



2016 Minerals Yearbook

COPPER [ADVANCE RELEASE]

COPPER

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In the United States, mine production of recoverable copper in 2016 increased for the fifth consecutive year, by 46,900 metric tons (t) to 1.43 million metric tons (Mt), and was the highest quantity since 2000, when production was 1.45 Mt (tables 1, 3). Production rose slightly in Arizona and significantly in Utah, where mining at one of the leading U.S. operations moved into a zone of higher ore grades. In all other copper-producing States, mine output decreased or was essentially unchanged. Globally, the United States remained the fourth-ranked mine producer of copper behind Chile, Peru, and China and accounted for 7% of global production. World mine output of copper rose by 5% to a record-high 20.1 Mt in 2016 from 19.2 Mt (revised) in 2015, primarily owing to an increase in production of 653,000 t in Peru, where a major new mine and expansions of current mines resulted in significantly increased capacity. Growth in global mine production was partially offset by declines in Chile, owing to lower ore grades at several leading copper mines, and Congo (Kinshasa), resulting from temporary production cuts (table 20).

Owing to higher mine output, production of refined copper in the United States increased by about 82,000 t to 1.22 Mt in 2016, the highest quantity since 2008, when production was 1.27 Mt (table 1). The United States remained the fourth-ranked producer of refined copper, following China, Chile, and Japan, and accounted for 5% of global output. World refinery production of copper increased slightly to a record-high 23.4 Mt from 23.2 Mt (revised) in 2015. Significant increases in refinery production in China, Indonesia, Japan, and the United States were mostly offset by decreases in Chile, Congo (Kinshasa), and Zambia (table 22).

Reported U.S. consumption of refined copper in 2016 was 1.81 Mt, essentially unchanged from that in 2015 (tables 1, 4, 5). Domestic consumption steadily decreased from a record high of 3.02 Mt in 2000 to 1.65 Mt in 2009 and has remained at roughly 1.8 Mt in each year since. In 2016, China accounted for 50% of world apparent consumption, which increased slightly to a record-high 23.4 Mt from 23.0 Mt, according to data compiled by the International Copper Study Group (ICSG). Consumption in China increased by 321,000 t from that in 2015, equivalent to about 80% of the total global increase, and consumption in all other countries and localities collectively rose by about 76,000 t. The ICSG calculation of China's apparent consumption was based on reported production, trade, and Shanghai Futures Exchange (SHFE) stock data and did not include unreported Government or industry stocks, which can fluctuate significantly on an annual basis. The United States was the second-ranked consumer of refined copper and accounted for 8% of global refined copper consumption, followed by Germany, Japan, and the Republic of Korea (International Copper Study Group, 2017a, p. 9, 19–20).

In 2016, the average annual Commodity Exchange Inc. (COMEX) spot copper price declined by 12% to \$2.20 per pound from \$2.51 per pound in 2015. The COMEX price

reached a record-high \$4.01 per pound in 2011 but has decreased in each of the following years (table 1).

Production

Domestic production data were compiled from U.S. Geological Survey (USGS) monthly canvasses of the mines, smelters, and refineries operating in the United States. In 2016, responses to the surveys accounted for no less than 95% of the production data reported for these facilities in table 1. Production figures for companies that publicly reported operational data in 2016 can be found in the "Operating Property Reviews" section.

Mine production of recoverable copper in the United States increased by 3% to 1.43 Mt in 2016 from 1.38 Mt in 2015, and the value of production decreased by 9% to \$7.09 billion from \$7.81 billion. Copper recoverable in concentrates and precipitates accounted for 57% of mine output and increased by 3% to 816,000 t, and copper produced by solution extraction and electrowinning (SX–EW) accounted for 43% of mine production and rose by 4% to 615,000 t (tables 1, 3). Arizona was the leading copper-producing State and accounted for 68% of U.S. output, followed by, in descending order of production, New Mexico, Utah, Nevada, Montana, Michigan, and Missouri. Production increased slightly in Arizona and significantly in Utah, where mining at one of the leading U.S. operations moved into a zone of higher ore grades. In all other copper-producing States, mine output decreased or was essentially unchanged compared with that in 2015 owing to production cuts resulting from low copper prices, reduced mining rates, or unplanned maintenance. Although copper was recovered at 25 mines in the United States (including 15 SX–EW facilities), 18 mines accounted for more than 99% of production in 2016 (table 2). The remaining mines were either small leach (solution extraction) operations or byproduct producers of copper.

Smelter production in the United States was 563,000 t in 2016, 7% higher than 527,000 t in 2015, and refinery production increased by 7% to 1.22 Mt from 1.14 Mt, owing to increased output of copper recoverable in concentrates. Copper produced by SX–EW accounted for 50% of refinery production in 2016, primary (from ore) electrolytic copper accounted for 46%, and secondary (from scrap) electrolytic and fire-refined copper accounted for 4%. Production of primary electrolytic copper increased by 12% from that in 2015 to 561,000 t, and secondary refined output decreased by 5% to 46,300 t (table 1). Three primary smelters in Arizona and Utah and three electrolytic refineries in Texas and Utah operated in the United States during 2016.

Operating Property Reviews.—In 2016, ASARCO LLC (Tucson, AZ) produced a total of 155,000 t of copper at its three mines in Arizona (a decrease of 5% from 163,000 t in 2015) and 132,000 t of electrolytic copper at its refinery in Amarillo, TX (an increase of 5% from 125,000 t in 2015). At the Mission Mine, the

company produced 68,200 t of copper in concentrates (68,300 t in 2015). Output from the Ray Mine was 46,500 t of copper in concentrates (47,100 t in 2015) and 20,700 t of copper by SX–EW (28,000 t in 2015). The Silver Bell Mine produced 19,100 t of electrowon copper (19,300 t in 2015). In late 2015, ASARCO partially shut down one of its concentrators in Hayden, AZ, and announced plans to reduce electrowon production at the Ray Mine in response to low copper prices (ASARCO LLC, 2015; Grupo México, S.A.B. de C.V., 2017, p. 79–84).

Capstone Mining Corp. (Canada) increased copper production at the Pinto Valley Mine in Arizona by 14% to 68,900 t in 2016 from 60,400 t in 2015, owing to higher mill throughput. Output at the mine primarily consisted of copper contained in concentrates with a small quantity of copper produced from residual leach operations. Based on the results of a prefeasibility study published in 2016, Capstone anticipated that the mine life would be extended by 13 years to 2039 (Capstone Mining Corp., 2017, p. 11, 15–16).

Total output of recoverable copper at Freeport-McMoRan Inc.'s (Phoenix, AZ) U.S. operations in 2016 decreased slightly to approximately 946,000 t from 955,000 t during the prior year, primarily owing to reduced mining rates. Combined copper in concentrates and (or) electrowon production at each of the company's mines in Arizona was as follows: Bagdad—80,300 t (95,300 t in 2015), Miami—11,300 t (19,500 t in 2015), Morenci (the fourth-ranked global copper mine by production quantity in 2016)—500,000 t (481,000 t in 2015), Safford—104,000 t (91,600 t in 2015), and Sierrita—73,500 t (85,700 t in 2015). In New Mexico, total copper output at the Chino Mine totaled 140,000 t (142,000 t in 2015), and SX–EW production at the Tyrone Mine was 34,500 t (38,100 t in 2015). Freeport produced refined copper at its electrolytic facility in El Paso, TX, but did not publicly report copper cathode output. On May 31, Freeport completed the sale of a 13% interest in the Morenci Mine to Sumitomo Metal Mining Co. Ltd. (Japan), reducing the company's stake in the operation from 85% to 72% (Freeport-McMoRan Inc., 2016; 2017, p. 27, 75).

KGHM International Ltd. (Canada) produced 53,700 t of copper in concentrates at the Robinson Mine in Nevada, a decline of 5% compared with 56,800 t in 2015. Less ore was processed at the mine in 2016 than in 2015 owing to an unplanned maintenance shutdown of the flotation circuit. Extraction of ore at KGHM's Carlota Mine in Arizona ceased in the fourth quarter of 2014, but leaching of stockpiles continued through 2016. Production for the Carlota Mine was not publicly reported (KGHM Polska Miedz S.A., 2015, p. 2; 2017, p. 50).

In 2016, Lundin Mining Corp. (Canada) produced 23,400 t of copper in concentrates at the Eagle nickel-copper mine in Michigan, 4% less than 24,300 t in 2015. Lundin released a preliminary economic assessment indicating that a proposed expansion to the Eagle Mine would significantly increase nickel and copper production beginning in 2020 and extend the mine life to at least the end of 2023. The company subsequently began a feasibility study on the expansion project (Lundin Mining Corp., 2016, p. 25; 2017, p. 11, 26).

At Rio Tinto Kennecott's (South Jordan, UT) Bingham Canyon Mine in Utah, operations moved into an area of higher ore grades, and production of copper in concentrates increased

by 66% to 153,000 t from 92,000 t in 2015. Publicly reported production of refined copper at the company's refinery in Magna, UT, rose by 36% to 157,000 t from 115,000 t. In 2015, refined copper output was constrained by reduced concentrate supply resulting from work to remediate the east wall of the Bingham Canyon open pit following a landslide in 2013. Total refinery production reported to the USGS in 2016 was higher than that stated in company reports because smelter and refinery production from toll third-party concentrates (which are processed and returned to the owner) were not included in the public figures. In 2016, the company processed 315,000 t of third-party concentrates for toll smelting. Rio Tinto continued remediation work on the east wall of the Bingham Canyon open pit and a project to push back the south wall to access an additional 510 Mt of ore reserves (Rio Tinto plc, 2016, p. 34, 35; 2017, p. 22, 36, 221).

Consumption

In 2016, reported consumption of refined copper in the United States was 1.81 Mt, essentially unchanged from that in 2015. Consumption by wire-rod mills, which accounted for 73% of the total, and consumption at brass mills, which accounted for 23%, also were essentially unchanged (tables 1, 4, 5). The lack of change in refined copper consumption coincided with varied economic trends in major domestic industrial sectors that use copper. Housing starts increased by 6% to 1.17 million units from 1.11 million units, and production of telecommunications equipment rose by 3% compared with that in 2015. In contrast, manufacture of power transmission products decreased by 11%; fabrication of equipment for heating, ventilation, and air-conditioning (HVAC) fell by 4%; and production of aircraft, automobiles, and ships declined slightly (Federal Reserve Board, 2017a; U.S. Census Bureau, 2017).

Copper recovered from refined or remelted scrap in the United States rose by 4% to 839,000 t (82% from new scrap and 18% from old scrap) and accounted for 33% of the total U.S. copper supply.¹ The conversion of new (manufacturing) and old (post-consumer) scrap to alloys and refined copper increased by 8% and decreased by 10%, respectively (tables 1, 6). Copper was consumed as refined copper and as direct-melt scrap at about 30 brass mills; 13 wire-rod mills; and 500 chemical plants, foundries, and miscellaneous manufacturers in the United States.

