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2021 Minerals Yearbook

COPPER [ADVANCE RELEASE]

U.S. Department of the Interior
U.S. Geological Survey

August 2025

U.S. Geological Survey, Reston, Virginia: 2025

Copper

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In 2021, mine production of recoverable copper in the United States was 1.23 million metric tons (Mt), 3% greater than 1.20 Mt in 2020 (tables 1, 3). Mined copper output increased because of a major expansion at a mine in Arizona, the restart of a mine in New Mexico following a shutdown in 2020 after workers tested positive for the coronavirus disease 2019 (COVID-19), and mining of higher grade copper ores at a leading mine in Utah. Globally, the United States remained the fifth-ranked mine producer of copper behind Chile, Peru, China, and Congo (Kinshasa), in descending order of output, and accounted for 6% of global production. World mine production of copper increased by 3% to 21.2 Mt from 20.6 Mt in 2020, mostly owing to production increases in China, Congo (Kinshasa), Indonesia, Panama, and Peru. These increases were partially offset by lower output in Australia, Burma, and Chile (table 20).

Smelter production of copper in the United States increased by 14% in 2021 to an estimated 360,000 metric tons (t) from an estimated 315,000 t in 2020, and domestic output of refined copper was 971,000 t, 6% greater than 916,000 t (revised) in 2020 (table 1). The smelter and electrolytic refinery in Utah returned to mostly normal operations in 2021 following multiple disruptions in 2020. The United States remained the sixth-ranked producer of refined copper, following China, Chile, Japan, Congo (Kinshasa), and Russia, in descending order of production, and accounted for 4% of global output. World refinery production of copper was 25.3 Mt in 2021 compared with 25.0 Mt in 2020. Large production increases in Belgium, China, Congo (Kinshasa), India, and the United States were partially offset by significant decreases in output in Burma, Chile, Japan, and Russia (table 22).

In 2021, reported U.S. consumption of refined copper increased by 4% to 1.75 Mt from 1.68 Mt (revised) in 2020, when the COVID-19 pandemic resulted in reduced domestic and global economic activity (tables 1, 4, 5). World apparent consumption of refined copper was 25.3 Mt compared with 25.0 Mt in 2020, according to data compiled by the International Copper Study Group (ICSG). China (including Hong Kong) was the leading consumer of refined copper and accounted for 55% of worldwide consumption. Consumption in China decreased by 543,000 t from that in 2020, and consumption in all other countries and localities collectively increased by 844,000 t. The United States remained the second-ranked consumer of refined copper and accounted for 7% of global apparent consumption, followed by Germany, Japan, and the Republic of Korea, in descending order of quantity (International Copper Study Group, 2022a, p. 19–20).

The annual average Commodity Exchange Inc. (COMEX) spot copper price was a record-high $4.24 per pound in 2021, 52% greater than $2.80 per pound in 2020 (table 1). Factors that contributed to the increased price included strong global demand for copper, improved investor sentiment associated with the role of copper in renewable energy technologies, low stockpiles of refined copper, and supply constraints owing to shipping disruptions (Freeport-McMoRan Inc., 2022, p. 73; PJSC MMC Norilsk Nickel, 2022a, p. 50).

Data in this report have been rounded to no more than three significant digits (except prices), and percentages were calculated from unrounded data.

Production

Domestic production data were compiled from U.S. Geological Survey (USGS) monthly canvasses of the 25 mines, 2 primary smelters, 2 primary electrolytic refineries, 14 electrowon refineries, and 3 secondary fire refineries operating in the United States. To avoid disclosing company proprietary data, smelter and electrolytic refinery output in 2020 and 2021 were estimated based on information in public company reports and do not reflect actual production reported to the USGS.

Mine.—Recoverable copper production in the United States increased by 3% to 1.23 Mt in 2021 from 1.20 Mt in 2020, and the value of production increased by 55% to $11.7 billion from $7.60 billion. Copper recoverable in concentrate and precipitate accounted for 54% of mine output and increased by 4% to 670,000 t in 2021 from 644,000 t (revised) in 2020. Copper produced by solvent extraction (leaching) and electrowinning (SX–EW) accounted for 46% of mine production and was 562,000 t compared with 557,000 t (revised) in 2020 (tables 1, 3). Arizona was the leading copper-producing State and accounted for 71% of U.S. output in 2021. Copper also was produced in Michigan, Missouri, Montana, Nevada, New Mexico, and Utah. Although 25 mines in the United States (including 14 SX–EW facilities) recovered copper in 2021, 17 mines accounted for more than 99% of production (table 2). Most of the remaining mines were small leach operations or byproduct producers of copper.

The largest increases in mined copper production in 2021 were at Freeport-McMoRan Inc.'s Safford Mine in Arizona, where output increased by 47,200 t from that in 2020; Rio Tinto Group's Bingham Canyon Mine in Utah, by 19,400 t; and Freeport's Chino Mine in New Mexico, by 14,500 t. The Lone Star expansion of the Safford Mine was completed in the second half of 2020 and ramped up to production levels that exceeded the initial design capacity in 2021. Copper output increased at Bingham Canyon owing to the completion of a project to push back the south wall of the open pit, resulting in higher ore grades and recovery rates. Mining operations at Chino, which had been halted since April 2020 after workers tested positive for COVID-19, restarted in the first quarter of 2021. The production increases at these mines were partially offset by significant decreases in mined copper output at Freeport's Bagdad and Morenci Mines in Arizona. At Morenci, copper production declined by 47,900 t in 2021 from that in

2020; one of the two concentrators at the mine was on care-and-maintenance status in the first half of 2021 and restarted in July. The Bagdad Mine produced 14,500 t less copper in 2021 than in 2020 (Freeport-McMoRan Inc., 2022, p. 9–11, 14, 30, 71; Rio Tinto Group, 2022b, p. 13, 26).

Smelter and Refinery.—In 2021, smelter production of copper in the United States, which consisted of primary output only, and U.S. production of primary electrolytically refined copper each increased by 14% to an estimated 360,000 t from an estimated 315,000 t in 2020 (table 1). Excluding a stoppage of approximately 1 month following a smelter furnace failure, the Kennecott smelter and electrolytic refinery in Utah (owned by Rio Tinto) returned to normal operations in 2021 following multiple disruptions in 2020. In March 2020, the flash converting furnace at the smelter was damaged by an earthquake and needed to be entirely rebuilt. The restart of the smelter was subsequently delayed until October 2020 by unexpected issues after planned major maintenance (Rio Tinto Group, 2021, p. 52; 2022a, p. 57).

In total, domestic refinery production in 2021 was 971,000 t, 6% greater than 916,000 t (revised) in 2020. Primary refined copper produced by electrowinning was 562,000 t in 2021 compared with 557,000 t (revised) in 2020. Significantly increased production at Freeport's Safford Mine and refinery owing to the Lone Star expansion was mostly offset by decreased electrowon output at other Freeport operations, where a lower quantity of ore was placed in leach stockpiles (Freeport-McMoRan Inc., 2022, p. 11, 30–31, 71). Secondary electrolytic and fire-refined copper increased by 13% to 48,900 t in 2021 from 43,200 t in 2020. Primary copper accounted for 95% of total domestic refined output (37% electrolytic and 58% electrowon), and secondary copper accounted for 5% (table 1).

Operating Property Reviews.—ASARCO LLC (a subsidiary of Grupo México, S.A.B. de C.V.) produced a total of 127,000 t of copper in 2021 at its three mines in Arizona compared with 128,000 t in 2020. At the Mission Mine, the company produced 54,900 t of copper in concentrate in 2021 (57,800 t in 2020). Output from the Ray Mine was 39,200 t of copper in concentrate (37,900 t in 2020) and 11,000 t of copper by SX–EW (11,400 t in 2020). The Silver Bell Mine produced 21,400 t of electrowon copper (20,400 t in 2020). ASARCO's smelter in Hayden, AZ, and electrolytic refinery in Amarillo, TX, remained idle for all of 2021 following what the company described as temporary shutdowns in October 2019 because of a worker strike. Although the strike ended in July 2020, ASARCO had not publicly announced as of yearend 2021 when operations were expected to resume nor provided a reason for the continued closures (Grupo México, S.A.B. de C.V., 2021, p. 83; 2022, p. 211, 213, 219, 221).

In 2021, copper production at Capstone Mining Corp.'s Pinto Valley Mine in Arizona increased by 12% to 60,500 t (58,300 t in concentrate and 2,180 t of electrowon cathodes) from 54,000 t in 2020 (51,700 t in concentrate and 2,270 t of cathodes). Capstone completed multiple mill optimization projects that increased ore throughput, and copper ore grades and flotation plant recoveries were higher than those in 2020. On November 4, 2021, the company announced that it had received final approval from the U.S. Forest Service to extend operations at Pinto Valley to 2039, with total copper output of 1.1 Mt expected during the remaining mine life (Capstone Mining Corp., 2021; 2022, p. 6, 9, 18).

Excelsior Mining Corp. produced the first copper cathode at the Gunnison Mine in Arizona in December 2020. The project used in situ recovery methods, consisting of the injection of sulfuric acid into the deposit, leaching copper in the ground without mining any ore, and pumping the copper-bearing solution to an electrowon plant through a series of recovery wells. In April 2021, the company announced that the rampup to the full stage one production capacity of 11,300 metric tons per year (t/yr) of copper would be delayed by the formation of carbon dioxide gas bubbles that were impeding fluid flow rates in the fracture system of the deposit. Excelsior was reviewing remediation methods as of yearend 2021 and was unable to project when the nameplate capacity would be achieved. Reported sales of cathodes from Gunnison in 2021 were 534 t (Excelsior Mining Corp., 2022, p. 15, 17, 25, 27–28).

Total output of recoverable copper at Freeport's U.S. operations in 2021 was 774,000 t compared with 768,000 t in 2020. Mining operations at the Chino Mine were suspended in April 2020 following a limited outbreak of the COVID-19 pandemic and restarted in the first quarter of 2021. At the Lone Star expansion of the Safford Mine, copper production began in the second half of 2020 and ramped up to a level that exceeded the initial design capacity in 2021. One of the two concentrators at the Morenci Mine was on care-and-maintenance status in the first half of 2021 and restarted in July. Combined copper in concentrate and (or) electrowon production at each of the company's mines in Arizona was as follows: Bagdad—83,500 t (98,000 t in 2020), Miami—5,440 t (7,710 t in 2020), Morenci (72%-owned by Freeport)—398,000 t (445,000 t in 2020), Safford—120,000 t (73,000 t in 2020), and Sierrita—85,700 t (80,700 t in 2020). In New Mexico, copper output at the Chino Mine totaled 56,200 t (41,700 t in 2020), and SX–EW production at the Tyrone Mine was 24,900 t (20,400 t in 2020). Freeport also produced copper anodes at its smelter in Miami, AZ, and refined copper cathodes at its electrolytic facility in El Paso, TX, but did not publicly report anode or cathode output (Freeport-McMoRan Inc., 2020, p. 1; 2022, p. 9–11, 14, 24, 30, 71).

In 2021, production of copper in concentrate at the Bingham Canyon Mine in Utah increased by 14% to 159,000 t from 140,000 t in 2020. Rio Tinto completed a project to push back the south wall of the open pit, which extended the expected mine life to 2026 and resulted in higher copper ore grades and recovery rates. A second phase of the project was underway that would increase the mine life by an additional 6 years. Publicly reported output at the company's copper smelter and electrolytic refinery in Magna, UT, increased significantly in 2021 from that in 2020, when operations were disrupted by an earthquake and planned major maintenance. Production of anodes increased by 64% to 143,000 t in 2021 from 86,900 t in 2020, and production of cathodes increased by 69% to 143,000 t from 84,800 t in 2020. Smelter and refinery production reported to the USGS were higher than stated in company reports because output originating from purchased and toll third-party concentrate was not included in the company's public figures (Rio Tinto Group, 2022a, p. 34, 40, 57, 351; 2022b, p. 13, 26).

