COPPER

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In 2004, mine production of recoverable copper in the United States rose by about 40,000 metric tons (t) (4%) to 1.16 million metric tons (Mt), the highest level since 2001. A global shortfall in production that began in 2003 and gained momentum in 2004, led to a sharp decline in global refined copper inventories and a rise in copper prices. Higher prices and projections of a sustained shortfall in production encouraged the restart of idle capacity at several operating mines in the latter part of the year and restart, under new ownership, of a mine idled since 1999.

Downstream smelter and refinery production were essentially unchanged from that of 2003, in part owing to increased exports of concentrates and anode copper. Electrowon production from the leaching of copper ores, which declined by about 7,000 t, accounted for 50% of mine output and 47% of primary refined copper production. Reported domestic consumption of refined copper in 2004 rose by about 5% to 2.41 Mt and was at its highest level since 2001. China was the world's leading consumer of refined copper with an estimated 20% market share.

Global mine production of copper, which had been essentially stagnant during the preceding 2 years, rose by about 6% to a record-high 14.6 Mt in 2004. The United States accounted for about 8% of world production and retained its position as the world's second leading mine producer. Chile, where mine production rose by about 10% to a record-high 5.4 Mt, remained the leading mine producer and accounted for more than 37% of total world production. Global smelter and refinery production rose by only about 3% and 4%, respectively. The United States fell to sixth place behind Poland in world smelter production and remained fourth in refinery output behind Chile, China, and Japan.

U.S. Geological Survey estimates indicated world copper reserves of 470 Mt and a copper reserve base of 940 Mt. The United States had about 7% each of the world's copper reserves and reserve base.

The principal mining States, in descending order of production, Arizona, Utah, New Mexico, and Montana, accounted for 99% of domestic production; copper was also recovered at mines in Idaho, Missouri, and Nevada. Although copper was recovered at 22 mines that operated in the United States, just 14 mines accounted for more than 99% of production. The remaining 8 mines were either small leach operations or byproduct producers of copper.

During the year, 3 primary smelters, 4 electrolytic and 3 fire refineries, and 12 solvent extraction-electrowinning (SX-EW) facilities operated in the United States. The three fire refineries processed scrap to recover unalloyed copper products; one of the refineries operated only during the fourth quarter. Scrap was also consumed in relatively small quantities at several of the primary smelters.

U.S. smelter and refinery capacity remained essentially unchanged at about 900,000 t, and 2.25 Mt, respectively, and capacity utilization rates remained unchanged at 60% and 58%, respectively. In 2004, copper recovered from refined or remelted scrap (about 80% from new scrap and 20% from old scrap) composed 29% of the total U.S. copper supply. The conversion of old scrap to alloys and refined copper declined by about 8% to 191,000 t of recoverable copper and was at about the same level as in 2003. Copper recovered from new scrap (774,000 t) rose by about 5%, and to a large extent was a reflection of increased manufacturing levels.

Copper was consumed as refined copper and as direct-melt scrap at about 30 brass mills, 13 wire-rod mills, and 500 chemical plants, foundries, and miscellaneous operations. Owing to sustained low-capacity utilization at U.S. refineries, the net import reliance for refined copper as a percentage of apparent consumption increased for the third consecutive year to a record-high 43%. Chile, Canada, and Peru, in descending order, accounted for 92% of the 807,000 t of refined copper imported for consumption. In addition to imports, domestic inventories, which declined by 522,000 t, provided significant supplies to the domestic industry.

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 (NPDWRs) were established prior to 1997, affirmed its conclusion that the established maximum contaminant level goal (MCLG) for copper of 1.3 milligrams per liter should be retained pending collection of additional data on health risks. The EPA further concluded that utilities had sufficient flexibility under the existing lead copper rule (LCR) to adopt new control strategies. The EPA recognized, however, that the existing LCR may limit the ability to adopt new or emerging technologies and stated that it would continue to monitor new developments and may consider revisions at the end of the next 6-year review cycle (U.S. Environmental Protection Agency, 2003). In 2004, the EPA held a series of workshops to discuss issues associated with company implementation of the LCR, including workshops on LCR Monitoring Protocols, simultaneous compliance with the LCR and NPDWRs, and public education requirements (U.S. Environmental Protection Agency, 2004a, b).

On April 7, the Bureau of Industry and Security (BIS), U.S. Department of Commerce, received a joint petition from the Copper and Brass Fabricators Council, Inc. and the Nonferrous Founders' Society that requested the imposition

of export monitoring and export controls on copper scrap and copper-alloy scrap and that requested a public hearing on the issue. The petition was filed under provisions of the Export Administration Act of 1979, as amended, that allowed for an industry, or a segment thereof, that processes metallic materials capable of being recycled to file such a petition (U.S. Department of Commerce, 2004). In their petition, the copper and brass industry contended that the rapid rise of scrap exports to China had created a short supply of scrap materials for domestic consumers and had contributed to higher prices for available supplies. The petitioners argued that not all sectors of their industry were able to substitute copper cathode for scrap as a feed material, and where possible, such substitution imposed economic penalty owing to the higher cost of cathode. The petitioners further claimed that higher raw material costs could not be passed through to consumers, and that scarcity limited their production and harmed their competitive position. According to the petition, total scrap exports from 1999 to 2003 rose by 138%, and exports to China, which rose by 515% during the same period, accounted for essentially all of the increase. The petitioners requested that export quotas for copper and copper-alloy scrap be set at the mean volume of exports for the period 1996-2000, 380,000 t, which was about 50% of the 2003 level (U.S. Department of Commerce, 2004b§[1]).

In July, BIS issued its ruling on the petition in which it determined that the short supply criteria had not been met, and that neither monitoring nor controls were warranted. In its determination, Commerce concluded that:

- Though the volume of exports of copper-base scrap increased significantly during the study period, the increase was somewhat less significant when considered in relation to domestic demand and the erosion of the secondary smelting industry.
- Copper scrap prices did increase significantly, but the world market for copper cathode, not the level of U.S. exports of copper-base scrap, was the most important determinant in the fluctuations of domestic scrap prices.
- The evidence did not demonstrate the existence of a scrap shortage, nor did it demonstrate a significant adverse effect on the national economy or sector thereof.

The Commerce Department indicated, however, that it would work to refine schedule B classifications for copper-base scrap exports in order to better delineate the varieties of scrap being exported; review the new scrap export data in the coming year; and work closely with the office of the United States Trade Representative to address any foreign government practices that may be distorting trade in copper-base scrap (U.S. Department of Commerce, 2004a§). New schedule B classifications were subsequently implemented for 2005.

Production

In 2004, in response to a projected sustained shift in the global supply balance (from one of oversupply of refined copper to a production deficit) and the precipitous rise in copper prices at yearend 2003, the 7-year downward trend in domestic mine production was reversed, and mine production rose by about 4%. At the end of January, in response to "higher copper prices and indications that the improved market for copper is sustainable," Phelps Dodge Corp. announced plans for increasing production at several North and South American operations. Phelps Dodge chose specific operations for increase in part to maintain a balance between its mining and its downstream processing facilities (Phelps Dodge Corp., 2004).

Smelter and refinery production were essentially unchanged in 2004. Three primary smelters and four primary electrolytic refineries operated during 2004. The Chino smelter in New Mexico and the Miami electrolytic refinery in Arizona that closed in 2002 were retained on care-and-maintenance status. During the fourth quarter, the secondary smelting and refining industry, which had endured a continual decline in recent years, received a boost when American Iron & Metal Co. Inc. (Montreal, Quebec, Canada) restarted its Warrenton, MO, fire refinery, the only remaining nonintegrated secondary copper refinery in the United States. American Iron & Metal acquired Warrenton from Philip Services Corp., of Houston, TX, in 2000 and operated the refinery intermittently until yearend 2002. Operating as the newly formed Warrenton Copper LLC, the plant hoped to fill a domestic niche as a "stable consumer capable of consuming large amounts of No. 2 copper (scrap)." The facility included wire-chopping lines, and plans called for adding a preshredder and granulator (McCann, 2004§).

Company Reviews.—ASARCO Incorporated [owned by Grupo México, S.A. de C.V. through its subsidiary, Americas Mining Corp. (AMC)] began an accelerated waste rock removal program in April at its Mission and Ray Mines in Arizona. As a result, waste removal in 2004 increased by about 65% compared with that in 2003. According to Asarco, the program began to bear fruit in the third quarter, with total company production rising to 36,200 t, an increase of 30.2% compared with production during the second quarter. Grupo México projected a significant mine turnaround by mid-2005 that could boost Asarco's total mine production capacity to 220,000 metric tons per year (t/yr) of copper. Production from U.S. operations in Arizona totaled 141,000 t; the Mission Mine produced 22,200 t of copper in concentrate; the Ray Mine produced 65,600 t in concentrate and 34,000 t of electrowon copper; and the Silver Bell Mine produced 19,500 t of electrowon copper. Asarco expected that a return to a positive net income in 2005 would allow for investment in process improvements and environmental remediation (Grupo México, S.A. de C.V., 2005, p. 11-15; Platts Metals Week, 2005).

Copper production from BHP Billiton's residual Arizona leach operations at Miami and Pinto Valley totaled 9,500 t in 2004, down from 10,200 t in 2003 (BHP Billiton, 2005, p. 10). Based on an agreement signed with BHP in 2001, Rio Tinto plc earned a 55% controlling interest in the Resolution Copper Company by investing $25 million in drilling, exploration, and remediation (BHP retained a 45% interest). Resolution was formed by Rio Tinto to evaluate a large copper sulfide deposit located about 2,000 meters (m) below the surface beneath BHP's shuttered Magma Mine in the Pioneer mining district east of Superior, AZ. By midyear, drilling had achieved at

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

least 5 intercepts with the ore body, one of which was reported to extend for about 300 m and grading 1.9% copper. If mine development was to proceed, then Rio Tinto did not anticipate production prior to 2014 (Dillard, 2004).

Constellation Copper Corp. announced in June that its board of directors had approved a $40 million debt financing package for the construction of the Lisbon Valley open pit and heap-leach SX-EW project in Utah (Constellation Copper Corp., 2004a). In September, Constellation reported that dismantling of the crushing and SX-EW processing facilities that it purchased from Equitorial Tonopah Inc.'s closed Tonapah, NV, mine was complete, and that the plant equipment had been relocated to the Lisbon Valley site. In November, Constellation announced that it had begun reconstruction of the crushing and SX-EW processing facilities. The Lisbon Valley project was designed to produce 24,500 t/yr of copper cathode at a projected average cash operating cost of $0.47 per pound (excluding mining fleet costs). The projected total cost of $0.72 per pound included all life-of-mine capital, reclamation, and closure costs (Constellation Copper Corp., 2004b, c).