According to preliminary data from the Copper Development Association Inc. (2017, p. 18), total shipments of copper and copper-alloy products to the U.S. market by fabricators (brass mills, foundries, powder producers, and wire mills), consisting of domestic product deliveries and net imports, increased by 3% to 2.43 Mt from 2.36 Mt in 2015. Since 2000, when shipments reached a record high of 4.34 Mt, shipments to the domestic market have trended downward, and those in 2016 were 44% less than those in 2000. In 2016, wire-mill products accounted for about 55% of total deliveries to the domestic market; brass mill products, 37%; net imports, 4%; foundry products, 3%; and powder products, 1%. The building construction sector remained the leading end-use market and accounted for

¹Copper supply is defined as primary refined production plus copper recovered from new and old scrap plus refined general imports minus refined exports, including adjustments for changes in refined copper stocks.

43% of total shipments, followed by, in descending order of quantity, electrical and electronic products, 19%; transportation equipment, 19%; consumer and general products, 12%; and industrial machinery and equipment, 7%. Examples of product categories included in each market are as follows: building construction—air conditioning, building wire, and plumbing and heating; electrical and electronic products—lighting and wiring devices, power utilities, and telecommunications; industrial machinery and equipment—industrial valves and fittings and plant equipment; transportation equipment—aircraft, automobiles, railroad, and ships; and consumer and general products—appliances, consumer electronics, and cords.

Prices and Stocks

In 2016, the average annual COMEX spot copper price decreased for the fifth consecutive year, by 12% to \$2.20 per pound from \$2.51 per pound in 2015 and by 45% from the record annual high of \$4.01 per pound in 2011 (table 1). The monthly average price ranged from a low of \$2.01 per pound in January 2016 to a high of \$2.57 per pound in December 2016. Daily prices ranged from a low of \$1.94 per pound on January 15 to a high of \$2.69 per pound on December 5.

Copper scrap prices generally followed the trend in refined copper prices, and prices for various types of scrap decreased by 9% to 20% in 2016 (table 13). The discount for refiners no. 2 scrap from the COMEX spot price averaged 22.2 cents per pound, down from 28.4 cents per pound in 2015. The refiners no. 2 scrap discount ranged between 18.1 cents per pound in June 2016 and 32.2 cents per pound in December 2016, and the refiners no. 2 scrap price averaged \$1.98 per pound, 11% less than \$2.22 cents per pound in 2015.

Total refined copper stocks in the United States increased by 14,700 t (7%) during the year to 223,000 t at the end of December from 209,000 t at the beginning of January, consistent with steady consumption accompanied by an increase in refined production. COMEX stocks rose by 17,400 t (28%), and London Metal Exchange Ltd. stocks in U.S. warehouses were higher by 15,100 t (18%). These increases were partially offset by a drawdown in refinery stocks, which declined by 7,830 t (65%), and wire-rod mill stocks, which decreased by 9,510 t (26%). Changes in brass mill and other industry stocks were negligible (table 1).

Foreign Trade

In 2016, net imports of refined copper were 574,000 t (708,000 t of imports and 134,000 t of exports), a decrease of 4% from 600,000 t (686,000 t of imports and 86,200 t of exports) in 2015. The consumer price-adjusted U.S. Broad Dollar Index averaged approximately 99.2 in 2016, 4% higher than about 95.5 in 2015 (Federal Reserve Board, 2017b). The combination of a stronger U.S. dollar and lower copper prices compared with those in recent years likely contributed to the increases in refined imports and exports. Refined copper accounted for 88% of all imports of unmanufactured copper,²

²Includes refined copper, unalloyed copper scrap, and the copper content of alloyed copper scrap; blister and anodes; matte, ash, and precipitates; and ore and concentrates.

including alloyed copper scrap, and 11% of unmanufactured exports. Chile, Canada, and Mexico were the leading foreign sources of refined copper in 2016 and accounted for 50%, 27%, and 14%, respectively, of the total refined import quantity. The leading destinations for refined copper exports, in decreasing order of quantity, were Mexico (51%) and China and Canada (24% each). Exports of copper ore and concentrates fell by 16% and were primarily shipped to Mexico (68% of the total ore and concentrates export quantity), and imports of ore and concentrates declined to 67 t in 2016 from 295 t in 2015 (tables 14, 16).

Copper scrap exports decreased slightly to a total gross weight of 944,000 t (411,000 t of unalloyed copper scrap and 532,000 t of copper-alloy scrap) in 2016 compared with 954,000 t (426,000 t of unalloyed scrap and 528,000 t of alloyed scrap) in 2015. China remained the leading destination for unalloyed and alloyed copper scrap from the United States and accounted for 70% of the total export quantity, 69% of the unalloyed quantity, and 71% of the alloyed quantity (table 18). Based on worldwide import data, China accounted for 53% of the reported 6.34 Mt (gross weight) of global copper scrap imports (International Copper Study Group, 2017a, p. 40–41). The United States imported an estimated 98,400 t of copper in scrap during 2016, an increase of 11% from 88,400 t in 2015 (table 19). Imports of copper in scrap primarily originated from Canada (52% of the total copper content) and Mexico (38%).

World Review

World mine production of copper increased by 5% to a record-high 20.1 Mt in 2016 from 19.2 Mt (revised) in 2015. Copper in concentrates accounted for 81% of global mine output and rose by 7% to 16.3 Mt from 15.2 Mt in 2015. Copper produced by SX-EW accounted for 19% of world mine production and decreased by 5% to 3.81 Mt from 4.01 Mt. Chile was the leading producer of mined copper and accounted for 28% of total global production, followed by Peru (12%), China (9%), the United States (7%), and Australia (5%). The remaining countries among the 10 leading producers were, in descending order of output, Congo (Kinshasa), Zambia, Mexico, Indonesia, and Canada. Fifty-three countries and localities were known to have mined copper in 2016. The 10 leading producers accounted for 79% of production, and the 20 leading producers accounted for 95%. Large increases in production took place in Peru, where output rose by 653,000 t (38% greater than country production in 2015); China, by 186,000 t (11%); Mexico, by 158,000 t (27%); and Indonesia, by 149,000 t (26%). These increases were partially offset by significant decreases in Chile and Congo (Kinshasa), where production declined by 220,000 t (4%) and 150,000 t (15%), respectively (table 20). According to data compiled by the International Copper Study Group (2017a, p. 9), global mine capacity rose by 4% to 23.4 Mt in 2016 from 22.4 Mt in 2015, and global mine capacity utilization increased to 86.3% from 85.3%.

In 2016, copper production decreased at multiple major mines in Chile. The largest declines took place at BHP Billiton Group's (Australia) Escondida Mine (1st-ranked producer in 2016), where output fell by 138,000 t (12%) from that in 2015, owing to lower ore grades and reduced mill throughput, and at

Anglo American plc's (United Kingdom) Los Bronces Mine (13th-ranked), where production decreased by 94,500 t (24%) because of significantly lower ore grades, adverse weather conditions, and a worker strike (Anglo American plc, 2017, p. 36, 191; Rio Tinto plc, 2017, p. 36, 221). Owing to higher ore grades, production increased by about 140,000 t (41%) at the Grasberg Mine (fifth-ranked) in Indonesia, owned by Freeport (Freeport-McMoRan Inc., 2017, p. 27, 81). In Mexico, Grupo México, S.A.B de C.V. completed a project to expand the capacity of its Buenavista del Cobre Mine (seventh-ranked), resulting in a production increase of 163,000 t (57%) compared with output in 2015 (Grupo México, S.A.B. de C.V., 2017, p. 13, 69). Mine capacity in Peru rose by roughly 615,000 t as multiple mine expansions ramped up and MMG Ltd.'s (Australia) Las Bambas Mine began commercial production in July 2016. Las Bambas produced 330,000 t of copper in concentrates and was one of the leading global copper mines (11th-ranked for all of 2016) in its first half year of operation (International Copper Study Group, 2017b, p. 101–107; MMG Ltd., 2017, p. 28). In September 2015, Glencore plc (Switzerland) temporarily closed the Kamoto Mine in Congo (Kinshasa) and the Mufulira Mine in Zambia to complete cost-reduction upgrades. The company announced in August 2016 that full production at each mine would not resume until 2018. The mines accounted for approximately 15% and 7% of the total mine capacity in Congo (Kinshasa) and Zambia, respectively (CRU International Ltd., 2016, p. 11; International Copper Study Group, 2017b, p. 76, 78, 128, 130).

World production of refined copper increased slightly in 2016 to a record-high 23.4 Mt from 23.2 Mt (revised) in 2015. Production of primary copper accounted for 80% of global refined production and rose slightly to 18.8 Mt from 18.4 Mt in 2015; electrowon copper output (16% of global refined production) decreased by 5%, and primary copper produced by electrolytic and fire refining (other primary, 64% of worldwide refined output) increased by 4%. Production of secondary copper accounted for 20% of global refined output and decreased slightly to 4.67 Mt from 4.78 Mt in 2015, likely owing to increased affordability of copper cathode resulting from a lower copper price in comparison with recent years. China was the leading producer of refined copper and accounted for 36% of world refinery production, followed by Chile (11%), Japan (7%), the United States (5%), and Russia (4%). The remaining countries among the 10 leading producers were, in descending order of output, India, Congo (Kinshasa), Germany, the Republic of Korea, and Poland. In 2016, 45 countries and localities were known to have refined copper. The 10 leading producers accounted for 77% of worldwide output, and the 20 leading producers accounted for 92%. Most of the growth in refined copper production was in China, where output rose by 375,000 t (5% higher than country production in 2015); the United States, by 82,000 t (7%); Japan, by 69,900 t (5%); and Indonesia, by 61,200 t (31%). These increases were partially offset by significant decreases in Congo (Kinshasa), where production declined by 177,000 t (20%); Chile, by 75,400 t (3%); and Zambia, by 73,600 t (16%) (table 22). Global refinery capacity increased slightly in 2016 to 27.1 Mt from 26.8 Mt in the prior

year, and global refinery capacity utilization rose to 85.9% from 85.5% (International Copper Study Group, 2017a, p. 9).

In 2016, global apparent consumption of refined copper increased slightly to a record-high 23.4 Mt from 23.0 Mt in 2015, according to the ICSG. The leading consumers of refined copper were China (50% of total consumption), the United States (8%), Germany (5%), Japan (4%), and the Republic of Korea (3%). The remaining countries and localities among the 10 leading consumers were, in descending order of quantity, Italy, Taiwan, Turkey, India, and the United Arab Emirates. The 10 leading countries and localities accounted for 80% of total global consumption. China accounted for most of the growth in consumption during 2016; use of refined copper in China increased by 321,000 t from that in 2015 (about 80% of the total increase), and consumption in all countries excluding China collectively rose by 76,000 t. The ICSG calculation of China's apparent consumption was based on reported production, trade, and SHFE stock data and did not include unreported Government or industry stocks, which can fluctuate significantly. On a regional basis, consumption of refined copper in Asia accounted for 73% of the global total (23% excluding China) in 2016, followed by Europe (14%), North America (10%), South America (2%), and Africa (1%). Consumption increased by 3% in Asia (also by 3% if China is excluded) and was essentially unchanged in Europe and North America (International Copper Study Group, 2017a, p. 9, 19–20).

