

COPPER

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In 2001, mine production of recoverable copper in the United States continued its downward slide that began in 1998, falling by more than 100,000 metric tons (t) to the lowest level since 1987. In addition to mine closures and cutbacks carried forward from preceding years, rising global inventories that sustained low copper prices led to additional cutbacks and closures. The Morenci Mine in Arizona completed its transition to an all-leach operation, further reducing production. Three companies, Phelps Dodge Corp., ASARCO Incorporated (owned by Mexico's Grupo Mexico, S.A. de C.V.), and Kennecott Utah Copper Corp. (owned by Rio Tinto plc of the United Kingdom), accounted for more than 97% of U.S. copper mine production.

While the United States maintained its position as the world's second largest mine producer of copper, accounting for about 10% of world production, its share of global production continued to decline from its 19% share in 1994. Chile, where mine production increased by 3% in 2001, was the largest mine producer and accounted for 35% of world production. World mine production grew by about 3% in 2001. The world reserves and reserve base for copper were estimated to be 475 million metric tons (Mt) and 950 Mt, respectively. The United States had about 7% each of reserves and reserve base. According to the National Mineral Resource Assessment conducted by the U.S. Geological Survey (2000), the mean estimate of copper in undiscovered deposits in the United States was 290 Mt. More than two-thirds of the copper was thought to be contained in undiscovered porphyry copper deposits. The identified copper resource was estimated to be 260 Mt.

U.S. copper smelter production declined by only about 8%, despite a 20% drop in concentrate production owing to an increase in net imports of concentrates and a drawdown in inventories of concentrate stockpiled during the previous year. This reflects a shift from 2000 when the United States was a net exporter of copper in concentrate. Primary refinery production rose by 2%, supported by an 11% increase in electrowon production following the conversion of Phelps Dodge Corp.'s Morenci, AZ, mine to an all-leach operation. Total refinery production remained unchanged from 2000 owing to a decline in secondary refined production. Contraction of the secondary industry continued with the indefinite closure of Chemetco Inc.'s smelter in November, the sole remaining dedicated secondary smelter in the United States. Though the country retained its position as the second largest refiner and third largest smelter, the U.S. share of world smelter and refinery production fell to 7.4% and 11.7%, respectively.

Twenty-three mines operating in 6 States, down from 27 in 2000, reported recoverable quantities of copper in 2001. Thirteen mines located in Arizona, Utah, and New Mexico, in descending order, accounted for more than 99% of production. The remaining 10 mines were either small leach operations or producers of byproduct copper. Despite the decline in production, capacity utilization at domestic mines was

essentially unchanged as capacity was adjusted downward to only 1.6 Mt, reflecting the long-term closure of mines that were not expected to reopen without significant capital investment.

During the year, 4 primary smelters and 1 secondary smelter, 5 electrolytic and 3 fire refineries, and 14 solvent-extraction electrowinning (SX-EW) facilities operated in the United States. By yearend, however, the sole secondary smelter, one primary smelter, and two small electrowinning operations had ceased production. Smelter and refinery capacity was revised downward to 1.04 Mt and 2.3 Mt, respectively, to reflect the permanent closure of the Southwire Company secondary smelter and associated refinery in 2000. Consequently, smelter and refinery capacity utilization rose to 91% and 78%, respectively, in 2001. In 1998, prior to the closure of three primary smelters and three secondary smelters, U.S. smelter capacity was estimated to have been 1.9 Mt.

The conversion of old scrap to alloys and refined copper declined for the fourth consecutive year, falling by 41,000 t (11%) to 316,000 t, and contributed 13% of apparent industrial demand for copper. Lower copper prices in 2001 and secondary copper smelter closures led to the continued downward trend in recovery.

Copper was consumed as refined copper and as direct melt scrap at about 35 brass mills, 13 wire-rod mills, and 600 foundries, chemical plants, and miscellaneous operations. According to data compiled by the Copper Development Association Inc. (CDA) (2002, p. 18), mill and foundry product shipments to the U.S. market, including net imports of mill products, declined by 15% in 2001 to 3.8 Mt, from the record-high shipments reported in 2000. Shipments, which in 2001 were at their lowest level since 1996, had risen steadily over the preceding 5 years.

The net import reliance for refined copper, as a percentage of apparent consumption, declined to about 22% from the record-high 37% experienced in 2000 owing to sustained domestic production of refined copper and a sharp dropoff in consumption. Peru, Canada, Chile, and Mexico, in descending order, accounted for 86% of imports for consumption. Canada remained the largest U.S. source for unwrought copper, accounting for 27% of total imports of unwrought copper. China (including Hong Kong), owing to a large growth in U.S. scrap exports, became the largest recipient for unwrought exports, accounting for 48% (copper content) of total exports.

Legislation and Government Programs

On January 26, 2000, as authorized by the Coin Act of 1997, the U.S. Mint began releasing its new Golden Dollar coin (88.5% copper) to replace the Susan B. Anthony dollar coin that had been introduced in 1979. By the end of September 2001, more than 1.5 billion Golden Dollar coins had been minted and more than 1 billion placed in circulation (U.S. Mint, 2001).

However, after minting more than 1 billion coins in 2001, initial demand for the coin was satisfied and the mint ceased commercial production of coins. Future demand for the Golden Dollar was estimated at only 150 to 200 million coins per year, and as of April 2002, the Mint had stores of 300 million coins. According to the Mint, demand for all coins has been declining over the past few years, falling from 28 billion coins in 2000 to 20 billion in 2001. Demand in 2002 was anticipated to fall to only 12 billion coins (American Metal Market, 2002).

In May, the U.S. Environmental Protection Agency (EPA) issued a final rule, effective November 23, 2001, that will provide regulatory flexibility under the Resource Conservation and Recovery Act (RCRA) for metal recycler, U.S. Filter Recovery Services (USFRS), Roseville, MN. The purpose of the rule is to encourage the use of the USFRS wastewater treatment ion exchange resin process by exempting the handling of the loaded resins and associated canisters and filters from designation as a listed hazardous waste, and therefore encouraging the recycling of metals, including copper, nickel, and zinc, derived from the treatment of electroplating solutions. Use of this process is also anticipated to reduce consumption of energy and potable water by the plating industry. The ruling is part of EPA's Project XL (Excellence and Leadership), announced in 1995, that provides a limited number of private and public regulated entities an opportunity to develop their own pilot projects that require regulatory flexibility and that will result in environmental protection that is superior to what could be achieved through compliance with existing and reasonably anticipated future regulations. The regulation will temporarily exempt the resins and associated filters and canisters from existing RCRA regulatory requirements through a new waste code designation for these materials while at Minnesota generators and during its processing at, and transport to, the USFRS plant in Roseville (U.S. Environmental Protection Agency, 2001).

Production

In response to a continuing slide in copper prices, temporary shutdowns initiated in 2000 were continued and further cutbacks announced. Mine production declined by about 100,000 t and was at the lowest level since 1987. Mine production capacity was adjusted downward by about 130,000 metric tons per year (t/yr) to about 1.6 Mt/yr, principally owing to completion of the conversion of the Morenci Mine to an all-leach operation during the first quarter of the year. The reduction also reflects lowered capacity from changes in long-term mine plans and reduced recoveries at residual leach operations at shuttered mines. The net result was that capacity utilization was essentially unchanged at 84%.

Smelter production continued its downward trend following the closure in 2000 of Southwire's secondary smelter. The three primary smelters that closed in 1999 remained shuttered. At the end of October 2001, Chemetco Inc. abruptly closed its secondary copper smelter near Hartford, IL. Chemetco had been ordered to pay \$3.8 million in fines for dumping hazardous wastes over a 10-year period, ending in 1996, through a pipe that ran from the plant to an area about 150 yards away. Six company employees, and the company itself, were charged in 1999 with discharging wastewater containing lead, cadmium, and zinc into a lake and wetland adjacent to the plant (Platts

Metals Week, 2001b). Chemetco, with a capacity of about 135,000 t/yr of copper anode, was the last dedicated secondary copper smelter operating in the United States. It processed a variety of copper materials including radiators, no. 2 copper, and low-grade residues.

Refinery production, however, remained unchanged in 2001 as increased electrowon production and increased concentrate and blister imports helped to sustain production in light of falling domestic concentrate and secondary smelter production. Electrowon production accounted for a record 47% and 35%, respectively, of mine and refinery production.

Phelps Dodge Corp. reported copper production of 1.28 Mt in 2001, including minority participants share of 228,000 t, from its worldwide operations, down from 1.32 Mt and 230,000 t, respectively, in 2000. U.S. production amounted to 764,000 t (231,000 t concentrate, 533,000 t electrowon), down from 851,000 t (387,000 t concentrate, 464,000 t electrowon) in 2000. In the United States, production was adversely affected by high energy costs and lower copper prices. Despite reducing implied unit costs by \$0.13 per pound from the first quarter to the fourth quarter, average annual implied costs rose to \$0.75 from \$0.72 per pound of copper in 2001, primarily owing to higher energy and depreciation costs (Phelps Dodge Corp., 2002b).

In response to a volatile U.S. energy market that carried forward from 2000, Phelps Dodge implemented a power cost stabilization program in March that reduced electricity-related costs at domestic mining operations. The plan entailed the construction of a 40-megawatt, co-generation plant in New Mexico; an additional negotiated firm power contract; short-term alternating production curtailments at the Tyrone, NM, Sierrita, AZ, and Bagdad, NM, mines; and longer-term production curtailment at the Chino, NM, mine that would cut 2001 production by about 79,000 t. At Chino, concentrator operations and associated sulfide mining were suspended immediately, reducing 2001 production by 61,000 t. Mining to feed leach stockpiles continued in support of SX-EW operations (Phelps Dodge Corp., 2001b). While annual production of concentrate at Chino fell by 62,000 t to only 17,000 t, the other production cuts were not realized. The combined production at Tyrone (72,000 t electrowon and precipitate), Sierrita (86,000 t concentrate, 24,000 t electrowon), and Bagdad (107,000 t concentrate, 9,500 t electrowon) remained essentially unchanged from that of 2000 at 330,000 t (Phelps Dodge Corp., 2002a, p. 11).

In May, Phelps Dodge announced that its newly constructed mine-for-leach project at Morenci had been completed in March and was expected to be at full capacity by the fourth quarter of the year. The \$220 million project, which includes crushing, stacking, leaching, and SX-EW facilities, took only 19 months to design, engineer, and construct. At capacity, Phelps Dodge expected to produce 372,000 t/yr of electrowon copper. The project included expansion of the mine's current crushing and conveying system; installation of "stackers," a mobile conveyor system that distributes crushed ore onto leach piles; expansion of existing solvent extraction facilities; and construction of an additional electrowinning tank house. The mine's Metcalf concentrator was permanently closed in 1999, while its crushing facility continued to process 75,000 tons per day (t/d) of leach ore (Phelps Dodge Corp., 2001a). With conversion to all-leach, the Morenci concentrator was placed on care and

maintenance and, according to the company, could produce concentrate under “certain favorable economic circumstances.” Production at Morenci totaled 355,000 t in 2001 (334,000 t electrowon, 21,000 t concentrate), down from 378,000 t (258,000 t electrowon, 120,000 t concentrate) in 2000 (Phelps Dodge Corp., 2002a, p. 7, 11).

Combined production at Phelps Dodge’s Miami, AZ, and Chino, NM, smelters rose by about 22,000 t to 420,000 t. At Phelps Dodge’s refineries in El Paso, TX, and Miami, AZ, production rose by about 30,000 t to about 456,000 t, yet remained well below their capacity of about 590,000 t. Stockpiled concentrates from Morenci, imports from its Candelaria Mine in Chile, and purchased concentrates helped to sustain production by Phelps Dodge despite lower concentrate production at its domestic mines (Phelps Dodge Corp., 2002a, p. 9).

