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# 2005 Minerals Yearbook

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In the United States, mine production of recoverable copper in 2005 declined by 20,000 metric tons (t) (1%) to 1.140 million metric tons (Mt) primarily owing to a 16-week strike that sharply curtailed production by a major producer. Downstream, U.S. smelter and refinery production declined by 3.5% and 4%, respectively, in part owing to increased exports of copper in concentrates. Equipment and labor shortages also delayed expansions and startup of new operations. Electrowon production of refined copper from the leaching of copper ores, which declined for the fourth consecutive year, fell by 30,000 t and accounted for 49% of mine output and 44% of refined copper production. Reported domestic consumption of refined copper in 2005 fell by 6% to 2.27 Mt and was at its lowest level since 2001.

Global mine production of copper in 2005 rose for the second consecutive year, increasing by 350,000 t (2.4%) to a record-high 15.1 Mt. Owing to production shortfalls in the United States and South America, however, global mine production fell short of its anticipated growth, and mine capacity utilization fell to its lowest level in recent years. The United States accounted for 8% of world production and narrowly retained its position as the world's second ranked mine producer. Chile, where mine production declined by 90,000 t (2%), remained the leading mine producer and accounted for more than 35% of total world production. Global smelter and refinery production rose by 5% and 4%, respectively. The United States fell to seventh place behind India in world smelter production and remained fourth in refinery output behind Chile, China, and Japan.

Global consumption of refined copper fell by 140,000 t (1%) (International Copper Study Group, 2006a, p. 19-20). Strong growth in Asia from China and India was more than offset by reduced use by other significant consuming regions. China, where apparent consumption of refined copper grew by 8%, remained the world's leading consumer of refined copper with an estimated 22% market share.

Copper prices trended upward throughout the year, and by yearend, the COMEX (COMEX Division of the New York Mercantile Exchange) spot price reached a record-high value of more than $2.00 per pound of copper. Production of refined copper was insufficient to meet global demand, and the refined copper production deficit that had developed during the preceding 2 years continued through most of 2005. Estimated global inventories of refined copper continued their downward trend and were down by 70,000 t at yearend (International Copper Study Group, 2006a, p. 21). This shortfall happened despite the growth in world production of refined copper and the decline in refined copper consumption.

The U.S. Geological Survey estimated that world copper reserves were 480 Mt and that the world copper reserve base was 940 Mt. The United States had 7% each of the world's copper reserves and reserve base. A recent assessment of U.S. copper resources indicated 550 Mt of copper in identified (260 Mt) and undiscovered resources (290 Mt), more than double the previous estimate (U.S. Geological Survey National Mineral Resource Assessment Team, 2000, p. 14). Similarly, a preliminary assessment of global copper resources indicated that global land-based resources exceed 3 billion metric tons, about double the previously published estimate.

The principal mining States for copper, which in descending order of production were Arizona, Utah, New Mexico, Nevada, and Montana, accounted for 99% of domestic production; copper was also recovered at mines in Idaho, Missouri, and Nevada. Although copper was recovered at 24 mines that operated in the United States, 14 mines accounted for more than 99% of production. The remaining 10 mines were either small leach operations or byproduct producers of copper.

During the year, 3 primary smelters, 4 electrolytic and 3 fire refineries, and 13 solvent extraction-electrowinning (SX-EW) facilities operated in the United States. The three fire refineries processed scrap to recover unalloyed copper products. Scrap was also consumed in relatively small quantities at several of the primary smelters. U.S. smelter and refinery capacity remained essentially unchanged at approximately 900,000 t and 2.25 Mt, respectively, and capacity utilization fell to 58% and 57%, respectively. Included in 2005 smelter capacity was Phelps Dodge Corp.'s (Phoenix, AZ) 190,000-metric-ton-per-year (t/yr) Hurley, NM, smelter. The smelter had been retained in care-and-maintenance status since closing in 2001, but in October 2005 the company announced that it was closing permanently and being dismantled.

In 2005, copper recovered from refined or remelted scrap (80% from new scrap and 20% from old scrap) composed 30% of the total U.S. copper supply. The conversion of old scrap to alloys and refined copper fell by 5% to 182,000 t of recoverable copper. The quantity of copper recovered from new scrap (769,000 t) was essentially unchanged from that of the previous year. Copper was consumed as refined copper and as direct melt scrap at approximately 30 brass mills, 14 wire-rod mills, and 500 chemical plants, foundries, and miscellaneous operations.

Owing to sustained low capacity utilization at U.S. refineries, the net import reliance for refined copper as a percentage of apparent consumption (42%) remained close to the record-high level of 43% in 2004. Imports of refined copper rose by approximately 200,000 t to 1 Mt of refined copper; Chile, Canada, and Peru, in decreasing order, accounted for 88% of refined copper imports. Despite lower domestic consumption, the rise in imports reflected lower copper inventory levels from which to draw. Domestic inventories, which had declined by 522,000 t in 2004, declined by only 68,000 t in 2005.

## Legislation and Government Programs

In 2003, the U.S. Environmental Protection Agency (EPA), as part of its review of existing drinking water standards for 69 substances (including lead and copper) for which national primary drinking water regulations were established prior to 1997, affirmed its conclusion that the established maximum contaminant level goal for copper of 1.3 milligrams per liter should be retained pending collection of additional data on health risks. Owing to high-profile incidences of elevated drinking water lead levels in the District of Columbia, the EPA initiated a national review and held a series of workshops in 2004 to discuss issues associated with implementation of the lead and copper rule. As a result of the review and workshops, the EPA released a drinking water lead reduction plan in March 2005 that identified nine actions to improve implementation of the rule. In 2006, these actions were consolidated into seven proposed changes aimed at reducing public exposure to lead in drinking water. While copper levels were not targeted, several actions, including the advance notification and approval of changes to water treatment that could affect a water system's corrosion control and proposed timelines for allowing plumbing replacement as a treatment option for reducing lead or copper levels, could affect the use of copper and copper alloys in water supply markets (U.S. Environmental Protection Agency, 2006).

On April 1, the Import Administration, International Trade Administration, U.S. Department of Commerce, initiated expedited sunset reviews of the antidumping and countervailing duty orders against brass sheet and strip from several countries including Brazil, Canada, France, Italy, and Japan. The material was classified under codes 7409.21.00 and 7409.29.00 of the Harmonized Tariff Schedule of the United States. In all cases, the U.S. Department of Commerce found that revocation of duties would likely lead to recurrence of dumping or countervailing subsidy (U.S. Department of Commerce, 2005a, b).

## Production

Mine production in the United States declined slightly in 2005 despite expectations of higher output held at yearend 2004. On July 2, workers at ASARCO Incorporated's (Asarco) (Phoenix, AZ) mines and facilities began a strike that lasted 16 weeks and sharply curtailed mine output. Unusually heavy rains in parts of Arizona in the first half of the year reduced SX-EW output, and equipment and labor shortages throughout the industry delayed expansions and mine startups. Quadra Mining Ltd. (Vancouver, British Columbia, Canada) reported that slope stability problems at the Tripp-Veteran pit (Robinson Mine, NV) forced the company to divert equipment to deweight a section of pit wall and to switch some production to lower grade and more metallurgically difficult ore that Quadra had not planned on mining until the first quarter of 2006. This reduced anticipated annual production by approximately 7,000 t of copper in concentrate (Quadra Mining, Ltd., 2005).

Downstream copper smelter and refinery production declined owing to the Asarco strike, shutdown of Asarco's smelter in Hayden, AZ, in October for repairs, and reduced SX-EW production, which in part resulted from dilution of leach solutions from heavy rains. Three primary smelters and four primary electrolytic refineries operated during 2005. The Miami electrolytic refinery in Arizona and the Chino smelter in New Mexico that closed in 2002 were retained on care-and-maintenance status until their official closure in October (Phelps Dodge Corp., 2005).

***Company Reviews.***—On July 2, workers at Asarco's Ray Mine in Arizona began a strike that soon spread to its other Arizona facilities (Hayden smelter and Mission and Silver Bell Mines) and its Amarillo, TX, refinery. The strike followed expiration of the contract between Asarco and the United Steelworkers Union at Ray. Prior to the strike, workers at Asarco's other facilities had continued to work under the terms of a previous contract that had expired in July 2004. On July 13, Asarco declared a force majeure on all outbound refined copper products from its Amarillo complex, including wire rod. Asarco was wholly owned by Grupo Mexico, S.A. de C.V. (Mexico City, Mexico) through its subsidiary, Americas Mining Corp. (Barry, 2005b, c; Brooks, 2005).

The strike by about 1,500 Asarco workers remained unsettled when Asarco filed for Chapter 11 bankruptcy protection from creditors on August 10. Grupo Mexico cited high production costs, high environmental and asbestos liabilities, and the prolonged general strike as the reasons for the filing. Owing to the need for increased stripping and the highest rainfall in 10 years at the Ray Mine, Asarco's break-even cash costs rose to $1.14 per pound of copper in 2005, up from $0.95 per pound in the second quarter of 2004. Analysts estimated that Asarco's environmental liabilities could exceed $1.9 billion (Barry, 2005d; Grupo Mexico, S.A. de C.V., 2005, p. 9; Millman, 2005; Platts Metals Week, 2005c; ASARCO LLC, undated §[1])

Workers at Asarco voted on November 12-13 to end their strike, though ramp-up to full production was not expected until February 2006. The new contract extended the terms of their existing contract through the end of 2006 but included a successorship clause that required any buyer of Asarco to recognize and negotiate with the union (Barry, 2005§). Grupo Mexico reported mine production, through bankruptcy filing, of 53,700 t of copper in concentrate and 32,700 t of electrowon copper and total refined production of 80,000 t (Grupo Mexico, S.A. de C.V., 2006, p. 13-14). Full-year 2005 cathode production was projected to be 150,000 t, down from a prestrike projection of 220,000 t (Barry, 2005a).

Copper production from BHP Billiton's (Melbourne, Australia) and residual Arizona leach operations at Miami and Pinto Valley totaled 8,800 t in 2005, down from 9,500 t in 2004 (BHP Billiton, 2006, p. 16). In January, Resolution Copper Company [owned 55% by Rio Tinto plc (London, United Kingdom) and 45% by BHP Billiton] announced that it would resume its drilling program as part of a comprehensive 5-year, $200 million feasibility study aimed at providing necessary data to plan for construction of the project. Resolution was formed to evaluate a large copper sulfide deposit located at a depth of approximately 2 kilometers (km) below the surface beneath BHP Billiton's shuttered Magma Mine, which operated from 1912 through 1996 in the Pioneer mining district east of

[1]References that include a section mark (§) are found in the Internet References Cited section.

Superior, AZ. If mine development were to proceed, Rio Tinto didn't anticipate production prior to 2014 (Resolution Copper Company, 2005).

Constellation Copper Corp. (Denver, CO) announced that it began applying acid solution to its leach dumps at its Lisbon Valley Mine in Utah on December 19. Startup of SX-EW cathode had been anticipated during the fourth quarter of the year, but completion of the SX-EW facilities had been delayed by a shortage of pipefitters, and construction was not completed until mid-January 2006, with the first cathode produced later during the first quarter. By mid-October 2005, mining of ore had reached its projected capacity of 24,000 metric tons per day (t/d). In May, Constellation announced that it had discovered an additional copper deposit at the Flying Diamond exploration target and additional drilling continued through the year (Constellation Copper Corp., 2005a, b; 2006).

Nord Resources Corporation (Dragoon, AZ) continued working toward reopening of its Johnson Camp Mine located in southern Arizona, which last produced in August 2003. In January, Nord completed the purchase of a crusher and, in October, completed an update of the 2000 feasibility study. In order to resume full mining operations, Nord anticipated a capital requirement in excess of $22 million during its first 2 years of operation for rehabilitation and expansion of facilities and installation of crushing and conveying equipment. Restart was subject to obtaining the necessary financing and mining permits. Operations at Johnson Camp would involve removal of 4,500 t/d of overburden and mining about 8,000 t/d of ore to produce about 9,000 t/yr of electrowon cathode (Nord Resources Corp., 2006).

In 2005, Phelps Dodge reported copper production of 1.17 Mt, which included minority participants' share of 223,000 t, from its worldwide operations, compared with 1.20 Mt and 220,000 t, respectively, in 2004. U.S. production in 2005 was 671,000 t of copper (515,000 t electrowon and 168,000 t in concentrate), a decrease of 13,000 t from that in 2004 (Phelps Dodge Corp., 2006, p. 9).

Production of electrowon copper at the Morenci Mine complex in Arizona of 363,000 t was down by 18,000 t. The complex comprised an open pit, a concentrator, four solvent extraction (SX) facilities, and three electrowinning tankhouses. In June, Phelps Dodge announced that it would spend $210 million to construct the first-ever commercial-scale copper concentrate leaching and direct electrowinning facility at Morenci. The facility would employ proprietary pressure leaching technology developed by Phelps Dodge and under demonstration at the Bagdad Mine in Arizona to process copper ores containing a mix of primary and secondary copper sulfide minerals. Restart of the idled Morenci concentrator was included in the cost and project development. The new concentrate leaching facilities were to be incorporated into the existing leaching and electrowinning complex at Morenci. Concentrate leach production, slated for startup in 2007, would replace an expected decline in Morenci's heap leach output later in this decade. The actions at Morenci affected plans for several other Phelps Dodge facilities in Arizona and New Mexico, including the Miami refinery in Arizona, the Chino smelter in New Mexico, and the Tyrone and Cobre Mines in New Mexico. The affected assets were determined by Phelps Dodge to be "impaired," and the idled Chino smelter and Miami refinery were permanently closed (Phelps Dodge Corp., 2005).