Three other companies with mines in the United States published operational results for 2021. KGHM International Ltd. (a subsidiary of KGHM Polska Miedź S.A. Group) produced 5,500 t of electrowon copper (5,000 t in 2020) at the

Carlota Mine in Arizona and 53,600 t of recoverable copper in concentrate (47,400 t in 2020) at the Robinson Mine in Nevada. Output at Robinson increased by 13% from that in 2020 because of higher ore grades and increased copper recovery rates (KGHM Polska Miedź S.A. Group, 2021, p. 36; 2022, p. 39, 75). At Lundin Mining Corp.'s Eagle nickel-copper mine in Michigan, production of copper in concentrate was 18,400 t compared with 18,700 t in 2020 (Lundin Mining Corp., 2022, p. 17). Nevada Copper Corp. continued to develop the Pumpkin Hollow Mine in Nevada and anticipated that the target mining rate of approximately 4,500 metric tons per day of ore would be achieved in the third quarter of 2022. Output of copper in concentrate from the mine increased to 1,520 t in 2021 from 1,200 t in 2020 (Nevada Copper Corp., 2022, p. 2, 5, 7).

Consumption

Domestic consumption data were compiled from USGS annual and monthly canvasses of U.S. manufacturers. In 2021, copper was consumed (used) as refined copper and scrap at about 30 brass mills; 14 wire-rod mills; and several hundred chemical plants, foundries, and miscellaneous manufacturers in the United States. Reported U.S. consumption of refined copper increased by 4% to 1.75 Mt from 1.68 Mt (revised) in 2020; consumption by wire-rod mills was 1.29 Mt (74% of total refined use), and consumption by brass mills was 415,000 t (24%). Domestic consumption of copper-base scrap in 2021 was 905,000 t (gross weight), slightly less than 926,000 t in 2020. Brass mills consumed 656,000 t of copper-base scrap (equivalent to 73% of total use), and wire-rod mills consumed 98,400 t (11%) (tables 1, 4, 5, 10, 11).

Copper recovered from refined or remelted scrap (of copper-base and non-copper-base) in the United States decreased slightly to 840,000 t in 2021 (81% from new scrap and 19% from old scrap) from 858,000 t in 2020 and accounted for 32% of the total U.S. copper supply of 2.63 Mt (defined as primary refined production plus copper recovered from new and old scrap plus refined imports for consumption minus refined exports, including adjustments for changes in refined copper stocks). The conversion of old (post-consumer) scrap to alloys and refined copper decreased slightly to 157,000 t in 2021 from 161,000 t (revised) in 2020, and recovery of copper from new (manufacturing) scrap decreased slightly to 683,000 t from 697,000 t (tables 1, 6). Brass and wire-rod mills accounted for 84% of copper recovered from scrap in 2021 (table 7).

According to preliminary data from the Copper Development Association Inc. (2022, p. 18), copper and copper-alloy product supply to the U.S. market by fabricators (brass mills, foundries, powder producers, and wire-rod mills), consisting of shipments from domestic plants and net imports, increased by 11% to 2.83 Mt of copper content in 2021 from 2.56 Mt (revised) in 2020. In 2021, wire-rod mill products accounted for 55% of the total U.S. copper supply; brass mill products, 31%; net imports, 11%; and foundry and powder products, 3% combined. The building construction sector remained the leading end-use market and accounted for 46% of total shipments, followed by electrical and electronic products, 21%; transportation equipment, 16%; 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, commercial refrigeration, 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 increased quantity of copper and copper-alloy product shipments to the domestic market in 2021 compared with those in 2020 corresponded with positive economic trends in major industries that used copper. In 2021, housing starts in the United States increased by 16% to 1.60 million units from 1.38 million units in 2020. Fabrication of equipment for heating, ventilation, and air conditioning (HVAC) increased by 14%; output of aircraft, automobiles, and ships increased by 13%; manufacture of power transmission products and telecommunications equipment increased by 12% each; and production of appliances and electrical equipment (such as batteries, generators, lighting components, and wiring devices) increased by 7% from that in 2020 (Board of Governors of the Federal Reserve System, 2022; U.S. Census Bureau, 2022).

Stocks

Total refined copper stocks in the United States were 117,000 t at the end of December 2021 compared with 118,000 t at the end of December 2020. Inventories of domestic refined copper were located primarily in COMEX warehouses (55% of total stocks), London Metal Exchange Ltd. (LME) warehouses (17%), and wire-rod mills (10%). Compared with those at yearend 2020, stocks at COMEX warehouses decreased by 6,430 t (9%) in 2021; combined stocks at brass mills, refineries, and other manufacturers decreased by 2,580 t (14%); stocks at wire-rod mills increased by 800 t (8%); and stocks at LME warehouses increased by 1,880 t (10%) (table 1).

Prices

The annual average COMEX spot copper price was a record-high $4.24 per pound in 2021, 52% greater than $2.80 per pound in 2020 (table 1). Factors that contributed to the increased price included strong global demand for copper, improved investor sentiment associated with the role of copper in renewable energy technologies, low stockpiles of refined copper, and supply constraints owing to shipping disruptions. The monthly average COMEX price was a minimum of $3.62 per pound in January and increased to a maximum of $4.64 per pound in May owing to stronger than expected global economic growth in Europe and the United States. The highest monthly price in 2021 corresponded with a period of low global exchange inventories (Freeport-McMoRan Inc., 2022, p. 73; PJSC MMC Norilsk Nickel, 2022a, p. 50).

Copper scrap prices generally followed the trend in refined copper prices, and increases in the prices of various types of scrap ranged from 52% to 63% in 2021. The refiners no. 2 scrap price averaged $3.69 per pound, 52% greater than $2.43 per pound in 2020. The annual average discount for refiners no. 2 scrap from the COMEX spot price increased to 55.3 cents per pound from 36.5 cents per pound (tables 1, 13).

Foreign Trade

In 2021, refined copper accounted for 88% of all U.S. imports of unmanufactured copper (consisting of refined copper, unalloyed copper scrap, and the copper content of alloyed copper scrap; blister and anodes; matte, ash, and precipitate; and ore and concentrate), and the copper content of scrap accounted for 11% (7% copper-alloy scrap and 4% unalloyed scrap). Refined copper imports increased by 36% to 919,000 t from 676,000 t in 2020. Chile was the leading foreign source of refined copper and accounted for 67% of the total refined copper imported, followed by Canada (15%) and Mexico (10%). The United States imported an estimated 113,000 t of copper contained in scrap in 2021, 25% greater than 90,200 t (revised) in 2020. Imports of copper in scrap originated primarily from Canada (48%) and Mexico (39%). Imports of copper ore and concentrate increased by 8,810 t to 11,000 t of copper content in 2021 and were sourced almost entirely (greater than 99%) from Canada (tables 16, 19).

The copper content of scrap was the primary source of copper shipped from the United States to international markets in 2021 and accounted for 64% of total unmanufactured copper exports (20% alloyed and 44% unalloyed), followed by the copper content of ore and concentrate (28%) and refined copper (4%). Exports of copper scrap increased by 22% to an estimated 784,000 t (copper content) from 643,000 t in 2020. China was the leading destination and accounted for 28% of copper exported in scrap, followed by Malaysia (15%), Canada (12%), the Republic of Korea (7%), and India (5%). Exports of copper ore and concentrate decreased by 9% to 347,000 t of copper content in 2021 from 383,000 t in 2020 and were sent primarily to Mexico (65%), China (19%), and Canada (11%). The United States exported 47,600 t of refined copper in 2021, 16% greater than 41,200 t in 2020. Canada (52%) and Mexico (40%) were the leading destinations for refined copper exported from the United States (tables 14, 18).

World Industry Structure

Mine Production.—In 2021, world mine production of copper increased by 3% to 21.2 Mt from 20.6 Mt in 2020. Copper in concentrate accounted for 81% of global mine output and increased by 4% to 17.1 Mt from 16.5 Mt (revised) in 2020. Copper produced by SX–EW accounted for 19% of world mine production and decreased by 4% to 4.03 Mt from 4.18 Mt (revised). Fifty-four countries and localities were known to have mined copper in 2021; Chile was the leading producer and accounted for 27% of total global production, followed by Peru (11%), China (9%), Congo (Kinshasa) (8%), and the United States (6%). The remaining countries among the 10 leading producers, in descending order of output, were Russia, Zambia, Australia, Mexico, and Indonesia. The 10 leading producers accounted for 80% of production, and the 20 leading producers accounted for 95%. The largest production increases took place in Indonesia, where output increased by 226,000 t (45% higher than country production in 2020); China, by 187,000 t (11%); Peru, by 149,000 t (7%); Congo (Kinshasa), by 138,000 t (9%); and Panama, by 125,000 t (61%). These increases were partially offset by significant decreases in Burma, where output was lower by 151,000 t (82%); Chile, by 108,000 t (slightly); and Australia, by 66,500 t (8%) (table 20). According to data compiled by the International Copper Study Group (2022a, p. 9), global mine capacity increased by 4% to 25.9 million metric tons per year (Mt/yr) in 2021 from 24.8 Mt/yr in 2020.

Refined Production.—Global output of refined copper in 2021 was 25.3 Mt compared with 25.0 Mt in 2020. Primary copper accounted for 83% of world refined production and totaled 21.1 Mt in 2021 compared with 21.0 Mt (revised) in 2020; primary copper produced by electrowon refining (16% of worldwide refined production) decreased by 4% to 4.03 Mt from 4.18 Mt (revised) in 2020, and primary copper produced by electrolytic and fire refining (other primary, 67%) was 17.0 Mt compared with 16.9 Mt in 2020. Secondary copper accounted for 17% of global refined output in 2021 and increased by 7% to 4.25 Mt from 3.97 Mt in 2020. In 2021, 45 countries and localities were known to have produced refined copper; China was the leading producer and accounted for 41% of world refinery production, followed by Chile (9%), Congo (Kinshasa) and Japan (6% each), and Russia and the United States (4% each). The remaining countries among the 10 leading producers, in descending order of output, were the Republic of Korea, Germany, Poland, and Kazakhstan. The 10 leading producers accounted for 79% of worldwide output, and the 20 leading producers accounted for 94%. Most of the growth in refined copper production was in China, where output increased by 462,000 t (5% greater than country production in 2020). Large increases also took place in India, by 155,000 t (47%); Congo (Kinshasa), by 99,400 t (7%); Belgium, by 65,000 t (20%); and the United States, by 55,100 t (6%). The most significant decreases were in Burma, where production decreased by 151,000 t (82%); Russia, by 73,800 t (7%); Japan, by 73,000 t (5%), and Chile, by 55,300 t (slightly) (table 22). Global refinery capacity increased to 30.1 Mt/yr in 2021 compared with 29.9 Mt/yr in 2020 (International Copper Study Group, 2022a, p. 9).

Apparent Consumption.—In 2021, global apparent consumption (usage) of refined copper was 25.3 Mt compared with 25.0 Mt in 2020, according to the ICSG. China (including Hong Kong) was the leading user of refined copper and accounted for 55% of worldwide consumption, followed by the United States (7%), Germany and Japan (4% each), and the Republic of Korea (3%). The remaining countries among the 10 leading consumers, in descending order of quantity, were Italy, Turkey, India, Russia, and Taiwan. The 10 leading consumers accounted for 81% of global apparent consumption, and the 20 leading consumers accounted for 93%. Consumption of copper in China decreased by 543,000 t to 13.9 Mt in 2021 from 14.4 Mt in 2020, and consumption collectively in all countries and localities except China increased by 844,000 t. The ICSG calculation of apparent consumption in China was based on reported production, trade, and Shanghai Futures Exchange 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 76% of the global total in 2021 (21% excluding China), followed by Europe (12%); North America (9%); and Africa, Oceania, and South America (3% combined) (International Copper Study Group, 2022a, p. 19–20).

World Review

Burma.—Production of electrowon copper was 33,900 t in 2021, a decrease of 82% from 185,000 t in 2020 (tables 20, 22). In February 2021, thousands of workers at the copper mines and refineries in Burma joined a civil disobedience movement to protest a military coup. All copper operations were closed as of yearend 2021 (Irrawaddy, The, 2021; International Copper Study Group, 2022b, p. 121).