At yearend 2000, Mexico’s Grupo Mexico S.A. de C.V. announced the creation of a subsidiary, Americas Mining Corp. (AMC), comprising its North American and South American copper mining and processing assets held by subsidiaries ASARCO Incorporated (100%), Grupo Minero Mexico (98.8%), and Southern Peru Copper Corp. (SPCC) (54.4%). Asarco operated three U.S copper mining complexes and a refinery and smelter in El Paso, TX. The El Paso smelter, closed in 2000, remained shuttered (ASARCO Incorporated, 2000). The Ray complex, near Hayden, AZ, consists of the Ray 225,000 t/d open pit mine with a 27,000 t/d concentrator, a 47,000 t/yr SX-EW operation, and the Hayden operations consisting of a 25,000 t/d concentrator and a 650,000 t/yr flash furnace smelter (ASARCO Incorporated, 2002b§¹). The Mission Complex, an open pit and underground copper mining operation composed of the Mission, Eisenhower, Pima, Mineral Hill, South San Xavier, and North San Xavier properties, was located near Sahuarita, AZ. The underground workings remained shut during 2001 (ASARCO Incorporated, 2002a§). The Silver Bell Unit, near Silver Bell, AZ, operates three open pits (North Silver Bell, El Tiro, and Oxide) and a 20,000 t/yr SX-EW plant. Approximately 50% of the ore reserves will be mined and hauled to dumps for leaching. The remaining 50% will be rubblized (drilled and blasted), and then leached in place. Each month, 775,000 t of ore and waste are mined, and 700,000 t of ore is rubblized (ASARCO Incorporated, 2002c§). Asarco also held a 49.9% interest in Montana Resources Corp., which operated the 40,000-t/yr Continental Mine, in Butte, MT. Montana Resources suspended milling operations on June 30, 2000, citing “a dramatic escalation in power prices” as the reason for the shutdown. The mine remained shuttered throughout 2001.

In August, citing low copper prices, Asarco cut mine production at its Mission complex by 24%, 9,000 t/d of ore, reducing copper output by 16,000 t/yr and laying off about 110 workers (Platts Metals Week, 2001a). Grupo subsequently announced that it had reduced its cash breakeven point for AMC’s operations to 49.8 cents per pound of copper by September, compared with 60.0 cents per pound for the comparative time in 2000 (Grupo Mexico S.A. de C.V., 2001). At the end of November, Asarco announced a 23% curtailment in copper ore production at its Mission mining complex in

Arizona owing to “poor market conditions,” effective January 1, 2002. This would reflect the second curtailment at Mission in 4 months and represent a total cutback of 61% since November 2000. Production of copper in concentrate in 2002 was projected to decline to about 45,000 t, down from 115,000 t in 1999. Asarco, which processed Chemetco’s anode at its Amarillo, TX, refinery, concurrently announced that owing to Chemetco’s closure in November, and Mission’s cutbacks, refined copper production would drop by 29%, or about 95,000 t/yr. Annual production of cathode at Amarillo in 2002 was projected to be down by 151,000 t from the 1999 level (ASARCO Incorporated, 2001). Despite the curtailment by Montana Resources and cutbacks at Mission, Asarco’s share of copper mine production fell by only 19,000 t in 2001 to 242,000 t, owing to increased production from the processing of higher grade ore at the Ray Mine. Total production by AMC fell to 890,000 t, down from 915,000 t in 2000 (Grupo Mexico S.A. de C.V., 2002, p. 9).

At Kennecott Utah Copper Corp.’s Bingham Canyon Mine, mine production of copper rose by 17,000 t to 313,000 t of copper in concentrate, the highest level in at least 10 years owing to a significant rise in mill head grades from 0.57% copper in 2000 to 0.73% in 2001. Byproduct gold and silver values rose from 0.3 grams per metric ton (g/t) and 2.85 g/t, respectively, in 1999 to 0.54 g/t and 3.67 g/t, respectively, in 2001. While total rock mined increased slightly to 160 Mt, ore processed through the mill declined by 17% to 49 Mt. According to Rio Tinto plc, proven and probable open pit reserves, anticipated to be exhausted about 2013, totaled 633 Mt of ore grading an average 0.56% copper. Underground reserves, which are anticipated to extend the mine life by 15 years, included 321 Mt of block caving ore grading 0.7% copper, and an additional 321 Mt of skarn ores grading 1.89% copper. Downstream refinery production fell by 34,000 t to 234,000 t owing to a shortage of anode arising from production disruptions from major maintenance on the flash converter and anode furnaces. At full capacity, the smelter can produce 320,000 t/yr of anode copper (Rio Tinto plc, 2002, p. 38-39).

In June, Kennecott announced the temporary suspension of operations at its North concentrator, its oldest and highest cost concentrator, and at the end of November announced that the facility would be permanently closed. The North concentrator had processed about 12 Mt/yr of ore to produce about 60,000 t/yr of copper in concentrate. As a result of the closure, concentrate sales by Kennecott, which had averaged about 100,000 t/yr, were suspended (Rio Tinto plc, 2001).

BHP Billiton copper operations in Arizona remained shuttered throughout 2001. Copper production from residual leach operations at San Manuel, Miami, and Pinto Valley totaled 23,800 t (BHP Billiton, 2002b, p. 8). In January 2002, BHP Billiton announced that its subsidiary, BHP Copper Inc., was permanently closing its mining operations at San Manuel, AZ. Included was the immediate closure of the remaining in situ copper leach operations, resulting in the loss of about 9,000 t/yr of electrowon copper cathode. BHP further planned to stop pumping water from the underground mine, which had been placed on care and maintenance in August 1999. When pumping stops, groundwater will recharge the underground mine, ensuring permanent loss of mining capacity. Prior to cessation of mining in 1999, San Manuel had produced about 100,000 t/yr of copper in concentrate and electrowon cathode.

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

The underground mine was first established in the 1940s, received a \$94 million Federal loan in 1952 to further develop the mine site and community, and added open pit mining and SX-EW in 1985. Over time, groundwater is expected to fill the underground workings and rise to the level of the open pit. BHP continued trying to sell the idled smelting, refining, and wire-rod facilities associated with the mine (BHP Billiton, 2002a).

In April, Summo Minerals Corp. announced that it had entered into an agreement with Gould Electronics Inc. and MicroMet GmbH Pulvertechnologie for completion of a new feasibility study for development of a copper powder business that may be able to use the Lisbon Valley ore deposit under existing weak market conditions. The study was to address the feasibility of developing Lisbon Valley as an open pit mine and heap-leach SX-EW facility designed to produce 4,500 t/yr of copper powder using patented technology developed by ElectroCopper Products Inc. Copper powders would be used to produce pressure molded parts and pressure extruded specialty copper wires (Summo Minerals Corp., 2001a). Subsequently, Summo announced that the three companies had mutually agreed to terminate the study. The Lisbon Valley Project is currently a fully permitted and engineered open pit, heap-leach, SX-EW project designed to produce 40 million pounds of cathode copper annually over a minimum 9-year mine life. According to the SX-EW feasibility study completed in 2000, capital costs for the project would be \$57 million with direct operating costs of \$0.48 per pound of copper. The feasibility study was to remain “the benchmark against which Summo will weigh other alternative plans.” Development stalled following long permitting delays and subsequent loss of financial support (Summo Minerals Corp., 2001b).

Nord Resources Corp., operator of the Johnson Camp Copper Mine, 105 kilometers east of Tucson, AZ, filed for Chapter 11 reorganization of the U.S. Bankruptcy Code in February 2001. Meanwhile, in March, under the terms of a consent order concluded with the Arizona Department of Environmental Quality, Nord began work on various projects intended to bring the mine and SX-EW plant into compliance. Heap leaching of stockpiled ore was “temporarily” halted at yearend and the SX-EW plant placed on care and maintenance. Although significant reserves remain, mining operations ceased in 1997 (Nord Resources Corp., 2002).

Polymet Mining Corp. announced completion of a pre-feasibility study on its NorthMet polymetallic deposit (copper, nickel, cobalt, and precious metals) in northeastern Minnesota. Based on drilling and associated geologic interpretations, Northmet contains measured and indicated resources of 643.2 million tons of ore grading 0.32% copper, 0.08% nickel, and 63.4 parts per million cobalt, as well as associated precious metal values. According to the baseline study, the deposit contains almost 1 Mt of payable copper. The study’s base-case scenario, using copper at \$0.85 per pound and nickel at \$3.25 per pound, indicated an equivalent total smelter return of 0.86% copper. Capital costs for an open pit and 55,000 t/d ore concentrator and processing facility using its patented PLATSOL hydrometallurgical process to treat the concentrate was estimated at \$647 million. It was estimated that it would take 6 years from completion of prefeasibility to bring the mine into full production. In February, the company reported the successful results of pilot plant testing of its PLATSOL process,

which uses a high-temperature pressure chloride leach to dissolve all the metal values, followed by solid liquid separation, precious metals recovery, and conventional copper SX-EW (Polymet Mining Corp., 2001).

Consumption

The upward trend in reported consumption of refined copper by domestic manufacturers came to an abrupt halt in 2001, consumption falling by 13% to 2.62 Mt, the lowest level since 1996. Consumption of copper-base scrap used directly (melted or processed to chemicals) by manufacturers declined by 12% to 1.18 Mt and contained 917,000 t of recoverable copper. An additional 63,000 t of copper was recovered in the consumption of aluminum-, nickel-, and zinc-base scrap.

According to data compiled by the American Bureau of Metal Statistics, Inc. (ABMS) (2002a) wire-rod shipments by domestic producers to the U.S. market fell by 13.2 % in 2001, and apparent consumption for wire rod (shipments plus net imports) fell by 13.6% to 2.0 Mt. Net imports declined by 18.1% to 166,000 t and accounted for 9% of apparent demand. Inventories of wire rod at producers fell by 7,000 t further contributing to weakness in copper consumption. The drop in apparent consumption to the lowest level in at least 5 years follows record-high apparent consumption in 2000. According to ABMS (2002c) data, brass mill product shipments by domestic producers were at their lowest level in 5 years, declining by 20% from 2000 record-high shipments, and 13.8% from the average annual shipments for the period 1996-2000. Shipments of copper and copper alloy products in 2001 declined sharply in all market segments: Plate sheet and strip, 33% to 219,000 t; rods and bars, 19% to 250,000 t; and tube, 6% to 268,000 t.

Olin Brass Corp. announced that it would idle its Indianapolis, IN, copper and copper-alloy sheet and strip mill by December 21 and lay off 200 employees because of poor market demand. Around 30 employees were to be retained for care-and-maintenance work so that the plant could be reopened when demand for the plant’s products improved. The Indianapolis plant primarily serves customers in the automotive, telecommunications, and computer sectors (Platts Metals Week, 2001c).

According to preliminary CDA data (2002, p. 18-21), the supply of copper and copper-alloy products to the U.S. market by fabricators (wire mills, brass mills, foundries, and powder producers), including net imports, declined by 15% in 2001 to 3.79 Mt, down from the revised total of 4.43 Mt in 2000. About 72% of shipments in 2001 was as unalloyed copper products. Wire mill products accounted for about 53% of total shipments to the domestic market; brass mill products, 42%; and foundry and powder products, 5%. In building construction, the largest end use sector, shipments declined by only 6% and accounted for about 45% of the market, up from 40% in 2000. Building construction included products used for building wire, plumbing and heating, air conditioning and commercial refrigeration, builders hardware, and architectural applications. Shipments for electric/electronic products (26% market share), transportation equipment (12% share), industrial machinery and equipment (10% share), and consumer and general products (11% share) declined by 21%, 14%, 27%, and 22%, respectively.

