2022 Minerals Yearbook

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Copper

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In 2022, U.S. mine production of recoverable copper was 1.23 million metric tons (Mt), unchanged from that in 2021 (tables 1, 3). The United States remained the fifth-ranked global mine producer of copper after Chile, Peru, Congo (Kinshasa), and China, in descending order of output, and accounted for 6% of global production. World mine production of copper increased by 4% to 21.9 Mt from 21.1 Mt (revised) in 2021, mostly owing to production increases in China, Congo (Kinshasa), Indonesia, Kazakhstan, Peru, and Serbia. These increases were partially offset by significantly lower output in Chile (table 20).

Smelter production of copper in the United States increased by 4% in 2022 to an estimated 375,000 metric tons (t) from an estimated 360,000 t in 2021, and domestic output of refined copper was 970,000 t compared with 971,000 t in 2021 (table 1). The United States remained the sixth-ranked producer of refined copper in 2022, after China, Chile, Congo (Kinshasa), Japan, and Russia, in descending order of production, and accounted for 4% of global output. World refinery production of copper was 25.9 Mt, 3% greater than 25.2 Mt (revised) in 2021. Large production increases in China, Congo (Kinshasa), India, and Kazakhstan were partially offset by significant decreases in Brazil, Chile, Germany, and Spain (table 22).

In 2022, reported U.S. consumption of refined copper was 1.72 Mt compared with 1.75 Mt in 2021, reflecting the closure in August 2022 of a wire-rod plant in Amarillo, TX (tables 1, 4–5). World apparent consumption of refined copper increased by 3% to 26.1 Mt from 25.2 Mt (revised) in 2021, 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 56% of worldwide consumption. Consumption in China increased by 820,000 t from that in 2021, and consumption in all other countries and localities collectively increased by 43,300 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, 2023a, p. 18).

The annual average Commodity Exchange Inc. (COMEX) spot copper price was $4.01 per pound in 2022, 6% less than a record-high $4.24 per pound in 2021 (table 1). Factors that contributed to the decreased price included expectations for reduced global economic growth in the near future, weaker-than-anticipated demand for copper in China, and increased strength of the United States dollar relative to other currencies (Freeport-McMoRan Inc., 2022, p. 3; PJSC MMC Norilsk Nickel, 2023, p. 32).

Data in this report were 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, 1 secondary smelter, 2 primary electrolytic refineries, 14 electrowon refineries, and 3 secondary fire refineries operating in the United States in 2022. To avoid disclosing company proprietary data, smelter and electrolytic refinery outputs in 2021 and 2022 were estimated based on information in public company reports and do not reflect actual production reported to the USGS.

Mine.—In 2022, recoverable copper production in the United States was 1.23 Mt, unchanged from that in 2021, and the value of production decreased by 5% to $11.2 billion from $11.7 billion. Copper recoverable in concentrate (including a small amount of copper in precipitate) accounted for 55% of mine output and was 678,000 t in 2022 compared with 670,000 t in 2021. Copper produced by leaching and solvent extraction–electrowinning (SX–EW) accounted for 45% of mine production and was 555,000 t compared with 562,000 t in 2021 (tables 1, 3). Arizona was the leading copper-producing State and accounted for 69% of domestic mine output. Copper also was produced in Michigan, Missouri, Montana, Nevada, New Mexico, and Utah. The leading 10 mines in the United States accounted for 90% of production in 2022; publicly reported production data for these and other major copper-producing mines are in table 2. Most, but not all, of the remaining mines were small SX–EW operations or byproduct producers of copper.

The largest increases in mined copper production in 2022 were at Rio Tinto Group's Bingham Canyon Mine in Utah, where output increased by 19,800 t from that in 2021, and at Freeport-McMoRan Inc.'s Safford Mine in Arizona, where output increased by 9,070 t (table 2). At Bingham Canyon, copper ore grades and recovery rates were higher than those in 2021 following a transition to mining a new area of the open pit. The Lone Star expansion of the Safford Mine was completed in the second half of 2020, and Freeport continued to ramp up operations in 2022. These increases in production were offset by significantly decreased production at ASARCO LLC's Mission Mine in Arizona, by 12,100 t from that in 2021; at Freeport's Bagdad Mine in Arizona, by 8,620 t; and at KGHM International Ltd.'s Robinson Mine in Nevada, by 6,800 t. Copper ore grades declined at Mission and Robinson, and output at Mission also was affected by a labor shortage (Grupo México, S.A.B. de C.V., 2022, p. 6; 2023, p. 222; Rio Tinto Group, 2022b, p. 12; 2023a, p. 41, 281; Freeport-McMoRan Inc., 2023a, p. 13, 33; KGHM Polska Miedź S.A. Group, 2023, p. 224).

Smelter and Refinery.—In 2022, smelter production of copper in the United States, which consisted predominantly of primary output, and U.S. production of primary electrolytically refined copper each increased by 4% to an estimated 375,000 t from an estimated 360,000 t in 2021 (table 1). Primary refined copper produced by electrowinning was 555,000 t in 2022 compared with 562,000 t in 2021, and secondary electrolytic and fire-refined copper decreased by 18% to 40,000 t from 48,900 t in 2021. In total, domestic refinery production in 2022 was 970,000 t, essentially unchanged from 971,000 t in 2021. Primary copper accounted for 96% of domestic refined output (39% electrolytic and 57% electrowon), and secondary copper accounted for 4% (table 1).

In September 2022, Ames Copper Group was reportedly starting up its new copper plant in Shelby, NC, the first secondary copper smelter in the United States since 2001. Once fully operational, the facility was expected to produce up to 50,000 metric tons per year (t/yr) of copper anodes from scrap (Taylor, 2021; CRU International Ltd., 2022, p. 12; Toto, 2023). Production at the new facility was likely limited in 2022.

Aurubis AG began construction of a secondary copper smelter in Augusta, GA, on June 17, 2022. The plant was expected to begin operating in 2024, to process 90,000 t/yr of complex copper-containing scrap (such as printed circuit boards and copper cables), and to produce 35,000 t/yr of blister copper. In December 2022, Aurubis announced an additional investment that would double the processing and production capacities of the plant, beginning in 2026 (Aurubis AG, 2022; Esmen, 2022).

On June 29, 2022, Wieland Group broke ground for a secondary copper refinery in Shelbyville, KY. The facility was expected to produce approximately 100,000 t/yr of refined copper from copper and copper-alloy scrap for use in manufacturing and semifinished products in North America (Toto, 2021; Wieland Group, 2022).

Operating Property Reviews.—ASARCO (a subsidiary of Grupo México, S.A.B. de C.V.) produced a total of 112,000 t of copper in 2022 at its three mines in Arizona (79,600 t of copper in concentrate and 32,500 t of copper by SX–EW), 11% less than 127,000 t in 2021 (94,100 t in concentrate and 32,400 t by SX–EW). The company attributed the decreased output to lower copper ore grades at the Mission Mine and a labor shortage in the United States. Production at each of ASARCO's mines is reported in table 2. ASARCO's smelter in Hayden, AZ, and electrolytic refinery in Amarillo, TX, remained idle in 2022 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 2022 when (or if) operations were expected to resume or a reason for the continued closures. In August 2022, ASARCO indefinitely shut down its wire-rod plant at the Amarillo refinery owing to high production costs, maintenance issues, and labor shortages (Grupo México, S.A.B. de C.V., 2021, p. 83; 2022, p. 6; 2023, p. 222, 224, 229, 231; Frazier, 2022).

In 2022, copper production at Capstone Copper Corp.'s Pinto Valley Mine in Arizona decreased by 6% to 56,800 t (54,200 t in concentrate and 2,620 t of electrowon cathodes) from 60,500 t in 2021 (58,300 t in concentrate and 2,180 t of cathodes) (table 2). Output was affected by lower ore grades and reduced mill throughput. Capstone advanced a feasibility study to increase ore processing, improve copper recovery rates, and expand tailings storage, which were expected to significantly extend the life of the mine (Capstone Copper Corp., 2023, p. 10, 13).

In December 2020, Excelsior Mining Corp. produced the first copper cathodes at the Gunnison Mine in Arizona. 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 refinery 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 t/yr would be delayed because of the formation of carbon dioxide gas bubbles that were impeding fluid flow rates in the fracture system of the ore body. Pending approval from the U.S. Environmental Protection Agency, Excelsior intended to conduct well stimulation trials in 2023 to eliminate the carbon dioxide gas bubbles and increase fluid flow. As of yearend 2022, the company was unable to project when the nameplate capacity would be achieved. Reported sales of cathodes from Gunnison were 471 t in 2022, 12% less than 534 t in 2021 (Excelsior Mining Corp., 2022, p. 25; 2023, p. 13, 15, 27, 29–30).

Total output of recoverable copper at Freeport's five mines in Arizona and two mines in New Mexico was 777,000 t in 2022 (315,000 t in concentrate and 462,000 t by SX–EW) compared with 773,000 t in 2021 (294,000 t in concentrate and 479,000 t by SX–EW). Production at each of the company's leading U.S. mines is reported in table 2. Freeport continued to ramp up the Lone Star expansion of the Safford Mine, which started in the second half of 2020, and expected to achieve its target production of approximately 135,000 t/yr of electrowon cathodes in 2023. The company also was conducting a feasibility study, with an anticipated completion date in 2023, to double the capacity of the concentrator at the Bagdad Mine in Arizona. Copper anodes and refined copper cathodes were produced at Freeport's smelter in Miami, AZ, and electrolytic facility in El Paso, TX (Freeport-McMoRan Inc., 2023a, p. 12–13, 33–34).

In 2022, Nevada Copper Corp. continued to develop the Pumpkin Hollow Mine in Nevada. In the second quarter, the company encountered a weak rock structure that required geotechnical mitigation and impeded access to the main ramp. Mining, ore processing, and development activities were subsequently suspended. Nevada Copper restarted development operations late in the third quarter and expected to restart milling operations in the third quarter of 2023. Sales of copper concentrate from the mine decreased by 39% to 4,080 t (gross weight) in 2022 from 6,660 t in 2021 (Nevada Copper Corp., 2023, p. 6–7, 9, 11).

Production of copper in concentrate at the Bingham Canyon Mine in Utah increased by 12% to 179,000 t in 2022 from 159,000 t in 2021 as a result of higher ore grades following a transition to mining a new area of the open pit (table 2). In September 2022, Rio Tinto announced a project to expand production at Bingham Canyon through development of an underground deposit. Operations at the company's Kennecott copper smelter and electrolytic refinery in Magna, UT, were affected by unplanned maintenance of the smelter anode furnaces in the fourth quarter of 2022. Rio Tinto anticipated that refined output would be lower than usual until a planned rebuild of the smelter was completed in 2023. Production of anodes at Kennecott in 2022 was 145,000 t compared with 143,000 t in 2021, and production of cathodes was 148,000 t, 3% greater than 143,000 t in 2021 (Rio Tinto Group, 2022b, p. 12; 2023a, p. 41, 137, 281; 2023b, p. 15, 28).

Consumption

Domestic consumption data were compiled from USGS annual and monthly canvasses of U.S. manufacturers. In 2022, 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 was 1.72 Mt compared with 1.75 Mt in 2021, reflecting the closure in August 2022 of ASARCO's wire-rod plant in Amarillo, TX. Consumption by wire-rod mills was 1.25 Mt (73% of total refined use), and consumption by brass mills was 420,000 t (24%). Domestic consumption of copper-base scrap in 2022 was 882,000 t (gross weight), 3% less than 906,000 t (revised) in 2021. Brass mills consumed 655,000 t of copper-base scrap (equivalent to 74% of total use), and wire-rod mills consumed 93,800 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 by 3% to 829,000 t in 2022 (82% from new scrap and 18% from old scrap) from 852,000 t (revised) in 2021 and accounted for 33% of the U.S. copper supply of 2.50 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 by 10% to 152,000 t in 2022 from 169,000 t (revised) in 2021, and recovery of copper from new (manufacturing) scrap was 677,000 t compared with 683,000 t in 2021 (tables 1, 6). Brass and wire-rod mills accounted for 85% of copper recovered from copper-base scrap in 2022 (table 7).

According to preliminary data from the Copper Development Association Inc. (2023, p. 18), wire-rod mill products accounted for 52% of the U.S. copper supply; brass mill products, 28%; net imports, 17%; and foundry and powder products, 3% combined. The building construction sector remained the leading end-use market for copper and accounted for 45% of consumption, followed by electrical and electronic products, 22%; 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, railroads, and ships.

Stocks

Refined copper stocks in the United States decreased by 28% to 83,500 t at yearend 2022 from 117,000 t at yearend 2021. COMEX stocks decreased by 32,100 t (50%), and stocks in U.S. London Metal Exchange Ltd. warehouses decreased by 13,300 t (66%). Combined inventories at manufacturers (brass mills, refineries, wire-rod mills, and other manufacturers) increased by 12,400 t (38%) from those at yearend 2021. Inventories of domestic refined copper at yearend 2022 were located primarily in COMEX warehouses (38% of total stocks), wire-rod mills (22%), and brass mills (13%) (table 1).

Prices

The annual average COMEX spot copper price was $4.01 per pound in 2022, 6% less than a record-high $4.24 per pound in 2021 (table 1). The monthly average COMEX price peaked at $4.68 per pound in March 2022, corresponding to a period of mine disruptions in South America, then steadily decreased to a minimum of $3.40 per pound in July because of expectations for reduced global economic growth in the near future, weak demand for copper in China, and increased strength of the United States dollar relative to other currencies. Late in 2022, prices increased owing in part to an increased demand outlook in China and low global refined copper stockpiles (Freeport-McMoRan Inc., 2022, p. 3; 2023b, p. 3; PJSC MMC Norilsk Nickel, 2023, p. 32).

Copper scrap prices generally followed the trend in refined copper prices, and decreases in the prices of various types of scrap ranged from 3% to 14% in 2022. The refiners no. 2 scrap price averaged $3.58 per pound, 3% less than $3.69 per pound in 2021. The annual average discount for refiners no. 2 scrap from the annual average COMEX price decreased to 42.7 cents per pound from 55.3 cents per pound (tables 1, 13).