In Nevada, GoldSpring, Inc. reported early in the year that it was proceeding with its Big Mike project, near Winnamucca. The project called for using the company's Eco-Vat leaching system to process about 1.1 Mt of stockpiled ore during a 5- to 6-year period to recover about 11,300 t of electrowon copper (GoldSpring, Inc., 2004§). By yearend, however, no further development had been announced.

Nord Resources Corp. announced that it had issued tender/contract documents to four mining contractors for mining at the company's Johnson Camp Mine located in Southern Arizona. Operations at Johnson Camp would involve removal of 4,500 metric tons per day (t/d) of overburden and mining about 8,000 t/d of ore to produce a nominal 9,000 t/yr of electrowon cathode. Actual production of copper cathode was anticipated to begin within 3 months of a restart (Nord Resources Corp., 2004).

In 2004, Phelps Dodge reported copper production of 1.20 Mt, which included minority participants' share of 204,000 t, from its worldwide operations, compared with 1.18 Mt and 223,000 t, respectively, in 2003. U.S. production in 2004 was 683,000 t of copper (515,000 t electrowon and 168,000 t in concentrate), an increase of 31,000 t from that produced in 2003 (Phelps Dodge Corp., 2005, p. 8).

Production of 381,000 t of electrowon copper at the Morenci Mine complex in Arizona was essentially unchanged from that of the previous year. The complex comprised an open pit, a concentrator, four solvent extraction (SX) facilities, and three electrowinning tankhouses. While the Morenci concentrator remained on care and maintenance, the Metcalf crushing facility processed about 77,000 t/d of ore (Phelps Dodge Corp., 2005, p. 8).

Production at the Bagdad Mine in Arizona rose nominally to 99,900 t of copper (74,500 t in net concentrate production and 25,400 t electrowon). Though Phelps Dodge began increasing mill throughput and reported the mill operating at full capacity by the end of the second quarter, net production of copper in concentrate was essentially unchanged owing to lower mill head grade (0.41% copper down from 0.43% in 2003) and the processing of 52,600 t of concentrate through a demonstration leach plant (commissioned in 2003) to produce 15,800 t of electrowon cathode. In 2003, the demonstration leach plant processed 40,000 t of concentrate and produced 11,000 t of electrowon copper. In 2002, prior to starting the concentrate leach plant, conventional leach production was only 14,000 t from residual leaching of ore piles. Between 1999, the year Phelps Dodge acquired the property, and yearend 2003, less than 1 Mt of leach ore had been added to the stockpiles. In 2004, more than 21 Mt of ore grading an average 0.9% copper was added to the leach stockpile (Phelps Dodge Corp., 2005, p. 3-8).

At the Sierrita Mine in Arizona, copper in concentrate production rose to 66,700 t from 60,100 t in 2003 following rampup to full capacity during the fourth quarter. Electrowon production plummeted to 3,600 t from 8,400 t during 2003, as the plant was shuttered for most of the year. Though it was renewed during the year, production had been interrupted by expiration of a land lease for the property upon which the electrowinning (EW) tankhouse was located. Phelps Dodge also completed construction of an 18,000 t/yr copper sulfate plant at Sierrita to supplement capacity at its plant in El Paso, TX (Phelps Dodge Corp., 2005, p. 3-8).

At the Chino Mine in New Mexico, mining and milling of sulfide ore, which had been curtailed since March 2001, resumed during the second quarter of the year, and by the end of the third quarter the mill reportedly was operating at about 80% capacity. Copper in concentrate production was 27,000 t for the year, about one-third of the level in 2000. Production of leach ore, which had been negligible in 2002, resumed during September 2003, and rose to the pre-curtailment level of 28 million metric tons per year (Mt/yr) during 2004. Electrowon production in 2004 rose to 56,000 t, the highest level since 1998, from 36,000 t in 2003 (Phelps Dodge Corp., 2005, p. 10). The Cobre Mine in New Mexico produced no copper in 2004 despite the announced intention to reopen the mine that had been shuttered since 1999, though limited mine rehabilitation activities took place. At the Tyrone Mine, also in New Mexico, production of electrowon copper decreased to 39,000 t from 52,000 t in 2003 following partial curtailment of production in September 2003. In 2004, 16.5 Mt of ore was placed in leach stockpiles, most of which was previously mined material that had been considered waste material (Phelps Dodge Corp., 2005, p. 3-10).

At Miami, AZ, Phelps Dodges's electrolytic refinery remained shuttered, while electrowon production decreased to 8,900 t of copper from 16,100 t in 2003. Mining of leach material, which last took place in 2001, remained suspended. Smelter production rose to 195,000 t of anode from 182,000 t in 2003, and the facility was reportedly operating at full capacity during the fourth quarter. Production of refined copper at its El Paso, TX, refinery rose to 280,000 t, yet remained well below capacity of about 400,000 t (Phelps Dodge Corp., 2005, p. 3-10).

Quadra Mining Ltd. (Vancouver, British Columbia, Canada) announced that the concentrator at its Robinson Mine near Ely, NV, had begun processing ore on September 1, and by the end of the first week in September it was operating at about 60% of its design capacity of 38,000 t/d of ore. The mine operating company, Robinson Nevada Mining Company (a wholly owned subsidiary of Quadra), contracted with Washington Group International to mine approximately 67 Mt/yr of ore and waste

at Robinson during a 5-year period. Ore and waste removal was expected to ramp up from 80,000 t/d to 200,000 t/d by January 2005. Quadra purchased Robinson from BHP in April 2004 for $18 million (Quadra Mining Ltd., 2004b). BHP, which built a new mill to process ore from pits first developed by what is now Kennecott Utah Copper Corp., operated the Robinson Mine from 1996-99. Updated reserve estimates and mine plans published by Quadra in August 2004 indicated copper reserves at its four pits of 133 Mt of ore grading 0.69% copper and 0.285 grams per metric ton of gold and containing 747,000 t of recoverable copper and 18,700 kilograms of recoverable gold at recovery rates of 82% and 49.3%, respectively. The overall mine life was projected to be 10 years at an average production rate of 75,000 t/yr of copper and 1,170 kilograms per year of gold, and have an average life-of-the-mine cash cost of $0.80 per pound of copper. Concentrates were expected to be sold offshore (Quadra Mining Ltd., 2004a).

At Rio Tinto's Bingham Canyon Mine in Utah, production of copper in concentrate decreased to 264,000 t from 282,000 t in 2003 owing to lower mill throughput and lower average mill-head grades (0.63% copper). Despite a 2-week smelter shutdown for maintenance during the fourth quarter, production of refined copper rose to 247,000 t from 231,000 t in 2003, yet remained well below capacity of about 300,000 t/yr. Early in 2005, parent company Rio Tinto approved the East 1 pushback project, budgeted to cost $170 million, to enlarge the Bingham Canyon open pit and extend the life of the pit until 2017. Previous plans had called for exhaustion of open pit reserves and development of an underground mine by 2013 (Rio Tinto plc, 2005a, p.17; 2005b, p. 48).

In October, Southern Peru Copper Corp. (SPCC) announced that it had executed a merger agreement with AMC, the net result of which was that Grupo México, through AMC, would increase its ownership in SPCC to roughly 75.1%. Previously, AMC owned 54.2% of SPCC with the balance held by Cerro Trading Company (14.2%), Phelps Dodge Corp. (14.0%), and other common shareholders (17.6%). According to Grupo México, after the merger it had the second largest copper reserves of any company in the world and the largest reserves of any publicly traded company (Grupo México, S.A. de C. V., 2004, p. 2; Southern Peru Copper Corp., 2004). In addition to its U.S. operations, Grupo México operated the Cananea and La Caridad Mines in Mexico, and SPCC operated the Toquepala and Cuajone Mines in Peru, the four mines having a combined capacity of more than 750,000 t/yr of copper in concentrate and electrowon copper.

Consumption

Reported domestic consumption of refined copper in 2004 reversed its 2-year downward trend, rising by more than 5% to the highest level in 3 years. Buoyed by continued strong housing construction, consumption of refined copper in the first quarter of 2004 rose 6% above consumption in the previous quarter and was up by more than 8% compared with consumption during the first quarter of 2003. Wire-rod mills accounted for most of the increase, with consumption rising by more than 7% compared with that of the previous quarter and more than 10% compared with that of the first quarter of 2003. According to data compiled by the American Bureau of Metal Statistics, Inc. (ABMS) (2004), U.S. shipments of wire rod in March 2004 were 24% higher than in March 2003, and first quarter 2004 shipments, which were at the highest level since the first quarter of 2001, were 13% above shipments in the first quarter of 2003. Apparent consumption of wire rod in the United States, which included net imports, was 15% higher than that for the first quarter of 2003. Inventories of wire rod at producers were at the lowest level since at least 1996, providing further evidence of recovery in demand.

Reported consumption in the second and third quarters, though down nominally from that in the first quarter, remained about 9% above that for the equivalent periods of 2003. By September, however, the markets showed signs of weakening, and during the fourth quarter, reported consumption of refined copper decreased by 10% from that of the third quarter and was 5% below the relatively strong fourth quarter of 2003. According to ABMS (2005b) data, domestic wire rod shipments for 2004 totaled 1.79 Mt, and were up by almost 9% from that of the previous year. Apparent consumption of wire rod was up by about 7%. Similarly, ABMS (2005a) data on 2004 brass mill products shipments by domestic producers were up by 7.3% compared with 2003 shipments, despite a 12.3% drop during the fourth quarter of 2004 (3.3% fourth quarter year-on-year drop). All copper and copper alloy product sectors rose in 2004—plate, strip and sheet (11.9%); rod and bar (7.7%); and tube (3.4%).

According to preliminary data from the Copper Development Association, Inc. (2005, p. 18-20), the 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, reversed a 2-year decline and rose by 5.1% in 2004 to about the same level as in 2001. Brass mill products accounted for about 49% of total shipments to the domestic market; wire mill products, 49%; and foundry and powder products, 2%. In building construction, which was the largest end use sector, shipments rose by 5.4% and accounted for about 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 (21% market share), transportation equipment (11% share), and consumer and general products (11% share) increased by 3%, 12%, and 8%, respectively. Shipments for industrial machinery and equipment (9% share) declined by about 2%.

