USGS
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2015 Minerals Yearbook

COPPER [ADVANCE RELEASE]

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

October 2017

Copper

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In 2015, the United States remained the fourth-ranked mine producer of copper behind Chile, China, and Peru, and accounted for about 7% of global production (table 20). U.S. mine production of recoverable copper increased to 1.38 million metric tons (Mt), slightly greater than that of 2014, and the highest since 2000, when production was 1.45 Mt. The principal mining States for copper, in descending order of production, Arizona, New Mexico, Utah, Nevada, Montana, and Michigan, accounted for more than 99% of domestic production; copper was also recovered at mines in Idaho and Missouri. Although copper was recovered at 26 mines in the United States during 2015, 18 mines accounted for more than 99% of production (table 2). The remaining mines were either small leach operations or byproduct producers of copper.

Global mine production increased by 4% to 19.1 Mt. Chile's mined copper production was essentially unchanged and it remained the leading world producer. It accounted for 30% of global production and produced about 4 Mt more than the second-ranked producer, China, which accounted for 9% of global production. Peru was the third-ranked producer and accounted for 9% of global production. The remaining countries among the 10 leading producers were, in descending order of production, the United States, Congo (Kinshasa), Australia, Russia, Zambia, Canada, and Mexico. Fifty-two countries were known to have mined copper in 2015. The 10 leading producers accounted for 80% of production, and the 20 leading producers accounted for 95% of production (table 20).

Global smelter production increased by 4% in 2015 and refinery production rose slightly owing to across-the-board increases in primary electrolytic and electrowon and secondary refinery production. The United States ranked ninth in copper smelter production and accounted for 3% of world production (table 21). The United States accounted for 5% of world refined copper production and remained the fourth-leading producer behind China (35%), Chile (12%), and Japan (6%) (table 22).

In 2015, copper recovered from refined or remelted scrap in the United States totaled 805,000 metric tons (t) (about 79% from new scrap and 21% from old scrap) and accounted for 33% of the total U.S. copper supply. The conversion of new and old scrap to alloys and refined copper decreased by 5% and 4%, respectively (tables 1, 6). In addition to scrap consumed domestically, an additional 955,000 t of scrap (gross weight) was exported, the majority of which was thought to be old scrap (table 18). Copper scrap exports reached a record high of 1.2 Mt in 2011, which corresponded with the record-high annual average price for copper. 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 operations.

According to data compiled by the International Copper Study Group (ICSG) (2016a, p. 9, 19–20), global consumption of refined copper was essentially unchanged from that of 2014 at 23.0 Mt owing to lower growth in China relative to the previous year. In 2015, apparent consumption in China increased by 3% to about 11.4 Mt, accounting for 49% of global consumption, compared with an increase of 14% during 2014. 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. Consumption in the United States increased by 3% and accounted for 8% of total global consumption. On a regional basis, consumption in 2015 increased slightly in Asia (and remained unchanged if China is excluded), by 3% in North America, and slightly in the European Union. Consumption in Asia accounted for 66% of global consumption (17% excluding China), the European Union accounted for 14% of consumption, and North America accounted for 10%.

From 2005 to 2015, global consumption of refined copper increased by 38%, a compound annual growth rate of about 3% per year, with slight decreases in 2005 and 2008. Over the same time period, apparent refined copper consumption in China more than tripled, with a compound annual growth rate of about 12% per year. According to the ICSG, global consumption of refined copper exceeded production by 153,000 t in 2015. This was the sixth consecutive year that global consumption of refined copper was greater than global production. Despite the apparent production shortfall, reported global yearend inventories of refined copper increased by 13% to 1.52 Mt, about 7% of annual consumption of refined copper (International Copper Study Group, 2015, p. 25; 2016a, p. 9, 19–21).

In 2015, the average annual Commodity Exchange, Inc. (COMEX) spot price declined by about 20% to $2.51 per pound of copper. The average annual copper price reached a record-high $4.00 per pound in 2011 but has declined in each of the following years (table 1).

Production

Domestic Industry Structure.—Mine production of recoverable copper in the United States increased slightly to 1.38 Mt in 2015, although the value of production decreased by 18% to $7.81 billion. Production in Arizona increased by 8% but was partially offset by a 9% decrease in other States. The copper yield (the recoverable copper content per unit of ore mined) of ore concentrated in the United States was unchanged at 0.47% copper. Smelter production was essentially unchanged and electrolytically refined copper production decreased by 6%. Electrowon copper production from leach solutions increased by 15% and accounted for 43% and 52%, respectively, of mine and refinery production (table 1).

Domestic production data were based on information compiled from U.S. Geological Survey (USGS) monthly surveys sent to 26 mine producers of copper [including 15 solvent extraction–electrowinning (SX–EW) facilities], 3 copper smelters, and 3 electrolytic copper refineries. In 2015, responses were received from all of the mines, smelters, and refineries.

Operating Property Reviews.—In 2015, ASARCO LLC (Phoenix, AZ) produced a total of 163,000 t of copper at its three mines in Arizona and 125,000 t of electrolytically refined copper at its refinery in Amarillo, TX. The Ray Mine produced 47,100 t of copper in concentrate (62,500 t in 2014) and 28,000 t of electrowon copper (31,000 t in 2014). The Mission Mine produced 68,300 t of copper in concentrate (60,800 t in 2014), and the Silver Bell Mine produced 19,300 t (19,400 t in 2014) of electrowon copper (Grupo México, S.A.B. de C.V., 2016, p. 78–84). On August 28, 2015, ASARCO announced that the company planned to indefinitely shut down the Hayden concentrator and reduced electrowon production at the Ray Mine. Low copper prices were cited as the reason for the production cuts, which ASARCO said would equal about 30,400 metric tons per year (t/yr), or about 17% of the company's total production (ASARCO LLC, 2015).

The Pinto Valley Mine (Arizona), owned by Capstone Mining Corp. (Canada), produced 60,400 t of copper in concentrate and electrowon copper cathode from its residual leach operation. The mine lowered its cost of production to $1.97 per pound in 2015 from $2.03 per pound in 2014 (Capstone Mining Corp., 2016, p. 7).

Production of copper at Freeport-McMoRan Copper & Gold Inc.'s (FCX's; Phoenix, AZ) U.S. operations increased by 18% to 955,000 t from 813,000 t in 2014 and accounted for 69% of all recoverable copper production in the United States in 2015. Three FCX mines significantly increased production and accounted for the overall increase in output. In Arizona, combined copper in concentrate and electrowon production at the Morenci Mine increased by 31% to 481,000 t, and electrowon production at the Safford Mine increased by 45% to 91,600 t. In New Mexico, combined copper in concentrate and electrowon production at the Chino Mine increased by 26% to 142,000 t. Output at FCX's remaining mines decreased by a total of 27,700 t. Production decreased at the Bagdad Mine (Arizona) by 11% to 95,300 t, at the Miami Mine (Arizona) by 25% to 19,500 t, at the Tyrone Mine (New Mexico) by 11% to 38,100 t, at the Sierrita Mine (Arizona) by 3% to 85,700 t, and at other mines by 57% to 1,360 t (Freeport-McMoRan Copper & Gold Inc., 2016, p. 30).

The production increase at FCX's Morenci Mine was due to a project to expand mining and milling capacity of sulfide ores, which reached full production rates in the second quarter of 2015. The expanded mill began operations in May 2014, and at full production the expansion was projected to allow Morenci to produce an average of 454,000 t/yr of copper in concentrate and electrowon cathode from 2016 through 2020. The Safford and the Chino Mines increased production owing to higher ore grades (Freeport-McMoRan Copper & Gold Inc., 2016, p. 9, 93).

At Kennecott Utah Copper LLC's (Magna, UT) Bingham Canyon Mine, production of mined copper decreased by 55% to 92,000 t (204,000 t in 2014). Production was reduced owing to work to stabilize the east wall of the mine following a 130-Mt rock slide that occurred in April 2013. Production of refined copper at the Kennecott refinery decreased by 44% to 115,000 t in 2015 (204,000 t in 2014), and the company also processed 414,000 t of third-party concentrates, which were processed and returned to the owner. During 2015, Rio Tinto was in the early stages of a project to push back the south wall of the Bingham Canyon Mine to access an additional 510 Mt of ore reserves (Rio Tinto plc, 2016a, p. 34, 35, 215; 2016b, p. 4).

In 2015, production at KGHM International Ltd.'s (Canada) Robinson Mine (Nevada) increased to 56,800 t of copper in concentrate from 39,300 t in 2014 owing to higher ore grades. The cost of production at the Robinson Mine decreased to $1.40 per pound from $2.52 per pound in 2014. Mining at KGHM's Carlota Mine (Arizona) was completed in the fourth quarter of 2014, but leaching of stockpiled ore continued through 2015. Production for the Carlota Mine was not publicly reported by KGHM in 2015, but in 2014 the mine produced 10,400 t of electrowon copper cathode (KGHM International Ltd., 2015, p. 7, 10; KGHM Polska Miedź S.A., 2016, p. 142–143).

The Eagle nickel-copper mine, owned by Lundin Mining Corp. (Canada), near Marquette, MI, began commercial production in November 2014. In 2015, it produced 27,200 t of nickel (4,300 t in 2014) and 24,300 t of copper in concentrate (3,910 t in 2014). In 2016, Lundin Mining expected the Eagle Mine to produce 21,000 to 24,000 t of nickel and 20,000 to 23,000 t of copper in concentrate (Lundin Mining Corp., 2016, p. 4, 19).

Mercator Minerals Ltd. (Canada) halted mining operations at the Mineral Park Mine (Arizona) on December 29, 2014, owing to low copper prices. In January 2015, Origin Mining Co. LLC (Elko, NV) purchased the Mineral Park Mine from Mercator Minerals for $10 million and assumed $3.5 million of environmental obligations. Origin planned to keep the mine on care-and-maintenance status with a small amount of copper production from residual leaching until copper prices increased (Matson, 2015).

In June 2015, Hecla Mining Co. (Coeur d'Alene, ID) completed the acquisition of Revett Mining Co. (Spokane Valley, WA) for $20.1 million. Revett Mining owned the Troy silver-copper mine (Montana) and the Rock Creek silver-copper deposit (Montana). Output was suspended at the underground Troy Mine in December 2012 owing to concerns about geotechnical conditions, and Hecla Mining planned to permanently close the mine (Hecla Mining Co., 2016, p. 39; Revett Minerals, Inc., 2012).

In December, Excelsior Mining Corp. (Canada) completed the acquisition of Nord Resources Corp. (Tucson, AZ), which owned the Johnson Camp Mine in Arizona. Excelsior Mining intended to use the existing 11,300-t/yr SX–EW facilities at Johnson Camp to process materials from the Gunnison Copper Project (Arizona) that Excelsior Mining was developing 1 mile north of the Johnson Camp Mine. The mine plan for the Gunnison Copper Project as stated by Excelsior Mining involved three stages, the first of which was to produce 11,300 t/yr of copper cathode at the Johnson Camp Mine. In the second stage of development (year 4 of the mine life), a 22,700-t/yr SX–EW facility would be built at the Gunnison location for a total production capacity

of 34,000 t/yr. In the third stage (year 7 of the mine life), the company planned to double the production capacity of the Gunnison SX–EW facility, for a total production capacity of 56,700 t/yr. Excelsior Mining estimated that production from the Gunnison Mine could begin in mid-2018 (Excelsior Mining Corp., 2015; 2016, p. 18, 273).

Consumption

U.S. reported consumption of refined copper increased by 3% in 2015. Consumption by wire-rod mills, which accounted for 73% of reported consumption, increased by 4%, and consumption at brass mills, which accounted for 23% of consumption, was essentially unchanged (table 5). According to data compiled by the American Bureau of Metal Statistics Inc. (2016), domestic apparent consumption of wire rod was essentially unchanged at 1.26 Mt.

