2008 Minerals Yearbook

COPPER [ADVANCE RELEASE]

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

August 2010

Copper

By Daniel L. Edelstein

Domestic survey data and tables were prepared by Virginia C. Harper, statistical assistant, and the world production tables were prepared by Linder Roberts and Glenn J. Wallace, international data coordinators.

In the United States, mine production of recoverable copper in 2008 rose by about 140,000 metric tons (t) to 1.31 million metric tons (Mt). Most of the production increase took place in Arizona, where two new mines, which began production during the fourth quarter of 2007, operated for the full year. Production increases also took place at mines in Nevada and Utah. Total refined production of 1.27 Mt was down by more than 3% from that in 2007. U.S. reported consumption of refined copper fell by about 6%, principally owing to a sharp drop in demand with the onset of the global economic crisis during the fourth quarter of 2008. Consumption for the first 9 months of the year was only slightly below that for the same period in 2007.

Despite numerous announced expansions in mine capacity and an increase in U.S. production, global copper mine production declined slightly in 2008. Numerous factors, including labor unrest, lower ore grades, rapidly escalating production costs, technical problems, and utility and equipment shortages, contributed to lower than anticipated production. The United States accounted for about 8% of world copper mine production and regained its position as the second leading copper producer, having relinquished that position in 2007 to Peru. Chile remained the leading world mined copper producer and accounted for 35% of global mined copper production. Global smelter and refinery production increased by 3% and 2%, respectively, principally owing to an increase in primary production. The United States fell to seventh place behind Germany in world smelter production and remained fourth in refinery output behind China, Chile, and Japan, in descending order of output.

According to data compiled by the International Copper Study Group (ICSG) (International Copper Study Group, 2009a, p. 19–20), global consumption of refined copper, which had risen by about 1.1 Mt (7%) in 2007, fell by about 160,000 t (1%) to 18.0 Mt. A 240,000-t (5%) growth in China's apparent consumption was more than offset by declines in Europe, North America, and the other major consuming countries in Asia. China accounted for an ever-increasing market share of 29% of global refined copper consumption, up from 27% in 2007 and 20% in 2004. However, changes in unreported inventories held by industry and China's State Reserve Bureau may have distorted year-on-year measurement of apparent consumption growth.

Global production of refined copper slightly exceeded consumption, and reported yearend global inventories of refined copper, based on revised data for 2007, rose by about 130,000 t. This compares with a decline in global inventories of about 100,000 t in 2007. Although global stocks rose from a minimum of 870,000 t in 2005, to 1.16 Mt at yearend 2008, they remained well below their peak level in 2002 of more than 2 Mt. At their peak in 2002, yearend inventories represented about 7 weeks of global supply compared with only about 3 weeks at yearend 2008 (International Copper Study Group, 2009a, p. 9).

Although yearend inventories rose compared with those at the end of 2007, inventories for the first 9 months of 2008 remained below the yearend 2007 level. Copper prices trended upward during the first part of 2008 to reach record-high monthly levels in April when the COMEX division of the New York Mercantile Exchange spot price averaged $3.94 per pound of copper. With the onset of the economic crisis during the fourth quarter of 2008, prices tumbled and the COMEX price averaged only $1.39 per pound in December.

The principal mining States for copper, which in descending order of production were Arizona, Utah, New Mexico, Nevada, and Montana, accounted for 99% of domestic production; copper was also recovered at mines in Idaho and Missouri. Although copper was recovered at 28 mines that operated in the United States, 18 mines accounted for more than 99% of production (table 2). The remaining mines were either small leach operations or byproduct producers of copper in concentrates.

In 2008, copper recovered from refined or remelted scrap (about 82% from new scrap and 18% from old scrap) composed 30% of the total U.S. copper supply. The conversion of old scrap to alloys and refined copper declined slightly to 155,000 t of recoverable copper. Copper was consumed as refined copper and as direct melt scrap at about 25 brass mills, 13 wire-rod mills, and 500 chemical plants, foundries, and miscellaneous operations.

Legislation and Government Programs

The U.S. Geological Survey (USGS), in cooperation with the geological surveys of Argentina, Chile, Colombia, and Peru, published a quantitative mineral resource assessment of copper, gold, molybdenum, and silver in undiscovered porphyry copper deposits in the Andes Mountains of South America. The study estimated that about 590 Mt of copper was contained (mined or still in the ground) in 69 known porphyry copper deposits in the Andes Mountains and another 750 Mt was estimated to occur in about 145 undiscovered porphyry copper deposits. By comparison, U.S. identified copper resources were about 350 Mt, and undiscovered deposits were estimated to contain approximately 290 Mt of copper (Cunningham and others, 2008).

On April 21, in reconsideration of a negative determination issued in March, the Employee and Training Administration, U.S. Department of Labor, issued an affirmative determination regarding the petition of former workers at Bolton Metal Products Co., Bellefonte, PA, who had sought to be certified to receive alternative trade adjustment assistance for older workers. The initial determination was based on the finding that imports

of brass rod, wire, and low-melting alloys did not contribute importantly to worker separation at the now closed Bellefonte facilities and that a shift of production to a foreign source had not happened. In reconsideration of additional information supplied about customers and production, the U.S. Department of Labor found that imports of certain products by one of Bolton's customers resulted in a loss of business that contributed importantly to worker separation, and that a significant number of employees in the firm were age 50 or older and possessed skills that were not easily transferable (U.S. Department of Labor, 2008).

In March, the U.S. Department of Agriculture, Forest Service, Coronado National Forest, published a notice of intent to prepare an environmental impact statement for the proposed Rosement Copper Project, in Pima County, AZ. In July, the Forest Service solicited the interest and eligibility of potential Federal, and non-Federal agencies in participating as cooperating agencies in the environmental study of the "Mine Plan of Operation." The mine and associated facilities would encompass about 1,800 hectares (4,500 acres) in public and private ownerships. The proposed mine would produce an average of 100,000 metric tons per year (t/yr) of copper during its more than 20-year life (U.S. Department of Agriculture, 2008).

Production

Domestic mine production rose by 12%, or about 140,000 t, owing to the startup of two major mining projects and expanded output of existing operations. Mine capacity rose by about 100,000 t to 1.67 Mt and the capacity utilization, although still low by historical standards, rose to 78% from 74% in 2007. Despite the increase in mine production, smelter production fell by 7% owing to smelter maintenance shutdowns and increased exports of copper concentrates. Downstream electrolytic refined production declined by 7% owing to a shortage of anode resulting from lower domestic production and lower net imports. Electrowon copper from leach solutions accounted for 39% and 40%, respectively, of mine and refinery production. Four primary electrolytic refineries and 15 solvent extraction-electrowinning (SX-EW) facilities operated during 2008.