Worldwide consumption of refined copper exceeded production for the seventh consecutive year in 2016, with a deficit of 129,000 t. Consistent with the apparent production shortfall, global yearend reported stocks of refined copper held by consumers, exchanges, merchants, and producers decreased to 1.40 Mt from 1.52 Mt in 2015 (International Copper Study Group, 2017a, p. 9, 21).

Outlook

According to production guidance published by companies that operate in the United States, domestic mine and refinery production will likely decrease in 2017 because of lower ore grades at multiple mines. Global mine and refinery production capacities are expected to increase slightly, and no new major mines are expected to begin operations. Global and domestic consumption will continue to depend on economic trends in sectors such as automobiles, housing and building construction, HVAC, power utilities, and telecommunications.

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TABLE 1
SALIENT COPPER STATISTICS¹

(Metric tons, copper content, unless otherwise specified)

	2012	2013	2014	2015	2016	
United States:						
Mine production:						
Copper ore concentrated, gross weight	180,000,000	172,000,000	175,000,000	164,000,000	155,000,000	
Average yield of concentrated copper ore	percent	0.36	0.43 [†]	0.47	0.51	
Recoverable copper:						
Arizona	763,000	795,000	893,000	961,000	969,000	
Other States	404,000	453,000	464,000	422,000	461,000	
Total	1,170,000	1,250,000	1,360,000	1,380,000	1,430,000	
Total value	millions	\$9,450	\$9,360	\$9,510	\$7,810	\$7,090
Smelter production:						
Primary ²	485,000	516,000	522,000	527,000	563,000	
Byproduct sulfuric acid, sulfur content	545,000	574,000	497,000 [†]	553,000	590,000	
Refinery production:						
Primary materials:						
Electrolytic from domestic ores	491,000	518,000	535,000	503,000	561,000	
Electrowon	471,000	475,000	514,000	588,000 [†]	615,000	
Total	962,000	993,000	1,050,000	1,090,000	1,180,000	
Secondary materials (scrap), electrolytic and fire refined	39,400	46,900	46,000	48,800	46,300	
Total, refinery production	1,000,000	1,040,000	1,090,000	1,140,000	1,220,000	
Secondary copper produced:						
Recovered from new scrap	642,000	630,000	672,000	640,000 [†]	690,000	
Recovered from old scrap	164,000	166,000	173,000	166,000 [†]	150,000	
Total	807,000	797,000 [†]	845,000	806,000 [†]	839,000	
Copper sulfate production, gross weight	22,500	23,000	22,900	18,500	18,400	
Exports, refined	169,000	111,000	127,000	86,200 [†]	134,000	
Imports for consumption, refined	630,000	734,000	620,000	686,000	708,000	
Stocks, December 31:						
Blister and in-process material	12,300	12,700	9,860	13,900	14,400	
Refined copper:						
Refineries	12,900	15,000	9,540	12,000	4,190	
Wire-rod mills	28,100	32,600	42,000	36,200	26,700	
Brass mills	6,540	6,710	7,400	7,580	7,380	
Other industry	4,160 [†]	4,360 [†]	5,090	5,730	5,420	
COMEX	64,100	14,900	23,900	63,200	80,700	
London Metal Exchange Ltd. (LME), U.S. warehouses	120,000	185,000	102,000	83,800	98,900	
Total	236,000	259,000 [†]	190,000	209,000	223,000	
Consumption:						
Reported, refined copper	1,760,000	1,830,000	1,760,000	1,810,000	1,810,000	
Apparent, primary refined and copper in old scrap ³	1,760,000	1,760,000	1,780,000	1,820,000	1,880,000	
Price:						
Producer, weighted average	cents per pound	367.28	339.94	318.05	256.15	224.87
COMEX, first position	do.	361.45	334.11	312.00	250.81	219.73
LME, Grade A cash	do.	360.58	332.29	311.13 [†]	249.53	220.57
World, production:						
Mine	16,700,000 [†]	18,300,000	18,500,000 [†]	19,200,000 [†]	20,100,000	
Smelter	15,900,000 [†]	16,600,000 [†]	18,000,000 [†]	18,500,000	18,900,000	
Refinery	20,400,000 [†]	21,300,000 [†]	22,800,000 [†]	23,200,000 [†]	23,400,000	

[†]Revised. do. Ditto.

¹Table includes data available through September 29, 2020. Data are rounded to no more than three significant digits, except prices; may not add to totals shown.

²May contain small amounts of scrap.

³Primary refined production plus copper recovered from old scrap plus general refined imports minus refined exports, including adjustments for changes in refined stocks. Calculated using the following values for general refined imports: 2012—628,000 metric tons (t), 2013—730,000 t, 2014—614,000 t, 2015—665,000 t, 2016—701,000 t.

TABLE 2
LEADING COPPER-PRODUCING MINES IN THE UNITED STATES IN 2016, IN ORDER OF OUTPUT^{1,2}

Rank	Mine	County and State	Operator	Source of copper	Capacity (thousand metric tons)
1	Morenci	Greenlee, AZ	Freeport-McMoRan Inc.	Copper-molybdenum ore, concentrated and leached	480
2	Bingham Canyon	Salt Lake, UT	Rio Tinto Kennecott ³	Copper-molybdenum ore, concentrated	280
3	Chino	Grant, NM	Freeport-McMoRan Inc.	Copper ore, concentrated and leached	130
4	Safford	Graham, AZ	do.	Copper ore, leached	110
5	Bagdad	Yavapai, AZ	do.	Copper-molybdenum ore, concentrated and leached	100
6	Sierrita	Pima, AZ	do.	do.	80
7	Pinto Valley	Gila, AZ	Capstone Mining Corp.	do.	60
8	Ray	Pinal, AZ	ASARCO LLC ⁴	Copper ore, concentrated and leached	150
9	Mission Complex	do.	do. ⁴	Copper ore, concentrated	70
10	Robinson	White Pine, NV	Robinson Nevada Mining Co. ⁵	Copper-molybdenum ore, concentrated	60
11	Tyrone	Grant, NM	Freeport-McMoRan Inc.	Copper ore, leached	45
12	Continental Pit	Silver Bow, MT	Montana Resources	Copper-molybdenum ore, concentrated	40
13	Eagle	Marquette, MI	Lundin Mining Corp.	Nickel-copper ore, concentrated	25
14	Silver Bell	Pima, AZ	ASARCO LLC ⁴	Copper ore, leached	25
15	Phoenix	Lander, NV	Newmont Mining Corp.	Gold-copper ore, concentrated and leached	25
16	Miami	Gila, AZ	Freeport-McMoRan Inc.	Copper ore, leached	90
17	Carlota	do.	Carlota Copper Co. ⁵	do.	10
18	Lisbon Valley	San Juan, UT	Lisbon Valley Mining Co. LLC	do.	10

do. Ditto.

¹The mines listed accounted for more than 99% of U.S. mine production in 2016.

²Table includes data available through September 29, 2020.

³Wholly owned subsidiary of Rio Tinto plc.

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

⁵Wholly owned subsidiary of KGHM International Ltd.

TABLE 3
MINE PRODUCTION OF COPPER-BEARING ORES AND RECOVERABLE COPPER CONTENT OF ORES
PRODUCED IN THE UNITED STATES, BY SOURCE AND TREATMENT PROCESS¹

(Metric tons)

Source and treatment process	2015		2016	
	Gross weight	Recoverable copper	Gross weight	Recoverable copper
Mined copper ore:				
Concentrated	164,000,000	769,000	155,000,000	793,000
Leached	NA	588,000	NA	615,000
Total	NA	1,360,000	NA	1,410,000
Copper precipitates shipped, leached from tailings, dumps, and in-place material	NA	W	NA	W
Other copper-bearing ores ²	5,530,000	25,600	4,590,000	22,800
Grand total	XX	1,380,000	XX	1,430,000

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

XX Not applicable.

¹Table includes data available through September 29, 2020. Data are rounded to no more than three significant digits; may not add to totals shown.

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

TABLE 4
CONSUMPTION OF COPPER AND BRASS MATERIALS IN THE UNITED STATES, BY ITEM¹

(Metric tons)

Item	Brass mills	Wire-rod mills	Foundries, chemical plants, miscellaneous users	Smelters, refiners, ingot makers	Total
2015:					
Copper scrap	675,000 ^r	W	55,800	171,000 ^r	903,000 ^r
Refined copper ²	422,000 ^r	1,320,000	65,300	4,510 ^r	1,810,000
Hardeners and master alloys	9,840	--	5,190	--	15,000
Brass ingots	--	--	51,100 ^r	--	51,100 ^r
Slab zinc	33,200	--	1,100 ^r	4 ^r	34,300 ^r
2016:					
Copper scrap	718,000	W	55,400	131,000	904,000
Refined copper ²	421,000	1,320,000	62,800	4,580	1,810,000
Hardeners and master alloys	9,800	--	5,750	--	15,500
Brass ingots	--	--	52,800	--	52,800
Slab zinc	33,200	--	493	283	34,000

^rRevised. W Withheld to avoid disclosing company proprietary data; included with "Brass mills." -- Zero.

¹Table includes data available through September 29, 2020. Data are rounded to no more than three significant digits; may not add to totals shown.

²Detailed information on consumption of refined copper can be found in table 5.

TABLE 5
CONSUMPTION OF REFINED COPPER SHAPES IN THE UNITED STATES, BY CLASS OF CONSUMER¹

(Metric tons)

Class of consumer	Cathodes	Ingots and ingot bars	Cakes and slabs	Wirebar, billets, other	Total
2015:					
Wire-rod mills	1,320,000 ^r	--	--	(2)	1,320,000
Brass mills	328,000	W	42,300	51,600	422,000
Chemical plants	W	-- ^r	--	6,560	6,560
Ingot makers	W	W	-- ^r	4,510	4,510
Foundries	19,000	3,030	W	10,700	32,800
Miscellaneous ³	W	W	-- ^r	26,000 ^r	26,000
Total	1,670,000 ^r	3,030	42,300	99,400 ^r	1,810,000
2016:					
Wire-rod mills	1,320,000	--	--	(2)	1,320,000
Brass mills	325,000	W	43,700	51,600	421,000
Chemical plants	W	--	--	6,560	6,560
Ingot makers	W	W	--	4,580	4,580
Foundries	17,700	3,050	--	9,540	30,300
Miscellaneous ³	W	W	--	25,900	25,900
Total	1,660,000	3,050	43,700	98,300	1,810,000

^rRevised. W Withheld to avoid disclosing company proprietary data; included with "Wirebar, billets, other." -- Zero.

¹Table includes data available through September 29, 2020. Data are rounded to no more than three significant digits; may not add to totals shown.

²Withheld to avoid disclosing company proprietary data; included with "Cathodes."

³Includes consumers of copper powder and copper shot, iron and steel plants, and other manufacturers.