In September, Southwire Company announced that it had signed an agreement to purchase the building wire assets of General Cable Corp. in Kingman, AZ; Plano, TX; and Watkinville, GA. At the end of October, Southwire confirmed completion of the acquisition. According to Southwire, the acquisition “solidified its position as the number one building wire producer in North America” and increased its presence in the Western United States (Southwire Company, 2001). According to preliminary CDA data (2002, p. 18), building electrical wire is the single largest end-use category for copper, accounting for about 22% (on a contained copper basis) of copper mill products shipped to the United States in 2001, and the only growth segment in the 2001 depressed market. In return for its building wire assets, General Cable reported receiving an initial cash payment of \$82 million, anticipated cash receivables of \$28 million, and certain assets of Southwire’s Cyber Technologies Division. General planned to pay down its indebtedness and reduce exposure from “a low return business unit” (General Cable Corp., 2001).

Prices and Stocks

The upward trend in copper prices that began in mid-1999 stalled during the fourth quarter of 2000, and prices began a 10-month descent in January 2001. The London Metal Exchange Ltd. (LME) price tracked that of the COMEX Div. of the New York Mercantile Exchange, generally trading at a one to two cent discount to COMEX, though trading at a slight premium in June. The COMEX spot price, which averaged \$0.87 in December 2000, averaged only \$0.84 in January and by August fell to an average of only \$0.67 per pound. On September 10, the COMEX price averaged only \$0.65 per pound. Copper prices remained stable for the first weeks following the terrorist attacks of September 11, when trading was halted for the remainder of the week, but resumed their downward trend. On November 7, the COMEX spot averaged only \$0.604 per pound, the lowest level in 15 years. Copper prices strengthened in the second half of November following an announcement by BHP Billiton Base Metals that it would temporarily reduce copper production by 170,000 t/yr. Effective immediately, production at the Escondida Mine in Chile was to be reduced by 10%, about 80,000 t/yr, and effective January 8, total sulfide production activities (90,000 t/yr) were to be curtailed at the Tintaya operations in Peru. At Escondida, production was to be lowered by selectively mining lower-grade material while maintaining mill throughput (BHP Billiton Base Metals, 2001).

Though the onset of the price decline preceded the rise in global inventories by several months, for the most part, the decline in copper prices paralleled a rise in domestic and global inventories. According to the International Copper Study Group (ICSG) (2002a), world inventories of refined copper, which totaled 1.32 Mt at yearend 2000, dipped slightly during January and February 2001, but rose to 1.50 Mt by midyear and reached a total of 2.10 Mt by yearend. At the prevailing rate of consumption, global inventories at yearend represented about 51 days of supply, up from 32 days in 2000. Most of the increase in inventories held in commodity exchange warehouses occurred in the United States. At LME warehouses located in the United States, inventories in 2001 rose by 412,000 t to 616,000 t and accounted for 94% of the global LME stock rise. At yearend, U.S. LME warehouses held 77% of total LME

stocks, up from 58% at yearend 2000. COMEX inventories rose to 244,000 t, up by 185,000 t.

Trade

Following 5 years of sustained growth, where net imports of refined copper rose from 212,000 t in 1995 to 962,000 in 2000, net imports in 2001 of 968,000 t, were essentially unchanged. General imports of refined copper of 1.2 Mt were 208,000 t higher than imports for consumption as bonded material entered U.S.-located LME warehouses. Owing to weak U.S. demand, U.S. import reliance as a percent of apparent demand fell in 2001 to 22%, down from its peak of 37% in 2000.

Reduced domestic capacities led to shifts in the trade patterns of several copper products. Cutbacks in domestic mine production of copper in concentrates balanced preceding years cutbacks in operating smelter capacity. As a result, net trade in copper concentrate in 2001 was virtually zero. In 2000, U.S. net exports of concentrate had amounted to about 175,000 t. Reduced secondary processing capacity led to continued growth in scrap exports; combined scrap exports (alloyed and unalloyed) of 534,000 t in 2001 were up from 486,000 t for 2000 and 288,000 t in 1998.

According to U.S. Census Bureau data compiled by the Copper and Brass Fabricators Council Inc. (2002, p. 1-9), the United States imported 308,000 t of copper and copper-alloy semifabricated products, excluding wire-rod mill products, and exported 261,000 t. Net imports fell to 171,000 t, down from a revised value of 220,000 t in 2000. Canada and Mexico accounted for 62% of semifabricated copper exports and 28% of imports. Germany was the largest source of imports, accounting for 17% of the total.

The Andean Trade Preference Act (ATPA) expired on December 4, 2001. The ATPA was enacted on December 4, 1991, and was to extend for no more than 10 years. It provided duty-free treatment to eligible products, including refined copper, from participating countries (Bolivia, Colombia, Ecuador, and Peru). The Act explicitly requires that participating countries satisfy narcotics cooperation certification criteria. Effective February 15, 2002, the U.S. Customs Service issued a 90-day temporary rule, that extended duty-free entry status to eligible articles from beneficiary countries under the ATPA. In issuing the rule, the Customs Service determined that there was a national security interest to be furthered by the interim deferral of collection of applicable duties, and it anticipated that the duty-free status for applicable merchandise, including refined copper, would be restored retroactive to its expiration (U.S. Customs Service, 2002). In 2001, Peru was the largest source of U.S. copper imports, accounting for 280,000 t (28%) of refined copper imports.

World Review

Following a respite in 2000 when global inventories of refined copper declined, the global production oversupply for refined copper, which had developed at midyear 1997, resumed in 2001. (More information can be found in the section on prices and stocks.) The transition from production deficit to production surplus in 2001 reflects both an increase in world refined production and a decline in copper demand. According to ICSG data (2002a), following a 9-year period of sustained

growth, world refined copper consumption declined by about 478,000 t in 2001. With the exception of Asia, all consuming regions of the world reported lower refined copper use in 2001. In Asia, a 19% (356,000 t) growth in apparent use by China and a 57% growth by Indonesia (40,000 t), where a new rod mill was commissioned in 2000, overshadowed declines by Japan of 15% (200,000 t), and Taipei 14% (88,000 t).

Two significant company mergers affected the structure of international copper mining. At midyear, Teck Corp. and Cominco Ltd., both headquartered in Vancouver, BC, agreed to a merger, forming Teck Cominco Ltd. Under terms of the agreement, Teck acquired the 49.9% interest in Cominco that it did not already own. Teck Cominco operates 11 mines in North America, South America, and Australia, including the Highland Valley copper mine in British Columbia and a 22% interest in the Antamina Mine in Peru (Engineering and Mining Journal, 2001). On June 29, Broken Hill Propriety Company Ltd. and Billiton plc merged under a dual listing arrangement forming BHP Billiton, listed on both the Australian and London stock exchanges. At the time of the merger, their joint assets were valued at \$38 billion and included shares in numerous properties throughout the world including: Ok Tedi, Papua New Guinea, (52%); Escondida, Chile (57.5%); Tintaya, Peru (100%); Antamina, Peru (33.6%); Alumbraera, Peru (25%); Highland Valley, British Columbia, Canada (33.6%); Cerro Colorado, Chile (100%); Selbae, Australia (100%); as well as the Pinto Valley Unit and San Manuel leach operations in the United States. BHP Billiton's beneficial share of copper production in 2001 totaled 934,000 t (BHP Billiton, 2002b).

Mine Production.— In 2001, despite the continued decline in U.S. capacity, estimated world mine capacity rose by 330,000 t/yr, or 2.25%, to 14.7 Mt/yr, extending the strong growth trend that began in 1995. South America and Mexico accounted for most of the increase in capacity, and with two notable exceptions, capacity increases were from expansions of existing facilities. In Northern Peru, the Antamina copper-zinc project (BHP Billiton, Noranda, Inc., Teck Cominco Ltd., and Mitsubishi Corp.) achieved commercial production, defined as 80% of design capacity, more than 4 months ahead of the original schedule of February 2002. As of October 1, the mine had produced 314,000 t of copper concentrates and at capacity was expected to produce 306,000 t/yr of copper and 284,000 t/yr of zinc in concentrates. With an expected life in excess of 22 years, the company reported measured resources of 321 Mt grading 1.23% copper and indicated resources of 283 Mt grading 1.06% copper (BHP Billiton, 2001). With commissioning of Antamina, Peruvian capacity was estimated by the ICSG (2002b) at 743,000 t/yr, up from 576,000 t/yr in 2000.

In Chile, construction was completed at the El Tesoro (Antofagasta Holdings, 61% and Equitorial Mining, 39%) open pit/leach/SX-EW project, and startup began in May. Production totaled 34,000 t of electrowon cathode, with cash costs averaging 36.6 cents per pound and full costs averaging 68.8 cents per pound during the second half of the year. The project was expected to produce 85,000 t of copper in 2002 and had an anticipated mine life of 21 years. Development costs were reported to be \$282 million. At Antofagasta's Los Pelambres Mine, recoverable copper in concentrates increased from 299,000 t in 2000 to 362,000 t in 2001 owing to optimization measures and the addition of a pebble mill (Antofagasta plc,

2002).

Other significant capacity expansions in Chile included a \$60-million investment by Corporación Nacional Del Cobre (Codelco) in its Radomiro Tomic Div., which boosted electrowon copper production by 69,000 t to 260,000 t/yr, and capacity to 272,000 t/yr, and accounted for most of Codelco's production increase. In 2001 Codelco produced 1.70 Mt of copper, up from 1.61 in 2000 (Corporación Nacional Del Cobre, 2002, p. 21, 34).

In Argentina, production increased by 45,000 t at the Bajo de la Alumbrera Mine. The mine was commissioned in 1998 at a development cost of \$1.2 billion. Production increased in 2001 owing to higher mill grades and capital investments geared at lowering costs and sustaining output at 190,000 t/yr over an 8-year period. A concentrator expansion was expected to be completed in 2002 (M.I.M. Holdings Ltd., 2002§). In Mexico, completion of an expansion of SX-EW capacity at Cannanea in August, boosted electrowon production by 16,000 t. Overall production, however, rose only nominally owing to lower production of copper in concentrates.

Production and capacity increased in Indonesia as the Batu Hijau copper-gold mine reached capacity. Commissioned during the fourth quarter of 1999 at a capital cost of \$1.8 billion, it was the world's largest greenfield project. In 2001, Batu Hijau milled 48 Mt of ore grading 0.75% copper to produce 298,000 t of copper in concentrate, an increase of 62,000 t from 2000 (Newmont Mining Corp., 2002, p. 24).

In Zambia, production by Konkola Copper Mines plc (KCM) rose by 18% to 197,000 t of copper. KCM operates the Nchanga open pit and underground mines, the Nchanga tailings leach project, the Chingola open pit, and the Konkola underground mine. In 2001, KCM spent \$178 million on refurbishing mine assets. Production fell short of the company target, however, owing to a slope failure at the Nchanga Open Pit that killed 10 workers and halted operations for one month. With limited reserves at its existing mines, however, future production by KCM was dependent on development of the Konkola Deep Mine Project (KDMP). The project, and the company's future, suffered a major setback in January 2002, however, when Anglo American plc, which owned 65% of KCM through its subsidiary Zambian Copper Investments Limited (ZCI), announced that it would write off \$360 million in losses at KCM and cease operations within 12 months if the sale or transfer of its share of KCM's assets could not be arranged. ZCI had reported losses of \$108 million from March to December 2001 and was reportedly unable to secure external financing for the more than \$1 billion necessary to develop the KDMP (George Coakley, U.S. Geological Survey, personal commun., August 24, 2002).

Mopani Copper Mines, 49% owned by First Quantum Minerals Ltd. of Canada, reported that combined production at its Mufulira and Nkana Divisions rose to 83,000 t, up from 46,000 t in 2000. At the Mufulira underground mine, overhaul of hoisting shafts was completed in July, raising haulage capacity by almost 50%. Reserves at the Mufulira and Nkana mines were placed at 22.5 Mt grading 3.01% copper and 4.24 Mt grading 3.05% copper, respectively (First Quantum Minerals, Ltd., 2002, p. 9-17). In May, First Quantum announced that it had signed a letter of intent with Phelps Dodge to acquire the latter's 80% interest in the Kansanshi copper-gold deposit. Kansanshi, located in the Northwestern

Province of Zambia, is one of Zambia's oldest known mines and has yielded about 80,000 t of copper from intermittent mining of high-grade copper zones. Current estimates indicate open pit minable reserves of 267 Mt of ore grading 1.28% copper and 0.16 g/t gold (First Quantum Minerals Ltd., 2001).