Foreign Trade

In 2022, refined copper accounted for 86% 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 12% (8% copper-alloy scrap and 4% unalloyed scrap). Refined copper imports decreased by 20% to 732,000 t from 919,000 t in 2021. Chile was the leading foreign source of refined copper and accounted for 64% of the total refined copper imported, followed by Canada (16%), Mexico (10%), and Peru (7%). The United States imported an estimated 102,000 t of copper contained in scrap in 2022, 9% less than 113,000 t in 2021. Imports of copper in scrap originated primarily from Canada (47%) and Mexico (42%). Imports of copper ore and concentrate increased by 7% to 11,700 t of copper content in 2022 from 11,000 t 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 2022 and accounted for 66% of total unmanufactured copper exports (18% alloyed and 48% unalloyed), followed by the copper content of ore and concentrate (29%) and refined copper (2%). Exports of copper scrap increased by 3% to an estimated 807,000 t (copper content) from 784,000 t in 2021. China was the leading destination and accounted for 35% of copper exported in scrap, followed by Canada (11%); India (8%); the Republic of Korea, Malaysia, and Thailand (6% each); and Belgium (5%). Exports of copper ore and concentrate increased slightly to 353,000 t of copper content in 2022 from 344,000 t (revised) in 2021 and were sent primarily to Mexico (66%), China (16%), and Canada (11%). The United States exported 27,600 t of refined copper in 2022, 42% less than 47,600 t in 2021. Canada (51%), Mexico (28%), China (8%), and the United Kingdom (6%) were the leading destinations of refined copper exports from the United States (tables 14, 18).

World Industry Structure

Mine Production.—World mine production of copper increased by 4% to 21.9 Mt in 2022 from 21.1 Mt (revised) in 2021. Production of copper in concentrate accounted for 80% of global mine output and was 17.6 Mt, 3% greater than 17.1 Mt in 2021. Copper produced by SX–EW accounted for 20% of world mine production and increased by 8% to 4.32 Mt from 4.01 Mt (revised). In 2022, 53 countries and localities were known to have mined copper; Chile was the leading producer and accounted for 24% of global production, followed by Congo (Kinshasa) and Peru (11% each), China (9%), and the United States (6%). The remaining countries among the 10 leading producers, in descending order of output, were Indonesia, Russia, Australia, Zambia, and Mexico. The 10 leading producers accounted for 80% of production, and the 20 leading producers accounted for 95%. The largest production increases took place in Congo (Kinshasa), where output increased by 573,000 t (32%) from that in 2021; Indonesia, by 210,000 t (29%); China, by 120,000 t (7%); Peru, by 115,000 t (5%); Serbia, by 82,800 t (68%); and Kazakhstan, by 77,800 t (15%). The most significant decrease was in Chile, where output decreased by 297,000 t (5%) (table 20). According to data compiled by the International Copper Study Group (2023a, p. 9), global mine capacity increased by 3% to 27.0 million metric tons per year (Mt/yr) in 2022 from 26.2 Mt/yr (revised) in 2021.

Refined Production.—Global output of refined copper in 2022 was 25.9 Mt, 3% greater than 25.2 Mt (revised) in 2021. Primary copper accounted for 84% of world refined production and increased by 4% to 21.6 Mt in 2022 from 20.9 Mt (revised) in 2021; primary copper produced by electrowon refining (17% of worldwide refined production) increased by 8% to 4.32 Mt from 4.01 Mt (revised) in 2021, and primary copper produced by electrolytic and fire refining (other primary, 67%) increased by 3% to 17.3 Mt from 16.9 Mt (revised) in 2021. Secondary copper accounted for 16% of global refined output in 2022 and decreased slightly to 4.24 Mt from 4.32 Mt (revised) in 2021. In 2022, 42 countries and localities were known to have produced refined copper; China was the leading producer and accounted for 43% of world refinery production, followed by Chile (8%), Congo (Kinshasa) (7%), Japan (6%), 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 81% of worldwide output, and the 20 leading producers accounted for 95%. Most of the growth in refined copper production was in China, where output increased by 596,000 t (6%) from that in 2021. Large increases also took place in Congo (Kinshasa), by 319,000 t (22%); India, by 72,900 t (21%); and Kazakhstan, by 51,200 t (12%). The most significant decreases were in Chile, where production declined by 125,000 t (5%); Spain, by 62,800 t (17%); Germany, by 62,400 t (9%); and Brazil, by 54,900 t (86%) (table 22). Global refinery capacity increased slightly to 31.3 Mt/yr in 2022 from 30.7 Mt/yr (revised) in 2021 (International Copper Study Group, 2023a, p. 9).

Apparent Consumption.—In 2022, global apparent consumption (usage) of refined copper increased by 3% to 26.1 Mt from 25.2 Mt (revised) in 2021, according to the ICSG. China (including Hong Kong) was the leading user of refined copper and accounted for 56% of worldwide consumption, followed by the United States (7%), Germany (4%), and Japan and the Republic of Korea (3% each). The remaining countries among the 10 leading consumers, in descending order of quantity, were Italy, Turkey, India, Spain, and Mexico. The 10 leading consumers accounted for 82% of global apparent consumption, and the 20 leading consumers accounted for 93%. Consumption of refined copper in China increased by 820,000 t to 14.7 Mt in 2022 from 13.9 Mt in 2021, and consumption collectively increased by 43,300 t in all other countries and localities. 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 77% of the global total in 2022 (21% excluding China), followed by Europe (12%); North America (9%); and Africa, Oceania, and South America (2% combined) (International Copper Study Group, 2023a, p. 18).

World Review

Brazil.—In 2022, Paranapanema S.A. operated the Caraíba Metais refinery, the only producer of refined copper in Brazil. Production of refined cathodes was 8,600 t, 86% less than 63,500 t in 2021 (table 22). The company attributed the decreased output to a lack of working capital and reported that it was considering a closure of the refinery. Paranapanema also shut down the Caraíba Metais facility for 38 days following an accident on June 20 (Paranapanema S.A., 2022, 2023; Ribeiro, 2022; International Copper Study Group, 2023b, p. 230).

Chile.—Mined copper output in Chile decreased by 5% to 5.33 Mt in 2022 from 5.62 Mt in 2021 (table 20). Total production from the seven mines that were wholly owned by Corporación Nacional del Cobre de Chile (Codelco) was 1.45 Mt of copper in 2022, 11% less than 1.62 Mt in 2021. The company attributed the reduced output to declining ore grades, a landslide at the Ministro Hales Mine, depletion of ore reserves, and delays to expansion projects at multiple operations. At the Andina Mine, Codelco began producing copper from a newly developed open pit that increased the production capacity to

240,000 t/yr of copper in concentrate from 184,000 t/yr and was expected to extend the mine life by 30 years (Corporación Nacional del Cobre de Chile, 2022, p. 27–28, 35; 2023, p. 9, 16, 84; Jamasmie, 2022).

Among the other leading mines in Chile, production at the Escondida Mine [majority-owned by BHP Group Ltd. (57.5%)] increased by 4% to 1.03 Mt in 2022 from 984,000 t in 2021, reflecting higher ore grades (BHP Group Ltd., 2022, p. 11–12; 2023, p. 8–9; Rio Tinto Group, 2023a, p. 41). Copper output at the Collahuasi Mine [jointly owned by Anglo American plc and Glencore plc (44% each)] was 571,000 t, 9% less than 630,000 t in 2021 owing to planned lower ore grades. Anglo American and Glencore advanced the construction of an additional mill that was expected to start in 2023 and were evaluating options to further expand production (Anglo American plc, 2023, p. 65, 92, 316). A 13-year drought limited water availability at the Los Pelambres Mine [Antofagasta plc (60%)], where copper production decreased by 15% to 275,000 t from 325,000 t in 2021. To reduce dependence on rainfall, Antofagasta was constructing a seawater desalination plant that was projected to start by the second quarter of 2023. Operations at Los Pelambres also were affected by a nearly 1-month shutdown of the concentrate pipeline following the detection of a leak (Antofagasta plc, 2023, p. 2–3, 58, 78–79). The Los Bronces Mine [Anglo American (50.1%)] produced 271,000 t of copper in 2022, a decrease of 17% from 328,000 t in 2021 because of lower ore grades, unplanned stoppages, and reduced water availability resulting from record-low precipitation in 2021 and 2022. To mitigate the effects of the prolonged drought in central Chile, Anglo American signed an agreement with a seawater desalination company in November 2022 to provide water for operations at Los Bronces (Anglo American plc, 2023, p. 50, 92, 316, 318). Owing to lower sulfide ore grades, Antofagasta reported output of 248,000 t at its 70%-owned Centinela Mine, 10% lower than 274,000 t in 2021 (Antofagasta plc, 2023, p. 2–3, 80–81).

In 2022, production of refined copper in Chile was 2.15 Mt, 5% less than 2.27 Mt in 2021 (table 22). Codelco's three electrolytic refineries and five electrowon refineries accounted for 56% of the refined copper capacity in Chile, and other SX–EW operations accounted for the remainder (International Copper Study Group, 2023b, p. 232–238). Codelco did not report its total refined production or sales in 2022, but shipments of copper in products derived from its own ores (concentrate, blister and anodes, and refined cathodes) decreased by 197,000 t (12%). In 2021, cathodes accounted for 65% of the company's total sales (Corporación Nacional del Cobre de Chile, 2022, p. 31; 2023, p. 83). On November 15, 2022, Codelco halted processing of copper concentrate at the Chuquicamata smelter because of planned maintenance. The shutdown of the plant, one of the largest in the world by capacity, was expected to last for 135 days and also would affect the Chuquicamata refinery. The company planned to sell copper concentrate instead of refined copper until smelting operations resumed (Luk and Rostás, 2022).

Refined copper production increased at most of the other leading SX–EW operations in Chile—by 19,100 t (26%) at Freeport's 51%-owned El Abra Mine; by 9,400 t (11%) at the Centinela Mine; and by 8,200 t (4%) at the Escondida Mine. In 2022, greater volumes of ore were stacked onto leaching pads at El Abra and Escondida than in 2021, when both operations were affected by protocols related to the coronavirus disease 2019 (COVID-19) pandemic. At Centinela, output of electrowon copper benefitted from higher oxide ore grades (Antofagasta plc, 2022, p. 2, 73; 2023, p. 2–3, 81; BHP Group Ltd., 2022, p. 13; 2023, p. 10; Rio Tinto Group, 2022a, p. 57; 2023b, p. 15; Freeport-McMoRan Inc., 2023a, p. 20, 33). Production at the Antucoya Mine [Antofagasta (70%)] and the Zaldivar Mine [Antofagasta and Barrick Gold Corp. (50% each)] increased marginally in 2022; Antucoya produced 79,200 t of copper by SX–EW compared with 78,600 t in 2021, and output at Zaldivar was 89,000 t compared with 88,000 t in 2021 (Antofagasta plc, 2023, p. 2–3, 82–83). At BHP's Spence Mine, cathode production decreased slightly to 120,000 t in 2022 from 123,000 t in 2021 (BHP Group Ltd., 2022, p. 13; 2023, p. 10).

China.—Commercial production of copper at the Julong Mine [Zijin Mining Group Co., Ltd. (50.1%)] began on December 27, 2021. In 2022, Zijin reported output of 115,000 t of copper in concentrate, an increase of 99,300 t from 15,700 t in 2021. Julong was expected to produce 160,000 t/yr of copper at full capacity, with the potential to produce 600,000 t/yr after planned expansions (Zijin Mining Group Co., Ltd., 2021; 2022, p. 13, 28, 35; 2023, p. 34, 44). Total mined copper production in China increased by 120,000 t (7%) in 2022 to 1.94 Mt (table 20).

In October 2022, China Daye Non-Ferrous Metals Mining Ltd. started a newly constructed copper smelter and refinery in Hubei Province. Following a rampup period, the facilities were expected to produce 400,000 t/yr of anodes and cathodes. According to data compiled by the ICSG, several other refineries in China also opened or completed expansion projects in 2022 (Zhang, 2022; China Daye Non-Ferrous Metals Mining Ltd., 2023, p. 25; International Copper Study Group, 2023b, p. 238–243). Production of refined copper in the country increased by 6% to 11.1 Mt from 10.5 Mt (revised) in 2021 (table 22).

Congo (Kinshasa).—In 2022, mined copper output in Congo (Kinshasa) increased by 573,000 t (32%) (table 20), primarily owing to the first full year of operation of the Kamoa-Kakula Mine [Ivanhoe Mines Ltd. and Zijin (39.6% each)]. Kamoa-Kakula produced 333,000 t of copper in concentrate, a more-than-threefold increase from 106,000 t in 2021. Ivanhoe and Zijin commissioned a second concentrator in April 2022 and planned to start a third concentrator in the fourth quarter of 2024 that would expand production to 620,000 t/yr (Ivanhoe Mines Ltd., 2022, p. 14; 2023, p. 4, 6; Zijin Mining Group Co., Ltd., 2022, p. 13; 2023, p. 13). Production of copper also increased at multiple electrowon operations in the country. At the Tenke Fungurume Mine [CMOC Group Ltd. (80%)], SX–EW copper output was 254,000 t in 2022, 22% greater than 209,000 t in 2021 (CMOC Group Ltd., 2023, p. 24). The capacity of Wanbao Minerals Co., Ltd.'s 70%-owned Kamoya Mine increased to 105,000 t/yr of electrowon copper from 50,000 t/yr in 2021, reflecting the rampup of an expansion (International Copper Study Group, 2023b, p. 104). Glencore reported production of 33,300 t of electrowon cathodes at its 95%-owned copper-cobalt Mutanda Mine in 2022 compared with 6,300 t in 2021. The company restarted the mine in late 2021 after placing it on temporary care-and-maintenance status in 2019 because of low cobalt prices and global cobalt oversupply (Glencore plc, 2021, p. 161; 2023, p. 84, 269). The Kambove Mine [China Nonferrous Mining Corp. Ltd. (55%)], which started in October 2021, produced 28,300 t of copper metal by electrowinning in its first full year of operation compared with 8,680 t in 2021 (China Nonferrous Mining Corp. Ltd., 2022, p. 31; 2023, p. 27). These increases were partially offset by significantly decreased output at the Katanga Mine [Glencore (75%)] as a result of geotechnical issues. Production of copper by SX–EW was 220,000 t, 17% less than 264,000 t in 2021 (Glencore plc, 2023, p. 67, 269). In 2022, total refinery production of copper in Congo (Kinshasa) increased by 22% to 1.77 Mt from 1.46 Mt (revised) in 2021. Electrowon cathodes accounted for 99% of refined output (table 22).