Chile.—Mined copper output in Chile decreased slightly to 5.62 Mt in 2021 from 5.73 Mt in 2020 (table 20). Among the leading mines in the country, production at the Escondida Mine [majority-owned by BHP Group (57.5%)] decreased by 15% to 984,000 t from 1.16 Mt in 2020, reflecting reduced workforce availability from ongoing COVID-19 pandemic-related preventative measures, lower mill throughput, and lower ore grades (BHP Group, 2021, p. 11; 2022b, p. 11; Rio Tinto Group, 2022a, p. 57). At the Collahuasi Mine [jointly owned by Anglo American plc and Glencore plc (44% each)], copper production was 630,000 t in 2021 compared with 629,000 t in 2020. Anglo American and Glencore planned to construct an additional mill and to restart leaching operations to add approximately 115,000 t/yr of copper capacity (Anglo American plc, 2022, p. 59, 276). Record low precipitation limited water availability at the Los Bronces Mine [Anglo American (50.1%)], but copper production increased marginally to 328,000 t from 325,000 t in 2020 because of water management initiatives (Anglo American plc, 2022, p. 83, 276, 278). Copper output at the Los Pelambres Mine [Antofagasta plc (60%)] was 325,000 t in 2021, 10% less than 360,000 t in 2020. Low rainfall affected water availability at the concentrator in 2021 and was expected to do so in 2022. To mitigate the effects of a prolonged drought in central Chile, Antofagasta was constructing a seawater desalination plant that was projected to start in the second half of 2022. The company also advanced an expansion project, with an anticipated completion date in 2022, which would increase copper production by 60,000 t/yr (Antofagasta plc, 2022, p. 2, 5, 25, 70–71). Owing to higher sulfide ore grades and greater mill throughput, Antofagasta increased output at its 70%-owned Centinela Mine by 11% to 274,000 t in 2021 from 247,000 t in 2020. The company expected to begin mining a new open pit in 2022 that would increase copper production by up to 15,000 t/yr (Antofagasta plc, 2022, p. 2, 5, 72–73). Total production of mined copper from the seven mines that were wholly owned by Corporación Nacional del Cobre de Chile (Codelco) was 1.62 Mt in 2021, unchanged from that in 2020 (Corporación Nacional del Cobre de Chile, 2021, p. 38; 2022, p. 27–28, 35).

In 2021, refined copper production in Chile was 2.27 Mt, slightly lower than 2.33 Mt in 2020 (table 22). Codelco's three electrolytic refineries and five electrowon refineries accounted for 54% of the refined copper capacity in Chile, and other SX–EW operations accounted for the remainder (International Copper Study Group, 2022b, p. 201–208). Codelco did not report its total refined copper production in 2021, but the company's refined sales decreased by 100,000 t (8%) to 1.13 Mt from 1.23 Mt in 2020 (Corporación Nacional del Cobre de Chile, 2021, p. 57; 2022, p. 31). Output of refined copper also decreased at most of the other leading SX–EW operations in Chile, by 38,800 t (17%) at the Escondida Mine; by 23,400 t (16%) at BHP's Spence Mine; by 8,400 t (9%) at the Zaldivar Mine [Antofagasta and Barrick Gold Corp. (50% each)]; by 4,500 t (5%) at the Centinela Mine; and marginally (by 700 t) at Antofagasta's 70%-owned Antucoya Mine. At Freeport's 51%-owned El Abra Mine, electrowon production was 72,600 t compared with 72,100 t in 2020. Oxide ore grades and copper recovery rates decreased at Centinela and Zaldivar, and operations at Spence were affected by the death of a desalination plant worker (Antofagasta plc, 2021, p. 2, 69; 2022, p. 2, 73–75; BHP Group, 2021, p. 15; 2022a, p. 6; 2022b, p. 13; Freeport-McMoRan Inc., 2022, p. 18, 30).

China.—On January 1, 2021, the Government of China prohibited imports of scrap materials that it classified as solid waste. The ban replaced a quota system under which companies were required to apply for an import license and to demonstrate that they had the capability to process scrap into refined metal or semifinished products in compliance with environmental regulations. Effective November 1, 2020, China reclassified the trade codes for copper scrap imports and set minimum copper contents ranging from 94% to 99.9%, depending on the scrap type. The revised standards prevented imports of scrap with no less than the minimum copper quantities from being considered solid waste under the regulations that took effect in January 2021. In May 2021, a group of 15 copper smelters in China announced that they would significantly reduce purchases of copper concentrate, likely in response to high prices for refined copper and decreasing output of mined copper in Chile, the leading supplier of Chinese smelters (Daly and Singh, 2019; CRU International Ltd., 2020; Luk, 2020; Mir, 2020; Staub, 2020; Hu, 2021).

Prior to 2021, shipments of copper scrap into China had steadily decreased since the first import restrictions were implemented in 2017. Owing to the revised import standards and decreased supply to smelters of primary feedstock from Chile, copper scrap imports in 2021 increased by 80% to 1.69 Mt (gross weight) from 944,000 t in 2020 (Hu, 2021; International Copper Study Group, 2022a, p. 40). Production of secondary refined copper in China consequently increased by 282,000 t. Overall output of refined copper was 10.5 Mt in 2021, 462,000 t more than 10.0 Mt in 2020 (table 22).

Congo (Kinshasa).—Mined copper production in Congo (Kinshasa) increased by 138,000 t (9%) in 2021 (table 20), primarily because of the start of copper production in May at the Kamoa-Kakula Mine [Ivanhoe Mines Ltd. and Zijin Mining Group Co., Ltd. (39.6% each)]. The initial phase of the mine produced 106,000 t of copper in concentrate in 2021, and Ivanhoe and Zijin were advancing projects that would expand production to 450,000 t/yr in 2023 (Ivanhoe Mines Ltd., 2022, p. 2; Zijin Mining Group Co., Ltd., 2022, p. 13, 28, 34). Kamoa-Kakula represented the largest addition to global copper mine capacity from a new mine or expansion since the Cobre Panama Mine in Panama began operating in 2019.

In 2021, total refinery output of copper in Congo (Kinshasa) increased by 7% to 1.45 Mt from 1.35 Mt in 2020 (table 22). Electrowon cathodes accounted for 98% of refined production. Among the leading mine and refinery complexes that produced copper by SX–EW, the Katanga Mine [Glencore plc (75%)] was affected by intermittent power outages and produced 264,000 t in 2021, slightly less than 271,000 t in 2020 (Glencore plc, 2022, p. 63, 243). At the Tenke Fungurume Mine [China Molybdenum

Co., Ltd. (80%)], copper metal output was 209,000 t, an increase of 15% from 183,000 t in 2020 (China Molybdenum Co., Ltd., 2022, p. 17). Electrowon production increased by 4% at the Kolwezi Mine [Zijin (72%)] to 59,900 t from 57,400 t in 2020 (Zijin Mining Group Co., Ltd., 2021, p. 40; 2022, p. 28). Production at MMG Ltd.'s Kinsevere Mine decreased by 33% to 48,000 t in 2021 from 72,000 t in 2020, reflecting a planned temporary suspension of mining activities and processing of lower grade stockpiled and third-party ores. MMG planned to increase future copper output by constructing new facilities to process sulfide ores in addition to oxide ores (MMG Ltd., 2022, p. 4, 7, 26–27). In the fourth quarter of 2021, Glencore restarted the copper-cobalt Mutanda Mine and produced 6,300 t of refined copper during the remainder of the year. The company placed the mine on temporary care-and-maintenance status in 2019 owing to low cobalt prices and global cobalt oversupply (Glencore plc, 2021, p. 161; 2022, p. 13, 243). According to the ICSG, the total capacity of refined copper produced by SX–EW in Congo (Kinshasa) increased by 65,000 t/yr in 2021 from that in 2020 because of expansions at multiple operations (International Copper Study Group, 2022b, p. 247).

India.—Refined copper production in India was 489,000 t in 2021, 47% greater than 334,000 t in 2020 (table 22). On an Indian fiscal year basis (March to April), cathode output at Hindalco Industries Ltd.'s Dahej refinery increased by 37% to 359,000 t in 2021–22 from 262,000 t in 2020–21. Dahej accounted for the majority of the refined copper capacity in India and returned to normal operations in 2021 following a shutdown in 2020 because of the COVID-19 pandemic. In 2020, Hindalco shut down the plant in March and did not resume operations until June. Vedanta Resources Ltd. reported cathode production of 125,000 t at the Silvassa refinery in 2021–22, an increase of 23% from 101,000 t in 2020–21 (Hindalco Industries Ltd., 2020, p. 4; 2021, p. 54, 169–170; 2022, p. 3–4, 173; Vedanta Resources Ltd., 2022, p. 263).

Indonesia.—Mine production of copper in Indonesia increased by 45% in 2021, to 731,000 t from 505,000 t in 2020 (table 20), primarily owing to the rampup of the Grasberg Mine [PT Indonesia Asahan Aluminum (51.24%)]. The quantity of ore milled at Grasberg increased significantly in 2021, and output of copper in concentrate consequently increased by 65% to 606,000 t from 367,000 t in 2020. PT Freeport Indonesia operated the mine and reported that annualized copper production in the fourth quarter of 2021 was equivalent to the annual target (Freeport-McMoRan Inc., 2022, p. 20, 30, 32, 71).

Panama.—In 2021, the Cobre Panama Mine (90%-owned by First Quantum Minerals Ltd.) was the only copper mine in Panama and operated without disruption for the first full year since commercial production began in September 2019. Output of copper in concentrate increased by 61% to 331,000 t from 206,000 t in 2020 (table 20), when the mine was on care-and-maintenance status for most of the year owing to COVID-19 pandemic-related restrictions. First Quantum was working to expand the processing capacity of the mill by 100 Mt/yr and expected to ramp up to the target throughput rate by yearend 2023 (First Quantum Minerals Ltd., 2022, p. 39, 56–58).

Peru.—Mine production of copper was 2.30 Mt in 2021, an increase of 7% from 2.15 Mt (revised) in 2020 (table 20). Minsur S.A. completed construction of its 60%-owned Mina Justa Mine in July 2021 and produced 85,000 t of copper during the remainder of the year (Minsur S.A., 2022, p. 6). Copper output in 2021 at the leading mines in Peru was as follows: Antamina [BHP and Glencore (33.75% each)]—445,000 t (381,000 t in 2020); Cerro Verde [Freeport (53.56%)]—402,000 t (372,000 t in 2020); Las Bambas [MMG (62.5%)]—290,000 t (311,000 t in 2020); Toquepala (Southern Copper Corp., a subsidiary of Grupo México)—229,000 t (255,000 t in 2020); and Antapaccay (Glencore)—171,000 t (186,000 t in 2020). In 2021, copper production at Antamina and Cerro Verde recovered from COVID-19 pandemic-related suspensions in 2020. Operations at Las Bambas were affected by lower copper ore grades and protests that disrupted concentrate transport and caused the mine to shut down for 2 weeks in December. Decreased output at Antapaccay and Toquepala reflected lower ore grades (International Copper Study Group, 2020, p. 20–21; Freeport-McMoRan Inc., 2022, p. 17, 30–31; Glencore plc, 2022, p. 63, 243; MMG Ltd., 2022, p. 23–24; Southern Copper Corp., 2022, p. 42, 87; Teck Resources Ltd., 2022, p. 13).

Russia.—Refined copper production in Russia was 981,000 t in 2021, 7% less than 1.06 Mt (revised) in 2020 (table 22). PJSC MMC Norilsk Nickel (Nornickel), which owned multiple refineries that accounted for 40% of the refined copper capacity in Russia, reported refined output of 325,000 t from its Russian facilities, a decrease of 22% from 416,000 t in 2020. Production in 2021 was affected by temporary suspensions of a concentrator (owing to an accident) and two mines (owing to flooding) that supplied raw materials to the Norilsk refinery. Nornickel also permanently closed a smelting and refining complex at its Kola Division in March 2021 because of high emissions of sulfur dioxide. The company planned to construct a new plant with an expected capacity of 150,000 t/yr of refined copper (International Copper Study Group, 2022b, p. 226–228; PJSC MMC Norilsk Nickel, 2022a, p. 24, 84–88; 2022b). None of the other major copper refining companies in Russia reported publicly available information on the output of their facilities in 2021.