Smelter Production.—Despite a decline in U.S. smelting capacity, world smelter capacity, which had declined in 2000, renewed its upward trend to a record-high of 1.56 Mt. In Japan, expansion at Mitsubishi Materials Corp.'s Naoshima smelter and Nippon Mining and Metals Co. Ltd.'s Saganoseki smelter boosted capacity by about 55,000 t/yr of copper anode. In Australia, capacity rose by 100,000 t owing to modest expansions of the Mount Isa (Mount Isa Mines Ltd.) and Olympic Dam (Western Mining Ltd.) smelters and a full year's operation of the Port Kembla (Port Kembla Pty. Ltd., 52.5% owned by Furukawa Mining Company Ltd.) smelter commissioned in 2000. In Chile, CODELCO's El Teniente (Calchetones smelter) completed an expansion that boosted annual capacity by 100,000 t to 490,000 t. Other expansions included: Norddeutsche Affinerie AG's smelter in Germany (30,000 t) and Sterlite Industries Ltd. (20,000 t) and Indo Gulf Fertilizers and Chemicals Corp.'s (20,000 t) smelters in India (International Copper Study Group, 2002b, p. 45-58). The Gresik smelter in Indonesia (Mitsubishi, 75%, PT Freeport Indonesia, 25%), commissioned in 1999, operated at 109% of its design capacity of 200,000 t/yr in 2001, up from 87% in 2000 (Freeport-McMoran Copper & Gold Inc., 2002, p. 30). In Peru, SPCC produced a record 325,000 t, up by 30,000 t from the previous year and commissioned a detailed feasibility study for modernizing and expanding capacity (Southern Peru Copper Corp., 2002, p. 11).

Despite reduced mine output, world smelter production increased by about 330,000 t or 2.7%, in part sustained by a drawdown in raw material inventories. According to CRU International Ltd. (2002, p. 54-55), the supply of copper concentrates from new mine production, in a reversal from the previous year, was insufficient to meet smelter demand, and inventories of copper concentrate fell by about 130,000 t. While annual contractual treatment and refining charges rose by about 1 cent per pound to 19.2 cents per pound of copper, owing to supply shortages, spot charges fell to about 15 cents per pound by yearend.

Refinery Production.—World refinery capacity rose by about 500,000 t/yr (3%), principally owing to expansion of electrowinning capacity in Chile (115,000 t/yr) and Mexico (40,000 t/yr); expanded electrolytic refining in Australia (80,000 t/yr), Canada (40,000 t/yr), China (70,000 t/yr), and India (40,000 t/yr); and small incremental increases at refineries in other countries. There were no new electrolytic refineries commissioned in 2001, and for the most part expansions followed expanded smelter capacities (International Copper Study Group, 2002b, p. 59-79). Increased capacity and record production of 323,000 t at Noranda Inc.'s CCR refinery in Quebec followed completion of a modernization program that included the introduction of stainless steel starter sheets (Noranda Inc., 2002).

Outlook

U.S. mine production is expected to decline by about 220,000 t in 2002 owing to continued cutbacks from 2001 and additional

cutbacks announced at yearend 2001. Barring a significant recovery in copper prices, production is anticipated to decline further in 2003 as cutbacks are sustained and leach recoveries fall at several mines that have ceased mining but continue to leach existing stockpiles. Lower mill-head grades at several mines that had been high-grading could further reduce production. The four primary smelters that have closed since 1999 are expected to remain shuttered. As of the end of October 2002, Asarco and the U.S. Department of Justice had yet to resolve issues surrounding the sale of SPCC. Asarco was facing a mid-November due date for repayment of \$450 million in debt and faced potential default without the sale of SPCC (Platts Metals Week, 2002).

Primary refined production in 2002 is expected to decline by about 11% owing to a shortage of concentrate for smelting. Production had risen in 2001 owing to a rise in SX-EW production, a drawdown in concentrate inventories, and a sharp decline in net concentrate exports. Secondary refined production is expected to fall by nearly 50% following the November 2001 closure of Chemetco's secondary smelter.

Domestic consumption of refined copper during the first 7 months of 2002 was down by about 10% from the same period in 2001 and is expected to be down by about 5% for the full year, the sharp drop in consumption having begun in the second half of 2001. According to data compiled by the American Bureau of Metal Statistics (2002b), U.S. apparent consumption of copper wire-rod for the first 6 months of 2002 was down by 6.2% from the comparative period in 2001.

Preliminary ICSG data (2002a) for the first 6 months of 2002 indicates that world refined copper use remained weak, falling by about 1% from that in the first half of 2001. Inventories, which continued to rise during the first 4 months of the year, peaking at 2.36 Mt, indicated a continued surplus of production. By midyear, however, inventories had fallen by about 130,000 t, reflecting the impact of production cutbacks in restoring a more balanced market.

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TABLE 1
SALIENT COPPER STATISTICS 1/

(Metric tons unless otherwise specified)

	1997	1998	1999	2000	2001	
United States:						
Mine production:						
Ore concentrated	thousand metric tons	284,000	268,000	236,000	202,000 r/	148,000
Average yield of copper 2/	percent	0.46	0.46	0.42	0.44	0.48
Recoverable copper:						
Arizona		1,250,000	1,190,000	1,050,000	929,000 r/	879,000
Michigan, Montana, Utah		337,000	337,000	313,000	W	W
New Mexico		259,000	252,000	197,000	195,000	141,000
Other States		96,500	78,900	37,400	321,000	318,000
Total		1,940,000	1,860,000	1,600,000	1,450,000 r/	1,340,000
Total value	millions	\$4,570	\$3,220	\$2,680	\$2,810	\$2,270
Smelter production:						
From domestic and foreign ores		1,440,000	1,490,000	1,090,000	(3/)	(3/)
From scrap (new and old)		285,000	232,000	205,000	(3/)	(3/)
Total		1,720,000	1,720,000	1,290,000	1,000,000	919,000
Byproduct sulfuric acid, sulfur content	thousand metric tons	1,430	1,420	1,130	830	813
Refinery production:						
Primary materials:						
Electrolytic from domestic ores		1,370,000	1,290,000	1,110,000	865,000	808,000
Electrolytic from foreign materials		113,000	238,000	196,000	163,000	192,000
Electrowon		586,000	609,000	586,000	566,000 r/	628,000
Total		2,070,000	2,140,000	1,890,000	1,590,000	1,630,000
Secondary materials (scrap):						
Electrolytic		233,000	202,000	156,000	(3/)	(3/)
Fire refined		163,000	147,000	73,700	(3/)	(3/)
Total		396,000	349,000	230,000	208,000	172,000
Grand total		2,470,000	2,490,000	2,120,000	1,800,000 r/	1,800,000
Secondary copper produced:						
Recovered from new scrap		967,000	956,000	949,000	955,000 r/	833,000
Recovered from old scrap		498,000	466,000	381,000	357,000 r/	316,000
Total		1,460,000	1,420,000	1,330,000	1,310,000	1,150,000
Copper sulfate production		48,400	44,000	52,700	55,500	55,200
Exports:						
Refined		92,900	86,200	25,200	93,600	22,500
Unmanufactured 4/		628,000	412,000	395,000	650,000	556,000
Imports:						
Refined		632,000	683,000	837,000	1,060,000	991,000
Unmanufactured 4/		999,000	1,190,000	1,280,000	1,350,000	1,400,000
Copper stocks, December 31:						
Blister and in-process material		180,000	160,000	138,000	122,000	98,000
Refined copper:						
Refineries		59,700	44,200	9,830	14,800	28,600
Wire rod mills		24,600	37,300	32,500	28,600	32,900
Brass mills		14,300	20,800	23,800	23,600	25,500
Other industry		3,390	3,870	3,870	4,680	4,680
New York Commodity Exchange (COMEX)		83,000	85,200	83,100	58,700	244,000
London Metal Exchange (LME), U.S. warehouses		129,000	341,000	412,000	204,000	617,000
Total		314,000	532,000	565,000	334,000	952,000
Consumption:						
Refined copper, reported		2,790,000	2,890,000	2,980,000	3,030,000	2,620,000
Apparent consumption, primary refined and old scrap 5/		2,940,000	3,030,000	3,130,000	3,130,000 r/	2,500,000
Price:						
Producer, weighted average	cents per pound	106.95	78.64	75.91	88.16	76.85
COMEX, first position	do.	103.58	75.08	72.11	83.97	72.57
LME, Grade A cash	do.	103.25	75.01	71.33	82.24	71.57
World, production:						
Mine	thousand metric tons	11,500 r/	12,100	12,700	13,200	13,700 e/
Smelter	do.	11,200	11,400	11,800 r/	12,100 r/	12,500 e/
Refinery	do.	13,500	14,100 r/	14,600	14,900 r/	15,600 e/

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/ Withheld to avoid disclosing company proprietary data; included in "Total."

4/ Includes copper content of alloy scrap.

5/ In 1998, 1999, 2000, and 2001, apparent consumption is calculated using General imports of 725,000 tons, 915,000 tons, 1,020,000, and 1,200,000 tons, respectively.

TABLE 2
LEADING COPPER-PRODUCING MINES IN THE UNITED STATES IN 2001, 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, concentrated and leached.	390
2	Bingham Canyon	Salt Lake, UT	Kennecott Utah Copper Corp.	Copper-molybdenum ore, concentrated.	310
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.	120
5	Sierrita	Pima, AZ	do.	do.	120
6	Chino	Grant, NM	do.	Copper ore, concentrated and leached.	125
7	Tyrone	do.	do.	Copper ore, leached.	75
8	Mission Complex	Pima, AZ 2/	ASARCO Incorporated	Copper ore, concentrated.	110
9	Miami (Inspiration)	Gila, AZ	Phelps Dodge Corp.	Copper ore, leached.	75
10	Silver Bell	Pima, AZ	ASARCO Incorporated	do.	21
11	San Manuel	Pinal, AZ	BHP Copper Co.	do.	25
12	Pinto Valley	Gila, AZ	do.	do.	10
13	Miami	do.	do.	do.	12
14	Tonopah	Nye, NV	Equatorial Tonopah Inc.	do.	15

1/ The mines in this list accounted for 99% of the U.S. mine production in 2001.

2/ Correction made on April 23, 2003.

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

(Metric tons)

Source and treatment process	2000		2001	
	Gross weight	Recoverable copper	Gross weight	Recoverable copper
Mined copper ore:				
Concentrated	202,000,000	880,000 r/	148,000,000 2/	707,000
Leached	NA	558,000 r/	NA	624,000
Total	NA	1,440,000	NA	1,330,000
Copper precipitates shipped: leached from tailings, dumps, and in-place material	3,900 r/	2,820 r/	1,570	936
Other copper-bearing ores 3/	5,340,000 r/	6,180 r/	10,800,000	6,870
Grand total	XX	1,450,000 r/	XX	1,340,000

r/ Revised. NA Not available. XX Not applicable.

1/ Data rounded to three significant digits; may not add to totals shown.

2/ In 2001, 18,200 kilograms of gold and 243 metric tons of silver were recovered from concentrated ore. The average value of gold and silver per metric ton of ore concentrated was \$1.31.

