treatment process	2017		2018	
	Gross weight	Recoverable copper	Gross weight	Recoverable copper
Mined copper ore:				
Concentrated	151,000,000	666,000	138,000,000	659,000
Leached	NA	557,000	NA	532,000
Total	NA	1,220,000	NA	1,190,000
Copper precipitates shipped, leached from tailings, dumps, and in-place material	NA	W	NA	W
Other copper-bearing ores[2]	4,500,000	35,700	4,550,000	30,700
Grand total	XX	1,260,000	XX	1,220,000

NA Not available. W Withheld to avoid disclosing company proprietary data; included with "Other copper-bearing ores." XX Not applicable.

[1]Table includes data available through July 7, 2021. Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Includes gold ore, lead ore, and nickel ore.

TABLE 4
CONSUMPTION OF COPPER AND BRASS MATERIALS IN THE UNITED STATES, BY ITEM[1]

(Metric tons, gross weight)

Item	Brass mills	Wire-rod mills	Foundries, chemical plants, miscellaneous users	Smelters, refiners, ingot makers	Total
2017:					
Copper scrap	638,000 r	105,000	42,500 r	125,000	910,000
Refined copper	420,000	1,320,000	58,000 r	4,550	1,800,000
Hardeners and master alloys	9,800	--	3,710	--	13,500
Brass ingots	--	--	58,800 r	--	58,800 r
Slab zinc	33,200	--	358	309	33,900
2018:					
Copper scrap	645,000	104,000	42,900	124,000	916,000
Refined copper	419,000	1,330,000	60,800	4,550	1,820,000
Hardeners and master alloys	9,790	--	3,550	--	13,300
Brass ingots	--	--	60,800	--	60,800
Slab zinc	33,200	--	465	358	34,000

rRevised. -- Zero.
[1]Table includes data available through July 7, 2021. Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 5
CONSUMPTION OF REFINED COPPER SHAPES IN THE UNITED STATES, BY CLASS OF CONSUMER[1]

(Metric tons)

Class of consumer	Cathodes	Ingots and ingot bars	Cakes and slabs	Wirebar, billets, other	Total
2017:					
Wire-rod mills	1,320,000	--	--	(2)	1,320,000
Brass mills	324,000	W	43,900	51,600	420,000
Chemical plants	W	--	--	242	242
Ingot makers	W	W	--	4,550	4,550
Foundries	17,900 r	4,750 r	--	9,430	32,100 r
Miscellaneous[3]	W	W	--	25,600 r	25,600 r
Total	1,660,000	4,750 r	43,900	91,400 r	1,800,000
2018:					
Wire-rod mills	1,330,000	--	--	(2)	1,330,000
Brass mills	323,000	W	43,800	51,600	419,000
Chemical plants	W	--	--	236	236
Ingot makers	W	W	--	4,550	4,550
Foundries	W	4,280	--	29,700	34,000
Miscellaneous[3]	W	W	--	26,600	26,600
Total	1,650,000	4,280	43,800	113,000	1,820,000

rRevised. W Withheld to avoid disclosing company proprietary data; included with "Wirebar, billets, other." -- Zero.
[1]Table includes data available through July 7, 2021. Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Withheld to avoid disclosing company proprietary data; included with "Cathodes."
[3]Includes consumers of copper powder and copper shot, iron and steel plants, and other manufacturers.

TABLE 6
COPPER RECOVERED FROM SCRAP PROCESSED IN THE UNITED STATES,
BY KIND OF SCRAP AND FORM OF RECOVERY[1]

(Metric tons)

	2017	2018
Kind of scrap:		
New:		
Copper-base	663,000	672,000
Aluminum-base	38,300	40,500
Nickel-base	18	18
Total	702,000	712,000
Old:		
Copper-base	115,000	116,000
Aluminum-base	30,500	32,300
Nickel-base	254	254
Zinc-base	10	9
Total	146,000	149,000
Grand total, new and old scrap	847,000 r	861,000
Form of recovery:		
As unalloyed copper	40,200	41,300
In brass and bronze	737,000 r	746,000
In aluminum alloys	67,600 r	71,900
In alloy iron and steel and other alloys	689 r	689
In chemical compounds	1,800 r	1,800
Total	847,000 r	861,000

rRevised.
[1]Table includes data available through July 7, 2021. Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 7
COPPER RECOVERED AS REFINED COPPER AND IN ALLOYS AND OTHER FORMS
FROM COPPER-BASE SCRAP PROCESSED IN THE UNITED STATES, BY TYPE OF OPERATION[1]

(Metric tons)

	From new scrap		From old scrap		Total	
Type of operation	2017	2018	2017	2018	2017	2018
Ingot makers	8,550 r	9,210	48,300	48,700	56,800	57,900
Refineries[2]	20,100	20,100	20,000	21,000	40,100	41,200
Brass and wire-rod mills	608,000	617,000	36,900	35,800	645,000	652,000
Foundries and miscellaneous manufacturers	26,200 r	25,800	9,950	11,000	36,200 r	36,700
Total	663,000	672,000	115,000	116,000	778,000 r	788,000

rRevised.
[1]Table includes data available through July 7, 2021. Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Electrolytically refined and fire refined from scrap based on source of material at smelter or refinery level.

TABLE 8
PRODUCTION OF SECONDARY COPPER AND COPPER-ALLOY PRODUCTS
IN THE UNITED STATES, BY ITEM PRODUCED FROM SCRAP[1]

(Metric tons, gross weight)

Item produced from scrap	2017	2018
Unalloyed copper products:[2]	40,200	41,300
Alloyed copper products:		
Brass and bronze ingots:		
Tin bronzes	5,820	5,820 e
Leaded red brass and semi-red brass	35,500	35,500 e
High leaded tin bronze	4,920	4,920 e
Yellow brass	1,280	1,280 e
Manganese bronze	6,170	6,170 e
Aluminum bronze	4,660	4,560
Nickel silver	1,020	1,020 e
Silicon bronze and brass	3,630	3,440
Copper-base hardeners and master alloys	4,480	4,480 e
Miscellaneous	6,090	7,010
Total	73,600	74,200
Brass mill and wire-rod mill products	729,000	735,000
Brass and bronze castings	32,400 r	33,800
Copper in chemical products	1,800 r	1,800
Grand total	877,000 r	887,000

eEstimated. rRevised.
[1]Table includes data available through July 7, 2021. Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Includes electrolytically refined copper, fire-refined copper, and copper castings.

TABLE 9
COMPOSITION OF SECONDARY COPPER-ALLOY PRODUCTION IN THE UNITED STATES[1]

(Metric tons)

	Copper	Tin	Lead	Zinc	Nickel	Aluminum	Total
Brass and bronze ingot production:							
2017	60,700 r	2,540 r	3,720 r	6,550 r	119	10 r	73,600
2018	59,400	3,200	4,500	6,960	125	10	74,200
Secondary metal content of brass mill products:							
2017	645,000	W	W	80,100	W	W	729,000
2018	652,000	W	W	79,900	W	W	735,000
Secondary metal content of brass and bronze castings:							
2017	31,500 r	117	129 r	421 r	79	W	32,400 r
2018	32,900	136	143	638	W	27	33,800

rRevised. W Withheld to avoid disclosing company proprietary data.
[1]Table includes data available through July 7, 2021. Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 10
CONSUMPTION AND YEAREND STOCKS OF COPPER-BASE SCRAP IN THE UNITED STATES, BY SCRAP TYPE AND PROCESSOR[1]

(Metric tons, gross weight)