Prices and Stocks

The copper price rally at yearend 2003, that was encouraged by a production deficit, stock drawdowns, and announcements of potential supply disruptions, continued almost uninterrupted through the first quarter of 2004. The COMEX (the COMEX Div. of the New York Mercantile Exchange) price reached a peak of $1.38 on March 19, and averaged $1.34 for the month, the highest monthly average since November 1995. Though the Platts Metals Week average producer price premium remained unchanged in the January to March period at 4.2 cents per pound

over COMEX, the New York dealer premium rose from 4.2 cents per pound in January, to 4.8 cents in February, to 5.5 cents in March, and was indicative of tightening copper supplies.

Though copper prices moderated during the second quarter (the COMEX price averaged only $1.21 in June), the market was volatile and was sensitive to industry announcements, including an announcement that Freeport McMoRan Copper and Gold Inc.'s Grasberg operation in Indonesia had restarted mining in the high-grade region of its pit (a series of slope failures had altered mine plans and reduced production projections) and reports of panic selling in China. Concern over a possible slowdown in China's economic growth sent prices plunging on April 28 to $1.18 (Francis-Grey, 2004§). Similarly, initial labor concerns at the 470,000-t/yr Collahuasi Mine in Chile and at Asarco's mines in Arizona, and their resolution without production disruption, led to price volatility in June (Platts Metals Week, 2004a).

Price volatility was closely tied to the tightening global supply of copper. Global commodity exchange inventories (COMEX, London Metal Exchange Ltd., and Shanghai Futures Exchange) had declined to 806,000 t at yearend 2003 from 1.29 Mt at yearend 2002. Exchange stocks continued their downward trend during the first 6 months of 2004, and by the end of June had decreased to 242,000 t. The United States accounted for most of the decline, with U.S. located exchange inventories declining to 152,000 t at the end of June, down from 590,000 t at yearend 2003.

Following a dip in August, a traditional period of light summer demand, tightening supply, labor unrest, and concern over other production disruptions led to a near steady rise in prices during the remainder of the year. The COMEX price peaked at $1.54 per pound on December 28 and closed the year at $1.49 per pound. In December, the Platts Metals Week average New York dealer premium for cathode rose to 5.5 cents per pound over the COMEX spot price and the producer premium rose to about 5.3 cents per pound. This compared with 3.0 cents per pound and 4.2 cents per pound, respectively, in December 2003. Kennecott Utah Copper indicated that premiums were likely to continue to rise when it announced that its first quarter 2005 premium for cathode delivery to U.S. locations would rise by between 1.4 cents per pound and 1.7 cents per pound depending on location (Platts Metals Week, 2004b). Copper inventories continued their downward trend, and by yearend global commodity exchange inventories had declined to only 124,000 t, the lowest level since mid-1990. According to International Copper Study Group (ICSG) data (2005a, p. 9), total yearend global inventories (commodity exchanges, consumer, government, merchant, and producer) declined to 922,000 t from 1.78 Mt at yearend 2003, and at the prevailing rate of consumption equaled less than a 3-week supply of copper.

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. According to American Metal Market data, the average discount for refiners No. 2 scrap rose to 21 cents per pound from 11 cents per pound in 2003 and the discount for brass mill No. 1 scrap rose to 2.6 cents per pound from 1.2 cents per pound in 2003. The price discount for No. 2 copper scrap increased sharply in April to 21.3 cents per pound from an average of only 11.5 cents per pound during the first quarter. The rise coincided with industry reports that China, which was the leading destination for domestic scrap exports, had essentially exited from the No. 2 scrap market, and that shipments of scrap were backed up at Chinese ports (McCann, 2004).

Trade

According to U.S. Census Bureau data, net refined copper imports of 689,000 t were down by about 13% from those in 2003. Owing to a large drawdown in inventories, however, U.S. import reliance as a percentage of apparent demand rose to a record-high 43%. Canada remained the most significant source of unwrought copper products from 2000 through 2004 and accounted for 31% of unmanufactured imports, followed by Chile, 28%, and Peru, 21%. Refined copper accounted for 75% of unwrought copper imports during the same period. In 2004, the United States was nominally (less than 1,300 t) a net exporter of copper in concentrates, having been a net importer (17,000 t) in 2003. This took place in large part because of increased concentrate production at nonintegrated mines that exported their concentrates for processing.

According to U.S. Census Bureau data compiled by the Copper and Brass Fabricators Council Inc. (2005, p. 1-9), U.S. imports of 328,000 t of copper and copper-alloy semifabricated products (excluding wire-rod mill products) were up by 22% from those of the previous year, and exports rose to 143,000 t from 122,000 t in 2003. Consequently, net imports rose to 184,000 t from 146,000 t in 2003. Canada and Mexico collectively accounted for 74% of semifabricated copper exports and 30% of imports.

Exports of copper scrap for 2004 totaled 714,000 t, up from 689,000 t in 2003. China (including Hong Kong) was the destination for 67% of domestic scrap exports and, based on import data, accounted for 65% of reported global scrap imports. The United States remained the leading source of scrap, accounting for 19% of global scrap trade (based on reported exports).

World Review

While world production of refined copper rose to 15.8 Mt, an increase of about 560,000 t, world copper use, according to ICSG data (2005a, p. 9), increased by more than 1 Mt to almost 16.7 Mt. As a result, the global production deficit that developed during 2003 continued throughout 2004. The calculated deficit for 2004 reached almost 900,000 t of refined copper. This correlates well with the ICSG reported global drawdown in total inventories (860,000 t) to 920,000 t at yearend 2004 from 1.78 Mt at yearend 2003. The accumulated 2-year deficit and stock drawdown (2003-04) totaled about 1.3 Mt and 1.13 Mt, respectively. The discrepancy between calculated deficits and stock drawdowns can readily be accounted for by the release of unreported inventories, especially those in China, the largest global consumer of copper.

While world refinery production rose by only about 560,000 t, world mine production rose by about 860,000 t to 14.6 Mt, with all of the increase coming as copper in concentrate. Smelters reportedly were taking advantage of a surge in concentrate availability and a rise in treatment and refining charges to rebuild diminished inventories rather than boost their output. This was reported to be most prevalent in Asia, where the declaration of a force majeure on concentrate shipments from the Grasberg Mine in Indonesia in late 2003 had caused severe supply shortages, and smelters were seeking to reduce their vulnerability to future supply shortages. According to Bloomsbury Minerals Economics Ltd., smelter stocks, which had been declining during the preceding 3 years, were approaching 2001 levels by yearend 2004 (Platts Metals Week, 2004c). Underperformance at some new smelters, including those in India and Thailand, also contributed to the failure of increased mine output to translate into increased refinery production. According to ICSG (2005b, p. 62-67) data, smelter capacity rose by about 600,000 t in 2004 to 15.4 Mt, whereas capacity utilization declined to 82% from about 83% in 2003. According to CRU International Ltd. (2005, p. 42-45), a tight supply of concentrate early in the year that resulted in spot treatment and refining charges falling to zero, or even to negative values, gave way to sharply rising charges at midyear and by yearend were about 30 cents per pound of copper. Yearend term contracts were reported to be about 22 cents per pound of copper.

In contrast to 2003, when only Asia showed a positive growth in copper use, ICSG (2005a, p. 19-20) data indicate that all the major copper consuming regions of the world reported significant growth in copper use. In North America, copper use increased by more than 6% to 3.09 Mt, up from 2.90 Mt in 2003, and in Asia, copper use increased by 7.5% to 7.7 Mt. Though all the significant Asian copper-consuming countries experienced growth, China, the world's largest consumer of copper, led the way with an almost 8% increase in apparent growth. Releases from China's strategic stockpile, for which data were not available, may have supplied additional copper to the Chinese market. In Europe, copper use increased by about 5.3% to 5.0 Mt on the strength of Russian use, which increased by about 30% to 582,000 t. Apparent consumption in the European Union increased by only about 2.3%. 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 305,000 t in 2004 from 185,000 t in 2003 and 59,000 t in 2001, while Russian exports of refined copper declined to 339,000 t in 2004 from 395,000 t in 2003 and more than 580,000 t in 2001. U.S. imports of Russian wire rod were only 29,000 t, down from 52,000 t in 2003, but still significantly higher than 2001 imports of less than 3,000 t.

Mine Production.—In 2004, according to ICSG (2005b, p. 2-60) estimates, world mine capacity resumed its strong upward growth, increasing by almost 600,000 t (3.9%). Capacity in 2003 had risen by only about 130,000 t (0.8%) to about 15.2 Mt. This followed a period of strong growth that began in 1995 and saw capacity growth of 42% during the 1994-2002 period. Estimated capacity utilization increased in 2004 from about 90% in the preceding 2 years, to almost 92% in 2004, yet remained well below that for 2001 when the utilization rate exceeded 94%.

In 2004, capacity growth in Chile (475,000 t), China (20,000 t), Congo (Kinshasa) (30,000 t), Kazakhstan (40,000 t), Mexico (30,000 t), Peru (105,000 t), and Zambia (34,000 t), was partially offset by reduction in Indonesia. In Indonesia, effective capacity was reduced by about 280,000 t from its engineered capacity when landslides limited access to high-grade ore in the Grasberg Mine (International Copper Study Group, 2005b, p. 12-60).

In Australia, capacity and production were poised to increase in 2005 following the purchase of the Mt. Gordon Mine from bankrupt Western Metals Ltd. by India's Aditya Birla Group, and the conversion of production to copper in concentrate from SX-EW in order to feed its Dahej smelter in India. The Birla Group had previously purchased the Nifty Mine and was planning a similar conversion to copper in concentrate and expansion by 2006 (Clarke, 2004§).

In Chile, there were major expansions at Corporación Nacional del Cobré de Chile's (Codelco) Norte and Teniente divisions, and at the Collahuasi and Escondida Mines. Total production from Codelco's mines rose to 1.84 Mt from 1.67 Mt in 2003. At Codelco Norte, production rose to 983,000 t in 2004 from 907,000 t in 2003 following a concentrator expansion in 2003. Work progressed toward opening the Mina Sur northern expansion, a 120,000-t/yr refined copper leach project slated to begin production in the latter part of 2005. Development of the Ministro Alejandro Hales Mine and associated expansion of concentrator capacity by 50,000 t/d of ore was being studied. At El Teniente, production rose to 435,000 t from 339,000 t owing to mill and infrastructure expansion that raised milling capacity to 131,000 t/d of ore (Corporación Nacional del Cobré de Chile, 2005, p. 25-42). At the Escondida Mine, production rose to 1.2 Mt from 993,000 t in 2003 following improved performance from the new Laguna concentrator. Mill-head grade rose to 1.51% from 1.43% in 2003 and throughput rose to 82 Mt from 70 Mt in 2003. Production in 2003 had been suppressed intentionally by mining lower-grade ore in order to limit the global copper surplus carrying forward from 2002 (Rio Tinto plc, 2005b, p.14, 45-48).