According to preliminary data from the Copper Development Association Inc. (2016, p. 18), the total shipments of copper and copper-alloy products to the U.S. market by fabricators (brass mills, foundries, powder producers, and wire mills), which included domestic product shipments and net imports, decreased by 3% to 2.32 Mt from 2.39 Mt in 2014. Since 2000, when shipments reached a record high of 4.34 Mt, shipments to the domestic market have trended downward, and shipments in 2015 were 47% below those in 2000. In 2015, domestic wire-mill products accounted for about 56% of total shipments to the domestic market; brass mill products, 37%; and foundry and powder products, 3%. Net imports, which also have trended downward from a peak of 6% market share in 2000, made up the remaining 4% of shipments. Shipments to the building construction sector, which remained the leading end-use market, decreased slightly and accounted for about 44% of shipments. Shipments to the transportation equipment sector (19% market share) were essentially unchanged, and shipments to the electric and electronic products sector (18% market share), to the consumer and general products sector (12% market share), and to the industrial machinery and equipment sector (7% market share), decreased by 4%, 6%, and 10%, respectively.

Prices and Stocks

In 2015, the average annual COMEX spot price declined for the fourth consecutive year, decreasing by about 20% to $2.51 per pound from $3.12 per pound in 2014 and by 37% from the record high of $4.00 per pound in 2011. The monthly average price in 2015 ranged from a high of $2.89 per pound in May to a low of $2.08 per pound in December. Daily prices ranged from a high of $2.95 per pound on May 12 to a low of $2.02 per pound on November 23. Total U.S. refined copper stocks increased by 10% during the year to 209,000 t at the end of December from 190,000 t at the beginning of January, mainly owing to an increase in COMEX stocks, which was partly offset by a drawdown of London Metal Exchange Ltd. (LME) stocks held in U.S. warehouses (table 1).

Copper scrap prices (table 13) generally followed the trend in refined copper prices, and scrap prices for various types of scrap decreased by 20% to 26%. According to American Metal Market price data, the discount for refiners' No. 2 scrap from the COMEX spot price averaged 28.4 cents per pound in 2015, essentially the same as the 28.6 cents per pound discount in 2014. In 2015, the refiners' No. 2 scrap discount ranged between 24.3 cents per pound in December and 31.6 cents per pound in May, and the refiners' No. 2 scrap price averaged $2.22 per pound, 22% less than in 2014.

Foreign Trade

Net imports of refined copper in 2015 were 600,000 t (686,000 t of imports and 86,500 t of exports), an increase of about 22% compared with 493,000 t (620,000 t of imports and 127,000 t of exports) in 2014 (tables 14, 16). Refined copper accounted for 95% of all unmanufactured copper imports and 9% of exports. Chile, Canada, and Mexico were the leading sources of refined copper imports in 2015, accounting for 52%, 28%, and 14%, respectively, of refined imports. Exports of copper ore and concentrate decreased by 5%, and exports of refined copper decreased by 32%. Mexico accounted for 82% of ore and concentrate exports, and Mexico and Canada accounted for 49% and 42%, respectively, of refined exports.

Copper scrap was the leading U.S. copper export, and combined copper-alloy and unalloyed scrap exports were greater in terms of quantity than all other unmanufactured copper exports combined (tables 14, 18). U.S. scrap exports decreased by 9% to a total of 955,000 t (426,000 t of unalloyed copper scrap and 529,000 t of copper-alloy scrap) in 2015 compared with 1.04 Mt (430,000 t of unalloyed copper scrap and 614,000 t of copper-alloy scrap) in 2014. The decrease in copper scrap exports was mainly owing to a 65,500-t (9%) decrease in exports to China. Exports to Germany and Hong Kong also decreased by 12,200 t (22%) and 11,300 t (33%), respectively. In 2011, total scrap exports reached a record high of 1.24 Mt, with 941,000 t of those exports going to China. Based on global import data for 2015, China was the recipient of 56% of the reported 6.58 Mt of global copper scrap trade (Brininstool, 2015; International Copper Study Group 2016a, p. 40–41).

According to U.S. Census Bureau data compiled by the Copper and Brass Fabricators Council Inc., U.S. imports of copper and copper-alloy semifabricated products (excluding wire-rod mill products) were 220,000 t in 2015 (8% less than those in 2014), exports were 111,000 t (a 4% decrease from those in 2014), and the resulting net imports decreased by about 12% to 109,000 t. The leading import sources were Germany (24%), the Republic of Korea (15%), Mexico (12%), Canada (10%), and Peru (6%). The leading export destinations were Mexico (40%), Canada (26%), and the Republic of Korea (2%) (Copper and Brass Fabricators Council Inc., 2016, p. 1–9).

World Review

World mine production of copper increased by 4% in 2015 from that in 2014 to a record-high 19.1 Mt (table 20). According to data compiled by the ICSG (2016a, p. 9), global mine capacity increased by 1.06 Mt (5%) to 22.6 million metric tons per year (Mt/yr) in 2015 from 21.5 Mt/yr in 2014, and by 3.37 Mt (18%) from 19.2 Mt/yr in 2010. Based on ICSG production and capacity data, worldwide capacity utilization at copper-producing mines worldwide decreased to 84.8% in 2015 from 85.7% in 2014.

Chile was the leading producer of mined copper in 2015 and produced 5.76 Mt, or 30% of total world production, followed by China, 1.71 Mt (9%); Peru, 1.70 Mt (9%); and the United States, 1.38 Mt (7%). Significant production increases took place in Peru, where total mined copper production increased by 321,000 t (23%); Indonesia, by 201,000 t (54%); Mexico, by 79,000 t (15%); Mongolia, by 63,000 t (25%); and Brazil, by 46,000 t (15%). Significant decreases in production took place in China, where output declined by 70,000 t (4%) and Argentina, by 40,800 t (40%) (table 20).

In 2015, world production of refined copper increased slightly to 23.0 Mt owing to increases in both primary and secondary production (table 22). Production of refined copper from electrowinning was essentially unchanged, from electrolytic and fire refining (other primary) increased slightly, and production from secondary refining (from scrap) increased by 5%. China was the leading producer of refined copper in 2015 and produced 7.96 Mt, or 35% of global production, followed by Chile, 2.69 Mt (12%); Japan, 1.48 Mt (6%); the United States, 1.14 Mt (5%); and Congo (Kinshasa), 878,000 t (4%). Most of the growth in refined copper production was in China, where total refined copper production increased by 310,000 t (4%); Kazakhstan, which increased production by 100,000 t (33%); the Republic of Korea, by 49,000 t (8%); and the United States, by 46,300 t (4%). Significant decreases in refined copper production took place in Japan, where output declined by 71,000 t (5%); Chile, by 41,000 t (2%); and Indonesia, by 33,600 t (14%).

According to ICSG data, world apparent consumption of refined copper rose slightly to a record-high 23.0 Mt in 2015 from 22.9 Mt in 2014. Stocks held on the more visible commodity exchanges (COMEX, LME, SHFE) increased by about 57% to 482,000 t from 306,000 t in 2014. ICSG estimates of total reported stocks (exchanges and industry) increased by 13% to 1.52 Mt from 1.35 Mt in 2014 owing to the increase in exchange stocks. Producer, merchant, and consumer stocks were essentially unchanged (International Copper Study Group 2016a, p. 19–21).

Argentina.—Mine production at Argentina's only copper mine, the Alumbrera Mine (Glencore plc, 50%; Goldcorp Inc., 37.5%; Yamana Gold Inc., 12.5%), decreased by 40% to 61,800 t from 103,000 t in 2014. Goldcorp cited higher gypsum content of ore, lower grindability of ore, and high stripping activity at the Bajo el Durazno pit as the reasons for the decrease in production (Goldcorp Inc., 2016, p. 38–39).

Brazil.—Copper mine production in Brazil increased significantly owing to a 58% increase in copper output at the Salobo Mine (Vale S.A.) to 155,000 t from 98,000 t in 2014. Vale completed a mine and concentrator expansion project at Salobo in the first half of 2014, which doubled the mine's production capacity of copper in concentrate to 200,000 t/yr (Vale S.A., 2015, p. 20; 2016, p. 45, 47).

Chile.—Since 1982, Chile has been the leading world producer of mined copper and in 2015 accounted for 30% of global mine output. The National Copper Corporation of Chile (Codelco), a Chilean state-owned company, operated seven mines that produced a combined total of 1.7 Mt of mined copper and accounted for 30% of total mined copper production in Chile. The Escondida Mine (BHP Billiton Ltd., 57.5%; Rio Tinto plc, 30%; consortiums of Japanese companies, 12.5%) produced 1.15 Mt of mined copper and accounted for 20% of total mined copper production in Chile. The rest of Chile's mined copper output came from 17 other mines. The Ministro Hales Mine (Codelco), which began production in 2013, ramped up production by 69% to 238,000 t in 2015 from 141,000 t in 2014. In its second year of production, the Sierra Gorda Mine (KGHM International Ltd., 55%; Sumitomo Metal Mining, 31.5%; Sumitomo Corp., 13.5%) increased output to 87,900 t from 12,700 t in 2014. These production increases were partially offset by smaller decreases in output at a number of mines. Refined copper production decreased by 2% (41,000 t) to 2.69 Mt owing to a 4% decrease in electrowon production, which was partially offset by a 3% increase in electrolytically refined copper production (BHP Billiton Ltd., 2016, p. 81; Comisión Chilena del Cobre, 2016; Jolly, 1987, p. 373–374).

China.—Mined copper output in China decreased by 4% in 2015 compared with that of 2014 as mines with higher production costs reduced output after copper prices fell midway through 2015. Smelter and refined copper production, however, increased by 6% and 4%, respectively, owing to increases in smelting capacity during the previous years. In 2014, China reportedly added 650,000 t/yr of smelting capacity and 900,000 t/yr of refining capacity, with total capacities reaching 6.55 Mt/yr and 9.86 Mt/yr, respectively. Imports of copper ores and concentrates into China increased to 13.3 Mt (3.7 Mt of contained copper) from 11.8 Mt (3.3 Mt of contained copper) in 2014. China also imported 3.66 Mt of copper and copper-alloy scrap (3.9 Mt in 2014), 3.68 Mt of refined copper (3.6 Mt in 2014), and 530,000 t of copper blister and anodes (585,000 t in 2014) (Copper Monthly, 2015, p. 5–6; 2016, p. 2; International Copper Study Group, 2016a, p. 24–28, 40).

In response to falling copper prices, 10 leading Chinese copper producers agreed to cut refined copper production in 2016 by 350,000 t. The copper producers also announced that they would close high-cost and outdated operations over the next several years and proposed that the Government of China undertake programs to support the copper industry, such as purchasing surplus copper production and suspending the issuance of licenses for new copper smelters (Xie, 2015).

Indonesia.—Mine production in Indonesia increased by 54% owing to increased production at PT Freeport Indonesia's (PT–FI's) (FCX, 90.64%; Government of Indonesia, 9.36%) mines in the Grasberg minerals district and at PT Newmont Nusa Tenggara's (PTNNT's) [Newmont Mining Corp. (Denver, CO), 31.5%; Sumitomo Corp. (Japan), 24.5%; PT Multi Daerah Bersaing, 24%; PT Pukuafu Indah, 17.8%; and PT Indonesia Masbaga Investama, 2.2%] Batu Hijau Mine (Freeport-McMoRan Copper & Gold Inc., 2016, p. 19; Newmont Mining Corp., 2016, p. 37).