Outlook

During the next several years, the Florence project (Taseko Mines Ltd.) and Gunnison Mine in Arizona and the Pumpkin Hollow Mine in Nevada are projected to begin producing copper or to complete rampups to full production capacity. Output of mined copper in the United States will likely remain steady or increase slightly during this period because decreasing ore grades at multiple established mines are expected to offset production from new mines. The trajectory of domestic refined production will depend on the future operating status of the idle smelter in Arizona and electrolytic refinery in Texas. Globally, the ICSG projects that world mine production capacity will increase by 10% and that world refinery production capacity will increase by 6% through 2025 (International Copper Study Group, 2022b, p. 176, 238). Worldwide copper production and consumption are expected to increase in the short term as economies continue to recover from the global COVID-19 pandemic. During the long term, investment in renewable energy technologies has the potential to significantly increase global demand for copper. Consumption will continue to depend on economic trends in traditional 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)

		2017	2018	2019	2020	2021
United States:						
Mine production:						
Copper ore concentrated, gross weight		229,000,000	228,000,000	235,000,000	221,000,000	208,000,000
Average copper yield of concentrated copper ore	percent	0.29	0.29	0.30	0.28	0.31
Recoverable copper:[2]						
Arizona		868,000	801,000	859,000	880,000	868,000
Other States		391,000	421,000	398,000	321,000 r	363,000
Total		1,260,000	1,220,000	1,260,000	1,200,000	1,230,000
Total value[3]	millions	$7,920	$8,050	$7,750	$7,600	$11,700
Smelter production:						
Primary (from ore)[4]		470,000	536,000	464,000	315,000 e, 5	360,000 e, 5
Byproduct sulfuric acid, sulfur content		489,000	586,000	522,000	508,000	529,000
Refinery production:						
Primary:						
Electrolytic		482,000	538,000	457,000	315,000 e, 5	360,000 e, 5
Electrowon		557,000	532,000	527,000	557,000 r	562,000
Total		1,040,000	1,070,000	985,000	872,000 r	922,000
Secondary (from scrap), electrolytic and fire-refined		40,100	41,200	44,400	43,200	48,900
Grand total, primary and secondary refinery		1,080,000	1,110,000	1,030,000	916,000 r	971,000
Secondary production, refineries and manufacturers:[6]						
Recovered from new (manufacturing) scrap		702,000	712,000	700,000	697,000	683,000
Recovered from old (post-consumer) scrap		146,000	141,000	166,000	161,000 r	157,000
Total		847,000	853,000	866,000	858,000	840,000
Copper sulfate production, gross weight		18,400	18,200	17,500	17,500 e	17,500 e
Exports, refined[7]		94,200	190,000	125,000	41,200	47,600
Imports for consumption, refined[7]		813,000	778,000	663,000	676,000	919,000
Closing stocks, December 31:						
Blister and anodes		12,600	9,230	16,400	9,380	16,100
Refined copper:						
Refineries		5,840	3,850	7,010	3,850	5,440
Wire-rod mills		27,800	21,800	20,000	10,700	11,500
Brass mills		7,870	8,210	7,520	7,850	9,500
Other industry		5,360	7,070	6,200	6,850	6,200
Commodity Exchange Inc. (COMEX)[8]		191,000	99,600	34,100	70,200	63,800
London Metal Exchange Ltd. (LME), U.S. warehouses[8]		27,100	104,000	35,000	18,300	20,200
Total		265,000	244,000	110,000	118,000	117,000
Consumption:						
Reported, refined copper		1,800,000	1,820,000	1,810,000	1,680,000 r	1,750,000
Apparent, primary refined copper and copper from old scrap[9]		1,860,000	1,820,000	1,820,000	1,660,000	1,950,000
Price, annual average:[8]						
U.S. producers cathode[10]	cents per pound	285.393	298.738	279.596	286.745	432.264
COMEX, high grade first position	do.	280.425	292.568	272.267	279.948	424.306
LME, grade A cash	do.	279.518	295.960	272.364	279.797	422.496
World, production:						
Mine		20,100,000	20,600,000	20,400,000	20,600,000	21,200,000
Smelter		19,500,000	20,100,000	19,800,000 r	20,800,000 r	21,300,000
Refinery		23,900,000	24,400,000	24,400,000	25,000,000	25,300,000

See footnotes at end of table.

TABLE 1—Continued
SALIENT COPPER STATISTICS[1]

[e]Estimated. [r]Revised. do. Ditto.
[1]Table includes data available through January 15, 2023. Data are rounded to no more than three significant digits, except prices; may not add to totals shown.
[2]Includes the recoverable copper content of concentrates (of copper and other metals), copper produced by solvent extraction and electrowinning, and copper recovered as precipitates.
[3]Calculated with the U.S. producers cathode price.
[4]May contain small quantities of copper from scrap.
[5]To avoid disclosing company proprietary data, production is an estimate based on information in public company reports and does not reflect actual output reported to the U.S. Geological Survey.
[6]Copper converted to refined metal, alloys, and other forms by refineries and manufacturers (brass mills, chemical plants, foundries, wire-rod mills, and other).
[7]Source: U.S. Census Bureau. Includes Harmonized Tariff Schedule (imports) and Schedule B (exports) codes 7403.11.0000, 7403.12.0000, 7403.13.0000, and 7403.19.0000.
[8]Source: S&P Global Platts Metals Week.
[9]Primary refined copper production plus copper recovered from old scrap plus refined imports for consumption minus refined exports, including adjustments for changes in refined stocks. Old scrap consists of copper items used by consumers.
[10]Sum of the annual average COMEX price and annual average New York dealers cathode premium; reflects the delivered spot price of copper to U.S. consumers by U.S. producers.

TABLE 2
LEADING COPPER-PRODUCING MINES IN THE UNITED STATES IN 2021, IN ORDER OF PUBLICLY AVAILABLE OUTPUT[1, 2]

Rank	Mine	County and State	Operator	Source of copper	Capacity[3] (thousand metric tons)
1	Morenci	Greenlee, AZ	Freeport-McMoRan Inc.	Copper-molybdenum ore, concentrated and leached	590
2	Bingham Canyon	Salt Lake, UT	Rio Tinto Kennecott[4]	Copper-molybdenum ore, concentrated	230
3	Safford	Graham, AZ	Freeport-McMoRan Inc.	Copper ore, leached	140
4	Sierrita	Pima, AZ	do.	Copper-molybdenum ore, concentrated and leached	110
5	Bagdad	Yavapai, AZ	do.	do.	110
6	Pinto Valley	Gila, AZ	Capstone Mining Corp.	do.	75
7	Chino	Grant, NM	Freeport-McMoRan Inc.	Copper ore, concentrated and leached	140
8	Mission	Pima, AZ	ASARCO LLC[5]	Copper ore, concentrated	65
9	Robinson	White Pine, NV	Robinson Nevada Mining Co.[6]	Copper-molybdenum ore, concentrated	65
10	Ray	Pinal, AZ	ASARCO LLC[5]	Copper ore, concentrated and leached	135
11	Tyrone	Grant, NM	Freeport-McMoRan Inc.	Copper ore, leached	45
12	Silver Bell	Pima, AZ	ASARCO LLC[5]	do.	25
13	Eagle	Marquette, MI	Lundin Mining Corp.	Nickel-copper ore, concentrated	20
14	Phoenix	Lander, NV	Nevada Gold Mines LLC[7]	Gold-copper ore, concentrated and leached	20 [e]
15	Miami	Gila, AZ	Freeport-McMoRan Inc.	Copper ore, leached	90
16	Carlota	do.	Carlota Copper Co.[6]	do.	35 [e]
(8)	Continental	Silver Bow, MT	Montana Resources LLP	Copper-molybdenum ore, concentrated	(8)

[e]Estimated. do. Ditto.
[1]Table includes data available through January 15, 2023.
[2]The mines listed accounted for more than 99% of U.S. mine production of copper in 2021.
[3]For copper produced from concentrates, capacity is calculated based on the material handling capacity of the mill and the copper content of ore reserves. For copper produced by solvent extraction and electrowinning, capacity is the reported design capacity of the tankhouse.
[4]Wholly owned subsidiary of Rio Tinto Group.
[5]Wholly owned subsidiary of Grupo México, S.A.B. de C.V.
[6]Wholly owned subsidiary of KGHM International Ltd., which was a wholly owned subsidiary of KGHM Polska Miedź S.A.
[7]A joint venture of Barrick Gold Corp. (61.5%) and Newmont Corp. (38.5%). The mine was operated by Barrick.
[8]The rank order and capacity are not shown because public data were not available.

TABLE 3
MINE PRODUCTION OF COPPER-BEARING ORES AND RECOVERABLE COPPER CONTENT OF ORES PRODUCED IN THE UNITED STATES[1]

(Metric tons)

Source and treatment process	2020		2021	
	Gross weight	Recoverable copper	Gross weight	Recoverable copper
Copper ore:				
Concentrated	221,000,000	610,000 r	208,000,000	638,000
Leached	NA	557,000 r	NA	562,000
Total	NA	1,170,000	NA	1,200,000
Copper precipitates, leached from tailings, dumps, and in-place material	NA	W	NA	W
Other copper-bearing ores, concentrated[2]	11,200,000 r	33,500	10,600,000	32,400
Grand total	XX	1,200,000	XX	1,230,000

rRevised. NA Not available. W Withheld to avoid disclosing company proprietary data; included with "Other copper-bearing ores, concentrated." XX Not applicable.
[1]Table includes data available through January 15, 2023. 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[1]

(Metric tons, gross weight)

Item	Brass mills	Wire-rod mills	Foundries, chemical plants, miscellaneous users	Smelters, refiners, ingot makers	Total
2020:					
Copper scrap	649,000	119,000 r	45,500	112,000	926,000
Refined copper	413,000 r	1,230,000 r	34,200 r	8,880	1,680,000 r
Hardeners and master alloys	W	--	886 r	--	886 r
Brass ingots	--	--	51,100	--	51,100
Slab zinc	W	--	32,300 r	W	49,700 r
2021:					
Copper scrap	656,000	98,400	46,900	103,000	905,000
Refined copper	415,000	1,290,000	34,500	8,540	1,750,000
Hardeners and master alloys	W	--	1,010	--	1,010
Brass ingots	--	--	55,500	--	55,500
Slab zinc	W	--	25,100	W	45,800

rRevised. W Withheld to avoid disclosing company proprietary data; included with "Slab zinc" under "Total." -- Zero.
[1]Table includes data available through January 15, 2023. 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[1]

(Metric tons)

Class of consumer	Cathodes	Ingots and ingot bars	Cakes and slabs	Wirebar, billets, other	Total
2020:					
Wire-rod mills	1,230,000 r	--	--	(2)	1,230,000 r
Brass mills	317,000	W	43,600 r	52,400 r	413,000 r
Chemical plants[e]	W	--	--	240	240
Ingot makers	W	W	--	8,880	8,880
Foundries	W	2,400 r	--	16,700 r	19,100 r
Miscellaneous[3]	W	W	--	14,900 r	14,900 r
Total	1,540,000 r	2,400 r	43,600 r	93,100 r	1,680,000 r
2021:					
Wire-rod mills	1,290,000	--	--	(2)	1,290,000
Brass mills	320,000	W	43,700	51,600	415,000
Chemical plants[e]	W	--	--	240	240
Ingot makers	W	W	--	8,540	8,540
Foundries	W	2,490	--	16,700	19,200
Miscellaneous[3]	W	W	--	15,100	15,100
Total	1,610,000	2,490	43,700	92,200	1,750,000