Indonesia.—Mine production of copper in Indonesia was 941,000 t in 2022, 29% greater than 731,000 t in 2021 (table 20). Owing to greater mill throughput, output of copper in concentrate at the Grasberg Mine [PT Indonesia Asahan Aluminum (51.24%)] increased by 105,000 t (17%) to 711,000 t in 2022 (Freeport-McMoRan Inc., 2023a, p. 33, 35). At the Batu Hijau Mine, PT Medco Energi Internasional Tbk increased production of copper in concentrate by 104,000 t (nearly twofold) to 210,000 t, reflecting higher ore grades and restricted operations in 2021 related to the COVID-19 pandemic (PT Medco Energi Internasional Tbk, 2023, p. 14–15, 42). In 2022, these two mines accounted for 98% of mined copper output in Indonesia.

Kazakhstan.—Mined copper production in Kazakhstan increased by 15% to 593,000 t in 2022 from 515,000 t (revised) in 2021 (table 20). KAZ Minerals Ltd.'s Aktogay Mine primarily accounted for the increase and produced 237,000 t of copper (213,000 t in concentrate and 24,100 t by SX–EW), 65% greater than 144,000 t in 2021 (120,000 t in concentrate and 24,200 t by SX–EW). KAZ Minerals attributed the higher output to the rampup of a second concentrator that was commissioned in October 2021. The company also executed operational improvement measures that yielded record-high ore throughput at the original concentrator (KAZ Minerals Ltd., 2022, 2023).

Copper production at refineries in Kazakhstan was 494,000 t in 2022, 12% greater than 443,000 t (revised) in 2021 (table 22). At the Balkhash and Zhezkazgan smelter and refinery complexes, JSC Kazakhmys Copper increased output by 55% to a total of 345,000 t of cathodes from 222,000 t in 2021, when operations of the Zhezkazgan smelter were disrupted by emergency repairs (JSC Kazakhmys Copper, 2022, p. 39–40; 2023, p. 22, 48). These two facilities accounted for 70% of refined copper production in Kazakhstan in 2022.

Malaysia.—New scrap import regulations took effect on January 10, 2022. Under the new rules, shipments of copper scrap into Malaysia were required to consist of at least 94.75% copper and to contain a maximum nonmetallic content, such as wire coating or other plastic components, of 0.25%. Any components that the Ministry of International Trade and Industry considered to be electronic scrap, such as fragments of printed circuit boards, were prohibited (Smalley, 2022).

Panama.—On December 21, 2022, First Quantum Minerals Ltd. received a formal order to close its 90%-owned Cobre Panama Mine, the only copper-producing mine in the country, after a December 14 deadline to finalize a new tax and royalty deal with the Government of Panama passed without an agreement. As of yearend 2022, the parties were in negotiations, and the mine was still operating. Cobre Panama was one of the leading global copper mines in 2022 and produced 350,000 t of copper in concentrate, an increase of 6% from 331,000 t in 2021. First Quantum implemented mill efficiency improvements and increased the number of haul trucks in its fleet, resulting in higher mining and milling rates (Go, 2022; First Quantum Minerals Ltd., 2023, p. 47, 61–62).

Peru.—Mine production of copper in Peru was 2.45 Mt in 2022, 5% greater than 2.33 Mt (revised) in 2021 (table 20). Anglo American started its 60%-owned Quellaveco Mine in July 2022 and reported copper output of 102,000 t during the remainder of the year. Quellaveco was projected to achieve the target operating rate in mid-2023 and to produce an average of 300,000 t/yr of copper in the first 10 years of operation (Anglo American plc, 2023, p. 29, 65, 316, 318). Production at the Mina Justa Mine [Minsur S.A. (60%)] increased by 47% to 125,000 t of copper in 2022 from 85,100 t in 2021, reflecting the first full year of operations (Minsur S.A., 2023, p. 16, 83).

In 2022, operations at the Cuajone Mine (Southern Copper Corp., a subsidiary of Grupo México) and the Las Bambas Mine [MMG Ltd. (62.5%)] were disrupted by social unrest. At Cuajone, demonstrators blocked roads, damaged a railroad used to transport copper concentrate, and took control of the water reservoir used for mining operations. Southern Copper Corp. suspended operations at the mine for approximately 2 months from late February through late April, and production of copper consequently decreased by 17% to 140,000 t from 169,000 t in 2021 (Luk, 2022; Southern Copper Corp., 2022; 2023, p. 39). At Las Bambas, protests by the community near the mine resulted in a 50-day shutdown in the second quarter and interrupted the transport of copper concentrate for 173 days. Copper output was 255,000 t, 12% less than 290,000 t in 2021. MMG commissioned a third mill in 2022 and planned to develop a new open pit to increase copper production to up to 400,000 t/yr, pending an agreement with the local community to halt protests (MMG Ltd., 2023, p. 4, 28–29, 44).

At other leading mines in Peru that publicly reported copper production, output in 2022 was as follows: Antamina [BHP and Glencore (33.75% each)]—455,000 t (445,000 t in 2021); Cerro Verde [Freeport (53.56%)]—442,000 t (402,000 t in 2021); Toquepala (Southern Copper)—202,000 t (229,000 t in 2021); and Antapaccay (Glencore)—151,000 t (171,000 t in 2021). BHP and Glencore processed greater volumes of copper-only ores at Antamina, according to the mine plan, and Freeport increased mining and milling rates at Cerro Verde. Decreased production at Antapaccay and Toquepala reflected planned mine sequencing and lower copper ore grades, respectively (Freeport-McMoRan Inc., 2023a, p. 19, 33, 94; Glencore plc, 2023, p. 84, 269; Southern Copper Corp., 2023, p. 44, 94; Teck Resources Ltd., 2023, p. 15).

Serbia.—All of the copper-producing mines in Serbia were majority-owned by Zijin in 2022. Zijin reported total mined copper production from its Serbian mines of 204,000 t, 68% greater than 121,000 t in 2021 (table 20). The increased output reflected the first full year of operations at the Čukaru Peki

Mine, which opened in October 2021, and the startup of a new processing plant at the VK Mine. Following the completion of technological upgrades and expansion projects, Zijin expected its mines in Serbia to produce a total of 300,000 t/yr of copper in concentrate by 2025 (Zijin Mining Group Co., Ltd., 2022, p. 13, 28; 2023, p. 13, 34, 55; International Copper Study Group, 2023b, p. 165–167).

Spain.—In 2022, production of refined copper decreased by 17% to 298,000 t from 361,000 t in 2021 (table 22). Freeport's Atlantic smelter and refinery accounted for 80% of the refined copper capacity in Spain. The plant produced 218,000 t of cathodes, 21% less than 277,000 t in 2021 because of a planned maintenance shutdown that lasted for 78 days (Freeport-McMoRan Inc., 2023a, p. 25, 87; International Copper Study Group, 2023b, p. 264).

Outlook

Over the next several years, the Florence project (Taseko Mines Ltd.) and the Gunnison Mine in Arizona and the Pumpkin Hollow Mine in Nevada may begin producing copper or may complete rampups to full production capacity. Output of mined copper in the United States will likely remain steady or increase slightly over this period because decreasing ore grades at multiple established mines are expected to offset production from new mines. Domestic refined production will increase within the next few years once a new secondary copper refinery opens in Shelbyville, KY, and will further increase if the currently idle electrolytic refinery in Texas eventually reopens. Globally, the ICSG projects that world mine production capacity will increase by 9% and that world refinery production capacity will increase by 6% through 2025 (International Copper Study Group, 2023b, p. 200, 276). Worldwide copper production and consumption are expected to increase in the short term as economies continue to recover from the global COVID-19 pandemic. In 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, air conditioning, housing and building construction, power utilities, and telecommunications.

References Cited

Anglo American plc, 2023, Integrated annual report 2022: London, United Kingdom, Anglo American plc, 327 p. (Accessed November 3, 2023, at https://www.angloamerican.com/~/media/Files/A/Anglo-American-Group-v9/PLC/investors/annual-reporting/2023/aa-annual-report-full-2022.pdf.)

Antofagasta plc, 2022, Developing mining for a better future—Annual report and financial statements 2021: London, United Kingdom, Antofagasta plc, 248 p. (Accessed September 14, 2022, at https://www.antofagasta.co.uk/media/4300/antofagasta-annual-report-2021.pdf.)

Antofagasta plc, 2023, Developing mining for a better future—Annual report and financial statements 2022: London, United Kingdom, Antofagasta plc, 259 p. (Accessed November 3, 2023, at https://www.antofagasta.co.uk/media/4502/antofagasta-2022-ara.pdf.)

Aurubis AG, 2022, Aurubis AG starts construction of a €300 million (approx. $320 million) multimetal recycling plant in Augusta, Georgia: Hamburg, Germany, Aurubis AG press release, June 17, 3 p. (Accessed June 18, 2022, at https://www.aurubis.com/dam/jcr:d18bbfd6-5ae2-4727-b103-1f9b0762b173/Aurubis_Press%20Release_Groundbreaking%20Aurubis%20Richmond_20220617.pdf.)

BHP Group Ltd., 2022, BHP operational review for the nine months ended 31 March 2022: Melbourne, Victoria, Australia, BHP Group Ltd. news release, April 21, 19 p. (Accessed September 14, 2022, at https://www.bhp.com/-/media/documents/media/reports-and-presentations/2022/220421_bhpoperationalreviewfortheninemonthsended31march2022.pdf.)

BHP Group Ltd., 2023, BHP operational review for the nine months ended 31 March 2023: Melbourne, Victoria, Australia, BHP Group Ltd. news release, April 21, 22 p. (Accessed November 3, 2023, at https://www.bhp.com/-/media/documents/media/reports-and-presentations/2023/230421_bhpoperationalreviewfortheninemonthsended31march2023.pdf.)

Capstone Copper Corp., 2023, Management's discussion and analysis of Capstone Copper Corp. for the year ended December 31, 2022: Vancouver, British Columbia, Canada, Capstone Copper Corp., 48 p. (Accessed March 8, 2023, at https://capstonecopper.com/wp-content/uploads/2023/02/2022-Year-end-Report-to-Shareholders.pdf.)

China Daye Non-Ferrous Metals Mining Ltd., 2023, 2022 annual report: Hong Kong, China, China Daye Non-Ferrous Metals Mining Ltd., 184 p. (Accessed November 5, 2023, at https://media-chinadaye.todayir.com/20230427194830488110710587_en.pdf.)

China Nonferrous Mining Corp. Ltd., 2022, 2021 annual report: Beijing, China, China Nonferrous Mining Corp. Ltd., 272 p. (Accessed November 5, 2023, at https://www1.hkexnews.hk/listedco/listconews/sehk/2022/0427/2022042700395.pdf.)

China Nonferrous Mining Corp. Ltd., 2023, 2022 annual report: Beijing, China, China Nonferrous Mining Corp. Ltd., 264 p. (Accessed November 5, 2023, at https://www1.hkexnews.hk/listedco/listconews/sehk/2023/0426/2023042600623.pdf.)

CMOC Group Ltd., 2023, 2022 annual report: Luoyang, China, CMOC Group Ltd., 372 p. (Accessed November 3, 2023, at https://www1.hkexnews.hk/listedco/listconews/sehk/2023/0428/2023042804425.pdf.)

Copper Development Association Inc., 2023, Copper supply & consumption 2001–2022: McLean, VA, Copper Development Association Inc., 20 p. (Accessed November 13, 2023, at https://copper.org/resources/market_data/Copper-Supply-and-Consumption-Report-2001-2022-no-graphs.pdf.)

Corporación Nacional del Cobre de Chile, 2022, Ya son 50 años por Chile, ¡Vamos por 50 años más!—Memoria anual 2021 [It's been 50 years for Chile, let's go for 50 more years!—Annual report 2021]: Santiago, Chile, Corporación Nacional del Cobre de Chile, 268 p. (Accessed September 14, 2022, at https://www.codelco.com/memoria2021/site/docs/20220219/20220219165533/memoria_codelco_2021.pdf.) [In Spanish.]

Corporación Nacional del Cobre de Chile, 2023, Memoria integrada 2022 [Integrated report 2022]: Santiago, Chile, Corporación Nacional del Cobre de Chile, 257 p. (Accessed November 3, 2023, at https://www.codelco.com/memoria2022/site/docs/20230205/20230205182458/memoria_integrada_2022_codelco.pdf.) [In Spanish.]

CRU International Ltd., 2022, CRU copper monitor: London, United Kingdom, CRU International Ltd., September 30, 23 p. (Accessed October 14, 2022, via https://www.crugroup.com.)

Esmen, Yasemin, 2022, Aurubis boosts investment in US, looks to increase scrap processing globally: Fastmarkets-AMM, December 23. (Accessed January 9, 2023, via https://auth.fastmarkets.com.)

Excelsior Mining Corp., 2022, Annual information form for the year ended December 31, 2021: Vancouver, British Columbia, Canada, Excelsior Mining Corp., March 31, 117 p. (Accessed August 18, 2022, via https://www.sedarplus.ca.)

Excelsior Mining Corp., 2023, Annual information form for the year ended December 31, 2022: Vancouver, British Columbia, Canada, Excelsior Mining Corp., March 24, 116 p. (Accessed April 13, 2023, via https://www.sedarplus.ca.)

First Quantum Minerals Ltd., 2023, Responsible growth—2022 annual report: Toronto, Ontario, Canada, First Quantum Minerals Ltd., 166 p. (Accessed July 25, 2023, at https://s24.q4cdn.com/821689673/files/doc_presentations/2022/2022-Annual-Report.pdf.)

Frazier, KyLeah, 2022, ASARCO announced 'indefinite shutdown' of Amarillo refinery due to freight costs of producing rod: Amarillo, TX, News Channel 10—KFDA, August 24. (Accessed September 27, 2022, at https://www.newschannel10.com/2022/08/24/asarco-announced-indefinite-shutdown-amarillo-refinery-due-freight-costs-producing-rod/.)

Freeport-McMoRan Inc., 2022, Freeport-McMoRan reports third-quarter and nine-month 2022 results: Phoenix, AZ, Freeport-McMoRan Inc. news release, October 20, [39] p. (Accessed November 2, 2022, at https://s22.q4cdn.com/529358580/files/doc_news/2022/FCX_221020_3Q_2022_Earnings_Release.pdf.)