Production at the Bagdad Mine in Arizona declined to 91,300 t (76,900 t in net concentrate production and 14,300 t electrowon) from 99,900 t of copper in 2004. Electrowon production was reduced in part by a temporary conversion in May (7-month duration) of the high-temperature concentrate pressure-leaching demonstration plant to medium temperatures to test an alternative technology that consumes less acid and oxygen (Phelps Dodge Corp., 2006, p. 13).

At the Sierrita Mine in Arizona, copper production rose by about 2,000 t to reach 80,000 t. Electrowon production rose to 6,800 t. The electrowinning tankhouse had been shuttered during much of 2004 owing to expiration of its land lease that was subsequently renewed. In early 2006, production began at a new 18,000-t/yr copper sulfate plant (Phelps Dodge Corp., 2006, p. 3).

At the Chino Mine in New Mexico, the sulfide ore mill operated at 80% of capacity throughout the year, and production rose to 46,000 t from 27,000 t in 2004. Electrowon production fell to 49,000 t from 56,000 t in 2004 owing to lower ore grade and reduced placement of ore on leach stockpiles. Though rehabilitation work continued in the first half of the year at the Cobre Mine, based on higher estimated restart and operating costs from its decision to permanently close the Chino smelter, Phelps Dodge claimed a $59.9 million pretax impairment charge against Cobre in June. Phelps Dodge reclassified most of Cobre's millable reserves as leach reserves because new mine plans excluded reopening the mill. At the Tyrone Mine, production of electrowon copper fell to 36,700 t from 39,000 t in 2004. Phelps Dodge focused on reclaiming stockpiles around the perimeter of the property, which effectively increased operating costs while reducing reserves by 14% (Phelps Dodge Corp, 2006, p. 3-15).

At Miami, AZ, Phelps Dodges's electrowon production rose to 11,200 t of copper from 8,900 t in 2004. Mining of leach material, which happened last in 2001, remained suspended, though Phelps Dodge reported Miami reserves to be 102,000 t of leach ore grading 0.37% copper. Production of refined copper at its El Paso, TX, refinery declined to 267,000 t from 280,000 t in 2004, well below its capacity of about 410,000 t (Phelps Dodge Corp., 2006, p. 3-11).

Robinson Nevada Mining Company (RNMC) (a wholly owned subsidiary of Quadra Mining Ltd.,Vancouver, British Columbia, Canada), produced 227,000 t of copper concentrate containing 57,200 t of copper during its first full year of operation from the Tripp area of the Tripp-Veteran pit at the Robinson Mine. Though in 2004 it contracted with Washington Group International (Boise, ID) to conduct its mining operations, by yearend 2005, RNMC had assumed control of mining operations. Total reported cash costs of $1.16 per pound of copper were higher than anticipated owing to lower head grades, lower than anticipated recoveries, and higher smelting and utility costs. The stripping ratio (ore:waste), which averaged 4.0 for the year, increased throughout the year as the company worked to expose ore in the Veteran area of the pit. At yearend, proven and probable reserves had increased to more than 145 Mt of ore grading 0.69% copper and 0.25 grams per metric ton (g/t) gold (Quadra Mining Ltd., 2006, p. 1-7).

During the fourth quarter of 2005, Quadra completed the acquisition of the Carlota project in the Globe/Miami mining district in Arizona from Cambior Inc. (Longueuil, Quebec, Canada) for an aggregate of about $23 million. Carlota was projected to be an open-pit leach operation with an 11-year mine life and an average production rate of about 30,000 t/yr of copper (Quadra Mining Ltd., 2006, p. 7).

At Rio Tinto's Bingham Canyon Mine in Utah, production of copper in concentrate fell by 16% to 221,000 t despite slightly higher mill throughput. Copper mill-head grade declined to 0.53% copper from 0.63% copper in 2004 owing to optimization of mine production in favor of molybdenum. Average molybdenum grades nearly doubled to 0.058% molybdenum from 0.033% in 2004. Smelter and refinery production, however, fell by only 4% and 6% to 229,000 t and 232,000 t, respectively, owing to the processing of stockpiled concentrates and a 2-week smelter maintenance shutdown that had reduced production during the fourth quarter of 2004 (Rio Tinto plc., 2005a, p. 16; 2005b, p. 14).

## Consumption

Despite a 5% increase in reported consumption in 2004, a downturn in the market that developed in the fourth quarter of the year continued into 2005, and reported domestic consumption of refined copper in 2005 plummeted by 6% to the lowest level since 1992. While U.S. production and shipments of wire rod declined by 8% and 7%, respectively, apparent consumption (domestic shipments plus net trade) rose slightly to 1.9 Mt. Net imports of wire rod more than doubled to 220,000 t and accounted for 12% of apparent consumption (American Bureau of Metal Statistics, Inc., 2006b). Despite a strong fourth quarter finish, brass mill product shipments by domestic producers declined nominally in 2005 to 770,000 t from 780,000 t in 2004. The copper tube market, which rose to 282,000 t from 276,000 t in 2004, was the only market segment to show a significant increase (American Bureau of Metal Statistics, Inc., 2006a).

The estimated total supply of copper and copper-alloy products to the U.S. market by fabricators (brass mills, wire mills, foundries, and powder producers), which included net imports, declined by 6% in 2005 from that in 2004 and was at about the same level as in 2003. Brass mill products accounted for 50% of total shipments to the domestic market; wire mill products, 48%; and foundry and powder products, 2%. In building construction, which was the leading end-use sector, total mill shipments declined by 9% and accounted for 49% of the market. Building construction included products used for air conditioning, architectural applications, builder's hardware, building wire, commercial refrigeration, and plumbing and heating. Shipments for electric/electronic products (20% market share), consumer and general products (11% market share), transportation equipment (11% marketshare), and industrial machinery (9% market share) declined by 3%, 5%, 5%, and 2%, respectively (Copper Development Association, Inc., 2006, p. 18-21).

## Prices and Stocks

Following a sharp rise in prices at yearend 2004, the COMEX price having peaked at $1.54 per pound of copper on December 28, copper prices moderated slightly during the first quarter of the year with the COMEX price averaging about $1.47 per pound for the first quarter. Copper prices renewed their upward trend in April, when the COMEX price averaged $1.49 per pound, the highest monthly average since January 1989. In March and April, the London Metal Exchange Ltd. (LME) spot price premium over the COMEX price averaged 4.6 cents per pound and 4.0 cents per pound, respectively. This uncharacteristically large spread was last seen briefly in 1996 and compared with an average premium of only about 1 cent per pound in 2004. World commodity exchange stock levels during both periods of high price differential were at extremely low levels by historical standards. In 1996, exchange inventories fell to below 200,000 t, from a peak of almost 700,000 t in 1993, and by the end of March 2005, exchange stocks had fallen to approximately 100,000 t from 1.3 Mt in 2002.

Copper began a more precipitous rise during the third quarter of the year. With copper inventories at minimal levels, copper prices became extremely sensitive to announced production disruptions. Production disruptions in the United States, including the Asarco strike, pitwall problems at the Robinson Mine, and reduced production at the Bingham Canyon Mine, as well as global disruptions, such as a week-long strike at the beginning of July at the 140,000 t/yr-of-copper Zaldivar Mine in Chile helped to stimulate the midyear price rise (Placer-Dome Inc., 2005).

During the fourth quarter of the year, copper prices continued to move upward to successive record-high levels. The COMEX price averaged $2.01 per pound of copper in November and $2.17 per pound in December, closing the year at $2.16 per pound. A particularly tight U.S. market for copper led to an increasing spread between LME and COMEX prices, which averaged $0.10 per pound in December. The price rise was in part fueled by speculation in mid-November that a trader acting on behalf of China's State Reserve Bureau (SRB) had built a substantial short position by selling forward copper contracts containing an estimated 100,000 to 200,000 t of copper on the LME and that releases totaling about 60,000 t of copper from SRB stockpiles over the preceding months were intended to ease supply constraints and lower copper prices (Platts Metals Week, 2005a). The reported December expiration date for the forward contracts came and went without disruption, and speculation was that the initial SRB short position had been overestimated (Bresnick, 2005§).

Copper scrap prices generally followed the upward trend in refined copper prices. With higher refined prices, however, the discount of most grades of copper scrap to refined copper increased. The American Metal Market average price discount for refiners No. 2 scrap rose to 31 cents per pound from 21 cents per pound in 2004 and 11 cents per pound in 2003, and the discount for brass mill No. 1 scrap rose to 15 cents per pound from about 3 cents per pound in 2004.

## Trade

With limited exchange stocks to draw upon, the shortfall in domestic copper production relative to demand was satisfied by an increase in imports of refined copper. Net refined copper

imports in 2005 rose to 961,000 t from 689,000 t in 2004. U.S. net import reliance as a percentage of apparent consumption, which includes copper recovered from old scrap, declined to 42% from the record-high 43% in 2004. Chile was the leading source of unwrought copper products from 2001 through 2005 and accounted for 34% of unmanufactured imports, followed by Canada (33%) and Peru (19%). Refined copper accounted for 78% of unwrought copper imports during the same period. The U.S. Census Bureau reported that exports of contained copper in concentrates rose to 147,000 t in 2005 from 24,000 t in 2004. Though an increase was anticipated from a full-year of operation of both the Robinson Mine and the Continental Pit in Montana, the balance between U.S. concentrate production and U.S. smelter production indicates that it is likely that Census Bureau data overstated the copper content of exports, tabulating some data on a gross weight basis instead of the purported copper basis.

U.S. Census Bureau data compiled by the Copper and Brass Fabricators Council Inc. (2006, p. 1-9) indicate that imports of 286,000 t of copper and copper-alloy semifabricated products (excluding wire-rod mill products) were down by 12% from those of the previous year, and exports rose to 164,000 t from 143,000 t in 2004. Consequently, net imports declined to 122,000 t in 2005 from 184,000 t in 2004. In 2005, Canada and Mexico collectively accounted for 71% of semifabricated copper exports and 28% of imports.

Exports of copper scrap for 2004 totaled 643,000 t, down from 714,000 t in 2004. China (including Hong Kong) was the destination for 61% of domestic scrap exports and accounted for 71% of reported global scrap imports. The United States remained the leading source of scrap, accounting for 17% of reported global scrap exports. However, there is a large discrepancy between reported global exports of scrap (3.76 Mt) and reported imports (7.0 Mt) (International Copper Study Group, 2006a, p. 41-44).

In 2004, the U.S. Census Bureau reported that the value of Russian wire-rod imports totaled $132 million and therefore exceeded the threshold limit of $115 million allowable under the Generalized System of Preferences (GSP). As a result, wire-rod imports from Russia lost their duty-free status effective July 1, 2005, and were then subject to a 3% ad valorem tariff. In 2003, Russia had been the second ranked source of wire-rod imports in to the United States, behind Canada but fell to third behind Mexico in 2004. Despite the loss of duty-free status, imports of wire rod from Russia rose to 102,000 t in 2005 from 29,000 t in 2004.

Russian export tariffs favored the export of value-added products, resulting in greater domestic consumption of refined copper and an increase in exports of copper and copper-alloy semifabricates, which rose to 350,000 t in 2005 from only 59,000 t in 2001, while Russian exports of refined copper fell to 301,000 t in 2005 from 585,000 t in 2001.

## World Industry Structure

While world production of refined copper rose to 16.6 Mt, an increase of 700,000 t from that in 2004, world copper use declined by 1% to 16.63 Mt (International Copper Study Group, 2006a, p. 19). The combined impact of higher production and lower copper use resulted in a global production deficit of only 50,000 t. This followed on the heels of a large production deficit that totaled about 1.3 Mt from 2003-2004. Global world reported stocks fell by about 1.13 Mt over the same period and began 2005 at only 920,000 t or, at the prevailing rate of consumption, less than a 3-week supply (International Copper Study Group, 2006a, p. 21). Inventories held on the global commodity exchanges totaled only 124,000 t, down from 1.3 Mt at the beginning of 2003. The limited inventory coupled with the production deficit in 2005 created upward pressure on global prices and market sensitivity to announced supply disruptions. The discrepancy between the calculated production deficit and stock drawdown can readily be accounted for by the release of unreported inventories, especially those in China, the leading global consumer of copper.

While world smelter and refinery production rose by 700,000 t, world mine production rose by only 400,000 t to 15.1 Mt, with all of the increase coming as copper in concentrate. Mine capacity, however, rose by approximately 900,000 t, and capacity utilization fell to 89.4% in 2005 from 92.9% in 2004 and was at its lowest level in 10 years (International Copper Study Group, 2006b, p. 16-63). Spot treatment and refining charges at global smelters, which had fallen to almost zero at the beginning of 2004 before rising to about 34 cents per pound of copper during the fourth quarter, continued to rise during 2005 and averaged about 40 cents per pound of copper during the fourth quarter of the year (CRU International Ltd., 2006, p. 53-57). During 2004, smelters reportedly had taken advantage of a surge in concentrate availability and a rise in treatment and refining charges to rebuild diminished inventories rather than boost their output. Capacity utilization at global smelters fell to 83.1% from 84.0% in 2004 owing to a 900,000-t increase in smelter capacity (International Copper Study Group, 2006a, p. 13-14; 2006b, p. 13).