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
2000:					
Copper scrap	1,070,000 r/ 2/	W	96,200 r/	421,000 r/	1,590,000 r/
Refined copper 3/	723,000	2,240,000	58,100 r/	4,590	3,030,000
Hardeners and master alloys	621	--	2,260	--	2,880
Brass ingots	--	--	122,000	--	122,000
Slab zinc	57,500	--	(4/)	(4/)	82,700 r/
2001:					
Copper scrap	919,000 2/	W	87,100	371,000	1,380,000
Refined copper 3/	623,000	1,940,000	54,900	4,590	2,620,000
Hardeners and master alloys	528	--	1,970	--	2,500
Brass ingots	--	--	105,000 p/	--	105,000
Slab zinc	51,700	--	(4/)	(4/)	73,500

p/ Preliminary. 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)

Class of consumer	Cathodes	Ingots and ingot bars	Cakes and slabs	Wirebar, billets, other	Total
2000:					
Wire rod mills	2,220,000	--	--	18,700	2,240,000
Brass mills	501,000	18,300	101,000	103,000	723,000
Chemical plants	--	--	--	1,200	1,200
Ingot makers	W	W	W	4,590 2/	4,590
Foundries	3,810	5,520 r/	--	15,000 r/	24,300 r/
Miscellaneous 3/	W	W	W	32,500 r/ 2/	32,500 r/
Total	2,730,000	23,800	101,000	175,000 r/	3,030,000
2001:					
Wire rod mills	1,930,000	--	--	12,600	1,940,000
Brass mills	429,000	18,400	95,900	80,000	623,000
Chemical plants	--	--	--	1,190	1,190
Ingot makers	W	W	W	4,590 2/	4,590
Foundries	3,210	5,580	--	14,000	22,800
Miscellaneous 3/	W	W	W	30,900 2/	30,900
Total	2,360,000	24,000	95,900	143,000	2,620,000

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, primary smelters producing alloys other than copper, 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)

	2000	2001
Kind of scrap:		
New scrap:		
Copper-base	909,000 r/	795,000
Aluminum-base	45,500	38,600
Nickel-base	18	18
Total	955,000 r/	833,000
Old scrap:		
Copper-base	328,000 r/	292,000
Aluminum-base	28,400	24,200
Nickel-base	170	173
Zinc-base	32	29
Total	357,000 r/	316,000
Grand total	1,310,000	1,150,000
Form of recovery:		
As unalloyed copper	217,000	180,000
In brass and bronze	1,010,000	892,000
In alloy iron and steel	542 r/	508
In aluminum alloys	73,900 r/	64,900
In other alloys	123	118
In chemical compounds	13,900	11,200
Total	1,310,000	1,150,000

r/ Revised.

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)

Type of operation	From new scrap		From old scrap		Total	
	2000	2001	2000	2001	2000	2001
Ingot makers	29,800 r/	27,700	88,500 r/	94,300	118,000 r/	122,000
Refineries 2/	39,000	35,800	169,000	137,000	208,000	172,000
Brass and wire rod mills	822,000	707,000	22,200	19,800	844,000	727,000
Foundries and manufacturers	10,800	18,600	46,300 r/	38,100	57,100 r/	56,700
Chemical plants 3/	7,630 r/	5,120	2,960 r/	2,960	10,600 r/	8,080
Total	909,000 r/	795,000	328,000 r/	292,000	1,240,000	1,090,000

r/ Revised.

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.

3/ 2000 data reflects expanded coverage to include copper sulfate and other copper chemical producers.

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	2000	2001
Unalloyed copper products:		
Refined copper	208,000	172,000
Copper powder	7,510	7,450
Copper castings	839	323
Total	217,000	180,000
Alloyed copper products:		
Brass and bronze ingots:		
Tin bronzes	15,100 r/	14,300
Leaded red brass and semired brass	103,000 r/	82,500
High leaded tin bronze	12,700	11,000
Yellow brass	5,650	5,980
Manganese bronze	6,890 r/	9,510
Aluminum bronze	7,030	7,100
Nickel silver	2,260	2,480
Silicon bronze and brass	4,680	4,780
Copper-base hardeners and master alloys	13,800	11,300
Miscellaneous	3,530 r/	3,640
Total	175,000 r/	153,000
Brass mill and wire-rod mill products	1,060,000	905,000
Brass and bronze castings	44,100 r/	45,200
Brass powder	198	182
Copper in chemical products	13,900	11,200
Grand total	1,510,000 r/	1,290,000 p/

p/ Preliminary. r/ Revised.

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/							
2000 r/	144,000	5,600	9,060	15,900	285	17	175,000
2001	125,000	5,370	8,390	13,900	256	16	153,000 p/
Secondary metal content of brass mill products:							
2000	844,000	1,650	7,450	199,000	W	W	1,060,000
2001	727,000	1,690	6,340	167,000	W	W	905,000
Secondary metal content of brass and bronze castings:							
2000	40,700 r/	638 r/	848 r/	1,730 r/	85	100 r/	44,100 r/
2001	40,800	1,450	917	1,930	91	94	45,200

p/ Preliminary. r/ Revised. 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 2000 and approximately 96% from scrap and 4% from other than scrap in 2001.

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

(Metric tons, gross weight)

Scrap type and processor	2000		2001	
	Consumption	Stocks	Consumption	Stocks
No. 1 wire and heavy:				
Smelters, refiners and ingot makers	86,900	2,260	82,600	1,030
Brass and wire-rod mills	438,000	(2/)	395,000	(2/)
Foundries and miscellaneous manufacturers	42,000 r/	(2/)	33,900	(2/)
No. 2 mixed heavy and light:				
Smelters, refiners and ingot makers	115,000 r/	1,680 r/	103,000	1,390
Brass and wire-rod mills	13,800	(2/)	5,340	(2/)
Foundries and miscellaneous manufacturers	3,320	(2/)	3,060	(2/)
Total unalloyed scrap:				
Smelters, refiners and ingot makers	202,000 r/	3,930 r/	186,000	2,420
Brass and wire-rod mills	452,000	17,600	400,000	16,100
Foundries and miscellaneous manufacturers	45,300 r/	2,920 r/	37,000	2,630 3/
Red brass: 4/				
Smelters, refiners and ingot makers	51,400 r/	2,120	47,300	2,430
Brass mills	9,330	(2/)	8,990	(2/)
Foundries and miscellaneous manufacturers	12,700 r/	(2/)	10,900	(2/)
Leaded yellow brass:				
Smelters, refiners and ingot makers	16,300 r/	1,210	14,800	1,130
Brass mills	396,000	(2/)	337,000	(2/)
Foundries and miscellaneous manufacturers	1,680	(2/)	1,610	(2/)
Yellow and low brass, all plants	105,000	878 r/	111,000	997
Cartridge cases and brass, all plants	72,600	(2/)	36,400	(2/)
Auto radiators:				
Smelters, refiners and ingot makers	46,700 r/	1,610	45,400	1,300
Foundries and miscellaneous manufacturers	2,750	(2/)	2,850	(2/)
Bronzes:				
Smelters, refiners and ingot makers	10,900 r/	1,130	11,800	1,100
Brass mills and miscellaneous manufacturers	11,800	(2/)	20,200	(2/)
Nickel-copper alloys, all plants	28,100	314	19,300	313
Low grade and residues:				
Smelters, refiners and miscellaneous manufacturers	105,000 r/	7,670	70,100	3,830
Other alloy scrap: 5/				
Smelters, refiners and ingot makers	11,300	324	8,450	298
Brass mills and miscellaneous manufacturers	7,610 r/	(2/)	6,910	(2/)
Total alloyed scrap:				
Smelters, refiners and ingot makers	218,000 r/	15,300	185,000	11,400
Brass mills	620,000	39,500	518,000	32,900
Foundries and miscellaneous manufacturers	50,900 r/	2,500 r/	50,100	2,480
Total scrap:				
Smelters, refiners and ingot makers	421,000 r/	19,200 r/	371,000	13,800
Brass and wire-rod mills	1,070,000	57,200	919,000	48,900
Foundries and miscellaneous manufacturers	96,200 r/	5,420 r/	87,100	5,110

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/ Correction made on May 7, 2003.

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

5/ 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	
	2000	2001	2000	2001	2000	2001
Ingot makers	43,800 r/	44,300	122,000 r/	131,000	166,000 r/	175,000
Smelters and refineries	39,700 r/	135,000	215,000 r/	61,300	255,000 r/	196,000
Brass and wire-rod mills	1,050,000	898,000	23,000	20,400	1,070,000	919,000
Foundries and miscellaneous manufacturers	42,500	41,900	53,700 r/	45,100	96,200 r/	87,100
Total	1,170,000 r/	1,120,000	414,000 r/	257,000	1,590,000 r/	1,380,000

r/ Revised.

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	2000	2001
Tin bronzes	29,900	27,800
Leaded red brass and semired brass	70,800 r/	57,700
Yellow, leaded, low brass 2/	8,510	7,670
Manganese bronze	4,600 r/	4,630
Nickel silver 3/	3,480	2,400
Aluminum bronze	4,650	4,080
Hardeners and master alloys 4/	2,260	1,970
Lead free alloys 5/	145	314
Total brass ingot	124,000 r/	107,000 p/
Refined copper	58,100 r/	54,900
Copper scrap	96,200 r/	87,100

p/ Preliminary. r/ Revised.

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)

Year	Brass mills No. 1 scrap	Refiners No. 2 scrap	Dealers' buying (New York)	
			No. 2 scrap	Red brass turnings and borings
2000	80.67	64.99	51.43	39.95
2001	69.62	58.96	48.76	40.63

Source: American Metal Market.

TABLE 14
U.S. EXPORTS OF UNMANUFACTURED COPPER (COPPER CONTENT), BY COUNTRY 1/

Country	Ore and concentrate		Matte, ash, precipitates		Refined		Unalloyed copper scrap		Blister and anodes		Total	
	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
2000	107,000 r/	\$153,000 r/	31,300	\$34,300	93,600	\$176,000	228,000	\$260,000	23,300	\$41,600	483,000 r/	\$666,000 r/
2001:												
Belgium	18	30	--	--	30	32	1,260	2,860	1,550	6,140	2,860	9,060
Canada	30,300	43,600	6,860	6,670	6,520	12,100	38,700	40,900	13,800	16,800	96,200	120,000
China	2,310	3,730	3	8	8,520	11,800	156,000	146,000	87	289	167,000	162,000
Egypt	--	--	--	--	2,160	6,370	--	--	2	7	2,170	6,380
France	1	15	64	95	62	93	11	74	2,130	3,340	2,270	3,620
Germany	443	534	50	59	169	286	6,500	9,150	982	3,220	8,150	13,300
Hong Kong	87	129	2	3	2,330	3,540	4,300	11,000	2,470	5,490	9,200	20,100
India	8	28	261	155	--	--	2,770	2,300	125	325	3,160	2,810
Israel	836	1,720	18	54	6	15	--	--	65	162	925	1,950
Italy	20	51	--	--	27	15	117	300	376	808	540	1,180
Japan	19	34	8	69	460	689	13,800	20,400	216	545	14,500	21,800
Korea, Republic of	699	2,490	1,090	4,870	78	248	24,400	37,400	1,320	3,090	27,600	48,100
Mexico	9,130	8,010	15,300	18,700	821	1,740	2,760	7,960	22	42	28,000	36,400
Singapore	159	354	(2/)	6	14	23	--	--	407	857	581	1,240
Taiwan	347	504	50	194	146	397	9,120	12,300	1,130	2,310	10,800	15,700
Thailand	22	51	--	--	--	--	270	289	264	586	557	926
United Kingdom	280	610	49	65	457	646	36	72	451	1,100	1,270	2,490
Other	644	837	144	268	716	1,480	1,850	2,400	649	1,530	4,010	6,510
Total	45,300	62,700	23,900	31,200	22,500	39,400	262,000	294,000	26,000	46,600	379,000	474,000

r/ Revised. -- Zero.

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

2/ Less than 1/2 unit.

Source: U.S. Census Bureau.