PT–FI increased production by 16% in 2015 from that of 2014 to 341,000 t of recoverable copper (295,000 t in 2014 and 421,000 t in 2013). Production was interrupted in 2014 in response to a Government-imposed export tax. Total contained copper production at PT–FI was slightly higher and is what was used when calculating Indonesia's total concentrate production in table 20. In January 2014, the Government of Indonesia

announced that exports of copper concentrate would be banned beginning in January 2017 and, from that time on, copper concentrates would need to be processed into metal before being exported. It was also announced that before January 2017, a gradually increasing export duty would be applied to copper concentrate. FCX claimed that the new export restrictions were a violation of PT–FI's Contract of Work and PT–FI halted exports of copper concentrate and operated at about one-half of its production capacity from January through July 2014, when a memorandum of understanding (MOU) between PT–FI and the Government of Indonesia was signed. As part of the MOU, PT–FI agreed to develop new copper smelting capacity in Indonesia and provided a $115 million assurance bond to go towards the development of a copper smelter. PT–FI was required to renew its export permits every 6 months and also agreed to pay concentrate export duties of 7.5%, which would decline to 5% when smelter development progress exceeded 7.5%, and no export duties once smelter development exceeded 30%. PTNNT more than tripled mined copper output to 224,000 t in 2015 (71,000 t in 2014 and 73,000 t in 2013) mainly owing to higher ore grades as the company accessed phase 6 ore for the first full year and higher metal recovery and throughput. Production was also negatively affected in 2014 by the export restrictions mentioned above (Freeport-McMoRan Copper & Gold Inc., 2016, p. 19–20, 30; Newmont Mining Corp., 2016, p. 74–75).

In April 2014, Finders Resources Ltd. (Australia) commissioned a 3,000-t/yr SX–EW demonstration plant on Wetar Island and was in the process of building a 25,000-t/yr SX–EW facility. By yearend 2014, Finders Resources produced 1,400 t of copper at Wetar, and in 2015 it produced 1,200 t. The company projected that the mine would produce 155,000 t of cathodes over a 10.5-year mine life (Finders Resources Ltd., 2016, p. 6).

In 2015, electrolytically refined copper production at PT Smelting (Mitsubishi Materials Corp., 60.5%; PT–FI, 25%; Mitsubishi Corporation Unimetals Ltd, 9.5%; JX Nippon Mining and Metals Corp., 5%), which was Indonesia's only electrolytic refinery, decreased by 14% to 198,000 t from 232,000 t in 2014. Operations at PT Smelting were suspended from July to September 2015 for maintenance work and, once production restarted, output was only 80% of capacity until November so that repairs could be made to an acid plant cooling tower (Freeport-McMoRan Copper & Gold Inc., 2016, p. 25).

Kazakhstan.—The 100,000-t (33%) increase in refinery production in Kazakhstan was thought to be a result of increased refinery production at the Zhezkazgan refinery, although reported production data were not available for that refinery for 2015. In October 2014, Kazakhmys plc (United Kingdom) completed restructuring that included selling some of its assets in Kazakhstan, including the Zhezkazgan refinery, to Cuprum Holding (the Netherlands). At that time, Kazakhmys changed its name to KAZ Minerals plc (Kazakhmys plc, 2014).

Mexico.—Mine production in Mexico increased by 15% in 2015 owing to a 16% increase in copper in concentrate production and a 14% increase in electrowon production. The Buenavista Mine (Southern Copper Corp.) increased copper in concentrate output by 22% to 162,000 t and electrowon output by 31% to 123,000 t in 2015 and accounted for 58,000 t of the 79,000 t increase in total mine production in Mexico. Production increased at Buenavista as a result of a capital investment program, which added a third SX–EW plant in June 2014 and a new concentrator that began production in September 2015 (Southern Copper Corp., 2016, p. 28, 41, 70).

Mongolia.—Mine production in Mongolia increased by 25% to an estimated 314,000 t from an estimated 251,000 t in 2014 owing mostly to an increase in copper output at the Oyu Tolgoi copper-gold mine [Turquoise Hill Resources Ltd., 66%; Erdenes Oly Tolgoi LLC (Government of Mongolia), 34%]. Oyu Tolgoi produced 202,000 t of copper in 2015, 36% more than that in 2014 as the mine continued to ramp up production. Turquoise Hill forecast the mine's copper production to range between 175,000 and 195,000 t in 2016 (Turquoise Hill Resources Ltd., 2016, p. 4, 12–13).

Peru.—Mine production in Peru increased by 23% (321,000 t) to 1.7 Mt. The Antamina Mine (BHP Billiton, 33.75%; Glencore, 33.75%; Teck Resources Ltd., 22.5%; Mitsubishi Corp., 10%) increased copper in concentrate production by 13% to 391,000 t in 2015 from 345,000 t in 2014 owing to higher mill throughput. Output of copper in concentrate at the Antapaccay Mine (Glencore) increased by 21% to 202,000 t in 2015 from 167,000 t in 2014 owing to the restart of the Tintaya mill in May 2015. The Cerro Verde Mine (FCX, 53.56%; SMM Cerro Verde Netherlands B.V., 21.0%; Compania de Minas Buenaventura S.A.A., 19.58%; other shareholders, 5.86%) increased production of combined copper in concentrate and electrowon copper by 9% to 247,000 t from 227,000 t in 2014 owing to the completion of a mine expansion project in September 2015. The Toromocho Mine (Chinalco Mining Corporation International), which was commissioned in 2013, ramped up production of copper in concentrate by 159% to 182,000 t of copper in concentrate in 2015 compared with 70,300 t in 2014 (Chinalco Mining Corporation International, 2015, p. 12; 2016, p. 12; Freeport-McMoRan Copper & Gold Inc., 2016, p. 17; Glencore plc, 2016, p. 54, 186; Teck Resources Ltd., 2016, p. 15).

The Constancia Mine (HudBay Minerals Inc.) began commercial production in the second quarter of 2015 and produced 106,000 t of copper concentrate by yearend. HudBay purchased the Constancia project in 2011, and the company projected that the mine would produce an average of 82,000 t/yr of copper in concentrate over a mine life of 22 years (HudBay Minerals Inc., 2016a, p. 28; 2016b).

Outlook

Based on preliminary estimates for 2016, U.S. mine production is expected to increase by about 4% owing mainly to a significant increase in production at the Bingham Canyon Mine. Although FCX and ASARCO announced price-induced production closures and reductions beginning in September 2015, it was not known if or when those plans would be implemented. After a series of smelter maintenance shutdowns in 2015, smelter production is expected to increase by 4% in 2016, and refinery production is expected to increase by about 11%.

In October 2016, ICSG forecast that global copper mine production would increase by 4% in 2016 and remain unchanged in 2017. Global refined copper production and apparent consumption are expected to increase slightly in both 2016 and 2017, resulting in a balanced market in 2016 and a refined copper surplus of 163,000 t in 2017 (International Copper Study Group, 2016b).

References Cited

American Bureau of Metal Statistics Inc., 2016, Copper wirerod market—December 2015: Chatham, NJ, American Bureau of Metal Statistics Inc., February 22, 5 p.

ASARCO LLC, 2015, Press release, August 28, 2015: ASARCO LLC news release, August 28. (Accessed September 11, 2015, at http://www.asarco.com/wp-content/uploads/PressRelease-2015-08-28.pdf.)

BHP Billiton Ltd., 2016, Annual report 2015: Melbourne, Victoria, Australia, BHP Billiton Ltd., 320 p. (Accessed December 8, 2016, at http://www.bhpbilliton.com/~/media/bhp/documents/investors/annual-reports/2015/bhpbillitonannualreport2015.pdf?la=en.)

Brininstool, Mark, 2015, Copper, *in* Metals and minerals: U.S. Geological Survey Minerals Yearbook 2012, v. I, p. 20.1–20.27.

Capstone Mining Corp., 2016, Management's discussion and analysis of Capstone Mining Corp. for the year ended December 31, 2015, *in* Consolidated financial statements—December 31, 2015 and 2014: Vancouver, British Columbia, Canada, Capstone Mining Corp., February 16, 58 p. (Accessed March 1, 2016, at http://s2.q4cdn.com/231101920/files/doc_financials/q42015/2015-12-CS-FS_MDA.pdf.)

Chinalco Mining Corporation International, 2015, Annual report 2014: Beijing, China, Chinalco Mining Corporation International, 140 p. (Accessed December 5, 2016, at http://www.chinalco-cmc.com/u/cms/www/20150430172600x4tr_en.pdf.)

Chinalco Mining Corporation International, 2016, Annual report 2015: Beijing, China, Chinalco Mining Corporation International, 152 p. (Accessed December 5, 2016, at http://www.chinalco-cmc.com/u/cms/www/e03668_CMC_Annual%20Report.pdf.)

Comisión Chilena del Cobre, 2016, Producción cobre de mina por empresa—Anual [Copper mine production by operation—Annual]: Santiago, Chile, Comisión Chilena del Cobre. (Accessed December 12, 2016, at https://www.cochilco.cl/Paginas/Estadisticas/Bases%20de%20Datos/Producci%C3%B3n-Minera.aspx.)

Copper and Brass Fabricators Council Inc., 2016, Copper and brass products import and export report—December 2015: Washington, DC, Copper and Brass Fabricators Council Inc., February 10, 243 p.

Copper Development Association Inc., 2016, Annual data 2016—Copper supply and consumption—1995–2016: New York, NY, Copper Development Association Inc., 20 p. (Accessed October 13, 2016, at https://www.copper.org/resources/market_data/pdfs/annual_data.pdf.)

Copper Monthly, 2015, Copper & copper fabrication monthly for January 2015: Copper Monthly [published by Beijing Antaike Information Development Co., Ltd., or Antaike], no. 217, January, 26 p.

Copper Monthly, 2016, Copper & copper fabrication monthly for February 2016: Copper Monthly [published by Beijing Antaike Information Development Co., Ltd., or Antaike], no. 230, February, 16 p.

Excelsior Mining Corp., 2015, Excelsior closes Johnson Camp Mine acquisition and US$12.0 million financing: Vancouver, British Columbia, Canada, Excelsior Mining Corp. press release, December 15. (Accessed March 1, 2015, at http://www.excelsiormining.com/index.php/news/news-2015/489-excelsior-closes-johnson-camp-mine-acquisition-and-us-12-0-million-financing.)

Excelsior Mining Corp., 2016, Gunnison copper project NI 43–101 technical report, Cochise County, Arizona, USA: Vancouver, British Columbia, Canada, Excelsior Mining Corp., March 23, 293 p. (Accessed November 10, 2016, at http://www.excelsiormining.com/images/Projects/GunnisonProject/PFS_2_14_14.pdf.)

Finders Resources Ltd., 2016, Annual report 2015: West Perth, Western Australia, Australia, Finders Resources Ltd., April 22, 70 p. (Accessed June 20, 2016, at http://findersresources.com/wp-content/uploads/2016/04/Annual-Report-2015.pdf.)

Freeport-McMoRan Copper & Gold Inc., 2016, Form 10–K—2015: U.S. Securities and Exchange Commission, 223 p. (Accessed June 22, 2016, at http://d1lge852tjjqow.cloudfront.net/CIK-0000831259/78231b00-1269-4bd9-84a0-ff9732e28be3.pdf.)

Glencore plc, 2016, Annual report 2016: Baar, Switzerland, Glencore plc, 202 p. (Accessed July 20, 2016, at http://www.glencore.com/assets/investors/doc/reports_and_results/2015/GLEN-2015-Annual-Report.pdf.)