The 3-year growth in world use of refined copper stalled in 2005, and world use of copper fell to 16.63 Mt from 16.77 Mt in 2004. Asia was the only major copper consuming region of the world to experience a growth in refined copper use: Growth in apparent use in China (8%) and India (19%) overshadowed lower consumption in Japan (4%), the Republic of Korea (9%), and Taiwan (8%). In North America, only Mexico experienced a growth in use (International Copper Study Group, 2006a, p. 9-10).

Consolidation of the global copper industry continued in 2005. In North America, Canadian mining companies Noranda Inc. and Falconbridge Ltd. announced in March that they would combine the assets of the two companies under the name NorandaFalconbridge by way of a "share exchange take-over bid by Noranda." Noranda already owned 58.8% of Falconbridge. The merged entity had a production capacity of more than 550,000 t/yr of refined copper, 530,000 t/yr of zinc, and 100,000 t/yr of nickel and a fully integrated aluminum unit. The two companies already held joint interests in the Kidd Creek Mine and metallurgical facilities in Canada and the Collahuasi and Lomas Bayas Mines in Chile. The merger was completed in June, and despite the initial announcement, the merged companies carried only the Falconbridge name (Noranda Inc., 2005; Platts Metals Week, 2005b).

In a second industry consolidation, BHP Billiton (United Kingdom and Australia) announced in March that the board of

directors of WMC Resources Ltd. (Australia) had recommended that its shareholders accept a takeover offer from BHP Billiton of $A7.85 per share for the entire issued capital of WMC Resources, thus ending a bid for control of WMC by Xstrata Plc (Switzerland) that had begun in October 2004. In June, BHP Billiton announced that it had secured more than 90% of WMC shares and that it would then proceed to compulsorily acquire the balance. The principal asset in the acquisition was WMC's Olympic Mine Dam, the world's fourth largest identified copper resource, one of the world's ten largest gold deposits, and a major producer of uranium ore. BHP Billiton already controlled a majority interest in Escondida (Chile), the world's leading copper mine and largest identified resource (BHP Billiton, 2005a, b).

## World Review

***Mine production.***—In 2005, world mine capacity continued its strong upward growth, increasing by 900,000 t (5.6%). There was significant capacity growth in Indonesia (260,000 t), Zambia (150,000 t), Chile (130,000 t), China (65,000 t), Brazil (60,000 t), Australia (50,000 t), and Iran (30,000 t). In Indonesia, effective capacity had been reduced by about 280,000 t in 2004 from its engineered capacity when landslides limited access to high-grade ore in the Grasberg Mine (International Copper Study Group, 2006b, p. 12-63).

**Australia.**—Several new mines began operation during the year. At the Whim Creek Mine (Straits Resources Ltd., Perth, Australia), electrowon cathode production began in June, and by mid-October, the mine reportedly was operating at its full capacity of 17,000 t/yr of cathode. Production of concentrate at the Tritton underground mine (also owned by Straits Resources) began in April, and the company shipped more than 78,000 t of concentrate in 2005. Annual capacity was projected to be 25,000 t/yr of copper in concentrate over an 11-year life (Straits Resources Ltd., 2006, p. 10-12). The Telfer Mine (Newcrest Mining Ltd., Melbourne, Victoria, Australia), which had operated as an open pit gold operation until 2000, was recommissioned and began producing gold-copper concentrate from a new processing train in November 2004 and started a second processing train in February 2005. At capacity, the mine was projected to produce 24,000 t/yr of copper in concentrate. The company reported combined reserves accessible by open pit and underground mining that containing 590,000 t of copper and 530 t of gold (Newcrest Mining Ltd., 2006§).

**Brazil.**—The Sossego Mine experienced its first year of full production, having produced it first concentrate in June 2004. Production in 2005 rose to 107,000 t of copper in concentrate from 73,000 t in 2004. The open pit operation, which was expected to produce 140,000 t/yr of copper at full capacity, had a projected life of about 14 years and was the first of five copper projects owned by Companhia Vale do Rio Doce (CVRD) in Brazil to be developed. In October, CVRD's board of directors approved investing in CVRD's Project 118, slated to produce 45,000 t/yr of electrowon cathode beginning in 2007 (Companhia Vale do Rio Doce, 2006, p. 41-42).

**Chile.**—Expansions at the Escondida Mine and Corporación Nacional del Cobré de Chile's (Codelco) (Santiago, Chile) Norte Division were partially balanced by reduced capacity from falling ore grades at the Los Pelambres and Los Bronces Mines. Total production from Codelco's mines declined nominally to 1.83 Mt from 1.84 Mt in 2004. Despite a capacity increase at Codelco Norte, production fell to 965,000 t from 983,000 t in 2004 owing to failure of a semiautogenous grinding mill. Production at Codelco's El Teniente, Andina, and Salvador, divisions rose nominally to 437,000 t, 248,000 t, and 77,500 t, respectively. Basic engineering was completed on Codelco's proposed Gaby project, which was expected to produce 150,000 t/yr of electrowon cathode beginning in 2008 (Corporación Nacional del Cobré de Chile, 2006, p. 26-42). Though production at the Escondida Mine rose to 1.27 Mt from 1.21 Mt in 2004 following commissioning of the Norte crusher and ore handling system, production fell short of expectations owing to technical problems (BHP Billiton, 2006, p. 6).

**Zambia.**—First Quantum Minerals Ltd. (Vancouver) reported producing 69,600 t of copper (41,500 t in electrowon copper and 28,100 t in concentrate) from its newly restarted Kansanshi Mine [formerly owned by Zambian Consolidated Copper Mines (ZCCM) and subsequently by Cyprus Amax Minerals Company]. First Quantum estimated the combined cash cost of production at $0.63 per pound of copper. Production fell short of expectations owing to a shortage of mining equipment. Full capacity was projected at about 150,000 t of copper per year, equally split between concentrate and electrowon copper (First Quantum Minerals Ltd., 2006, p. 3). Capacity also increased at the Chambishi Mine, which was reopened in 2003 by China's Non-Ferrous Metal Mining Co., which had purchased an 85% share in the operations from ZCCM.

***Smelter Production.***—World smelter capacity rose by approximately 1 million metric tons per year (Mt/yr) to a record-high 20.3 Mt/yr. With the exception of small incremental increases, China, India, and Thailand accounted for most of the expansion (International Copper Study Group, 2006b, p. 64-89).

**China.**—Capacity rose by more than 400,000 t/yr to about 2.2 Mt/yr. The Jinchuan smelter doubled its capacity to 250,000 t/yr of anode; the Daye Non-Ferrous Metal Co. smelter reached full capacity of 200,000 t/yr; the Huludao smelter installed Ausmelt technology to double capacity to about 120,000 t/yr; and by yearend, Jinchuan Non-Ferrous Metal Co. had completed the smelter expansion that increased capacity to 350,000 t/yr of anode from 130,000 t/yr over a 2-year period ( International Copper Study Group, 2006b, p. 65-66).

**India.**—The Birla Copper Unit of Hindalco Industries Ltd. (Worli, Mumbai, India) commissioned a new Ausmelt copper smelting and converting plant in November 2004 that will allow capacity to double to about 500,000 t/yr in 2006 from 250,000 t/yr (Ausmelt Ltd., 2004). In 2005, Sterlite Industries Ltd. (Aurangabad, India) commissioned a new ISASMELT smelter at Tuticorin in southern India that doubled its capacity to 300,000 t/yr of copper from 150,000 t/yr. The new furnace replaced an ISASMELT furnace commissioned in 1996 (Xstrata Plc., 2006§).

**Thailand.**—The Rayong copper smelter, about 170 km from Bangkok, was completed in mid-2004. The smelter employs a rotary smelting reactor and Chilean Teniente converting technology. Though the smelter experienced technical problems at startup, the new smelter and associated refinery were designed

to have the capacity to produce 165,000 t/yr of cathode, 150,000 t/yr from concentrate and 15,000 t/yr from scrap (Aker Kvaerner ASA, 2005§).

***Refinery Production.***—Total world refinery capacity also rose by approximately 1 Mt/yr (5%) to more than 20 Mt/yr. New electrowinning capacity accounted for about 160,000 t/yr of the expansion. For the most part, increased capacity was matched to expansions in smelting capacity. Exceptions included expansion of Southern Copper Corp.'s (Phoenix, AZ) Ilo refinery in Peru to 350,000 t/yr from 290,000 t/yr prior to expansion of smelting capacity and commissioning in India of the Jhagadia Ltd. 50,000-t/yr electrolytic refinery, which was designed to process high-grade scrap (International Copper Study Group, 2006b, p. 80-103).

## Outlook

Heading into 2006, the refined copper production deficit that had persisted during the preceding 3 years resulted in tight supplies, limited stock availability, and concerns over supply adequacy. Copper availability remained extremely tight during the first 9 months of 2006, with estimated production only slightly exceeding consumption. Reported global inventories declined by 20,000 t from those at yearend 2005 (International Copper Study Group, 2006a, p. 9). Global mine production in 2006 was expected to fall short of expectations owing to production problems in Chile, Indonesia, and the United States, as well as labor disruptions in Chile and Mexico. Copper prices continued their upward trend, and in May 2006, the COMEX spot price reached a record-high price of $4.08 per pound, nearly twice the previous record-high price of $2.28 set in December 2005, before settling back to an average of $3.54 per pound during the fourth quarter. Higher metal prices also led to increased investment interest in metal markets, including copper, and speculation as to the long-term effects high prices could have on substitution and demand for copper. Record-high profits led to competition for and continued consolidation of international copper mining companies.

In the United States, mine production in 2006 was expected to rise to the highest level since 2001, following a post-strike return to full production at Asarco's mines; startup of new mines in Montana, Nevada, and Utah; and restart of concentrate production at the Morenci Mine. Consumption of refined copper was expected to decline further owing to the compound effects of a turndown in the housing market, substitution for copper tubing occasioned by the high copper prices, and greater import penetration by foreign copper wire rod. U.S. mine and refinery production were expected to increase further in 2007 as new operations started up or reached capacity.

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TABLE 1
SALIENT COPPER STATISTICS[1]

(Metric tons, copper, unless otherwise specified)

| | | 2001 | 2002 | 2003 | 2004 | 2005 |
|---|---|---|---|---|---|---|
| United States: | | | | | | |
| Production: | | | | | | |
| Mine: | | | | | | |
| Ore concentrated, gross weight | thousand metric tons | 148,000 | 104,000 | 114,000 | 139,000 | 154,000 |
| Average yield of copper[2] | percent | 0.48 | 0.52 | 0.46 | 0.38 | 0.34 |
| Recoverable copper: | | | | | | |
| Arizona | | 879,000 | 767,000 | 741,000 | 723,000 | 690,000 |
| Michigan, Montana, Utah | | W | W | W | W | W |
| New Mexico | | 141,000 | 112,000 | 87,800 | 122,000 | 131,000 |
| Other States | | 318,000 | 263,000 | 287,000 | 312,000 | 319,000 |
| Total | | 1,340,000 | 1,140,000 | 1,120,000 | 1,160,000 | 1,140,000 |
| Total value | millions | $2,270 | $1,910 | $2,100 | $3,420 | $4,360 |
| Smelter: | | | | | | |
| Primary and secondary, gross weight | | 919,000 | 683,000 | 539,000 | 542,000 | 523,000 |
| Byproduct sulfuric acid, sulfur content | thousand metric tons | 813 | 695 | 590 | 600 | 575 |
| Refinery: | | | | | | |
| Primary materials: | | | | | | |
| Electrolytic from domestic ores | | 808,000 | 725,000 | 532,000 | 531,000 | 524,000 |
| Electrolytic from foreign materials | | 192,000 | 116,000 | 130,000 | 140,000 | 130,000 |
| Electrowon | | 628,000 | 601,000 r | 591,000 | 584,000 | 554,000 |
| Total | | 1,630,000 | 1,440,000 | 1,250,000 | 1,260,000 | 1,210,000 |

See footnotes at end of table.