At the Collahuasi Mine, production rose to 481,000 t of copper (423,000 t copper in concentrate and 58,000 t electrowon) from a total of 395,000 t in 2003, following completion of a $584 million expansion program that was intended to give the mine a long-term capacity of 500,000 t/yr of copper (Anglo American, 2005, p. 124; Mining-technology.com, 2005§). At the El Abra Mine (Phelps Dodge, 51% and Codelco, 49%), production of electrowon copper declined by about 9,000 t to 218,000 t, and at the Candaleria Mine (Phelps Dodge, 80% and Sumitomo Corp., 20%) concentrate production declined by 12,700 t to 200,000 t (Phelps Dodge Corp., 2005, p. 9).

In Northern Peru, production at the Antamina copper-zinc project (BHP Billiton, Mitsubishi Corp., Noranda Inc., and Teck Cominco Ltd.) rose to a record-high 362,000 t of copper in concentrate from 272,000 t in 2003. Efficiency improvements resulted in an 18% increase in mill throughput, and completion of sediment removal from the bottom of the pit allowed access

to copper-only ore. As a result, average mill-head grades rose to 1.34% copper from 1.19% in 2003, while zinc grades declined to 0.97% zinc from 1.86% in 2003 (Teck Cominco Ltd., 2005§).

At SPCC operations, mine production for 2004 increased by 6.1% to 397,000 t. Copper in concentrate production rose by 22,600 t at the Toquepala Mine and by 9,800 t at the Cuajone Mine, while SX-EW production decreased by about 5,600 t. Mill throughput at the Toquepala concentrator increased 3%, establishing a new facility milling record of 19.8 Mt/yr (Southern Peru Copper Company, 2005).

Smelter Production.—World smelter capacity rose by about 600,000 t to a record-high 15.4 Mt/yr. In Chile, modernization of Noranda's Alnorte smelter, including a new Noranda furnace, was completed in 2003 and boosted full-year capacity in 2004 to 270,000 t/yr from 165,000 t/yr in 2002. Replacement of the reverberatory furnace at Codelco's Salvador Division (Potrerillos smelter) boosted capacity to about 200,000 t/yr from 170,000 t/yr (International Copper Study Group, 2005b, p. 62-67).

In China, expansions of the Guixi (Jiangxi Copper Corp.), the Jinchuan Non-ferrous Metal Co., and the Jinlong (Tonling Nonferrous Metals Corp.) smelters accounted for most of a 160,000-t/yr increase in capacity. A new smelter was under construction by Jinchuan that could add an additional 200,000 t/yr of capacity by yearend 2005. At yearend, a 30,000-t/yr smelter was commissioned by Boatou Huading Copper Co., and phase 2 construction, which could bring its ultimate capacity up to 200,000 t/yr, was under construction (International Copper Study Group, 2005b, p. 65-66).

In India, the Birla Group installed Ausmelt technology in 2003 to expand its Outokumpu furnace to 250,000 t/yr in 2004 from 150,000 t/yr in 2002, and the Sterlite Industries Ltd., Isasmelt smelter, which started up in 1996, reached its capacity of about 210,000 t/yr in 2004, up from 180,000 t/yr in 2003. Capacity at the Birla smelter was expected to double to 500,000 t/yr in 2006, while capacity at the Sterlite smelter was scheduled to increase to 300,000 t/yr in 2005. In Indonesia, a first-phase expansion of the Gresik smelter was completed, boosting capacity by about 25,000 t/yr to 245,000 t/yr, and a second-phase expansion was anticipated to come onstream in 2006. In 2004, Iran emerged as a major smelting country with startup of an 80,000 t/yr flash smelter in Khatoon Abad and expansion of the Sar Chesmaeh smelter to 200,000 t/yr from 145,000 t/yr, both owned by the National Iranian Copper Industry Co. (International Copper Study Group, 2005b, p. 68).

Refinery Production.—World refinery capacity rose by about 530,000 t/yr (3%). With the exception of one new refinery in China (Zhongtiaoshan Nonferrous Metals Co.), no new electrolytic refineries were commissioned in 2004, and for the most part, expansions followed expanded smelter capacities. China accounted for almost 340,000 t of the increased global capacity. In Belgium, the secondary refinery in Liege, with a capacity of about 80,000 t/yr of fire-refined copper, closed early in the year. After falling in 2003 owing to a global shortage of concentrates, capacity utilization at global refineries rose to about 82% from 81% in 2003, but was down from 88% as recently as 2001 (International Copper Study Group, 2005b, p. 96-106).

Outlook

Despite a more than 3% estimated growth in world mine and refinery production in 2005, production was insufficient to meet global demand, and the refined copper production deficit that had developed during the preceding 2 years continued through at least the first 3 quarters of 2005. Global inventories of refined copper held in metal exchange warehouses continued their downward trend, falling below 100,000 t during the third quarter of 2005. This shortfall developed despite an estimated decline in global consumption, which, according to the ICSG (2005a, p. 19), declined by almost 2% during the first 9 months of 2005 compared with that for the same period in 2004. Strong growth in China and India was more than offset by reduced use by other significant consumers. Though global mine capacity was projected to increase by about 860,000 t (5.5%), global mine production fell short of its anticipated growth owing to production shortfalls in the United States and South America, and mine capacity utilization was projected to fall to its lowest level in recent years. New capacity and increased capacity utilization was expected to reverse the global production deficit, and a modest production surplus was anticipated for 2006.

In the United States, mine output was projected to decrease to about 1.15 Mt in 2005 owing to unusually heavy spring rains, equipment shortages, and a strike by workers at Asarco that began in July and extended through the second week in November. Year-on-year U.S. consumption of refined copper declined during the first 9 months of 2005 owing to weaker demand and a surge in imports of wire rod in the first half of 2005. U.S. mine and refinery production were expected to increase in 2006 following settlement of the strike and the expected startup of a new EW facility in Utah early in the year.

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TABLE 1
SALIENT COPPER STATISTICS[1]

(Metric tons unless otherwise specified)

		2000	2001	2002	2003	2004
United States:						
Mine production:						
Ore concentrated	thousand metric tons	202,000	148,000	104,000	114,000	139,000
Average yield of copper[2]	percent	0.44 r	0.48 r	0.52 r	0.46 r	0.38
Recoverable copper:						
Arizona		929,000	879,000	767,000	741,000	723,000
Michigan, Montana, Utah		W	W	W	W	W
New Mexico		195,000	141,000	112,000	87,800	122,000
Other States		322,000	318,000	263,000	287,000	312,000
Total		1,450,000	1,340,000	1,140,000	1,120,000	1,160,000
Total value	millions	$2,810	$2,270	$1,910	$2,100	$3,420
Smelter production, primary and secondary		1,000,000	919,000	683,000	539,000	542,000
Byproduct sulfuric acid, sulfur content	thousand metric tons	830	813	695	590	600
Refinery production:						
Primary materials:						
Electrolytic from domestic ores		865,000	808,000	725,000	532,000	531,000
Electrolytic from foreign materials		163,000	192,000	116,000	130,000	140,000
Electrowon		556,000	628,000	601,000	591,000	584,000
Total		1,580,000	1,630,000	1,440,000	1,250,000	1,260,000
Secondary materials (scrap), electrolytic and fire refined		209,000	172,000	69,900	53,300	50,800
Grand total		1,790,000	1,800,000	1,510,000	1,310,000	1,310,000
Secondary copper produced:						
Recovered from new scrap		955,000	833,000	840,000 r	737,000 r	774,000
Recovered from old scrap		358,000	317,000	190,000 r	207,000 r	191,000
Total		1,310,000	1,150,000	1,030,000 r	944,000	965,000
Copper sulfate production		55,500	55,200	49,200	32,100	25,100
Exports:						
Refined		93,600	22,500	26,600	93,300	118,000
Unmanufactured[3]		650,000	556,000	506,000	703,000	789,000
Imports:						
Refined		1,060,000	991,000	927,000	882,000	807,000
Unmanufactured[3]		1,350,000	1,400,000	1,230,000	1,140,000	1,060,000
Copper stocks, December 31:						
Blister and in-process material		122,000	98,000	44,400	56,800	51,400
Refined copper:						
Refineries		14,800	28,600	11,700	12,100	10,400
Wire-rod mills		39,900	37,600	23,000	29,700	20,300
Brass mills		23,600	25,500	28,700	20,200	21,500
Other industry		4,390	4,860	4,800	4,240 r	3,230
New York Commodity Exchange (COMEX)		58,700	244,000	362,000	255,000	43,700
London Metal Exchange (LME), U.S. warehouses		204,000	617,000	601,000	335,000	35,000
Total		345,000	957,000	1,030,000	656,000 r	134,000
Consumption:						
Refined copper, reported		3,020,000	2,620,000	2,370,000	2,290,000	2,410,000
Apparent consumption, primary refined and old scrap[4]		3,090,000	2,510,000	2,610,000	2,430,000	2,550,000
Price:						
Producer, weighted average	cents per pound	88.16	76.85	75.80	85.25	133.94
COMEX, first position	do.	83.97	72.57	71.67	81.05	128.97
LME, Grade A cash	do.	82.24	71.57	70.72	80.68	129.96
World production:						
Mine	thousand metric tons	13,300 r	13,700	13,700 r	13,700 r	14,600 e
Smelter	do.	12,300 r	12,800 r	12,600 r	12,500 r	12,700 e
Refinery	do.	14,900	15,600 r	15,400 r	15,200 e	15,800

See footnotes at end of table.

TABLE 1—Continued
SALIENT COPPER STATISTICS[1]

[e]Estimated. [r]Revised. 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 2000, 2001, 2002, 2003, and 2004, apparent consumption is calculated using general imports of 1,020,000 tons, 1,200,000 tons, 1,060,000 tons, 687,000 tons, and 704,000 tons, respectively.