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

Country	Pipes and tubing		Plates, sheets, foil, bars		Bare wire, including wire rod 2/		Wire and cable, stranded		Copper sulfate	
	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
2000	28,800	\$90,700 r/	42,100 r/	\$156,000 r/	74,900	\$208,000	31,400	\$157,000	10,300	\$25,100
2001:										
Australia	7	76	19	244	4	46	54	1,330	276	656
Belgium	11	94	5	58	32	226	136	1,450	--	--
Brazil	83	705	8	139	44	230	191	1,490	49	134
Canada	8,500	26,100	12,500	44,100	18,800	41,600	4,950	14,600	843	1,620
Chile	11	59	13	50	11	257	557	2,020	302	620
China	181	608	560	2,370	59	312	1,180	2,330	693	1,510
Colombia	101	356	4	29	13	126	167	1,700	--	--
Denmark	97	489	6	9	--	--	8	118	348	773
France	710	3,270	129	1,710	31	292	139	3,830	95	263
Germany	44	170	1,230	9,000	44	566	137	2,990	24	118
Hong Kong	6	51	240	1,560	115	1,570	174	1,830	226	420
India	71	205	25	192	7	135	318	519	1	3
Indonesia	--	--	13	40	(1/)	3	--	--	392	828
Israel	188	559	27	1,360	13	198	68	521	--	--
Italy	1,240	3,770	74	315	36	168	30	422	197	480
Japan	64	195	2,620	5,050	102	1,110	237	2,730	992	2,370
Korea, Republic of	15	174	2,300	5,220	33	236	326	3,820	2,070	4,550
Mexico	9,390	29,300	9,630	24,400	55,100	115,000	17,800	72,300	110	246
Mongolia	--	--	400	778	--	--	2	19	--	--
Netherlands	88	574	31	366	10	192	32	340	116	253
New Zealand	6	81	104	534	2	18	5	105	169	392
Saudi Arabia	283	1,040	44	103	36	109	314	900	20	46
Singapore	6	71	164	829	78	477	323	1,850	559	1,300
Sweden	16	75	20	433	13	185	18	532	1,420	3,380
Taiwan	72	300	855	3,930	386	1,410	66	748	599	1,400
United Kingdom	125	680	331	4,590	201	647	148	2,910	1,250	3,110
Venezuela	160	781	8	50	8	154	580	2,330	8	22
Other	930	2,910	478	3,410	1,250	3,870	1,780	12,600	239	600
Total	22,400	72,700	31,800	111,000	76,400	169,000	29,800	136,000	11,000	25,100

r/ Revised. -- Zero.

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

2/ Total exports of wire rod in 2000 were 44,100 tons valued at \$98,800,000 and in 2001 were 55,200 tons valued at \$105,000,000.

Source: U.S. Census Bureau.

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

Country	Ore and concentrate		Matte, ash, precipitates		Blister and anode		Refined		Unalloyed scrap		Total	
	Quantity (metric tons)	Value 2/ (thousands)	Quantity (metric tons)	Value 2/ (thousands)	Quantity (metric tons)	Value 2/ (thousands)	Quantity (metric tons)	Value 2/ (thousands)	Quantity (metric tons)	Value 2/ (thousands)	Quantity (metric tons)	Value 2/ (thousands)
2000	53	\$12	1,680	\$2,780	185,000	\$435,000	1,060,000	\$1,960,000	30,900	\$43,400	1,270,000	\$2,440,000
2001:												
Brazil	--	--	--	--	--	--	12,000	18,500	68	96	12,000	18,600
Canada	7,210	7,690	43	58	79,700	235,000	270,000	456,000	10,600	15,000	368,000	714,000
Chile	19,200	21,200	--	--	87,700	165,000	174,000	298,000	119	144	281,000	484,000
Costa Rica	--	--	--	--	--	--	--	--	868	893	868	893
Dominican Republic	--	--	--	--	--	--	--	--	1,550	1,700	1,550	1,700
Guatemala	--	--	--	--	--	--	--	--	499	614	499	614
Honduras	--	--	--	--	--	--	--	--	484	441	484	441
Indonesia	6,010	14,500	--	--	--	--	--	--	--	--	6,010	14,500
Italy	--	--	--	--	12,200	21,200	--	--	309	1,840	12,500	23,000
Japan	--	--	(3/)	6	--	--	8,660	18,800	169	819	8,830	19,600
Kazakhstan	--	--	--	--	--	--	82,400	83,800	--	--	82,400	83,800
Mexico	2,550	2,730	317	196	48,900	152,000	131,000	216,000	13,500	17,000	196,000	388,000
Namibia	--	--	--	--	6,840	11,800	--	--	--	--	6,840	11,800
Peru	11,600	15,900	--	--	22,600	33,300	280,000	467,000	347	778	315,000	517,000
Philippines	--	--	--	--	4,990	11,500	999	1,880	--	--	5,990	13,400
Russia	--	--	--	--	115	196	22,800	41,500	--	--	23,000	41,700
Spain	--	--	--	--	4,420	8,930	--	--	--	--	4,420	8,930
Taiwan	--	--	560	1,530	--	--	34	100	--	--	594	1,630
Other	--	--	25	60	3,510	6,510	8,790	15,900	1,700	2,400	14,000	24,900
Total	46,500	62,100	945	1,850	271,000	645,000	991,000	1,620,000	30,300	41,700	1,340,000	2,370,000

-- Zero.

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

2/ C.i.f. value at U.S. port.

3/ Less than 1/2 unit.

Source: U.S. Census Bureau.

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

Country	Pipes and tubing		Plates, sheets, foil, bars		Bare wire, including wire rod 2/		Wire and cable, stranded		Copper sulfate	
	Quantity (metric tons)	Value 3/ (thousands)	Quantity (metric tons)	Value 3/ (thousands)	Quantity (metric tons)	Value 3/ (thousands)	Quantity (metric tons)	Value 3/ (thousands)	Quantity (metric tons)	Value 3/ (thousands)
2000	1,020	\$4,750	120,000	\$381,000	250,000 r/	\$540,000 r/	7,620	\$36,100	2,550	\$9,910
2001:										
Australia	12	31	1,050	2,730	--	--	--	--	2,150	4,020
Brazil	48	239	1,600	3,930	18,800	46,300	2	15	--	--
Canada	586	3,480	11,000	33,600	113,000	209,000	1,010	3,810	--	--
Chile	4	10	5,970	14,400	11	35	--	--	--	--
China	36	127	907	3,300	46	149	7	137	--	--
Finland	--	--	2,970	10,800	615	2,210	6	86	--	--
France	1	73	2,980	8,050	251	2,130	55	696	69	188
Germany	7	44	27,100	77,800	1,040	3,360	305	1,760	99	359
Hong Kong	--	--	1	8	(4/)	3	2	6	195	220
Israel	--	--	--	--	344	1,390	2,220	11,100	--	--
Italy	--	--	5,610	14,800	11	35	1	14	--	--
Japan	(4/)	15	14,000	53,400	572	4,690	41	547	5	70
Korea, Republic of	(4/)	19	2,310	5,470	126	347	19	121	--	--
Luxembourg	--	--	2,710	18,900	--	--	--	--	--	--
Malaysia	418	1,410	531	3,960	2	49	--	--	--	--
Mexico	1	11	2,440	7,300	91,900	152,000	16	74	2,090	3,720
Peru	--	--	3,650	8,380	284	663	166	412	--	--
Poland	1	3	183	473	22	54	4,010	10,900	--	--
Russia	--	--	1,360	2,310	1,720	2,960	--	--	--	--
Spain	250	1,410	1,080	3,110	(4/)	3	--	--	--	--
Sweden	--	--	9,180	30,000	70	159	(4/)	3	--	--
Taiwan	1	16	511	3,200	202	785	4	154	--	--
Turkey	--	--	99	251	2,830	9,020	744	2,420	--	--
United Kingdom	2	27	1,230	4,860	2,050	4,940	21	265	6	43
Other	3	18	2,840	7,650	438	2,000	29	211	35	68
Total	1,370	6,940	101,000	319,000	234,000	442,000	8,660	32,800	4,650	8,680

r/ Revised. -- Zero.

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

2/ Total imports of wire rod in 2000 were 247,000 tons valued at \$502,000,000 and in 2001 were 221,000 tons valued at \$393,000,000. Imports data adjusted by USGS to correct misclassification of imports from Mexico.

3/ C.i.f. value at U.S. port.

4/ Less than 1/2 unit.

Source: U.S. Census Bureau.

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

Country	Unalloyed copper scrap				Copper-alloy scrap			
	2000		2001		2000		2001	
	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
Belgium	731	\$5,320	1,260	\$2,860	1,280	\$1,730	1,470	\$1,870
Canada	45,300	50,900	38,700	40,900	41,400	56,700	33,100	43,900
China	124,000	101,000	156,000	146,000	86,100	65,700	136,000	94,800
Germany	2,070	5,270	6,500	9,150	5,610	9,920	9,480	8,030
Hong Kong	6,900	6,870	4,300	11,000	6,240	6,700	5,440	4,650
India	933	963	2,770	2,300	24,000	19,400	33,400	25,500
Japan	15,900	38,900	13,800	20,400	16,200	24,700	13,200	19,200
Korea, Republic of	20,600	31,500	24,400	37,400	39,700	54,800	17,800	25,000
Mexico	2,760	7,350	2,760	7,960	14,700	14,600	4,370	3,550
Singapore	979	1,050	--	--	2,440	2,920	281	297
Spain	589	272	549	281	5,460	1,400	2,710	799
Switzerland	126	143	596	887	966	1,670	3,720	2,580
Taiwan	5,080	7,530	9,120	12,300	6,190	7,620	5,870	8,320
Other	1,570 r/	3,000 r/	1,140	1,960	7,490 r/	8,590 r/	4,970	5,570
Total	228,000	260,000	262,000	294,000	258,000	276,000	272,000	244,000

r/ Revised. -- Zero.

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

Source: U.S. Census Bureau.

TABLE 19
U.S. IMPORTS FOR CONSUMPTION OF COPPER SCRAP, BY COUNTRY 1/

Country or territory	Unalloyed copper scrap		Copper-alloy scrap		
	Quantity (metric tons)	Value 2/ (thousands)	Gross weight (metric tons)	Copper content e/ 3/ (metric tons)	Value 2/ (thousands)
2000	30,900	\$43,400	113,000	81,200	\$143,000
2001:					
Canada	10,600	15,000	45,800	33,000	56,600
Colombia	--	--	899	647	1,360
Costa Rica	868	893	635	457	769
Dominican Republic	1,550	1,700	1,570	1,130	1,340
Guatemala	499	614	1,990	1,430	2,820
Honduras	484	441	656	472	751
Italy	309	1,840	--	--	--
Jamaica	283	436	470	338	409
Japan	169	819	--	--	--
Mexico	13,500	17,000	24,000	17,300	26,000
Nicaragua	276	348	54	39	63
Peru	347	778	112	81	144
Slovenia	50	342	--	--	--
United Kingdom	64	185	919	662	1,540
Venezuela	42	54	874	630	913
Other	1,170	1,270	6,390	4,600	9,670
Total	30,300	41,700	84,400	60,800	102,000

e/ Estimated. -- Zero.

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

2/ C.i.f. value at U.S. port.

3/ Content is estimated by USGS to be 72% of gross weight.

Source: U.S. Census Bureau.