TABLE 1—Continued
SALIENT COPPER STATISTICS[1]

(Metric tons, copper, unless otherwise specified)

| | | 2001 | 2002 | 2003 | 2004 | 2005 |
|---|---|---|---|---|---|---|
| United States—Continued: | | | | | | |
| Production—Continued: | | | | | | |
| Refinery—Continued: | | | | | | |
| Secondary materials (scrap), electrolytic and fire refined | | 172,000 | 69,900 | 53,300 | 50,800 | 47,200 |
| Total refinery | | 1,800,000 | 1,510,000 | 1,310,000 | 1,310,000 | 1,260,000 |
| Secondary copper: | | | | | | |
| Recovered from new scrap | | 833,000 | 840,000 | 737,000 | 774,000 | 769,000 |
| Recovered from old scrap | | 317,000 | 190,000 | 207,000 | 191,000 | 182,000 |
| Total | | 1,150,000 | 1,030,000 | 944,000 | 965,000 | 951,000 |
| Copper sulfate, gross weight | | 55,200 | 49,200 | 32,100 | 25,100 | 25,600 |
| Exports: | | | | | | |
| Refined | | 22,500 | 26,600 | 93,300 | 118,000 | 39,500 |
| Unmanufactured[3] | | 556,000 | 506,000 | 703,000 | 789,000 | 815,000 |
| Imports: | | | | | | |
| Refined | | 991,000 | 927,000 | 882,000 | 807,000 | 1,000,000 |
| Unmanufactured[3] | | 1,400,000 | 1,230,000 | 1,140,000 | 1,060,000 | 1,230,000 |
| Stocks, December 31: | | | | | | |
| Blister and in-process material | | 98,000 | 44,400 | 56,800 | 51,400 | 44,300 |
| Refined copper: | | | | | | |
| Refineries | | 28,600 | 11,700 | 12,100 | 10,400 | 8,190 |
| Wire-rod mills | | 37,600 | 23,000 | 29,700 | 20,300 | 20,400 |
| Brass mills | | 25,500 | 28,700 | 20,200 | 21,500 | 24,500 |
| Other industry | | 4,860 | 4,800 | 4,240 | 3,230 | 5,750 |
| New York Commodity Exchange (COMEX) | | 244,000 | 362,000 | 255,000 | 43,700 | 6,180 |
| London Metal Exchange (LME), U.S. warehouses | | 617,000 | 601,000 | 335,000 | 35,000 | 800 |
| Total | | 957,000 | 1,030,000 | 656,000 | 134,000 | 65,900 |
| Consumption: | | | | | | |
| Refined copper, reported | | 2,620,000 | 2,370,000 | 2,290,000 | 2,410,000 | 2,270,000 |
| Apparent consumption, primary refined and old scrap[4] | | 2,510,000 | 2,610,000 | 2,430,000 | 2,550,000 | 2,400,000 |
| Price: | | | | | | |
| Producer, weighted average | cents per pound | 76.85 | 75.80 | 85.25 | 133.94 | 173.49 |
| COMEX, first position | do. | 72.57 | 71.67 | 81.05 | 128.97 | 168.23 |
| LME, Grade A cash | do. | 71.57 | 70.72 | 80.68 | 129.96 | 166.84 |
| World, production: | | | | | | |
| Mine | thousand metric tons | 13,700 r | 13,700 r | 13,700 r | 14,700 r | 15,100 e |
| Smelter, gross weight | do. | 12,700 r | 12,500 r | 12,700 r | 12,800 r | 13,500 e |
| Refinery | do. | 15,700 r | 15,500 r | 15,300 r | 15,900 r | 16,600 |

eEstimated. rRevised. W Withheld to avoid disclosing company proprietary data; included in "Other States."

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

[2]Yield calculations are for concentrated ore only.

[3]Includes copper content of alloy scrap.

[4]In 2001, 2002, 2003, 2004, and 2005, apparent consumption is calculated using general imports of 1,200,000 metric tons (t) , 1,060,000 t, 687,000 t, 704,000 t, and 977,000 t, respectively.

TABLE 2
LEADING COPPER-PRODUCING MINES IN THE UNITED STATES IN 2005, IN ORDER OF OUTPUT[1]

| Rank | Mine | County and State | Operator | Source of copper | Capacity (thousand metric tons) |
|---|---|---|---|---|---|
| 1 | Morenci | Greenlee, AZ | Phelps Dodge Corp. | Copper ore, leached | 390 |
| 2 | Bingham Canyon | Salt Lake, UT | Kennecott Utah Copper Corp. | Copper-molybdenum ore, concentrated | 300 |
| 3 | Ray | Pinal, AZ | ASARCO Incorporated | Copper ore, concentrated and leached | 170 |
| 4 | Bagdad | Yavapai, AZ | Phelps Dodge Corp. | Copper-molybdenum ore, concentrated and leached | 100 |
| 5 | Chino | Grant, NM | do. | do. | 125 |
| 6 | Sierrita | Pima, AZ | do. | do. | 100 |
| 7 | Tyrone | Grant, NM | do. | Copper ore, leached | 80 |
| 8 | Continental Pit | Silver Bow, MT | Montana Resources | Copper-molybdenum ore, concentrated | 45 |
| 9 | Mission Complex | Pima, AZ | ASARCO Incorporated | Copper ore, concentrated | 70 |
| 10 | Silver Bell | do. | do. | Copper ore, leached | 22 |
| 11 | Robinson | White Pine, NV | Quadra Mining Ltd. | Copper-molybdenum ore, concentrated | 60 |
| 12 | Miami | Gila, AZ | Phelps Dodge Corp. | Copper ore, leached | 50 |
| 13 | Pinto Valley | do. | BHP Copper Co. | do. | 5 |
| 14 | Miami | do. | do. | do. | 5 |

[1]The mines on this list accounted for more than 99% of U.S. mine production in 2005.

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)

| | 2004 | | 2005 | |
|---|---|---|---|---|
| Source and treatment process | Gross weight[2] | Recoverable copper | Gross weight[2] | Recoverable copper |
| Mined copper ore: | | | | |
| Concentrated | 139,000,000 | 533,000 | 154,000,000 | 529,000 |
| Leached | NA | 584,000 | NA | 554,000 |
| Total | NA | 1,120,000 | NA | 1,080,000 |
| Copper precipitates shipped, leached from tailings, dumps, and in-place material | 1,270 | 2,360 | 1,490 | 1,990 |
| Other copper-bearing ores[3] | 4,780,000 | 37,200 | 5,170,000 | 55,000 |
| Grand total | XX | 1,160,000 | XX | 1,140,000 |

NA Not available. XX Not applicable.

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

[2]In 2005, 14,518 kilograms of gold and 207 metric tons of silver were recovered from concentrated ore. The average value of gold and silver per metric ton of ore concentrated was $1.66.

[3]Includes gold ore, lead ore, silver ore, silver-copper ore, zinc ore, and ore shipped directly to smelter.

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

(Metric tons, gross weight)

| Item | Brass mills | Wire-rod mills | Foundries, chemical plants, miscellaneous users | Smelters, refiners, ingot makers | Total |
|---|---|---|---|---|---|
| 2004: | | | | | |
| Copper scrap | 876,000 [r, 2] | W | 80,700 | 183,000 | 1,140,000 |
| Refined copper[3] | 573,000 | 1,780,000 | 57,400 | 4,560 | 2,410,000 |
| Hardeners and master alloys | 10,000 | -- | 2,040 | -- | 12,100 |
| Brass ingots | 1,470 | -- | 95,200 | -- | 96,600 |
| Slab zinc | 68,300 | -- | (4) | (4) | 95,500 |
| 2005: | | | | | |
| Copper scrap | 870,000 | W | 81,700 | 192,000 | 1,140,000 |
| Refined copper[3] | 528,000 | 1,680,000 | 60,700 | 4,540 | 2,270,000 |
| Hardeners and master alloys | 10,000 | -- | 2,330 | -- | 12,400 |
| Brass ingots | -- | -- | 89,900 | -- | 89,900 |
| Slab zinc | 59,700 | -- | (4) | (4) | 82,500 |

[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.
[4]Withheld to avoid disclosing company proprietary data; included in "Total."

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

(Metric tons, copper)

| Class of consumer | Cathodes | Ingots and ingot bars | Cakes and slabs | Wirebar, billets, other | Total |
|---|---|---|---|---|---|
| 2004: | | | | | |
| Wire-rod mills | 1,770,000 | -- | -- | 8,860 | 1,780,000 |
| Brass mills | 389,000 | 15,100 | 57,000 | 112,000 | 573,000 |
| Chemical plants | -- | -- | -- | 1,200 | 1,200 |
| Ingot makers | W | W | W | 4,560 [2] | 4,560 |
| Foundries | 3,470 | 6,230 | -- | 11,300 | 21,000 |
| Miscellaneous[3] | W | W | W | 35,200 [2] | 35,200 |
| Total | 2,160,000 | 21,400 | 57,000 | 173,000 | 2,410,000 |
| 2005: | | | | | |
| Wire-rod mills | 1,680,000 | -- | -- | 2,590 | 1,680,000 |
| Brass mills | 361,000 | 23,300 | 35,300 | 108,000 | 528,000 |
| Chemical plants | -- | -- | -- | 1,200 | 1,200 |
| Ingot makers | W | W | W | 4,540 [2] | 4,540 |
| Foundries | 3,780 | 5,490 | -- | 10,900 | 20,200 |
| Miscellaneous[3] | W | W | W | 39,300 [2] | 39,300 |
| Total | 2,040,000 | 28,800 | 35,300 | 167,000 | 2,270,000 |

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]Includes items indicated by symbol W.
[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, copper)

| | 2004 | 2005 |
|---|---|---|
| Kind of scrap: | | |
| New scrap: | | |
| Copper-base | 735,000 | 730,000 |
| Aluminum-base | 38,800 | 39,300 |
| Nickel-base | 18 | 18 |
| Total | 774,000 | 769,000 |
| Old scrap: | | |
| Copper-base | 169,000 | 168,000 |
| Aluminum-base | 22,100 | 14,200 |
| Nickel-base | 279 | 214 |
| Zinc-base | 29 | 33 |
| Total | 191,000 | 182,000 |
| Grand total | 965,000 | 951,000 |
| Form of recovery: | | |
| As unalloyed copper | 51,400 | 48,100 |
| In brass and bronze | 840,000 | 837,000 |
| In alloy iron and steel | 1,020 | 985 |
| In aluminum alloys | 60,400 | 53,400 |
| In other alloys | 28 | 32 |
| In chemical compounds | 12,300 | 12,300 |
| Total | 965,000 | 951,000 |

[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, copper)

| | From new scrap | | From old scrap | | Total | |
|---|---|---|---|---|---|---|
| Type of operation | 2004 | 2005 | 2004 | 2005 | 2004 | 2005 |
| Ingot makers | 25,700 | 24,100 | 63,800 | 70,100 | 89,500 | 94,200 |
| Refineries[2] | 16,000 | 16,000 | 34,700 | 31,200 | 50,800 | 47,200 |
| Brass and wire-rod mills | 669,000 | 667,000 | 36,300 | 29,800 | 705,000 | 697,000 |
| Foundries and manufacturers | 19,400 | 17,500 | 30,800 | 33,700 | 50,200 | 51,200 |
| Chemical plants | 5,040 | 5,040 | 3,130 | 3,130 | 8,160 | 8,160 |
| Total | 735,000 | 730,000 | 169,000 | 168,000 | 904,000 | 898,000 |

[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Electrolytically refined based on source of material 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, gross weight)

| Item produced from scrap | 2004 | 2005 |
|---|---|---|
| Unalloyed copper products: | | |
| Refined copper | 50,800 | 47,200 |
| Copper powder | 48 | 314 |
| Copper castings | 574 | 547 |
| Total | 51,400 | 48,100 |
| Alloyed copper products: | | |
| Brass and bronze ingots: | | |
| Tin bronzes | 10,200 | 10,100 |
| Leaded red brass and semired brass | 68,400 | 68,700 |
| High leaded tin bronze | 10,400 | 10,500 |
| Yellow brass | 5,890 | 5,910 |
| Manganese bronze | 8,270 | 8,240 |
| Aluminum bronze | 6,010 | 5,980 |
| Nickel silver | 2,140 | 1,990 |
| Silicon bronze and brass | 5,900 | 6,010 |
| Copper-base hardeners and master alloys | 5,500 | 5,810 |
| Miscellaneous | 4,940 | 4,930 |
| Total | 128,000 | 128,000 |
| Brass mill and wire-rod mill products | 865,000 | 859,000 |
| Brass and bronze castings | 44,100 r | 45,300 |
| Brass powder | 71 | 69 |
| Copper in chemical products | 12,300 | 12,300 |
| Grand total | 1,100,000 | 1,090,000 |

rRevised.
[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] | | | | | | | |
| 2004 | 107,000 | 3,830 r | 5,760 r | 10,500 r | 225 r | 14 | 128,000 |
| 2005 | 109,000 | 3,750 | 5,510 | 9,150 | 184 | 12 | 128,000 |
| Secondary metal content of brass mill products: | | | | | | | |
| 2004 | 706,000 | 475 | 6,160 | 150,000 | W | W | 865,000 |
| 2005 | 698,000 | 1,750 | 3,590 | 154,000 | W | W | 859,000 |
| Secondary metal content of brass and bronze castings: | | | | | | | |
| 2004 | 39,200 r | 1,520 | 1,130 | 2,030 | 182 | 62 | 44,100 r |
| 2005 | 40,600 | 1,450 | 1,100 | 1,940 | 116 | 60 | 45,300 |

rRevised. W Withheld to avoid disclosing company proprietary data; included in "Total."
[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 in 2004 and 2005.