Freeport-McMoRan Inc., 2023a, Form 10–K—2022: Washington, DC, U.S. Securities and Exchange Commission, 188 p. (Accessed April 13, 2023, at https://s22.q4cdn.com/529358580/files/doc_financials/10-K/10_k2022.pdf.)
Freeport-McMoRan Inc., 2023b, Freeport-McMoRan reports fourth-quarter and year ended 2022 results: Phoenix, AZ, Freeport-McMoRan Inc. news release, January 25, [41] p. (Accessed January 27, 2023, at https://s22.q4cdn.com/529358580/files/doc_news/2023/FCX_230125_4Q_2022_Earnings_Release.pdf.)
Glencore plc, 2021, Responsibly sourcing the commodities that advance everyday life—Annual report 2020: Baar, Switzerland, Glencore plc, 244 p. (Accessed December 10, 2021, at https://www.glencore.com/.rest/api/v1/documents/3505497f3cb94b24f0c79f5ba32b293b/Glencore_AR20_Interactive%20(1).pdf.)
Glencore plc, 2023, Annual report 2022—Energising today—Advancing tomorrow: Baar, Switzerland, Glencore plc, 284 p. (Accessed November 3, 2023, at https://www.glencore.com/.rest/api/v1/documents/ded10fa92974aa388a43aa9f86f483e9/GLEN-2022-Annual-Report.pdf.)
Go, R.J., 2022, Panama, First Quantum hold talks over Cobre Panama dispute—Reuters: S&P Capital IQ, December 27. (Accessed March 2, 2023, via https://www.capitaliq.spglobal.com.)
Grupo México, S.A.B. de C.V., 2021, Reporte anual—2020 [Annual report—2020]: Mexico City, Mexico, Grupo México, S.A.B. de C.V., [329] p. (Accessed June 4, 2021, at https://www.gmexico.com/GMDocs/ReportesFinancieros/ING/2020/RF_EN_2020_BMV.pdf.) [In Spanish.]
Grupo México, S.A.B. de C.V., 2022, Results—Third quarter 2022: Mexico City, Mexico, Grupo México, S.A.B. de C.V., October 27, 19 p. (Accessed March 2, 2023, at https://www.gmexico.com/GMDocs/Home/Eng/3rd_Quarter_2022_Report.pdf.)
Grupo México, S.A.B. de C.V., 2023, Informe anual 2022—Tenacidad y confianza [Annual report 2022—Tenacity and confidence]: Mexico City, Mexico, Grupo México, S.A.B. de C.V., 535 p. (Accessed July 26, 2023, at https://www.gmexico.com/GMDocs/ReportesFinancieros/ING/2022/RF_EN_2022_BMV.pdf.) [In Spanish.]
International Copper Study Group, 2023a, Copper bulletin: Lisbon, Portugal, International Copper Study Group, v. 30, no. 4, April, 50 p. (Accessed May 18, 2023, via https://www.icsg.org.)
International Copper Study Group, 2023b, Directory of copper mines and plants up to 2027: Lisbon, Portugal, International Copper Study Group, March 8, 311 p. (Accessed March 9, 2023, via https://www.icsg.org.)
Ivanhoe Mines Ltd., 2022, Management's discussion and analysis for the year ended December 31, 2021: Vancouver, British Columbia, Canada, Ivanhoe Mines Ltd., March 7, 58 p. (Accessed December 7, 2022, at https://www.ivanhoemines.com/site/assets/files/5497/ivn_q4_2021_mda_-_final.pdf.)
Ivanhoe Mines Ltd., 2023, Management's discussion and analysis for the year ended December 31, 2022: Vancouver, British Columbia, Canada, Ivanhoe Mines Ltd., March 10, 64 p. (Accessed November 3, 2023, at https://ivanhoemines2023oar.q4web.com/files/doc_downloads/2022/MANAGEMENT-S-DISCUSSION-AND-ANALYSISmarch-10-2023.pdf.)
Jamasmie, Cecilia, 2022, Codelco adds 30 years to Andina copper mine: Mining.com, January 20. (Accessed April 7, 2022, at https://www.mining.com/codelco-adds-30-years-to-andina-copper-mine/.)
JSC Kazakhmys Copper, 2022, [2021 annual report of joint-stock company Kazakhmys Copper]: Nur-Sultan, Kazakhstan, JSC Kazakhmys Copper, 211 p. (Accessed November 5, 2023, at https://kase.kz/files/emitters/KMCP/kmcpp_2021_rus.pdf.) [In Russian.]
JSC Kazakhmys Copper, 2023, [2022 annual report of joint-stock company Kazakhmys Copper]: Nur-Sultan, Kazakhstan, JSC Kazakhmys Copper, 221 p. (Accessed November 5, 2023, at https://kase.kz/files/emitters/KMCP/kmcpp_2022_rus.pdf.) [In Russian.]
KAZ Minerals Ltd., 2022, KAZ Minerals Group production and sales report for twelve months and the fourth quarter ended 31 December 2021: London, United Kingdom, KAZ Minerals Ltd. news release, February 10, 6 p. (Accessed July 23, 2022, at https://www.kazminerals.com/media/22270/q4-2021-production-report-final.pdf.)
KAZ Minerals Ltd., 2023, KAZ Minerals Group production and sales report for twelve months and the fourth quarter ended 31 December 2022: London, United Kingdom, KAZ Minerals Ltd. news release, February 28, 6 p. (Accessed November 5, 2023, at https://www.kazminerals.com/media/22693/q4-2022-production-report-final.pdf.)
KGHM Polska Miedź S.A. Group, 2023, The management board's report on the activities of KGHM Polska Miedź S.A. and of the KGHM Polska Miedź S.A. Group in 2022: Lubin, Poland, KGHM Polska Miedź S.A. Group, March, 255 p. (Accessed April 13, 2023, at https://kghm.com/sites/default/files/mbs_report_on_activities_in_2022.pdf.)
Luk, Julian, 2022, Southern Copper's Cuajone Mine halts operation amid community protests—Sources: Fastmarkets-AMM, March 11. (Accessed June 14, 2022, via https://auth.fastmarkets.com.)
Luk, Julian, and Rostás, Renato, 2022, Codelco to shut down Chuquicamata copper smelter next week; copper concs diverted: Fastmarkets-AMM, November 9. (Accessed December 1, 2022, via https://auth.fastmarkets.com.)
Minsur S.A., 2023, Annual report 2022: Lima, Peru, Minsur S.A., 89 p. (Accessed November 4, 2023, at https://www.minsur.com/wp-content/uploads/2023/07/memoria-2022-ingles-v09.pdf.)
MMG Ltd., 2023, Annual report 2022—Mining with principles: Southbank, Victoria, Australia, MMG Ltd., 206 p. (Accessed November 4, 2023, at https://www.mmg.com/wp-content/uploads/2023/04/E1208_MMG_2022_AR.pdf.)
Nevada Copper Corp., 2023, Management's discussion and analysis for the year ended December 31, 2022: Vancouver, British Columbia, Canada, Nevada Copper Corp., March 20, 30 p. (Accessed April 12, 2024, via https://www.sedarplus.ca.)
Paranapanema S.A., 2022, Divulgação dos resultados—3T22 [Disclosure of results—3Q22]: Santo Andre, Brazil, Paranapanema S.A., November 11, 11 p. (Accessed November 3, 2023, at https://api.mziq.com/mzfilemanager/v2/d/419ea13e-3f77-40c7-916f-17d2c9adde94/29458da5-7842-45e0-8be5-8814439254a2?origin=1.) [In Portuguese.]
Paranapanema S.A., 2023, Divulgação dos resultados—4T22 [Disclosure of results—4Q22]: Santo Andre, Brazil, Paranapanema S.A., March 17, 13 p. (Accessed November 3, 2023, at https://api.mziq.com/mzfilemanager/v2/d/419ea13e-3f77-40c7-916f-17d2c9adde94/b792402d-dd4b-dd2b-72a2-4617df11af6f?origin=1.) [In Portuguese.]
PJSC MMC Norilsk Nickel, 2023, Momentum of renewal—'22 annual report: Moscow, Russia, PJSC MMC Norilsk Nickel, 337 p. (Accessed November 3, 2023, at https://nornickel.com/upload/iblock/461/19utieij7n11286t4gj2qwyld0qt36hc/2022_Annual_Report_of_PJSC_MMC_Norilsk_Nickel_eng.pdf.)
PT Medco Energi Internasional Tbk, 2023, 2022 annual report—Reaching new heights: Jakarta, Indonesia, PT Medco Energi Internasional Tbk, 529 p. (Accessed July 25, 2023, at https://www.medcoenergi.com/uploads/areports/2022/ar2022_eng.pdf.)
Ribeiro, Ivo, 2022, Paranapanema files for bankruptcy protection, lists R$450m debt: Valor International [Sao Paulo, Brazil], December 1. (Accessed November 3, 2023, at https://valorinternational.globo.com/business/news/2022/12/01/paranapanema-files-for-bankruptcy-protection-lists-r450m-debt.ghtml.)
Rio Tinto Group, 2022a, Annual report 2021: London, United Kingdom, Rio Tinto Group, 420 p. (Accessed March 21, 2022, at https://cdn-rio.dataweavers.io/-/media/content/documents/invest/reports/annual-reports/2021/rt-annual-report-2021.pdf?rev=d54c8b0596a44e159024ac7421a4d38d.)
Rio Tinto Group, 2022b, Rio Tinto releases third quarter production results: London, United Kingdom, Rio Tinto Group media release, October 18, 28 p. (Accessed November 2, 2022, at https://cdn-rio.dataweavers.io/-/media/content/documents/invest/financial-news-and-performance/production/2022/rt-third-quarter-operations-review-2022-pdf.pdf?rev=1989c347556f42fdb156f5d9a0034129.)
Rio Tinto Group, 2023a, Annual report 2022: London, United Kingdom, Rio Tinto Group, 348 p. (Accessed June 28, 2023, at https://www.riotinto.com/-/media/content/documents/invest/reports/annual-reports/2022/rt-annual-report-2022.pdf.)
Rio Tinto Group, 2023b, Rio Tinto releases fourth quarter production results: London, United Kingdom, Rio Tinto Group media release, January 17, 31 p. (Accessed January 17, 2023, at https://cdn-rio.dataweavers.io/-/media/content/documents/invest/financial-news-and-performance/production/2022/rt-fourth-quarter-operations-review-2022-pdf.pdf?rev=5a8e37310ec046418f968c0cf7022de4.)
Smalley, Megan, 2022, Malaysia to enact updated scrap purity standards: Recycling Today, January 5. (Accessed April 7, 2022, at https://www.recyclingtoday.com/article/malaysia-enacts-updated-scrap-purity-standards/.)

Southern Copper Corp., 2022, Results—First quarter 2022: Phoenix, AZ, Southern Copper Corp. press release, May 2, 11 p. (Accessed August 17, 2022, at https://southerncoppercorp.com/eng/wp-content/uploads/sites/2/2022/06/pr220502.pdf.)

Southern Copper Corp., 2023, Form 10–K—2022: Washington, DC, U.S. Securities and Exchange Commission, [226] p. (Accessed November 4, 2023, at https://southerncoppercorp.com/eng/wp-content/uploads/sites/2/2023/03/10k2022.pdf.)

Taylor, Brian, 2021, Ames Copper to use SMS secondary furnace technology: Recycling Today, January 3. (Accessed May 17, 2021, at https://www.recyclingtoday.com/news/sms-ames-copper-recycling-north-carolina-equipment/.)

Teck Resources Ltd., 2023, Purpose in action—2022 annual report: Vancouver, British Columbia, Canada, Teck Resources Ltd., 140 p. (Accessed November 4, 2023, at https://www.teck.com/media/2022-Annual-Report.pdf.)

Toto, DeAnne, 2021, Wieland offers additional details on new Shelbyville, Kentucky, copper recycling plant: Recycling Today, June 22. (Accessed April 8, 2022, at https://www.recyclingtoday.com/article/matt-bedingfield-wieland-kentucky-copper-scrap-recycling-plant/.)

Toto, DeAnne, 2023, ISRI 2023—Critical copper: Recycling Today, April 22. (Accessed June 8, 2023, at https://www.recyclingtoday.com/news/isri-2023-spotlight-on-copper-critical-metal/.)

Wieland Group, 2022, Wieland breaks ground on recycling and refining center in Shelbyville, KY: Ulm, Germany, Wieland Group press release, June 30, 4 p. (Accessed September 14, 2022, at https://www.wieland.com/en/media/press-releases/press-release-wieland-breaks-ground-on-recycling-center-in-shelbyville.pdf.)

Zhang, Sally, 2022, China's Daye starts trial production at new copper smelter, sources: Fastmarkets-AMM, October 25. (Accessed December 1, 2022, via https://auth.fastmarkets.com.)

Zijin Mining Group Co., Ltd., 2021, Julong phase 1 of Zijin Mining starts production: Longyan, China, Zijin Mining Group Co., Ltd. news release, December 28. (Accessed April 7, 2022, at https://www.zijinmining.com/news/news-detail-119220.htm.)

Zijin Mining Group Co., Ltd., 2022, Annual report 2021—Mining for a better society: Longyan, China, Zijin Mining Group Co., Ltd., 428 p. (Accessed July 23, 2022, at https://www.zijinmining.com/upload/file/2022/06/20/771c971d76154257882f58ed03643c07.pdf.)

Zijin Mining Group Co., Ltd., 2023, Annual report 2022—Providing the materials that improve standards of living in a low carbon future: Longyan, China, Zijin Mining Group Co., Ltd., 460 p. (Accessed July 24, 2023, at https://www.zijinmining.com/upload/file/2023/04/28/f37618ac59554a0d84a5f89bb99e476a.pdf.)

GENERAL SOURCES OF INFORMATION

U.S. Geological Survey Publications

Assessment of Undiscovered Copper Resources of the World, 2015. Scientific Investigations Report 2018–5160, 2019.

Copper. Ch. in Mineral Commodity Summaries, annual.

Copper. Ch. in United States Mineral Resources, Professional Paper 820, 1973.

Copper. Mineral Industry Surveys, monthly.

Copper (Cu). Ch. in Metal Prices in the United States Through 2010, Scientific Investigations Report 2012–5188, 2013.

Copper Recycling in the United States in 2004. Circular 1196–X, 2009.

Historical Statistics for Mineral and Material Commodities in the United States. Data Series 140.

The Nature and Use of Copper Reserve and Resource Data. Professional Paper 907–F, 1981.

United States Copper Metal and Scrap Use and Trade Patterns, 1995–2014. Scientific Investigations Report 2016–5075, 2016.

Other

Copper. Ch. in Mineral Facts and Problems, U.S. Bureau of Mines Bulletin 675, 1985.

Copper Bulletin. International Copper Study Group, monthly.

Copper Demand to 2035. Roskill Information Services, Ltd.

Copper Development Association.

CRU Group.

Directory of Copper and Copper Alloy Fabricators. International Copper Study Group, annual.

Directory of Copper Mines and Plants. International Copper Study Group.

Fastmarkets-AMM.

S&P Global Market Intelligence.