Goldcorp Inc., 2016, Annual report 2015: Vancouver, British Columbia, Canada, Goldcorp Inc., 137 p. (Accessed March 22, 2016, at http://s1.q4cdn.com/038672619/files/doc_downloads/ManagementInfoCirular/Annual-Report-(SEDAR).pdf.)

Grupo México, S.A.B. de C.V., 2016, Annual information form 2015: Mexico City, Mexico, Grupo México, S.A.B. de C.V., 281 p. (Accessed January 6, 2017, via http://quicktake.morningstar.com/stocknet/secdocuments.aspx?symbol=gmbxf.)

Hecla Mining Co., 2016, Form 10–K—2015: Coeur d'Alene, ID, Hecla Mining Co., 48 p. (Accessed November 11, 2016, at http://216.139.227.101/interactive/hl2015/pf/page_001.pdf.)

HudBay Minerals Inc., 2016a, 2015 annual and CSR report: Toronto, Ontario, Canada, HudBay Minerals Inc., 158 p. (Accessed December 5, 2016, at http://s1.q4cdn.com/305438552/files/2015/en/_doc/Hudbay_2015_AR_CSR_Full_Printable.pdf.)

HudBay Minerals Inc., 2016b, Our business—Peru: Toronto, Ontario, Canada, HudBay Minerals Inc. (Accessed December 5, 2016, at http://www.hudbayminerals.com/English/Our-Business/Peru/default.aspx.)

International Copper Study Group, 2015, 2015 statistical yearbook (2005–2014): Lisbon, Portugal, International Copper Study Group, v. 12, November, 79 p.

International Copper Study Group, 2016a, Copper bulletin: Lisbon, Portugal, International Copper Study Group, v. 23, no. 10, October, 53 p.

International Copper Study Group, 2016b, Copper market forecast 2016/2017: Lisbon, Portugal, International Copper Study Group press release, October 26. (Accessed October 28, 2016, at http://icsg.org/index.php/press-releases/finish/113-forecast-press-release/2201-2016-10-icsg-forecast-press-release.)

Jolly, J.L.W., 1987, Copper, *in* Metals and minerals: U.S. Bureau of Mines Minerals Yearbook 1985, v. I, p. 317–379.

Kazakhmys plc, 2014, Kazakhmys announces completion of restructuring and change of name to KAZ Minerals plc: London, United Kingdom, Kazakhmys plc news release, October 31. (Accessed December 15, 2015, at http://www.kazminerals.com/en/investors_media/news/press_release.jsp?id=1793.)

KGHM International Ltd., 2015, Management discussion and analysis for the year and fourth quarter ended December 31, 2014: Vancouver, British Columbia, Canada, KGHM International Ltd., March 16, 24 p. (Accessed August 18, 2015, at http://kghm.com/en/investors/kghm-international.)

KGHM Polska Miedź S.A., 2016, Consolidated annual report RS 2015: Lubin, Poland, KGHM Polska Miedź S.A., March 17, 192 p. (Accessed November 9, 2016, via http://kghm.com/en/node/4991.)

Lundin Mining Corp., 2016, Management's discussion and analysis for the year ended December 31, 2015: Toronto, Ontario, Canada, Lundin Mining Corp., 51 p. (Accessed July 14, 2015, at http://www.lundinmining.com/i/pdf/2015YE.pdf.)

Matson, Zachary, 2015, Judge approves $10 million sale of Mineral Park Mine: Today's News-Herald [Lake Havasu City, AZ], January 21. (Accessed February 4, 2015, at http://www.havasunews.com/news/judge-approvesmillion-sale-of-mineral-park-mine/article_c0314bfe-a128-11e4-b42f-4397c92be1cb.html.)

Newmont Mining Corp., 2016, 2015 annual report and form 10–K: Denver, CO, Newmont Mining Corp., 174 p. (Accessed June 30, 2016, at http://s1.q4cdn.com/259923520/files/doc_financials/annual/2015/newmont-2015-AR.pdf).

Revett Minerals Inc., 2012, Revett announces temporary suspension of underground operations at Troy Mine: Spokane Valley, WA, Revett Minerals Inc. press release, December 17. (Accessed August 26, 2013, at http://www.revettminerals.com/sites/default/files/news_releases/rvm-12172012-en.pdf.)

Rio Tinto plc, 2016a, 2015 annual report: London, United Kingdom, Rio Tinto plc, 244 p. (Accessed September 14, 2016, at http://www.riotinto.com/documents/RT_Annual_Report_2015.pdf.)

Rio Tinto plc, 2016b, Rio Tinto releases solid fourth quarter production results: London, United Kingdom, Rio Tinto plc, January 19, 26 p. (Accessed February 3, 2016, at http://www.riotinto.com/documents/160119_Rio%20Tinto%20releases%20solid%20fourth%20quarter%20production%20results.pdf.)

Southern Copper Corp., 2016, Form 10–K—2015: U.S. Securities and Exchange Commission, 152 p. (Accessed December 1, 2016, at http://www.southerncoppercorp.com/ENG/invrel/2015/10K/10k2015.pdf.)
Teck Resources Ltd., 2016, 2015 annual report: Vancouver, British Columbia, Canada, Teck Resources Ltd., 109 p. (Accessed December 5, 2016, at http://www.teck.com/media/2015-Teck-Annual-Report.pdf.)
Turquoise Hill Resources, 2016, Annual report to shareholders, December 31, 2015—Management's discussion and analysis of financial condition and results of operations: Vancouver, British Columbia, Canada, Turquoise Hill Resources Ltd., 110 p. (Accessed July 7, 2016, at http://www.turquoisehill.com/i/pdf/TRQ-Q4-2015.pdf.)
Vale S.A., 2015, Form 20–F—2014: U.S. Securities and Exchange Commission, 164 p. (Accessed July 2, 2015, at http://www.vale.com/EN/investors/information-market/annual-reports/20f/20FDocs/Vale%2020-F%202014_i_novo.pdf.)
Vale S.A., 2016, Form 20–F—2015: U.S. Securities and Exchange Commission, 174 p. (Accessed August 2, 2016, at http://www.vale.com/EN/investors/information-market/annual-reports/20f/20FDocs/Vale%2020-F%202015_i.PDF.)
Xie, Yifan, 2015, Chinese copper smelters to cut output by 350,000 tons in 2016: The Wall Street Journal, December 1. (Accessed December 12, 2016, at http://www.wsj.com/articles/chinese-copper-smelters-to-cut-output-by-350-000-tons-in-2016-1448980163.)

GENERAL SOURCES OF INFORMATION

U.S. Geological Survey Publications

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. Circular 1196–X.
The Nature and Use of Copper Reserve and Resource Data. Professional Paper 907–F, 1981.

Other

American Bureau of Metal Statistics nonferrous metal data.
Copper. Ch. in Mineral Facts and Problems, U.S. Bureau of Mines Bulletin 675, 1985.
International Copper Study Group, Copper Bulletin, monthly.
International Copper Study Group, Directory of Copper Mines and Plants.

TABLE 1
SALIENT COPPER STATISTICS[1]

(Metric tons, unless otherwise specified)

		2011	2012	2013	2014	2015
United States:						
Mine production:						
Ore concentrated	thousand metric tons	187,000	180,000	172,000	175,000	164,000
Average yield of concentrated ore	percent	0.34	0.36	0.40	0.47	0.47
Recoverable copper:						
Arizona		751,000	763,000	795,000	893,000	961,000
Other States		362,000	404,000	453,000	464,000	422,000
Total		1,110,000	1,170,000	1,250,000	1,360,000	1,380,000
Total value	millions	$9,960	$9,450	$9,360	$9,510	$7,810
Smelter production:						
Primary[2]		538,000	485,000	516,000	522,000	527,000
Byproduct sulfuric acid, sulfur content		679,000	545,000	574,000	545,000 r	553,000
Refinery production:						
Primary materials:						
Electrolytic from domestic ores		545,000	491,000	518,000	535,000	503,000
Electrolytic from foreign materials		--	--	--	--	--
Electrowon		447,000	471,000	475,000	514,000	589,000
Total		992,000	962,000	993,000	1,050,000	1,090,000
Secondary materials (scrap), electrolytic and fire refined		37,300	39,400	46,900	46,000	48,800
Total, refinery production		1,030,000	1,000,000	1,040,000	1,090,000	1,140,000
Secondary copper produced:						
Recovered from new scrap		649,000	642,000	630,000	672,000 r	638,000
Recovered from old scrap		153,000	164,000	166,000	173,000 r	167,000
Total		802,000	807,000	796,000	845,000 r	805,000
Copper sulfate production		22,800	22,500	23,000	22,900	18,497
Exports, refined		40,400	169,000	111,000	127,000	86,500
Imports, refined		670,000	630,000	734,000	620,000	686,000
Stocks, December 31:						
Blister and in-process material		13,000	12,300	12,700	9,860	13,900
Refined copper:						
Refineries		8,360	12,900	15,000	9,540	12,000
Wire-rod mills		24,000	28,100	32,600	42,000	36,200
Brass mills		6,850	6,540	6,710	7,400 r	7,580
Other industry		4,330	4,180	4,230	5,090 r	5,730
COMEX		79,800	64,100	15,000	24,200	63,300
London Metal Exchange (LME), U.S. warehouses		286,000	120,000	185,000	102,000	83,800
Total		409,000	236,000	258,000	190,000 r	209,000
Consumption:						
Refined copper, reported		1,760,000	1,760,000	1,830,000	1,760,000 r	1,810,000
Primary refined and old scrap, apparent[3]		1,730,000	1,760,000	1,750,000 r	1,780,000 r	1,820,000
Price:						
Producer, weighted average	cents per pound	405.85	367.28	339.94	318.05	256.15
COMEX, first position	do.	400.05	361.45	334.11	312.00	250.81
LME, Grade A cash	do.	399.79	360.58	332.29	311.10	249.53
World, production:						
Mine	thousand metric tons	16,100	16,900	18,300 r	18,400 r	19,100
Smelter	do.	15,900	16,100	17,100	17,900	18,500
Refinery	do.	19,600 r	20,200	21,100 r	22,600 r	23,000

rRevised. do. Ditto. -- Zero.

[1]Data are rounded to no more than three significant digits, except prices; may not add to totals shown.

[2]May contain small amounts of scrap.

[3]In 2011, 2012, 2013, 2014, and 2015, apparent consumption is calculated using general imports of 649,000 metric tons (t), 628,000 t, 729,000 t, 614,000 t, and 664,000 t respectively.

TABLE 2
LEADING COPPER-PRODUCING MINES IN THE UNITED STATES IN 2015, IN ORDER OF OUTPUT[1]

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

do. Ditto.
[1]The mines listed accounted for more than 99% of U.S. mine production in 2015.
[2]Wholly owned subsidiary of Rio Tinto plc.
[3]Wholly owned subsidiary of Grupo México, S.A.B. de C.V.
[4]Wholly owned subsidiary of KGHM International Ltd.

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

(Metric tons)

Source and treatment process	2014		2015	
	Gross weight	Recoverable copper	Gross weight	Recoverable copper
Mined copper ore:				
Concentrated	175,000,000	819,000	164,000,000	769,000
Leached	NA	514,000	NA	588,000
Total	NA	1,330,000	NA	1,360,000
Copper precipitates shipped, leached from tailings, dumps, and in-place material	NA	W	NA	W
Other copper-bearing ores[2]	5,620,000	24,500	5,530,000	25,600
Grand total	XX	1,360,000	XX	1,380,000

NA Not available. W Withheld to avoid disclosing company proprietary data; included with "Other copper-bearing ores."
XX Not applicable.
[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Includes gold ore, lead ore, and silver ore.