Scrap type and processor	2017		2018	
	Consumption	Stocks	Consumption	Stocks
Unalloyed scrap:				
No. 1 wire and heavy:				
Smelters, refiners, and ingot makers	13,200	W	9,990	W
Brass and wire-rod mills	391,000	(2)	393,000	(2)
Foundries and miscellaneous manufacturers	18,900	(2)	20,600	(2)
No. 2 mixed heavy and light:				
Smelters, refiners, and ingot makers	58,400	W	59,400	W
Brass and wire-rod mills	87,400	(2)	92,300	(2)
Foundries and miscellaneous manufacturers	12,500	(2)	12,000	(2)
Total unalloyed scrap:				
Smelters, refiners, and ingot makers	71,600	68,200	69,400	68,200
Brass and wire-rod mills	478,000	1,060	486,000	1,260
Foundries and miscellaneous manufacturers	31,400	3,450 r	32,600	3,290
Alloyed scrap:				
Red brass:[3]				
Smelters, refiners, and ingot makers	12,300	1,450	12,300	1,450
Brass mills	W	(2)	W	(2)
Foundries and miscellaneous manufacturers	W	(2)	W	(2)
Leaded yellow brass:				
Smelters, refiners, and ingot makers	8,800	774	8,800	774
Brass mills	W	(2)	W	(2)
Foundries and miscellaneous manufacturers	W	(2)	640	(2)
Yellow and low brass, all plants	65,700	766	65,400	902
Cartridge cases and brass, all plants	W	W	W	W
Auto radiators:				
Smelters, refiners, and ingot makers	15,100	663	15,100	663
Foundries and miscellaneous manufacturers	W	(2)	W	(2)
Bronzes:				
Smelters, refiners, and ingot makers	8,560	532	8,640	536
Brass mills and miscellaneous manufacturers	332 r	(2)	408	(2)
Nickel-copper alloys, all plants	9,690	159	9,670	186
Low grade and residues; smelters, refiners, miscellaneous manufacturers	8,890	620	8,890	620
Other alloy scrap:[4]				
Smelters, refiners, and ingot makers	W	209	W	209
Brass mills and miscellaneous manufacturers	5,440	(2)	W	(2)
Total alloyed scrap:				
Smelters, refiners, and ingot makers	53,700	5,200	54,600	5,230
Brass mills	264,000	323	263,000	501
Foundries and miscellaneous manufacturers	11,100 r	1,270 r	10,300	1,160
Grand total, scrap:				
Smelters, refiners, and ingot makers	125,000	73,400	124,000	73,500
Brass and wire-rod mills	742,000	1,380	749,000	1,760
Foundries and miscellaneous manufacturers	42,500 r	4,720 r	42,900	4,450

rRevised. W Withheld to avoid disclosing company proprietary data; included in totals.

[1]Table includes data available through July 7, 2021. Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Individual breakdown is not available; included in totals.

[3]Includes cocks and faucets, commercial bronze, composition turnings, gilding metal, railroad car boxes, and silicon bronze.

[4]Includes aluminum bronze, beryllium copper, and refinery brass.

TABLE 11
CONSUMPTION OF PURCHASED COPPER-BASE SCRAP IN THE UNITED STATES, BY TYPE OF OPERATION[1]

(Metric tons, gross weight)

Type of operation	New scrap		Old scrap		Total	
	2017	2018	2017	2018	2017	2018
Ingot makers	24,400	24,600	60,400 r	57,500	84,800	82,100
Smelters and refineries	21,000	20,900	19,500	20,900	40,500	41,800
Brass and wire-rod mills[2]	704,000	712,000	38,000	36,800	742,000	749,000
Foundries and miscellaneous manufacturers	31,300 r	30,800	11,200	12,100	42,500 r	42,900
Total	781,000	789,000	129,000	127,000	910,000	916,000

rRevised.
[1]Table includes data available through July 7, 2021. Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Consumption at brass and wire-rod mills assumed equal to receipts.

TABLE 12
FOUNDRIES AND MISCELLANEOUS MANUFACTURERS CONSUMPTION OF BRASS INGOT, REFINED COPPER, AND COPPER SCRAP IN THE UNITED STATES, BY INGOT TYPE OR MATERIAL CONSUMED[1]

(Metric tons, gross weight)

Ingot type or material consumed	2017	2018
Brass ingot:		
Tin bronzes	6,370 r	7,220
Leaded red brass and semi-red brass	24,200 r	25,300
Yellow, leaded, low brass[2]	14,600 r	14,000
Manganese bronze	2,380 r	2,390
Nickel silver[3]	4,270	4,720
Aluminum bronze	3,120	3,290
Hardeners and master alloys[4]	3,710	3,550
Lead free alloys[5]	3,890	3,880
Total	62,500 r	64,300
Refined copper	58,000 r	60,800
Copper scrap	42,500 r	42,900

rRevised.
[1]Table includes data available through July 7, 2021. Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Includes brass and silicon bronze.
[3]Includes brass, copper nickel, and nickel bronze.
[4]Includes special alloys.
[5]Includes copper-bismuth and copper-bismuth-selenium alloys.

TABLE 13
AVERAGE BUYING PRICES FOR COPPER SCRAP IN THE UNITED STATES, BY TYPE[1]

(Cents per pound)

			New York dealers	
Year	Brass mills no. 1 scrap	Refiners no. 2 scrap	No. 2 scrap	Red brass turnings and borings
2017	271.69	245.68	189.25	149.55
2018	283.19	254.90	200.31	150.76

[1]Table includes data available through July 7, 2021.

Source: Fastmarkets-AMM.

TABLE 14

U.S. EXPORTS OF UNMANUFACTURED COPPER (COPPER CONTENT), BY COUNTRY OR LOCALITY[1]

	Ore and concentrates[2]		Matte, ash, and precipitates[3]		Blister and anodes[4]		Refined[5]		Unalloyed copper scrap[6]		Total	
Country or locality	Quantity (metric tons)	Value[7] (thousands)	Quantity (metric tons)	Value[7] (thousands)	Quantity (metric tons)	Value[7] (thousands)	Quantity (metric tons)	Value[7] (thousands)	Quantity (metric tons)	Value[7] (thousands)	Quantity (metric tons)	Value[7] (thousands)
2017	237,000	$1,580,000	25,200	$36,400	9,690	$46,700	94,200	$596,000	494,000	$1,860,000	860,000	$4,120,000 r
2018:												
Belgium	20	79	2,150	2,170	226	518	--	--	19,600	94,900	22,000	97,700
Brazil	3,040	15,400	--	--	62	486	23	56	147	664	3,270	16,600
Bulgaria	2,990	14,800	--	--	--	--	--	--	118	579	3,100	15,400
Canada	17,200	98,200	17,100	27,100	2,240	10,200	37,200	244,000	51,800	298,000	126,000	677,000
China	47,500	295,000	1,650	4,830	210	1,530	47,600	319,000	193,000	868,000	290,000	1,490,000
France	3	15	--	--	80	606	1	23	21	45	105	689
Germany	4,810	28,200	1,130	2,130	282	1,920	2	15	24,000	118,000	30,200	150,000
Greece	--	--	--	--	--	--	--	--	7,630	41,800	7,630	41,800
Hong Kong	--	--	--	--	462	3,370	(8)	7	20,700	79,600	21,200	83,000
India	--	--	44	47	585	4,050	9	118	14,000	56,000	14,600	60,200
Indonesia	--	--	117	1,640	80	599	64	328	3,160	5,610	3,420	8,180
Italy	1	11	10	17	281	1,930	24	116	814	3,580	1,130	5,650
Japan	13,500	77,600	230	392	36	269	14	150	29,300	156,000	43,100	234,000
Korea, Republic of	4,690	25,800	817	3,800	1,680	12,500	2,200	15,400	45,800	259,000	55,200	316,000
Malaysia	545	3,290	413	736	178	1,080	62	92	47,700	130,000	48,900	135,000
Mexico	147,000	1,020,000	1,430	8,530	80	385	102,000	688,000	3,800	23,500	255,000	1,740,000
Netherlands	--	--	79	153	--	--	1	37	8,030	42,000	8,110	42,200
Pakistan	--	--	383	245	--	--	--	--	1,450	6,470	1,830	6,720
Philippines	1,180	7,240	--	--	42	320	(8)	6	738	2,020	1,960	9,580
Slovakia	--	--	526	2,310	--	--	--	--	1,330	5,740	1,860	8,050
Spain	10,500	59,200	210	248	101	735	1	139	760	3,070	11,600	63,400
Taiwan	--	--	152	621	40	288	12	357	17,100	82,400	17,400	83,700
Other	117	712	1,120	2,550	303	1,800	200	2,090	18,600	71,500	20,300	78,600
Total	253,000	1,650,000	27,500	57,500	6,970	42,600	190,000	1,270,000	509,000	2,350,000	987,000	5,360,000