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

(Metric tons, gross weight)

| Scrap type and processor | 2004 | | 2005 | |
|---|---|---|---|---|
| | Consumption | Stocks | Consumption | Stocks |
| Unalloyed scrap: | | | | |
| No. 1 wire and heavy: | | | | |
| Smelters, refiners, and ingot makers | 58,600 | 980 r | 68,700 | 5,890 |
| Brass and wire-rod mills | 394,000 | (2) | 382,000 | (2) |
| Foundries and miscellaneous manufacturers | 27,200 | (2) | 28,000 | (2) |
| No. 2 mixed heavy and light: | | | | |
| Smelters, refiners, and ingot makers | 28,800 | 2,090 r | 34,900 | 1,220 |
| Brass and wire-rod mills | 6,250 | (2) | 5,260 | (2) |
| Foundries and miscellaneous manufacturers | 3,570 | (2) | 5,160 | (2) |
| Total unalloyed scrap: | | | | |
| Smelters, refiners, and ingot makers | 87,400 | 3,070 r | 104,000 | 7,120 |
| Brass and wire-rod mills | 401,000 | 28,800 | 387,000 | 33,800 |
| Foundries and miscellaneous manufacturers | 30,700 | 2,550 | 33,200 | 2,220 |
| Alloyed scrap: | | | | |
| Red brass:[3] | | | | |
| Smelters, refiners, and ingot makers | 26,300 | 1,360 r | 22,900 | 1,340 |
| Brass mills | 14,200 | (2) | 14,330 | (2) |
| Foundries and miscellaneous manufacturers | 9,820 | (2) | 7,900 | (2) |
| Leaded yellow brass: | | | | |
| Smelters, refiners, and ingot makers | 8,140 | 735 r | 8,010 | 746 |
| Brass mills | 314,000 | (2) | 183,000 | (2) |
| Foundries and miscellaneous manufacturers | 1,150 | (2) | 981 | (2) |
| Yellow and low brass, all plants | 42,600 | 948 r | 174,000 | 901 |
| Cartridge cases and brass, all plants | 86,700 | (2) | 94,600 | (2) |
| Auto radiators: | | | | |
| Smelters, refiners, and ingot makers | 25,000 | 1,048 r | 24,300 | 1,020 |
| Foundries and miscellaneous manufacturers | 4,300 | (2) | 5,030 | (2) |
| Bronzes: | | | | |
| Smelters, refiners, and ingot makers | 11,100 | 750 r | 10,300 | 625 |
| Brass mills and miscellaneous manufacturers | 18,400 | (2) | 17,900 | (2) |
| Nickel-copper alloys, all plants | 20,900 | 224 r | 18,700 | 211 |
| Low grade and residues, smelters, refiners, miscellaneous manufacturers | 35,300 | 619 | 35,000 | 630 |
| Other alloy scrap:[4] | | | | |
| Smelters, refiners, and ingot makers | 1,130 | 382 r | 1,180 | 372 |
| Brass mills and miscellaneous manufacturers | 6,000 | (2) | 5,398 | (2) |
| Total alloyed scrap: | | | | |
| Smelters, refiners, and ingot makers | 95,500 | 6,070 r | 88,800 | 5,850 |
| Brass mills | 480,000 | 25,000 | 487,000 | 24,300 |
| Foundries and miscellaneous manufacturers | 50,000 | 2,150 r | 48,500 | 2,160 |
| Total scrap: | | | | |
| Smelters, refiners, and ingot makers | 183,000 | 9,140 r | 193,000 | 13,000 |
| Brass and wire-rod mills | 881,000 | 53,800 | 874,000 | 58,100 |
| Foundries and miscellaneous manufacturers | 80,700 | 4,700 r | 81,700 | 4,380 |

r Revised.

[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 | From new scrap | | From old scrap | | Total | |
|---|---|---|---|---|---|---|
| | 2004 | 2005 | 2004 | 2005 | 2004 | 2005 |
| Ingot makers | 40,200 | 48,100 | 91,700 | 96,600 | 132,000 | 145,000 |
| Smelters and refineries | 16,200 | 16,200 | 34,900 | 31,700 | 51,100 | 47,800 |
| Brass and wire-rod mills | 843,000 | 842,000 | 37,700 | 31,600 | 880,000 | 874,000 |
| Foundries and miscellaneous manufacturers | 42,600 | 40,100 | 38,200 | 41,600 | 80,700 | 81,700 |
| Total | 942,000 | 947,000 | 202,000 | 201,000 | 1,140,000 | 1,150,000 |

[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, gross weight)

| Ingot type or material consumed | 2004 | 2005 |
|---|---|---|
| Brass ingot: | | |
| Tin bronzes | 22,800 | 16,400 |
| Leaded red brass and semired brass | 55,300 | 54,400 |
| Yellow, leaded, low brass[2] | 6,440 | 7,850 |
| Manganese bronze | 3,930 r | 3,870 |
| Nickel silver[3] | 2,270 r | 2,410 |
| Aluminum bronze | 3,580 r | 3,970 |
| Hardeners and master alloys[4] | 2,040 | 2,330 |
| Lead free alloys[5] | 864 | 974 |
| Total brass ingot | 97,200 | 92,200 |
| Refined copper | 57,400 | 60,700 |
| Copper scrap | 80,700 | 81,700 |

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 AND ALLOY-INGOT, 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 |
| 2004 | 126.41 | 107.62 | 86.86 | 55.14 |
| 2005 | 153.46 | 137.28 | 95.92 | 61.10 |

Source: American Metal Market.

TABLE 14

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

| Country | Ore and concentrate | | Matte, ash and precipitates | | Refined | | Unalloyed copper scrap | | Blister and anodes | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Quantity (metric tons, Cu content) | Value (thousands) | Quantity (metric tons, Cu content) | Value (thousands) | Quantity (metric tons, Cu content) | Value (thousands) | Quantity (metric tons, Cu content) | Value (thousands) | Quantity (metric tons, Cu content) | Value (thousands) | Quantity (metric tons, Cu content) | Value (thousands) |
| 2004 | 24,200 | $48,172 | 22,137 | $27,154 | 118,289 | $232,811 | 325,118 | $430,226 | 46,404 | $120,534 | 536,148 | $858,897 |
| 2005: | | | | | | | | | | | | |
| Belgium | 41 | 73 | 37 | 10 | 49 | 73 | 644 | 1,250 | 724 | 1,410 | 1,500 | 2,820 |
| Canada | 18,300 | 32,400 | 30,900 | 35,600 | 2,070 | 6,020 | 27,900 | 33,300 | 20,500 | 35,400 | 99,700 | 143,000 |
| China | 75,700 | 111,000 | 9,650 | 10,600 | 19,000 | 47,300 | 265,000 | 440,000 | 343 | 1,270 | 369,000 | 610,000 |
| Germany | -- | -- | 93 | 131 | 182 | 277 | 10,600 | 16,400 | 779 | 2,980 | 11,600 | 19,800 |
| Hong Kong | 2 | 3 | 1 | 7 | 7 | 13 | 9,200 | 7,650 | 3,190 | 12,900 | 12,400 | 20,600 |
| India | 149 | 177 | 1 | 33 | 6,650 | 5,720 | 4,460 | 4,930 | 58 | 205 | 11,300 | 11,100 |
| Japan | 28,700 | 49,200 | 70 | 126 | 5 | 8 | 6,710 | 21,900 | 2,230 | 4,830 | 37,800 | 76,100 |
| Korea, Republic of | 1 | 4 | 32 | 46 | 132 | 285 | 27,200 | 69,900 | 464 | 1,910 | 27,900 | 72,200 |
| Malaysia | 10 | 19 | -- | -- | -- | -- | 33 | 22 | 117 | 367 | 160 | 408 |
| Mexico | 6,380 | 13,200 | 682 | 849 | 9,860 | 33,900 | 1,010 | 3,070 | 2,660 | 8,680 | 20,600 | 59,700 |
| Peru | -- | -- | 1 | 11 | 28 | 42 | -- | -- | -- | -- | 29 | 53 |
| Singapore | 19 | 43 | 20 | 96 | 13 | 75 | 1 | 7 | 491 | 1,960 | 544 | 2,180 |
| Spain | 1,730 | 7,670 | -- | -- | -- | -- | 146 | 472 | 203 | 837 | 2,080 | 8,980 |
| Taiwan | 15 | 25 | 14 | 27 | 180 | 280 | 11,600 | 32,500 | 1,680 | 6,820 | 13,500 | 39,700 |
| Thailand | 5,390 | 10,700 | (2) | 5 | -- | -- | 874 | 2,400 | 125 | 520 | 6,390 | 13,600 |
| United Kingdom | 67 | 84 | 46 | 65 | 158 | 328 | 276 | 1,040 | 223 | 1,010 | 770 | 2,530 |
| Other | 136 | 234 | 302 | 691 | 1,190 | 2,600 | 1,080 | 2,470 | 7,730 | 16,200 | 10,400 | 22,200 |
| Total | 137,000 | 224,000 | 41,800 | 48,300 | 39,500 | 97,000 | 366,000 | 637,000 | 41,600 | 97,300 | 626,000 | 1,100,000 |

-- 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, copper) | Value (thousands) | Quantity (metric tons, copper) | Value (thousands) | Quantity (metric tons, copper) | Value (thousands) | Quantity (metric tons, copper) | Value (thousands) | Quantity (metric tons, copper) | Value (thousands) |
| 2004 | 24,800 | $102,000 | 29,600 | $120,000 | 148,000 | $464,000 | 32,400 | $175,000 | 1,440 | $1,710 |
| 2005: | | | | | | | | | | |
| Australia | 26 | 103 | 25 | 109 | 3 | 58 | 91 | 2,540 | -- | -- |
| Brazil | 38 | 207 | 36 | 910 | 4 | 85 | 69 | 1,160 | -- | -- |
| Canada | 7,140 | 36,400 | 14,500 | 70,300 | 16,200 | 67,700 | 5,870 | 28,400 | 1,530 | 2,040 |
| China | 71 | 267 | 615 | 3,530 | 3,110 | 6,110 | 2,960 | 7,540 | 353 | 525 |
| Denmark | -- | -- | 9 | 58 | 16 | 147 | 38 | 495 | -- | -- |
| France | 19 | 66 | 65 | 805 | 179 | 2,020 | 192 | 2,220 | -- | -- |
| Germany | 50 | 133 | 136 | 1,310 | 206 | 3,570 | 154 | 3,520 | 5 | 4 |
| Hong Kong | 43 | 195 | 1,060 | 5,890 | 64 | 779 | 245 | 3,100 | -- | -- |
| Italy | -- | -- | 6 | 142 | 4 | 105 | 85 | 391 | -- | -- |
| Japan | 8 | 76 | 501 | 3,370 | 34 | 265 | 430 | 3,780 | 38 | 74 |
| Korea, Republic of | 10 | 53 | 1,670 | 4,990 | 374 | 1,040 | 270 | 3,100 | 20 | 33 |
| Malaysia | 258 | 1,690 | 263 | 1,810 | 83 | 452 | 10 | 289 | 9 | 8 |
| Mexico | 20,100 | 88,100 | 7,710 | 28,400 | 132,000 | 517,000 | 18,700 | 98,200 | 79 | 78 |
| Netherlands | 20 | 159 | 201 | 1,130 | 30 | 408 | 104 | 1,390 | 105 | 187 |
| Saudi Arabia | 362 | 1,820 | -[3] | 6 | 5 | 65 | 72 | 423 | -- | -- |
| Singapore | 40 | 415 | 158 | 1,230 | 14 | 245 | 328 | 3,470 | 25 | 20 |
| Sweden | -- | -- | 20 | 257 | 22 | 355 | 17 | 644 | -- | -- |
| Taiwan | 20 | 106 | 121 | 1,530 | 19 | 214 | 383 | 1,880 | 11 | 9 |
| Thailand | -[3] | 13 | 352 | 2,090 | 68 | 486 | 26 | 972 | 3 | 3 |
| United Kingdom | 56 | 312 | 91 | 1,200 | 153 | 1,060 | 82 | 2,460 | -- | -- |
| Other | 954 | 4,510 | 920 | 7,110 | 1,600 | 6,200 | 8,680 | 46,100 | 1,050 | 1,540 |
| Total | 29,200 | 135,000 | 28,500 | 136,000 | 154,000 | 608,000 | 38,800 | 212,000 | 3,220 | 4,520 |

-- Zero.

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

[2]Total revised exports of wire rod in 2004 were 128,563 metric tons (t) valued at $389 million, and in 2005, wire rod exports were 137,515 t valued at $530 million.

[3]Less than ½ unit.

Source: U.S. Census Bureau, adjusted by the U.S. Geological Survey for misclassified wire rod shipments to Mexico.