TABLE 6
COPPER RECOVERED FROM SCRAP PROCESSED IN THE UNITED STATES,
BY KIND OF SCRAP AND FORM OF RECOVERY¹

(Metric tons)

	2015	2016
Kind of scrap:		
New:		
Copper-base	603,000	652,000
Aluminum-base	36,600 ^r	37,400
Nickel-base	18	18
Total	640,000 ^r	690,000
Old:		
Copper-base	136,000	120,000
Aluminum-base	29,800	29,600
Nickel-base	267	254
Zinc-base	12 ^r	10
Total	166,000 ^r	150,000
Grand total, new and old scrap	806,000 ^r	839,000
Form of recovery:		
As unalloyed copper	48,900	46,400
In brass and bronze	689,000	723,000
In alloy iron and steel and other alloys	887	839
In aluminum alloys	65,300 ^r	67,200
In chemical compounds	1,800	1,800
Total	806,000 ^r	839,000

^rRevised.

¹Table includes data available through September 29, 2020. Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 7
COPPER RECOVERED AS REFINED COPPER AND IN ALLOYS AND OTHER FORMS
FROM COPPER-BASE SCRAP PROCESSED IN THE UNITED STATES, BY TYPE OF OPERATION¹

(Metric tons)

Type of operation	From new scrap		From old scrap		Total	
	2015	2016	2015	2016	2015	2016
Ingot makers	15,600 ^r	9,570	57,500 ^r	48,100	73,100	57,600
Refineries ²	17,900	19,900	30,900	26,400	48,800	46,300
Brass and wire-rod mills	533,000	586,000	37,100	35,200	570,000	621,000
Foundries and manufacturers	34,700	34,900	10,800	10,100	45,400	45,000
Chemical plants	1,800	1,800	--	--	1,800	1,800
Total	603,000	652,000	136,000	120,000	739,000	772,000

^rRevised. -- Zero.

¹Table includes data available through September 29, 2020. Data are rounded to no more than three significant digits; may not add to totals shown.

²Includes electrolytically refined copper produced from scrap material processed at smelter level.

TABLE 8
 PRODUCTION OF SECONDARY COPPER AND COPPER-ALLOY PRODUCTS
 IN THE UNITED STATES, BY ITEM PRODUCED FROM SCRAP¹

(Metric tons)

Item produced from scrap	2015	2016
Unalloyed copper products:		
Refined copper	48,800 ^r	46,300
Copper castings	124	124
Total	48,900	46,400
Alloyed copper products:		
Brass and bronze ingots:		
Tin bronzes	6,240	5,940
Leaded red brass and semired brass	37,500	35,700
High leaded tin bronze	5,100	4,920
Yellow brass	4,820	1,580
Manganese bronze	6,260	6,170
Aluminum bronze	5,110	4,770
Nickel silver	1,020	1,020
Silicon bronze and brass	4,390	3,470
Copper-base hardeners and master alloys	5,810	4,990
Miscellaneous	6,090	6,090
Total	82,300	74,600
Brass mill and wire-rod mill products	663,000	702,000
Brass and bronze castings	45,600	45,300
Copper in chemical products	1,800	1,800
Grand total	841,000	870,000

^rRevised.

¹Table includes data available through September 29, 2020. Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 9
 COMPOSITION OF SECONDARY COPPER-ALLOY PRODUCTION IN THE UNITED STATES¹

(Metric tons)

	Copper	Tin	Lead	Zinc	Nickel	Aluminum	Total
Brass and bronze ingot production: ²							
2015	66,500 ^r	3,340 ^r	4,730 ^r	7,680 ^r	94 ^r	11	82,300
2016	60,300	3,020	4,290	6,960	85	10	74,600
Secondary metal content of brass mill products:							
2015	570,000	271	2,450	88,700	1,180	16	663,000
2016	619,000	263	1,980	80,100	1,140	16	702,000
Secondary metal content of brass and bronze castings:							
2015	43,100	1,030	400	969	79	91	45,600
2016	42,700	1,050	417	966	68	93	45,300

^rRevised.

¹Table includes data available through September 29, 2020. Data are rounded to no more than three significant digits; may not add to totals shown.

²Includes approximately 96% from scrap and 4% from other than scrap.

TABLE 10
CONSUMPTION AND YEAREND STOCKS OF COPPER-BASE SCRAP¹

(Metric tons, gross weight)

Scrap type and processor	2015		2016	
	Consumption	Stocks	Consumption	Stocks
Unalloyed scrap:				
No. 1 wire and heavy:				
Smelters, refiners, and ingot makers	33,900 ^r	2,000 ^r	14,700	23,800
Brass and wire-rod mills	343,000	(2)	387,000	(2)
Foundries and miscellaneous manufacturers	20,000	(2)	19,300	(2)
No. 2 mixed heavy and light:				
Smelters, refiners, and ingot makers	78,300 ^r	3,230 ^r	62,900	30,600
Brass and wire-rod mills	42,500	(2)	66,600	(2)
Foundries and miscellaneous manufacturers	12,500	(2)	12,500	(2)
Total unalloyed scrap:				
Smelters, refiners, and ingot makers	112,000 ^r	5,230 ^r	77,600	54,400
Brass and wire-rod mills	386,000	1,960	454,000	1,330
Foundries and miscellaneous manufacturers	32,500	2,960	31,800	3,440
Alloyed scrap:				
Red brass: ³				
Smelters, refiners, and ingot makers	14,900	1,430	12,200	1,500
Brass mills	12,200	(2)	12,200	(2)
Foundries and miscellaneous manufacturers	3,080	(2)	3,470	(2)
Leaded yellow brass:				
Smelters, refiners, and ingot makers	8,970	757	8,800	758
Brass mills	125,000	(2)	101,000	(2)
Foundries and miscellaneous manufacturers	655	(2)	605	(2)
Yellow and low brass, all plants	52,900	(2)	50,200	(2)
Cartridge cases and brass, all plants	93,400	(2)	93,400	(2)
Auto radiators:				
Smelters, refiners, and ingot makers	15,600	674	14,900	655
Foundries and miscellaneous manufacturers	56	(2)	56	(2)
Bronzes:				
Smelters, refiners, and ingot makers	9,290	578	8,560	515
Brass mills and miscellaneous manufacturers	11,700	(2)	11,700	(2)
Nickel-copper alloys, all plants	9,950	173	9,520	191
Low grade and residues; smelters, refiners, miscellaneous manufacturers	8,890	612	8,890	607
Other alloy scrap: ⁴				
Smelters, refiners, and ingot makers	220	303	220	829
Brass mills and miscellaneous manufacturers	5,370	(2)	5,390	(2)
Total alloyed scrap:				
Smelters, refiners, and ingot makers	59,200	5,080	53,300	5,570
Brass mills	290,000	421	264,000	356
Foundries and miscellaneous manufacturers	23,300	1,820	23,600	1,060
Grand total, scrap:				
Smelters, refiners, and ingot makers	171,000 ^r	10,300 ^r	131,000	60,000
Brass and wire-rod mills	675,000	2,380	718,000	1,690
Foundries and miscellaneous manufacturers	55,800	4,780	55,400	4,490

^rRevised.

¹Table includes data available through September 29, 2020. Data are rounded to no more than three significant digits; may not add to totals shown.

²Individual breakdown is not available; included in totals.

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

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

TABLE 11
 CONSUMPTION OF PURCHASED COPPER-BASE SCRAP¹

(Metric tons, gross weight)

Type of operation	New scrap		Old scrap		Total	
	2015	2016	2015	2016	2015	2016
Ingot makers	15,400 ^r	24,700	66,500 ^r	61,600	81,900 ^r	86,400
Smelters and refineries	20,200 ^r	21,300	69,400 ^r	23,300	89,600	44,600
Brass and wire-rod mills ²	637,000	681,000	38,500	36,400	675,000	718,000
Foundries and miscellaneous manufacturers	43,900	43,900	11,900	11,500	55,800	55,400
Total	716,000 ^r	771,000	186,000 ^r	133,000	903,000 ^r	904,000

^rRevised.

¹Table includes data available through September 29, 2020. Data are rounded to no more than three significant digits; may not add to totals shown.

²Consumption 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 STATES¹

(Metric tons)

Ingot type or material consumed	2015	2016
Brass ingot:		
Tin bronzes	6,190 ^r	6,510
Leaded red brass and semired brass	21,400	21,800
Yellow, leaded, low brass ²	10,300	11,400
Manganese bronze	2,490	2,500
Nickel silver ³	3,750 ^r	3,700
Aluminum bronze	3,480 ^r	2,970
Hardeners and master alloys ⁴	5,190	5,750
Lead free alloys ⁵	3,460	3,950
Total	56,300 ^r	58,500
Refined copper	65,300	62,800
Copper scrap	55,800	55,400

^rRevised.

¹Table includes data available through September 29, 2020. Data are rounded to no more than three significant digits; may not add to totals shown.

²Includes brass and silicon bronze.

³Includes brass, copper nickel, and nickel bronze.

⁴Includes special alloys.

⁵Includes copper-bismuth and copper-bismuth-selenium alloys.

TABLE 13
AVERAGE PRICES FOR COPPER SCRAP, BY TYPE¹

(Cents per pound)

Year	Brass mills no. 1 scrap	Refiners no. 2 scrap	Dealers' buying (New York)	
			No. 2 scrap	Red brass turnings and borings
2015	246.13	222.45	194.49	144.62
2016	218.01	197.52	155.05	132.17

¹Table includes data available through September 29, 2020.

Source: American Metal Market.

TABLE 14
U.S. EXPORTS OF UNMANUFACTURED COPPER (COPPER CONTENT), BY COUNTRY OR LOCALITY¹

Country or locality	Ore and concentrates		Matte, ash, and precipitates		Blister and anodes		Refined		Unalloyed copper scrap		Total	
	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
2015	392,000	\$2,870,000	15,900 ^r	\$22,900 ^r	10,700	\$47,700 ^r	86,200 ^r	\$486,000 ^r	426,000	\$1,610,000	931,000 ^r	\$5,040,000
2016:												
Belgium	(2)	3	5,700	5,000	679	2,140	--	--	9,030	33,100	15,400	40,300
Canada	25,800	109,000	12,300	14,700	2,050	6,600	32,400	158,000	23,400	109,000	96,000	398,000
China	57,100	258,000	52	197	485	1,780	32,600	149,000	284,000	788,000	374,000	1,200,000
Germany	--	--	204	507	517	2,500	21	135	24,900	90,400	25,600	93,500
Hong Kong	--	--	36	156	1,070	5,610	--	--	6,550	17,900	7,650	23,700
India	--	--	44	39	603	3,210	84	459	1,670	6,390	2,400	10,100
Japan	20,400	111,000	180	276	453	1,290	157	436	6,460	28,700	27,700	141,000
Korea, Republic of	138	553	352	1,780	1,420	7,730	85	612	17,000	75,900	19,000	86,500
Mexico	226,000	1,730,000	--	--	99	712	67,700	337,000	1,660	7,730	296,000	2,070,000
Netherlands	--	--	76	76	--	--	95	96	12,100	42,700	12,300	42,800
Philippines	816	4,070	--	--	48	283	3	25	41	65	908	4,440
Slovakia	--	--	753	754	--	--	--	--	6,300	30,000	7,050	30,800
Spain	--	--	40	50	266	1,410	4	33	182	649	492	2,140
Taiwan	--	--	359	1,730	60	330	62	484	8,290	35,300	8,770	37,900
Other	37	226	11	21	1,770	7,440	594	8,090	9,880	42,700	12,300	58,400
Total	331,000	2,210,000	20,100	25,300	9,510	41,000	134,000	656,000	411,000	1,310,000	905,000	4,240,000

^rRevised. -- Zero.