rRevised. -- Zero.

[1]Table includes data available through July 7, 2021. Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Schedule B of the United States code 2603.00.0010. Includes copper ore and concentrates only; excludes copper contained in ore and concentrates of other metals.

[3]Schedule B codes 2620.30.0000, 7401.00.0010, and 7401.00.0050. Includes copper matte, ash, and precipitates only; excludes the copper content of mattes and ashes of other metals.

[4]Schedule B code 7402.00.0000.

[5]Schedule B codes 7403.11.0000, 7403.12.0000, 7403.13.0000, and 7403.19.0000.

[6]Schedule B codes 7404.00.0010, 7404.00.0015, 7404.00.0025, and 7404.00.0030.

[7]Free alongside ship value.

[8]Less than ½ unit.

Source: U.S. Census Bureau.

TABLE 15

U.S. EXPORTS OF COPPER SEMIMANUFACTURES (GROSS WEIGHT), BY COUNTRY OR LOCALITY[1, 2]

Country or locality	Pipes and tubing[3]		Plates, sheets, foil, bars[4]		Bare wire, including wire rod[5]		Wire and cable, stranded[6]		Copper sulfate[7]	
	Quantity (metric tons)	Value[8] (thousands)	Quantity (metric tons)	Value[8] (thousands)	Quantity (metric tons)	Value[8] (thousands)	Quantity (metric tons)	Value[8] (thousands)	Quantity (metric tons)	Value[8] (thousands)
2017	15,500	$124,000	29,400	$283,000	164,000	$1,050,000	41,800	$326,000	6,160	$36,900
2018:										
Bahrain	118	1,030	25	140	--	--	4	132	(9)	3
Belgium	10	184	48	433	--	--	101	6,910	11	201
Brazil	259	2,100	54	660	25	407	4	151	1	9
Canada	3,290	30,700	7,160	62,900	34,400	239,000	14,300	102,000	3,150	6,690
China	560	3,150	2,300	44,100	322	3,430	312	4,880	450	5,940
Dominican Republic	33	302	38	552	229	961	116	1,020	51	130
Germany	91	685	717	6,860	16	221	32	1,490	45	99
Hong Kong	7	208	515	12,000	574	1,190	32	1,100	--	--
Ireland	(9)	9	10	70	8	126	3	295	1,210	6,820
Japan	9	109	233	4,840	7	179	45	767	168	1,320
Jordan	163	1,600	18	171	--	--	1	10	--	--
Korea, Republic of	35	508	275	4,250	422	3,160	37	900	847	7,630
Malaysia	16	160	348	6,260	1,490	2,870	100	321	295	544
Mexico	6,460	56,500	14,000	116,000	125,000	844,000	28,300	228,000	2	24
Morocco	--	--	--	--	--	--	104	5,410	--	--
Netherlands	98	839	35	358	(9)	23	28	517	1	13
Saudi Arabia	2420	21,300	36	343	(9)	9	200	1,280	--	--
Singapore	68	480	282	3,420	519	4,680	16	347	101	1,940
Taiwan	18	226	72	1,420	(9)	15	88	268	888	9,990
Thailand	2	41	550	4,960	3	15	1	47	--	--
United Arab Emirates	409	4,060	37	634	(9)	10	4	54	--	--
United Kingdom	33	416	123	1,060	128	553	31	1,050	--	--
Vietnam	774	4,400	8	437	20	243	(9)	3	--	--
Other	772	6,760	522	6,640	475	4,610	452	10,800	861	3,450
Total	15,600	136,000	27,400	278,000	163,000	1,110,000	44,300	368,000	8,080	44,800

-- Zero.

[1]Table includes data available through July 7, 2021. Data are rounded to no more than three significant digits; may not add to totals shown.

[2]With the exception of copper sulfate, all categories include refined copper only; copper-alloy products are excluded.

[3]Includes all products listed under the Schedule B of the United States heading 7411.10 (tubes and pipes of refined copper), whether or not seamless.

[4]Includes all products listed under the Schedule B headings 7407.10 (bars, rods, and profiles of refined copper); 7409.11 and 7409.19 (plates, sheets, and strip of refined copper), whether or not coiled; and 7410.11 (foil of refined copper, not backed).

[5]Includes all products listed under the Schedule B headings 7408.11 and 7408.19 (wire of refined copper), regardless of the maximum cross-sectional dimension. Exports of wire rod (wire with a maximum cross-sectional dimension of more than 6 millimeters) were 156,000 metric tons (t) valued at $995 million in 2017 and 153,000 t valued at $1.04 billion in 2018.

[6]Includes all products listed under the Schedule B heading 7413 (stranded wire and cables of refined copper, not electrically insulated), excluding those with fittings or made into articles.

[7]Schedule B code 2833.25.0000.

[8]Free alongside ship value.

[9]Less than ½ unit.

Source: U.S. Census Bureau.

TABLE 16

U.S. IMPORTS FOR CONSUMPTION OF UNMANUFACTURED COPPER (COPPER CONTENT), BY COUNTRY OR LOCALITY[1]

	Ore and concentrates[2]		Matte, ash, and precipitates[3]		Blister and anodes[4]		Refined[5]		Unalloyed scrap[6]		Total	
Country or locality	Quantity (metric tons)	Value[7] (thousands)	Quantity (metric tons)	Value[7] (thousands)	Quantity (metric tons)	Value[7] (thousands)	Quantity (metric tons)	Value[7] (thousands)	Quantity (metric tons)	Value[7] (thousands)	Quantity (metric tons)	Value[7] (thousands)
2017	14,000	$25,700	49,700 r	$6,660 r	504	$3,520	813,000	$4,980,000	35,500	$170,000	913,000 r	$5,180,000 r
2018:												
Belgium	--	--	283	1,320	--	--	10,100	71,400	--	--	10,400	72,700
Bolivia	--	--	--	--	--	--	1,460	9,630	18	80	1,470	9,710
Canada	40	64	613	2,340	(8)	20	172,000	1,130,000	16,800	87,700	189,000	1,220,000
Chile	--	--	--	--	--	--	483,000	3,180,000	177	731	483,000	3,180,000
Colombia	--	--	--	--	--	--	--	--	367	1,580	367	1,580
Congo (Kinshasa)	--	--	--	--	--	--	3,380	19,800	--	--	3,380	19,800
Costa Rica	--	--	--	--	--	--	--	--	459	1,500	459	1,500
Finland	--	--	--	--	309	1,910	--	--	--	--	309	1,910
Germany	--	--	--	--	(8)	19	1,270	9,010	77	123	1,340	9,150
Japan	--	--	10	48	2	163	3,990	36,000	201	649	4,200	36,900
Malaysia	--	--	--	--	54	395	--	--	--	--	54	395
Mexico	32,100	89,700	539	879	--	--	63,100	410,000	10,700	44,900	106,000	545,000
Netherlands	--	--	115	426	2	66	(8)	8	46	168	163	668
Pakistan	--	--	--	--	--	--	--	--	567	2,340	567	2,340
Panama	--	--	--	--	--	--	--	--	1,020	6,050	1,020	6,050
Peru	--	--	--	--	--	--	19,100	123,000	38	156	19,200	123,000
Saudi Arabia	--	--	85	410	--	--	--	--	150	590	235	1,000
United Kingdom	--	--	127	128	4	316	25	178	68	359	224	981
Venezuela	--	--	--	--	--	--	--	--	2,540	13,300	2,540	13,300
Zambia	--	--	--	--	--	--	18,900	126,000	--	--	18,900	126,000
Other	8	45	50	312	1	49	1,680	13,100	1,080	5,160	2,820	18,700
Total	32,200	89,800	1,820	5,870	372	2,940	778,000	5,130,000	34,400	165,000	847,000	5,400,000