TABLE 2
LEADING COPPER-PRODUCING MINES IN THE UNITED STATES IN 2004, 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 Mine	Pinal, AZ	ASARCO Incorporated	Copper ore, concentrated and leached	180
4	Bagdad	Yavapai, AZ	Phelps Dodge Corp.	Copper-molybdenum ore, concentrated and leached	120
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 Mine	White Pine, NV	Robinson Nevada Mining Company	Copper ore, concentrated	60
12	Miami Mine	Gila, AZ	Phelps Dodge Corp.	Copper ore, leached	73
13	Pinto Valley	do.	BHP Copper Co.	do.	10
14	Miami Mine	do.	do.	do.	12

[1]The mines on this list accounted for more than 99% of U.S. mine production in 2004.

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)

	2003		2004	
Source and treatment process	Gross weight[2]	Recoverable copper	Gross weight[2]	Recoverable copper
Mined copper ore:				
Concentrated	114,000,000	518,000	139,000,000	533,000
Leached	NA	591,000	NA	584,000
Total	NA	1,110,000	NA	1,120,000
Copper precipitates shipped, leached from tailings, dumps, and in-place material	1,210	684	1,270	2,360
Other copper-bearing ores[3]	3,320,000 [r]	6,060	4,780,000	37,200
Grand total	XX	1,120,000	XX	1,160,000

[r]Revised. 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 2004, 9,706 kilograms of gold and 171 metric tons of silver were recovered from concentrated ore. The average value of gold and silver per metric ton of ore concentrated was $1.18.
[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)

Item	Brass mills	Wire-rod mills	Foundries, chemical plants, miscellaneous users	Smelters, refiners, ingot makers	Total
2003:					
Copper scrap	840,000 [2]	W	85,900 [r]	187,000 [r]	1,110,000
Refined copper[3]	587,000	1,640,000	59,500 [r]	4,550	2,290,000
Hardeners and master alloys	6,060	--	1,750	--	7,800
Brass ingots	1,180	--	98,700 [r]	--	99,900 [r]
Slab zinc	65,600	--	(4)	(4)	86,200
2004:					
Copper scrap	880,000 [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

[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
ONSUMPTION OF REFINED COPPER SHAPES IN THE UNITED STATES, BY CLASS OF CONSUME

(Metric tons)

Class of consumer	Cathodes	Ingots and ingot bars	Cakes and slabs	Wirebar, billets, other	Total
2003:					
Wire-rod mills	1,630,000	--	--	8,730	1,640,000
Brass mills	439,000	14,900	41,800	91,400	587,000
Chemical plants	--	--	--	959	959
Ingot makers	W	W	W	4,550 [2]	4,550
Foundries	3,320 [r]	7,440 [r]	--	11,100 [r]	21,900 [r]
Miscellaneous[3]	W	W	W	36,700 [r, 2]	36,700 [r]
Total	2,070,000	22,300 [r]	41,800	153,000	2,290,000 [r]
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

[r]Revised. 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)

	2003	2004
Kind of scrap:		
New scrap:		
Copper-base	701,000	735,000
Aluminum-base	36,400	38,800
Nickel-base	18	18
Total	737,000 r	774,000
Old scrap:		
Copper-base	185,000	169,000
Aluminum-base	21,700 r	22,100
Nickel-base	213	279
Zinc-base	27	29
Total	207,000 r	191,000
Grand total	944,000	965,000
Form of recovery:		
As unalloyed copper	53,600 r	51,400
In brass and bronze	818,000 r	840,000
In alloy iron and steel	974 r	1,020
In aluminum alloys	59,300 r	60,400
In other alloys	27	28
In chemical compounds	12,300	12,300
Total	944,000	965,000

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

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

(Metric tons)

	From new scrap		From old scrap		Total	
Type of operation	2003	2004	2003	2004	2003	2004
Ingot makers	17,100 r	25,700	75,800 r	63,800	93,000 r	89,500
Refineries[2]	16,000	16,000	37,300	34,700	53,300	50,800
Brass and wire-rod mills	644,000	669,000	31,800	36,300	676,000	705,000
Foundries and manufacturers	18,800 r	19,400	36,800 r	30,800	55,600 r	50,200
Chemical plants	5,040	5,040	3,130	3,130	8,160	8,160
Total	701,000	735,000	185,000	169,000	886,000	904,000

rRevised.
[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)

Item produced from scrap	2003	2004
Unalloyed copper products:		
Refined copper	53,300	50,800
Copper powder	6,850 r	48
Copper castings	338	574
Total	60,500 r	51,400
Alloyed copper products:		
Brass and bronze ingots:		
Tin bronzes	8,820 r	10,200
Leaded red brass and semired brass	64,700 r	68,400
High leaded tin bronze	9,840 r	10,400
Yellow brass	4,370 r	5,890
Manganese bronze	7,860 r	8,270
Aluminum bronze	5,030 r	6,010
Nickel silver	2,270 r	2,140
Silicon bronze and brass	4,190 r	5,900
Copper-base hardeners and master alloys	5,420	5,500
Miscellaneous	6,130 r	4,940
Total	119,000 r	128,000
Brass mill and wire-rod mill products	829,000	865,000
Brass and bronze castings	42,800 r	44,000
Brass powder	102	71
Copper in chemical products	12,300	12,300
Grand total	1,060,000	1,100,000

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]							
2003r	100,000	3,400	5,290	9,540	221	12	119,000
2004	107,000	4,140	6,110	10,600	224	14	128,000
Secondary metal content of brass mill products:							
2003	677,000	491	5,820	144,000	W	W	829,000
2004	706,000	475	6,160	150,000	W	W	865,000
Secondary metal content of brass and bronze castings:							
2003	38,000 r	1,510 r	1,080	1,950 r	121 r	75 r	42,800 r
2004	39,100	1,520	1,130	2,030	182	62	44,000

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 97% from scrap and 3% from other than scrap in 2003 and approximately 96% from scrap and 4% from other than scrap in 2004.

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

(Metric tons, gross weight)

Scrap type and processor	2003		2004	
	Consumption	Stocks	Consumption	Stocks
No. 1 wire and heavy:				
Smelters, refiners, and ingot makers	68,400 r	942 r	58,600	1,030
Brass and wire-rod mills	377,000	(2)	394,000	(2)
Foundries and miscellaneous manufacturers	33,300 r	(2)	27,200	(2)
No. 2 mixed heavy and light:				
Smelters, refiners, and ingot makers	29,600 r	1,090 r	28,800	2,100
Brass and wire-rod mills	5,750	(2)	6,250	(2)
Foundries and miscellaneous manufacturers	2,650 r	(2)	3,570	(2)
Total unalloyed scrap:				
Smelters, refiners, and ingot makers	98,000 r	2,030 r	87,400	3,130
Brass and wire-rod mills	383,000	17,600	401,000	28,800
Foundries and miscellaneous manufacturers	36,000 r	2,400 r	30,700	2,550
Red brass:[3]				
Smelters, refiners, and ingot makers	25,100 r	1,600 r	26,300	1,630
Brass mills	11,900	(2)	14,200	(2)
Foundries and miscellaneous manufacturers	10,800	(2)	9,820	(2)
Leaded yellow brass:				
Smelters, refiners, and ingot makers	7,190 r	748 r	8,140	797
Brass mills	297,000	(2)	314,000	(2)
Foundries and miscellaneous manufacturers	1,210 r	(2)	1,150	(2)
Yellow and low brass, all plants	51,700 r	756 r	42,600	1,090
Cartridge cases and brass, all plants	80,500	(2)	86,700	(2)
Auto radiators:				
Smelters, refiners, and ingot makers	26,700 r	1,470 r	25,000	1,560
Foundries and miscellaneous manufacturers	3,680	(2)	4,300	(2)
Bronzes:				
Smelters, refiners, and ingot makers	8,390 r	983 r	11,100	946
Brass mills and miscellaneous manufacturers	17,200 r	(2)	18,400	(2)
Nickel-copper alloys, all plants	17,400 r	338 r	20,900	246
Low grade and residues; smelters, refiners, and miscellaneous manufacturers	32,200	1,040 r	35,300	619
Other alloy scrap:[4]				
Smelters, refiners, and ingot makers	1,100	326 r	1,130	402
Brass mills and miscellaneous manufacturers	5,230 r	(2)	6,000	(2)
Total alloyed scrap:				
Smelters, refiners, and ingot makers	89,100 r	7,270 r	95,500	7,290
Brass mills	458,000	26,500	480,000	25,000
Foundries and miscellaneous manufacturers	49,900 r	2,620 r	50,000	2,160
Total scrap:				
Smelters, refiners, and ingot makers	187,000 r	9,300 r	183,000	10,400
Brass and wire-rod mills	841,000	44,100	880,000	53,900
Foundries and miscellaneous manufacturers	85,900 r	5,010 r	80,700	4,710

rRevised.

[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	
	2003	2004	2003	2004	2003	2004
Ingot makers	23,000 r	40,200	110,000 r	91,700	133,000 r	132,000
Smelters and refineries	16,200	16,200	37,600	34,900	53,800	51,100
Brass and wire-rod mills	808,000	843,000	32,600	37,700	841,000	880,000
Foundries and miscellaneous manufacturers	41,600 r	42,600	44,200 r	38,200	85,900 r	80,700
Total	889,000 r	941,000	225,000 r	202,000	1,110,000	1,140,000

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

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

(Metric tons)

Ingot type or material consumed	2003	2004
Tin bronzes	23,500 r	22,800
Leaded red brass and semired brass	57,300 r	55,300
Yellow, leaded, low brass[2]	5,460 r	6,440
Manganese bronze	5,640 r	3,940
Nickel silver[3]	2,850	2,260
Aluminum bronze	3,580 r	3,590
Hardeners and master alloys[4]	1,750	2,040
Lead free alloys[5]	377	864
Total brass ingot	100,000 r	97,200
Refined copper	59,500 r	57,400
Copper scrap	85,900 r	80,700

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
2003	80.17	70.42	52.70	38.65
2004	126.41	107.62	86.86	55.14

Source: American Metal Market.