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

(Metric tons)

Item	Brass mills	Wire-rod mills	Foundries, chemical plants, miscellaneous users	Smelters, refiners, ingot makers	Total
2014:					
Copper scrap	737,000 [2]	W	59,400	139,000	936,000
Refined copper[3]	429,000 [r]	1,270,000	54,300 [r]	--	1,760,000 [r]
Hardeners and master alloys	10,000	--	5,450	--	15,500 [r]
Brass ingots	--	--	59,000 [r]	--	59,000 [r]
Slab zinc	32,200 [r]	--	751	--	32,200 [r]
2015:					
Copper scrap	672,000 [2]	W	55,800	191,000	919,000
Refined copper[3]	427,000	1,320,000	65,300	--	1,810,000
Hardeners and master alloys	9,840	--	5,190	--	15,000
Brass ingots	--	--	51,000	--	51,000
Slab zinc	33,200	--	--	--	33,200

[r]Revised. W Withheld to avoid disclosing company proprietary data; included with "Brass mills." -- Zero.
[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Includes item indicated by symbol W.
[3]Detailed 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 CONSUMER[1]

(Metric tons)

Class of consumer	Cathodes	Ingots and ingot bars	Cakes and slabs	Wirebar, billets, other	Total
2014:					
Wire-rod mills	1,270,000	--	--	(2)	1,270,000
Brass mills	329,000	W	43,700	51,600 r	424,000
Chemical plants	W	W	--	231	231
Ingot makers	W	W	W	4,510	4,510
Foundries	15,100 r	2,860 r	W	9,980	27,900 r
Miscellaneous[3]	W	W	W	26,100	26,100
Total	1,620,000	2,860 r	43,700	92,500	1,760,000 r
2015:					
Wire-rod mills	1,320,000	--	--	(2)	1,320,000
Brass mills	328,000	W	42,300	51,600	422,000
Chemical plants	W	W	--	6,560	6,560
Ingot makers	W	W	W	4,510	4,510
Foundries	19,000	3,030	W	10,700	32,800
Miscellaneous[3]	W	W	W	26,000	26,000
Total	1,670,000	3,030	42,300	99,400	1,810,000

rRevised. W Withheld to avoid disclosing company proprietary data; included with "Wirebar, billets, other." -- Zero.
[1]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 "Wire-rod mills" under "Cathodes."
[3]Includes consumers of copper powder and copper shot, iron and steel plants, and other manufacturers.

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

(Metric tons)

	2014	2015
Kind of scrap:		
New:		
Copper-base	635,000	603,000
Aluminum-base	36,700 r	35,600
Nickel-base	18	18
Total	672,000 r	638,000
Old:		
Copper-base	140,000	136,000
Aluminum-base	32,400 r	29,800
Nickel-base	267	267
Zinc-base	10	--
Total	173,000 r	167,000
Total, new and old scrap	845,000 r	805,000
Form of recovery:		
As unalloyed copper	53,400	48,900
In brass and bronze	720,000	689,000
In alloy iron and steel	2,240	683
In aluminum alloys	67,700 r	64,600
In chemical compounds	1,800	1,800
Total	845,000 r	805,000

rRevised. -- Zero.
[1]Data are rounded to no more than three significant digits; may not add to totals shown.

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

(Metric tons)

	From new scrap		From old scrap		Total	
Type of operation	2014	2015	2014	2015	2014	2015
Ingot makers	15,900	15,400	57,700	57,600	43,600	73,100
Refineries[2]	17,000	17,900	29,000	30,900	46,000	48,800
Brass and wire-rod mills	563,000	533,000	43,000	37,100	606,000	570,000
Foundries and manufacturers	37,600	34,700	10,800	10,800	48,400	45,400
Chemical plants	1,800	1,800	--	--	1,800	1,800
Total	635,000	603,000	140,000	136,000	776,000	739,000

-- Zero.
[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Includes 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 SCRAP[1]

(Metric tons)

Item produced from scrap	2014	2015
Unalloyed copper products:		
Refined copper	46,000	48,800
Copper powder	7,060	--
Copper castings	347	124
Total	53,400	48,900
Alloyed copper products:		
Brass and bronze ingots:		
Tin bronzes	6,230	6,240
Leaded red brass and semired brass	37,800	37,500
High leaded tin bronze	5,100	5,100
Yellow brass	4,820	4,820
Manganese bronze	6,260	6,260
Aluminum bronze	5,130	5,110
Nickel silver	1,030	1,020
Silicon bronze and brass	4,390	4,390
Copper-base hardeners and master alloys	5,900	5,810
Miscellaneous	6,090	6,090
Total	82,800	82,300
Brass mill and wire-rod mill products	727,000	663,000
Brass and bronze castings	40,600	45,600
Copper in chemical products	1,800	1,800
Grand total	905,000	841,000

-- Zero.
[1]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 STATES[1]

(Metric tons)

	Copper	Tin	Lead	Zinc	Nickel	Aluminum	Total
Brass and bronze ingot production:[2]							
2014	87,800 [r]	3,220 [r]	4,680 [r]	8,850 [r]	107	11	105,000
2015	90,100	3,000	4,170	6,860	70	8	104,000
Secondary metal content of brass mill products:							
2014[r]	606,000	1,090	2,350	116,000	1,210	16	727,000
2015	570,000	271	2,450	88,700	1,180	16	663,000
Secondary metal content of brass and bronze castings:							
2014	37,700	1,070	542	1,120	75	89	40,600
2015	43,100	1,030	400	969	79	91	45,600

[r]Revised.
[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Includes approximately 96% from scrap and 4% from other than scrap.

TABLE 10
CONSUMPTION AND YEAREND STOCKS OF COPPER-BASE SCRAP[1]

(Metric tons, gross weight)

Scrap type and processor	2014		2015	
	Consumption	Stocks	Consumption	Stocks
Unalloyed scrap:				
No.1 wire and heavy:				
Smelters, refiners, and ingot makers	18,100	813	36,900	2,340
Brass and wire-rod mills	361,000	(2)	343,000	(2)
Foundries and miscellaneous manufacturers	19,400	(2)	20,000	(2)
No. 2 mixed heavy and light:				
Smelters, refiners, and ingot makers	61,100	2,080	95,000	4,490
Brass and wire-rod mills	12,200	(2)	42,500	(2)
Foundries and miscellaneous manufacturers	15,700	(2)	12,500	(2)
Total unalloyed scrap:				
Smelters, refiners, and ingot makers	79,200	2,890	132,000	6,830
Brass and wire-rod mills	373,000	2,520	386,000	1,960
Foundries and miscellaneous manufacturers	35,100	3,020	32,500	2,960
Alloyed scrap:				
Red brass:[3]				
Smelters, refiners, and ingot makers	14,900	1,560	14,900	1,430
Brass mills	12,500	(2)	12,200	(2)
Foundries and miscellaneous manufacturers	2,400	(2)	3,080	(2)
Leaded yellow brass:				
Smelters, refiners, and ingot makers	8,970	836	8,970	757
Brass mills	120,000	(2)	125,000	(2)
Foundries and miscellaneous manufacturers	541	(2)	655	(2)
Yellow and low brass, all plants	135,000	(2)	52,900	(2)
Cartridge cases and brass, all plants	93,300	(2)	93,400	(2)
Auto radiators:				
Smelters, refiners, and ingot makers	15,600	710	15,600	674
Foundries and miscellaneous manufacturers	1,900	(2)	56	(2)
Bronzes:				
Smelters, refiners, and ingot makers	9,310	558	9,290	578
Brass mills and miscellaneous manufacturers	12,000	(2)	11,700	(2)
Nickel-copper alloys, all plants	10,400	98	9,950	173
Low grade and residues; smelters, refiners, miscellaneous manufacturers	8,890	628	8,890	612
Other alloy scrap:[4]				
Smelters, refiners, and ingot makers	1,010	352	220	303
Brass mills and miscellaneous manufacturers	5,330	(2)	5,370	(2)
Total alloyed scrap:				
Smelters, refiners, and ingot makers	60,100	5,390	59,200	5,080
Brass mills	368,000	1,960	290,000	421
Foundries and miscellaneous manufacturers	24,200	1,780	23,300	1,820
Total scrap:				
Smelters, refiners, and ingot makers	139,000	8,280	191,000	11,900
Brass and wire-rod mills	740,000	4,480	675,000	2,380
Foundries and miscellaneous manufacturers	59,400	4,800	55,800	4,780

[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Individual breakdown is not available; included in "Total unalloyed scrap," "Total alloyed scrap," and "Total scrap."
[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[1, 2]

(Metric tons, gross weight)

Type of operation	New scrap		Old scrap		Total	
	2014	2015	2014	2015	2014	2015
Ingot makers	23,900	34,700	65,700	65,500	89,600	100,000
Smelters and refineries	18,300	19,800	31,500	68,200	49,700	88,000
Brass and wire-rod mills	696,000	637,000	44,400	38,500	740,000	675,000
Foundries and miscellaneous manufacturers	47,400	43,900	11,900 r	11,900	59,400	55,800
Total	786,000	735,000	154,000	184,000	939,000	919,000

rRevised.
[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Consumption at brass and wire-rod mills assumed equal to receipts.

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

(Metric tons)

Ingot type or material consumed	2014	2015
Brass ingot:		
Tin bronzes	6,610 r	6,180
Leaded red brass and semired brass	26,300	21,400
Yellow, leaded, low brass[2]	10,800 r	10,300
Manganese bronze	2,380 r	2,490
Nickel silver[3]	4,590	3,740
Aluminum bronze	4,550 r	3,470
Hardeners and master alloys[4]	5,450	5,190
Lead free alloys[5]	3,810	3,460
Total	64,500 r	56,200
Refined copper	54,900 r	65,300
Copper scrap	59,400	55,800

rRevised.
[1]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 PRICES FOR COPPER SCRAP, BY TYPE

(Cents per pound)

			Dealers' buying (New York)	
Year	Brass mills No. 1 scrap	Refiners' No. 2 scrap	No. 2 scrap	Red brass turnings and borings
2014	307.75	283.44	263.33	183.01
2015	246.13	222.45	194.49	144.62

Source: American Metal Market.

TABLE 14

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

	Ore and concentrate		Matte, ash, and precipitates		Blister and anodes		Refined		Unalloyed copper scrap		Total	
Country	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)
2014	410,000	$2,950,000	22,200	$34,800	11,800	$59,200	127,000	$858,000 r	430,000	$1,920,000 r	1,000,000	$5,830,000 r
2015:												
Belgium	3	26	23	51	228	523	--	--	10,800	43,300	11,100	43,900
Canada	21,100	106,000	16,600	23,300	2,310	8,260	36,000	205,000	27,600	143,000	104,000	486,000
China	37,800	196,000	153	629	773	2,350	5,000	21,100	281,000	964,000	325,000	1,180,000
Germany	--	--	70	57	413	2,620	12	81	30,500	123,000	31,000	126,000
Hong Kong	--	--	--	--	1,650	7,840	7	54	8,720	25,100	10,400	33,000
India	56	239	57	252	1,580	6,330	(2)	5	4,050	14,800	5,740	21,600
Japan	9,130	52,700	185	220	39	184	1,000	1,130	6,140	29,200	16,500	83,500
Korea, Republic of	157	678	38	114	1,520	9,430	1,190	6,020	16,500	83,900	19,400	100,000
Mexico	321,000	2,500,000	--	--	64	473	42,100	250,000	723	3,260	364,000	2,760,000
Philippines	1,950	10,100	--	--	29	167	289	1,140	--	--	2,270	11,400
Spain	--	--	16	3	141	886	24	127	457	1,130	638	2,150
Other	233	2,050	195	231	1,950	8,750	861	2,390	39,600	178,000	42,800	191,000
Total	392,000	2,870,000	17,300	24,900	10,700	47,800	86,500	487,000	426,000	1,610,000	932,000	5,040,000

rRevised. -- Zero.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Less than ½ unit.