TABLE 16

U.S. IMPORTS FOR CONSUMPTION OF UNMANUFACTURED COPPER, BY COUNTRY[1]

| | Ore and concentrate | | Matte, ash and precipitates | | Blister and anode | | Refined | | Unalloyed scrap | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Country | Quantity (metric tons, Cu content) | Value[2] (thousands) | Quantity (metric tons, Cu content) | Value[2] (thousands) | Quantity (metric tons, Cu content) | Value[2] (thousands) | Quantity (metric tons, Cu content) | Value[2] (thousands) | Quantity (metric tons, Cu content) | Value[2] (thousands) | Quantity (metric tons, Cu content) | Value[2] (thousands) |
| 2004 | 22,900 | $25,000 | 1,680 | $3,850 | 151,000 | $423,000 | 807,000 | $2,170,000 | 23,400 | $37,100 | 1,010,000 | $2,660,000 |
| 2005: | | | | | | | | | | | | |
| Belgium | -- | -- | -- | -- | -- | -- | 8,160 | 32,800 | -- | -- | 8,160 | 32,800 |
| Brazil | -- | -- | -- | -- | 10 | 158 | 30,500 | 112,000 | -- | -- | 30,500 | 112,000 |
| Canada | 2 | 2 | 138 | 656 | 86,500 | 257,000 | 296,000 | 881,000 | 9,080 | 22,500 | 391,000 | 1,160,000 |
| Chile | -- | -- | -- | -- | 41,700 | 152,000 | 429,000 | 1,620,000 | 842 | 3,730 | 471,000 | 1,780,000 |
| Costa Rica | -- | -- | -- | -- | -- | -- | -- | -- | 2,020 | 1,780 | 2,020 | 1,780 |
| Dominican Republic | -- | -- | -- | -- | -- | -- | -- | -- | 210 | 197 | 210 | 197 |
| Finland | -- | -- | -- | -- | 65 | 335 | 2,910 | 12,300 | -- | -- | 2,980 | 12,700 |
| Germany | -- | -- | -- | -- | 12 | 42 | 24,900 | 95,200 | 85 | 20 | 25,000 | 95,300 |
| Honduras | -- | -- | -- | -- | -- | -- | -- | -- | 1,910 | 3,320 | 1,910 | 3,320 |
| Japan | -- | -- | -- | -- | (3) | 5 | 5,340 | 23,700 | 70 | 350 | 5,410 | 24,100 |
| Mexico | 221 | 473 | 37 | 34 | 3,870 | 13,200 | 28,900 | 94,000 | 13,300 | 36,100 | 46,400 | 144,000 |
| Peru | -- | -- | -- | -- | -- | -- | 154,000 | 565,000 | 54 | 223 | 154,000 | 565,000 |
| Taiwan | -- | -- | 1,180 | 3,410 | -- | -- | -- | -- | 2 | 16 | 1,180 | 3,430 |
| United Kingdom | -- | -- | 35 | 118 | (3) | 24 | (3) | 10 | 258 | 1,340 | 293 | 1,490 |
| Other | -- | -- | 253 | 676 | 16 | 47 | 24,700 | 98,600 | 2,220 | 3,440 | 27,200 | 103,000 |
| Total | 223 | 476 | 1,640 | 4,890 | 132,000 | 423,000 | 1,000,000 | 3,540,000 | 30,100 | 73,000 | 1,170,000 | 4,040,000 |

-- 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]

| | Pipes and tubing | | Plates, sheets, foil, bars | | Bare wire, including wire rod[2] | | Wire and cable, stranded | | Copper sulfate | |
|---|---|---|---|---|---|---|---|---|---|---|
| Country | Quantity (metric tons, copper) | Value[3] (thousands) | Quantity (metric tons, copper) | Value[3] (thousands) | Quantity (metric tons, copper) | Value[3] (thousands) | Quantity (metric tons, copper) | Value[3] (thousands) | Quantity (metric tons, copper) | Value[3] (thousands) |
| 2004 | 957 | $5,090 | 83,600 | $335,000 | 242,000 | $842,000 | 7,920 | $34,100 | 56,100 | $55,100 |
| 2005: | | | | | | | | | | |
| Australia | -- | -- | 248 | 879 | -- | -- | 1 | 21 | -- | -- |
| Belgium | 1 | 20 | 122 | 644 | -- | -- | (4) | 10 | 287 | 349 |
| Brazil | 10 | 57 | 636 | 3,230 | 36,800 | 139,000 | -- | -- | -- | -- |
| Canada | 167 | 939 | 6,080 | 31,400 | 156,000 | 597,000 | 377 | 2,410 | 8,290 | 9,230 |
| Chile | 7 | 37 | 6,130 | 27,000 | -- | -- | 44 | 163 | 541 | 625 |
| China | 124 | 632 | 1,700 | 8,970 | 201 | 849 | 4,400 | 7,810 | 6,460 | 6,930 |
| Finland | 9 | 160 | 3,500 | 20,900 | 496 | 2,400 | 42 | 253 | -- | -- |
| France | 2 | 223 | 3,470 | 15,900 | 362 | 4,290 | 27 | 420 | 37 | 43 |
| Germany | 104 | 539 | 24,800 | 112,000 | 897 | 5,530 | 433 | 3,060 | 3 | 27 |
| Israel | -- | -- | 5 | 100 | 5 | 43 | 2,210 | 13,900 | -- | -- |
| Italy | (4) | 12 | 1,940 | 8,540 | 2 | 38 | 1 | 13 | -- | -- |
| Japan | 4 | 49 | 2,920 | 17,000 | 227 | 2,020 | 5 | 57 | 33 | 180 |
| Luxembourg | -- | -- | 928 | 8,120 | -- | -- | -- | -- | -- | -- |
| Mexico | 45 | 326 | 1,810 | 8,620 | 77,800 | 286,000 | 2,780 | 10,000 | 34,600 | 40,900 |
| Norway | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Peru | -- | -- | 4,720 | 19,900 | 743 | 3,140 | 190 | 802 | 1,050 | 1,230 |
| Russia | -- | -- | (4) | 7 | 102,000 | 392,000 | -- | -- | 196 | 258 |
| Sweden | (4) | 7 | 9,500 | 48,400 | 67 | 357 | (4) | 2 | -- | -- |
| Taiwan | 2 | 38 | 26 | 255 | 128 | 610 | 24 | 437 | 3,950 | 3,760 |
| Turkey | -- | -- | -- | -- | 8,120 | 40,000 | 652 | 3,340 | -- | -- |
| United Kingdom | 14 | 86 | 401 | 1,760 | 556 | 2,620 | 14 | 155 | (4) | 4 |
| Other | 15 | 183 | 2,780 | 13,500 | 301 | 2,580 | 365 | 2,740 | 442 | 450 |
| Total | 505 | 3,310 | 71,800 | 347,000 | 385,000 | 1,480,000 | 11,600 | 45,600 | 55,900 | 64,000 |

-- Zero.

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

[2]Total revised imports of wire rod in 2004 were 227,791 metric tons (t) valued at $709 million, and in 2005, wire rod imports were 365,901 t valued at $1.38 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 | | | |
|---|---|---|---|---|---|---|---|---|
| | 2004 | | 2005 | | 2004 | | 2005 | |
| Country | Quantity (metric tons, gross weight) | Value (thousands) | Quantity (metric tons, gross weight) | Value (thousands) | Quantity (metric tons, gross weight) | Value (thousands) | Quantity (metric tons, gross weight) | Value (thousands) |
| Belgium | 3,850 | $4,490 | 644 | $1,250 | 8,200 | $8,930 | 6,890 | $10,500 |
| Canada | 33,300 | 43,500 | 27,900 | 33,300 | 15,000 | 27,000 | 13,900 | 28,900 |
| China | 222,000 | 257,000 | 265,000 | 440,000 | 239,000 | 220,000 | 182,000 | 236,000 |
| Germany | 8,830 | 15,300 | 10,600 | 16,400 | 13,800 | 20,600 | 9,990 | 15,900 |
| Hong Kong | 3,910 | 9,480 | 9,200 | 7,650 | 11,000 | 9,800 | 12,800 | 13,300 |
| India | 4,160 | 5,900 | 4,460 | 4,930 | 45,100 | 45,000 | 15,800 | 27,200 |
| Japan | 7,930 | 15,800 | 6,710 | 21,900 | 9,660 | 25,900 | 7,950 | 20,400 |
| Korea, Republic of | 22,400 | 40,900 | 27,200 | 69,900 | 16,300 | 40,000 | 10,200 | 20,500 |
| Mexico | 4,560 | 12,300 | 1,010 | 3,070 | 1,570 | 4,720 | 1,570 | 5,140 |
| Taiwan | 11,300 | 21,000 | 11,600 | 32,500 | 13,700 | 26,300 | 10,600 | 20,100 |
| Other | 3,060 | 4,210 | 2,410 | 6,410 | 15,800 | 23,600 | 19,700 | 21,100 |
| Total | 325,000 | 430,000 | 366,000 | 637,000 | 389,000 | 451,000 | 291,000 | 419,000 |

[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]

| | Unalloyed copper scrap | | Copper-alloy scrap | | |
|---|---|---|---|---|---|
| | Quantity | | Quantity | | |
| Country | (metric tons, gross weight) | Value[2] (thousands) | Gross weight (metric tons) | Cu content[e, 3] (metric tons) | Value[2] (thousands) |
| 2004 | 23,400 | $37,100 | 78,300 | 56,400 | $150,000 |
| 2005: | | | | | |
| Canada | 9,080 | 22,500 | 47,700 | 34,400 | 123,000 |
| Costa Rica | 2,020 | 1,780 | 495 | 356 | 1,130 |
| El Salvador | 358 | 517 | 73 | 52 | 119 |
| Germany | 85 | 20 | 76 | 55 | 497 |
| Guatemala | 79 | 123 | 1,500 | 1,080 | 4,290 |
| Honduras | 1,910 | 3,320 | 651 | 468 | 1,330 |
| Mexico | 13,300 | 36,100 | 24,800 | 17,800 | 43,700 |
| Taiwan | 2 | 16 | 348 | 251 | 1,050 |
| United Kingdom | 258 | 1,340 | 925 | 666 | 2,740 |
| Venezuela | -- | -- | 193 | 139 | 170 |
| Other | 2,960 | 7,290 | 6,920 | 4,980 | 24,200 |
| Total | 30,100 | 73,000 | 83,700 | 60,200 | 203,000 |

[e]Estimated. -- 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]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)

| Country | 2001 | 2002 | 2003 | 2004 | 2005[e] |
|---|---|---|---|---|---|
| Argentina | 191,667 | 204,027 [r] | 199,020 | 177,143 | 188,000 |
| Armenia | 16,460 | 16,641 | 18,000 [e] | 17,700 [e] | 16,400 |
| Australia: | | | | | |
| Concentrates | 769,000 | 787,000 | 763,000 | 795,800 | 876,000 [3] |
| Leaching, electrowon | 102,000 | 96,000 [e] | 67,000 | 58,300 | 51,000 [3] |
| Total | 871,000 | 883,000 [e] | 830,000 | 854,100 | 927,000 [3] |
| Bolivia | 18 [e] | 3 | 182 | 596 [r] | 714 [3] |
| Botswana[e] | 19,200 [r] | 21,600 [r] | 27,400 [r] | 22,500 [r, 3] | 26,100 |
| Brazil | 32,734 | 32,711 | 26,275 | 103,153 [r] | 131,000 [p] |
| Bulgaria | 88,000 | 92,800 | 91,700 | 93,000 | 97,000 |
| Burma, leaching, electrowon | 25,800 | 27,500 | 27,870 [r] | 31,756 | 34,478 [3] |
| Canada, concentrates | 633,531 | 603,498 | 557,082 | 566,491 [r] | 566,500 [p] |
| Chile:[4] | | | | | |
| Concentrates | 3,200,800 | 2,979,000 | 3,251,100 | 3,776,200 | 3,735,900 [p, 3] |
| Leaching, electrowon | 1,538,200 | 1,602,000 | 1,653,100 | 1,636,300 | 1,584,600 [p, 3] |
| Total | 4,739,000 | 4,581,000 | 4,904,200 | 5,412,500 | 5,320,500 [p, 3] |
| China:[e] | | | | | |
| Concentrates | 587,000 | 568,000 | 610,000 | 742,000 [r] | 740,000 |
| Leaching, electrowon | 18,000 | 25,000 | 10,000 | 10,000 | 15,000 |
| Total | 605,000 | 593,000 | 620,000 | 752,000 [r] | 755,000 |
| Colombia | 2,192 | 1,853 | 1,578 [r] | 1,701 [r] | 1,700 |
| Congo (Kinshasa):[e, 5] | | | | | |
| Concentrates | 37,800 [r] | 27,500 [r] | 30,300 [r] | 31,800 [r] | 49,500 [3] |
| Leaching, electrowon | -- | 6,500 [r] | 29,500 [r] | 41,500 [r] | 56,500 |
| Total | 37,800 [r] | 34,000 [r] | 59,800 [r] | 73,300 [r] | 106,000 |
| Cuba[e] | 1,000 | 1,000 | -- | -- | -- |
| Cyprus, leaching, electrowon | 5,176 | 3,695 | 2,552 | 1,240 | -- |
| Ecuador[e] | 100 | 100 | 100 | 100 | -- |
| Finland | 13,715 | 14,400 | 14,900 | 15,500 | 15,000 [3] |
| Georgia[e] | 8,000 | 10,000 | 12,000 | 12,000 | 12,000 |
| India | 32,400 | 31,500 | 28,500 | 29,500 [r] | 26,900 [3] |
| Indonesia[5] | 1,081,040 | 1,171,726 [r] | 1,005,831 [r] | 840,318 | 1,065,000 [3] |
| Iran:[e] | | | | | |
| Concentrates | 121,000 | 121,000 | 130,000 | 150,000 [r] | 185,000 |
| Leaching, electrowon | 12,000 | 12,000 | 12,000 | 12,000 | 12,000 |
| Total | 133,000 | 133,000 | 142,000 | 162,000 [r] | 197,000 |
| Japan | 744 | -- [r] | -- [r] | -- [r] | -- |
| Kazakhstan[e] | 470,100 [3] | 490,000 | 485,000 | 461,000 [3] | 402,000 |
| Korea, North[e] | 12,000 | 12,000 | 12,000 | 12,000 | 12,000 |
| Laos | -- | -- | -- | -- | 30,500 |
| Macedonia[e] | 9,000 | 5,600 | 700 [r] | -- [r] | 22,000 |
| Mexico: | | | | | |
| Concentrates | 310,623 | 260,574 | 284,653 | 333,540 | 350,000 |
| Leaching, electrowon | 60,500 | 69,300 [r] | 71,000 | 72,000 | 75,000 |
| Total | 371,123 | 329,874 [r] | 355,653 | 405,540 | 425,000 |
| Mongolia | 133,503 | 131,705 | 131,600 | 132,000 | 126,547 [3] |
| Morocco | 5,400 [r] | 5,000 | 4,900 | 4,400 [r] | 4,400 |
| Namibia | 12,393 [r] | 18,012 | 16,175 [r] | 11,174 [r] | 10,900 |
| Pakistan | -- | -- | 3,200 | 15,000 | 17,700 [3] |
| Papua New Guinea | 218,000 [e] | 211,311 | 190,200 | 173,400 | 193,000 [3] |
| Peru: | | | | | |
| Concentrates | 590,896 | 686,748 | 660,025 | 868,574 | 844,368 [3] |
| Leaching, electrowon | 131,409 [r] | 156,467 [r] | 171,198 | 167,000 | 165,530 [3] |
| Total | 722,305 [r] | 843,215 [r] | 831,223 | 1,035,574 | 1,009,898 [3] |

See footnotes at end of table.