World Bureau of Metal Statistics.

TABLE 1
SALIENT COPPER STATISTICS[1]

(Metric tons, copper content, unless otherwise specified)

		2018	2019	2020	2021	2022
United States:						
Mine production:						
Copper ore concentrated, gross weight		228,000,000	235,000,000	221,000,000	208,000,000	215,000,000
Average copper yield of concentrated copper ore	percent	0.29	0.30	0.28	0.31	0.30
Recoverable copper:[2]						
Arizona		801,000	859,000	880,000	868,000	855,000
Other States		421,000	398,000	321,000	363,000	378,000
Total		1,220,000	1,260,000	1,200,000	1,230,000	1,230,000
Total value[3]	millions	$8,050	$7,750	$7,600	$11,700	$11,200
Smelter production:						
Primary (from ore)[4]		536,000	464,000	315,000 [e, 5]	360,000 [e, 5]	375,000 [e, 5]
Byproduct sulfuric acid, sulfur content		586,000	522,000	508,000	529,000	568,000
Refinery production:						
Primary:						
Electrolytic		538,000	457,000	315,000 [e, 5]	360,000 [e, 5]	375,000 [e, 5]
Electrowon		532,000	527,000	557,000	562,000	555,000
Total		1,070,000	985,000	872,000	922,000	930,000
Secondary (from scrap), electrolytic and fire-refined		41,200	44,400	43,200	48,900	40,000
Grand total, primary and secondary refinery		1,110,000	1,030,000	916,000	971,000	970,000
Secondary production, refineries and manufacturers:[6]						
Recovered from new (manufacturing) scrap		712,000	700,000	697,000	683,000	677,000
Recovered from old (post-consumer) scrap		141,000	166,000	161,000	169,000 [r]	152,000
Total		853,000	866,000	858,000	852,000 [r]	829,000
Copper sulfate production, gross weight		18,200	17,500	17,500 [e]	17,500 [e]	17,500 [e]
Exports, refined[7]		190,000	125,000	41,200	47,600	27,600
Imports for consumption, refined[7]		778,000	663,000	676,000	919,000	732,000
Closing stocks, December 31:						
Blister and anodes		9,230	16,400	9,380	16,100	13,300
Refined copper:						
Refineries		3,850	7,010	3,850	5,440	9,100
Wire-rod mills		21,800	20,000	10,700	11,500	18,000
Brass mills		8,210	7,520	7,850	9,500	11,000
Other industry		7,070	6,200	6,850	6,200	6,970
Commodity Exchange Inc. (COMEX)[8]		99,600	34,100	70,200	63,800	31,700
London Metal Exchange Ltd. (LME), U.S. warehouses[8]		104,000	35,000	18,300	20,200	6,850
Total		244,000	110,000	118,000	117,000	83,500
Consumption:						
Reported, refined copper		1,820,000	1,810,000	1,680,000	1,750,000	1,720,000
Apparent, primary refined copper and copper from old scrap[9]		1,820,000	1,820,000	1,660,000	1,960,000 [r]	1,820,000
Price, annual average:[8]						
U.S. producers cathode[10]	cents per pound	298.738	279.596	286.745	432.264	410.775
COMEX, high grade first position	do.	292.568	272.267	279.948	424.306	400.719
LME, grade A cash	do.	295.960	272.364	279.797	422.496	399.791
World, production:						
Mine		20,600,000	20,500,000 [r]	20,600,000	21,100,000 [r]	21,900,000
Smelter		20,100,000	19,900,000 [r]	21,000,000 [r]	21,300,000	21,600,000
Refinery		24,400,000	24,400,000	25,000,000	25,200,000 [r]	25,900,000

[e]Estimated. [r]Revised. do. Ditto.

[1]Table includes data available through October 31, 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.

TABLE 1—Continued

SALIENT COPPER STATISTICS[1]

[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 2022, IN ORDER OF PUBLICLY AVAILABLE OUTPUT[1]

(Metric tons)

Rank	Mine[2]	County and State	Operator	Source of copper	Quantity[3] 2021	Quantity[3] 2022	Copper content basis[4]
1	Morenci	Greenlee, AZ	Freeport-McMoRan Inc.	Copper-molybdenum ore, concentrated and leached	398,000	401,000	Recoverable.
2	Bingham Canyon	Salt Lake, UT	Rio Tinto Kennecott[5]	Copper-molybdenum ore, concentrated	159,000	179,000	Contained.
3	Safford	Graham, AZ	Freeport-McMoRan Inc.	Copper ore, leached	120,000	129,000	XX.
4	Sierrita	Pima, AZ	do.	Copper-molybdenum ore, concentrated and leached	85,700	83,500	Recoverable.
5	Bagdad	Yavapai, AZ	do.	do.	83,500	74,800	do.
6	Chino	Grant, NM	do.	Copper ore, concentrated and leached	56,200	59,000	do.
7	Pinto Valley	Gila, AZ	Pinto Valley Mining Corp.[6]	Copper-molybdenum ore, concentrated and leached	60,500	56,800	Contained.
8	Ray	Pinal, AZ	ASARCO LLC[7]	Copper ore, concentrated and leached	50,200	47,800	do.
9	Robinson	White Pine, NV	Robinson Nevada Mining Co.[8]	Copper-molybdenum ore, concentrated	53,700	46,800	Recoverable.
10	Mission	Pima, AZ	ASARCO LLC[7]	Copper ore, concentrated	54,900	42,800	Contained.
(9)	Tyrone	Grant, NM	Freeport-McMoRan Inc.	Copper ore, leached	24,900	26,800	XX.
(9)	Silver Bell	Pima, AZ	ASARCO LLC[7]	do.	21,400	21,500	do.
(9)	Eagle	Marquette, MI	Lundin Mining Corp.	Nickel-copper ore, concentrated	18,400	15,900	Contained.
(9)	Phoenix	Lander, NV	Nevada Gold Mines LLC[10]	Gold-copper ore, concentrated and leached	16,700	14,200	do.

do. Ditto. XX Not applicable.

[1]Table includes data available through October 31, 2023. Data are rounded to no more than three significant digits.
[2]Includes only leading mines with publicly reported production data.
[3]Data are from publicly available reports and may differ from proprietary information used to generate the U.S. totals in tables 1, 3, and 20.
[4]Applies only to the copper content of concentrates.
[5]Wholly owned subsidiary of Rio Tinto Group.
[6]Wholly owned subsidiary of Capstone Copper Corp.
[7]Wholly owned subsidiary of Grupo México, S.A.B. de C.V.
[8]Wholly owned subsidiary of KGHM International Ltd., which was a wholly owned subsidiary of KGHM Polska Miedź S.A.
[9]Rank order is shown only for the leading 10 mines to avoid disclosing company proprietary data.
[10]A joint venture of Barrick Gold Corp. (61.5%) and Newmont Corp. (38.5%). The mine was operated by Barrick.

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	2021 Gross weight	2021 Recoverable copper	2022 Gross weight	2022 Recoverable copper
Copper ore:				
Concentrated	208,000,000	638,000	215,000,000	650,000
Leached	NA	562,000	NA	555,000
Total	NA	1,200,000	NA	1,210,000
Copper precipitates, leached from tailings, dumps, and in-place material	NA	W	NA	W
Other copper-bearing ores, concentrated[2]	10,600,000	32,400	10,000,000	27,600
Grand total	XX	1,230,000	XX	1,230,000

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 October 31, 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
2021:					
Copper scrap	656,000	98,400	46,900	104,000 r	906,000 r
Refined copper	415,000	1,290,000	34,200 r	8,740 r	1,750,000
Hardeners and master alloys	W	--	880 r	--	880 r
Brass ingots	--	--	54,800 r	--	54,800 r
Slab zinc	W	--	25,100	W	45,800
2022:					
Copper scrap	655,000	93,800	41,400	91,600	882,000
Refined copper	420,000	1,250,000	41,600	8,320	1,720,000
Hardeners and master alloys	W	--	949	--	949
Brass ingots	--	--	55,100	--	55,100
Slab zinc	W	--	21,100	W	40,100

[r]Revised. W Withheld to avoid disclosing company proprietary data; included with "Slab zinc" under "Total." -- Zero.

[1]Table includes data available through October 31, 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
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	--	8,740 r	8,740 r
Foundries	W	2,470 r	--	16,500 r	19,000 r
Miscellaneous[3]	W	W	--	14,900 r	14,900 r
Total	1,610,000	2,470 r	43,700	92,100 r	1,750,000
2022:					
Wire-rod mills	1,250,000	--	--	(2)	1,250,000
Brass mills	326,000	W	43,700	51,300	420,000
Chemical plants[e]	W	--	--	240	240
Ingot makers	W	W	--	8,320	8,320
Foundries	W	2,990	--	20,200	23,200
Miscellaneous[3]	W	W	--	18,200	18,200
Total	1,580,000	2,990	43,700	98,200	1,720,000

[e]Estimated. [r]Revised. W Withheld to avoid disclosing company proprietary data; included with "Wirebar, billets, other." -- Zero.

[1]Table includes data available through October 31, 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)

	2021	2022
Kind of scrap:		
New:		
Copper-base	647,000	641,000
Aluminum-base	35,600	36,000
Nickel-base[e]	20	20
Total	683,000	677,000
Old:		
Copper-base	137,000 r	121,000
Aluminum-base	31,700 r	30,700
Nickel- and zinc-base	68	68
Total	169,000 r	152,000
Grand total, new and old scrap	852,000 r	829,000
Form of recovery:		
As unalloyed copper	48,900	40,000
In brass and bronze	733,000	720,000
In aluminum alloys	68,200 r	67,700
In alloy iron and steel and other alloys	111 r	110
In chemical compounds[e]	1,800	1,800
Total	852,000 r	829,000

[e]Estimated. [r]Revised.

[1]Table includes data available through October 31, 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)

Type of operation	From new scrap[2] 2021	From new scrap[2] 2022	From old scrap[2] 2021	From old scrap[2] 2022	Total 2021	Total 2022
Ingot makers	4,200	4,200	36,100 r	33,200	40,300 r	37,400
Refineries[3]	20,100 e	20,100 e	28,800	19,900	48,900	40,000
Brass and wire-rod mills	614,000	608,000	41,100	41,900	655,000	650,000
Foundries and miscellaneous manufacturers	8,880	8,910	31,100	26,300	40,000	35,200
Total	647,000	641,000	137,000 r	121,000	785,000 r	763,000

[e]Estimated. [r]Revised.

[1]Table includes data available through October 31, 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	2021	2022
Unalloyed copper products[2]	48,900	40,000
Alloyed copper products:		
Brass and bronze ingots:		
Tin bronzes	3,510	3,360
Leaded red brass and semi-red brass	29,400	27,800
High leaded tin bronze	7,160	6,580
Yellow brass	1,060	734
Manganese bronze	6,090	6,250
Aluminum bronze	3,510	3,480
Nickel silver	761	779
Silicon bronze and brass	2,390	2,340
Copper-base hardeners, master alloys, and miscellaneous	8,560	8,760
Total	62,400 r	60,100
Brass mill and wire-rod mill products	739,000	737,000
Brass and bronze castings	33,100	32,100
Copper in chemical products[e]	1,800	1,800
Grand total	885,000	871,000

[e]Estimated. [r]Revised.

[1]Table includes data available through October 31, 2023. Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Includes electrolytically refined and fire-refined copper.

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:							
2021	52,800 r	1,890 r	2,720 r	4,910 r	119 r	12	62,400 r
2022	53,000	1,420	2,000	3,610	87	10	60,100
Brass mill and wire-rod mill products:							
2021	656,000	450	1,640	80,000	1,120	15	739,000
2022	651,000	470	1,670	82,000	1,140	20	737,000
Brass and bronze castings:							
2021	32,100	130	140	630	46	26	33,100
2022	31,100	125	130	610	45	25	32,100

[r]Revised.
[1]Table includes data available through October 31, 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)

	2021		2022	
Scrap type and processor	Consumption	Stocks	Consumption	Stocks
Unalloyed scrap:				
No. 1 wire and heavy:				
Smelters, refiners, and ingot makers	8,380	W	12,700	W
Brass and wire-rod mills	389,000	(2)	386,000	(2)
Foundries and miscellaneous manufacturers	25,600	(2)	26,400	(2)
No. 2 mixed heavy and light:				
Smelters, refiners, and ingot makers	56,000	W	54,800	W
Brass and wire-rod mills	96,100	(2)	93,600	(2)
Foundries and miscellaneous manufacturers	16,200	(2)	9,340	(2)
Total unalloyed scrap:				
Smelters, refiners, and ingot makers	64,400	23,200	67,500	23,000
Brass and wire-rod mills	485,000	919	480,000	1,090
Foundries and miscellaneous manufacturers	41,800	605	35,700	1,140
Alloyed scrap:				
Red brass:[3]				
Smelters, refiners, and ingot makers	12,600	1,390	2,580	1,190
Brass mills	W	(2)	W	(2)
Foundries and miscellaneous manufacturers	W	(2)	W	(2)
Leaded yellow brass:				
Smelters, refiners, and ingot makers	3,830	562	4,610	373
Brass mills	W	(2)	W	(2)
Foundries and miscellaneous manufacturers	W	(2)	W	(2)
Yellow and low brass, all plants	77,600	625	71,500	544
Cartridge cases and brass, all plants	W	(2)	W	(2)
Auto radiators:				
Smelters, refiners, and ingot makers	10,500	801	2,800	625
Foundries and miscellaneous manufacturers	W	(2)	W	(2)
Bronzes:				
Smelters, refiners, and ingot makers	5,140 r	586 r	5,010	651
Brass mills and miscellaneous manufacturers	W	(2)	W	(2)
Nickel-copper alloys, all plants	10,100 r	193 r	10,100	186
Low grade and residues; smelters, refiners, miscellaneous manufacturers	W	592 r	W	298
Other alloy scrap:[4]				
Smelters, refiners, and ingot makers	W	W	W	W
Brass mills and miscellaneous manufacturers	W	(2)	W	(2)
Total alloyed scrap:				
Smelters, refiners, and ingot makers	39,700 r	5,430 r	24,100	4,050
Brass mills	270,000	525	269,000	509
Foundries and miscellaneous manufacturers	5,130	1,010 r	5,700	1,180
Grand total, scrap:				
Smelters, refiners, and ingot makers	104,000 r	28,600 r	91,600	27,000
Brass and wire-rod mills	755,000	1,440	749,000	1,600
Foundries and miscellaneous manufacturers	46,900	1,620 r	41,400	2,320

[r]Revised. W Withheld to avoid disclosing company proprietary data; included in totals and grand totals.
[1]Table includes data available through October 31, 2023. Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Individual breakdown is not available; included in totals 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)

	New scrap[2]		Old scrap[2]		Total	
Type of operation	2021	2022	2021	2022	2021	2022
Ingot makers	11,200	11,200	42,500 r	39,100	53,700 r	50,300
Smelters and refineries	20,800 e	20,800 e	29,700	20,500	50,500	41,300
Brass and wire-rod mills[3]	711,000	705,000	43,200	43,900	755,000	749,000
Foundries and miscellaneous manufacturers	10,500	10,500	36,500	31,000	46,900	41,400
Total	754,000	747,000	152,000 r	135,000	906,000 r	882,000

[e]Estimated. [r]Revised.
[1]Table includes data available through October 31, 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	2021	2022
Brass ingot:		
Tin bronzes	3,580 r	4,260
Leaded red brass and semi-red brass	18,900 r	18,900
Yellow, leaded, low brass[2]	11,900 r	9,180
Manganese bronze	2,980 r	3,040
Nickel silver[3]	9,530	12,000
Aluminum bronze	3,990 r	3,850
Hardeners and master alloys[4]	880 r	949
Lead free alloys[e, 5]	3,880	3,880
Total	55,700 r	56,100
Refined copper	34,200 r	41,600
Copper scrap	46,900	41,400

[e]Estimated. [r]Revised.
[1]Table includes data available through October 31, 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
2021	408.14	369.04	314.79	212.63
2022	390.04	358.05	296.29	183.13

[1]Table includes data available through October 31, 2023.