rRevised. -- Zero.

[1]Table includes data available through July 7, 2021. Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Harmonized Tariff Schedule of the United States (HTS) code 2603.00.0010. Includes copper ore and concentrates only; excludes copper contained in ore and concentrates of other metals.

[3]HTS codes 2620.30.0010 and 7401.00.0000. Includes copper matte, ash, and precipitates only; excludes the copper content of mattes and ashes of other metals.

[4]HTS code 7402.00.0000.

[5]HTS codes 7403.11.0000, 7403.12.0000, 7403.13.0000, and 7403.19.0000.

[6]HTS codes 7404.00.3020 and 7404.00.6020.

[7]U.S. Customs value.

[8]Less than ½ unit.

Source: U.S. Census Bureau.

TABLE 17

U.S. IMPORTS FOR CONSUMPTION OF COPPER SEMIMANUFACTURES (GROSS WEIGHT), BY COUNTRY OR LOCALITY[1, 2]

	Pipes and tubing[3]		Plates, sheets, foil, bars[4]		Bare wire, including wire rod[5]		Wire and cable, stranded[6]		Copper sulfate[7]	
Country or locality	Quantity (metric tons)	Value[8] (thousands)	Quantity (metric tons)	Value[8] (thousands)	Quantity (metric tons)	Value[8] (thousands)	Quantity (metric tons)	Value[8] (thousands)	Quantity (metric tons)	Value[8] (thousands)
2017	61,400	$471,000	55,600	$467,000	144,000	$918,000	3,330	$27,600	53,300	$112,000
2018:										
Brazil	2,700	20,000	2,370	18,400	18	138	--	--	402	740
Bulgaria	--	--	1,510	11,100	--	--	--	--	--	--
Canada	12,600	116,000	727	6,840	159,000	1,100,000	762	5,590	2,140	4,480
Chile	--	--	206	1,090	3	21	--	--	2,860	5,820
China	710	6,470	1,970	20,700	675	6,540	109	1,030	67	168
Finland	386	5,510	5,810	56,900	681	6,050	3	14	--	--
France	14	323	2,340	21,500	223	5,490	96	2,040	--	--
Germany	1,190	12,900	25,700	221,000	1,360	13,200	82	1,980	1	23
Greece	4,480	34,000	18	151	--	--	--	--	--	--
Italy	1,190	11,600	353	3,100	8	125	15	283	17	68
Japan	103	984	6,710	117,000	589	8,350	1	42	333	370
Korea, Republic of	10,800	83,900	1,810	21,200	129	1,380	2	54	--	--
Malaysia	2,690	21,100	11	90	(9)	3	(9)	10	--	--
Mexico	4,350	37,900	2,600	19,900	15,300	99,100	824	2,750	31,500	70,000
Peru	--	--	9,250	70,200	2,660	19,600	--	--	1,210	2,390
Russia	--	--	--	--	(9)	4	--	--	2,440	6,980
Taiwan	47	555	1,470	17,400	174	2,030	54	990	1,540	3,120
Turkey	--	--	1	17	117	1,050	1,380	10,500	46	92
Vietnam	18,300	138,000	--	--	--	--	--	--	--	--
Other	3,230	30,700	2,450	24,900	450	4,090	185	4,540	176	394
Total	62,900	520,000	65,300	632,000	181,000	1,270,000	3,520	29,800	42,700	94,700

-- Zero.

[1]Table includes data available through July 7, 2021. Data are rounded to no more than three significant digits; may not add to totals shown.

[2]With the exception of copper sulfate, all categories include refined copper only; copper-alloy products are excluded.

[3]Includes all products listed under the Harmonized Tariff Schedule of the United States (HTS) heading 7411.10 (tubes and pipes of refined copper), whether or not seamless and (or) coiled.

[4]Includes all products listed under the HTS headings 7407.10 (bars, rods, and profiles of refined copper), whether or not hollow; 7409.11 and 7409.19 (plates, sheets, and strip of refined copper), whether or not coiled; and 7410.11 (foil of refined copper, not backed).

[5]Includes all products listed under the HTS headings 7408.11 and 7408.19 (wire of refined copper), regardless of the maximum cross-sectional dimension. Imports of wire rod (wire with a maximum cross-sectional dimension of more than 6 millimeters) were 133,000 metric tons (t) valued at $836 million in 2017 and 168,000 t valued at $1.17 billion in 2018.

[6]Includes all products listed under the HTS heading 7413 (stranded wire and cables of refined copper, not electrically insulated), excluding those with fittings or made into articles.

[7]HTS code 2833.25.0000.

[8]U.S. Customs value.

[9]Less than ½ unit.

Source: U.S. Census Bureau.

TABLE 18

U.S. EXPORTS OF COPPER SCRAP (GROSS WEIGHT), BY COUNTRY OR LOCALITY[1]

	Unalloyed copper scrap[2]				Copper-alloy scrap[3]			
	2017		2018		2017		2018	
Country or locality	Quantity (metric tons)	Value[4] (thousands)	Quantity (metric tons)	Value[4] (thousands)	Quantity (metric tons)	Value[4] (thousands)	Quantity (metric tons)	Value[4] (thousands)
Belgium	7,870	$34,900	19,600	$94,900	8,560	$21,800	11,800	$29,200
Canada	43,800	238,000 r	51,800	298,000	49,700	47,100	40,300	34,000
China	352,000	1,180,000	193,000	868,000	336,000	538,000	78,600	187,000
Germany	19,700	92,300	24,000	118,000	10,900	51,200	13,400	59,100
Greece	172	1,050	7,630	41,800	79	366	1,150	4,100
Hong Kong	5,580	16,600	20,700	79,600	30,800	32,700	23,600	38,800
India	4,810	17,500	14,000	56,000	20,100	54,700	34,300	90,700
Japan	11,800	59,400	29,300	156,000	9,300	30,800	26,700	67,900
Korea, Republic of	17,200	83,200	45,800	259,000	14,100	47,300	25,900	79,100
Malaysia	2,320	6,440	47,700	130,000	3,240	2,860	71,800	83,400
Netherlands	7,260	35,700	8,030	42,000	1,120	2,520	2,280	6,280
Pakistan	3,790	15,400	1,450	6,470	5,780	3,190	16,500	9,890
Slovakia	2,980	13,800	1,330	5,740	4,940	16,700	3,830	13,400
Spain	1,220	3,920	760	3,070	6,280	16,000	10,100	26,300
Taiwan	5,750	29,000	17,100	82,400	2,890	7,930	18,300	38,000
Thailand	204	542	3,000	7,490	473	1,830	11,100	11,500
Other	7,720 r	38,300 r	24,300	100,000	5,860 r	16,100 r	14,200	28,600
Total	494,000	1,860,000	509,000	2,350,000	510,000	891,000	404,000	807,000

rRevised.