TABLE 14

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

	Ore and concentrate		Matte, ash and precipitates		Refined		Unalloyed copper scrap		Blister and anodes		Total	
Country	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
2003	9,860	$18,700	15,600	$24,200	93,300	$178,000	316,000	$343,000	26,100	$44,200	460,000	$608,000
2004:												
Belgium	6	11	45	19	998	750	3,850	4,490	1,320	2,200	6,220	7,470
Canada	18,200	34,100	18,800	22,300	2,230	5,830	33,300	43,500	22,400	44,200	94,900	150,000
China	2,340	4,880	52	232	23,900	60,600	222,000	257,000	307	1,130	248,000	324,000
Germany	32	53	23	128	70	106	8,830	15,300	1,880	4,400	10,800	20,000
Hong Kong	229	378	12	20	11	28	3,910	9,480	3,410	11,500	7,570	21,400
India	56	98	21	55	2,940	4,000	4,160	5,900	164	558	7,340	10,600
Japan	2,510	7,180	122	218	66	178	7,930	15,800	705	1,660	11,300	25,100
Korea, Republic of	23	38	8	11	5,060	14,500	22,400	40,900	8,910	35,600	36,400	91,000
Malaysia	33	55	(2)	3	4	17	578	555	137	419	753	1,050
Mexico	115	201	2,650	3,710	20,500	53,500	4,560	12,300	221	514	28,000	70,200
Peru	--	--	--	--	4	24	--	--	(2)	3	5	27
Singapore	--	--	19	57	39	90	157	172	654	2,210	870	2,530
Spain	308	519	--	--	--	--	37	121	347	1,180	692	1,820
Taiwan	109	172	5	8	29,000	59,700	11,300	21,000	1,320	4,380	41,800	85,300
Thailand	6	10	5	7	538	1,650	946	784	172	592	1,670	3,050
United Kingdom	37	73	87	141	590	579	34	56	474	1,450	1,220	2,300
Other	235	374	244	226	32,300	31,200	1,310	2,530	4,010	8,550	38,100	42,900
Total	24,200	48,200	22,100	27,200	118,000	233,000	325,000	430,000	46,400	121,000	536,000	859,000

-- 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]

	Pipes and tubing		Plates, sheets, foil, bars		Bare wire, including wire rod		Wire and cable, stranded		Copper sulfate	
Country	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
2003	23,900	$76,700	20,300	$73,600	115,000	$243,000	28,000	$142,000	2,070	$1,940
2004:										
Australia	8	71	5	77	4	122	127	2,490	--	--
Brazil	83	316	72	1,250	27	504	61	692	--	--
Canada	9,250	40,400	9,550	43,500	14,000	44,500	6,230	23,800	818	934
China	34	109	1,030	3,930	472	1,300	1,720	5,830	134	143
Denmark	(3)	17	(3)	4	12	46	7	66	--	--
France	130	480	88	602	232	2,600	81	2,150	--	--
Germany	5	87	567	3,660	150	4,330	167	4,340	53	45
Hong Kong	10	40	2,060	9,040	92	840	191	2,150	--	--
Italy	114	463	34	247	8	170	49	317	--	--
Japan	37	163	411	2,110	17	878	396	3,370	127	178
Korea, Republic of	1	11	136	839	29	210	299	3,440	16	20
Malaysia	215	1,140	34	337	48	384	21	280	--	--
Mexico	13,400	51,500	13,100	39,300	130,000	398,000	17,300	92,100	36	50
Netherlands	5	65	39	362	23	509	114	3,320	15	12
Saudi Arabia	271	2,520	15	9	--	--	153	487	--	--
Singapore	8	61	184	1,180	39	192	69	1,220	5	10
Sweden	--	--	10	165	16	308	13	486	--	--
Taiwan	59	227	836	4,100	41	175	87	801	16	32
Thailand	4	57	609	3,070	43	365	35	363	--	--
United Kingdom	50	345	110	1,550	54	403	97	2,210	9	9
Other	1,090	4,360	702	4,890	2,080	8,790	5,160	24,900	212	280
Total	24,800	102,000	29,600	120,000	148,000	464,000	32,400	175,000	1,440	1,710

-- 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 2003 were 100,014 metric tons (t) valued at $197 million, and in 2004, wire rod exports were 128,536 t valued at $389 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 (COPPER CONTENT), BY COUNTRY[1]

	Ore and concentrate		Matte, ash and precipitates		Blister and anode		Refined		Unalloyed scrap		Total	
Country	Quantity (metric tons)	Value[2] (thousands)	Quantity (metric tons)	Value[2] (thousands)	Quantity (metric tons)	Value[2] (thousands)	Quantity (metric tons)	Value[2] (thousands)	Quantity (metric tons)	Value[2] (thousands)	Quantity (metric tons)	Value[2] (thousands)
2003	27,100	$16,600	1,500	$2,030	157,000	$393,000	882,000	$1,580,000	19,600	$24,600	1,090,000	$2,020,000
2004:												
Brazil	--	--	--	--	--	--	15,600	47,700	--	--	15,600	47,700
Canada	516	881	99	348	75,500	223,000	278,000	666,000	6,370	13,600	360,000	904,000
Chile	--	--	--	--	48,900	130,000	311,000	875,000	--	--	360,000	1,000,000
Costa Rica	--	--	--	--	--	--	--	--	1,400	1,260	1,400	1,260
Dominican Republic	--	--	--	--	--	--	--	--	446	444	446	444
Finland	--	--	--	--	--	--	94	272	--	--	94	272
Germany	--	--	--	--	--	--	21,000	68,300	48	12	21,000	68,300
Honduras	--	--	--	--	--	--	--	--	1,430	1,980	143	1,980
Japan	--	--	(3)	3	19	40	4,380	15,700	65	695	4,460	16,400
Mexico	22,400	24,100	206	115	8,630	29,500	19,300	55,900	10,300	13,000	60,700	123,000
Namibia	--	--	--	--	7,710	22,600	--	--	--	--	7,710	22,600
Peru	--	--	--	--	10,200	18,300	152,000	429,000	58	169	162,000	447,000
Taiwan	--	--	1,330	3,290	--	--	(3)	2	--	--	1,330	3,290
United Kingdom	--	--	--	--	3	82	27	180	554	2,240	584	2,500
Other	--	--	45	93	13	97	6,000	8,560	2,770	3,610	10,100	12,400
Total	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

-- 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)	Value[3] (thousands)	Quantity (metric tons)	Value[3] (thousands)	Quantity (metric tons)	Value[3] (thousands)	Quantity (metric tons)	Value[3] (thousands)	Quantity (metric tons)	Value[3] (thousands)
2003	75,100	$208,000	65,500	$197,000	230,000	$474,000	5,990	$22,100	50,900	$37,600
2004:										
Australia	--	--	484	1,580	--	--	1	30	--	--
Brazil	199	1,060	1,000	4,160	15,700	111,000	13	18	--	--
Belgium	(4)	23	69	348	52	341	--	--	970	965
Canada	193	1,080	8,990	36,400	143,000	420,000	1,240	3,960	8,600	8,570
Chile	130	452	4,440	16,200	2	4	--	--	79	63
China	106	433	1,230	5,430	64	293	2,100	4,070	5,880	5,130
Finland	54	527	4,230	19,300	847	2,880	43	347	--	--
France	(4)	50	3,380	12,300	408	4,230	102	2,180	380	392
Germany	124	686	32,900	115,000	799	4,160	654	3,640	67	122
Israel	--	--	(4)	8	17	141	1,970	11,700	--	--
Italy	--	--	3,450	11,800	11	95	7	104	18	22
Japan	(4)	7	4,210	31,800	309	2,490	11	153	20	135
Luxembourg	--	--	477	4,880	--	--	--	--	--	--
Mexico	21	83	2,030	7,790	39,200	112,000	93	512	34,000	33,200
Norway	--	--	--	--	--	--	5	33	--	--
Peru	--	--	3,970	13,600	704	2,300	299	970	783	681
Russia	--	--	90	343	29,400	134,000	--	--	139	102
Sweden	--	--	9,730	41,600	32	154	14	31	--	--
Taiwan	(4)	19	89	617	664	2,750	17	336	4,540	3,080
Turkey	--	--	--	--	9,900	40,700	946	3,780	--	--
United Kingdom	(4)	21	684	3,400	554	2,200	17	218	--	--
Other	130	640	2,150	8,610	314	2,580	388	2,020	540	403
Total	957	5,090	83,600	335,000	242,000	842,000	7,920	34,100	56,100	52,900

-- 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 2003 were 212,000 metric tons (t) valued at $394 million, and in 2004, wire rod imports were 241,910 t valued at $832 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			
	2003		2004		2003		2004	
Country	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
Belgium	2,630	$4,420	3,850	$4,490	6,010	$8,370	8,200	$8,930
Canada	21,200	20,600	33,300	43,500	17,500	23,200	15,000	27,000
China	225,000	233,000	222,000	257,000	245,000	174,000	239,000	220,000
Germany	7,900	8,510	8,830	15,300	7,680	7,310	13,800	20,600
Hong Kong	2,530	2,140	3,910	9,480	9,600	4,790	11,000	9,800
India	5,550	5,120	4,160	5,900	45,400	38,800	45,100	45,000
Japan	6,790	9,730	7,930	15,800	9,110	15,600	9,660	25,900
Korea, Republic of	25,400	32,500	22,400	40,900	15,500	25,600	16,300	40,000
Mexico	3,200	8,320	4,560	12,300	808	1,380	1,570	4,720
Taiwan	8,500	11,400	11,300	21,000	6,860	10,200	13,700	26,300
Other	6,650	6,920	3,060	4,210	10,000	11,800	15,800	23,600
Total	316,000	343,000	325,000	430,000	373,000	321,000	389,000	451,000

[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		
Country or Territory	Quantity (metric tons)	Value[2] (thousands)	Gross weight (metric tons)	Copper content[e, 3] (metric tons)	Value[2] (thousands)
2003	19,600	$24,600	71,000	51,500	$99,600
2004:					
Canada	6,370	13,600	44,500	32,100	90,400
Costa Rica	1,400	1,260	516	372	733
El Salvador	758	1,230	224	161	391
Germany	48	12	1,130	812	5,510
Guatemala	271	278	1,050	755	1,990
Honduras	1,430	1,980	625	450	685
Mexico	10,300	13,000	22,100	15,900	31,200
Taiwan	--	--	1,480	1,060	5,970
United Kingdom	554	2,240	1,030	740	2,690
Venezuela	--	--	--	--	--
Other	2,310	3,410	5,610	4,040	10,800
Total	23,400	37,100	78,300	56,400	150,000