¹Table includes data available through September 29, 2020. Data are rounded to no more than three significant digits; may not add to totals shown.

²Less than 1/2 unit.

Source: U.S. Census Bureau.

TABLE 15
U.S. EXPORTS OF COPPER SEMIMANUFACTURES, BY COUNTRY OR LOCALITY¹

Country or locality	Pipes and tubing		Plates, sheets, foil, bars		Bare wire, including wire rod ²		Wire and cable, stranded		Copper sulfate	
	Quantity (metric tons)	Value (thousands) \$121,000	Quantity (metric tons)	Value (thousands) \$242,000	Quantity (metric tons)	Value (thousands) \$1,020,000 ^r	Quantity (metric tons)	Value (thousands) \$382,000 ^r	Quantity (metric tons)	Value (thousands) \$32,000
2015	14,400	\$121,000	26,800	\$242,000	160,000	\$1,020,000 ^r	43,300 ^r	\$382,000 ^r	6,160 ^r	\$32,000
2016:										
Bahamas, The	3	33	8	56	2	8	89	1,010	--	--
Belgium	8	101	8	198	77	287	37	1,640	12	233
Canada	2,030	16,600	6,530	46,200	35,200	185,000	12,200	75,500	1,750	3,210
China	532	2,560	1,360	17,100	3,160	12,900	170	2,510	499	5,030
Colombia	7	50	6	81	1	34	16	341	--	--
Costa Rica	--	--	31	476	25	330	26	419	(3)	9
Dominican Republic	33	255	1	32	139	506	188	1,940	57	116
Germany	87	456	609	6,380	19	298	34	1,260	20	42
Hong Kong	14	399	216	2,160	215	910	169	1,330	2	4
India	182	1,140	79	557	18	137	639	3,010	--	--
Ireland	38	328	21	78	6	123	(3)	24	1,140	8,060
Israel	3	17	21	136	11	239	22	488	145	739
Japan	59	256	318	5,860	14	197	51	1,030	41	1,140
Korea, Republic of	284	2,650	628	5,060	604	3,620	25	1,080	395	2,970
Malaysia	10	99	443	7,380	(3)	14	8	478	234	526
Mexico	5,160	40,800	17,000	134,000	129,000	674,000	22,500	174,000	16	41
Netherlands	37	254	13	204	3	32	19	556	--	--
Saudi Arabia	2,720	18,400	23	286	5	36	260	2,000	--	--
Singapore	99	465	61	580	691	4,260	10	226	36	1,090
Taiwan	28	391	98	1,100	12	76	22	384	796	9,960
Trinidad and Tobago	--	--	(3)	3	50	295	43	340	--	--
United Arab Emirates	1,470	10,000	1	28	39	140	11	190	--	--
United Kingdom	31	417	142	844	156	822	47	1,010	4	16
Other	1,200	8,420	704	9,690	423	3,780	1,290	20,400	686	1,740
Total	14,000	104,000	28,400	239,000	170,000	888,000	37,800	291,000	5,840	34,900

^rRevised. -- Zero.¹Table includes data available through September 29, 2020. Data are rounded to no more than three significant digits; may not add to totals shown.²Exports of wire rod in 2015 were 146,000 metric tons (t) valued at \$918 million, and in 2016, wire-rod exports were 158,000 t valued at \$816 million.³Less than 1/2 unit.

Source: U.S. Census Bureau.

TABLE 16
U.S. IMPORTS FOR CONSUMPTION OF UNMANUFACTURED COPPER (COPPER CONTENT), BY COUNTRY OR LOCALITY¹

Country or locality	Ore and concentrates		Matte, ash, and precipitates		Blister and anodes		Refined		Unalloyed scrap		Total	
	Quantity (metric tons)	Value ² (thousands)	Quantity (metric tons)	Value ² (thousands)	Quantity (metric tons)	Value ² (thousands)	Quantity (metric tons)	Value ² (thousands)	Quantity (metric tons)	Value ² (thousands)	Quantity (metric tons)	Value ² (thousands)
2015	295	\$1,380	1,140	\$5,310	2,810	\$46,200	686,000	\$3,950,000	28,600	\$129,000	719,000	\$4,130,000
2016:												
Brazil	--	--	--	--	--	--	903	4,140	219	742	1,120	4,890
Canada	33	100	355	1,340	2	61	193,000	930,000	13,300	57,800	207,000	989,000
Chile	--	--	--	--	--	--	354,000	1,720,000	41	89	354,000	1,720,000
China	--	--	2	8	(3)	6	76	705	100	226	178	945
Congo (Kinshasa)	--	--	--	--	--	--	21,100	101,000	--	--	21,100	101,000
Costa Rica	--	--	--	--	--	--	--	--	344	1,060	344	1,060
Dominican Republic	--	--	--	--	--	--	--	--	197	833	197	833
Finland	--	--	--	--	175	1,250	110	580	--	--	285	1,830
Germany	--	--	--	--	(3)	67	1,830	9,280	42	79	1,870	9,430
Indonesia	27	44	--	--	--	--	--	--	--	--	27	44
Japan	--	--	109	150	3	219	4,090	28,300	12	147	4,210	28,800
Korea, Republic of	--	--	--	--	1	24	301	2,000	3	10	305	2,040
Malaysia	--	--	139	673	82	458	--	--	--	--	221	1,130
Mexico	3	28	41	132	--	--	102,000	490,000	12,900	49,200	115,000	539,000
Netherlands	--	--	69	287	(3)	14	(3)	5	19	65	88	371
Panama	--	--	--	--	--	--	--	--	249	1,130	249	1,130
Peru	--	--	--	--	--	--	24,800	124,000	188	572	25,000	124,000
Saudi Arabia	--	--	--	--	--	--	--	--	240	728	240	728
South Africa	--	--	--	--	--	--	13	59	88	393	101	452
Spain	--	--	52	390	--	--	--	--	--	--	52	390
Other	3	7	41	168	9	959	4,090	19,500	1,250	4,340	5,390	25,000
Total	67	178	808	3,150	274	3,060	708,000	3,430,000	29,200	117,000	738,000	3,550,000

¹Revised. -- Zero.

²Table includes data available through September 29, 2020. Data are rounded to no more than three significant digits; may not add to totals shown.

³Cost, insurance, freight value at U.S. port.

⁴Less than 1/2 unit.

Source: U.S. Census Bureau.

TABLE 17
U.S. IMPORTS FOR CONSUMPTION OF COPPER SEMIMANUFACTURES, BY COUNTRY OR LOCALITY¹

Country or locality	Pipes and tubing		Plates, sheets, foil, bars		Bare wire, including wire rod ²		Wire and cable, stranded		Copper sulfate	
	Quantity (metric tons)	Value ³ (thousands) \$18,300 r	Quantity (metric tons)	Value ³ (thousands) \$409,000 r	Quantity (metric tons)	Value ³ (thousands) \$848,000 r	Quantity (metric tons)	Value ³ (thousands) \$47,300 r	Quantity (metric tons)	Value ³ (thousands) \$94,900 r
2015	1,750 r	\$18,300 r	50,200	\$409,000 r	140,000	\$848,000 r	6,470	\$47,300 r	43,900	\$94,900 r
2016:										
Brazil	69	538	1,630	10,100	17	76	--	--	--	--
Canada	109	1,470	503	3,790	127,000	638,000	1,050	6,210	3,800	6,120
Chile	--	--	--	--	85	728	--	--	680	1,050
China	48	743	1,740	14,000	580	5,530	42	839	100	203
Finland	--	--	4,190	33,300	693	4,860	--	--	--	--
France	45	485	707	4,880	190	4,200	31	665	--	--
Germany	25	289	20,100	142,000	1,100	8,550	95	1,530	2	51
Hong Kong	--	--	21	151	17	160	--	--	20	37
India	57	374	344	2,360	3	42	93	1,450	25	79
Israel	--	--	--	--	--	--	1	12	--	--
Italy	103	765	11	153	1	131	19	241	--	--
Japan	23	221	1,200	10,200	538	5,010	1	21	390	429
Korea, Republic of	1,710	9,720	1,810	16,300	35	387	1	41	--	--
Luxembourg	--	--	868	9,600	--	--	--	--	--	--
Mexico	168	2,350	2,750	16,400	20,000	97,400	466	2,530	33,000	57,800
Peru	--	--	7,110	41,500	1,160	8,070	--	--	500	793
Russia	--	--	--	--	(4)	2	--	--	3,570	8,140
Sweden	--	--	(4)	12	80	630	(4)	11	--	--
Taiwan	(4)	8	337	3,490	377	2,600	8	415	3,000	5,780
Thailand	(4)	7	142	1,080	192	1,100	77	523	--	--
Turkey	--	--	2	15	35	202	3,250	18,200	103	168
United Kingdom	5	154	132	521	7	244	(4)	72	(4)	3
Other	4	41	2,670	15,500	317	4,260	88	1,880	72	123
Total	2,370	17,200	46,200	325,000	152,000	782,000	5,230	34,600	45,200	80,800

¹Revised. -- Zero.

²Table includes data available through September 29, 2020. Data are rounded to no more than three significant digits; may not add to totals shown.

³Imports of wire rod in 2015 were 129,000 metric tons (t) valued at \$771 million, and in 2016, wire-rod imports were 140,000 t valued at \$706 million.

⁴Cost, insurance, freight value at U.S. port.

⁵Less than 1/2 unit.

Source: U.S. Census Bureau.

TABLE 18
U.S. EXPORTS OF COPPER SCRAP, BY COUNTRY OR LOCALITY¹

Country or locality	Unalloyed copper scrap				Copper-alloy scrap			
	2015		2016		2015		2016	
	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
Belgium	10,800	\$43,300	9,030	\$33,100	12,600	\$33,900	8,390	\$23,400
Canada	27,600	143,000	23,400	109,000	39,500	103,000	51,200	83,300
China	281,000	965,000 ^r	284,000	788,000	378,000	705,000 ^r	376,000	570,000
Germany	30,500	123,000	24,900	90,400	13,900	47,100	8,130	31,100
Hong Kong	8,720	25,100	6,550	17,900	14,100	18,900	17,100	19,300
India	4,050	14,800	1,670	6,390	17,600	48,900	23,000	60,000
Japan	6,140	29,200	6,460	28,700	11,900	55,400	8,730	36,400
Korea, Republic of	16,500	83,900	17,000	75,900	11,900 ^r	49,900 ^r	10,300	33,500
Mexico	723	3,260	1,660	7,730	3,490	17,000	950	3,960
Netherlands	11,300	49,900	12,100	42,700	740	2,490	1,170	1,850
Pakistan	841	4,190	1,890	7,110	1,350	936	6,200	2,680
Slovakia	6,680	32,300	6,300	30,000	875	2,000	1,470	4,500
Spain	457	1,130	182	649	10,500	21,000	7,770	13,700
Taiwan	7,650	29,600	8,290	35,300	2,470	10,200	1,740	5,790
Other	13,100	61,600	8,040	35,600	9,510	24,400	10,300	24,700
Total	426,000	1,610,000	411,000	1,310,000	528,000 ^r	1,140,000	532,000	914,000

^rRevised.