[1]Table includes data available through July 7, 2021. Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Schedule B of the United States codes 7404.00.0010, 7404.00.0015, 7404.00.0025, and 7404.00.0030.

[3]Schedule B codes 7404.00.0041, 7404.00.0046, 7404.00.0051, 7404.00.0056, 7404.00.0061, 7404.00.0066, 7404.00.0075, 7404.00.0085, and 7404.00.0095.

[4]Free alongside ship value.

Source: U.S. Census Bureau.

TABLE 19

U.S. IMPORTS FOR CONSUMPTION OF COPPER SCRAP, BY COUNTRY OR LOCALITY[1]

Country or locality	Unalloyed copper scrap[2]		Copper-alloy scrap[3]		
	Quantity (metric tons)	Value[4] (thousands)	Gross weight (metric tons)	Copper content[5] (metric tons)	Value[4] (thousands)
2017	35,500	$170,000	130,000	93,500	$591,000 [r]
2018:					
Bahamas, The	23	71	569	410	1,670
Brazil	29	164	463	333	1,900
Canada	16,800	87,700	72,000	51,900	409,000
Chile	177	731	321	231	913
China	27	83	304	219	951
Colombia	367	1,580	926	667	4,270
Costa Rica	459	1,500	749	539	3,030
Dominican Republic	80	332	901	649	2,620
Guatemala	92	564	501	361	2,070
Honduras	5	22	589	424	2,390
Hong Kong	7	25	1,450	1,040	3,360
Japan	201	649	52	37	319
Mexico	10,700	44,900	38,500	27,700	148,000
Morocco	121	464	20	14	82
Pakistan	567	2,340	--	--	--
Panama	1,020	6,050	640	461	2,460
Saudi Arabia	150	590	--	--	--
Singapore	102	571	--	--	--
Spain	--	--	637	459	1,010
Suriname	135	685	51	37	205
Venezuela	2,540	13,300	646	465	2,380
Vietnam	110	601	34	24	132
Other	596	2,470	3,270	2,360	13,400
Total	34,400	165,000	123,000	88,300	601,000

[r]Revised. -- Zero.

[1]Table includes data available through July 7, 2021. Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Harmonized Tariff Schedule of the United States (HTS) codes 7404.00.3020 and 7404.00.6020.

[3]HTS codes 7404.00.3045, 7404.00.3055, 7404.00.3065, 7404.00.3090, 7404.00.6045, 7404.00.6055, 7404.00.6065, and 7404.00.6090.

[4]U.S. Customs value.

[5]Content is estimated by the U.S. Geological Survey to be 72% of gross weight.

Source: U.S. Census Bureau.

TABLE 20

COPPER: WORLD MINE PRODUCTION, BY COUNTRY OR LOCALITY[1, 2]

(Metric tons, copper content)

Country or locality	2014	2015	2016	2017	2018 [p]
Albania, concentrates	3,500 [e]	1,900 [e]	200 [e]	--	3,500 [e]
Argentina, concentrates	97,566 [r]	61,766	81,902	33,303 [r]	17,400
Armenia, concentrates	46,849 [r]	75,700	95,079	95,793	68,928
Australia:					
Concentrates	936,000	956,000	918,000	830,000 [r]	892,000
Leaching, electrowon	43,000	40,000	30,000	26,000	28,000
Total	979,000	996,000	948,000	856,000 [r]	920,000
Azerbaijan, concentrates	675	969	1,947	2,063	1,650
Bolivia:					
Concentrates	8,936	7,690	6,519	5,350 [r]	1,100 [e]
Leaching, electrowon	1,810	1,789	2,199	1,780 [r]	1,800 [e]
Total	10,746	9,479	8,718	7,130 [r]	2,900 [e]
Botswana, concentrates	38,000	9,126	12,415	1,239	13,128
Brazil:					
Concentrates	301,197	350,940 [r]	338,921 [r]	384,542 [r]	385,800
Leaching, electrowon	700	--	--	--	--
Total	301,897	350,940 [r]	338,921 [r]	384,542 [r]	385,800
Bulgaria, concentrates[3]	72,419	71,748	70,573	73,003	69,841
Burma, leaching, electrowon	33,200	46,900	75,000	115,100	153,000
Canada:					
Concentrates	672,729	714,647	693,059	594,994	542,900
Leaching, electrowon	900	500	--	--	--
Total	673,629	715,147	693,059	594,994	542,900
Chile:					
Concentrates	3,917,100	3,993,700	3,892,300	3,917,300	4,256,300
Leaching, electrowon	1,844,000	1,778,400	1,660,300	1,586,200	1,575,300
Total	5,761,100	5,772,100	5,552,600	5,503,500	5,831,600
China:					
Concentrates	1,740,000	1,670,000	1,850,700	1,660,000	1,536,000
Leaching, electrowon	35,500	44,900	49,500	50,000	55,000
Total	1,775,500	1,714,900	1,900,200	1,710,000	1,591,000
Colombia, concentrates	4,118	5,463	8,493	9,355	9,920
Congo (Kinshasa):					
Concentrates	163,204	109,497	180,512	276,000 [r, e]	280,000 [e]
Leaching, electrowon	866,407 [r]	870,589 [r]	811,274 [r]	818,730 [r]	945,607
Total	1,029,611 [r]	980,086 [r]	991,786 [r]	1,094,730 [r]	1,225,607
Cyprus, leaching, electrowon	3,088	2,121	1,754	1,293	908
Dominican Republic, concentrates	9,262	7,324	9,725	9,618	10,600
Ecuador, concentrates[e]	120,000	1,400	40,000	8,200	8,000
Eritrea, concentrates	88,900	61,600	25,300	7,900	17,000
Finland, concentrates	42,800	41,805	47,488	53,144	46,674
Georgia, concentrates[e]	5,000	6,500	7,700	9,500 [r]	9,200
India, concentrates	26,700	29,900	29,600 [r, e]	30,300 [r, e]	36,000 [e]
Indonesia:					
Concentrates	377,400	577,300	716,200	598,800	634,000
Leaching, electrowon	1,416	1,226	11,760	23,160	17,071
Total	378,816	578,526	727,960	621,960	651,071
Iran:					
Concentrates	203,900	233,400	275,900	288,900 [r]	300,800
Leaching, electrowon	12,700	13,000	13,400	13,200 [r]	15,700
Total	216,600	246,400	289,300	302,100	316,500
Kazakhstan:					
Concentrates	458,800	458,100	432,400	515,600 [r]	560,000 [e]
Leaching, electrowon	12,900	15,500	35,100	42,200	42,700
Total	471,700	473,600	467,500	557,800 [r]	602,700
Korea, North, concentrates[e]	19,300	20,000	25,000 [r]	10,000 [r]	10,000
Kyrgyzstan, concentrates	780	3,100	8,300	8,000	7,600

See footnotes at end of table.