[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 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	2000	2001	2002	2003	2004[e]
Argentina	145,197	191,667 [r]	204,029 [r]	199,020 [r]	177,143 [3]
Armenia	12,234	16,460	16,641	18,000 [e]	17,700
Australia:					
Concentrates	732,000	769,000	787,000	763,000	795,800 [3]
Leaching, electrowon	97,000	102,000	96,000 [e]	67,000	58,300 [3]
Total	829,000	871,000	883,000 [e]	830,000	854,100 [3]
Bolivia	110	18 [e]	3	182 [r]	182
Botswana[4]	20,977	19,209	21,182	24,289 [r]	21,195 [3]
Brazil	31,786	32,734 [r]	32,711 [r]	26,275 [r]	98,700 [3]
Bulgaria	92,000	88,000	92,800	91,700	93,000
Burma:					
Concentrates[e]	100	--	--	--	--
Leaching, electrowon	26,711	25,800 [r]	27,500 [r]	27,900	31,756 [3]
Total	26,811	25,800 [r]	27,500 [r]	27,900	31,756 [3]
Canada, concentrates	633,855	633,531	603,498	557,082 [r]	563,741 [3]
Chile:[5]					
Concentrates	3,229,800	3,200,800	2,979,000	3,251,100 [r]	3,776,200 [p, 3]
Leaching, electrowon	1,372,600	1,538,200	1,602,000	1,653,100 [r]	1,636,300 [p, 3]
Total	4,602,400	4,739,000	4,581,000	4,904,200 [r]	5,412,500 [p, 3]
China:[e]					
Concentrates	593,000	587,000	568,000 [r]	610,000 [r]	610,000
Leaching, electrowon	20,000	18,000	25,000	10,000 [r]	10,000
Total	613,000	605,000	593,000 [r]	620,000 [r]	620,000
Colombia	2,062	2,192	1,853	1,599	1,600
Congo (Kinshasa):[e, 6]					
Concentrates	21,000	38,000	28,300	29,100	33,800
Leaching, electrowon	-- [r]	-- [r]	9,600 [r]	34,800 [r]	42,000
Total	21,000	38,000 [r]	37,900	63,900	75,800
Cuba[e]	1,346 [3]	1,000 [r]	1,000 [r]	--	--
Cyprus, leaching, electrowon	5,197	5,176	3,695 [r]	2,552 [r]	1,240 [3]
Ecuador[e]	100	100	100	100	100
Finland	14,354	13,715	14,400	14,900	15,500
Georgia[e]	8,000	8,000	10,000	12,000	12,000
India	31,900	32,400	31,500	28,500 [r]	28,800 [3]
Indonesia[6]	1,012,054	1,081,040	1,171,726 [r]	1,005,831 [r]	840,318 [3]
Iran:[e]					
Concentrates	125,000	121,000	121,000	130,000	178,000
Leaching, electrowon	10,000	12,000	12,000	12,000	12,000
Total	135,000	133,000	133,000	142,000	190,000
Japan	1,211	744	750 [e]	1,300 [r]	790
Kazakhstan[e]	430,000	470,100 [3]	490,000	485,000	461,000 [3]
Korea, North[e]	12,000 [r]	12,000 [r]	12,000 [r]	12,000 [r]	12,000
Macedonia[e]	6,000 [r]	9,000 [r]	5,600 [r]	4,000 [r]	5,000
Mexico:					
Concentrates	308,966	310,623	260,574	284,653 [r]	333,540 [3]
Leaching, electrowon	55,600	60,500	69,000 [e]	71,000 [r]	72,000
Total	364,566	371,123	329,574	355,653 [r]	405,540 [3]
Mongolia	125,227	133,503	131,705	131,600	132,000
Morocco	7,080	5,800	5,000	4,900	4,900
Namibia	5,620	12,392	18,012	16,200 [r]	13,800
Pakistan	--	--	--	3,200	15,000
Papua New Guinea	200,900	218,000 [e]	211,311	190,200	173,400 [3]

See footnotes at end of table.

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

(Metric tons)

Country	2000	2001	2002	2003	2004[e]
Peru:					
Concentrates	426,614	590,896	686,748	660,025	868,574 [3]
Leaching, electrowon	127,310	131,139	156,465	171,198	167,000 [3]
Total	553,924	722,035	843,213	831,223	1,035,574 [3]
Philippines	30,644	20,322	18,364	20,400	6,000 [3]
Poland	454,100	474,000	502,800	495,000	531,000 [3]
Portugal	76,200	82,900	77,000 [e]	78,000	96,000
Romania[7]	16,079	19,185	18,962	21,317	20,000
Russia[e]	570,000	600,000	695,000	675,000	675,000
Saudi Arabia[e]	900	800	800	800	500
Serbia and Montenegro[e]	86,100 [r]	31,000 [r]	36,900 [r]	26,400 [r]	30,000
South Africa	137,092	141,865	129,589	89,500 [e]	87,000
Spain	23,312	9,700	--	-- [e]	--
Sweden	77,765	74,269	72,100	83,100 [r]	85,500
Tanzania, in concentrates and bullion	--	2,645	2,700	3,303 [r]	3,400
Turkey[7]	76,253	56,864	48,253	58,000 [e]	49,000
United States:[6]					
Concentrates	887,000	714,000	601,000	525,000	576,000 [3]
Leaching, electrowon	557,000	624,000	542,000	591,000	584,000 [3]
Total	1,440,000	1,340,000	1,140,000	1,120,000	1,160,000 [3]
Uzbekistan[e]	70,000	78,000	80,000	80,000	80,000
Zambia:					
Concentrates	184,100	233,000	251,100	269,000 [r]	344,300 [3]
Leaching, electrowon	65,000	79,000	78,900	80,000	82,600
Total	249,100	312,000 [8]	330,000	349,000 [r]	426,900 [3]
Zimbabwe, concentrates	2,104	2,057	2,502	2,767 [r]	2,383 [3]
Grand total	13,300,000 [r]	13,700,000	13,700,000 [r]	13,700,000 [r]	14,600,000
Of which:					
Concentrates	10,900,000	11,100,000	11,000,000	11,000,000 [r]	11,900,000
Leaching, electrowon	2,340,000 [r]	2,600,000 [r]	2,620,000 [r]	2,720,000 [r]	2,700,000

[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, 2005.

[3]Reported figure.

[4]Copper content of pelletized nickel-copper matte produced in smelter.

[5]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.

[6]Recoverable content.

[7]Excludes copper content of pyrite.

[8]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	2000	2001	2002	2003	2004[e]
Armenia, primary[e]	4,000	4,000	6,700	7,500	7,500
Australia, primary	394,000	455,000	458,000 [e]	435,000	443,000 [3]
Austria, secondary	70,000 [e]	68,642	64,932	75,000 [r]	88,000
Belgium, secondary	144,700	138,200	125,900	117,500	120,700 [3]
Botswana, primary[4]	18,722	19,209	21,590	27,400 [r, e]	21,400
Brazil, primary	185,345	212,243	189,651	173,373 [r]	186,000
Bulgaria:					
Primary	173,000	152,000	167,000	199,300	220,000
Secondary[e]	5,000	5,000	15,000	16,000	7,000
Total	178,000	157,000	182,000	215,300	227,000
Canada:					
Primary	543,593	601,359	513,934	430,116	446,221 [3]
Secondary	60,109	41,640	24,761	26,789	29,962 [3]
Total	603,702	642,999	538,695	456,905	476,183 [3]
Chile, primary	1,460,400	1,503,200 [r]	1,438,700 [r]	1,542,400	1,563,800 [3]
China:[e]					
Primary	1,020,000	1,120,000	1,180,000	1,380,000 [r]	1,400,000
Secondary	180,000	190,000	310,000	350,000	440,000
Total	1,200,000	1,310,000	1,490,000	1,730,000 [r]	1,840,000
Congo (Kinshasa), primary, electrowon[e]	-- [r]	-- [r]	-- [r]	-- [r]	--
Finland:					
Primary	155,400	169,300	160,900	160,600	170,400 [3]
Secondary[e]	2,000	2,000	2,000	2,000	2,000
Total	157,400	171,300	162,900	162,600	172,400 [3]
Germany:					
Primary	310,000 [r]	303,000 [r]	327,100 [r]	288,800	278,600 [3]
Secondary	399,472 [r]	390,773 [r]	368,791 [r]	306,600 [r]	262,600 [3]
Total	709,472 [r]	693,773 [r]	695,891 [r]	595,400 [r]	541,200 [3]
India, primary[e]	256,000	293,000	385,400 [3]	391,000	400,900 [3]
Indonesia, undifferentiated	173,726	217,500	211,200	247,400	211,600 [3]
Iran, undifferentiated[e, 5]	135,000	135,000	146,000	150,000	209,000
Japan:					
Primary	1,331,352	1,328,489	1,317,291	1,343,353	1,270,495 [3]
Secondary	149,282	139,764	182,069	172,724	194,927 [3]
Total	1,480,634	1,468,253	1,499,360	1,516,077	1,465,422 [3]
Kazakhstan, undifferentiated	413,859	433,600	446,200	431,930	445,200 [3]
Korea, North, primary and secondary[e]	15,000 [r]	15,000 [r]	15,000 [r]	15,000 [r]	15,000
Korea, Republic of, undifferentiated	424,100 [r]	428,500 [r]	430,000 [r]	460,000 [e]	430,000 [3]
Mexico:					
Primary	297,000 [r]	310,000 [r]	248,000 [r]	220,100 [r]	285,000
Secondary[e]	5,000	5,000	5,000	5,000	5,000
Total	302,000 [r]	315,000 [r]	253,000 [r]	225,100 [r]	290,000
Namibia, primary[6, 7]	5,082	27,015	26,703	26,036	24,700
Oman, primary	23,790	24,200	24,000	17,000 [e]	24,000
Peru, primary	366,700	396,400	379,600 [r]	376,100 [r]	397,800 [3]
Philippines, primary	160,000	165,000	165,800	227,900	220,000
Poland:					
Primary	462,800	485,900	511,000	516,500 [r]	541,000
Secondary[e]	19,700	27,900	30,000	30,000	30,000
Total	482,500	513,800	541,000	546,500 [r]	571,000 [3]
Romania:					
Primary	16,429	9,279	8,871	4,493 [r]	61 [3]
Secondary[e]	2,000	2,000	2,000	500	--
Total	18,429	11,279	10,871	4,993 [r]	61 [3]

See footnotes at end of table.