Asarco LLC continued to operate under Chapter 11 reorganization protection throughout 2008. In March, Asarco sought and was granted its tenth extension since 2005 to its exclusivity period, the period during which Asarco alone could file a reorganization plan. Over the objections of its parent company, Grupo México S.A.B. de C.V., Asarco also received court approval to start a bidding process for a potential acquirer of the company (Asarco LLC, 2008c; Barry, 2008). On May 31, Asarco announced that Sterlite Industries (India) Ltd. [a subsidiary of Vedanta Resources plc (London, United Kingdom)], signed a definitive agreement for the sale of substantially all of Asarco's operating assets to Sterlite, including its three copper mines and smelter in Arizona, and copper refinery, rod, cake, and precious metal plants in Texas for $2.6 billion. In signing the agreement, Asarco was rejecting a repurchase offer by Grupo México that included $2.7 billion in cash, payment of all environmental liabilities, and a $440 million guarantee to Asarco's creditors (Asarco LLC, 2008e). In early October, following filings for court approval of its reorganization plan under the proposed purchase by Sterlite, creditors of Asarco received ballots to approve the planned reorganization, and the U.S. Bankruptcy Court set confirmation hearings for November 17. According to Asarco, the plan was the result of 3 years of negotiation, mediation, and litigation with its principal creditors. On October 22, however, the hearings and balloting were suspended following termination of the Sterlite purchase contract by Asarco in response to a disclosure by Sterlite that it could not and would not close on the sale unless Asarco agreed to a price reduction. Sterlite cited world economic events that were affecting credit markets, as well as the decline in copper prices, as the reasons they were unwilling to close the transaction at the contract price (Asarco LLC, 2008b).

In October, in a separate issue, a federal judge ordered Grupo México and Asarco into mediation to try and reach a monetary settlement over the 2003 transfer of Asarco's controlling interest in Southern Peru Copper Corp. by Americas Mining Corp. (AMC) (a subsidiary of Grupo México) to itself. In August, a U.S. District Court judge had found the transfer to be fraudulent and had ruled that AMC had closed the transaction with actual intent to hinder or delay some of Asarco's creditors. Asarco was seeking a total relief that exceeded $8 billion, including recovery of assets and $1.85 billion in dividends that would have been paid to Asarco since 2003. The mediation was abandoned after 3 weeks of negotiations failed to achieve an agreement (Asarco LLC, 2008a; Riley, 2008).

In May, against a growing backdrop of public opposition, Asarco indicated it would "work diligently" to satisfy the conditions of its operating permit for its El Paso, TX, smelter in order to give itself the opportunity to reopen it. The smelter last operated in 1999 and has long been removed from USGS tabulations of operable smelter capacity. In February 2009, Asarco informed the Texas Commission on Environmental Quality that it had abandoned its plan to reopen the smelter, and it was working with the State of Texas to fund a custodial trust for demolition of the plant and remediation of the site (Asarco LLC, 2008d, 2009).

Augusta Resource Corp. (Vancouver, British Columbia, Canada) was proceeding with development of the Rosemont Mine, about 50 kilometers southeast of Tucson, AZ. In August 2007, the company completed a bankable feasibility study for an open pit copper operation that was subsequently updated in January 2009. An updated mineral reserve estimate completed in November 2008 indicated proven and probable reserves of 546 Mt of sulfide ore grading 0.45% copper and 0.015% molybdenum and 70 Mt of oxide ore grading 0.17% copper. Augusta Resources anticipated building a 68,000 metric-ton-per-day (t/d) mill for processing sulfide ore and a heap-leach SX-EW facility with a combined annual production of 100,000 t/yr for the first 8 years. Augusta anticipated startup of the SX-EW plant by the end of 2011 and startup of the concentrator during the first quarter of 2012 (Augusta Resource Corp., 2009).

Copper production from BHP Billiton's (Melbourne, Australia, and London, United Kingdom) residual Arizona leach operations at Miami and Pinto Valley continued to decline, the

combined production falling to 6,700 t in 2008 from 7,300 t in 2007. Production of copper concentrate at Pinto Valley, which was resumed in October 2007 to "take advantage of market conditions at the time," yielded about 50,000 t of payable copper in concentrates in 2008. At yearend, however, BHP Billiton announced that this "high-cost and short-life operation" would be placed back on care and maintenance during February 2009 (BHP Billiton, 2009, p. 3, 8).

Resolution Copper Co. [55% Rio Tinto plc (London) and 45% BHP Billiton] continued with development work and resource definition of the Resolution copper sulfide deposit located more than 2,100 meters below the surface and beneath BHP Billiton's shuttered Magma Mine, with the goal of commencing production by 2020. In May, Rio Tinto announced that Resolution had completed sufficient drilling on the deposit to report an inferred resource of 1.34 billion metric tons (Gt) of ore grading 1.51% copper and 0.04% molybdenum. In order to proceed with development, Resolution was seeking a land exchange required to access to about 3,100 hectares of Federally controlled property. Near-term development plans called for completing a prefeasibility study, dewatering the former Magma Mine, and sinking an exploratory shaft. As of February 2009, $290 million had been invested in project development (Resolution Copper Co., 2009).

Output at Constellation Copper Corp.'s (Denver, CO) Lisbon Valley Mine in Utah, which began production in November 2006, remained well below planned capacity throughout 2007, and during the first quarter of 2008, the company ceased mining and converted the mine to a residual leach-only operation. The company planned to continue to leach 18,000 t of recoverable copper inventory in the leach pile during a 1- to 3-year period. In December 2008, after failing to meet interest payments due in March and September, Constellation filed for assignment in bankruptcy under Canada's Bankruptcy and Insolvency Act (Constellation Copper Corp., 2007; Hill, 2008).

In December, Mercator Minerals Ltd. (Kingman, AZ, and Vancouver) reported that it had begun producing copper and molybdenum concentrates, had completed startup of its Phase I, 23,000-t/d copper-molybdenum mill, and had completed 70% of the Phase 2 expansion that would double capacity. In January 2009, Mercator began shipping copper concentrates. Production of electrowon copper fell to 4,800 t from 5,000 t in 2007. In May 2008, the company stopped placing new ore on the leach pads though recovery continued from residual material (Mercator Minerals Ltd., 2009, p. 3, 9).

Mines Management, Inc. (Spokane, WA) was proceeding with development activities at its Montanore silver-copper project in northwestern Montana, having spent $8.9 million on development expenses. In 2008, the company received approval from the Montana State Department of Commerce for its proposed hard rock mining impact plan, and in February 2009, completed and released its draft environmental impact statement for public comment. The Montanore Project hosts one of the world's largest known silver-copper deposits, with estimated resources containing more than 7 million kilograms of silver and nearly 900,000 t of copper. The project has already undergone extensive engineering and was designed with an initial production capacity of approximately 12,500 t/d of ore and an estimated annual production of about 250,000 kilograms of silver and 27,000 t of copper (Mines Management, Inc., 2009).