¹Table includes data available through September 29, 2020. Data are rounded to no more than three significant digits; may not add to totals shown.

Source: U.S. Census Bureau.

TABLE 19
U.S. IMPORTS FOR CONSUMPTION OF COPPER SCRAP, BY COUNTRY OR LOCALITY¹

Country or locality	Unalloyed copper scrap		Copper-alloy scrap		
	Quantity (metric tons)	Value ² (thousands)	Gross weight (metric tons)	Copper content ³ (metric tons)	Value ² (thousands)
2015	28,600	\$129,000 ^r	83,100 ^r	59,800 ^r	\$328,000 ^r
2016:					
Bahamas, The	23	90	474	341	453
Brazil	219	742	159	114	436
Canada	13,300	57,800	52,200	37,600	204,000
Chile	41	89	211	152	397
China	100	226	466	336	1,590
Colombia	259	730	1,180	848	4,020
Costa Rica	344	1,060	1,030	743	3,310
Dominican Republic	197	833	720	518	1,150
Ecuador	--	--	357	257	778
El Salvador	82	146	480	346	1,360
Guatemala	--	--	326	235	968
Honduras	102	448	357	257	1,110
Mexico	12,900	49,200	34,400	24,800	112,000
Nicaragua	--	--	264	190	1,060
Pakistan	244	814	--	--	--
Panama	249	1,130	147	106	415
Peru	188	572	143	103	451
Philippines	--	--	176	127	639
Saudi Arabia	240	728	42	30	170
Suriname	183	787	40	29	107
Trinidad and Tobago	--	--	31	22	61
United Kingdom	(4)	3	207	149	671
Venezuela	73	228	1,200	861	2,780
Other	445	1,790	1,540	1,110	3,960
Total	29,200	117,000	96,100	69,200	342,000

^rRevised. -- Zero.

¹Table includes data available through September 29, 2020. Data are rounded to no more than three significant digits; may not add to totals shown.

²Cost, insurance, freight value at U.S. port.

³Content is estimated by the U.S. Geological Survey to be 72% of gross weight.

⁴Less than ½ unit.

Source: U.S. Census Bureau.

TABLE 20
COPPER: WORLD MINE PRODUCTION, BY COUNTRY OR LOCALITY^{1,2}

(Metric tons, copper content)

Country or locality	2012	2013	2014	2015	2016 ^p
Albania, concentrates	5,690	6,900 ^r	3,500	1,900 ^r	200
Argentina, concentrates	135,743 ^r	109,631 ^r	102,557 ^r	61,766 ^r	81,900
Armenia, concentrates	52,467 ^r	57,653 ^r	62,413 ^r	103,000 ^{r,c}	97,300 ^c
Australia:					
Concentrates	883,000 ^r	961,000 ^r	927,000 ^r	956,000 ^r	918,000
Leaching, electrowon	38,000	40,000 ^r	39,000 ^r	40,000 ^r	30,000
Total	921,000 ^r	1,001,000 ^r	966,000 ^r	996,000 ^r	948,000
Azerbaijan, concentrates	502	329 ^r	675 ^r	969 ^r	1,940
Bolivia:					
Concentrates	5,400	5,500 ^r	7,700 ^r	6,400 ^r	5,000
Leaching, electrowon	3,200 ^r	2,100 ^r	3,100 ^r	3,100 ^r	3,000
Total	8,600 ^r	7,600 ^r	10,800 ^r	9,500 ^r	8,000
Botswana, concentrates	35,768 ^r	51,254 ^r	38,000	9,126 ^r	13,200
Brazil:					
Concentrates	223,141	270,979 ^r	301,197 ^r	359,848 ^r	335,000
Leaching, electrowon	4,374	4,060	700	--	--
Total	227,515	275,039 ^r	301,897 ^r	359,848 ^r	335,000
Bulgaria, concentrates	78,653 ^r	75,307 ^r	72,419 ^r	71,748 ^r	70,573
Burma, leaching, electrowon	19,000	25,000	33,200	46,900	75,000
Canada:					
Concentrates	580,082 ^r	652,595 ^r	672,729 ^r	697,322 ^r	707,600
Leaching, electrowon ^c	1,000 ^r	--	1,000	1,000	--
Total	581,082 ^r	652,595 ^r	673,729 ^r	698,322 ^r	707,600
Chile:					
Concentrates	3,405,100	3,843,100	3,917,100 ^r	3,993,700 ^r	3,892,300
Leaching, electrowon	2,028,800	1,932,900	1,844,000	1,778,400	1,660,300
Total	5,433,900	5,776,000	5,761,100 ^r	5,772,100 ^r	5,552,600
China:					
Concentrates	1,550,000	1,680,000	1,740,000	1,670,000	1,850,700
Leaching, electrowon	25,300 ^r	33,900 ^r	40,000	39,400 ^r	45,000
Total	1,575,300 ^r	1,713,900 ^r	1,780,000	1,709,400 ^r	1,895,700
Colombia, concentrates	858 ^r	725 ^r	4,118 ^r	5,463 ^r	8,500
Congo (Kinshasa):^c					
Concentrates	187,000	285,000	152,000	140,000	167,000
Leaching, electrowon	473,000	685,000	878,000	856,000 ^r	679,000
Total	660,000	970,000	1,030,000	996,000 ^r	846,000
Cyprus, leaching, electrowon	4,328	3,631	3,088 ^r	2,121 ^r	1,700
Dominican Republic, concentrates	11,737	10,379	9,262 ^r	7,324 ^r	9,800
Eritrea, concentrates	--	21,800	88,900	61,600	25,300
Finland, concentrates	25,500	38,800	42,800	41,100	47,500
Georgia, concentrates ^c	7,400	5,000	5,000 ^r	6,500 ^r	7,700
India, concentrates	34,000	34,800 ^r	26,700 ^r	29,900 ^r	30,500
Indonesia:					
Concentrates	398,200 ^r	509,200 ^r	376,000 ^r	577,300 ^r	715,600
Leaching, electrowon	--	--	1,400	1,200	11,800
Total	398,200 ^r	509,200 ^r	377,400 ^r	578,500 ^r	727,400
Iran:					
Concentrates	233,000	209,200 ^r	203,900 ^r	233,400 ^r	275,900
Leaching, electrowon	12,500 ^r	13,700 ^r	12,700 ^r	13,000	13,400
Total	245,500 ^r	222,900 ^r	216,600 ^r	246,400 ^r	289,300
Kazakhstan:					
Concentrates	419,200	440,300 ^r	458,800	458,100 ^r	450,600
Leaching, electrowon	7,600 ^r	12,200	12,900 ^r	15,500 ^r	35,300
Total	426,800 ^r	452,500 ^r	471,700 ^r	473,600 ^r	485,900
Korea, North, concentrates ^c	16,000	17,000	19,300	20,000	20,000
Kyrgyzstan, concentrates	--	--	800	3,100	8,300

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	2012	2013	2014	2015	2016 ^p
Laos:					
Concentrates	63,285	64,885 ^r	71,155 ^r	78,449 ^r	89,200
Leaching, electrowon	86,295	90,030 ^r	88,541 ^r	89,253 ^r	78,500
Total	149,580	154,915^r	159,696^r	167,702^r	167,700
Macedonia:					
Concentrates	9,100	9,300	7,800	8,500	9,000
Leaching, electrowon	1,100	1,900	1,700	2,400	1,300
Total	10,200	11,200	9,500	10,900	10,300
Mauritania, concentrates	37,670	37,970	33,079^r	45,001^r	32,800
Mexico:					
Concentrates	330,000 ^r	318,000 ^r	338,200 ^r	378,900 ^r	529,000
Leaching, electrowon	157,900 ^r	162,100 ^r	188,400 ^r	215,700 ^r	223,400
Total	487,900^r	480,100^r	526,600^r	594,600^r	752,400
Mongolia:					
Concentrates	121,660 ^r	186,655 ^r	249,200 ^r	311,745 ^r	337,000
Leaching, electrowon	2,282 ^r	2,344 ^r	2,132 ^r	2,600 ^r	2,600
Total	123,942^r	188,999^r	251,332^r	314,345^r	339,600
Morocco, concentrates	17,700^r	10,172^r	16,579^r	18,292^r	18,000^e
Namibia:					
Concentrates	5,304 ^r	4,896 ^r	5,249 ^r	3,200 ^r	--
Leaching, electrowon	--	--	--	10,659	16,400
Total	5,304^r	4,896^r	5,249^r	13,859^r	16,400
Oman, concentrates^e	21,000	11,000	14,000	8,000	--
Pakistan, concentrates	19,211^r	13,500	13,122^r	13,056^r	14,100
Papua New Guinea, concentrates	125,348^r	105,524^r	75,907^r	42,894^r	80,000
Peru:					
Concentrates	1,197,569	1,285,983	1,293,842 ^r	1,627,727	2,280,005
Leaching, electrowon	101,174	89,658	83,800	73,091 ^r	73,854
Total	1,298,743	1,375,641	1,377,642^r	1,700,818^r	2,353,859
Philippines, concentrates	65,444	90,861	91,824^r	83,835^r	83,700
Poland, concentrates	427,064^r	429,275^r	421,695^r	426,196^r	424,300
Portugal, concentrates	74,043	77,236	75,433^r	83,081^r	76,600
Romania, concentrates	5,902^r	6,700	7,200	8,800^r	9,500
Russia:					
Concentrates	580,900 ^r	654,000 ^r	690,000 ^r	696,000 ^r	682,500
Leaching, electrowon ^e	2,000	2,000	2,000	2,000	2,000
Total	582,900^r	656,000^r	692,000^r	698,000^r	684,500
Saudi Arabia, concentrates	3,900^r	4,500^r	9,500^r	12,900^r	27,100
Serbia, concentrates	34,400	35,500^r	35,843^r	36,410^r	35,000
South Africa, concentrates	81,000	76,500	87,600	77,400	65,300
Spain:					
Concentrates	32,300 ^r	37,800 ^r	34,800	41,700	58,000
Leaching, electrowon	67,700	69,300	71,100	70,000	73,600
Total	100,000^r	107,100^r	105,900	111,700	131,600
Sweden, concentrates	82,422^r	82,904^r	79,681^r	75,600^r	79,000
Tanzania, concentrates	8,800	15,400	16,400	16,800	17,400
Turkey, concentrates	104,300^r	120,500^r	122,000	108,000^r	105,000
United States:³					
Concentrates	696,000	774,000	843,000	795,000	815,000
Leaching, electrowon	471,000	475,000	514,000	588,000	615,000
Total	1,170,000	1,250,000	1,360,000	1,380,000	1,430,000
Uzbekistan, concentrates	95,600	98,000^r	99,500^r	101,000^r	100,000^e
Vietnam, concentrates^e	12,700	12,300	12,100	12,300	12,300
Zambia:					
Concentrates	517,000	558,900 ^r	517,100 ^r	558,600 ^r	595,500
Leaching, electrowon	178,200 ^r	200,900 ^r	190,000 ^r	158,700 ^r	167,300
Total	695,200^r	759,800^r	707,100^r	717,300^r	762,800

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	2012	2013	2014	2015	2016 ^P
Zimbabwe, concentrates	6,300 ^e	8,285 ^r	8,261 ^r	8,218 ^r	9,100 ^e
Grand total	16,700,000 ^r	18,300,000	18,500,000 ^r	19,200,000 ^r	20,100,000
Of which:					
Concentrates	13,100,000 ^r	14,400,000	14,500,000 ^r	15,200,000 ^r	16,300,000
Leaching, electrowon	3,690,000 ^r	3,850,000	4,010,000	4,010,000 ^r	3,810,000

^eEstimated. ^PPreliminary. ^rRevised. -- Zero.