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

(Metric tons, gross weight)

Country	2000	2001	2002	2003	2004[e]
Russia:[e]					
Primary	600,000	650,000	660,000	670,000	662,000
Secondary	220,000	245,000	200,000	170,000	257,000
Total	820,000	895,000	860,000	840,000	919,000 [3]
Serbia and Montenegro:[e]					
Primary	34,000	24,000	30,000	10,000	30,000
Secondary	14,000	14,000	10,000	5,000	10,000
Total	48,000 [4]	38,000	40,000	15,000	40,000
South Africa, primary	123,978	117,237	116,996	112,025	89,300
Spain:					
Primary	258,600	255,200	281,300	276,300 [r]	210,200 [3]
Secondary	31,300	24,700	16,700 [e]	14,000 [r, e]	14,100
Total	289,900	279,900	298,000	290,300 [r]	224,300 [3]
Sweden:[e]					
Primary	95,000	173,000	188,000	185,000	186,000
Secondary	35,000	35,000	35,000	30,000	30,000
Total	130,000	208,000	223,000	215,000	216,000
Turkey, undifferentiated[8]	32,500	33,504	32,550	30,400 [r, e]	11,500
United States, undifferentiated	1,000,000	919,000	683,000	539,000	542,000
Uzbekistan:[e]					
Primary	75,000	80,000	75,000	75,000	75,000
Secondary	10,000	10,000	--	--	--
Total	85,000	90,000	75,000	75,000	75,000
Zambia, primary:					
Electrowon	50,000	50,000	60,000	50,000	60,000
Other	308,300	306,000	311,400	200,000	220,000
Total	358,300	356,000	371,400	250,000	280,000
Zimbabwe, primary[6]	14,500 [e]	2,160 [e]	2,502	2,767	--
Grand total:	12,300,000 [r]	12,800,000 [r]	12,600,000 [r]	12,500,000 [r]	12,700,000
Of which					
Primary:					
Electrowon	50,000 [r]	50,000 [r]	60,000 [r]	50,000 [r]	60,000
Other	8,690,000 [r]	9,190,000 [r]	9,200,000 [r]	9,300,000 [r]	9,370,000
Secondary	1,350,000 [r]	1,340,000 [r]	1,390,000 [r]	1,320,000 [r]	1,490,000
Undifferentiated	2,200,000 [r]	2,180,000 [r]	1,960,000 [r]	1,870,000	1,860,000

[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, 2005.

[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 2001-04 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	2000	2001	2002	2003[e]	2004
Argentina, secondary[e]	16,000	16,000	16,000	16,000	16,000
Australia:[e]					
Electrowon	97,000	102,000	96,000	67,400 [3]	58,300
Primary	390,000	456,000	449,000	416,600 [3]	431,800
Total	487,000	558,000	545,000	484,000 [3]	490,100
Austria:[e]					
Primary	2,000	--	--	--	--
Secondary	77,000	69,000	65,000	75,000	88,000
Total	79,000 [3]	69,000	65,000	75,000	88,000
Belgium:[e]					
Primary[4]	236,100 [3]	236,000	207,000	208,000	223,000
Secondary	187,000	187,000	216,000	215,000	174,000
Total	423,100	423,000	423,000	423,000	397,000
Brazil, primary	185,345	212,243	189,651	173,900 [r, 3]	174,000 [e]
Bulgaria:[e]					
Primary	27,500	29,400 [3]	38,000	43,000 [r]	52,300
Secondary	5,000	5,000	3,000	2,000 [r]	3,000
Total	32,500	34,400	41,000	45,000 [r]	55,300
Burma, electrowon	26,711	25,800 [r]	27,500 [r]	27,900	31,800
Canada:					
Primary	490,093	524,920	513,934	430,116 [3]	495,900
Secondary	61,300	42,800	24,761	26,789 [3]	31,100
Total	551,393	567,720	538,695	456,905 [3]	527,000
Chile:					
Electrowon	1,372,600	1,538,200	1,602,000	1,653,100 [r, 3]	1,636,300
Primary	1,295,700	1,344,000	1,248,100	1,248,800 [r, 3]	1,258,800
Total	2,668,300	2,882,200	2,850,100	2,901,900 [r, 3]	2,895,100
China:[e]					
Electrowon	20,800	18,000	20,000	10,000	10,000
Primary	1,003,000	1,200,000	1,280,000	1,420,000 [r]	1,600,000
Secondary	347,000	300,000	350,000	430,000 [r]	520,000
Total	1,370,800 [3]	1,518,000 [3]	1,650,000	1,860,000 [r]	2,130,000
Congo (Kinshasa), primary	-- [r]	-- [r]	-- [r]	-- [r]	--
Cyprus, electrowon	5,197	5,176	3,695 [r]	2,552 [r, 3]	1,240
Egypt, secondary[e]	4,000 [r]	4,000 [r]	4,000 [r]	4,000	4,000
Finland:[e]					
Primary	100,000	105,000	112,000 [r]	120,000	128,000
Secondary	14,000	15,000	15,000	16,000	16,000
Total	114,000	120,000	127,000 [r]	136,000	144,000
France, secondary[e]	1,500	--	--	--	--
Germany:					
Primary	245,000	352,400 [r]	330,900	242,500 [r, 3]	283,700 [p]
Secondary	464,400 [r]	341,400 [r]	364,900	355,000 [r, 3]	369,000 [p]
Total	709,400 [r]	693,800 [r]	695,800	597,500 [r, 3]	652,700 [p]
Hungary, secondary[e]	12,000	10,000	10,000	10,000	10,000
India:[e]					
Primary, electrolytic	234,000	310,000 [3]	354,000	375,000	381,000
Secondary	9,000	18,000	20,000	19,000	20,000
Total	243,000	328,000	374,000	394,000	401,000
Indonesia, primary	158,400	212,500	192,400	223,300 [3]	210,500
Iran:[5]					
Electrowon[e]	10,000	12,000	12,000	12,000	12,000
Primary[6]	132,000	132,000	143,000	134,632 [3]	190,000 [e]
Total	142,000	144,000	155,000	146,632 [3]	202,000 [e]

See footnotes at end of table.

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

(Metric tons)

Country	2000	2001	2002	2003[e]	2004
Italy, secondary	32,800	35,500	32,400	26,700	30,000
Japan:					
Primary	1,292,351	1,287,165	1,211,111	1,251,728 [3]	1,188,491
Secondary	149,260	138,526	189,968	178,637 [3]	191,653
Total	1,441,611	1,425,691	1,401,079	1,430,365 [3]	1,380,144
Kazakhstan, primary	394,722	425,700	453,000	432,901 [3]	445,200
Korea, North, primary[e]	13,000 [r]	13,000 [r]	13,000 [r]	13,000 [r]	13,000
Korea, Republic of, primary	467,900	473,624	495,400 [r]	505,900 [r, 3]	491,900
Mexico:					
Primary:					
Electrowon	55,600	59,800	69,100	76,000 [r]	72,000 [e]
Other	340,400	333,000	215,000 [r, e]	199,000 [r]	239,000 [e]
Secondary[e]	15,000	15,000	35,000	35,000	35,000
Total[e]	411,000	407,800 [3]	319,100 [r, e]	310,000	346,000
Mongolia, electrowon	641	1,476	1,500	1,341 [r, 3]	1,500 [e]
Norway, primary[6]	27,000 [e]	26,700	30,500 [e]	35,900 [3]	35,600
Oman, primary[e]	24,281 [3]	24,000	24,000	17,000	17,000
Peru:					
Primary:					
Electrowon	127,311	131,139	156,465	171,198 [3]	167,000
Other	324,417	340,736	346,277	345,848 [3]	338,308
Total	451,728	471,875	502,742	517,046 [3]	505,308
Philippines, primary	159,000	164,530	144,315	171,200 [3]	175,000
Poland:					
Primary	498,100	498,451	508,674	510,000	510,000
Secondary	19,700	30,286	19,146	20,000	20,000
Total	517,800	528,737	527,820	530,000	530,000
Romania:					
Primary	13,803	18,500	11,453	16,739 [r, 3]	24,383
Secondary[e]	4,000	4,000	2,000	2,000	2,000
Total	17,803	22,500 [e]	13,453	18,739 [r, 3]	26,383
Russia:					
Primary	620,000	650,000	670,000 [e]	670,000	662,000
Secondary	220,000	244,500	200,000 [e]	170,000	257,000
Total	840,000	894,500	870,000 [e]	840,000	919,000
Serbia and Montenegro:					
Primary	45,602	32,365	35,897	9,000 [r]	25,000
Secondary[e]	14,000	10,000	10,000	5,000 [r]	10,000
Total	59,602	42,365	45,897	14,000 [r]	35,000
South Africa, primary[6]	105,500	104,700	99,100	93,300 [3]	91,295
Spain:[e]					
Primary	258,000	235,100 [3]	272,000	259,000	193,200 [3]
Secondary	58,000	55,600 [3]	37,000	35,000	35,000
Total	316,000	290,700 [3]	309,000	294,000 [3]	228,200 [3]
Sweden:[e]					
Primary	105,000	179,000 [3]	199,000	189,000	210,000
Secondary	25,000	25,000	25,000	25,000	25,000
Total	130,000	204,000 [3]	224,000	214,000	235,000
Taiwan, secondary[e]	4,000	4,000	4,000	4,000	4,000
Thailand, primary	--	--	--	--	20,000
Turkey:[e]					
Primary	59,100	54,400	39,000	40,000	45,000
Secondary	5,000	4,000	2,000	5,000	5,000
Total	64,100	58,400	41,000	45,000	50,000

See footnotes at end of table.

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

(Metric tons)

Country	2000	2001	2002	2003[e]	2004
Ukraine, secondary	--	--	10	20	20
United Kingdom, secondary[e]	3 [3]	--	--	--	--
United States:					
Primary:					
Electrowon	566,000	628,000	600,000	591,000 [3]	584,000
Other	1,030,000	1,000,000	841,000	662,000 [3]	671,000
Secondary	208,000	172,000	69,900	53,300 [3]	50,800
Total	1,800,000	1,800,000	1,510,000	1,310,000 [3]	1,310,000
Uzbekistan:[e]					
Primary	75,000	80,000	75,000	75,000	75,000
Secondary	10,000	10,000	--	--	--
Total	85,000	90,000	75,000	75,000	75,000
Zambia, primary:					
Electrowon[7]	50,000	79,000	83,700	109,000 [r, 3]	120,900
Other	227,400	217,500	253,100	240,800 [r, 3]	277,300
Total	277,400	296,500	336,800	349,800 [r, 3]	398,200
Zimbabwe, primary	7,200 [e]	5,300 [e]	2,502 [r]	2,767 [r, 3]	2,383
Grand total	14,900,000	15,600,000 [r]	15,400,000 [r]	15,200,000	15,800,000
Of which:					
Primary:					
Electrowon	2,330,000	2,600,000	2,670,000	2,720,000 [r]	2,700,000
Other	10,600,000	11,300,000	11,000,000 [r]	10,800,000 [r]	11,200,000
Secondary	1,960,000 [r]	1,760,000 [r]	1,720,000	1,730,000 [r]	1,920,000

[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 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, 2005.

[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."