In January, Nord Resources Corp. (Dragoon, AZ) reported the first production of cathode since August 2003 from the leaching of existing stockpiles at its Johnson Camp Mine in southern Arizona. Production totaled only 1,300 t in 2008, but was expected to reach 11,300 t/yr following restart of mining, which began in February 2009. During 2008, Nord rehabilitated solution ponds, refurbished and expanded the SX-EW facilities, and installed primary and secondary crushers, an agglomerator, and conveying equipment (Nord Resources Corp., 2009).

In March, Copper Mesa Mining Corp. (formerly Ascendant Copper Corp.), a Canadian mineral exploration and development company with headquarters in Lakewood, CO, acquired the assets of St. Geneviève Resources Ltd. (Montreal, Quebec, Canada), including two past producing mines in Arizona—Emerald Isle and Zonia. In August, it initiated several drill programs at Zonia to confirm historical tonnage and grades and to generate data for reserve modeling. The company anticipated permitting and constructing an open pit mine and an SX-EW processing complex that could produce an average of 9,000 t/yr of copper cathode. In November, however, all work on the project was suspended, reportedly owing to the sharp decline in copper prices and additional challenges in raising capital necessary to proceed (Copper Mesa Mining Corp., 2009, p. 1–3).

In July, Freeport-McMoRan Copper & Gold Inc. (FCX) announced that it was evaluating the potential for expansion at its operating properties, and had initiated plans for incremental expansions at its Bagdad, Morenci, and Sierrita Mines in Arizona, and its Cerro Verde Mine in Peru. Scoping level estimates indicated that these projects could provide an additional 90,000 t/yr of copper and 3,000 t/yr of molybdenum by 2011 at a capital investment of $400 million. In addition, FCX announced that it had restarted limited mining of leach ore at its Miami Mine and expected to ramp up to a production rate of 45,000 t/yr of cathode by 2010 through the expenditure of about $100 million, primarily for mining equipment. In 2007, Miami had produced about 9,000 t of copper (Freeport-McMoRan Copper & Gold Inc., 2008b, p. 9). In December, however, in response to the sharp decline in copper and molybdenum prices, FCX reversed course and announced revised production plans that included a 25% reduction in the mining and milling rates at its Morenci Mine, a 50% reduction in the mining and stacking rates at its newly commissioned Safford Mine, a 50% reduction at its mining rate at its Tyrone Mine in New Mexico, and suspension of mining and milling activities at the Chino Mine in New Mexico. Based on these cutbacks, FCX anticipated that sales from its U.S. mines in 2009 would be about 90,000 t lower than its previous estimate and about 45,000 t lower than that in 2008. While these changes would reduce operating costs by about $0.39 per pound of copper, net cash costs were expected to rise by about 2 cents per pound to $1.33 per pound owing to a 42-cent-per-pound anticipated drop in byproduct credits (Freeport-McMoRan Copper & Gold Inc., 2008a).

Production of recoverable copper at the Morenci Mine complex in Arizona of 334,000 t was down by about 33,000 t from that in 2007. During the third quarter of 2007, Morenci began production of copper and molybdenum concentrates from its recommissioned 49,000-t/d concentrator and correspondingly commissioned a new concentrate leach, direct electrowinning facility using proprietary medium-temperature pressure leaching. Production distribution between concentrate and run-of-mine leach was not reported. As part of its revised mine plan for 2009, the concentrate-leach project, including the mill, were to be closed during the first quarter of 2009 (Freeport-McMoRan Copper & Gold Inc., 2009, p. 7–8, 22).

Production at FCX's Bagdad Mine in Arizona rose to 103,000 t of recoverable copper (concentrate and electrowon) from 91,600 t in 2007 and was at its highest level since 2001. The Bagdad operation consists of a 75,000-t/yr concentrator and an 11,000-t/yr SX-EW plant that operated at near capacity throughout the year. During 2008, the high-temperature concentrate leach plant, which closed in 2007, was converted to a molybdenum leach facility and was expected to be commissioned by the end of the first quarter 2009 (Freeport-McMoRan Copper & Gold Inc., 2009, p. 9, 21).

At the Sierrita copper-molybdenum mine in Arizona, copper production rose to 83,000 t of recoverable copper from 68,000 t in 2007 and was also at its highest level since 2001. An 18,000-t/yr copper sulfate plant started in early 2006 continued to operate below capacity. Despite initial plans to resume mining, the Miami open pit remained on care-and-maintenance status, and electrowon production from residual leach operations declined nominally to 8,600 t. At yearend, the mine had reported leach reserves of 91 Mt grading 0.43% copper. At an expected recovery rate of 63%, the ore could generate more than 240,000 t of copper (Freeport-McMoRan Copper & Gold Inc., 2009, p. 8, 21, 32).

The Safford Mine, which started up during the first quarter of 2008, produced almost 49,000 t of electrowon copper. Production reportedly reached full capacity of 109,000 t/yr of cathode during the second half of the year. Mined ore passed through a three-stage crushing and agglomeration process before being transferred to leach pads via a mobile conveying system (Freeport-McMoRan Copper & Gold Inc., 2009, p. 10).

In New Mexico, combined production at FCX's two operating mines fell by about 4,000 t to 105,000 t, as a rise in production at the Tyrone Mine to 34,000 t from 23,000 t in 2007 was partially offset by a decline at the Chino Mine to 70,000 t from 86,000 t in 2007. Tyrone mined ore from a central pit that was processed through leaching and solvent extraction.

Formation Metals Inc. (Vancouver) was proceeding with its development of the underground Idaho Cobalt Project that was projected to produce about 2,000 t/yr of copper as a byproduct of cobalt production. The company received a bankable feasibility study in July 2007, a final environmental impact statement in June 2008, and a series of permits in January and February 2009 that would allow construction to go forward. Proven and probable reserves were reported to be 2.64 Mt grading 0.56% cobalt and 0.6% copper (Formation Metals Inc., 2009).

In April, the Pebble Limited Partnership, an equal partnership between Anglo American plc (London) and Northern Dynasty Minerals Ltd. (Vancouver), announced that it had approved a $140 million budget for advancement of the project in southwest Alaska during 2008, including a $61.6 million drilling program in the Pebble East deposit and a $30.2 million engineering program to support completion of a prefeasibility study. In December, an updated mineral resource assessment was released that integrated estimates for the near-surface Pebble West deposit and the deeper Pebble East deposit. At a 0.3% copper-equivalent cutoff grade, the deposits contained 5.1 Gt of measured and indicated mineral resources grading 0.77% copper equivalent and containing 106 Mt of copper, 860,000 t of molybdenum, and 1,800 t of gold (Northern Dynasty Minerals Ltd., 2008a, b).