TABLE 20
COPPER: WORLD MINE PRODUCTION, BY COUNTRY 1/ 2/

(Metric tons)

Country	1997	1998	1999	2000	2001
Albania e/	220	3,200	900	-- r/	--
Argentina	30,421	170,273	210,126	145,197	191,566
Armenia e/	9,000	9,200	9,600	7,231 3/	9,700
Australia:					
By concentration or cementation	507,400	552,000	655,900	751,300	782,100
Leaching, electrowon	50,600	55,000	83,100	77,700	86,900
Total	558,000	607,000	739,000	829,000	869,000
Bolivia	182	48	252	-- r/	-- e/
Botswana 4/	22,840	25,043	37,604	38,420	31,300 e/
Brazil	39,952	34,446	31,371	31,786	32,000 e/
Bulgaria	93,000	88,000	76,000	75,000 e/	95,000 e/
Burma:					
By concentration or cementation	2,927	--	97	100 e/	-- e/
Leaching, electrowon	--	6,700 e/	26,736	26,711	26,300 e/
Total	2,927	6,700 e/	26,833	26,811	26,300 e/
Canada:					
By concentration or cementation	656,800	703,966	620,085	633,855 r/	632,800
Leaching, electrowon	2,700	1,800	--	--	--
Total	659,500	705,766	620,085	633,855 r/	632,800
Chile: 5/					
By concentration or cementation	2,511,000	2,578,800	3,029,100	3,229,800	3,200,800 p/
Leaching, electrowon	881,000	1,108,000	1,362,100	1,372,600	1,538,200 p/
Total	3,392,000	3,686,800	4,391,200	4,602,400	4,739,000 p/
China: e/					
By concentration or cementation	495,500 3/	486,000	520,000	593,000 r/	570,000
Leaching, electrowon	15,000	18,000	13,000	20,000	18,000
Total	511,000	504,000	533,000	613,000	588,000
Colombia	1,800 e/	1,400 e/	2,295 r/	2,062 r/	2,000 e/
Congo (Kinshasa), leaching, electrowon 6/	39,651	34,994	32,000 e/	21,000	20,988
Cuba	2,208 r/	1,351 r/	1,090 r/	1,346 r/	1,000 e/
Cyprus, leaching, electrowon	3,900	7,800	11,300 e/	11,300 e/	7,600 p/
Ecuador e/	100	100	100	100	100
Finland e/	8,500	9,000	10,500	11,600	11,500
Georgia e/	4,100 3/	6,000	7,000 r/	8,000	8,000
Honduras	(7/)	(7/)	(7/)	-- e/	-- e/
India	37,200 e/	39,900	34,100 e/	31,900 r/	30,900
Indonesia 6/	529,121	780,780	766,027	1,012,054	1,050,000 e/
Iran: e/					
By concentration or cementation	115,000 r/	127,000 r/	128,000 r/	128,000 r/	128,000
Leaching, electrowon	2,000 r/	10,000 r/	10,000 r/	10,000 r/	12,000
Total	117,000 r/	137,000 r/	138,000 r/	138,000 r/	140,000
Japan	932	1,070	1,038	1,211	744
Kazakhstan	316,166	337,600	374,000 e/	430,000 e/	470,100
Korea, North e/	16,000	14,000	14,000	13,000 r/	13,000
Korea, Republic of	-- e/	41	--	--	--
Macedonia	13,000	9,100	10,200	10,000	10,000 e/
Malaysia	18,821	13,907	4,600	--	--
Mexico:					
By concentration or cementation	342,319	335,822	330,232	319,766	306,779
Leaching, electrowon	48,217	48,819	50,952	44,800	60,600
Total	390,536	384,641	381,184	364,566	367,379
Mongolia	124,400	125,400	126,700	125,227 r/	133,503
Morocco	15,400	8,200	7,700	7,125 r/	7,100 e/
Namibia	17,879	7,500 r/	--	5,620 r/	12,392
Norway	6,671	2,698	-- e/	-- e/	-- e/
Papua New Guinea	111,515	152,200	187,921	200,900	218,000 e/

See footnotes at end of table.

TABLE 20--Continued
COPPER: WORLD MINE PRODUCTION, BY COUNTRY 1/ 2/

(Metric tons)

Country	1997	1998	1999	2000	2001
Peru:					
By concentration or cementation	406,760	381,501	421,470	426,614	590,896
Leaching, electrowon	99,738	101,837	114,917	127,310	131,139
Total	506,498	483,338	536,387	553,924	722,035
Philippines	48,600	45,400	34,600 r/	30,644 r/	20,322
Poland	414,800	436,200	464,000	456,200	474,000
Portugal	106,479	114,637	99,500 e/	76,200	82,900
Romania 8/	23,190	19,065	16,455	16,079	16,000 e/
Russia e/	505,000	500,000 3/	530,000	570,000	620,000
Saudi Arabia	703	782	821	900 r/ e/	800 e/
Serbia and Montenegro	73,600	70,900 e/	51,700	41,000 e/	22,000 e/
Slovakia e/	314	155	124	--	--
South Africa	153,058	166,000	144,263	137,092	141,865
Spain	37,883	37,000	1,738	23,312	9,700
Sweden	86,640	73,685	71,200	75,600	79,000
Tanzania, in concentrates and bullion	--	--	--	--	3,200
Turkey 8/	36,400	40,000 e/	73,051	76,253	64,000 e/
United States: 6/					
By concentration or cementation	1,350,000	1,250,000	1,010,000	887,000	714,000
Leaching, electrowon	586,000	609,000	586,000	557,000	628,000
Total	1,940,000	1,860,000	1,600,000	1,440,000	1,340,000
Uzbekistan	73,000	65,000	60,000 e/	65,000 e/	65,000 e/
Zambia: 9/					
By concentration or cementation	288,900	258,000	213,000	186,200	249,300
Leaching, electrowon	64,000	57,000	57,000 e/	55,000	50,000 e/
Total	352,900	315,000	270,000 e/	241,200	299,300
Zimbabwe: e/					
By concentration or cementation	3,900	3,600	3,491 3/	2,104 3/	2,057 3/
Leaching, electrowon	2,900	2,400	1,020 3/	--	--
Total	6,800	6,000	4,511 3/	2,104 3/	2,057 3/
Grand total	11,500,000 r/	12,100,000	12,700,000	13,200,000	13,700,000

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/ Data represent copper content by analysis of concentrates produced except where otherwise noted. Table includes data available through July 22, 2002.

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/ Less than 1/2 unit.

8/ Excludes copper content of pyrite.

9/ Data are for fiscal years beginning April 1 of year stated. Zambian-mined copper reported recovered during smelting and electrowinning.

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

(Metric tons)

Country	1997	1998	1999	2000	2001 e/
Albania, primary	--	1,632	1,281	-- r/	--
Australia, primary	216,000 r/	211,000 r/	332,000 r/	394,000 r/	455,000 3/
Austria, secondary e/	73,000	54,800	77,573 3/	70,000 r/	68,000
Belgium:					
Primary	38,000	20,700	25,000 e/	20,000 e/	20,000
Secondary	139,000	138,400	143,300	144,700	138,200 3/
Total	177,000	159,100	168,300	164,700	158,200 3/
Botswana, primary 4/	19,820	22,124	20,960	20,977	17,057 3/
Brazil, primary	177,060	167,205	193,014	185,345 r/	190,000
Bulgaria:					
Primary	109,630	114,500	107,000	160,600	160,000
Secondary e/	5,000	5,000	5,000	5,000	5,000
Total	114,630	119,500	112,000 e/	165,600	165,000
Canada:					
Primary	529,524	553,100	550,200	543,600	598,200 3/
Secondary	96,957	71,300	66,800	60,100	41,600 3/
Total	626,481	624,400	617,000	603,700	639,800 3/
Chile, primary	1,389,600	1,403,100	1,474,000	1,460,400 r/	1,503,300 p/ 3/
China: e/					
Primary	789,000	839,000	837,000	1,020,000 r/	1,120,000
Secondary	180,000	170,000	190,000	180,000 r/	190,000
Total	969,000	1,010,000	1,030,000 r/	1,200,000 r/	1,310,000
Congo (Kinshasa), primary, electrowon e/	40,100	40,000	32,000	21,000	20,988 3/
Finland:					
Primary	159,000	156,000	149,600	155,400	169,300 3/
Secondary e/	2,000	2,000	2,000	2,000	2,000
Total	161,000 e/	158,000 e/	151,600	157,400	171,300 3/
France, secondary e/	2,400	2,000	1,000	--	--
Germany:					
Primary	273,000	258,600	266,400	275,000 e/	270,000
Secondary e/	76,000	80,000 3/	60,000	75,000	60,000
Total	349,000 e/	338,000	326,400	350,000 e/	330,000
Hungary, secondary e/	100	--	--	--	--
India, primary	51,000	107,600	224,400	256,000 r/ e/	293,000
Indonesia, undifferentiated	--	--	126,739	173,726	217,500 3/
Iran, undifferentiated e/ 5/	99,100	150,000	154,000	154,000	155,000
Japan:					
Primary	1,214,172	1,171,657	1,256,276	1,331,352	1,328,489 3/
Secondary	136,274	131,979	133,188	149,282	139,764 3/
Total	1,350,446	1,303,636	1,389,464	1,480,634	1,468,253 3/
Kazakhstan, undifferentiated	327,397 r/	351,336 r/	383,457 r/	413,859 r/	430,000
Korea, North: e/					
Primary	24,000	23,000	20,000	20,000	20,000
Secondary	5,000	4,500	5,000	5,000	5,000
Total	29,000	27,500	25,000	25,000	25,000
Korea, Republic of, undifferentiated	160,000	293,000	370,000	410,000 e/	410,000
Mexico:					
Primary	348,290	378,302	352,700	323,000 e/	310,000
Secondary e/	4,000	4,000	5,000	5,000	5,000
Total	352,290	382,302	357,700	328,000 e/	315,000
Namibia, primary	24,997	8,014	-- e/	5,082 r/	27,015 3/
Norway, primary	32,639	31,658	33,262	27,000 e/	26,700 3/
Oman, primary	22,800	24,400	16,818	23,790	24,000
Peru, primary	323,382	356,189	350,399	340,447	340,500 3/
Philippines, primary	206,160	161,600 r/	162,000 r/	160,000 r/	189,000
Poland:					
Primary	415,000 e/	422,243	486,384	507,846	518,737 3/
Secondary e/	15,000	10,000	10,000	10,000	10,000
Total	430,000 e/	432,243	496,384	517,846	528,737 3/
Romania:					
Primary	25,024	18,708	24,013	16,495	16,000
Secondary e/	1,000	1,000	2,000	2,000	2,000
Total	26,024	19,708	26,013	18,495	18,000

See footnotes at end of table.

TABLE 21--Continued
COPPER: WORLD SMELTER PRODUCTION, BY COUNTRY 1/ 2/

(Metric tons)

Country	1997	1998	1999	2000	2001 e/
Russia: e/					
Primary	535,000	510,000	540,000	580,000	600,000
Secondary	35,000	40,000	158,000	200,000	200,000
Total	570,000	550,000	698,000	780,000 3/	800,000
Serbia and Montenegro: e/					
Primary	60,000	101,000 r/	54,000	45,000 r/	34,000
Secondary	60,000	10,000 r/	49,780 3/	45,000 r/	35,000
Total	120,000	111,000 r/	103,780 3/	90,000 3/	69,000
Slovakia, primary e/	10,000	10,000	10,000	-- r/	--
South Africa, primary	163,600	152,300	149,300	172,800 r/	142,500 3/
Spain:					
Primary	288,900	291,400	292,800 r/	289,900 r/	279,900 3/
Secondary	23,800	23,800	25,000 e/	24,700 r/	24,700 3/
Total	312,700	315,200	317,800 r/	314,600 r/	304,600 3/
Sweden: e/					
Primary	95,000	90,000	85,000	95,000	173,000
Secondary	33,000	35,000	30,000	35,000	35,000
Total	128,000	125,000	115,000	130,000	208,000
Turkey, undifferentiated 6/	32,491	35,000	32,900 r/ e/	32,500 r/ e/	33,000
United States:					
Primary	1,440,000	1,490,000	1,090,000	W	W
Secondary	285,000	232,000	205,000	W	W
Total	1,720,000	1,720,000	1,290,000	1,000,000	919,000 3/
Uzbekistan: e/					
Primary	80,000	89,930 3/	72,000	75,000	70,000
Secondary	5,000	5,000	5,000	5,000	5,000
Total	85,000	94,930 3/	77,000	80,000	75,000
Zambia, primary: 7/					
Electrowon	61140	51,736	60,200 r/	50,000 r/	50,000
Other	220,327	206,871	289,000 r/	308,300 r/	333,800 3/
Total	281,467	258,607	349,200 r/	358,300 r/	383,800 3/
Zimbabwe, primary e/ 8/	18,000	15,000 r/	15,000 r/	15,000 r/	2,160
Grand total:	11,200,000	11,400,000	11,800,000 r/	12,100,000 r/	12,500,000
Of which:					
Primary:					
Electrowon	101,000	91,700	92,200 r/	71,000 r/	71,000
Other	9,390,000 r/	9,550,000 r/	9,630,000 r/	8,980,000 r/	9,390,000
Secondary	1,180,000	1,020,000 r/	1,170,000 r/	1,020,000 r/	966,000
Undifferentiated	540,000 r/	701,000 r/	934,000 r/	2,050,000 r/ 9/	2,030,000 9/

e/ Estimated. p/ Preliminary. r/ Revised. W Withheld to avoid disclosing company proprietary data; included in "Total." -- 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 copper metal at the refined stage, 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 22, 2002.