Source: Fastmarkets-AMM.

TABLE 14

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

Country or locality	Ore and concentrates[2] Quantity (metric tons)	Ore and concentrates[2] Value[7] (thousands)	Matte, ash, and precipitates[3] Quantity (metric tons)	Matte, ash, and precipitates[3] Value[7] (thousands)	Blister and anodes[4] Quantity (metric tons)	Blister and anodes[4] Value[7] (thousands)	Refined[5] Quantity (metric tons)	Refined[5] Value[7] (thousands)	Unalloyed copper scrap[6] Quantity (metric tons)	Unalloyed copper scrap[6] Value[7] (thousands)	Total Quantity (metric tons)	Total Value[7] (thousands)
2021	344,000 r	$2,570,000 r	27,500	$54,300	24,300 r	$88,800 r	47,600	$418,000	539,000	$3,560,000	982,000 r	$6,690,000 r
2022:												
Belgium	70	543	5,950	15,200	211	514	--	--	33,200	253,000	39,500	269,000
Bulgaria	1,540	15,200	--	--	--	--	--	--	--	--	1,540	15,200
Canada	39,800	329,000	13,500	24,400	6,740	48,600	14,200	131,000	60,900	453,000	135,000	985,000
China	56,900	484,000	378	522	60	568	2,150	6,720	260,000	1,810,000	319,000	2,300,000
Costa Rica	--	--	345	514	--	--	(8)	4	--	--	345	518
Finland	552	5,470	--	--	--	--	--	--	--	--	552	5,470
Germany	1,590	13,200	235	1,200	244	1,260	1	9	15,400	97,700	17,400	113,000
Greece	--	--	--	--	99	279	--	--	8,830	77,600	8,930	77,900
Hong Kong	1	10	(8)	4	35	339	17	211	16,800	87,200	16,800	87,800
India	--	--	16	20	1,560	4,700	34	224	19,900	87,400	21,500	92,300
Israel	--	--	--	--	115	388	98	802	4	11	217	1,200
Italy	--	--	--	--	155	1,430	10	91	549	6,820	714	8,330
Japan	11,000	89,300	361	512	20	192	23	322	25,400	179,000	36,800	269,000
Korea, Republic of	59	447	189	713	1,570	12,600	133	704	42,200	316,000	44,100	330,000
Madagascar	1,220	10,700	--	--	--	--	--	--	--	--	1,220	10,700
Malaysia	186	1,270	147	218	168	1,490	51	359	24,700	91,600	25,200	95,000
Mexico	232,000	1,770,000	30	50	260	1,320	7,680	72,400	3,120	27,900	243,000	1,870,000
Netherlands	--	--	40	182	4	9	1,070	8,250	7,600	35,300	8,710	43,700
Philippines	7,770	60,200	(8)	7	67	349	35	102	1,660	6,230	9,530	66,900
Poland	--	--	270	1,420	--	--	--	--	15,700	124,000	16,000	125,000
Singapore	--	--	414	620	40	109	22	211	1,210	3,990	1,690	4,930
Slovakia	--	--	1,210	6,170	--	--	--	--	1,550	8,680	2,760	14,800
Spain	26	214	1,510	2,160	42	386	376	2,230	3,860	22,000	5,810	27,000
Taiwan	--	--	86	144	137	652	25	234	13,100	92,200	13,400	93,200
Thailand	--	--	158	158	94	259	--	--	23,900	93,100	24,100	93,500
Turkey	--	--	233	258	20	215	20	197	1,020	3,540	1,300	4,210
United Kingdom	--	--	4	12	40	124	1,630	12,000	358	5,790	2,030	17,900
Other	165	1,320	194	171	244	1,390	40	714	5,080	41,200	5,720	44,800
Total	353,000	2,780,000	25,200	54,700	11,900	77,200	27,600	237,000	586,000	3,920,000	1,000,000	7,070,000

[r]Revised. -- Zero.

[1]Table includes data available through August 9, 2023. 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] Quantity (metric tons)	Pipes and tubing[3] Value[8] (thousands)	Plates, sheets, foil, bars[4] Quantity (metric tons)	Plates, sheets, foil, bars[4] Value[8] (thousands)	Bare wire, including wire rod[5] Quantity (metric tons)	Bare wire, including wire rod[5] Value[8] (thousands)	Wire and cable, stranded[6] Quantity (metric tons)	Wire and cable, stranded[6] Value[8] (thousands)	Copper sulfate (gross weight)[7] Quantity (metric tons)	Copper sulfate (gross weight)[7] Value[8] (thousands)
2021	18,500	$208,000	29,100	$366,000	151,000	$1,420,000	30,800	$317,000	8,680	$64,000
2022:										
Belgium	--	--	261	1,220	7	25	(9)	4	9	130
Canada	2,640	34,800	7,090	84,000	36,300	360,000	11,600	151,000	2,570	7,330
China	545	2,650	1,170	31,000	76	906	241	6,620	686	10,900
Dominican Republic	59	903	4	65	69	243	167	2,500	196	852
Egypt	117	1,430	1	12	(9)	3	46	935	--	--
Germany	102	799	726	12,700	50	514	57	1,350	130	455
Honduras	2	44	--	--	394	3,560	29	360	(9)	3
Hong Kong	(9)	29	254	7,160	30	208	25	1,220	8	29
Ireland	1	3	26	193	5	29	(9)	7	206	7,250
Israel	18	415	17	274	10	40	60	1,680	867	2,850
Japan	33	352	537	18,000	105	1,070	50	1,460	2	165
Jordan	237	3,270	4	12	--	--	--	--	--	--
Korea, Republic of	13	219	639	9,390	279	2,540	11	536	2,350	20,700
Malaysia	15	160	1,180	13,600	43	145	16	441	297	459
Mexico	5,570	65,700	14,300	161,000	123,000	1,110,000	15,800	169,000	5	113
Oman	126	1,640	--	--	1	24	(9)	8	--	--
Qatar	136	1,870	--	--	--	--	(9)	3	--	--
Saudi Arabia	8,670	112,000	319	2,290	1	22	248	1,210	--	--
Singapore	115	513	170	1,580	329	2,930	13	292	81	1,200
Taiwan	11	112	502	8,570	2	16	23	1,210	1,560	24,600
Thailand	12	63	555	6,930	5	88	24	154	--	--
United Arab Emirates	2,020	26,200	(9)	24	2	67	6	239	--	--
United Kingdom	43	344	107	3,080	42	290	164	2,720	(9)	3
Other	649	9,080	585	10,600	490	4,870	377	8,610	129	1,370
Total	21,100	263,000	28,500	372,000	161,000	1,480,000	28,900	352,000	9,100	78,400

-- Zero.

[1]Table includes data available through August 9, 2023. 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).

[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), 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). Exports of wire rod (wire with a maximum cross-sectional dimension of more than 6 millimeters) were 144,000 metric tons (t) valued at \$1.35 billion in 2021 and 153,000 t valued at \$1.4 billion in 2022.

[6]Schedule B code 7413.00.1000 and 7413.00.5000 (stranded wire and cables of copper, not electrically insulated, not fitted with fittings, and not made up 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]

Country or locality	Ore and concentrates[2]		Matte, ash, and precipitates[3]		Blister and anodes[4]		Refined[5]		Unalloyed copper scrap[6]		Total	
	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)
2021	11,000	$84,600	1,580	$7,140	384	$2,920	919,000	$8,540,000 r	37,700	$196,000	969,000 r	$8,830,000 r
2022:												
Austria	--	--	--	--	--	--	54	613	--	--	54	613
Belgium	--	--	384	740	--	--	2	14	--	--	386	754
Bolivia	--	--	--	--	--	--	--	--	46	202	46	202
Canada	11,700	100,000	581	3,390	(8)	20	118,000	1,060,000	17,600	95,300	148,000	1,260,000
Chile	--	--	--	--	--	--	472,000	4,320,000	--	--	472,000	4,320,000
China	--	--	--	--	(8)	8	897	5,530	--	--	897	5,540
Colombia	--	--	--	--	--	--	--	--	196	1,190	196	1,190
Congo (Kinshasa)	--	--	--	--	--	--	8,910	88,900	--	--	8,910	88,900
Costa Rica	--	--	--	--	--	--	--	--	712	4,420	712	4,420
Dominican Republic	--	--	--	--	--	--	--	--	1,350	7,620	1,350	7,620
Finland	--	--	--	--	281	1,680	39	384	--	--	320	2,070
France	--	--	--	--	15	92	53	459	--	--	68	551
Germany	(8)	7	94	52	(8)	8	3,410	34,400	260	148	3,770	34,600
India	11	123	--	--	--	--	57	548	--	--	68	671
Japan	(8)	10	--	--	(8)	21	1,370	13,800	--	--	1,370	13,800
Mexico	--	--	25	83	(8)	44	75,500	684,000	12,200	67,900	87,700	752,000
Panama	--	--	--	--	--	--	--	--	1,190	5,650	1,190	5,650
Peru	--	--	--	--	--	--	50,100	451,000	--	--	50,100	451,000
Qatar	--	--	43	64	--	--	--	--	--	--	43	64
Singapore	--	--	--	--	--	--	--	--	40	274	40	274
Spain	--	--	51	64	(8)	6	--	--	--	--	51	70
St. Lucia	--	--	--	--	--	--	--	--	25	132	25	132
Suriname	--	--	--	--	--	--	--	--	360	2,560	360	2,560
United Kingdom	(8)	2	(8)	6	5	481	138	458	--	--	143	947
Uruguay	--	--	--	--	--	--	--	--	73	489	73	489
Vietnam	--	--	--	--	--	--	--	--	62	462	62	462
Zambia	--	--	--	--	--	--	1,230	12,300	--	--	1,230	12,300
Other	9	17	15	124	4	301	21	227	117	552	166	1,220
Total	11,700	101,000	1,190	4,530	306	2,660	732,000	6,670,000	34,200	187,000	779,000	6,970,000

[r]Revised. -- Zero.
[1]Table includes data available through August 9, 2023. 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] Quantity (metric tons)	Pipes and tubing[3] Value[8] (thousands)	Plates, sheets, foil, bars[4] Quantity (metric tons)	Plates, sheets, foil, bars[4] Value[8] (thousands)	Bare wire, including wire rod[5] Quantity (metric tons)	Bare wire, including wire rod[5] Value[8] (thousands)	Wire and cable, stranded[6] Quantity (metric tons)	Wire and cable, stranded[6] Value[8] (thousands)	Copper sulfate (gross weight)[7] Quantity (metric tons)	Copper sulfate (gross weight)[7] Value[8] (thousands)
2021	76,200	$851,000	65,600 r	$757,000 r	216,000	$1,970,000	4,440	$51,900	43,300	$117,000
2022:										
Bahrain	10,100	111,000	--	--	--	--	--	--	--	--
Brazil	5,030	52,400	4,280	44,400	4	44	300	3,770	500	1,390
Bulgaria	--	--	3,140	34,200	--	--	(9)	2	--	--
Canada	11,500	170,000	382	4,570	183,000	1,730,000	322	3,990	2,090	6,090
China	332	4,100	4,740	64,400	366	4,200	83	1,330	20	72
Finland	649	10,700	5,760	69,600	692	7,960	--	--	--	--
France	62	501	2,150	27,400	180	8,600	43	1,730	(9)	28
Germany	2,720	35,100	17,900	220,000	1,450	17,700	120	2,920	22	103
Greece	2,360	25,100	19	113	--	--	--	--	--	--
India	1,430	17,300	2,210	23,200	44	571	131	2,150	268	666
Italy	3,120	44,900	1,910	20,300	4	111	4	86	59	269
Japan	15	301	5,660	94,400	442	6,570	36	780	165	254
Korea, Republic of	21,300	227,000	9,150	135,000	2,530	28,400	57	705	--	--
Malaysia	5,550	56,100	115	1,600	(9)	3	--	--	--	--
Mexico	8,490	95,300	4,640	43,900	9,280	86,800	1,050	11,200	24,200	72,600
Netherlands	2	82	2,470	26,500	--	--	7	442	--	--
Peru	--	--	16,900	175,000	2,500	24,600	--	--	2,390	6,250
Russia	--	--	--	--	--	--	--	--	4,650	13,600
Spain	--	--	35	725	2,510	21,700	57	534	(9)	8
Taiwan	66	966	3,390	49,800	44	503	8	134	803	2,230
Thailand	24,700	270,000	287	2,420	100	1,460	38	601	--	--
Turkey	2	18	500	5,300	1,230	11,600	3,320	36,000	448	1,270
United Arab Emirates	--	--	1	23	2,950	26,200	--	--	--	--
Other	2,420	26,100	1,870	23,800	556	7,330	119	2,440	753	2,470
Total	99,900	1,150,000	87,500	1,070,000	208,000	1,990,000	5,700	68,800	36,400	107,000

[r]Revised. -- Zero.

[1]Table includes data available through August 9, 2023. 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).