PolyMet Mining Corp. (Vancouver) was proceeding with the development of the NorthMet copper-nickel-precious metals project (mine and processing plant) in northeastern Minnesota. In May, the company announced revised plans and cost estimates that would shorten the preproduction construction period to less than 12 months and improve cash flow by initially selling concentrate. The estimated $290 million construction cost for the metallurgical plant to process the concentrate would be funded through the sale of concentrate. In October, Polymet announced completion of a "strategic partnership" with Glencore International AG under which Glencore would purchase Polymet's output of concentrates, metals, or intermediate products at prevailing market terms for at least the first 5 years of production prior to construction of its metallurgical facilities. In December, the Minnesota Department of Natural Resources and the U.S. Army Corps of Engineers provided a preliminary version of the draft environmental impact statement to PolyMet and various government organizations (Polymet Mining Corp., 2009, p. 9–12).

Quadra Mining Ltd. (Vancouver) reported that its Robinson Mine in Nevada produced 72,400 t of copper in concentrate compared with 59,800 t produced in 2007. While mill throughput declined to 3.36 Mt from 3.75 Mt in 2007, copper ore grades rose to 0.69% copper from 0.59% in 2007, and the copper recovery rate rose to 68.1% from 66.1% in 2007. Owing to the higher grades and cost-containment efforts, production costs fell to $1.15 per pound of copper from $1.49 per pound in 2007 and from $1.74 per pound of copper in 2006. Despite higher mill head grades in 2008, gold recovery fell slightly to 837 kg from 841 kg in 2007.

Quadra, which began construction of the Carlota Mine and SX-EW facilities in Nevada in 2007, had substantially completed construction by the end of September 2008 and began applying leaching solutions to the run-of-mine-ore leach pad in early October, having spent $220 million by yearend on total construction, equipment purchases, and other development costs. By the end of December, 8 Mt of ore containing an estimated 14,500 t of recoverable copper had been mined and placed on leach pads and about 360 t of cathode had been produced. Quadra expected cash costs in 2009 to be about $1.50 per pound of copper (Quadra Mining Ltd., 2009).

At Rio Tinto's Bingham Canyon Mine in Utah, production of copper in concentrate rose by 12% to 238,000 t from 212,000 t. The concentrator achieved a record throughput of 49.1 Mt, and mill head ore grades rose to an average of 0.58% copper from 0.53% in 2007, yet production remained below the 265,600 t produced in 2006 when mill head grades averaged 0.63% copper. Byproduct gold and molybdenum ore grades and recovery declined in 2008. Copper refinery production, however, fell to 201,000 t from 266,000 t in 2007, owing to a scheduled smelter shutdown during the third quarter of 2008 (Rio Tinto plc, 2009a, p. 4, 22, 27 p.).

In December, Rio Tinto announced plans to invest $300 million to develop the Eagle nickel-copper mine near Marquette, MI. Slated to start production by yearend 2009, the mine was expected to yield 16,000 t/yr of nickel and 15,000 t/yr of copper during at least a 7-year period from a resource grading 3.6% nickel and 2.9% copper. During 2008, design engineering continued, and the Humboldt mill was purchased for processing ore. Development of the mine, however, was deferred as a cost-saving measure until "warranted by better market conditions" (Rio Tinto plc, 2009b, p. 56).

Consumption

U.S. reported consumption of refined copper declined by about 6% to the lowest level in more than 20 years. Consumption for the first three quarters of the year was down by only about 3% compared with that in the same period of 2007 but fell off sharply during the fourth quarter of the year following the onset of the economic crisis. Consumption by wire-rod producers declined by about 120,000 t (7%) in response to depressed housing demand, and would have fallen further had it not been for a 54,000-t decline in net imports of wire rod. According to data compiled by the American Bureau of Metal Statistics, Inc. (ABMS) (2009b), apparent consumption of wire rod declined by about 180,000 t, or 11%, for the third consecutive year. In January, in response to the weak markets, Superior Essex Inc. announced the restructuring of its magnet wire business, including the phased closure of its Vincennes, IN, rod mill, and at yearend, Freeport-McMoRan closed its Chicago wire-rod mill. Consumption of refined copper at brass mills rose nominally, despite a 5% decline in shipments as refined copper in part substituted for scrap. Copper recovered from scrap at brass mills fell by about 8% (Superior Essex Inc., 2008).

According to ABMS, domestic shipments of copper and copper alloy mill products declined by 12% from shipments in 2007 and were 36% below the 2000 level. While all market segments declined, the copper sheet and strip and the copper tube markets were hardest hit, falling by 14% and 15%, respectively. The copper tube market, which accounted for 31% of domestic brass mill shipments in 2008, continued to decline sharply, falling from about 565,000 t in 2005 during the housing boom to only 364,000 t in 2008. In addition to weakness in the housing market, the copper tube market was affected by continued substitution by plastic (American Bureau of Metal Statistics, Inc., 2009a).

According to preliminary data from the Copper Development Association Inc. (2009, p. 18–21), the total supply of copper and copper alloy products to the U.S. market by fabricators (brass mills, wire mills, foundries, and powder producers), which included net imports, declined by about 11% in 2008 from the revised shipments for 2007 and was down by 36% from its peak in 2000. Wire-mill products accounted for about 50% of total shipments to the domestic market; brass mill products, 47%; and foundry and powder products, 3%. Consumption in the building construction sector, which remained the largest end-use market, declined by 10%, and accounted for about 50% of shipments. The electric and electronic products (21% market share), industrial machinery and equipment (8% market share), transportation equipment (11% market share), and consumer and general products (10% market share) sectors declined by 9%, 13%, 17%, and 14%, respectively.

Prices and Stocks

Copper prices, which had finished 2007 on a downward trend and had averaged about $3 per pound in December, trended upward for the first 4 months of 2008, with the COMEX price reaching a record-high monthly average of $3.94 per pound of copper in April. Copper prices remained well above $3 per pound through August, with the COMEX and London Metals Exchange Ltd. (LME) price reaching record-high daily levels of $4.08 per pound of copper on July 2 and 3, respectively. Inventories on the global commodity exchanges [COMEX, LME, and Shanghai Futures Exchange (SHFE)], which began the year at the relatively low level of 238,000 t, trended downward to a monthend low of 165,000 t in June. Commodity exchange inventories rose slightly in July and August, a traditional period of lower copper demand, and the upward movement of copper prices stalled in August, with the COMEX price falling back to $3.46 per pound from $3.82 per pound in July. Although copper exchange inventories rose to only 224,000 t by the end of September, still below yearend 2007 levels, the economic crisis was readily apparent, and by the end of September, prices had fallen to below $3.00 per pound, for the first time since March 2007. Copper prices began a sharp downward spiral in October that did not come to a halt until December 24, when the COMEX price fell below $1.25 per pound of copper, the lowest level since September 2004. Prices rallied somewhat to finish 2008 at about $1.40 per pound. The LME price trend closely tracked that of the COMEX price, averaging $3.15 per pound and $3.13 per pound, respectively, for the year. Commodity exchange inventories finished 2008 at about 390,000 t, more than double yearend 2007 inventories. Commodity exchange inventories held in the United States (COMEX and LME) rose to 137,000 t from 74,000 t at yearend 2007.