TABLE 20—Continued
COPPER: WORLD MINE PRODUCTION, BY COUNTRY OR LOCALITY[1, 2]

(Metric tons, copper content)

Country or locality	2014	2015	2016	2017	2018 [p]
Laos:					
Concentrates	71,155	78,449	89,187	90,363	83,680
Leaching, electrowon	88,541	89,253	78,492	62,941	68,200
Total	159,696	167,702	167,679	153,304	151,880
Macedonia:					
Concentrates	7,800 [e]	8,834	9,032	8,008	6,950
Leaching, electrowon	1,700	2,268	1,396	958	768
Total	9,500	11,102	10,428	8,966	7,718
Mauritania, concentrates	33,079	45,001	32,818	28,791	28,137
Mexico:					
Concentrates	329,600	386,400	536,800 [r]	527,000 [r]	558,300
Leaching, electrowon	185,400	208,100	230,000 [r]	215,200 [r]	192,700
Total	515,000	594,500	766,800 [r]	742,200	751,000
Mongolia:					
Concentrates	249,200	311,745	332,000 [e]	303,000 [e]	301,000 [e]
Leaching, electrowon	6,993	14,990	15,010	14,689 [r]	14,174
Total	256,193	326,735	347,010	317,689 [r]	315,174
Morocco, concentrates	16,579 [r]	24,000 [r, e]	28,000 [r, e]	30,000 [e]	30,000 [e]
Namibia:					
Concentrates	5,249	3,351	262	68	--
Leaching, electrowon	--	10,659	16,391	15,466	15,177
Total	5,249	14,010	16,653	15,534	15,177
Oman, concentrates	15,400	8,700	--	--	--
Pakistan, concentrates	13,122	13,056	14,136	10,052	12,538
Papua New Guinea, concentrates	75,901	45,185	80,022	105,000	96,000
Peru:					
Concentrates	1,293,842	1,627,727	2,280,005	2,383,163	2,370,693
Leaching, electrowon	83,800	73,091	73,854	62,421	66,257
Total	1,377,642	1,700,818	2,353,859	2,445,584	2,436,950
Philippines, concentrates	91,824	83,835	83,649	68,156	69,933
Poland, concentrates	421,695	426,196	424,704	419,603	401,696
Portugal, concentrates	75,433	83,081	74,352 [r]	63,812	51,700 [e]
Romania, concentrates	8,200	8,800	9,500	11,000	11,000
Russia:					
Concentrates	690,000	710,000	701,000	704,000	750,000 [e]
Leaching, electrowon	1,500	1,400	1,300	1,400	1,400 [e]
Total	691,500	711,400	702,300	705,400	751,000 [e]
Saudi Arabia, concentrates[e]	8,300	12,000	28,000	17,000 [r]	18,000
Serbia, concentrates	35,843	36,410	41,312	44,750	42,500
South Africa, concentrates	78,700	77,400	65,300	65,500	48,100
Spain:					
Concentrates	33,386	51,492	94,093	124,689 [r]	115,800
Leaching, electrowon	71,090	70,029	73,643	73,664	70,738
Total	104,476	121,521	167,736	198,353 [r]	186,538
Sweden, concentrates	79,681	75,113	79,247	104,594	106,100
Tanzania, concentrates	16,400	16,800	17,400	15,800	10,000
Turkey, concentrates	122,000	108,000	100,000	83,000	79,600
Uganda, concentrates	--	--	550 [e]	-- [e]	--
United States:					
Concentrates[4]	843,000	795,000	815,000	702,000	690,000
Leaching, electrowon	514,000	588,000	615,000	557,000	532,000
Total	1,360,000	1,380,000	1,430,000	1,260,000	1,220,000
Uzbekistan, concentrates[e]	99,500	101,000	100,000	100,000	100,000
Vietnam, concentrates[e]	20,800 [r]	23,200 [r]	22,300 [r]	21,000 [r]	21,900

See footnotes at end of table.

TABLE 20—Continued
COPPER: WORLD MINE PRODUCTION, BY COUNTRY OR LOCALITY[1, 2]

(Metric tons, copper content)

Country or locality	2014	2015	2016	2017	2018 [p]
Zambia:					
Concentrates	517,100	558,600	595,500	628,400	677,300
Leaching, electrowon	190,000	158,700	167,300	165,700	176,800
Total	707,100	717,300	762,800	794,100	854,100
Zimbabwe, concentrates	8,261	8,218	9,101	8,839	9,077
Grand total	18,600,000	19,200,000	20,400,000	19,900,000 [r]	20,400,000
Of which:					
Concentrates	14,600,000	15,200,000	16,400,000	16,100,000	16,400,000
Leaching, electrowon	4,000,000	4,030,000 [r]	3,960,000 [r]	3,850,000 [r]	3,970,000

[e]Estimated. [p]Preliminary. [r]Revised. -- Zero.

[1]Table includes data available through August 12, 2019. All data are reported unless otherwise noted. Grand totals, U.S. data, and estimated data are rounded to no more than three significant digits; may not add to totals shown.

[2]For some countries and (or) localities, the copper content of concentrates may also include copper precipitates. In some cases, total mine production is reported, but the distribution between concentrates and electrowon is estimated.

[3]Copper content of local concentrates processed to produce anodes and cathodes in Bulgaria. Total output is higher, as the copper content of exported local concentrates is not reported.

[4]Recoverable copper content.

TABLE 21
COPPER: WORLD SMELTER PRODUCTION, BY COUNTRY OR LOCALITY[1, 2]

(Metric tons, copper content)

Country or locality	2014	2015	2016	2017	2018 [p]
Armenia, primary	9,814	11,601	12,920	12,051	9,400
Australia, primary	468,000	433,000	445,000	360,000	378,000
Austria, secondary	56,000	60,000	60,000 [e]	60,000 [e]	70,000 [e]
Belgium, secondary	143,100	141,000	143,800	126,900	140,500
Botswana, primary[3]	14,628	13,888	11,348	--	--
Brazil:					
Primary	182,800	157,800	188,500	118,800	132,200
Secondary	50,500	42,400	27,000	24,800	15,300
Total	233,300	200,200	215,500	143,600	147,500
Bulgaria:					
Primary	318,700	292,200	245,000	322,700	304,900
Secondary	62,300	56,200	51,800	52,500	53,800
Total	381,000	348,400	296,800	375,200	358,700
Canada:					
Primary	288,699	281,416	304,349	289,400	290,100
Secondary	32,069	28,713	29,165	31,000	30,000
Total	320,768	310,129	333,514	320,400	320,100
Chile, primary	1,362,400 [r]	1,382,000 [r]	1,365,300 [r]	1,264,600 [r]	1,246,100
China:					
Primary	5,170,000	5,500,000	5,800,000	6,050,000	6,400,000
Secondary	1,350,000	1,380,000	1,410,000	1,510,000	1,600,000
Total	6,520,000	6,880,000	7,210,000	7,560,000	8,000,000
Finland:					
Primary	169,000	166,500	150,000	150,000 [e]	150,000 [e]
Secondary	4,000	4,000 [e]	4,000 [e]	4,000 [e]	4,000 [e]
Total	173,000	170,500	154,000	154,000 [e]	154,000 [e]
Germany:					
Primary	349,700	349,700	342,800	332,600	311,200
Secondary	179,000	170,000	159,100	198,300	157,400
Total	528,700	519,700	501,900	530,900	468,600
India:					
Primary	766,000	792,600	769,800	813,100 [r]	481,500
Secondary	--	--	3,500	10,000 [r]	10,000
Total	766,000	792,600	773,300	823,100	491,500
Indonesia, primary	236,900	199,700	255,700	247,176 [r]	230,924
Iran:					
Primary	156,500	153,500	153,400	114,200	204,100
Secondary	76,000	82,100	72,200	70,900	100,300
Total	232,500	235,600	225,600	185,100	304,400
Japan:					
Primary	1,290,640	1,175,101	1,137,864	1,118,626	1,142,778
Secondary	310,029	296,486	358,810	369,525	421,735
Total	1,600,669	1,471,587	1,496,674	1,488,151	1,564,513
Kazakhstan, primary	214,058	309,355	310,001	334,844 [r]	330,000 [e]
Korea, North:[e]					
Primary	10,000	10,000	10,000	10,000	10,000
Secondary	5,000	5,000	5,000	5,000	5,000
Total	15,000	15,000	15,000	15,000	15,000
Korea, Republic of:					
Primary	500,000	511,200	510,000	510,000	530,000
Secondary	120,000	125,000	125,000	125,000	140,000
Total	620,000	636,200	635,000	635,000	670,000
Mexico:					
Primary	258,000	256,300	267,800	270,000	286,200
Secondary[e]	5,000	5,000	5,000	5,000	5,000
Total	263,000	261,300	272,800	275,000	291,200
Namibia, primary	36,877	45,220	40,869	45,523	48,970

See footnotes at end of table.