[e]Estimated. [r]Revised. W Withheld to avoid disclosing company proprietary data; included with "Wirebar, billets, other." -- Zero.
[1]Table includes data available through January 15, 2023. 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[1]

(Metric tons)

	2020	2021
Kind of scrap:		
New:		
Copper-base	665,000	647,000
Aluminum-base	32,000	35,600
Nickel-base[e]	20	20
Total	697,000	683,000
Old:		
Copper-base	138,000	136,000
Aluminum-base	22,700 [r]	20,300
Nickel- and zinc-base	70	68
Total	161,000 [r]	157,000
Grand total, new and old scrap	858,000	840,000
Form of recovery:		
As unalloyed copper	43,200	48,900
In brass and bronze	758,000	733,000
In aluminum alloys	54,700 [r]	55,900
In alloy iron and steel and other alloys	88	86
In chemical compounds[e]	1,800	1,800
Total	858,000	840,000

[e]Estimated. [r]Revised.
[1]Table includes data available through January 15, 2023. 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 PURCHASED COPPER-BASE SCRAP IN THE UNITED STATES[1]

(Metric tons)

	From new scrap[2]		From old scrap[2]		Total	
Type of operation	2020	2021	2020	2021	2020	2021
Ingot makers	4,730	4,200	46,900	35,300	51,600	39,500
Refineries[3]	20,100 [e]	20,100 [e]	23,100	28,800	43,200	48,900
Brass and wire-rod mills	631,000	614,000	38,100	41,100	670,000	655,000
Foundries and miscellaneous manufacturers	9,150	8,880	29,600	31,100	38,800	40,000
Total	665,000	647,000	138,000	136,000	803,000	784,000

[e]Estimated.
[1]Table includes data available through January 15, 2023. Data are rounded to no more than three significant digits; may not add to totals shown.
[2]New scrap refers to material generated during the manufacturing process. Old scrap consists of copper items used by consumers.
[3]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[1]

(Metric tons, gross weight)

Item produced from scrap	2020	2021
Unalloyed copper products[2]	43,200	48,900
Alloyed copper products:		
Brass and bronze ingots:		
Tin bronzes	3,750	3,510
Leaded red brass and semi-red brass	36,200	29,400
High leaded tin bronze	9,310	7,160
Yellow brass	1,210	1,060
Manganese bronze	7,010	6,090
Aluminum bronze	3,870	3,510
Nickel silver	918	761
Silicon bronze and brass	3,090	2,390
Copper-base hardeners and master alloys	4,500	4,160
Miscellaneous	7,050	4,400
Total	76,900	62,500
Brass mill and wire-rod mill products	755,000	739,000
Brass and bronze castings	33,700	33,100
Copper in chemical products[e]	1,800	1,800
Grand total	910,000	885,000

[e]Estimated.
[1]Table includes data available through January 15, 2023. 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
ESTIMATED COMPOSITION OF SECONDARY COPPER-ALLOY PRODUCTION IN THE UNITED STATES[1]

(Metric tons)

	Copper	Tin	Lead	Zinc	Nickel	Aluminum	Total
Brass and bronze ingots:							
2020	65,100	2,320	3,170	6,150	150	13	76,900
2021	52,900	1,840	2,700	4,920	100	12	62,500
Brass mill and wire-rod mill products:							
2020	670,000	462	1,670	81,700	1,140	15	755,000
2021	656,000	450	1,640	80,000	1,120	15	739,000
Brass and bronze castings:							
2020	32,700	137	145	642	47	27	33,700
2021	32,100	130	140	630	46	26	33,100

[1]Table includes data available through January 15, 2023. 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[1]

(Metric tons, gross weight)

Scrap type and processor	2020		2021	
	Consumption	Stocks	Consumption	Stocks
Unalloyed scrap:				
No. 1 wire and heavy:				
Smelters, refiners, and ingot makers	12,400	W	8,380	W
Brass and wire-rod mills	400,000	(2)	389,000	(2)
Foundries and miscellaneous manufacturers	20,500	(2)	25,600	(2)
No. 2 mixed heavy and light:				
Smelters, refiners, and ingot makers	49,400	W	56,000	W
Brass and wire-rod mills	99,900	(2)	96,100	(2)
Foundries and miscellaneous manufacturers	13,700	(2)	16,200	(2)
Total unalloyed scrap:				
Smelters, refiners, and ingot makers	61,800	49,300	64,400	23,200
Brass and wire-rod mills	500,000	986	485,000	919
Foundries and miscellaneous manufacturers	34,200	2,260	41,800	605
Alloyed scrap:				
Red brass:[3]				
Smelters, refiners, and ingot makers	11,300	2,750	12,600	1,390
Brass mills	W	(2)	W	(2)
Foundries and miscellaneous manufacturers	W	(2)	W	(2)
Leaded yellow brass:				
Smelters, refiners, and ingot makers	4,700	596	3,830	562
Brass mills	W	(2)	W	(2)
Foundries and miscellaneous manufacturers	W	(2)	W	(2)
Yellow and low brass, all plants	71,400	725	77,600	625
Cartridge cases and brass, all plants	W	(2)	W	(2)
Auto radiators:				
Smelters, refiners, and ingot makers	13,200	600	10,500	801
Foundries and miscellaneous manufacturers	W	(2)	W	(2)
Bronzes:				
Smelters, refiners, and ingot makers	8,530	1,230	4,320	766
Brass mills and miscellaneous manufacturers	W	(2)	W	(2)
Nickel-copper alloys, all plants	10,300	296	9,840	409
Low grade and residues; smelters, refiners, miscellaneous manufacturers	W	470	W	471
Other alloy scrap:[4]				
Smelters, refiners, and ingot makers	1,350	W	W	W
Brass mills and miscellaneous manufacturers	W	(2)	W	(2)
Total alloyed scrap:				
Smelters, refiners, and ingot makers	50,600	3,710	38,700	6,790
Brass mills	269,000	564	270,000	525
Foundries and miscellaneous manufacturers	11,400	1,010	5,130	1,070
Grand total, scrap:				
Smelters, refiners, and ingot makers	112,000	53,000	103,000	30,000
Brass and wire-rod mills	768,000	1,550	755,000	1,440
Foundries and miscellaneous manufacturers	45,600	3,280	46,900	1,670

W Withheld to avoid disclosing company proprietary data; included in "Total unalloyed scrap," "Total alloyed scrap," and grand totals.

[1]Table includes data available through January 15, 2023. Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Individual breakdown was not available; included in "Total unalloyed scrap," "Total alloyed scrap," and grand 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[1]

(Metric tons, gross weight)

Type of operation	New scrap[2]		Old scrap[2]		Total	
	2020	2021	2020	2021	2020	2021
Ingot makers	12,600	11,200	55,200	41,400	67,800	52,600
Smelters and refineries	20,800 e	20,800 e	23,800	29,700	44,600	50,500
Brass and wire-rod mills[3]	729,000	711,000	39,900	43,200	768,000	755,000
Foundries and miscellaneous manufacturers	10,800	10,500	34,800	36,500	45,500	46,900
Total	773,000	754,000	154,000	151,000	926,000	905,000

[e]Estimated.
[1]Table includes data available through January 15, 2023. Data are rounded to no more than three significant digits; may not add to totals shown.
[2]New scrap refers to material generated during the manufacturing process. Old scrap consists of copper items used by consumers.
[3]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[1]

(Metric tons, gross weight)

Ingot type or material consumed	2020	2021
Brass ingot:		
Tin bronzes	3,680	3,850
Leaded red brass and semi-red brass	19,100	19,300
Yellow, leaded, low brass[2]	9,090	12,000
Manganese bronze	2,620	3,000
Nickel silver[3]	8,800	9,530
Aluminum bronze	3,900	4,020
Hardeners and master alloys[4]	886 r	1,010
Lead free alloys[e, 5]	3,880	3,880
Total	52,000 r	56,500
Refined copper	34,200 r	34,500
Copper scrap	45,500	46,900

[e]Estimated. [r]Revised.
[1]Table includes data available through January 15, 2023. 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[1]

(Cents per pound)

			Dealers	
Year	Brass mills no. 1 scrap	Refiners no. 2 scrap	No. 2 scrap	Red brass turnings and borings
2020	268.76	243.47	201.72	130.67
2021	408.14	369.04	314.79	212.63

[1]Table includes data available through January 15, 2023.

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)
2020	383,000	$2,040,000	25,900	$50,400 r	6,210	$33,600	41,200	$265,000 r	396,000	$1,950,000	853,000 r	$4,330,000
2021:												
Austria	--	--	--	--	(8)	3	--	--	1,250	8,500	1,250	8,500
Belgium	246	1,490	6,120	12,900	1,490	3,700	--	--	20,700	154,000	28,600	172,000
Canada	39,500	338,000	16,200	28,100	18,800	56,600	24,700	227,000	61,000	494,000	160,000	1,140,000
Chile	--	--	--	--	2	21	(8)	3	2,380	21,400	2,380	21,400
China	65,600	561,000	548	810	171	1,470	3,190	7,760	195,000	1,330,000	264,000	1,910,000
Finland	783	6,660	--	--	--	--	--	--	103	910	886	7,570
Germany	784	6,660	430	1,090	190	1,780	20	173	19,100	121,000	20,600	130,000
Greece	--	--	--	--	--	--	--	--	15,000	125,000	15,000	125,000
Hong Kong	2	10	44	63	310	1,390	9	157	23,100	124,000	23,400	126,000
India	--	--	30	178	433	2,540	--	--	12,800	48,500	13,200	51,200
Indonesia	--	--	--	--	60	603	--	--	747	1,360	807	1,970
Japan	6,350	60,500	760	352	17	164	11	253	19,900	151,000	27,100	212,000
Korea, Republic of	2,370	18,500	171	686	1,320	11,800	30	190	47,200	338,000	51,100	369,000
Malaysia	5	33	47	102	188	1,470	13	91	63,900	253,000	64,200	255,000
Mexico	228,000	1,620,000	33	106	258	995	19,100	178,000	3,590	31,500	251,000	1,830,000
Netherlands	13	95	58	131	44	432	1	8	2,950	20,400	3,070	21,000
Philippines	2,350	22,500	1	13	39	209	--	--	657	4,240	3,050	27,000
Poland	--	--	--	--	2	4	2	4	11,300	94,200	11,400	94,200
Russia	--	--	--	--	--	--	--	--	1,410	9,150	1,410	9,150
Slovakia	--	--	1,450	8,010	--	--	--	--	1,850	9,260	3,300	17,300
Spain	--	--	1,130	1,170	20	182	(8)	63	2,960	22,100	4,110	23,500
Sweden	--	--	--	--	72	164	1	8	1,080	5,700	1,150	5,870
Taiwan	1,490	13,100	19	71	291	1,390	282	1,900	13,800	101,000	15,900	117,000
Thailand	--	--	--	--	26	246	--	--	9,750	41,000	9,770	41,300
Turkey	--	--	--	--	20	208	42	385	709	5,270	771	5,870
United Arab Emirates	--	--	--	--	--	--	1	4	1,770	7,050	1,770	7,060
Vietnam	--	--	--	--	--	--	2	15	1,070	7,170	1,070	7,190
Other	280	1,870	449	632	635	3,620	130	1,920	3,630	26,200	5,120	34,200
Total	347,000	2,650,000	27,500	54,300	24,400	89,000	47,600	418,000	539,000	3,560,000	986,000	6,770,000

rRevised. -- Zero.