[4]Includes all products listed under the HTS headings 7407.10 (bars, rods, and profiles of refined copper), 7409.11 and 7409.19 (plates, sheets, and strip of refined copper), 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). Imports of wire rod (wire with a maximum cross-sectional dimension of more than 6 millimeters) were 195,000 metric tons (t) valued at $1.79 billion in 2021 and 183,000 t valued at $1.73 billion in 2022.

[6]HTS codes 7413.00.1000 and 7413.00.5000 (stranded wire and cables of copper, not electrically insulated, not fitted with fittings, and not made up 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] Quantity (metric tons)	Unalloyed copper scrap[2] Value[4] (thousands)	Copper-alloy scrap[3] Gross weight (metric tons)	Copper-alloy scrap[3] Copper content[e, 5] (metric tons)	Copper-alloy scrap[3] Value[4] (thousands)
2021	539,000	$3,560,000	378,000	246,000	$937,000 r
2022:					
Austria	1,300	8,380	1,210	788	4,250
Belgium	33,200	253,000	8,860	5,760	38,300
Cambodia	--	--	679	441	3,090
Canada	60,900	453,000	46,200	30,000	106,000
China	260,000	1,810,000	31,900	20,700	149,000
Czechia	138	1,090	--	--	--
Ecuador	139	277	60	39	278
Germany	15,400	97,700	15,300	9,970	76,500
Greece	8,830	77,600	2,170	1,410	16,600
Hong Kong	16,800	87,200	3,760	2,440	5,340
India	19,900	87,400	65,700	42,700	121,000
Indonesia	--	--	144	94	149
Italy	549	6,820	316	206	935
Japan	25,400	179,000	6,980	4,540	44,800
Korea, Republic of	42,200	316,000	11,400	7,380	50,100
Latvia	137	646	62	40	182
Malaysia	24,700	91,600	41,700	27,100	87,600
Mexico	3,120	27,900	8,380	5,450	60,900
Netherlands	7,600	35,300	1,540	1,000	6,300
Pakistan	1,020	5,210	26,300	17,100	27,600
Philippines	1,660	6,230	757	492	1,730
Poland	15,700	124,000	1,030	670	3,360
Singapore	1,210	3,990	264	172	433
Slovakia	1,550	8,680	2,500	1,620	11,000
Spain	3,860	22,000	7,380	4,800	47,500
Sri Lanka	243	14,900	357	232	1,250
Sweden	581	1,800	1,940	1,260	8,020
Switzerland	134	1,200	25	16	139
Taiwan	13,100	92,200	4,440	2,890	15,200
Thailand	23,900	93,100	39,600	25,700	68,000
Turkey	1,020	3,540	2,320	1,510	4,520
United Arab Emirates	766	2,430	5,790	3,760	10,200
United Kingdom	358	5,790	404	263	1,770
Vietnam	139	1,170	929	604	3,070
Other	481	4,090	355	231	1,650
Total	586,000	3,920,000	341,000	221,000	976,000

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

[1]Table includes data available through August 9, 2023. 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] Quantity (metric tons)	Unalloyed copper scrap[2] Value[4] (thousands)	Copper-alloy scrap[3] Gross weight (metric tons)	Copper-alloy scrap[3] Copper content[e, 5] (metric tons)	Copper-alloy scrap[3] Value[4] (thousands)
2021	37,700	$196,000	105,000	75,300	$629,000
2022:					
Antigua and Barbuda	--	--	188	135	567
Bahamas, The	--	--	612	441	2,890
Barbados	--	--	326	235	753
Bermuda	12	35	90	65	207
Bolivia	46	202	106	77	557
Brazil	14	48	69	50	844
Canada	17,600	95,300	41,800	30,100	299,000
Cayman Islands	--	--	243	175	919
Chile	--	--	40	29	285
Colombia	196	1,190	106	76	458
Costa Rica	712	4,420	1,350	971	8,840
Dominican Republic	1,350	7,620	2,090	1,500	12,900
Ecuador	24	155	57	41	380
El Salvador	--	--	1,090	785	7,160
Germany	260	148	50	36	337
Grenada	--	--	72	52	249
Guatemala	--	--	309	223	1,500
Guyana	--	--	49	35	307
Haiti	--	--	104	75	479
Honduras	24	82	787	566	3,800
Jamaica	7	49	461	332	2,420
Malaysia	--	--	28	20	72
Mexico	12,200	67,900	42,900	30,900	232,000
Nicaragua	--	--	194	140	1,540
Panama	1,190	5,650	405	291	1,690
Peru	--	--	225	162	1,500
Saudi Arabia	--	--	134	97	215
Singapore	40	274	--	--	--
Sint Maarten	1	6	54	39	56
St. Lucia	25	132	269	194	1,440
St. Vincent and the Grenadines	--	--	91	65	263
Suriname	360	2,560	69	49	305
Uruguay	73	489	20	15	130
Venezuela	--	--	43	31	88
Vietnam	62	462	50	36	379
Other	35	178	241	174	1,400
Total	34,200	187,000	94,700	68,200	586,000

[e]Estimated. -- Zero.
[1]Table includes data available through August 9, 2023. 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.

Source: U.S. Census Bureau.

TABLE 20

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

(Metric tons, copper content)

Country or locality	2018	2019	2020	2021	2022
Albania, concentrates	2,520	2,080	3,520	4,430	3,470
Argentina, concentrates	17,435	--	--	--	--
Armenia, concentrates	68,928	89,700	82,600	79,000 [r, e, 3]	68,000 [e, 3]
Australia:					
Concentrates	888,000	900,200	843,300 [r]	773,000 [r]	791,700
Leaching, electrowon	23,000	24,900	24,700	23,000	27,100
Total	911,000	925,100	868,000 [r]	796,000 [r]	818,800
Azerbaijan, concentrates	1,650	2,213	2,718	2,682 [r]	2,520
Bolivia:					
Concentrates	2,102	1,381	1,076 [r]	1,616	2,213
Leaching, electrowon	3,114	3,097	1,746 [r]	1,694	1,395
Total	5,216	4,478	2,822	3,310	3,608
Botswana, concentrates	1,462	--	--	11,742 [r]	34,201
Brazil, concentrates	385,762	363,268	352,635	335,761	300,400
Bulgaria, concentrates	112,850 [r]	114,240 [r]	107,610 [r]	104,020 [r]	100,000 [e]
Burma, leaching, electrowon	153,000	153,100	185,000	33,900	--
Canada, concentrates[4]	548,011	572,705	584,609	550,418	519,691
Chile:					
Concentrates	4,256,300	4,207,200	4,265,600	4,210,500	3,913,900
Leaching, electrowon	1,575,300	1,580,200	1,467,500	1,414,400	1,414,400
Total	5,831,600	5,787,400	5,733,100	5,624,900	5,328,300
China:					
Concentrates	1,569,900	1,628,000	1,673,000	1,758,000 [r]	1,873,500
Leaching, electrowon	55,000	55,700	50,100	60,000 [r]	64,200
Total	1,624,900	1,683,700	1,723,100	1,818,000 [r]	1,937,700
Colombia, concentrates	9,920	7,644	9,371	8,194	6,817
Congo (Brazzaville), leaching, electrowon	15,875	13,607	8,342 [r]	12,860 [r]	9,042
Congo (Kinshasa):					
Concentrates	239,546 [r]	300,901 [r]	240,618 [r]	345,717 [r]	584,279
Leaching, electrowon	945,607	1,126,500	1,325,600	1,428,975 [r]	1,763,135
Total	1,185,153 [r]	1,427,401 [r]	1,566,218 [r]	1,774,692 [r]	2,347,414
Cyprus, leaching, electrowon	908	703	--	--	--
Dominican Republic, concentrates	8,588	6,047	2,193	4,774 [r]	6,000
Ecuador, concentrates[e]	42,000 [3]	9,900 [3]	43,000 [3]	84,000 [r, 3]	110,000
Eritrea, concentrates	17,000	16,008	21,725	20,224	17,098
Finland, concentrates	46,674	32,861	36,278	32,384	27,637
Georgia, concentrates	9,200 [e]	9,547	8,031	8,147	6,364
India, concentrates	35,300 [r]	29,200 [r]	24,000 [r]	27,800 [r]	23,700 [e]
Indonesia:					
Concentrates	591,000	334,000	500,000	712,000	921,000
Leaching, electrowon	17,071	16,777	5,377	19,045	19,551
Total	608,071	350,777	505,377	731,045	940,551
Iran:					
Concentrates	300,800	295,800	297,100	316,800	320,900
Leaching, electrowon	15,700	16,400	16,400	22,800	23,300
Total	316,500	312,200	313,500	339,600	344,200
Kazakhstan:					
Concentrates	592,800	522,600	513,600	473,700 [r]	551,400
Leaching, electrowon	42,700	39,500	38,200	41,300	41,400
Total	635,500	562,100	551,800	515,000 [r]	592,800
Korea, North, concentrates[e]	10,000	10,000	7,000 [r]	7,000 [r]	7,000
Kyrgyzstan, concentrates	7,600	7,400	5,400	6,900	6,500
Laos:					
Concentrates	83,680	69,284	48,433	32,385 [r]	37,200
Leaching, electrowon	68,200	72,006	39,730	5,341	6,600
Total	151,880	141,290	88,163	37,726 [r]	43,800
Mauritania, concentrates	28,137	29,620	28,491	18,845	13,313

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	2018	2019	2020	2021	2022
Mexico:					
Concentrates	517,300	526,100	566,100	601,100 r	598,900
Leaching, electrowon	179,300	187,600	166,800	133,000 r	155,000
Total	696,600	713,700	732,900	734,100	753,900
Mongolia:					
Concentrates[e, 3]	301,000	290,000	294,000	305,000	274,000
Leaching, electrowon	14,175	11,758	9,488	9,690	9,736
Total[e]	315,000	302,000	303,000	315,000	284,000
Morocco, concentrates[e]	29,000 3	25,000 3	27,000 3	28,000 3	25,000
Namibia:					
Concentrates	--	180 e, 3	110 e, 3	90 e, 3	200 e, 3
Leaching, electrowon	15,177	14,940	15,741	950	--
Total	15,177	15,120	15,851	1,040	200 e
North Macedonia:					
Concentrates	6,950	6,512	5,903	5,900	7,000
Leaching, electrowon	768	719	722	700	600
Total	7,718	7,231	6,625	6,600	7,600
Pakistan, concentrates	12,538	13,049	13,200	18,806	16,346
Panama, concentrates	--	147,480	205,548	331,000	350,438
Papua New Guinea, concentrates	97,300	99,400	82,800	66,500	75,800
Peru:					
Concentrates	2,350,628 r	2,371,639 r	2,086,694	2,246,466 r	2,343,928
Leaching, electrowon	66,253 r	66,286 r	67,258 r	83,420 r	101,182
Total	2,416,881 r	2,437,925 r	2,153,952 r	2,329,886 r	2,445,110
Philippines, concentrates	69,933	71,892	60,856	51,586	59,509
Poland, concentrates	401,300	398,900	392,700	391,300	392,500
Portugal, concentrates	49,064	41,553	32,230	38,145 r	32,000
Romania, concentrates	8,700	9,200	8,300	8,900	9,100
Russia:					
Concentrates	869,300	811,200	923,000	937,800 r	935,000 e
Leaching, electrowon	1,200	1,200	1,100	1,000 r	900 e
Total	870,500	812,400	924,100	938,800 r	936,000 e
Saudi Arabia, concentrates	60,340	68,000 r	77,000 r	77,000 r	76,000
Serbia, concentrates	42,500	43,550	52,207	121,150	203,998
South Africa, concentrates	46,900	52,500	38,334 r	51,138 r	49,194
Spain:					
Concentrates	116,976	122,466	128,326	128,729 r	117,600
Leaching, electrowon	70,738	48,090	54,352	13,652	9,557
Total	187,714	170,556	182,678	142,381 r	127,157
Sweden, concentrates	106,140	99,332	100,065	88,108 r	87,800
Tanzania, concentrates	730	14,186	1,706	1,521 r	3,097
Turkey, concentrates	79,600	73,500	107,000	110,000 r	115,000
United States:					
Concentrates[4]	690,000	730,000	644,000	670,000	678,000
Leaching, electrowon	532,000	527,000	557,000	562,000	555,000
Total	1,220,000	1,260,000	1,200,000	1,230,000	1,230,000
Uzbekistan, concentrates	141,200	137,300	142,800	146,900 r	150,000 e
Vietnam, concentrates[e, 3]	26,200	29,200	30,800	33,600	34,700
Zambia:					
Concentrates	677,300	655,500	706,700	702,800	680,400
Leaching, electrowon	210,000	144,400	146,000	138,700	116,600
Total	887,300	799,900	852,700	841,500	797,000
Zimbabwe, concentrates	9,077	8,678	7,933	8,650	10,168
Grand total	20,600,000	20,500,000 r	20,600,000	21,100,000 r	21,900,000
Of which:					
Concentrates	16,600,000	16,400,000 r	16,400,000 r	17,100,000	17,600,000
Leaching, electrowon	4,010,000	4,100,000	4,180,000	4,010,000 r	4,320,000

See footnotes at end of table.

[e]Estimated. [r]Revised. -- Zero.
[1]Table includes data available through August 10, 2023. 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]The copper content of concentrates may include copper precipitates for some countries and (or) localities. In some cases, total mine production is reported but the distribution between concentrates and electrowon output is estimated.
[3]Estimate based on reported production (in gross weight) of copper ore and (or) concentrates.
[4]Recoverable copper content.