TABLE 21—Continued
COPPER: WORLD SMELTER PRODUCTION, BY COUNTRY OR LOCALITY[1, 2]

(Metric tons, copper content)

Country or locality	2014	2015	2016	2017	2018 [p]
Oman, primary	21,000	26,500	11,300	20,400	21,800
Pakistan, primary[e]	13,000	13,000	14,000	10,000	12,000
Peru, primary	314,615	327,909	309,469	316,882	327,821
Philippines, primary	153,200	189,200	215,000	240,000	170,900
Poland:					
Primary	503,111	514,774	446,902	457,549	461,865
Secondary	72,585	67,624	60,369	53,024	50,001
Total	575,696	582,398	507,271	510,573	511,866
Russia:					
Primary	664,000	661,000	665,000	730,000 [r]	754,300
Secondary	220,400	218,900	202,000	200,000	210,000
Total	884,400	879,900	867,000	930,000 [r]	964,300
Serbia:					
Primary	30,700	43,000	61,000	68,200 [r]	66,000 [e]
Secondary	2,500	1,000	1,000 [e]	1,000 [e]	1,000 [e]
Total	33,200	44,000	62,000	69,200 [r]	67,000 [e]
Slovakia, secondary	11,400	11,400	42,691	48,152	38,379
South Africa, primary	71,700	71,800	68,700	70,000	70,000
Spain:					
Primary	285,400	286,300	292,300	272,000	284,800
Secondary	8,700	6,900	4,600	11,100	10,600
Total	294,100	293,200	296,900	283,100	295,400
Sweden:					
Primary	145,300	137,400	131,500	150,000	150,000
Secondary	65,200	61,800	62,200	60,000	60,000
Total	210,500	199,200	193,700	210,000	210,000
Turkey:					
Primary	40,600	45,400	46,200	46,000	46,000
Secondary[e]	5,000	5,000	5,000	5,000	5,000
Total	45,600	50,400	51,200	51,000	51,000
United States, primary	522,000	527,000	563,000	470,000	536,000
Uzbekistan, primary	99,500	101,000 [e]	101,000 [e]	101,000 [e]	101,000 [e]
Vietnam, primary	12,500	11,000	11,000	15,800 [r]	15,100
Zambia, primary	525,800	648,800	698,100	787,900	828,700
Grand total	18,000,000	18,400,000 [r]	18,800,000 [r]	19,100,000 [r]	19,500,000
Of which:					
Primary	15,200,000	15,600,000 [r]	16,000,000 [r]	16,100,000 [r]	16,300,000
Secondary	2,780,000	2,770,000	2,830,000	2,970,000 [r]	3,130,000

[e]Estimated. [p]Preliminary. [r]Revised. -- Zero.

[1]Table includes data available through August 13, 2019. All data are reported unless otherwise noted. Grand totals, U.S. data, and estimated data are rounded to no more than three significant digits; may not add to totals shown.

[2]To the extent possible, primary and secondary output of each country and (or) locality is shown separately. In some cases, total smelter production is officially reported, but the distribution between primary and secondary is estimated.

[3]Copper content of nickel-copper-cobalt matte.

TABLE 22

COPPER: WORLD REFINERY PRODUCTION, BY COUNTRY OR LOCALITY[1, 2]

(Metric tons)

Country or locality	2014	2015	2016	2017	2018 [p]
Argentina, secondary[e]	16,000	16,000	16,000	16,000	16,000
Australia, primary:					
Leaching, electrowon	43,000	40,000	30,000	26,000	28,000
Other	468,000	435,000	445,000	360,000	380,000
Total	511,000	475,000	475,000	386,000	408,000
Austria, secondary	83,190	102,859	103,215	100,000	115,000
Belgium:					
Primary	228,300	226,100	217,900	235,500	230,800
Secondary	159,000	152,500	148,800	163,400	159,400
Total	387,300	378,600	366,700	398,900	390,200
Bolivia, leaching, electrowon	1,810	1,789	2,199	1,780 [r]	1,800 [e]
Brazil:					
Primary:					
Leaching, electrowon	700	--	--	--	--
Other	212,385	241,469 [r]	225,558 [r]	118,300 [r]	132,200
Total, primary	213,085	241,469 [r]	225,558 [r]	118,300 [r]	132,200
Secondary	23,600	29,000 [r]	38,500 [r]	24,800 [r]	15,300
Total, primary and secondary	236,685	270,469 [r]	264,058 [r]	143,100 [r]	147,500
Bulgaria:					
Primary	208,300	204,700	197,200	203,500	199,400
Secondary	25,000	25,000	19,200	25,000	24,700
Total	233,300	229,700	216,400	228,500	224,100
Burma, leaching, electrowon	33,200	46,900	75,000	115,100	153,000
Canada:					
Primary:					
Leaching, electrowon	900	500	--	--	--
Other	292,900	301,300	284,400	290,600	251,400
Total, primary	293,800	301,800	284,400	290,600	251,400
Secondary	32,500	29,100	30,000	30,400	30,000
Total, primary and secondary	326,300	330,900	314,400	321,000	281,400
Chile, primary:					
Leaching, electrowon	1,844,000	1,778,400	1,660,300	1,586,200	1,575,300
Other	885,400	910,000	952,200	843,300	885,900
Total	2,729,400	2,688,400	2,612,500	2,429,500	2,461,200
China:					
Primary:					
Leaching, electrowon	35,500	44,900	49,500	50,000	55,000
Other	5,358,800 [r]	5,627,000 [r]	6,195,700 [r]	6,564,300 [r]	7,001,700
Total, primary	5,394,300 [r]	5,671,900 [r]	6,245,200 [r]	6,614,300 [r]	7,056,700
Secondary	2,254,800 [r]	2,297,000 [r]	2,209,000 [r]	2,300,800 [r]	2,234,600
Total, primary and secondary	7,649,100 [r]	7,968,900 [r]	8,454,200 [r]	8,915,100 [r]	9,291,300
Congo (Kinshasa), primary:					
Leaching, electrowon	866,407 [r]	870,589 [r]	811,274 [r]	818,730 [r]	945,607
Other	11,559 [r]	15,347 [r]	10,039 [r]	11,757 [r]	7,631
Total	877,966 [r]	885,936 [r]	821,313 [r]	830,487 [r]	953,238
Cyprus, leaching, electrowon	3,088	2,121	1,754	1,293	908
Egypt, secondary	142,022	98,051	100,000 [e]	100,000 [e]	100,000 [e]
Finland:					
Primary	132,000	127,900	125,100 [r]	129,200 [r]	135,100
Secondary	4,000	4,000 [e]	4,000 [e]	4,000 [e]	4,000 [e]
Total	136,000	131,900	129,100 [r]	133,200 [r]	139,100
Germany:					
Primary	390,900	400,100	396,100	413,200 [r]	397,300
Secondary	283,100	278,000	275,300	281,200 [r]	275,100
Total	674,000	678,100	671,400	694,400	672,400

See footnotes at end of table.