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

(Metric tons)

| Country | 2001 | 2002 | 2003 | 2004 | 2005[e] |
|---|---|---|---|---|---|
| Philippines | 20,322 | 18,364 | 20,400 | 15,984 [r] | 16,323 [3] |
| Poland | 474,000 | 502,800 | 495,000 | 531,000 | 523,000 |
| Portugal | 82,900 | 77,000 | 78,000 | 96,000 | 89,500 |
| Romania[6] | 19,185 | 18,962 | 23,389 [r] | 18,767 [r] | 15,000 |
| Russia[e] | 600,000 | 695,000 | 675,000 | 675,000 | 700,000 |
| Saudi Arabia[e] | 800 | 800 | 800 | 500 | 700 |
| Serbia and Montenegro[e] | 31,000 | 36,900 | 26,400 | 13,000 [r] | 25,000 |
| South Africa | 141,865 | 129,589 | 120,800 [r] | 120,577 [r] | 103,907 [p] |
| Spain | 9,700 | -- | -- | -- | 4,900 [3] |
| Sweden | 74,269 | 76,200 [r] | 96,000 [r] | 90,600 [r] | 97,800 [3] |
| Tanzania, in concentrates and bullion | 2,645 | 4,191 [r] | 3,715 [r] | 4,133 [r] | 4,200 |
| Turkey[6] | 56,864 | 48,253 | 58,000 [e] | 49,000 [e] | 48,000 |
| United States:[5] | | | | | |
| Concentrates | 714,000 | 601,000 | 525,000 | 576,000 | 586,000 [3] |
| Leaching, electrowon | 624,000 | 542,000 | 591,000 | 584,000 | 554,000 [3] |
| Total | 1,340,000 | 1,140,000 | 1,120,000 | 1,160,000 | 1,140,000 [3] |
| Uzbekistan[e] | 78,000 | 80,000 | 80,000 | 95,000 [r] | 100,000 |
| Zambia: | | | | | |
| Concentrates | 233,000 | 251,100 | 269,000 | 344,300 | 330,000 |
| Leaching, electrowon | 79,000 | 78,900 | 80,000 | 82,600 | 106,000 |
| Total | 312,000 [7] | 330,000 | 349,000 | 426,900 | 436,000 |
| Zimbabwe, concentrates | 2,057 | 2,502 | 2,767 | 2,383 | 2,700 |
| Grand total | 13,700,000 | 13,700,000 | 13,700,000 | 14,700,000 [r] | 15,100,000 |
| Of which: | | | | | |
| Concentrates | 11,100,000 | 11,000,000 | 11,000,000 | 12,000,000 [r] | 12,400,000 |
| Leaching, electrowon | 2,600,000 | 2,620,000 | 2,720,000 | 2,700,000 | 2,660,000 |

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

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

[2]Table represent copper content by analysis of concentrates produced (includes cement copper, if applicable), except where otherwise noted. Table includes data available through July 22, 2006.

[3]Reported figure.

[4]Reported by Comision Chilena del Cobre. Includes recoverable copper content of nonduplicative mine and metal products produced from domestic ores and concentrates and leach production for electrowinning.

[5]Recoverable content.

[6]Excludes copper content of pyrite.

[7]Data are for fiscal years beginning April 1 of year stated.

TABLE 21

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

(Metric tons, gross weight)

| Country | 2001 | 2002 | 2003 | 2004 | 2005[e] |
|---|---|---|---|---|---|
| Armenia, primary[e] | 4,000 | 6,700 | 7,500 | 7,500 | 9,800 [3] |
| Australia, primary | 455,000 | 458,000 [e] | 435,000 | 443,000 | 410,000 [3] |
| Austria, secondary | 68,642 | 64,932 | 75,000 | 88,000 | 90,000 |
| Belgium, secondary | 138,200 | 125,900 | 117,500 | 107,000 [r] | 99,200 [3] |
| Bolivia, primary | -- | -- | -- | -- [r] | -- |
| Botswana, primary[4] | 19,209 | 21,590 | 25,292 [r] | 21,195 [r] | 26,700 |
| Brazil, primary | 212,243 | 189,651 | 173,378 [r] | 208,020 [r] | 210,000 [p] |
| Bulgaria: | | | | | |
| Primary | 157,000 [r] | 181,000 [r] | 215,300 [r] | 227,100 [r] | 240,100 [3] |
| Secondary[e] | 5,000 | 15,000 | 16,000 | 7,000 | 5,000 |
| Total | 162,000 [r] | 196,000 [r] | 231,300 [r] | 234,100 [r] | 245,000 |
| Canada: | | | | | |
| Primary | 601,359 | 513,934 | 430,116 | 446,221 | 450,000 [p] |
| Secondary | 41,640 | 24,761 | 26,789 | 29,962 | 30,000 [p] |
| Total | 642,999 | 538,695 | 456,905 | 476,183 | 480,000 [3] |
| Chile, primary | 1,503,200 | 1,438,700 | 1,542,400 | 1,517,600 | 1,558,100 [p, 3] |
| China:[e] | | | | | |
| Primary | 1,120,000 | 1,180,000 | 1,380,000 | 1,500,000 [r] | 1,700,000 |
| Secondary | 190,000 | 310,000 | 350,000 | 440,000 | 540,000 |
| Total | 1,310,000 | 1,490,000 | 1,730,000 | 1,940,000 [r] | 2,240,000 |
| Congo (Kinshasa), primary, electrowon | 25,000 [r] | 10,000 [r] | 8,000 | 20,000 [r] | 10,000 |
| Finland: | | | | | |
| Primary | 169,300 | 160,900 | 176,400 [r] | 168,600 [r] | 170,000 |
| Secondary[e] | 2,000 | 2,000 | 2,000 | 2,000 | 2,000 |
| Total | 171,300 | 162,900 | 178,400 [r] | 170,600 [r] | 172,000 |
| Germany: | | | | | |
| Primary | 317,700 [r] | 295,100 [r] | 288,800 | 278,600 | 257,200 [3] |
| Secondary | 240,900 [r] | 283,100 [r] | 306,600 | 262,600 | 251,400 [3] |
| Total | 558,600 [r] | 578,200 [r] | 595,400 | 541,200 | 508,600 [3] |
| India: | | | | | |
| Primary | 293,000 [e] | 385,400 | 391,000 | 401,000 [r] | 486,600 [3] |
| Secondary[e] | -- | -- | -- | -- | 38,000 |
| Total | 293,000 [e] | 385,400 | 391,000 | 401,000 | 524,600 [3] |
| Indonesia, undifferentiated | 217,500 | 211,200 | 247,400 | 211,600 | 275,000 |
| Iran, undifferentiated[5] | 181,526 [r] | 171,591 [r] | 168,613 [r] | 184,814 [r] | 185,000 |
| Japan: | | | | | |
| Primary | 1,328,489 | 1,317,291 | 1,343,353 | 1,270,495 | 1,319,247 [3] |
| Secondary | 139,764 | 182,069 | 172,724 | 194,927 | 198,516 [3] |
| Total | 1,468,253 | 1,499,360 | 1,516,077 | 1,465,422 | 1,517,763 [3] |
| Kazakhstan, undifferentiated | 433,600 | 446,200 | 431,930 | 445,200 | 425,000 |
| Korea, North, primary and secondary[e] | 15,000 | 15,000 | 15,000 | 15,000 | 15,000 |
| Korea, Republic of: | | | | | |
| Primary | 386,200 [r] | 380,000 [r] | 410,000 [r] | 380,000 [r] | 426,000 |
| Secondary | 42,300 [r] | 50,000 [r] | 50,000 [r] | 50,000 [r] | 50,000 |
| Total | 428,500 | 430,000 | 460,000 | 430,000 | 476,000 [3] |
| Mexico: | | | | | |
| Primary | 305,000 [r] | 243,000 [r] | 238,000 [r] | 274,000 [r] | 290,000 |
| Secondary[e] | 5,000 | 5,000 | 5,000 | 5,000 | 5,000 |
| Total | 310,000 [r] | 248,000 [r] | 243,000 [r] | 279,000 [r] | 295,000 |
| Namibia, primary[6, 7] | 27,015 | 26,703 | 26,036 | 24,704 [r] | 23,300 |
| Oman, primary[e] | 24,200 [3] | 25,000 [r] | 18,000 [r] | 25,000 [r] | 25,000 |
| Peru, primary | 396,400 [r] | 379,600 [r] | 396,100 [r] | 377,800 [r] | 381,600 [3] |
| Philippines, primary | 165,000 | 165,800 | 227,900 | 217,300 [r] | 201,300 [3] |

See footnotes at end of table.

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

(Metric tons, gross weight)

| Country | 2001 | 2002 | 2003 | 2004 | 2005[e] |
|---|---|---|---|---|---|
| Poland: | | | | | |
| Primary | 485,900 | 511,000 | 560,000 [r] | 545,000 [r] | 550,000 |
| Secondary[e] | 27,900 | 39,400 [r] | 24,100 [r] | 25,000 [r] | 25,000 |
| Total | 513,800 | 550,400 [r] | 584,100 [r] | 570,000 [r] | 575,000 |
| Romania: | | | | | |
| Primary | 9,279 | 8,871 | 4,493 [r] | 61 [r] | 100 |
| Secondary[e] | 2,000 | 2,000 | 500 | -- | -- |
| Total | 11,279 | 10,871 | 4,993 [r] | 61 [r] | 100 |
| Russia:[e] | | | | | |
| Primary | 650,000 | 660,000 | 670,000 | 662,000 | 686,000 |
| Secondary | 245,000 | 200,000 | 170,000 | 257,000 | 272,000 |
| Total | 895,000 | 860,000 | 840,000 | 919,000 [3] | 958,000 |
| Serbia and Montenegro:[e] | | | | | |
| Primary | 24,000 | 36,000 [r] | 14,000 [r] | 12,000 [r] | 16,300 |
| Secondary | 14,000 | 6,700 [r] | 3,600 [r] | 1,100 [r] | 6,000 |
| Total | 38,000 | 42,700 [r] | 17,600 [r] | 13,100 [r] | 22,300 |
| South Africa, primary | 117,237 | 116,996 | 112,025 | 89,300 [e] | 100,000 |
| Spain: | | | | | |
| Primary | 255,200 | 281,300 | 276,300 | 210,200 | 278,600 |
| Secondary[e] | 24,700 [3] | 16,700 | 14,000 | 14,100 | 5,000 |
| Total | 279,900 | 298,000 | 290,300 | 224,300 | 283,600 [3] |
| Sweden:[e] | | | | | |
| Primary | 173,000 | 188,000 | 185,000 | 206,000 [r] | 192,000 |
| Secondary | 35,000 | 35,000 | 30,000 | 30,000 | 30,000 |
| Total | 208,000 | 223,000 | 215,000 | 236,000 [r] | 222,000 |
| Turkey, undifferentiated[8] | 33,504 | 32,550 | 30,400 [e] | 11,500 | 9,000 |
| United States, undifferentiated | 919,000 | 683,000 | 539,000 | 542,000 | 523,000 [3] |
| Uzbekistan, undifferentiated[e] | 90,000 | 75,000 | 75,000 | 105,000 [r] | 115,000 |
| Zambia, primary: | | | | | |
| Electrowon | 50,000 | 60,000 | 50,000 | 60,000 | 50,000 |
| Other | 306,000 | 311,400 | 200,000 | 220,000 | 220,000 |
| Total | 356,000 | 371,400 | 250,000 | 280,000 | 270,000 |
| Zimbabwe, primary[e, 6] | 2,160 | -- [r] | -- [r] | -- [r] | -- |
| Grand total | 12,700,000 [r] | 12,500,000 [r] | 12,700,000 [r] | 12,800,000 [r] | 13,500,000 |
| Of which: | | | | | |
| Primary: | | | | | |
| Electrowon | 75,000 [r] | 70,000 [r] | 58,000 [r] | 80,000 [r] | 60,000 |
| Other | 9,510,000 [r] | 9,480,000 [r] | 9,750,000 [r] | 9,730,000 [r] | 10,200,000 |
| Secondary | 1,220,000 [r] | 1,360,000 [r] | 1,360,000 [r] | 1,510,000 [r] | 1,650,000 |
| Undifferentiated[9] | 1,890,000 [r] | 1,630,000 [r] | 1,510,000 [r] | 1,520,000 [r] | 1,550,000 |

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

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

[2]This table includes total production of smelted copper metal, including low-grade cathode produced by electrowinning methods. The smelter feed maybe 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. Table includes data available through July 15, 2006.