¹Table includes data available through August 29, 2017. All data are reported unless otherwise noted. Grand totals, U.S. data, and estimated data are rounded to no more than three significant digits; may not add to totals shown.

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

³Recoverable copper content.

TABLE 21
COPPER: WORLD SMELTER PRODUCTION, BY COUNTRY OR LOCALITY^{1,2}

(Metric tons)

Country or locality	2012	2013	2014	2015	2016 ^p
Armenia, primary	10,075	10,771	9,814 ^r	11,601 ^r	12,800
Australia, primary	422,000	446,000	468,000	433,000 ^r	448,000
Austria, secondary	72,000 ^r	61,000 ^r	56,000 ^r	60,000	60,000
Belgium, secondary	118,600	150,600	143,100 ^r	141,000 ^r	143,800
Botswana, primary ³	17,625	21,300	14,628 ^r	13,888 ^r	13,120
Brazil:					
Primary	128,100 ^r	202,900 ^r	182,800 ^r	157,800 ^r	188,500
Secondary	46,800 ^r	54,000 ^r	50,500 ^r	42,400 ^r	27,000
Total	174,900 ^r	256,900 ^r	233,300 ^r	200,200 ^r	215,500
Bulgaria:					
Primary	269,100 ^r	294,000	324,000 ^r	296,100 ^r	252,300
Secondary	56,100 ^r	60,300 ^r	57,000 ^r	52,300 ^r	44,500
Total	325,200 ^r	354,300 ^r	381,000 ^r	348,400 ^r	296,800
Canada:					
Primary	287,051	254,509 ^r	288,699 ^r	281,416 ^r	304,300
Secondary	23,362	28,743 ^r	32,069 ^r	28,713 ^r	29,200
Total	310,413	283,252 ^r	320,768 ^r	310,129 ^r	333,500
Chile, primary	1,342,400	1,358,300	1,356,200	1,496,200	1,490,800
China:					
Primary	3,600,000 ^r	4,230,000 ^r	5,170,000 ^r	5,500,000	5,800,000
Secondary	1,150,000 ^r	1,300,000 ^r	1,350,000 ^r	1,380,000	1,410,000
Total	4,750,000 ^r	5,530,000 ^r	6,520,000 ^r	6,880,000	7,210,000
Finland:					
Primary	150,000 ^r	154,500 ^r	169,000 ^r	166,500 ^r	150,000
Secondary	4,000 ^r	3,700 ^r	4,000 ^r	4,000 ^r	4,000
Total	154,000 ^r	158,200 ^r	173,000 ^r	170,500 ^r	154,000
Germany:					
Primary	352,400	289,900 ^r	349,700 ^r	349,700 ^r	342,800
Secondary	182,000	169,000 ^r	179,000 ^r	170,000 ^r	159,100
Total	534,400	458,900 ^r	528,700 ^r	519,700 ^r	501,900
India:					
Primary	680,000	617,000 ^r	766,000 ^r	792,600 ^r	769,800
Secondary	--	--	--	--	3,500
Total	680,000	617,000	766,000	792,600	773,300
Indonesia, primary	207,000 ^r	215,000 ^r	236,900	199,700	255,700
Iran:					
Primary	173,100 ^r	154,600 ^r	156,500 ^r	153,500 ^r	153,400
Secondary	96,000 ^r	69,500 ^r	76,000 ^r	82,100 ^r	72,200
Total	269,100 ^r	224,100 ^r	232,500 ^r	235,600 ^r	225,600
Japan:					
Primary	1,304,916 ^r	1,249,332 ^r	1,290,640 ^r	1,175,101 ^r	1,138,000
Secondary	303,900	313,636 ^r	310,029 ^r	296,486 ^r	358,700
Total	1,608,816 ^r	1,562,968 ^r	1,600,669 ^r	1,471,587 ^r	1,496,700
Kazakhstan, primary	302,183 ^r	269,220 ^r	214,058 ^r	309,355 ^r	310,001
Korea, North:^c					
Primary	10,000	10,000	10,000	10,000	10,000
Secondary	5,000	5,000	5,000	5,000	5,000
Total	15,000	15,000	15,000	15,000	15,000
Korea, Republic of:					
Primary	477,300	478,800	500,000	511,200 ^r	510,000 ^c
Secondary	144,500	125,100	120,000	125,000 ^r	125,000 ^c
Total	621,800	603,900	620,000	636,200 ^r	635,000 ^c
Mexico:					
Primary	260,900 ^r	220,800 ^r	258,000	256,300 ^r	267,800
Secondary ^e	5,000	5,000	5,000	5,000	5,000
Total	265,900 ^r	225,800 ^r	263,000	261,300 ^r	272,800

See footnotes at end of table.

TABLE 21—Continued
COPPER: WORLD SMELTER PRODUCTION, BY COUNTRY OR LOCALITY^{1,2}

(Metric tons)

Country or locality	2012	2013	2014	2015	2016 ^P
Namibia, primary	39,800	38,100	49,600	49,027 ^r	41,100
Oman, primary ^c	12,000	12,000	12,000	12,000	12,000
Peru, primary	290,088	412,966 ^r	314,615 ^r	327,909 ^r	309,469
Philippines, primary	97,000	181,900	153,200 ^r	189,200 ^r	215,000
Poland:					
Primary	466,715 ^r	458,789 ^r	503,111 ^r	514,774 ^r	446,902
Secondary	82,297 ^r	78,009 ^r	72,585 ^r	67,624 ^r	60,369
Total	549,012 ^r	536,798 ^r	575,696 ^r	582,398 ^r	507,271
Russia:					
Primary	621,200 ^r	625,000	643,000 ^r	641,000 ^r	665,000
Secondary	253,800 ^r	255,000	227,000 ^r	226,000 ^r	202,000
Total	875,000	880,000	870,000 ^r	867,000 ^r	867,000
Serbia:					
Primary	32,200 ^r	33,300 ^r	30,700 ^r	43,000	70,000
Secondary	2,500 ^r	3,200 ^r	2,500 ^r	1,000 ^r	1,000
Total	34,700 ^r	36,500 ^r	33,200 ^r	44,000 ^r	71,000
Slovakia, secondary	41,713 ^r	18,458 ^r	23,328 ^r	11,400 ^r	43,000
South Africa, primary	62,300	69,700	71,700	71,800	68,700
Spain:					
Primary	270,000	212,000	285,400 ^r	286,300 ^r	292,300
Secondary	25,000	12,300 ^r	8,700 ^r	6,900 ^r	4,600
Total	295,000	224,300 ^r	294,100	293,200 ^r	296,900
Sweden:					
Primary	151,100 ^r	137,200 ^r	145,300 ^r	137,400 ^r	131,500
Secondary	56,200 ^r	61,900 ^r	65,200 ^r	61,800 ^r	62,200
Total	207,300 ^r	199,100 ^r	210,500 ^r	199,200 ^r	193,700
Turkey:					
Primary	35,500	35,800	40,600	45,400	46,200
Secondary ^c	5,000	5,000	5,000	5,000	5,000
Total	40,500	40,800	45,600	50,400	51,200
United States, primary	485,000	516,000	522,000	527,000	563,000
Uzbekistan, primary	96,000	98,000	100,000 ^c	100,000 ^c	100,000 ^c
Vietnam, primary ^c	8,000	8,000	8,000	8,000	8,000
Zambia, primary	519,200 ^r	520,300 ^r	525,800 ^r	648,800 ^r	698,100
Grand total	15,900,000 ^r	16,600,000 ^r	18,000,000 ^r	18,500,000	18,900,000
Of which:					
Primary	13,200,000 ^r	13,800,000 ^r	15,200,000 ^r	15,700,000	16,100,000
Secondary	2,670,000 ^r	2,780,000 ^r	2,790,000 ^r	2,770,000 ^r	2,830,000

^cEstimated. ^PPreliminary. ^rRevised. -- Zero.

¹Table includes data available through August 29, 2017. All data are reported unless otherwise noted. Grand totals, U.S. data, and estimated data are rounded to no more than three significant digits; may not add to totals shown.

²To the extent possible, primary and secondary output of each country is shown separately. In some cases, total smelter production is officially reported, but the distribution between primary and secondary has been estimated.

³Copper content of nickel-copper-cobalt matte.