TABLE 22—Continued
COPPER: WORLD REFINERY PRODUCTION, BY COUNTRY OR LOCALITY[1, 2]

(Metric tons)

Country or locality	2014	2015	2016	2017	2018 [p]
India:					
Primary	766,000	791,900	769,300 [r]	819,000 [r]	544,000 [e]
Secondary	--	--	3,500	10,000	10,000 [e]
Total	766,000	791,900	772,800	829,000	554,000 [e]
Indonesia, primary:					
Leaching, electrowon	1,416	1,226	11,760	23,160	17,071
Other	232,000	197,100	249,000	245,000	243,400
Total	233,416	198,326	260,760	268,160	260,471
Iran:					
Primary:					
Leaching, electrowon	12,700	13,000	13,400	13,200 [r]	15,700
Other	124,000	113,900	125,700	90,000	149,600
Total, primary	136,700	126,900	139,100	103,200 [r]	165,300
Secondary	60,800	59,900	61,700	57,000	73,300
Total, primary and secondary	197,500	186,800	200,800	160,200 [r]	238,600
Italy, secondary	7,900	7,300	6,600	8,700	7,500
Japan:					
Primary	1,296,641	1,243,072	1,259,426	1,166,194	1,241,100
Secondary	257,583	240,059	293,707	321,886	353,417
Total	1,554,224	1,483,131	1,553,133	1,488,080	1,594,517
Kazakhstan, primary:					
Leaching, electrowon	12,900	15,500	35,100	42,200	42,700
Other	294,808	394,641	408,435	426,191 [r]	440,000 [e]
Total	307,708	410,141	443,535	468,391 [r]	482,700
Korea, North:[e]					
Primary	10,000	10,000	10,000	10,000	10,000
Secondary	5,000	5,000	5,000	5,000	5,000
Total	15,000	15,000	15,000	15,000	15,000
Korea, Republic of:					
Primary	491,200	515,300	522,400	501,300	500,500
Secondary	110,500	134,400	124,800	163,000	174,000
Total	601,700	649,700	647,200	664,300	674,500
Laos, leaching, electrowon	88,541	89,253	78,492	62,941	68,200
Macedonia, leaching, electrowon	1,700	2,268	1,396	958	768
Mexico:					
Primary:					
Leaching, electrowon	185,400	208,100	230,000 [r]	215,200 [r]	192,700
Other	262,000	272,400	256,000 [r]	243,100 [r]	239,200
Total, primary	447,400	480,500	486,000	458,300 [r]	431,900
Secondary[e]	5,000	5,000	5,000	5,000	5,000
Total, primary and secondary	452,400	485,500	491,000	463,300 [r]	436,900
Mongolia, leaching, electrowon	6,993	14,990	15,010	14,689 [r]	14,174
Namibia, leaching, electrowon	--	10,659	16,391	15,466	15,177
Norway, primary	35,800	35,500	28,100	22,700	20,600
Oman, primary	21,000	26,500	11,300	20,400	21,800
Peru, primary:					
Leaching, electrowon	83,800	73,091	73,854	62,421	66,257
Other	263,597	279,869	257,470	272,996	270,541
Total	347,397	352,960	331,324	335,417	336,798
Philippines, primary	130,000	153,000	185,100	205,000	170,800
Poland:					
Primary	469,100	470,900	429,000	429,600	423,600
Secondary	107,800	103,400	106,600	92,400	78,200
Total	576,900	574,300	535,600	522,000	501,800

See footnotes at end of table.

TABLE 22—Continued
COPPER: WORLD REFINERY PRODUCTION, BY COUNTRY OR LOCALITY[1, 2]

(Metric tons)

Country or locality	2014	2015	2016	2017	2018 [p]
Russia:					
Primary:					
Leaching, electrowon	1,500	1,400	1,300	1,400	1,400 [e]
Other	667,000	655,700	662,300	735,100	793,000 [e]
Total, primary	668,500	657,100	663,600	736,500	794,000 [e]
Secondary	222,300	218,600	197,800	219,600	237,000 [e]
Total, primary and secondary	890,800	875,700	861,400	956,100	1,030,000 [e]
Serbia:					
Primary	31,584	42,729	61,309	67,752	66,000
Secondary	1,591	1,917	1,000	1,469	1,000
Total	33,175	44,646	62,309	69,221	67,000
South Africa, primary	78,697	77,360	65,257 [r]	65,503	65,000 [e]
Spain:					
Primary:					
Leaching, electrowon	71,090	70,029	73,643	73,664	70,738
Other	274,300	278,300	281,600	260,700	273,200
Total, primary	345,390	348,329	355,243	334,364	343,938
Secondary	73,100	71,600	74,200	80,800	79,900
Total, primary and secondary	418,490	419,929	429,443	415,164	423,838
Sweden:					
Primary	152,100	144,200	145,100	153,600	157,100
Secondary	65,200	61,800	62,200	65,800	67,300
Total	217,300	206,000	207,300	219,400	224,400
Thailand, secondary	229	--	--	--	--
Turkey:					
Primary	61,300	74,000	47,400	88,000	116,300
Secondary	10,000 [e]	10,000 [e]	5,000	7,000	10,000
Total	71,300	84,000	52,400	95,000	126,300
Ukraine, secondary	15,200	18,500	21,973 [r]	25,186 [r]	22,000 [e]
United States:					
Primary:					
Leaching, electrowon	514,000	588,000	615,000	557,000	532,000
Other	535,000	503,000	561,000	482,000	538,000
Total, primary	1,050,000	1,090,000	1,180,000	1,040,000	1,070,000
Secondary	46,000	48,800	46,300	40,100	41,200
Total, primary and secondary	1,090,000	1,140,000	1,220,000	1,080,000	1,110,000
Uzbekistan, primary	99,500	101,000 [e]	101,000 [e]	101,000 [e]	101,000 [e]
Vietnam, primary	12,500	11,000	11,000	15,800 [r]	15,100
Zambia, primary:					
Leaching, electrowon	190,000	158,700	167,300	165,700	176,800
Other	288,800	312,800	230,600	264,800	248,200
Total	478,800	471,500	397,900	430,500	425,000
Zimbabwe, primary	1,500 [e]	--	--	--	--
Grand total	22,800,000	23,200,000	23,600,000 [r]	23,900,000	24,400,000
Of which:					
Primary:					
Leaching, electrowon	4,000,000	4,030,000 [r]	3,960,000 [r]	3,850,000 [r]	3,970,000
Other	14,800,000 [r]	15,200,000 [r]	15,700,000 [r]	15,900,000 [r]	16,300,000
Total, primary	18,800,000 [r]	19,200,000 [r]	19,700,000 [r]	19,700,000 [r]	20,200,000
Secondary	4,010,000 [r]	4,020,000 [r]	3,960,000 [r]	4,150,000 [r]	4,140,000

[e]Estimated. [p]Preliminary. [r]Revised. -- Zero.

[1]Table includes data available through August 13, 2019. All data are reported unless otherwise noted. Grand totals, U.S. data, and estimated data are rounded to no more than three significant digits; may not add to totals shown.

[2]To the extent possible, primary and secondary output of each country and (or) locality is shown separately. The "primary," "primary, other," and "secondary" categories consist of electrolytic and fire-refined copper, and the "leaching, electrowon" category consists of refined copper produced by solvent extraction and electrowinning. In some cases, total refined production is officially reported, but the distribution between primary [electrowon and (or) other] and secondary is estimated.