[3]Reported figure.

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

[5]Data are for year beginning March 21 of that stated. Secondary production is estimated to be about 5% of total.

[6]Includes impure cathodes produced by electrowinning in nickel processing.

[7]Includes 8,000 to 10,000 metric tons per year for 2001-05 produced from imported toll concentrates.

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

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

(Metric tons)

| Country | 2001 | 2002 | 2003 | 2004 | 2005 |
|---|---|---|---|---|---|
| Argentina, secondary[e] | 16,000 | 16,000 | 16,000 | 16,000 | 16,000 |
| Australia, primary: | | | | | |
| Electrowon | 102,000 [e] | 96,000 [e] | 67,400 | 58,300 | 50,900 |
| Other | 456,000 [e] | 449,000 [e] | 416,600 | 431,800 | 420,200 |
| Total | 558,000 [e] | 545,000 [e] | 484,000 | 490,100 | 471,100 |
| Austria, secondary[e] | 69,000 | 65,000 | 65,100 [r] | 59,000 [r, 3] | 52,000 |
| Belgium:[e] | | | | | |
| Primary[4] | 236,000 | 207,000 | 208,000 | 223,000 | 252,900 [3] |
| Secondary | 187,000 | 216,000 | 215,000 | 174,000 | 130,000 |
| Total | 423,000 | 423,000 | 423,000 | 397,000 | 382,900 [3] |
| Brazil, primary | 212,243 | 189,651 | 173,378 [r] | 208,020 [r] | 210,000 [p] |
| Bulgaria:[e] | | | | | |
| Primary | 29,400 [3] | 38,000 | 43,000 | 52,300 | 60,500 |
| Secondary | 5,000 | 3,000 | 2,000 | 3,000 | 3,000 |
| Total | 34,400 | 41,000 | 45,000 | 55,300 | 63,500 |
| Burma, electrowon | 25,800 | 27,500 | 27,900 [e] | 31,800 | 32,000 [e] |
| Canada: | | | | | |
| Primary | 524,900 [r] | 469,760 [r] | 428,077 [r] | 495,867 [r] | 483,500 |
| Secondary | 42,800 | 24,761 | 26,789 | 31,100 | 31,800 |
| Total | 567,700 [r] | 494,521 [r] | 454,866 [r] | 526,967 [r] | 515,300 |
| Chile, primary | | | | | |
| Electrowon | 1,538,200 | 1,602,000 | 1,653,100 | 1,636,300 | 1,584,600 [p] |
| Other | 1,344,000 | 1,248,100 | 1,248,800 | 1,200,400 [r] | 1,239,400 [p] |
| Total | 2,882,200 | 2,850,100 | 2,901,900 | 2,836,700 [r] | 2,824,000 [p] |
| China, primary[e] | | | | | |
| Primary | | | | | |
| Electrowon | 18,000 | 20,000 | 10,000 | 10,000 | 15,000 |
| Other | 1,200,000 | 1,280,000 | 1,420,000 | 1,580,000 [r] | 1,850,000 |
| Secondary | 300,000 | 350,000 | 430,000 | 620,000 [r] | 750,000 |
| Total | 1,518,000 [3] | 1,650,000 | 1,860,000 | 2,210,000 [r] | 2,615,000 [3] |
| Cyprus, electrowon | 5,176 | 3,695 | 2,552 | 1,240 | -- |
| Egypt, secondary[e] | 4,000 | 4,000 | 4,000 | 4,000 | 4,000 |
| Finland:[e] | | | | | |
| Primary | 105,000 | 112,000 | 120,000 | 117,000 [r] | 118,000 |
| Secondary | 15,000 | 15,000 | 15,000 [r] | 16,000 | 16,000 |
| Total | 120,000 | 127,000 | 135,000 [r] | 133,000 [r] | 134,000 |
| Germany: | | | | | |
| Primary | 303,000 [r] | 327,000 [r] | 286,653 [r] | 283,686 [r] | 293,800 |
| Secondary | 390,773 [r] | 368,791 [r] | 310,925 [r] | 368,956 [r] | 344,400 |
| Total | 693,773 [r] | 695,791 [r] | 597,578 [r] | 652,642 [r] | 638,200 |
| Hungary, secondary[e] | 10,000 | 10,000 | 10,000 | 10,000 | 10,000 |
| India:[e] | | | | | |
| Primary, electrolytic | 310,000 [3] | 354,000 | 375,000 | 399,000 [r] | 497,000 [3] |
| Secondary | 18,000 | 20,000 | 19,000 | 20,000 | 20,000 |
| Total | 328,000 | 374,000 | 394,000 | 419,000 [r] | 517,000 |
| Indonesia, primary | 212,500 | 192,400 | 223,300 | 210,500 | 262,900 |
| Iran, primary[5] | | | | | |
| Electrowon[e] | 12,000 | 12,000 | 12,000 | 12,000 | 12,000 |
| Other[6] | 140,000 [r] | 131,000 [r] | 134,632 | 140,000 [r] | 163,100 |
| Total | 152,000 [r] | 143,000 [r] | 146,632 | 152,000 [r] | 175,100 |
| Italy, secondary | 35,500 | 32,400 | 26,700 [e] | 34,000 [r] | 32,200 |

See footnotes at end of table.

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

(Metric tons)

| Country | 2001 | 2002 | 2003 | 2004 | 2005 |
|---|---|---|---|---|---|
| Japan: | | | | | |
| Primary | 1,287,165 | 1,211,111 | 1,251,728 | 1,188,491 | 1,227,528 |
| Secondary | 138,526 | 189,968 | 178,637 | 191,653 | 167,756 |
| Total | 1,425,691 | 1,401,079 | 1,430,365 | 1,380,144 | 1,395,284 |
| Kazakhstan, primary | 425,700 | 453,000 | 432,901 | 445,200 | 418,833 |
| Korea, North, primary[e] | 15,000 [r] | 15,000 [r] | 15,000 [r] | 15,000 [r] | 15,000 |
| Korea, Republic of, undifferentiated | 473,252 [r] | 499,116 [r] | 509,970 [r] | 495,952 [r] | 526,566 |
| Laos, electrowon | -- | -- | -- | -- | 30,500 |
| Mexico, primary: | | | | | |
| Electrowon | 60,500 [r] | 69,300 [r] | 71,000 [r] | 72,000 [e] | 75,000 [e] |
| Other | 332,500 [r] | 318,700 [r] | 249,000 [r] | 321,000 [r] | 325,000 [e] |
| Secondary | 15,000 | 35,000 | 35,000 | 35,000 | 35,000 |
| Total[e] | 408,000 [r] | 423,000 [r] | 355,000 [r] | 428,000 [r] | 435,000 |
| Mongolia, electrowon | 1,476 | 1,500 | 1,341 | 2,376 [r] | 2,475 |
| Norway, primary[6] | 26,700 | 30,500 [e] | 35,900 | 35,600 | 38,500 |
| Oman, primary[e] | 24,000 | 24,000 | 17,000 | 24,000 [r] | 24,000 |
| Peru, primary: | | | | | |
| Electrowon | 131,409 [r] | 156,467 [r] | 171,198 | 167,000 | 165,530 |
| Other | 342,502 [r] | 346,282 [r] | 345,848 | 338,308 | 344,862 |
| Total | 473,911 [r] | 502,749 [r] | 517,046 | 505,308 | 510,392 |
| Philippines, primary | 164,530 | 144,315 | 171,200 [3] | 175,000 | 172,000 |
| Poland: | | | | | |
| Primary | 498,451 | 508,674 | 513,600 [r] | 531,100 [r] | 540,300 |
| Secondary | 30,286 | 19,146 | 16,000 [r] | 21,000 [r] | 20,000 |
| Total | 528,737 | 527,820 | 529,600 [r] | 552,100 [r] | 560,300 |
| Romania: | | | | | |
| Primary | 18,500 | 11,453 | 16,739 | 24,383 | 30,000 |
| Secondary[e] | 4,000 | 2,000 | 2,000 | 2,000 | 2,000 |
| Total | 22,500 | 13,453 | 18,739 | 26,383 | 32,000 |
| Russia: | | | | | |
| Primary | 650,000 | 670,000 [e] | 670,000 [e] | 662,000 | 664,000 |
| Secondary | 244,500 | 200,000 [e] | 170,000 [e] | 257,000 | 269,000 |
| Total | 894,500 | 870,000 [e] | 840,000 [e] | 919,000 | 933,000 |
| Serbia and Montenegro: | | | | | |
| Primary | 32,365 | 35,897 | 14,000 [r] | 12,000 [r] | 23,000 |
| Secondary[e] | 17,000 [r] | 17,000 [r] | 8,000 [r] | 7,000 [r] | 7,000 |
| Total | 49,365 [r] | 52,897 [r] | 22,000 [r] | 19,000 [r] | 30,000 |
| South Africa, primary[6] | 132,000 [r] | 119,970 [r] | 111,400 [r] | 91,495 [r] | 97,000 |
| Spain: | | | | | |
| Primary | 235,100 | 272,000 [e] | 259,000 [e] | 193,200 | 242,700 |
| Secondary[e] | 55,600 [3] | 37,000 | 35,000 | 35,000 | 26,300 [3] |
| Total | 290,700 | 309,000 [e] | 294,000 [e] | 228,200 | 269,000 |
| Sweden:[e] | | | | | |
| Primary | 179,000 [3] | 199,000 | 189,000 | 210,000 | 200,000 |
| Secondary | 25,000 | 25,000 | 25,000 | 25,000 | 22,000 |
| Total | 204,000 [3] | 224,000 | 214,000 | 235,000 | 222,000 |
| Taiwan, secondary[e] | 4,000 | 4,000 | 4,000 | 4,000 | 4,000 |
| Thailand, primary | -- | -- | -- | 27,200 [r] | 26,100 |
| Turkey:[e] | | | | | |
| Primary | 54,400 | 39,000 | 40,000 | 45,000 | 90,000 |
| Secondary | 4,000 | 2,000 | 5,000 | 5,000 | 5,000 |
| Total | 58,400 | 41,000 | 45,000 | 50,000 | 95,000 |
| Ukraine, secondary | -- | 10 | 20 | 20 | 20 |

See footnotes at end of table.

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

(Metric tons)

| Country | 2001 | 2002 | 2003 | 2004 | 2005 |
|---|---|---|---|---|---|
| United States: | | | | | |
| Primary: | | | | | |
| Electrowon | 628,000 | 601,000 r | 591,000 | 584,000 | 554,000 |
| Other | 1,000,000 | 841,000 | 662,000 | 671,000 | 654,000 |
| Secondary | 172,000 | 69,900 | 53,300 | 50,800 | 47,200 |
| Total | 1,800,000 | 1,510,000 | 1,310,000 | 1,310,000 | 1,260,000 |
| Uzbekistan:[e] | | | | | |
| Primary | 80,000 | 75,000 | 75,000 | 105,000 r | 115,000 |
| Secondary | 10,000 | -- | -- | -- | -- |
| Total | 90,000 | 75,000 | 75,000 | 105,000 r | 115,000 |
| Zambia, primary: | | | | | |
| Electrowon[7] | 79,000 | 83,700 | 109,000 | 124,000 r | 150,000 e |
| Other | 217,500 | 253,100 | 240,800 | 286,000 r | 244,000 e |
| Total | 296,500 | 336,800 | 349,800 | 410,000 r | 394,000 e |
| Zimbabwe, primary | 5,300 e | 2,502 | 2,767 | 2,383 | 2,400 e |
| Grand total | 15,700,000 r | 15,500,000 r | 15,300,000 r | 15,900,000 r | 16,600,000 e |
| Of which: | | | | | |
| Primary: | | | | | |
| Electrowon | 2,600,000 | 2,670,000 | 2,720,000 | 2,700,000 | 2,670,000 e |
| Other | 11,300,000 | 11,100,000 r | 10,900,000 r | 11,200,000 | 11,900,000 e |
| Secondary | 1,810,000 r | 1,730,000 r | 1,670,000 r | 2,000,000 r | 2,010,000 e |

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

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

[2]This table 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. Table includes data available through July 22, 2006.

[3]Reported figure.

[4]Includes reprocessed leach cathode from Congo (Kinshasa).

[5]Data are for Iranian years beginning March 21 of that stated.

[6]May include secondary.

[7]Electrowon covers only high-grade electrowon cathodes reported as "finished production leach cathodes."