Copper scrap prices generally followed the trend in refined copper prices. With higher refined prices, however, the discount of most grades of copper scrap to refined copper increased. According to American Metal Market price data, the discount for refiners No. 2 scrap from the COMEX price averaged 34.3 cents per pound for the year, below the record discount of 48 cents per pound in 2006, and ranged between 26.5 cents per pound in January and 44.4 cents per pound in July. The average discount during the fourth quarter (32.1 cents per pound), when refined prices were falling sharply, remained relatively high owing to weak scrap demand. Though following the same trend,

the discount for No. 1 brass mill scrap remained much smaller, averaging about 5.4 cents per pound in December when refined prices were at their lowest, to 18.4 cents per pound during peak copper prices in July.

Foreign Trade

Net refined copper imports in 2008 declined for the second consecutive year, falling by about 12% to 687,000 t, and were at their lowest level since 1997. Chile was the leading source of unwrought copper products (40%) from 2005 through 2008, followed by Canada (34%) and Peru (13%). Refined copper accounted for 81% of unwrought copper imports during the same period. Exports of copper contained in concentrates totaled 301,000 t in 2008, up from 134,000 t in 2007, owing to increased mine production from nonintegrated producers and to smelter shutdowns that resulted in surplus concentrates at integrated producers.

According to U.S. Census Bureau data compiled by the Copper and Brass Fabricators Council Inc. (2009, p. 1–9), in 2008, U.S. imports of copper and copper-alloy semifabricated products (excluding wire-rod mill products) were 277,000 t (up about 3% from those in 2007), exports were 135,000 t (down by 4%), and the resulting net imports rose by 10% to 142,000 t. Canada and Mexico collectively accounted for 68% of semifabricated copper exports and 26% of imports.

ABMS adjusted trade data indicate that imports of copper wire rod fell to 156,000 t from 217,000 t in 2007 and from 355,000 t in 2006, exports declined to 121,000 t from 145,000 t in 2007, and the resulting net imports declined to 35,000 t from 72,000 t in 2007. Canada remained the leading source of imports (72%), followed by Russia (18%) and Mexico (9%) (American Bureau of Metal Statistics, Inc., 2009b).

Exports of copper and copper alloy scrap were essentially unchanged at 908,000 t. China (including Hong Kong) was the destination for 75% of domestic scrap exports and, based on import data, accounted for 70% of reported global scrap trade of 8.2 Mt (International Copper Study Group, 2009a, p. 39–42).

World Review

World production of refined copper rose slightly in 2008 to 18.2 Mt. World copper use, according to revised ICSG data, declined nominally in 2008 to about 18.0 Mt. Consequently, the global market balance indicated a small production surplus of about 225,000 t, about equal to the revised deficit for 2007. Stocks held on the more visible commodity exchanges rose by about 150,000 t to 390,000 t but still remained low by historical standards. ICSG estimates of total reported inventories (exchanges, governments, and industry) rose by about 130,000 t to 1.16 Mt. The yearend surplus and inventory rise developed during the fourth quarter of 2008, subsequent to the beginning of the global economic downturn. The estimated ICSG balance after the first three quarters of the year indicated a production deficit of almost 100,000 t and a year-to-date drawdown in global inventories of about 60,000 t. Note that inventory levels within China were not reported and were discounted in these analyses. Consumption data for China were based on apparent consumption of refined copper (production, net trade, and changes in SHFE stocks) and did not account for changes in industry and government stock levels. The low level of exchange inventories contributed to price volatility and record-high LME prices through the first three quarters of 2008 when the LME price averaged almost $3.60 per pound of copper (International Copper Study Group, 2009a, p. 9–20).

World mine production of copper, which had risen by about 425,000 t (3%) in 2007, declined by about 60,000 t in 2008. Copper mine production had remained relatively flat from 2005 to 2008, growing by a cumulative 2.6%. This low level of growth took place despite estimated capacity growth of 1.9 Mt, according to data compiled by the ICSG. Production of copper in concentrates, which declined in 2008 by 190,000 t to 12.4 Mt, was insufficient to meet smelter demand, and concentrate supplies remained tight through most of the year (International Copper Study Group, 2010, p. 13). According to CRU International Ltd. (2009, p. 102–106), demand for copper concentrates exceeded supply by about 190,000 t. The combined spot treatment (smelting) and refining charge fell from the already low 9 cents per pound of copper during the first quarter of the year to about 3 cents per pound during the third quarter. With onset of the economic crisis and announced smelter cutbacks, the charge rose to an average of about 15 cents per pound in the fourth quarter. Spot treatment and refining charges have trended lower since 2005, when they averaged about 40 cents per pound of copper.

Global consumption of refined copper declined by about 160,000 t, falling to about 18 Mt from the record-high level in 2007. Based on revised data, consumption in 2007 had risen by more than 1 Mt (7%). In 2008, for the second consecutive year, Asia was the only major consuming region to experience demand growth, led by China, where apparent consumption rose by a relatively modest 5% (240,000 t) to reach 5.2 Mt and account for about 29% of total estimated global consumption. In 2007, apparent consumption had grown by about 38% (1.35 Mt). As noted, apparent consumption calculations for China do not include changes in unreported stock levels that were thought to have accumulated during 2007, only to be drawn down in 2008. Consequently, this distorts the year-on-year apparent industrial demand calculations for refined copper (International Copper Study Group, 2010, p. 19–20).

Copper consumption in India rose by about 9%, while consumption in the more industrialized countries of Japan, the Republic of Korea, and Taiwan declined by 5%, 3%, and 5%, respectively. In North America, consumption was down in Canada, Mexico, and the United States for a combined decline of about 5%. A reduction in exports of wire rod to the United States of 10% and 5%, respectively, accounted for much of the weakness in Canadian and Mexican consumption. In the European Union-15, apparent consumption fell by about 5% and was down by 11% from that in 2006 (International Copper Study Group, 2009a, p. 19–20).

Consolidation of the global copper industry that was either set in motion or completed during 2007 led to a reordering of the positions of major global copper producers in 2008. In March, Norddeutsce Affinerie AG (Hamburg, Germany) acquired Cumerio SA (Olen, Belgium), with assets in Belgium, Bulgaria, Germany, Italy, and Switzerland. The combined company had

a capacity to process 1.9 Mt of concentrates and up to 500,000 t of secondary raw materials. In 2008, Norddeutsce produced 990,000 t of refined copper to become the third ranked global producer, having ranked fifth in 2007 (Norddeutsce Affinerie AG, 2009, p. 8–9). Corporación Nacional del Cobré de Chile (Codelco) retained its position as the leading global copper refiner, FCX remained the 2d ranked producer, Xstrata plc (Zug, Switzerland) fell to 4th position, and Jiangxi Copper Corp. (Guixi City, Jiangxi Province, China), through expansion of its Giuxi smelting and refining complex, rose to 5th position from 10th place in 2007. The top 5 producers accounted for 30% of global refined copper production, and the top 10 producers accounted for 46% (CRU International Ltd., 2009, p. 280).