[1]Table includes data available through November 15, 2022. 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 REFINED COPPER SEMIMANUFACTURES AND COPPER SULFATE, 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 (gross weight)[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)
2020	12,800	$109,000	23,900	$239,000	125,000	$838,000	26,200	$222,000	8,160	$56,100
2021:										
Bahrain	63	731	1	10	(9)	3	4	132	3	17
Canada	2,280	28,800	6,030	69,900	42,600	425,000	12,400	140,000	2,440	6,430
China	673	3,050	1,030	18,600	183	1,970	226	6,070	505	6,830
Dominican Republic	31	408	4	63	67	222	154	2,380	177	557
Germany	132	690	774	10,700	18	473	17	1,020	152	535
Guatemala	81	784	2	22	3	41	39	457	--	--
Hong Kong	(9)	15	1,250	34,000	651	1,960	13	722	13	40
India	6	132	54	600	83	774	13	414	18	74
Ireland	(9)	13	36	336	4	32	--	--	1,210	10,500
Israel	(9)	7	16	213	10	79	90	1,630	959	2,890
Japan	33	213	549	18,500	58	763	25	680	37	308
Jordan	193	2,310	--	--	--	--	1	19	--	--
Korea, Republic of	26	366	342	5,960	388	3,980	57	1,190	1,630	14,700
Malaysia	30	624	491	6,090	59	204	25	494	215	367
Mexico	7,700	84,800	15,600	159,000	106,000	976,000	17,000	153,000	4	16
Oman	134	1,520	--	--	(9)	11	--	--	--	--
Pakistan	57	717	--	--	--	--	--	--	--	--
Qatar	99	992	2	18	19	67	--	--	--	--
Saudi Arabia	4,880	57,400	164	2,300	--	--	160	1,040	--	--
Singapore	147	703	360	4,360	404	4,160	6	165	30	1,070
Taiwan	15	179	544	11,000	10	137	23	558	1,170	18,500
Thailand	4	41	1,190	13,600	4	40	135	294	(9)	3
United Arab Emirates	1,530	18,800	3	27	(9)	12	3	75	--	--
United Kingdom	51	623	192	3,680	28	217	124	2,200	(9)	6
Other	379	4,210	468	7,590	415	4,430	235	4,850	105	1,100
Total	18,500	208,000	29,100	366,000	151,000	1,420,000	30,800	317,000	8,680	64,000

-- Zero.

[1]Table includes data available through November 15, 2022. Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Copper-alloy products are excluded from exports of copper semimanufactures (pipes and tubing; plates, sheets, foil, and bars; bare wire; and stranded wire and cable).

[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 118,000 metric tons (t) valued at $783 million in 2020 and 144,000 t valued at $1.35 billion in 2021.

[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 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)
2020	2,170	$8,140	1,060	$4,650	281 r	$2,040	676,000	$4,100,000	27,600	$122,000	707,000	$4,240,000 r
2021:												
Belgium	--	--	236	608	--	--	29	176	--	--	265	784
Bolivia	--	--	--	--	--	--	763	6,540	114	491	877	7,040
Brazil	--	--	--	--	--	--	5,720	50,800	15	64	5,740	50,900
Canada	11,000	84,600	651	3,670	(8)	3	141,000	1,300,000	19,900	109,000	173,000	1,490,000
Chile	--	--	--	--	--	--	613,000	5,700,000	--	--	613,000	5,700,000
China	--	--	--	--	--	--	654	4,530	54	135	708	4,670
Colombia	--	--	--	--	--	--	--	--	174	1,110	174	1,110
Congo (Kinshasa)	--	--	--	--	--	--	22,200	217,000	--	--	22,200	217,000
Costa Rica	--	--	--	--	--	--	--	--	729	4,470	729	4,470
Dominican Republic	--	--	--	--	--	--	--	--	1,550	8,520	1,550	8,520
Ecuador	--	--	--	--	--	--	--	--	88	438	88	438
Finland	--	--	--	--	371	2,230	35	316	--	--	406	2,540
Germany	--	--	155	1,390	(8)	59	2,150	22,800	210	165	2,510	24,400
Honduras	--	--	--	--	--	--	--	--	75	476	75	476
Japan	1	11	483	1,200	1	46	1,440	13,400	5	32	1,930	14,700
Mexico	--	--	8	74	(8)	30	87,300	803,000	12,600	57,900	100,000	861,000
Netherlands	10	16	21	102	(8)	26	--	--	2	15	33	159
Panama	--	--	--	--	--	--	--	--	1,040	5,860	1,040	5,860
Peru	--	--	--	--	--	--	28,500	264,000	19	90	28,500	264,000
Russia	--	--	--	--	--	--	3,900	36,100	--	--	3,900	36,100
Singapore	--	--	--	--	(8)	16	10	60	52	248	62	324
South Africa	--	--	--	--	--	--	277	2,580	--	--	277	2,580
Suriname	--	--	--	--	--	--	--	--	254	1,920	254	1,920
United Kingdom	--	--	(8)	5	10	412	13	246	(8)	10	23	673
Uruguay	--	--	--	--	--	--	--	--	481	3,700	481	3,700
Vietnam	--	--	--	--	--	--	(8)	10	114	710	114	720
Zambia	--	--	--	--	--	--	11,400	113,000	--	--	11,400	113,000
Other	(8)	11	28	89	1	106	132	4,430	178	828	339	5,460
Total	11,000	84,600	1,580	7,140	384	2,920	919,000	8,530,000	37,700	196,000	970,000	8,820,000

rRevised. -- Zero.

[1]Table includes data available through November 15, 2022. 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 REFINED COPPER SEMIMANUFACTURES AND COPPER SULFATE, 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 (gross weight)[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)
2020	76,100 r	$591,000 r	53,300	$491,000	169,000	$1,110,000	3,560	$28,100	49,800	$95,300
2021:										
Austria	712	7,500	136	1,640	1	65	1	27	--	--
Bahrain	5,200	52,500	--	--	--	--	--	--	--	--
Brazil	1,170	11,900	2,740	27,900	5	46	--	--	443	1,190
Bulgaria	--	--	1,740	17,400	--	--	--	--	--	--
Canada	13,600	200,000	342	2,950	186,000	1,660,000	199	2,420	2,330	6,050
Chile	--	--	--	--	105	1,050	--	--	876	2,100
China	529	5,520	1,070	15,200	430	5,130	38	674	36	161
Finland	432	6,230	4,720	51,000	666	7,160	--	--	--	--
France	20	155	1,320	15,500	197	6,440	26	697	15	47
Germany	2,160	27,100	20,100	222,000	1,790	21,800	48	1,420	16	171
Greece	2,870	28,400	130	894	--	--	--	--	--	--
India	1,190	12,600	463	4,150	29	324	61	962	131	248
Italy	1,900	24,400	1,370	14,100	8	107	1	24	--	--
Japan	3	96	5,950	96,100	330	5,100	10	432	529	587
Korea, Republic of	18,600	188,000	3,060	43,200	5,090	49,800	6	77	--	--
Malaysia	2,450	24,100	2	178	--	--	--	--	--	--
Mexico	6,890	76,600	3,100	32,400	6,350	61,700	932	9,410	28,900	80,400
Netherlands	32	674	2,710	29,100	2	25	2	119	--	--
Peru	--	--	12,200	126,000	2,770	26,100	--	--	1,560	4,080
Russia	--	--	--	--	7,530	70,900	--	--	7,030	18,200
Taiwan	122	1,430	2,570	35,500	213	3,000	1	98	1,360	3,540
Thailand	17,700	177,000	91	1,070	74	658	29	500	--	--
Turkey	(9)	3	620	5,640	267	2,910	3,040	33,000	--	--
United Arab Emirates	--	--	--	--	1,510	14,300	--	--	--	--
Uzbekistan	--	--	--	--	2,230	21,500	--	--	--	--
Other	640	6,840	969	13,900	319	5,540	41	2,000	106	290
Total	76,200	851,000	65,400	756,000	216,000	1,970,000	4,440	51,900	43,300	117,000

rRevised. -- Zero.

[1]Table includes data available through November 15, 2022. Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Copper-alloy products are excluded from imports of copper semimanufactures (pipes and tubing; plates, sheets, foil, and bars; bare wire; and stranded wire and cable).

[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 149,000 metric tons (t) valued at $973 million in 2020 and 195,000 t valued at $1.79 billion in 2021.

[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, 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[e, 5] (metric tons)	Value[4] (thousands)
2020	396,000	$1,950,000	379,000 [r]	247,000	$724,000 [r]
2021:					
Austria	1,250	8,500	193	125	1,070
Belgium	20,700	154,000	8,520	5,540	29,800
Cambodia	71	517	733	476	1,580
Canada	61,000	494,000	53,900	35,000	99,100
Chile	2,380	21,400	345	224	220
China	195,000	1,330,000	43,300	28,200	122,000
Ecuador	683	4,360	243	158	848
Germany	19,100	121,000	15,300	9,910	75,400
Greece	15,000	125,000	2,140	1,390	7,570
Hong Kong	23,100	124,000	7,570	4,920	19,000
India	12,800	48,500	39,600	25,800	81,300
Indonesia	747	1,360	463	301	523
Japan	19,900	151,000	7,490	4,870	50,600
Korea, Republic of	47,200	338,000	17,100	11,100	72,000
Malaysia	63,900	253,000	88,200	57,300	171,000
Mexico	3,590	31,500	4,640	3,020	35,800
Netherlands	2,950	20,400	569	370	2,840
Pakistan	476	2,120	24,400	15,900	24,200
Philippines	657	4,240	783	509	1,310
Poland	11,300	94,200	2,280	1,480	5,840
Russia	1,410	9,150	766	498	553
Slovakia	1,850	9,260	1,760	1,140	8,980
Spain	2,960	22,100	7,070	4,600	30,100
Sri Lanka	138	557	609	396	1,520
Sweden	1,080	5,700	2,480	1,610	11,200
Taiwan	13,800	101,000	6,310	4,100	21,600
Thailand	9,750	41,000	35,900	23,300	52,200
Turkey	709	5,270	252	164	664
United Arab Emirates	1,770	7,050	3,320	2,160	3,700
Vietnam	1,070	7,170	165	107	479
Other	2,360	19,500	1,770	1,150	5,530
Total	539,000	3,560,000	378,000	246,000	939,000

[e]Estimated. [r]Revised.

[1]Table includes data available through November 15, 2022. 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.

[5]Copper content is estimated by the U.S. Geological Survey to be 65% of gross weight.

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[e, 5] (metric tons)	Value[4] (thousands)
2020	27,600	$122,000	86,900 [r]	62,600 [r]	$372,000 [r]
2021:					
Antigua and Barbuda	--	--	126	91	470
Bahamas, The	--	--	608	438	2,630
Bolivia	114	491	442	318	1,940
Brazil	15	64	114	82	420
Canada	19,900	109,000	48,200	34,700	332,000
Cayman Islands	--	--	219	158	909
Chile	--	--	122	88	705
Colombia	174	1,110	643	463	2,700
Costa Rica	729	4,470	1,480	1,070	9,420
Dominican Republic	1,550	8,520	2,720	1,960	16,500
Ecuador	88	438	277	199	1,490
El Salvador	--	--	583	420	4,090
Germany	210	165	191	138	1,160
Guatemala	--	--	484	348	2,650
Haiti	--	--	121	87	373
Honduras	75	476	907	653	4,660
Jamaica	7	32	159	114	978
Mexico	12,600	57,900	43,800	31,600	229,000
Nicaragua	17	138	115	83	813
Panama	1,040	5,860	496	357	2,110
Peru	19	90	439	316	2,270
Philippines	32	224	136	98	990
St. Lucia	32	155	140	101	825
Suriname	254	1,920	58	42	210
Trinidad and Tobago	--	--	111	80	499
United Kingdom	(6)	10	143	103	1,210
Uruguay	481	3,700	58	42	432
Venezuela	--	--	675	486	3,590
Vietnam	114	710	64	46	421
Other	205	708	933	672	3,810
Total	37,700	196,000	105,000	75,300	629,000

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

[1]Table includes data available through November 15, 2022. 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]Copper content is estimated by the U.S. Geological Survey to be 72% of gross weight.

[6]Less than ½ unit.

Source: U.S. Census Bureau.