Source: U.S. Census Bureau.

TABLE 15
U.S. EXPORTS OF COPPER SEMIMANUFACTURES, BY COUNTRY[1]

Country	Pipes and tubing		Plates, sheets, foil, bars		Bare wire, including wire rod[2]		Wire and cable, stranded		Copper sulfate	
	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)
2014	13,900	$131,000	26,300	$279,000	155,000	$1,120,000	45,800	$426,000	6,280 r	$24,700
2015:										
Bahamas, The	2	17	8	63	4	45	229	1,930	--	--
Belgium	4	50	14	134	402	1,780	96	6,230	24	260
Canada	2,490	22,000	6,830	52,000	34,100	203,000	12,800	92,900	2,570	5,990
China	413	2,290	689	10,100	2,370	17,700	97	1,930	430	2,680
Colombia	61	273	1	17	89	789	71	859	--	--
Costa Rica	3	32	23	200	13	190	54	515	--	--
Dominican Republic	36	278	(3)	26	85	381	132	1,230	--	--
Germany	81	533	209	2,690	32	325	51	2,390	55	84
Hong Kong	15	154	692	6,890	87	1,260	16	558	(3)	6
India	9	121	62	454	169	685	38	973	53	122
Israel	1	9	8	80	9	152	45	876	195	1,180
Japan	25	235	506	6,900	9	162	42	1,100	24	434
Korea, Republic of	241	1,990	499	4,020	925	5,230	32	878	270	2,370
Malaysia	42	356	476	7,450	(3)	5	7	162	222	400
Mexico	4,190	38,200	15,600	139,000	121,000	787,000	26,800	237,000	5	19
Netherlands	56	508	16	194	29	152	12	446	--	--
Saudi Arabia	3,510	27,900	53	339	26	191	315	3,540	--	--
Singapore	56	544	85	757	479	3,340	25	457	95	1,280
Taiwan	22	180	91	1,760	12	346	24	449	834	10,300
Trinidad and Tobago	3	34	21	77	160	867	30	429	--	--
United Arab Emirates	2,020	16,100	5	50	1	23	14	326	--	--
United Kingdom	42	678	135	1,760	39	580	83	1,510	6	29
Other	1,060	8,890	717	6,790	480	4,300	1,760	19,700	1,390	6,850
Total	14,400	121,000	26,800	242,000	160,000	1,030,000	42,800	376,000	6,170	32,000

rRevised. -- Zero.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Total exports of wire rod in 2014 were 137,000 (revised) metric tons (t) valued at $1,000 million, and in 2015, wire rod exports were 146,000 t valued at $918 million.

[3]Less than ½ unit.

Source: U.S. Census Bureau.

TABLE 16
U.S. IMPORTS FOR CONSUMPTION OF UNMANUFACTURED COPPER (COPPER CONTENT), BY COUNTRY[1]

	Ore and concentrate		Matte, ash, and precipitates		Blister and anode		Refined		Unalloyed scrap		Total	
Country	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)
2014	100	$579	1,060	$5,180	503	$5,180	620,000	$4,350,000 r	31,000	$166,000	653,000	$4,530,000
2015:												
Brazil	--	--	--	--	--	--	--	--	168	765	168	765
Canada	98	1,080	198	1,050	2	66	191,000	1,110,000	12,800	61,100	204,000	1,180,000
Chile	--	--	--	--	--	--	358,000	2,080,000	--	--	358,000	2,080,000
China	--	--	3	16	--	--	35	1,100	55	196	93	1,310
Congo (Kinshasa)	--	--	--	--	--	--	21,400	128,000	--	--	21,400	128,000
Costa Rica	--	--	--	--	--	--	--	--	426	2,110	426	2,110
Dominican Republic	--	--	--	--	--	--	--	--	107	411	107	411
Germany	78	155	24	130	7	95	2,130	13,700	65	124	2,310	14,200
Japan	--	--	141	139	3	291	4,010	32,600	36	159	4,190	33,200
Korea, Republic of	--	--	--	--	2	28	302	2,610	--	--	304	2,640
Mexico	10	16	--	--	--	--	94,800	534,000	12,400	54,900	107,000	589,000
Netherlands	--	--	257	1,850	2	87	(3)	8	--	--	259	1,940
Panama	--	--	--	--	--	--	--	--	557	2,920	557	2,920
Peru	--	--	--	--	--	--	11,700	72,300	226	829	11,900	73,100
Russia	--	--	--	--	--	--	206	1,260	6	36	212	1,290
Saudi Arabia	--	--	50	272	--	--	--	--	457	1,700	507	1,970
South Africa	--	--	--	--	2,320	42,100	23	152	--	--	2,350	42,200
Other	115	197	519	2,610	2,700	45,700	24,300	144,000	1,720	6,590	29,300	199,000
Total	301	1,450	1,140	5,790	2,710	46,300	686,000	3,990,000	28,600	130,000	719,000	4,180,000

[r]Revised. -- Zero.
[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Cost, insurance, freight value at U.S. port.
[3]Less than ½ unit.

Source: U.S. Census Bureau.

TABLE 17
U.S. IMPORTS FOR CONSUMPTION OF COPPER SEMIMANUFACTURES, BY COUNTRY[1]

Country	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)	Quantity (metric tons)	Value[3] (thousands)	Quantity (metric tons)	Value[3] (thousands)	Quantity (metric tons)	Value[3] (thousands)	Quantity (metric tons)	Value[3] (thousands)
2014	1,310	$11,200	57,500	$559,000	143,000	$1,050,000	13,900	$117,000	40,500	$99,900
2015:										
Brazil	69	521	1,890	13,300	3	24	(4)	3	--	--
Canada	197	2,420	400	3,690	107,000	639,000	683	4,950	2,130	4,840
Chile	--	--	4	96	495	3,090	--	--	201	452
China	44	865	2,280	19,900	411	4,160	49	855	314	752
Finland	1	30	4,190	38,200	711	5,690	--	--	--	--
France	13	315	1,160	9,210	(4)	2	13	448	(4)	12
Germany	41	490	20,900	167,000	565	4,070	62	1,490	2	60
Hong Kong	(4)	4	3	44	13	194	--	--	2	6
India	26	236	218	1,810	--	--	87	1,490	36	129
Israel	--	--	--	--	158	1,620	30	316	--	--
Italy	4	44	497	3,590	--	--	24	456	16	72
Japan	29	295	1,670	32,000	12	100	4	58	407	490
Korea, Republic of	796	5,860	1,670	16,500	31	335	4	63	--	--
Luxembourg	--	--	1,090	13,500	--	--	--	--	--	--
Mexico	441	6,040	3,280	23,000	19,400	110,000	525	3,530	31,100	67,700
Peru	--	--	7,730	52,100	101	635	--	--	293	572
Russia	--	--	--	--	--	--	--	--	6,890	16,400
Sweden	--	--	39	421	118	1,130	1	22	--	--
Taiwan	--	--	385	4,020	37	244	13	237	2,250	4,480
Thailand	7	71	197	1,750	--	--	195	1,440	--	--
Turkey	--	--	2	39	20	114	4,680	31,100	183	333
United Kingdom	13	449	134	791	--	--	(4)	53	--	--
Other	127	379	2,500	17,500	130	1,220	127	1,380	71	138
Total	1,730	18,000	50,200	419,000	129,000	772,000	6,470	47,900	43,900	96,400

-- Zero.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Total imports of wire rod in 2014 were 143,000 metric tons (t) valued at $1,040 million, and in 2015, wire rod imports were 129,000 t valued at $771 million.

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

[4]Less than ½ unit.

Source: U.S. Census Bureau.

TABLE 18
U.S. EXPORTS OF COPPER SCRAP, BY COUNTRY[1]

	Unalloyed copper scrap				Copper-alloy scrap			
	2014		2015		2014		2015	
Country	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
Belgium	11,900	$49,800	10,800	$43,300	9,440	$30,000	12,600	$33,900
Canada	26,800	183,000 r	27,600	143,000	37,600	136,000	39,500	103,000
China	276,000	1,120,000	281,000	964,000	449,000 r	981,000 r	378,000	706,000
Germany	44,900	215,000	30,500	123,000	11,700	46,900 r	13900	47,100
Hong Kong	5,530 r	17,900 r	8,720	25,100	28,600 r	49,500 r	14,100	18,900
India	3,220	12,900	4,050	14,800	16,900	51,600 r	17,600	48,900
Japan	6,870 r	31,300 r	6,140	29,200	12,900	60,600 r	11,900	55,400
Korea, Republic of	14,100	92,200 r	16,500	83,900	16,700 r	85,700 r	12,000	50,100
Mexico	708	3,740	723	3,260	3,410 r	19,600	3,490	17,000
Spain	1,550	5,820	457	1,130	11,800	28,200	10,500	21,000
Taiwan	5,850 r	22,600 r	7,650	29,600	5,340	15,700	2,470	10,200
Other	32,500	174,000 r	31,900	148,000	11,300 r	36,100	12,500	29,800
Total	430,000	1,920,000 r	426,000	1,610,000	614,000 r	1,540,000 r	529,000	1,140,000

rRevised.
[1]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[1]

Country or territory	Unalloyed copper scrap		Copper-alloy scrap		
	Quantity (metric tons)	Value[2] (thousands)	Gross weight (metric tons)	Copper content[3] (metric tons)	Value[2] (thousands)
2014	31,000	$166,000	85,600	61,600	$401,000
2015:					
Bahamas, The	50	157	602	433	689
Brazil	168	765	573	413	2,230
Canada	12,800	61,100	42,300	30,400	188,000
Chile	--	--	392	282	1,700
China	55	196	449	323	2,690
Colombia	151	554	1,890	1,360	5,500
Costa Rica	426	2,110	1,310	943	5,010
Dominican Republic	107	411	523	377	870
Ecuador	18	63	290	209	1,080
El Salvador	97	132	662	477	2,240
Guatemala	138	614	545	393	1,780
Honduras	167	646	502	361	1,790
Mexico	12,400	54,900	30,600	22,000	107,000
Nicaragua	--	--	590	425	2,740
Panama	557	2,920	173	125	588
Philippines	--	--	274	197	1,410
Saudi Arabia	457	1,700	38	27	150
Suriname	208	1,050	24	17	99
Trinidad and Tobago	--	--	13	10	32
United Kingdom	21	110	96	69	423
Other	742	2,680	1,160	833	3,940
Total	28,600	130,000	83,000	59,700	330,000

-- Zero.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Cost, insurance, and freight value at U.S. port.