Codelco retained its position as the leading global mine producer, followed by FCX, BHP Billiton, Xstrata, and Rio Tinto. In 2008, the top 5 copper mining companies accounted for about 40% of global production, and the top 10 producers accounted for 55% (CRU International Ltd., 2009, p. 280).

Mine Production.—In 2008, world mine production capacity continued its strong upward growth and, according to ICSG estimates, increased by about 600,000 t (4%). Significant capacity growth took place in Chile (130,000 t), Congo (Kinshasa) (125,000 t), the United States (100,000 t), Peru (75,000 t), Zambia (65,000 t), and China (50,000 t). The capacity utilization rate fell for the fourth consecutive year to 82% in 2008 and was at its lowest level in more than 10 years (International Copper Study Group, 2010, p. 17–19).

Mine production in 2008 continued to suffer from a number of problems, including lower head grades, equipment failures, infrastructure strain, a global shortage of major equipment (including haulage trucks and tires), increased raw material and energy costs, and labor disruptions at mines and refineries in part brought on by higher copper prices (CRU International Ltd., 2008, p. 5). As well as lower than anticipated production during the first three quarters of 2008, production declined further during the fourth quarter with the sharp drop in copper prices.

Average production costs for most producers continued the steep rise begun in 2006 with the onset of generally higher metal commodity prices. As an example, FCX reported that net cash costs for its North American operations rose to $1.33 per pound of copper in 2008, compared with $0.87 per pound of copper in 2007 and $0.61 per pound in 2006, owing to increased labor, energy, and sulfuric acid costs; higher mining and milling rates; lower byproduct molybdenum credits; and development costs associated with the ramp up to full production of its Safford Mine. Similarly, FCX's net cash cost for its South American operations rose to $1.14 per pound of copper from $1.02 per pound in 2007 and $0.91 per pound in 2006 (Freeport-McMoRan Copper & Gold Inc., 2009, p. 82–87). Codelco reported that its net cathode costs, including treatment and refining charges and byproduct credits, rose to 119.6 cents per pound of copper from 86.7 cents per pound in 2007 and 68.4 cents in 2006, in part owing to lower ore grades and higher mill throughputs, and to higher supply costs owing to rising consumer prices and a weaker U.S. dollar (Corporación Nacional del Cobré de Chile, 2009, p. 66).

Australia.—Production of copper in cathode at the Olympic Dam Mine rose to 196,000 t from 178,000 t in 2007, still below its capacity of about 240,000 t/yr, because of production problems that carried over from 2007 into the first quarter of 2008 (BHP Billiton, 2009, p. 2). Xstrata's North Queensland division, comprising the Ernst Henry and Mount Isa operations, produced 263,000 t of copper in concentrate, down slightly from that of the previous year owing to lower head grades at Mount Isa that reduced output by 12%, which was partially offset by higher throughput and head grades at Ernst Henry, where production rose by 16% to 111,000 t of copper in concentrate (Xstrata plc, 2009, p. 58).

Canada.—Production rose slightly despite a temporary capacity reduction at Teck Resources Ltd.'s (Vancouver) Highland Valley Mine, where production fell to 119,000 t in 2008 from 140,000 t in 2007. Highland Valley was engaged in a two-phase mine-life extension project through pushbacks of the east and west walls of the Valley Pit that would enable mining to continue through 2019. During the stripping operations, a greater proportion of mill feed was from the Lomax pit, which had softer, lower grade ore with reduced recovery rates. The reduced output from Highland Valley was partially offset by increased output from Teck's Duck Pond copper-zinc operation, which began production in April 2007 and produced 12,800 t of copper in 2008 (Teck Resources Ltd., 2009, p. 13–14). Production at Xstrata's Kidd Creek Mine fell by 8% to 42,700 t owing to processing of ore with lower copper ore grades in exchange for higher zinc grades (Xstrata plc, 2009, p. 58).

Chile.—Despite increased capacity, mine production fell by about 230,000 t, primarily owing to lower ore grades at the Codelco Norte Division of Codelco, where production fell to 755,000 t from 896,000 t in 2007, and the Escondida Mine (BHP Billiton), the world's leading copper-producing mine, where production fell to 965,000 t in 2008 from 1.2 Mt in 2007. In addition to lower head grades, electrical motor reliability issues with a semiautogenous grinding (SAG) mill significantly reduced second-half production at Escondida. Besides several small incremental expansions, the only significant capacity increases resulted from startup of Codelco's Gabriela Mistral (Gaby) project, with an initial capacity of 100,000 t/yr of electrowon copper; a 50,000-t/yr capacity rampup of the Spence Mine (BHP Billiton) leach SX-EW operation, which began production in 2006; and 60,000 t/yr of increased copper in concentrate capacity at Los Pelambres Mine [Antofagasta plc (London) (60%)] (BHP Billiton, 2009, p. 2–3; Corporación Nacional del Cobré de Chile, 2009, p. 3; International Copper Study Group, 2009b, p. 41–44).

Despite adverse weather conditions and unplanned maintenance shutdowns, production at the Collahuasi Mine rose to 464,000 t from 450,000 t in 2007 when the principal SAG mill had been out of commission for 46 days. Approval was granted to spend $183 million to enlarge the primary crusher as part of its Phase I expansion to increase capacity to 600,000 t/yr by the second half of 2010 (Xstrata plc, 2009, p. 59–60).

Congo (Kinshasa).—Mine production rose by about 85,000 t, principally owing to First Quantum Minerals Ltd.'s (Vancouver) Frontier Mine, which began production in 2007 after a capital

investment of $226 million; the mine produced 80,200 t of copper in concentrate during 2008. Measured and indicated resources reportedly contained 182.1 Mt of primary sulfide ore grading 1.16% copper at a cutoff grade of 0.35% copper (First Quantum Minerals Ltd., 2009, p. 8). Anvil Mining Ltd. reported producing 41,400 t of copper, 13% less than that in 2007, from its three operations in Congo (Kinshasa). After investing $180 million in a Phase 2 expansion of 60,000 t/yr of SX-EW capacity at its flagship Kinsevere Mine, the project was put on standby late in 2008 until further financing could be secured. At the time of work stoppage, construction reportedly was 40% completed (Anvil Mining Ltd., 2009, p. 3).

Mexico.—Production in Mexico fell by about 90,000 t in 2008, primarily owing to a full year of work stoppage from a strike at Grupo México's Cananea and San Martin Mines, as well as by lower ore grades at the La Caridad Mine. Combined concentrate and electrowon production fell to 14,000 t from 89,000 t in 2007 at Cananea and to 108,000 t from 113,000 t at La Caridad (Grupo México, S.A. de C.V., 2009, p. 17–18).