TABLE 20

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

(Metric tons, copper content)

Country or locality	2017	2018	2019	2020	2021
Albania, concentrates	--	2,520 [r]	2,080 [r]	3,520 [r]	4,430
Argentina, concentrates	33,303	17,435	--	--	--
Armenia, concentrates	95,793	68,928	89,700	82,600	81,700 [e, 3]
Australia:					
Concentrates	823,000	888,000	900,200 [r]	854,800 [r]	790,000
Leaching, electrowon	26,000	23,000	24,900 [r]	24,700 [r]	23,000
Total	849,000	911,000	925,100 [r]	879,500 [r]	813,000
Azerbaijan, concentrates	2,063	1,650	2,213	2,718 [r]	2,657
Bolivia:					
Concentrates	4,450	2,102	1,381	1,068	1,616
Leaching, electrowon	2,269	3,114	3,097	1,754	1,694
Total	6,719	5,216	4,478	2,822	3,310
Botswana, concentrates	1,239	1,462	--	--	10,670
Brazil, concentrates	384,542	385,762	363,268	352,635	335,761
Bulgaria, concentrates[4]	73,003	69,841	70,927	70,176 [r]	70,000 [e]
Burma, leaching, electrowon	115,100	153,000	153,100	185,000	33,900
Canada, concentrates	597,194	548,011 [r]	572,705	584,609	550,418
Chile:					
Concentrates	3,917,300	4,256,300	4,207,200	4,265,600	4,210,500
Leaching, electrowon	1,586,200	1,575,300	1,580,200	1,467,500	1,414,400
Total	5,503,500	5,831,600	5,787,400	5,733,100	5,624,900
China:					
Concentrates	1,656,400	1,569,900	1,628,000	1,673,000	1,855,000
Leaching, electrowon	50,000	55,000	55,700	50,100	55,000
Total	1,706,400	1,624,900	1,683,700	1,723,100	1,910,000
Colombia, concentrates	9,355	9,920	7,644	9,371	8,194
Congo (Brazzaville), leaching, electrowon	15,400	15,875	13,607 [r]	10,000 [e]	10,000 [e]
Congo (Kinshasa):					
Concentrates[e, 5]	276,000	280,000	244,000	276,000	320,000
Leaching, electrowon	818,730	945,607	1,126,500	1,325,600	1,420,000
Total	1,094,730	1,225,607	1,370,500	1,601,600	1,740,000
Cyprus, leaching, electrowon	1,293	908	703	--	--
Dominican Republic, concentrates	9,618	8,588	6,047	2,193 [r]	5,600
Ecuador, concentrates[e]	8,200 [3]	42,000 [3]	9,900 [3]	43,000 [3]	120,000
Eritrea, concentrates	7,900	17,000	16,008	21,725	20,224
Finland, concentrates	53,144	46,674	32,861	36,278	32,384
Georgia, concentrates	9,500 [e]	9,200 [e]	9,547	8,031 [r]	8,147
India, concentrates	31,800	34,100	28,000	22,800	26,300
Indonesia:					
Concentrates	577,000	591,000	334,000	500,000	712,000
Leaching, electrowon	23,160	17,071	16,777	5,377	19,045
Total	600,160	608,071	350,777	505,377	731,045
Iran:					
Concentrates	288,900	300,800	295,800	297,100	316,800
Leaching, electrowon	13,200	15,700	16,400	16,400	22,800
Total	302,100	316,500	312,200	313,500	339,600
Kazakhstan:					
Concentrates	515,600	592,800	522,600	513,600	468,900
Leaching, electrowon	42,200	42,700	39,500	38,200	41,300
Total	557,800	635,500	562,100	551,800	510,200
Korea, North, concentrates[e]	10,000	10,000	10,000	10,000	10,000
Korea, Republic of, concentrates	7	--	--	--	--
Kyrgyzstan, concentrates	8,000	7,600	7,400	5,400	6,900
Laos:					
Concentrates	90,363	83,680	69,284	48,433	45,806
Leaching, electrowon	62,941	68,200	72,006	39,730	5,341
Total	153,304	151,880	141,290	88,163	51,147

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	2017	2018	2019	2020	2021
Mauritania, concentrates	28,791	28,137	29,620	28,491	18,845
Mexico:					
Concentrates	540,200	517,300	526,100	566,100	551,100
Leaching, electrowon	202,000	179,300	187,600	166,800	183,000
Total	742,200	696,600	713,700	732,900	734,100
Mongolia:					
Concentrates[e, 3]	303,000	301,000	290,000	294,000	305,000
Leaching, electrowon	14,689	14,175	11,758	9,488	9,690
Total	318,000	315,000	302,000	303,000	315,000
Morocco, concentrates[e, 3]	30,000	29,000	25,000	27,000 [r]	28,000
Namibia:					
Concentrates	68	--	180 [e, 3]	110 [e, 3]	90 [e, 3]
Leaching, electrowon	15,466	15,177	14,940	15,741	950
Total	15,534	15,177	15,120	15,851	1,040
North Macedonia:					
Concentrates	8,008	6,950	6,512	5,903	5,900
Leaching, electrowon	958	768	719	722	700
Total	8,966	7,718	7,231	6,625	6,600
Pakistan, concentrates	10,052	12,538	13,049	13,200	18,806
Panama, concentrates	--	--	147,480	205,548	331,000
Papua New Guinea, concentrates	105,000	97,300	99,400	82,800	66,500
Peru:					
Concentrates	2,383,163	2,370,778	2,389,145	2,086,694	2,223,076
Leaching, electrowon	62,421	66,257	66,295	63,432 [r]	76,201
Total	2,445,584	2,437,035	2,455,440	2,150,126 [r]	2,299,277
Philippines, concentrates	68,156	69,933	71,892	60,856	51,586
Poland, concentrates	419,300	401,300	398,900	392,700	391,300
Portugal, concentrates	63,812	49,064	41,553	32,230	37,900
Romania, concentrates	8,700	8,700	9,200	8,300	8,900
Russia:					
Concentrates	759,800	869,300	811,200	923,000 [r]	940,000 [e]
Leaching, electrowon	1,300	1,200	1,200	1,100 [r]	1,400
Total	761,100	870,500	812,400	924,100 [r]	941,000
Saudi Arabia, concentrates	67,097	60,340	88,491	92,883 [r]	97,527
Serbia, concentrates	44,750	42,500	43,550	52,207	121,150
South Africa, concentrates	65,500	46,900	52,500	29,100	28,300
Spain:					
Concentrates	124,689	116,976	122,466	128,326 [r]	133,300
Leaching, electrowon	73,664	70,738	48,090	54,352	13,652
Total	198,353	187,714	170,556	182,678 [r]	146,952
Sweden, concentrates	104,594	106,140	99,332	100,065	88,000
Tanzania, concentrates	2,748 [r]	730 [r]	14,186 [r]	1,706 [r]	1,700 [e]
Turkey, concentrates	83,000	79,600	73,500	107,000	108,000
United States:					
Concentrates[6]	702,000	690,000	730,000	644,000 [r]	670,000
Leaching, electrowon	557,000	532,000	527,000	557,000 [r]	562,000
Total	1,260,000	1,220,000	1,260,000	1,200,000	1,230,000
Uzbekistan, concentrates	140,100	141,200	137,300	142,800 [r]	150,000 [e]
Vietnam, concentrates[e]	21,000 [5]	26,200 [3]	29,200 [5]	30,800 [r, 5]	33,600 [5]
Zambia:					
Concentrates	628,400	677,300	655,500	706,700	702,800
Leaching, electrowon	201,300	210,000	144,400	146,000	138,700
Total	829,700	887,300	799,900	852,700	841,500

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	2017	2018	2019	2020	2021
Zimbabwe, concentrates	8,839	9,077	8,678 r	7,933	8,650
Grand total	20,100,000	20,600,000	20,400,000	20,600,000	21,200,000
Of which:					
Concentrates	16,200,000	16,600,000	16,300,000	16,500,000 r	17,100,000
Leaching, electrowon	3,890,000	4,010,000	4,100,000 r	4,180,000 r	4,030,000

eEstimated. rRevised. -- Zero.

[1]Table includes data available through August 22, 2022. All data are reported unless otherwise noted; totals may include estimated data. 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.

[3]Estimate based on reported production of ore and (or) concentrates.

[4]Copper content of concentrates produced in Bulgaria and then processed to produce anodes and cathodes within Bulgaria. Total output is higher, as the copper content of concentrates produced in and then exported from Bulgaria is not reported.

[5]Estimate based on a combination of reported copper production for some companies and reported production of concentrates for other companies.

[6]Recoverable copper content.

TABLE 21

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

(Metric tons, copper content)

Country or locality	2017	2018	2019	2020	2021
Armenia, primary	12,051	8,831	--	--	--
Australia, primary	360,000	361,000	401,000	399,000 r	367,000
Austria, secondary	65,939	66,689	68,595	75,412	75,370
Belgium, secondary	126,900	140,500	139,900	152,000	151,900
Brazil:					
Primary	118,800	125,500	115,400	85,400	49,900
Secondary	24,800	15,300	41,700	24,000	7,100
Total	143,600	140,800	157,100	109,400	57,000
Bulgaria:					
Primary	322,700	316,800	270,400 r	291,500 r	291,700
Secondary	52,500	41,800	39,800 r	43,800 r	50,000
Total	375,200	358,600	310,200	335,300 r	341,700
Canada:					
Primary	289,400	290,100	265,000 r, e	255,000 r, e	265,000 e
Secondary	31,000	30,000	28,000 r, e	30,000 e	31,000 e
Total	320,400	320,100	293,000 r	285,000 r	296,000
Chile, primary	1,264,600	1,246,100	1,011,200	1,206,300	1,206,600
China:					
Primary	6,600,000	7,035,600	7,400,000	7,907,000	8,200,000
Secondary	1,380,500	1,561,800	1,688,400	1,749,800	1,850,000
Total	7,980,500	8,597,400	9,088,400	9,656,800	10,050,000
Finland:					
Primary	112,400 [3]	123,500 [3]	109,700 [3]	130,000 e	135,000 e
Secondary	5,900 [3]	6,500 [3]	5,800 [3]	7,000 e	7,200 e
Total	118,300 [3]	130,000 [3]	115,500 [3]	137,000	142,000
Germany:					
Primary	332,600	311,200	288,600	312,600	373,100
Secondary	198,300	157,400	152,100 r	179,500 r	151,200
Total	530,900	468,600	440,700 r	492,100 r	524,300
India:					
Primary	813,100	481,500	342,300	243,200	363,000
Secondary	10,000	10,000	2,000	--	--
Total	823,100	491,500	344,300	243,200	363,000
Indonesia, primary	245,800	213,767	163,429	279,598	280,400
Iran:					
Primary	114,200	204,100	201,100	223,300	246,800
Secondary	70,900	100,300	109,100	127,500	114,400
Total	185,100	304,400	310,200	350,800	361,200
Japan:					
Primary	1,118,626	1,169,500	1,112,276	1,259,400	1,197,000
Secondary	369,525	421,736	394,401	332,100	357,800
Total	1,488,151	1,591,236	1,506,677	1,591,500	1,554,800
Kazakhstan, primary	334,844	327,314	371,359	378,618 r	364,413
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	510,000	530,000	520,000	513,900	520,000
Secondary	125,000	140,000	160,000	166,000	170,000
Total	635,000	670,000	680,000	679,900	690,000
Mexico:					
Primary	270,200	286,200	277,700	283,600	289,200
Secondary[e]	5,000	5,000	5,000	5,000	5,000
Total	275,200	291,200	282,700	288,600	294,200
Namibia, primary	45,523	48,970	45,953	46,792	42,010
Oman, primary	5,100	6,000	--	--	--