TABLE 22
COPPER: WORLD REFINERY PRODUCTION, BY COUNTRY OR LOCALITY^{1,2}

(Metric tons)

Country or locality	2012	2013	2014	2015	2016 ^p
Argentina, secondary ^e	13,000	14,000	14,000	14,000	14,000
Australia, primary:					
Electrowon	38,000	40,000 ^r	39,000 ^r	40,000 ^r	30,000
Other	422,000	441,000 ^r	472,000 ^r	435,000 ^r	448,000
Total	460,000	481,000	511,000 ^r	475,000 ^r	478,000
Austria, secondary	113,578 ^r	82,842 ^r	83,190 ^r	102,859 ^r	103,200
Belgium:					
Primary	234,000 ^r	229,000 ^r	228,300	226,100	217,900
Secondary	158,000 ^r	158,000 ^r	159,000	152,500	148,800
Total	392,000 ^r	387,000 ^r	387,300	378,600	366,700
Bolivia, primary, electrowon	3,200 ^r	2,100 ^r	3,100 ^r	3,100 ^r	3,000
Brazil:					
Primary:					
Electrowon	4,374	4,060	700	--	--
Other	186,000 ^r	236,050 ^r	213,085 ^r	199,000 ^r	216,000 ^e
Total	190,374 ^r	240,110 ^r	213,785 ^r	199,000 ^r	216,000 ^e
Secondary	24,700	25,900 ^r	23,600 ^r	42,500 ^r	27,000 ^e
Total, primary and secondary	215,074 ^r	266,010 ^r	237,385 ^r	241,500 ^r	243,000 ^e
Bulgaria:					
Primary	201,700 ^r	204,600 ^r	208,300 ^r	204,700 ^r	191,400
Secondary ^c	25,000	25,000	25,000	25,000	25,000
Total	226,700 ^r	229,600 ^r	233,300 ^r	229,700 ^r	216,400
Burma, primary, electrowon	19,000	25,000 ^r	33,200	46,900	75,000
Canada:					
Primary:					
Electrowon ^c	1,000 ^r	--	1,000 ^r	1,000 ^r	--
Other	252,000 ^r	292,200	292,900 ^r	301,300 ^r	284,400
Total	253,000 ^r	292,200	293,900 ^r	302,300 ^r	284,400
Secondary	24,000 ^r	29,300 ^r	32,500 ^r	29,100 ^r	30,000
Total, primary and secondary	277,000 ^r	321,500 ^r	326,400 ^r	331,400 ^r	314,400
Chile, primary:					
Electrowon	2,028,800	1,932,900	1,844,000	1,778,400	1,660,300
Other	873,200	822,000	885,400	910,000	952,700
Total	2,902,000	2,754,900	2,729,400	2,688,400	2,613,000
China:					
Primary:					
Electrowon	25,300 ^r	33,900 ^r	40,000	39,400 ^r	45,000 ^e
Other	3,905,000 ^r	4,656,000 ^r	4,780,000	4,921,000 ^r	5,410,000 ^e
Total	3,930,300 ^r	4,689,900 ^r	4,820,000	4,960,400 ^r	5,455,000 ^e
Secondary	1,950,000 ^r	1,980,000	2,830,000	3,000,000	2,880,000 ^e
Total, primary and secondary	5,880,300 ^r	6,669,900 ^r	7,650,000	7,960,400 ^r	8,335,000 ^e
Congo (Kinshasa), primary: ^c					
Electrowon	473,000	685,000	878,000	856,000 ^r	679,000
Other	25,000	35,000	40,000	40,000	40,100
Total	498,000	720,000	918,000	896,000	719,000
Cyprus, primary, electrowon	4,328	3,631	3,088 ^r	2,121 ^r	1,700
Egypt, secondary	130,000 ^r	135,000 ^r	143,026 ^r	145,000 ^r	145,000 ^e
Finland:					
Primary	126,500 ^r	120,800 ^r	132,000 ^r	127,900 ^r	132,100
Secondary	4,000 ^r	3,700 ^r	4,000 ^r	4,000 ^{r,c}	4,000 ^e
Total	130,500 ^r	124,500 ^r	136,000 ^r	131,900 ^r	136,100
Germany:					
Primary	390,000	390,000	389,000 ^r	397,200	393,400
Secondary	295,700	287,600	285,000	281,000	278,000
Total	685,700	677,600	674,000 ^r	678,200	671,400
India, primary	695,400	617,000	766,000	791,900	769,800

See footnotes at end of table.

TABLE 22—Continued
COPPER: WORLD REFINERY PRODUCTION, BY COUNTRY OR LOCALITY^{1,2}

(Metric tons)

Country or locality	2012	2013	2014	2015	2016 ^P
Indonesia, primary:					
Electrowon	--	--	1,400	1,200	11,800
Other	207,000	215,000	231,800	198,400	249,000
Total	207,000	215,000	233,200	199,600	260,800
Italy, secondary	2,000	4,900	7,900	7,300	6,600
Iran:					
Primary:					
Electrowon	12,500 ^r	13,700 ^r	12,700 ^r	13,000	13,400
Other	138,300 ^r	123,100 ^r	124,000 ^r	113,900 ^r	127,700
Total	150,800 ^r	136,800 ^r	136,700 ^r	126,900 ^r	141,100
Secondary	75,600 ^r	54,500 ^r	60,800 ^r	59,900 ^r	59,700
Total, primary and secondary	226,400 ^r	191,300 ^r	197,500 ^r	186,800 ^r	200,800
Japan:					
Primary	1,270,914 ^r	1,210,242 ^r	1,296,641 ^r	1,243,072 ^r	1,259,426
Secondary	245,440 ^r	257,900	257,583 ^r	240,059 ^r	293,595
Total	1,516,354 ^r	1,468,142 ^r	1,554,224 ^r	1,483,131 ^r	1,553,021
Kazakhstan, primary:					
Electrowon	7,600 ^r	12,200	12,900 ^r	15,500 ^r	35,300
Other	367,161 ^r	352,061	294,808 ^r	394,641 ^r	395,000 ^c
Total	374,761 ^r	364,261	307,708 ^r	410,141 ^r	430,000 ^c
Korea, North: ^c					
Primary	10,000 ^r	10,000 ^r	10,000 ^r	10,000 ^r	10,000
Secondary	5,000	5,000	5,000	5,000	5,000
Total	15,000	15,000	15,000	15,000	15,000
Korea, Republic of:					
Primary	493,200	495,400	491,200 ^r	515,300 ^r	522,400
Secondary	96,200	109,800	110,500 ^r	134,400 ^r	124,800
Total	589,400	605,200	601,700 ^r	649,700 ^r	647,200
Laos, primary, electrowon	86,295	90,030 ^r	88,541 ^r	89,253 ^r	78,500
Macedonia, primary, electrowon	1,100	1,900	1,700	2,400 ^r	1,300
Mexico:					
Primary:					
Electrowon	157,900 ^r	162,100 ^r	188,400 ^r	215,700 ^r	223,400
Other	214,000 ^r	188,000	204,300 ^r	213,400 ^r	224,200
Total	371,900 ^r	350,100 ^r	392,700 ^r	429,100 ^r	447,600
Secondary ^c	5,000	5,000	5,000	5,000	5,000
Total, primary and secondary	376,900 ^r	355,100 ^r	397,700 ^r	434,100 ^r	452,600
Mongolia, primary, electrowon	2,282 ^r	2,344 ^r	2,132 ^r	2,600 ^r	2,600
Namibia, primary, electrowon	--	--	--	10,659	16,400
Norway, primary	37,900	37,461 ^r	35,800	35,500	28,100
Oman, primary ^c	12,000 ^r	12,000 ^r	12,000 ^r	12,000 ^r	12,000
Peru, primary:					
Electrowon	101,174	89,658	83,800	73,091 ^r	73,854
Other	210,119	271,792	263,597 ^r	279,869 ^r	257,470
Total	311,293	361,450	347,397 ^r	352,960 ^r	331,324
Philippines, primary	90,400	153,000	130,000	153,000 ^r	190,000
Poland:					
Primary	457,700 ^r	450,700 ^r	469,100	471,500 ^r	429,000
Secondary	108,100 ^r	114,500	107,800	102,800 ^r	106,600
Total	565,800 ^r	565,200 ^r	576,900	574,300	535,600
Russia:					
Primary:					
Electrowon ^c	2,000	2,000	2,000	2,000	2,000
Other	653,900 ^r	658,500 ^r	669,900 ^r	660,600 ^r	663,800
Total	655,900 ^r	660,500 ^r	671,900 ^r	662,600 ^r	665,800
Secondary	233,500 ^r	215,100 ^r	219,400 ^r	213,700 ^r	201,500
Total, primary and secondary	889,400 ^r	875,600 ^r	891,300 ^r	876,300 ^r	867,300

See footnotes at end of table.

TABLE 22—Continued
COPPER: WORLD REFINERY PRODUCTION, BY COUNTRY OR LOCALITY^{1,2}

(Metric tons)

Country or locality	2012	2013	2014	2015	2016 ^P
Serbia:					
Primary	32,229	32,606	31,584 ^r	42,729 ^r	70,000
Secondary	2,473	3,234	1,591 ^r	1,917 ^r	1,000
Total	34,702	35,840	33,175 ^r	44,646 ^r	71,000
South Africa, primary	66,416	80,821	78,697^r	77,360^r	66,257
Spain:					
Primary:					
Electrowon	67,700	69,300	71,100	70,000	73,600
Other	250,500 ^r	213,500 ^r	274,300 ^r	278,300 ^r	281,600
Total	318,200 ^r	282,800 ^r	345,400 ^r	348,300 ^r	355,200
Secondary	88,300	68,200	73,100 ^r	71,600 ^r	74,200
Total, primary and secondary	406,500 ^r	351,000 ^r	418,500 ^r	419,900 ^r	429,400
Sweden:					
Primary	157,900 ^r	144,300 ^r	152,100 ^r	144,200 ^r	145,100
Secondary	56,200 ^r	61,900 ^r	65,200 ^r	61,800 ^r	62,200
Total	214,100 ^r	206,200 ^r	217,300 ^r	206,000	207,300
Turkey:					
Primary	76,300 ^r	64,000 ^r	61,300 ^r	74,000 ^r	57,000
Secondary ^e	10,000 ^r	10,000 ^r	10,000 ^r	10,000 ^r	7,000
Total	86,300	74,000 ^r	71,300 ^r	84,000 ^r	64,000
Ukraine, secondary^e	20,000	20,000	20,000	20,000	20,000
United States:					
Primary:					
Electrowon	471,000	475,000	514,000	588,000 ^r	615,000
Other	491,000	518,000	535,000	503,000	561,000
Total	962,000	993,000	1,050,000	1,090,000	1,180,000
Secondary	39,400	46,900	46,000	48,800	46,300
Total, primary and secondary	1,000,000	1,040,000	1,090,000	1,140,000	1,220,000
Uzbekistan, primary	95,600	98,000	99,000^e	100,000^e	100,000^e
Vietnam, primary^e	8,000	8,000	8,000	8,000	8,000
Zambia, primary:					
Electrowon	178,200 ^r	200,900 ^r	190,000 ^r	158,700 ^r	167,300
Other	344,000	327,200 ^r	288,800 ^r	312,800 ^r	230,600
Total	522,200 ^r	528,100 ^r	478,800 ^r	471,500 ^r	397,900
Zimbabwe, primary	2,869^r	3,360^r	3,300^r	--^r	--
Grand total	20,400,000^r	21,300,000^r	22,800,000^r	23,200,000^r	23,400,000
Of which:					
Primary:					
Electrowon	3,680,000 ^r	3,850,000 ^r	4,010,000	4,010,000 ^r	3,810,000
Other	13,000,000	13,700,000	14,200,000	14,400,000 ^r	14,900,000
Total	16,700,000	17,600,000 ^r	18,200,000	18,400,000 ^r	18,800,000
Secondary	3,730,000 ^r	3,720,000 ^r	4,590,000 ^r	4,780,000 ^r	4,670,000

^eEstimated. ^PPreliminary. ^rRevised. -- Zero.

¹Table includes data available through August 30, 2017. All data are reported unless otherwise noted. Grand totals, U.S. data, and estimated data are rounded to no more than three significant digits; may not add to totals shown.

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