Peru.—Production at the Cerro Verde oxide and sulfide operation (Freeport-McMoRan, 53.6%) rose to 588,000 t from 503,000 t in 2007, owing to capacity rampup at the new sulfide operation (Cerro Verde II) that was commissioned in December 2006 (Freeport-McMoRan Copper & Gold Inc., 2009, p. 21).

Smelter and Refinery Production.—According to the ICSG, world smelter production capacity rose by about 680,000 t/yr to 17.6 million metric tons per year (Mt/yr), and refinery capacity rose by 900,000 t/yr to 22.5 Mt/yr. About 350,000 t/yr of the refinery capacity increase came from electowinning associated mine leach operations, and most of the electrolytic expansions were associated with expansions of smelting operations that happened during a 2-year period. China (330,000 t/yr), Chile, (230,000 t/yr), and Japan (50,000 t/yr) accounted for most of the increase in smelter capacity. Electrolytic refinery capacity increases in China (315,000 t/yr), Russia (70,000 t/yr), Chile (60,000 t/yr), and Japan (40,000 t/yr) were augmented by electrowinning capacity increases in Chile (200,000 t/yr) and the United States (80,000 t/yr). In China, Jiangxi Copper expanded capacity at its Guixi smelter and refinery to 900,000 t/yr of copper from 800,000 t/yr, more than doubling its capacity since 2006, to become the largest smelter/refinery in the world. In Chile, Xstrata was expanding capacity at its Altonorte smelter to 290,000 t/yr in 2009 from 270,000 t/yr in 2007, and Codelco added about 160,000 t/yr of combined capacity at three of its four smelters and 60,000 t/yr of capacity at its El Teniente refinery. In Japan, Sumitomo Corp. completed an expansion at its Toyo smelter and refinery that raised capacity to 450,000 t/yr of copper from 365,000 t/yr in 2006. In Russia, the Russian Copper Co. completed expansion of its Kyshlym refinery to 220,000 t/yr from 120,000 t/yr in 2006 (International Copper Study Group, 2009b, p. 58–81; 2010, p. 71–107).

Outlook

With the onset of the economic crisis in the fourth quarter of 2008, the COMEX price, which had averaged $3.59 per pound of copper during the first 9 months of 2008, fell sharply to an average of only $1.39 per pound in December. Prices during 2009, however, trended upward throughout the year despite rising exchange inventories during the latter 4 months of 2009, in part encouraged by renewed interest in metal commodity markets. The COMEX price broke back above $2.00 per pound in April, $3.00 per pound in October, and averaged $3.18 per pound in December. Global production of refined copper rose only slightly owing to a similar growth in mine production that resulted from cutbacks in response to the global economic crisis and to operational constraints that reduced output in Australia, Chile, and Indonesia. Refined copper consumption declined slightly, as double digit declines in the European Union, Japan, and the United States were mostly offset by growth in China's apparent consumption of more than 35%. China's year-on-year imports of refined copper rose by 1.1 Mt during the first 6 months of 2009, much of which was thought to have entered unreported government and industry inventories. The ICSG reported a small refined copper production surplus developed during the second half of 2009 and that a slightly larger surplus was anticipated in 2010 (International Copper Study Group, 2009c).

U.S. copper mine production, which had been expected to rise by more than 200,000 t, declined by about 130,000 t in 2009 following significant revisions to mine plans by several producers, including the closure of a mine opened during 2008. Domestic consumption of refined copper trended lower owing to weaker housing and automotive demand, and several brass mills closed during the year. U.S. mine and refinery production were expected to fall slightly in 2010, while consumption was projected to increase modestly in response to anticipated economic recovery.

References Cited

American Bureau of Metal Statistics, Inc., 2009a, Copper and copper alloy mill products—December 2008: Chatham, NJ, American Bureau of Metal Statistics, Inc. Report 3, March 11, 10 p.

American Bureau of Metal Statistics, Inc., 2009b, US copper wirerod market—December 2008: Chatham, NJ, American Bureau of Metal Statistics, Inc. Report 4, March 3, 6 p.

Anvil Mining Ltd., 2009, Annual report—2008: Perth, Australia, Anvil Mining Ltd., 72 p.

Asarco LLC, 2008a, Asarco LLC wins liability phase of fraudulent transfer trial against Grupo Mexico: Tucson, AZ, Asarco LLC press release, September 3, 1 p.

Asarco LLC, 2008b, Asarco terminates purchase agreement with Sterlite: Tucson, AZ, Asarco LLC press release, October 22, 1 p.

Asarco LLC, 2008c, Bankruptcy court approves Asarco LLC's bidding process: Tucson, AZ, Asarco LLC press release, March 25, 1 p.

Asarco LLC, 2008d, Statement on El Paso plant: Tucson, AZ, Asarco LLC press release, May 31, 1 p.

Asarco LLC, 2008e, Sterlite Industries (India) Limited to purchase operating assets of Asarco LLC for $2.6 billion: Tucson, AZ, Asarco LLC press release, May 31, 1 p.

Asarco LLC, 2009, Economic conditions cause re-evaluation of El Paso plant investment /goals: El Paso, TX, Asarco LLC press release, February 3, 1 p.

Augusta Resource Corp., 2009, Management's discussion and analysis report for the year ended December 31, 2008: Vancouver, British Columbia, Canada, Augusta Resource Corp., February 18, 29 p.

Barry, Sean, 2008, Asarco OK'd to begin bidding process: American Metal Market, March 26, 1 p. (Accessed November 2, 2008, via http://www.amm.com.)

BHP Billiton, 2009, BHP Billiton production report for the half year ending 31 December 2008: London, United Kingdom, BHP Billiton, January 21, 15 p.

Constellation Copper Corp., 2007, Lisbon Valley operations to be curtailed to leach only: Denver, CO, Constellation Copper Corp. press release, November 30, 2 p.