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	2017	2018	2019	2020	2021
Pakistan, primary	10,000 e	12,500 e	13,000 e	5,700	12,400
Peru, primary	316,882	327,821	294,315	342,738	311,000
Philippines, primary	240,000	170,900	217,800	247,000	219,800
Poland:					
Primary	457,549	461,865	489,242	462,868	482,557
Secondary	53,024	50,001	51,904	69,696	98,852
Total	510,573	511,866	541,146	532,564	581,409
Russia:					
Primary	730,000	789,000	801,000	815,200	737,600
Secondary	216,000	230,000	240,000	235,000	222,600
Total	946,000	1,019,000	1,041,000	1,050,200	960,200
Serbia:					
Primary	67,800 r, 3	65,900 r, 3	72,500 r, 3	45,100 r	57,800
Secondary	1,400 r, 3	1,300 r, 3	1,500 r, 3	800 r	900
Total	69,200 3	67,200 r, 3	74,000 3	45,900 r	58,700
Slovakia, secondary	48,200 r	38,400 r	51,800 r	55,300 r	59,700
South Africa, primary	52,600	33,300	26,000	22,000 r, e	28,000 e
Spain:					
Primary	272,000	284,800	255,700 3	257,700	253,800
Secondary	11,100	10,600	16,300 3	18,200	24,700
Total	283,100	295,400	272,000 3	275,900	278,500
Sweden:					
Primary	153,600 r	157,100 r	140,900 r	166,200 r	156,200
Secondary	65,800 r	67,300 r	60,400 r	59,900 r	66,900
Total	219,400 r	224,400 r	201,300 r	226,100 r	223,100
Turkey:					
Primary	53,400	85,400	83,700	78,900	79,000
Secondary[e]	5,000	5,000	5,000	5,000	5,000
Total	58,400	90,400	88,700	83,900	84,000
United States, primary	470,000	536,000	464,000	315,000 e, 4	360,000 e, 4
Uzbekistan, primary[e]	110,000 r	120,000 r	145,000	145,000	150,000
Vietnam, primary	15,800	15,100	19,200	20,200 r, e	22,000 e
Zambia, primary	787,900	828,700	638,500	750,600	758,500
Grand total	19,500,000	20,100,000	19,800,000 r	20,800,000 r	21,300,000
Of which:					
Primary	16,600,000	17,000,000	16,600,000	17,500,000 r	17,800,000
Secondary	2,870,000	3,100,000	3,270,000 r	3,340,000 r	3,450,000

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

[1]Table includes data available through August 23, 2022. All data are reported unless otherwise noted; totals may include estimated data. 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 are shown separately.

[3]Total smelter production is reported, but the distribution between primary and secondary output is estimated.

[4]To avoid disclosing company proprietary data, production is an estimate based on information in public company reports and does not reflect actual output reported to the U.S. Geological Survey.

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

(Metric tons)

Country or locality	2017	2018	2019	2020	2021
Argentina, secondary[e]	16,000	16,000	16,000	16,000	16,000
Australia, primary:					
Leaching, electrowon	26,000	23,000	24,900 [r]	24,700 [r]	23,000
Other	360,000	354,000	401,800 [r]	402,600 [r]	361,800
Total	386,000	377,000	426,700 [r]	427,300 [r]	384,800
Austria, secondary	109,823	107,210	128,207	132,019	133,482
Belgium:					
Primary	235,500	230,800	209,600	188,000	227,900
Secondary	163,400	159,400	147,000	133,500	158,600
Total	398,900	390,200	356,600	321,500	386,500
Bolivia, leaching, electrowon	2,269	3,114	3,097	1,754	1,694
Brazil:					
Primary	118,100	131,800	133,500	85,900	56,400
Secondary	24,800	15,300	41,700	24,000	7,100
Total	142,900	147,100	175,200	109,900	63,500
Bulgaria:[3]					
Primary	196,500 [r]	197,200 [r]	180,300 [r]	195,700 [r]	188,300
Secondary	32,000 [r]	26,900 [r]	26,900 [r]	29,200 [r]	30,700
Total	228,500	224,100 [r]	207,200 [r]	224,900 [r]	219,000
Burma, leaching, electrowon	115,100	153,000	153,100	185,000	33,900
Canada:					
Primary	300,700 [3]	259,300 [3]	253,100 [3]	246,100 [r]	255,400
Secondary	29,700 [3]	32,000 [3]	28,100 [3]	30,000	31,100
Total	330,400 [3]	291,300 [3]	281,200 [3]	276,100 [r]	286,500
Chile, primary:					
Leaching, electrowon	1,586,200	1,575,300	1,580,200	1,467,500	1,414,400
Other	843,300	885,900	688,900	861,800	859,600
Total	2,429,500	2,461,200	2,269,100	2,329,300	2,274,000
China:					
Primary:					
Leaching, electrowon	50,000	55,000	55,700	50,100	55,000
Other	6,564,300	7,001,800	7,556,400	7,999,800	8,175,000
Total, primary	6,614,300	7,056,800	7,612,100	8,049,900	8,230,000
Secondary	2,300,800	2,234,600	2,170,800	1,975,500	2,257,000
Total, primary and secondary	8,915,100	9,291,400	9,782,900	10,025,400	10,487,000
Congo (Brazzaville), leaching, electrowon	15,400	15,875	13,607 [r]	10,000 [e]	10,000 [e]
Congo (Kinshasa), primary:					
Leaching, electrowon	818,730	945,607	1,126,500	1,325,600	1,420,000
Other	11,757	7,631	14,838	21,663	26,691
Total	830,487	953,238	1,141,338	1,347,263	1,446,691
Cyprus, leaching, electrowon	1,293	908	703	--	--
Egypt, secondary[e]	100,000	100,000	100,000	100,000	100,000
Finland:					
Primary	126,500 [3]	132,100 [3]	114,727	139,888 [r]	143,761
Secondary	6,700 [3]	7,000 [3]	5,642	5,959 [r]	7,545
Total	133,200 [3]	139,100 [3]	120,369	145,847	151,306
Germany:					
Primary	413,200	396,700	336,300 [r]	358,000	383,800
Secondary	281,200	275,700	266,400 [r]	285,000	231,200
Total	694,400	672,400	602,700 [r]	643,000	615,000
India:					
Primary	819,000	541,000	424,200	333,500	488,600
Secondary	10,000	10,000	2,000	--	--
Total	829,000	551,000	426,200	333,500	488,600

See footnotes at end of table.

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

(Metric tons)

Country or locality	2017	2018	2019	2020	2021
Indonesia, primary:					
Leaching, electrowon	23,160	17,071	16,777	5,377	19,045
Other	224,015	213,853	163,427	263,208	270,497
Total	247,175	230,924	180,204	268,585	289,542
Iran:					
Primary:					
Leaching, electrowon	13,200	15,700	16,400	16,400	22,800
Other	90,000	149,600	160,400	167,500	192,000
Total, primary	103,200	165,300	176,800	183,900	214,800
Secondary	57,000	73,300	84,700	95,500	88,700
Total, primary and secondary	160,200	238,600	261,500	279,400	303,500
Italy, secondary	8,700	7,200	9,800	15,000	15,400
Japan:					
Primary	1,166,194	1,241,100	1,152,847	1,242,743	1,119,400
Secondary	321,886	353,417	342,512	340,348	390,700
Total	1,488,080	1,594,517	1,495,359	1,583,091	1,510,100
Kazakhstan, primary:					
Leaching, electrowon	42,200	42,700	39,500	38,200	41,300
Other	426,191	438,115	472,327	477,016	458,604
Total	468,391	480,815	511,827	515,216	499,904
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	501,300	500,500	473,600	489,500	476,300
Secondary	163,000	174,000	189,400	181,800	171,100
Total	664,300	674,500	663,000	671,300	647,400
Laos, leaching, electrowon	62,941	68,200	72,006	39,730	5,341
Mexico:					
Primary:					
Leaching, electrowon	202,000	179,300	187,600	166,800	183,000
Other	256,300	289,300	294,300	320,100	284,800
Total, primary	458,300	468,600	481,900	486,900	467,800
Secondary[e]	5,000	5,000	5,000	5,000	5,000
Total, primary and secondary	463,300	473,600	486,900	491,900	472,800
Mongolia, leaching, electrowon	14,689	14,175	11,758	9,488	9,690
Namibia, leaching, electrowon	15,466	15,177	14,940	15,741	950
North Macedonia, leaching, electrowon	958	768	719	722	700
Norway, primary	22,700	20,600	22,000	20,500	20,100
Oman, primary	5,100	6,000	--	--	--
Peru, primary:					
Leaching, electrowon	62,421	66,257	66,295	63,432 [r]	76,201
Other	272,996	270,541	241,567	256,322	260,200
Total	335,417	336,798	307,862	319,754 [r]	336,401
Philippines, primary	205,000	170,800	217,300	220,900	206,200
Poland:					
Primary	429,600	423,600	463,600	428,500	448,800
Secondary	92,400	78,200	102,000	131,800	128,700
Total	522,000	501,800	565,600	560,300	577,500
Russia:					
Primary:					
Leaching, electrowon	1,300 [4]	1,200 [4]	1,200 [4]	1,100 [r, 4]	1,400
Other	729,700 [4]	781,400 [4]	790,600 [4]	811,500 [r, 4]	753,700
Total, primary	731,000 [4]	782,600 [4]	791,800 [4]	812,600 [r, 4]	755,100
Secondary	218,000 [4]	233,400 [4]	236,200 [4]	242,400 [r, 4]	226,100
Total, primary and secondary	949,000 [4]	1,016,000 [4]	1,028,000 [4]	1,055,000 [r, 4]	981,200

See footnotes at end of table.

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

(Metric tons)

Country or locality	2017	2018	2019	2020	2021
Serbia:					
Primary	67,752	65,700 r, 3	72,500 r, 3	45,100	57,400
Secondary	1,469	1,300 r, 3	1,500 r, 3	1,900	900
Total	69,221	67,000 r, 3	74,000 3	47,000	58,300
South Africa, primary	66,200	43,900	35,600	21,800	20,400
Spain:					
Primary:					
Leaching, electrowon	73,664	70,738	48,090	54,352	13,652
Other	260,700	273,200	252,900	256,600	252,800
Total, primary	334,364	343,938	300,990	310,952	266,452
Secondary	80,800	79,900	85,300	88,700	94,200
Total, primary and secondary	415,164	423,838	386,290	399,652	360,652
Sweden:					
Primary	157,500	167,900	146,600	167,200	162,800 3
Secondary	61,500	56,100	54,400	58,800	60,200 3
Total	219,000	224,000	201,000	226,000	223,000 3
Turkey:					
Primary	88,000	116,300	106,000	116,100	117,000
Secondary	7,000	10,000	10,000 e	10,000 e	10,000 e
Total	95,000	126,300	116,000	126,100	127,000
Ukraine, secondary	25,186	24,901	20,409	24,335	28,817
United States:					
Primary:					
Leaching, electrowon	557,000	532,000	527,000	557,000 r	562,000
Other	482,000	538,000	457,000	315,000 e, 5	360,000 e, 5
Total, primary	1,040,000	1,070,000	985,000	872,000 r	922,000
Secondary	40,100	41,200	44,400	43,200	48,900
Total, primary and secondary	1,080,000	1,110,000	1,030,000	916,000 r	971,000
Uzbekistan, primary	109,900 r	117,400 r	147,250	147,700 r	148,500
Vietnam, primary	15,800	15,100	19,200	20,200 r, e	22,000 e
Zambia, primary:					
Leaching, electrowon	201,300	210,000	144,400	146,000	138,700
Other	264,800	248,200	120,100	232,400	215,200
Total	466,100	458,200	264,500	378,400	353,900
Zimbabwe, primary	--	62	71	70 e	100 e
Grand total	23,900,000	24,400,000	24,400,000	25,000,000	25,300,000
Of which:					
Primary:					
Leaching, electrowon	3,890,000	4,010,000	4,100,000 r	4,180,000 r	4,030,000
Other	15,800,000 r	16,200,000 r	16,100,000	16,900,000	17,000,000
Total	19,700,000 r	20,200,000 r	20,200,000 r	21,000,000 r	21,100,000
Secondary	4,160,000 r	4,130,000 r	4,120,000 r	3,970,000	4,250,000

eEstimated. rRevised. -- Zero.

[1]Table includes data available through August 22, 2022. All data are reported unless otherwise noted; totals may include estimated data. 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 are 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.

[3]Total refined production is reported, but the distribution between primary (electrowon), primary (other), and (or) secondary output is estimated.

[4]Total refined production and electrowon production are reported, but the distribution between primary (other) and secondary output is estimated.

[5]To avoid disclosing company proprietary data, production is an estimate based on information in public company reports and does not reflect