TABLE 21

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

(Metric tons, copper content)

Country or locality	2018	2019	2020	2021	2022
Armenia, primary	8,831	--	--	--	--
Australia, primary	361,000	401,000	399,000	381,900 r	373,800
Austria, secondary	66,689	68,595	75,412	75,370	85,658
Belgium, secondary	140,500	139,900	152,000	151,900	139,100
Brazil:					
Primary	125,500	115,400	85,400	49,900	22,100
Secondary	15,300	41,700	24,000	7,100	2,300
Total	140,800	157,100	109,400	57,000	24,400
Bulgaria:					
Primary	316,800	270,400	285,000 r	256,900 r	310,000
Secondary	41,800	39,800	50,300 r	41,800 r	55,000
Total	358,600	310,200	335,300	298,700 r	365,000
Canada:					
Primary	290,100	255,000 r, e	245,000 r, e	255,000 r, e	261,100
Secondary	30,000	28,000 e	30,000 e	31,000 e	27,500
Total	320,100	283,000 r, e	275,000 r, e	286,000 r, e	288,600
Chile, primary	1,246,100	1,011,200	1,206,300	1,206,600	1,112,000
China:					
Primary	7,035,600	7,400,000	7,907,000	8,200,000	8,390,000
Secondary	1,561,800	1,688,400	1,749,800	1,850,000	2,000,000
Total	8,597,400	9,088,400	9,656,800	10,050,000	10,390,000
Congo (Kinshasa), primary	47,000 e	62,000 e	119,059	123,037	157,017
Finland:					
Primary	123,500	109,700	140,000 r	144,000 r	130,000
Secondary	6,500	5,800	6,000 r	7,500 r	6,000
Total	130,000	115,500	146,000 r	151,500 r	136,000
Germany:					
Primary	311,200	288,600	312,600	342,800 r	306,200
Secondary	157,400	152,100	179,500	151,200	170,300
Total	468,600	440,700	492,100	494,000 r	476,500
India:					
Primary	481,500	342,300	243,200	363,000	398,400
Secondary	10,000	2,000	--	--	--
Total	491,500	344,300	243,200	363,000	398,400
Indonesia, primary	213,767	163,429	279,598	280,400	272,500
Iran:					
Primary	204,100	201,100	223,300	246,800	252,700
Secondary	100,300	109,100	127,500	114,400	96,300
Total	304,400	310,200	350,800	361,200	349,000
Japan:					
Primary	1,169,500	1,112,276	1,259,400	1,197,000	1,255,400
Secondary	421,736	394,401	332,100	357,800	331,000
Total	1,591,236	1,506,677	1,591,500	1,554,800	1,586,400
Kazakhstan, primary	327,314	371,359	378,618	296,683 r	344,410
Korea, North:[e]					
Primary	10,000	10,000	7,000 r	7,000 r	7,000
Secondary	5,000	5,000	4,000 r	4,000 r	4,000
Total	15,000	15,000	11,000 r	11,000 r	11,000
Korea, Republic of:					
Primary	530,000	520,000	513,900	520,000	525,000
Secondary	140,000	160,000	166,000	170,000	165,000
Total	670,000	680,000	679,900	690,000	690,000
Mexico:					
Primary	286,200	277,700	283,600	287,400 r	285,500
Secondary[e]	5,000	5,000	5,000	5,000	5,000
Total	291,200	282,700	288,600	292,400 r	290,500
Namibia, primary	48,970	45,953	46,792	42,010	37,285

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	2018	2019	2020	2021	2022
Oman, primary	6,000	--	--	--	--
Pakistan, primary	12,500 e	13,000 e	5,700	12,400	12,200
Peru, primary	327,821	294,315	342,738	311,000	352,000
Philippines, primary	170,900	217,800	247,000	219,800	185,100
Poland:					
Primary	461,865	489,242	462,868	482,557	451,420
Secondary	50,001	51,904	69,696	98,852	109,304
Total	511,866	541,146	532,564	581,409	560,724
Russia:					
Primary	789,000	801,000	815,200	763,100 r	805,000 e
Secondary	230,000	240,000	235,000	227,900 r	180,000 e
Total	1,019,000	1,041,000	1,050,200	991,000 r	985,000 e
Serbia:					
Primary	65,900	72,500	45,100	57,800	24,000
Secondary	1,300	1,500	800	900	600
Total	67,200	74,000	45,900	58,700	24,600
Slovakia, secondary	38,400	51,800	55,300	59,800 r	59,000 e
South Africa, primary	33,300	26,000	22,000 e	28,000 e	28,000 e
Spain:					
Primary	284,800	255,700	257,700	253,800	199,600
Secondary	10,600	16,300	18,200	24,700	15,400
Total	295,400	272,000	275,900	278,500	215,000
Sweden:					
Primary	157,100	140,900	166,200	155,600 r	152,400
Secondary	67,300	60,400	59,900	67,100 r	65,300
Total	224,400	201,300	226,100	222,700 r	217,700
Turkey:					
Primary	85,400	83,700	78,900	79,000	79,000
Secondary[e]	5,000	5,000	5,000	5,000	5,000
Total	90,400	88,700	83,900	84,000	84,000
United States, primary	536,000	464,000	315,000 e, 3	360,000 e, 3	375,000 e, 3
Uzbekistan, primary[e]	120,000	145,000	145,000	150,000	150,000
Vietnam, primary	15,100	19,200	20,200 e	22,000 e	22,700 e
Zambia, primary	828,700	638,500	750,600	758,500	771,500
Grand total	20,100,000	19,900,000 r	21,000,000 r	21,300,000	21,600,000
Of which:					
Primary	17,000,000	16,600,000	17,600,000 r	17,900,000 r	18,000,000
Secondary	3,100,000	3,270,000	3,350,000 r	3,450,000	3,520,000

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

[1]Table includes data available through August 15, 2023. 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]Data are reported in copper content insofar as possible, but many sources do not distinguish between the copper content and gross weight of smelter products. To the extent possible, primary and secondary output of each country and (or) locality are shown separately. In some cases, total smelter production is reported but the distribution between primary and secondary output is estimated.

[3]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	2018	2019	2020	2021	2022
Argentina, secondary[e]	16,000	16,000	16,000	16,000	16,000
Australia, primary:					
Leaching, electrowon	23,000	24,900	24,700	23,000	27,100
Other	354,000	401,800	402,300 r	377,200 r	373,800
Total	377,000	426,700	427,000 r	400,200 r	400,900
Austria, secondary	107,210	128,207	132,019	133,482	107,862
Belgium:					
Primary	230,800	209,600	188,000	227,900	222,300
Secondary	159,400	147,000	133,500	158,600	155,300
Total	390,200	356,600	321,500	386,500	377,600
Bolivia, leaching, electrowon	3,114	3,097	1,746 r	1,694	1,395
Brazil:					
Primary	131,800	133,500	85,900	56,400	6,200
Secondary	15,300	41,700	24,000	7,100	2,400
Total	147,100	175,200	109,900	63,500	8,600
Bulgaria:					
Primary	197,200	180,300	191,200 r	187,500 r	194,700
Secondary	26,900	26,900	33,700 r	30,500 r	34,300
Total	224,100	207,200	224,900	218,000 r	229,000
Burma, leaching, electrowon	153,000	153,100	185,000	33,900	--
Canada:					
Primary	259,300	253,100	246,100	255,400	250,500
Secondary	32,000	28,100	30,000	31,100	27,500
Total	291,300	281,200	276,100	286,500	278,000
Chile, primary:					
Leaching, electrowon	1,575,300	1,580,200	1,467,500	1,414,400	1,414,400
Other	885,900	688,900	861,800	859,600	734,900
Total	2,461,200	2,269,100	2,329,300	2,274,000	2,149,300
China:					
Primary:					
Leaching, electrowon	55,000	55,700	50,100	60,000 r	64,200
Other	7,001,800	7,556,400	7,999,800	8,149,000 r	8,651,800
Total, primary	7,056,800	7,612,100	8,049,900	8,209,000 r	8,716,000
Secondary	2,234,600	2,170,800	1,975,500	2,257,000	2,346,000
Total, primary and secondary	9,291,400	9,782,900	10,025,400	10,466,000 r	11,062,000
Congo (Brazzaville), leaching, electrowon	15,875	13,607	8,342 r	12,860 r	9,042
Congo (Kinshasa), primary:					
Leaching, electrowon	945,607	1,126,500	1,325,600	1,428,975 r	1,763,135
Other	7,631	14,838	21,663	26,691	11,415
Total	953,238	1,141,338	1,347,263	1,455,666 r	1,774,550
Cyprus, leaching, electrowon	908	703	--	--	--
Egypt, secondary[e]	100,000	100,000	100,000	100,000	100,000
Finland:					
Primary	132,100	114,727	139,888	143,761	128,781
Secondary	7,000	5,642	5,959	7,545	6,422
Total	139,100	120,369	145,847	151,306	135,203
Germany:					
Primary	396,700	336,300	358,000	376,000 r	364,000
Secondary	275,700	266,400	285,000	295,400 r	245,000
Total	672,400	602,700	643,000	671,400 r	609,000
India:					
Primary	541,000	424,200	333,542 r	353,086 r	426,000 e
Secondary	10,000	2,000	--	--	--
Total	551,000	426,200	333,542 r	353,086 r	426,000 e

See footnotes at end of table.

TABLE 22—Continued

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

(Metric tons)

Country or locality	2018	2019	2020	2021	2022
Indonesia, primary:					
Leaching, electrowon	17,071	16,777	5,377	19,045	19,551
Other	213,853	163,427	263,208	270,497	290,300
Total	230,924	180,204	268,585	289,542	309,851
Iran:					
Primary:					
Leaching, electrowon	15,700	16,400	16,400	22,800	23,300
Other	149,600	160,400	167,500	192,000	206,400
Total, primary	165,300	176,800	183,900	214,800	229,700
Secondary	73,300	84,700	95,500	88,700	78,400
Total, primary and secondary	238,600	261,500	279,400	303,500	308,100
Italy, secondary	7,200	9,800	15,000	15,400	9,900
Japan:					
Primary	1,241,100	1,152,847	1,242,743	1,119,400	1,168,100
Secondary	353,417	342,512	340,348	390,700	383,000
Total	1,594,517	1,495,359	1,583,091	1,510,100	1,551,100
Kazakhstan, primary:					
Leaching, electrowon	42,700	39,500	38,200	41,300	41,400
Other	438,115	472,327	477,016	401,883 r	453,003
Total	480,815	511,827	515,216	443,183 r	494,403
Korea, North:[e]					
Primary	10,000	10,000	7,000 r	7,000 r	7,000
Secondary	5,000	5,000	4,000 r	4,000 r	4,000
Total	15,000	15,000	11,000 r	11,000 r	11,000
Korea, Republic of:					
Primary	500,500	473,600	489,500	476,300	465,700
Secondary	174,000	189,400	181,800	171,100	172,200
Total	674,500	663,000	671,300	647,400	637,900
Laos, leaching, electrowon	68,200	72,006	39,730	5,341	6,600
Mexico:					
Primary:					
Leaching, electrowon	179,300	187,600	166,800	133,000 r	155,000
Other	289,300	294,300	320,100	334,800 r	326,100
Total, primary	468,600	481,900	486,900	467,800	481,100
Secondary[e]	5,000	5,000	5,000	5,000	5,000
Total, primary and secondary	473,600	486,900	491,900	472,800	486,100
Mongolia, leaching, electrowon	14,175	11,758	9,488	9,690	9,736
Namibia, leaching, electrowon	15,177	14,940	15,741	950	--
North Macedonia, leaching, electrowon	768	719	722	700	600
Norway, primary	20,600	22,000	20,500	20,100	18,500
Oman, primary	6,000	--	--	--	--
Peru, primary:					
Leaching, electrowon	66,253 r	66,286 r	67,258 r	83,420 r	101,182
Other	270,541	241,567	256,322	260,200	289,700
Total	336,794 r	307,853 r	323,580 r	343,620 r	390,882
Philippines, primary	170,800	217,300	220,900	206,200	184,100
Poland:					
Primary	423,600	463,600	428,500	448,800	430,300
Secondary	78,200	102,000	131,800	128,700	155,700
Total	501,800	565,600	560,300	577,500	586,000
Russia:					
Primary:					
Leaching, electrowon	1,200	1,200	1,100	1,000 r	900 e
Other	781,400	790,600	811,500	786,200 r	810,000 e
Total, primary	782,600	791,800	812,600	787,200 r	811,000 e
Secondary	233,400	236,200	242,400	234,800 r	200,000 e
Total, primary and secondary	1,016,000	1,028,000	1,055,000	1,022,000 r	1,010,000 e

See footnotes at end of table.

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

(Metric tons)

Country or locality	2018	2019	2020	2021	2022
Serbia:					
Primary	65,700	72,500	45,100	57,400	24,000
Secondary	1,300	1,500	1,900	900	600
Total	67,000	74,000	47,000	58,300	24,600
South Africa, primary	43,900	35,600	21,800	20,400	20,200
Spain:					
Primary:					
Leaching, electrowon	70,738	48,090	54,352	13,652	9,557
Other	273,200	252,900	256,600	252,800	202,700
Total, primary	343,938	300,990	310,952	266,452	212,257
Secondary	79,900	85,300	88,700	94,200	85,600
Total, primary and secondary	423,838	386,290	399,652	360,652	297,857
Sweden:					
Primary	167,900	146,600	167,200	162,800	159,100
Secondary	56,100	54,400	58,800	60,200	58,900
Total	224,000	201,000	226,000	223,000	218,000
Turkey:					
Primary	116,300	106,000	116,100	117,000	124,600
Secondary	10,000	10,000 e	10,000 e	10,000 e	10,000 e
Total	126,300	116,000	126,100	127,000	134,600
Ukraine, secondary	24,901	20,409	24,335	28,817	--
United States:					
Primary:					
Leaching, electrowon	532,000	527,000	557,000	562,000	555,000
Other	538,000	457,000	315,000 e, 3	360,000 e, 3	375,000 e, 3
Total, primary	1,070,000	985,000	872,000	922,000	930,000
Secondary	41,200	44,400	43,200	48,900	40,000
Total, primary and secondary	1,110,000	1,030,000	916,000	971,000	970,000
Uzbekistan, primary	117,400	147,250	147,700	148,500	148,500
Vietnam, primary	15,100	19,200	20,200 e	22,000 e	22,700 e
Zambia, primary:					
Leaching, electrowon	210,000	144,400	146,000	138,700	116,600
Other	248,200	120,100	232,400	215,200	232,000
Total	458,200	264,500	378,400	353,900	348,600
Zimbabwe, primary	62	71	70 e	21 r	20 e
Grand total	24,400,000	24,400,000	25,000,000	25,200,000 r	25,900,000
Of which:					
Primary:					
Leaching, electrowon	4,010,000	4,100,000	4,180,000	4,010,000 r	4,320,000
Other	16,200,000	16,100,000	16,900,000	16,900,000 r	17,300,000
Total	20,200,000	20,200,000	21,000,000	20,900,000 r	21,600,000
Secondary	4,130,000	4,120,000	3,980,000 r	4,320,000 r	4,240,000

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

[1]Table includes data available through August 10, 2023. 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]Primary and secondary output of each country and (or) locality are shown separately to the extent possible. The "primary," "primary, other," and "secondary" categories consist of electrolytic and fire-refined copper, and the "leaching, electrowon" category consists of refined copper produced by solvent extraction and electrowinning. In some cases, total refinery production is reported but the distribution between primary (electrowon), primary (other), and (or) secondary output is estimated.

[3]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.