[3]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[1, 2]

(Metric tons, copper content)

Country	2011	2012	2013	2014	2015
Albania[e]	4,860	5,690	5,090	3,500	3,500
Argentina	116,700	136,000	109,600	102,600	61,800
Armenia[e]	33,597 [3]	41,200	42,000	48,000	78,900
Australia:[e]					
Concentrates	922,300 [3]	876,000	966,000	930,000	932,000
Leaching, electrowon	35,600	38,000	35,000	40,000	39,000
Total	958,000	914,000	1,000,000	970,000	971,000
Azerbaijan	611	502	330	780	970
Bolivia:					
Concentrates	1,900	5,400	5,000	8,900	7,500 [e]
Leaching, electrowon	1,000	900	1,300	1,800	1,500 [e]
Total	2,900	6,300	6,300	10,700	9,000 [e]
Botswana	31,900 [r]	35,700 [r]	51,300 [r]	38,000 [r]	9,100
Brazil:					
Concentrates	213,760	223,141	271,000	301,000 [r]	348,000 [e]
Leaching, electrowon	4,550	4,374	4,060	700 [r, e]	--
Total	218,310	227,515	275,060	302,000 [r, e]	348,000 [e]
Bulgaria[e]	85,000 [r]	79,000 [r]	75,000 [r]	72,000 [r]	72,000
Burma, leaching, electrowon[e]	9,000	19,000	25,000	33,200	46,900
Canada:					
Concentrates	568,800	578,600	631,900	673,000 [r]	697,000
Leaching, electrowon	1,000	900	--	--	--
Total	569,800	579,500	631,900	673,000 [r]	697,000
Chile:[3]					
Concentrates	3,238,000	3,405,100	3,843,100	3,905,600 [r]	3,985,600
Leaching, electrowon	2,024,800	2,028,800	1,932,900	1,844,000 [r]	1,778,400
Total	5,262,800	5,433,900	5,776,000	5,749,600	5,764,000
China:[e]					
Concentrates	1,270,000	1,550,000	1,680,000 [r]	1,740,000 [r]	1,670,000
Leaching, electrowon	40,000 [r]	40,000 [r]	40,000	40,000	40,000
Total	1,310,000 [r]	1,590,000 [r]	1,720,000 [r]	1,780,000 [r]	1,710,000
Colombia	890	750	640	4,100	5,500
Congo (Kinshasa):[e, 4]					
Concentrates	168,000	187,000	285,000 [r]	152,000 [r]	140,000
Leaching, electrowon	362,000	473,000	685,000 [r]	878,000 [r]	878,000
Total	530,000	660,000	970,000	1,030,000	1,020,000
Cyprus, leaching, electrowon	3,660	4,328	3,631	3,090	2,120
Dominican Republic	11,777	11,737	10,379	9,260	7,000 [e]
Finland	14,000	25,500	38,800	42,800	41,100
Georgia[e]	6,300	7,400	5,000	6,000	6,000
India[e]	37,700	34,000	36,100	25,000	30,000
Indonesia:[e]					
Concentrates	534,000	394,000	504,000	373,000	573,300 [3]
Leaching, electrowon	900	--	--	1,400 [3]	1,200 [3]
Total	535,000	394,000	504,000	374,000	574,500 [3]
Iran:[e]					
Concentrates	249,000	233,000	209,000	205,000	232,000
Leaching, electrowon	10,100	12,000	14,000	15,000	13,000
Total	259,000	245,000	223,000	220,000	245,000
Kazakhstan:					
Concentrates	405,300	419,200	440,000	458,800 [r]	465,800
Leaching, electrowon[e]	-- [3]	7,000	12,200 [3]	12,400	13,000
Total[e]	405,300 [3]	426,000	452,200 [3]	471,000 [r]	479,000

See footnotes at end of table.

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

(Metric tons, copper content)

Country	2011	2012	2013	2014	2015
Korea, North[e]	12,000	16,000	17,000	19,300	20,000
Laos:					
Concentrates	59,897	63,285	64,900	71,200	78,400
Leaching, electrowon	78,860	86,295	90,000	88,500	89,300
Total	138,757	149,580	154,900	159,700	167,700
Macedonia:[e]					
Concentrates	7,200	9,100	9,300 [r]	7,800	8,500
Leaching, electrowon	--	1,100	1,900	1,700 [r]	2,400
Total	7,200	10,200	11,200 [r]	9,500 [r]	10,900
Mauritania	35,281	37,670	37,970	33,100	45,000
Mexico:[e]					
Concentrates	297,000	342,000	317,000	327,000	380,000
Leaching, electrowon	147,000	158,000	163,000	188,000	214,000
Total	444,000	500,000	480,000	515,000	594,000
Mongolia:					
Concentrates	121,600	121,700	186,700	249,000	312,000
Leaching, electrowon	2,400	2,100	2,100	2,100 [e]	2,100 [e]
Total	124,000	123,800	188,800	251,000 [e]	314,000 [e]
Morocco[e]	9,400 [r]	10,400 [r]	13,100 [r]	19,900 [r]	23,900
Namibia:					
Concentrates	3,370	5,300	4,900	5,250	3,300 [e]
Leaching, electrowon	--	--	--	--	10,659
Total	3,370	5,300	4,900	5,250	14,000 [e]
Oman[e]	22,000 [r]	21,000 [r]	11,000 [r]	14,000 [r]	8,000
Pakistan[e]	18,800	19,200	13,500	13,100	13,100
Papua New Guinea	130,500	125,300	105,500	75,900	42,900
Peru:					
Concentrates	1,094,971	1,197,569	1,285,983	1,295,800	1,627,700
Leaching, electrowon	140,341	101,174	89,658	83,800	73,100
Total	1,235,312	1,298,743	1,375,641	1,379,600	1,700,800
Philippines	63,835	65,444	90,861	91,900	83,800
Poland	426,700	427,100	429,300 [r]	421,700 [r]	426,200
Portugal	79,686	74,043	77,236	75,400	83,100
Romania[e]	6,400 [r]	5,900 [r]	6,700 [r]	7,200 [r]	7,600
Russia:[e]					
Concentrates	710,400 [3]	718,000	720,000	740,000	730,000
Leaching, electrowon	2,700	2,000	2,000	2,000	2,000
Total	713,000	720,000	722,000	742,000	732,000
Saudi Arabia[e]	1,620	6,000	9,900	10,000	10,000
Serbia	28,000	34,400	36,500	35,800 [r]	36,400
South Africa	96,600	81,000	76,500	87,600	77,400
Spain:					
Concentrates	33,000	32,200	26,100	34,800	41,700
Leaching, electrowon	42,100	67,700	69,300	71,100	70,000
Total	75,100	99,900	95,400	105,900	111,700
Sweden	82,200	82,500	83,000	79,900	74,800
Tanzania, in concentrates and dore	6,748	8,800 [r]	15,400 [r]	16,400 [r]	16,800 [e]
Turkey[e]	80,000	104,000	120,000	122,000	125,000
United States:[4]					
Concentrates	666,000	696,000	774,000	843,000	795,000
Leaching, electrowon	447,000	471,000	475,000	514,000	588,000
Total	1,110,000	1,170,000	1,250,000	1,360,000	1,380,000
Uzbekistan[e]	91,500 [3]	95,600	97,000	100,000	100,000
Vietnam[e]	11,300	12,700 [r]	12,300	12,100 [r]	12,300

See footnotes at end of table.

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

(Metric tons, copper content)

Country	2011	2012	2013	2014	2015
Zambia:[e]					
Concentrates	521,000	517,000	559,000	520,000	550,000
Leaching, electrowon	142,000	178,000	201,000	188,000	162,000
Total	663,000	695,000	760,000	708,000	712,000
Zimbabwe, concentrates[e]	6,000	6,300	8,300	8,300	8,200
Grand total	16,100,000	16,900,000	18,300,000 [r]	18,400,000 [r]	19,100,000
Of which:					
Concentrates	12,600,000 [r]	13,200,000 [r]	14,400,000 [r]	14,400,000	15,100,000
Leaching, electrowon	3,500,000 [r]	3,700,000 [r]	3,850,000	4,010,000 [r]	4,030,000

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

[1]Grand totals, U.S. data, and estimated data are rounded to no more than three significant digits; may not add to totals shown.

[2]Table represents copper content of concentrates produced (includes cement copper, if applicable), except where otherwise noted. Includes data available through August 16, 2017.

[3]Reported figure.

[4]Recoverable content.

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

(Metric tons, gross weight)

Country	2011	2012	2013	2014	2015
Armenia, primary	8,876	10,075	10,771	9,810	11,600
Australia, primary	442,000	422,000	446,000	468,000	442,000
Austria, secondary[e]	70,000	70,000	60,000	60,000	60,000
Belgium, secondary	112,900	118,600	150,600	143,000	140,000
Botswana, primary[3]	16,100	17,625	21,300	14,600	13,900
Brazil:[e]					
Primary	222,550 [4]	186,000 [4]	200,000	188,000	156,000
Secondary	22,800	24,700	26,000	25,000	42,000
Total	245,000	211,000	226,000	213,000	198,000
Bulgaria:					
Primary	256,300	270,000 [r]	294,000	305,000	302,000
Secondary[e]	82,000	55,000 [r]	60,000	55,000	55,000
Total[e]	338,000	325,000 [r]	354,000	360,000	357,000
Canada:					
Primary	304,724	287,051	254,000	289,000	280,000
Secondary	25,214	23,362	29,000	32,000	30,000
Total	329,938	310,413	283,000	321,000	310,000
Chile, primary	1,522,300	1,342,400	1,358,300	1,356,200	1,496,200
China:[e]					
Primary	3,030,000	3,200,000	4,000,000	4,600,000	5,500,000
Secondary	1,600,000	1,800,000	2,000,000	1,900,000	1,380,000
Total	4,630,000	5,000,000	6,000,000	6,500,000	6,880,000
Finland:[e]					
Primary	156,000	175,000	175,000	175,000	175,000
Secondary	2,000	2,000	2,000	2,000	2,000
Total	158,000	177,000	177,000	177,000	180,000
Germany:					
Primary	335,000	352,400	295,200	351,100	338,300
Secondary	212,000	182,000	168,600	173,400	182,900
Total	547,000	534,400	463,800	524,500	521,200
India, primary	670,000	680,000	690,000	750,000	790,000
Indonesia, primary	276,200	198,400	217,700	236,900	199,700
Iran:[e]					
Primary	185,000	180,000	155,000	155,000	155,000
Secondary	85,000	90,000	70,000	75,000	80,000
Total	270,000	270,000	225,000	230,000	235,000
Japan:					
Primary	1,168,284	1,304,900	1,249,300	1,290,000	1,176,600
Secondary	269,748	303,900	313,600	310,000	295,000
Total	1,438,032	1,608,800	1,562,900	1,600,000	1,471,600
Kazakhstan, primary	303,000	302,000	269,000	214,100 [r]	307,400
Korea, North, undifferentiated[e]	12,000	12,000	12,000	12,000	12,000
Korea, Republic of:					
Primary	449,200	477,300	478,800	500,000	510,000
Secondary[e]	89,800	144,500 [4]	125,100 [4]	120,000	130,000
Total[e]	539,000	621,800 [4]	603,900 [4]	620,000	640,000
Mexico:					
Primary	233,800	255,900	215,000	258,000 [r]	256,000
Secondary[e]	5,000	5,000	5,000	5,000	5,000
Total[e]	239,000	261,000	220,000	263,000 [r]	261,000
Namibia, primary[e]	43,800	39,800	38,100	49,600	49,000
Oman, primary[e]	12,000	12,000	12,000	12,000	12,000
Pakistan, primary	18,000	19,200	13,500	13,100	13,000 [e]
Peru, primary	299,004	290,088	320,000	314,600	327,900
Philippines, primary	205,000	97,000	181,900	153,000	189,000

See footnotes at end of table.