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/ Secondary production is estimated to be about one-third of total.

7/ For 1998-99, fiscal year beginning April 1 of year stated. Electrowon is total electrowon production reported less the quantity reported as "finished production, leach cathodes."

8/ Includes impure cathodes produced by electrowinning in nickel processing.

9/ Includes U.S. production undifferentiated.

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

(Metric tons)

Country	1997	1998	1999	2000	2001 e/
Albania, primary	--	1,150	342	350 e/	350
Argentina, secondary e/	16,000	16,000	16,000	16,000	16,000
Australia:					
Electrowon	50,600	55,000	84,000	97,000 e/	102,000
Primary	219,500 r/	230,000 r/	335,000 r/	390,000 r/ e/	456,000
Total	270,100	285,900	412,000	487,000 e/	558,000
Austria: e/					
Primary	2,000	2,000	2,000	2,000	--
Secondary	65,000	76,000	75,000	77,000	69,000
Total	67,000	78,000	77,000	79,000 3/	69,000
Belgium: 4/					
Primary	190,000	185,000	201,100 r/	236,100	236,000
Secondary	183,000	183,000	187,000 e/	187,000 e/	187,000
Total	373,000	368,000	388,100 r/	423,100 r/	423,000
Brazil, primary	177,060	167,200	193,014 r/	185,345	185,000
Bulgaria:					
Primary	29,530	31,400	16,000 e/	25,500 e/	25,000
Secondary e/	5,000	5,000	5,000	5,000	5,000
Total	34,530	36,400	21,000	30,500	30,000
Burma, electrowon	--	6,700 e/	26,736	26,711	26,300
Canada:					
Electrowon	2,700	1,800	--	-- e/	--
Primary	458,400	488,100	480,400	490,100	501,800 p/
Secondary	99,300	72,600	60,100 r/	61,300	62,800 p/
Total	560,400	562,500	540,500 r/	551,400	564,600 p/
Chile:					
Electrowon	881,000	1,108,000	1,362,100 r/	1,372,600	1,538,000 3/
Primary	1,235,600	1,226,900	1,304,300	1,295,700	1,344,000 3/
Total	2,116,600	2,334,900	2,666,400 r/	2,668,300	2,882,000 3/
China: e/					
Primary	801,000	870,000	836,000	1,023,000 r/ 3/	1,070,000
Secondary	379,000	341,000	338,000	347,000 r/	370,000
Total	1,180,000	1,210,000	1,170,000	1,370,000 r/	1,440,000
Congo (Kinshasa), primary 5/	37,658	38,236	31,225	20,500 e/	21,000
Cyprus, electrowon	4,435	4,936	5,004	5,197	5,176 3/
Egypt, secondary e/	5,000	6,000	6,000	5,000	5,000
Finland: e/					
Primary	100,000	108,000	100,000	100,000	100,000
Secondary	16,000	15,000	15,000	14,000	15,000
Total	116,000	123,000	115,000	114,000	115,000
France, secondary e/	35,580 r/ 3/	22,400	1,800	1,500	--
Germany:					
Primary	297,900	322,800	271,000 e/	335,000 e/	334,000
Secondary	375,800	373,000	425,000 e/	375,000 e/	375,000
Total	673,700	695,800	696,000 e/	710,000 e/	709,000
Hungary, secondary e/	12,000	12,000	12,000	12,000	10,000
India:					
Primary, electrolytic	30,200	100,000	200,000 e/	234,000 e/	310,000 3/
Secondary e/	6,000	7,000	8,000	9,000	18,000
Total e/	36,200	107,000	208,000	243,000	328,000
Indonesia, primary	--	--	90,800 r/	158,400 r/	212,500 3/
Iran: 6/					
Electrowon	9,500	14,000	14,000 e/	14,000 e/	14,000
Primary 7/	103,300	129,000	131,700	132,000 r/ e/	132,000
Total	112,800	143,000	146,000 e/	146,000 r/ e/	146,000
Italy:					
Primary	5,600	--	--	-- e/	--
Secondary	80,100	29,100 e/	28,500 r/ e/	72,800 r/	35,500 3/
Total	85,700	29,100 e/	28,500 r/ e/	72,800 r/	35,500 3/
Japan:					
Primary	1,157,299	1,149,266	1,215,248	1,289,682 r/	1,287,200 3/
Secondary	121,400	128,086	126,301	147,669 r/	138,500 3/
Total	1,278,699	1,277,352	1,341,549	1,437,351	1,425,700 3/

See footnotes at end of table.

TABLE 22--Continued
COPPER: WORLD REFINERY PRODUCTION, BY COUNTRY 1/ 2/

(Metric tons)

Country	1997	1998	1999	2000	2001 e/
Kazakhstan, primary	301,100	324,900	361,889	394,722	421,800 3/
Korea, North: e/					
Primary	15,000 r/	15,000 r/	13,000 r/	12,000 r/	12,000
Secondary	3,000 r/	3,000 r/	3,000 r/	3,000 r/	3,000
Total	18,000 r/	18,000 r/	16,000 r/	15,000 r/	15,000
Korea, Republic of:					
Primary 7/	265,426	373,205	450,444	467,900 r/	473,624 3/
Secondary e/	-- r/	-- r/	-- r/	-- r/	--
Total	265,426 r/	373,205 r/	450,444 r/	467,900 r/	473,624 3/
Mexico:					
Primary:					
Electrowon	48,217	48,819	50,952	47,800 e/	60,600
Other	234,000 e/	383,181	361,000	340,400	340,000
Secondary e/	14,783 3/	15,000	14,000	15,000	15,000
Total	297,000	447,000	425,952	403,200 r/	415,600 3/
Mongolia, electrowon	2,751	2,319	1,545	641 r/	1,476 3/
Norway, primary 7/	32,639	31,658	33,262	27,000 e/	26,700 3/
Oman, primary	23,600	22,700	17,171	24,281	23,000
Peru, primary:					
Electrowon	99,738	101,837	114,927	127,311 r/	131,139 3/
Other	284,347	309,594	318,914	324,417 r/	340,736 3/
Total	384,085	411,431	433,841	451,728 r/	471,875 3/
Philippines, primary	146,630	152,400	147,982	138,707 r/	164,530 3/
Poland:					
Primary	420,600	426,537	448,300	466,002	478,000
Secondary e/	20,000	20,300	22,200 3/	20,000	20,000
Total	440,600	446,837	470,500	486,002	498,000
Romania:					
Primary	22,912	21,028	24,983	13,803	15,000
Secondary e/	4,000	2,000	4,000	4,000	4,000
Total	26,912	23,028	28,983	17,803	19,000
Russia:					
Primary	535,000	543,000	600,000	640,000 e/	650,000 3/
Secondary	65,000	77,000	150,000	200,000 e/	244,500 3/
Total	600,000	620,000	750,000	840,000 e/	894,500 3/
Serbia and Montenegro:					
Primary	70,534	49,346	48,002	45,602	32,365 3/
Secondary e/	43,000 3/	45,000	1,900	40,000	30,000
Total	113,534	94,346	49,902	85,602 r/	62,365 3/
Slovakia, primary e/ 7/	31,400	24,100	21,000	20,000	20,000
South Africa, primary 7/	130,200	125,600	134,500 r/	126,100 r/	132,078 3/
Spain:					
Primary	229,000 e/	239,600	250,756	258,000 r/	235,100 3/
Secondary e/	63,300	64,730 3/	65,000	58,000 r/	55,600 3/
Total e/	292,000	304,000 r/	316,000 r/	316,000 r/	290,700 3/
Sweden: e/					
Primary	105,000	100,000	95,000	105,000	179,000 3/
Secondary	23,000 3/	25,000	20,000	25,000	25,000
Total	128,000 3/	125,000	115,000	130,000	204,000 3/
Taiwan, secondary e/	4,000	4,000	4,000	4,000	4,000
Turkey:					
Primary	102,100	82,800	69,000 e/	68,000 r/ e/	68,000
Secondary	9,300	9,000	9,000 e/	10,000 e/	10,000
Total	111,400	91,800	78,000 e/	78,000 r/ e/	78,000
United Kingdom:					
Primary	9,100	8,000	5,000 e/	-- r/	--
Secondary	51,300	44,000	45,000 e/	3 r/	--
Total	60,400	52,000	50,000 e/	3 r/	--

See footnotes at end of table.

TABLE 22--Continued
COPPER: WORLD REFINERY PRODUCTION, BY COUNTRY 1/ 2/

(Metric tons)

Country	1997	1998	1999	2000	2001 e/
United States:					
Primary:					
Electrowon	586,000	609,000	586,000	557,000	628,000 3/
Other	1,480,000	1,530,000	1,300,000	1,030,000	1,000,000 3/
Secondary	396,000	349,000	230,000	208,000	172,000 3/
Total	2,470,000	2,490,000	2,120,000	1,790,000	1,800,000 3/
Uzbekistan: e/					
Primary	105,000	89,930 3/	72,000	75,000	75,000
Secondary	5,000	5,000	5,000	5,000	5,000
Total	110,000	94,930 3/	77,000	80,000	80,000
Zambia, primary: 8/					
Electrowon	63,736	80,709	60,200 r/	50,000 r/	45,800 3/
Other	268,553	248,820	258,900 r/	227,400 r/	282,100 3/
Total	332,289	329,529	319,100 r/	277,400 r/	327,900 3/
Zimbabwe: e/					
Electrowon	2,900	2,400	1,020	--	--
Primary	4,990	2,940	7,000	7,200	5,300
Total	7,890	5,340	8,020	7,200	5,300
Grand total:	13,500,000	14,100,000 r/	14,600,000	14,900,000 r/	15,600,000
Of which:					
Primary:					
Electrowon	1,750,000	2,040,000	2,310,000	2,300,000	2,550,000
Other	9,670,000	10,200,000	10,500,000	10,700,000	11,200,000
Secondary	2,100,000 r/	1,950,000 r/	1,880,000	1,920,000 r/	1,900,000

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, 2002.

3/ Reported figure.

4/ Includes reprocessed leach cathode from Congo (Kinshasa).

5/ Excludes leach cathode exported for processing in Belgium.

6/ Data are for Iranian years beginning March 21 of that stated.

7/ May include secondary.

8/ Data are for fiscal year beginning April 1 of that stated. Electrowon covers only presumably high-grade electrowon cathodes reported as "finished production leach cathodes." Other, in addition to electrowon cathodes, includes a smaller amount of "finished product shapes" presumably cast from electro-refined cathodes, or any blister-anodes and low-anodes and low-grade electrowon cathodes that were furnace- or fire-refined.