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

(Metric tons, gross weight)

Country	2011	2012	2013	2014	2015
Poland:					
Primary	481,900	466,700	458,800	503,000 r	515,000
Secondary	68,200	82,300	78,000	73,000 r	68,000
Total	550,100	549,000	536,800	576,000 r	583,000
Russia:e					
Primary	596,490 4	621,000	625,000	650,000	660,000
Secondary	242,640 4	254,000	255,000	230,000	220,000
Total	839,130 4	875,000	880,000	880,000	880,000
Serbia:e					
Primary	27,000	33,000	33,000	33,000	43,000
Secondary	1,000	1,000	1,000	1,000	2,000
Total	28,000	34,000	34,000	34,000	45,000
Slovakia, secondary	48,800	41,700	18,500	23,300	23,000 e
South Africa, primary	82,400	62,300	69,700	71,700 r	71,800
Spain:e					
Primary	231,300 r, 4	270,000	212,000	284,100 4	283,000
Secondary	21,700	25,000	14,000	10,000	10,000
Total	253,000	295,000	226,000	294,100 4	293,000
Sweden:					
Primary	162,000	151,000	140,000	150,000	150,000
Secondarye	45,000	56,000	59,000	60,000	60,000
Totale	207,000	207,000	199,000	210,000	210,000
Turkey, undifferentiated e, 5	25,000	25,000	31,500	35,000	35,000
United States, primary	538,000	485,000	516,000	522,000	527,000
Uzbekistan, primarye	92,000	96,000	98,000	100,000	100,000
Vietnam, primarye	8,000	8,000	8,000	8,000	8,000
Zambia, primary	520,000	519,000	520,000	526,000	649,000
Grand total	15,900,000	16,100,000	17,100,000	17,900,000	18,500,000
Of which:					
Primary	12,900,000 r	12,800,000 r	13,600,000 r	14,600,000 r	15,700,000
Secondary	3,000,000	3,280,000 r	3,440,000	3,300,000	2,780,000
Undifferentiated	37,000 r	37,000 r	43,500 r	47,000 r	47,000

eEstimated. rRevised.

[1]Grand totals, U.S. data, and estimated data are rounded to no more than three significant digits; may not add to totals shown.

[2]Includes total production of smelted copper metal, including low-grade cathode produced by electrowinning methods. The smelter feed may be derived from ore, concentrates, copper precipitate or matte (primary), and (or) scrap (secondary). To 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. Includes data available through August 16, 2017.

[3]Copper content of nickel-copper matte exported to Norway for refining.

[4]Reported figure.

[5]Secondary production is estimated to be about one-third of total.

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

(Metric tons)

Country[3]	2011	2012	2013	2014	2015
Argentina, secondary[e]	13,000	13,000	14,000	14,000	14,000
Australia, primary:					
Electrowon	35,600	38,000	35,000	40,000	39,000
Other	441,400	422,000	446,000	469,000	442,000
Total	477,000	460,000	481,000	509,000	481,000
Austria, secondary	112,500	113,600	82,800 [r]	83,200 [r]	83,000
Belgium:					
Primary	226,200	217,900	202,500	225,000	220,000
Secondary	168,000	178,800	186,900	160,000	160,000
Total	394,200	396,700	389,400	385,000	380,000
Bolivia, primary, electrowon	1,000	900	1,300	1,800	1,500 [e]
Brazil:					
Primary:					
Electrowon	4,550	4,374	4,060	700 [r, e]	--
Other	218,000	182,000	230,000	213,000 [e]	216,000 [e]
Total	222,550	186,374	234,060	213,700 [r]	216,000 [e]
Secondary	22,800	24,700	27,800	24,000 [r]	25,000 [e]
Total, primary and secondary	245,350	211,074	261,860	237,700 [r]	241,000 [e]
Bulgaria:					
Primary	201,100	201,000	204,000	209,000	205,000
Secondary[e]	25,000	25,000	25,000	25,000	25,000
Total	226,100	226,000	229,000	234,000	230,000
Burma, primary, electrowon[e]	9,000	19,000	20,000	33,200	46,900
Canada:					
Primary:					
Electrowon	1,000	900	--	--	--
Other	244,000	246,000	292,200	295,000	301,000
Total	245,000	246,900	292,200	295,000	301,000
Secondary[e]	30,000	30,000	30,000	30,000	30,000
Total, primary and secondary	275,000	276,900	322,200	325,000	331,000
Chile, primary:					
Electrowon	2,024,800	2,028,800	1,932,900	1,844,000 [r]	1,778,400
Other	1,067,600	873,200	822,000	885,400	910,000
Total	3,092,400	2,902,000	2,754,900	2,729,400 [r]	2,688,400
China:[e]					
Primary:					
Electrowon	40,000 [r]	40,000 [r]	40,000	40,000	40,000
Other	3,270,000 [r]	3,930,000	4,650,000 [r]	4,780,000 [r]	4,920,000
Total	3,310,000 [r]	3,970,000 [r]	4,690,000 [r]	4,820,000 [r]	4,960,000
Secondary	1,850,000	1,910,000 [r]	1,980,000 [r]	2,830,000 [r]	3,000,000
Total, primary and secondary	5,160,000 [r]	5,880,000 [r]	6,670,000 [r]	7,650,000 [r]	7,960,000
Congo (Kinshasa), primary, electrowon[e]	362,000	473,000	685,000 [r]	878,000 [r]	878,000
Cyprus, primary, electrowon	3,660	4,328	3,631	3,090	2,120
Egypt, secondary[e]	3,000	3,000	3,000	3,000	3,000
Finland:[e]					
Primary	117,000	120,000	120,000	130,000	126,000
Secondary	9,000	9,000	9,000	10,000	10,000
Total	126,000	129,000	129,000	140,000	136,000
Germany:					
Primary	401,200	390,000	390,000	391,900	397,200
Secondary	308,000	295,700	287,600	285,000	281,000
Total	709,200	685,700	677,600	676,900	678,200
India:					
Primary, other, electrolytic	671,100	690,000	610,000	756,000 [r]	782,000
Secondary[e]	2,000	10,000	12,000	10,000	10,000
Total	673,100	700,000	622,000	766,000 [r]	792,000

See footnotes at end of table.

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

(Metric tons)

Country[3]	2011	2012	2013	2014	2015
Indonesia, primary:					
Electrowon	900 [e]	--	--	1,400	1,200
Other	274,900	197,200	214,300	231,800	198,400
Total	276,000 [e]	197,200	214,300	233,200	199,600
Iran:					
Primary:[e]					
Electrowon	10,100	12,000	14,000	15,000	13,000
Other	149,000	136,000	121,000	120,000	114,000
Total	159,000	148,000	135,000	135,000	127,000
Secondary	68,000	78,000	56,000	60,000	60,000
Total, primary and secondary[e]	227,000	226,000	191,000	195,000	187,000
Italy, secondary[e]	2,000	2,000	5,000 [r]	8,000 [r]	7,000
Japan:					
Primary	1,094,360	1,270,900	1,210,200	1,294,000	1,243,000
Secondary	233,238	245,400	257,900	260,000 [e]	240,000
Total	1,327,598	1,516,300	1,468,100	1,554,000	1,483,000
Kazakstan, primary:					
Leaching, electrowon[e]	-- [4]	7,000	12,200 [4]	12,400	13,000
Other	338,346	367,177	352,061	294,000	392,500
Total[e]	338,346 [4]	374,000	364,261 [4]	306,000	406,000
Korea, North, primary[e]	12,000	12,000	12,000	12,000	12,000
Korea, Republic of:					
Primary	486,900	493,200	495,400	490,000	515,000
Secondary	106,600	96,200	109,800	110,000	134,000
Total	593,500	589,400	605,200	600,000	649,000
Laos, primary, electrowon	78,860	86,295	90,000	88,500	89,300
Macedonia, primary, electrowon	--	1,100	1,900	1,700 [r]	2,300
Mexico:[e]					
Primary:					
Electrowon	147,000	158,000	163,000	188,000	214,000
Other	251,000	215,000	188,000	204,000	213,000
Total	398,000	373,000	351,000	392,000	427,000
Secondary	5,000	5,000	5,000	5,000	5,000
Total, primary and secondary	403,000	378,000	356,000	397,000	432,000
Mongolia, primary, electrowon	2,400	2,100	2,100	2,100 [e]	2,100
Namibia, primary, electrowon	--	--	--	--	10,659
Norway, primary[e, 5]	35,700	37,900	37,500	35,800	35,500
Oman, primary	16,000	16,000	16,000	16,000	16,000
Peru, primary:					
Electrowon	140,341	101,174	89,658	83,800	73,100
Other	227,320	210,119	271,792	263,600	279,900
Total	367,661	311,293	361,450	347,400	353,000
Philippines, primary	164,000	90,400	153,000	130,000	133,000
Poland:					
Primary	489,000	464,900	450,600	469,100	420,000
Secondary	81,900	100,800 [r]	114,500	107,800	154,300
Total	570,900	565,700 [r]	565,100	576,900	574,300
Russia:[e]					
Primary:					
Electrowon	2,700	2,000	2,000	2,000	2,000
Other	663,200	635,000	650,000	660,000	650,000
Total	666,000	637,000	652,000	662,000	652,000
Secondary	220,400	209,400	220,000	220,000	210,000
Total, primary and secondary	886,000	846,000	872,000	882,000	862,000

See footnotes at end of table.

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

(Metric tons)

Country[3]	2011	2012	2013	2014	2015
Serbia:					
Primary	25,251	32,229	32,606	31,600 r	42,700
Secondary	3,198	2,473	3,234	1,600 r	1,900
Total	28,449	34,702	35,840	33,200 r	44,600
South Africa, primary	86,166	66,416	80,821	87,700 r	77,000
Spain:					
Primary:					
Electrowon	42,100	67,700	69,300	71,100	70,000
Other	247,400 r	274,400 r	226,000 r	283,000 r	284,800
Total	289,500 r	342,100 r	295,300 r	354,100 r	354,800
Secondary	86,000	88,300	68,200	73,000	70,000
Total, primary and secondary	375,500 r	430,400 r	363,500 r	427,100 r	424,800
Sweden:e					
Primary	179,316 4	174,000	166,000	177,000	161,000
Secondary	40,000	40,000	40,000	40,000	45,000
Total	219,000	214,000	206,000	217,000	206,000
Turkey:e					
Primary	81,500	81,300	72,000	65,000	65,000
Secondary	5,000	5,000	5,000	5,000	5,000
Total	86,500	86,300	77,000	70,000	70,000
Ukraine, secondarye	20,000	20,000	20,000	20,000	20,000
United States:					
Primary:					
Electrowon	447,000	471,000	475,000	514,000	589,000
Other	545,000	491,000	518,000	535,000	503,000
Total	992,000	962,000	993,000	1,050,000	1,090,000
Secondary	37,300	39,400	46,900	46,000	48,800
Total, primary and secondary	1,030,000	1,000,000	1,040,000	1,090,000	1,140,000
Uzbekistan, primarye	91,500	95,600	98,000	99,500	100,000
Vietnam, primarye	8,000	8,000	8,000	8,000	8,000
Zambia, primary:e					
Electrowon	142,000 r	178,000 r	201,000 r	188,000 r	162,000
Other	369,000	344,000	327,000	290,000 r	309,500
Total	511,000 r	522,000 r	528,000 r	478,000 r	472,000
Zimbabwe, primarye	4,355 4	5,000	5,000	5,000	5,000
Grand total	19,600,000 r	20,200,000	21,100,000	22,600,000 r	23,000,000
Of which:					
Primary:					
Electrowon	3,500,000 r	3,700,000 r	3,840,000 r	4,010,000 r	4,030,000
Other	12,700,000 r	13,000,000	13,700,000 r	14,200,000	14,300,000
Total	16,200,000 r	16,700,000	17,500,000 r	18,200,000 r	18,300,000
Secondary	3,450,000 r	3,540,000 r	3,610,000 r	4,430,000 r	4,640,000

eEstimated. rRevised. -- Zero.

[1]Grand totals, U.S. data, and estimated data are rounded to no more than three significant digits; may not add to totals shown.

[2]Includes total production of refined copper whether produced by pyrometallurgical or electrolytic refining methods and whether derived from primary unrefined copper or from scrap. Copper cathode derived from electrowinning processing is also included. Includes data available through August 16, 2017.

[3]In addition to the countries listed, Thailand produced secondary copper, but available information was inadequate to make reliable estimates of output.

[4]Reported figure.

[5]May include secondary.