Copper and Brass Fabricators Council Inc., 2009, Copper and brass products import/export report—December 2008: Washington, DC, Copper and Brass Fabricators Council Inc., January, 168 p.
Copper Mesa Mining Corp., 2009, Managements discussion and analysis for the year ended December 31, 2008: Lakewood, CO, Copper Mesa Mining Corp., May 29, 20 p.
Copper Development Association Inc., 2009, Annual data 2008—Copper supply and consumption: New York, NY, Copper Development Association Inc., 21 p.
Corporación Nacional del Cobré de Chile, 2009, Annual report—2008: Santiago, Chile, Corporación Nacional del Cobré de Chile, 234 p.
CRU International Ltd., 2008, Copper quarterly industry and market outlook: London, United Kingdom, CRU International Ltd., October, 288 p.
CRU International Ltd., 2009, Copper quarterly industry and market outlook: London, United Kingdom, CRU International Ltd., April, 263 p.
Cunningham, C.G., Zappettini, E.O., Vivallo, S., Waldo, Celada, C.M., Quispe, Jorge, Singer, D.A., Briskey, J.A., Sutphin, D.M., Gajardo, M., Mariano, Diaz, Alejandro, Portigliati, Carlos, Berger, V.I., Carrasco, Rodrigo, and Schulz, K.J., 2008, Quantitative mineral resource assessment of copper, molybdenum, gold, and silver in undiscovered porphyry copper deposits in the Andes Mountains of South America: U.S. Geological Survey Open-file Report 2008–1253, 282 p.
First Quantum Minerals Ltd., 2009, 2009 annual report: Vancouver, British Columbia, Canada, First Quantum Minerals Ltd., 72 p.
Formation Metals Inc., 2009, Idaho Cobalt Project: Vancouver, British Columbia, Canada, Formation Metals Inc. (Accessed October 2, 2009, via http://www.formationmetals.com.)
Freeport-McMoRan Copper & Gold Inc., 2008a, Freeport-McMoRan Copper & Gold Inc. announces revised operating plans in response to weak market conditions: Phoenix, AZ, Freeport-McMoRan Copper & Gold Inc. press release, December 3, 9 p.
Freeport-McMoRan Copper & Gold Inc., 2008b, Freeport-McMoRan Copper & Gold Inc. reports second-quarter and six-month 2008 results: Phoenix, AZ, Freeport-McMoRan Copper & Gold Inc. press release, July 22, 39 p.
Freeport-McMoRan Copper & Gold Inc., 2009, Form 10–K—2008: U.S. Securities and Exchange Commission, 183 p.
Grupo México, S.A.B. de C.V., 2009, Annual report—2008: Mexico City, Mexico, Grupo México, S.A. de C.V., 110 p.
Hill, Liezel, 2008, Constellation Copper files for bankruptcy: Mining Weekly, December 24, 1 p. (Accessed June 4, 2009, via http://www.miningweekly.com.)
International Copper Study Group, 2009a, Copper bulletin: Lisbon, Portugal, International Copper Study Group, v. 16, no. 12, December, 54 p.
International Copper Study Group, 2009b, Directory of copper mines and plants 2007 to 2012—March 2009: Lisbon, Portugal, International Copper Study Group, 81 p.
International Copper Study Group, 2009c, Forecast 2009–2010: Lisbon, Portugal, International Copper Study Group press release, October 8, 1 p.
International Copper Study Group, 2010, Directory of copper mines and plants 2008 to 2013—January 2010: Lisbon, Portugal, International Copper Study Group, 106 p.
Mercator Minerals Ltd., 2009, Management discussion and analysis, December 31: Vancouver, British Columbia, Canada, Mercator Minerals Ltd., 36 p.
Mines Management, Inc., 2009, Mines Management announces 2008 operating results: Spokane, WA, Mines Management, Inc. press release, March 31, 2 p.
Nord Resources Corp., 2009, Nord Resources reports 2008 year-end results: Dragoon, AZ, Nord Resources Corp. press release, March 31, 9 p.
Norddeutsce Affinerie AG, 2009, 2007/2008 annual report: Hamburg, Germany, Nordddeutsce Affinerie AG, 188 p.
Northern Dynasty Minerals Ltd., 2008a, Pebble project update: Vancouver, British Columbia, Canada, Northern Dynasty Minerals Ltd. press release, April 21, 2 p.
Northern Dynasty Minerals Ltd., 2008b, Resource estimate confirms Pebble as one of the world's most important copper-gold-molybdenum deposits: Vancouver, British Columbia, Canada, Northern Dynasty Minerals Ltd. press release, December 4, 4 p.
Polymet Mining Corp., 2009, Polymet Mining Corp. 2008 annual report: Vancouver, British Colombia, Canada, Polymet Mining Corp., 66 p.
Quadra Mining Ltd., 2009, Management discussion and analysis for the year and fourth quarter ended December 31, 2008: Quadra Mining, Ltd., Vancouver, British Columbia, Canada, 24 p.
Resolution Copper Co., 2009, Project profiles: Superior, AZ, Resolution Copper Co. (Accessed November 1, 2009, via http://www.Resolutioncopper.com.)
Riley, Anne, 2008, Asarco, Grupo Mexico mediation talks fail: American Metal Market, November 26, 1 p. (Accessed November 28, 2008, via http://www.amm.com.)
Rio Tinto plc, 2009a, Fourth quarter operations review: London, United Kingdom, Rio Tinto plc media release, January 15, 27 p.
Rio Tinto plc, 2009b, Rio Tinto annual report 2008: London, United Kingdom, Rio Tinto plc, 57 p.
Superior Essex Inc., 2008, Superior Essex announces realignment of magnet wire North American manufacturing network: Atlanta, GA, Superior Essex Inc. press release, January 23, 3 p.
Teck Resources Ltd., 2009, 2008 annual report: Vancouver British Columbia, Canada, Teck Resources Ltd., 122 p.
U.S. Department of Agriculture, 2008, Coronado National Forest, Rosemont Copper Project, Coronado National Forest, Pima County AZ—Revised notice of intent to prepare an environmental impact statement: Federal Register, v. 73, no. 138, July 17, p. 41031–41032.
U.S. Department of Labor, 2008, Employee and Training Administration, Bolton Metal Products Co., Bellefonte, PA—Notice of revised determination of reconsideration: Federal Register, v. 73, no. 81, April 25, p. 22434–22435.
Xstrata plc, 2009, Annual report—2008: Zug, Switzerland, Xstrata plc, 209 p.

GENERAL SOURCES OF INFORMATION

U.S. Geological Survey Publications

Copper. Ch. in Metal Prices in the United States Through 1998, 1999.
Copper. Ch. in Mineral Commodity Summaries, annual.
Copper. Mineral Industry Surveys, monthly.
Flows of selected materials associated with world copper smelting. Open-File Report 2004–1395.

Other

American Bureau of Metal Statistics nonferrous metal data.
International Copper Study Group, Copper Bulletin, monthly.
International Copper Study Group, Directory of Copper Mines and Plants.

TABLE 1

SALIENT COPPER STATISTICS[1]

(Metric tons, unless otherwise specified)

		2004	2005	2006	2007	2008
United States:						
Mine production:						
Ore concentrated	thousand metric tons	139,000	154,000	163,000	138,000	156,000
Average yield of concentrated ore	percent	0.40	0.37	0.40	0.47	0.50
Recoverable copper:						
Arizona		723,000	690,000	712,000	731,000	836,000
New Mexico		122,000	131,000	113,000	108,000	104,000
Other States		312,000	319,000	372,000	329,000	368,000
Total		1,160,000	1,140,000	1,200,000	1,170,000	1,310,000
Total value	millions	$3,420	$4,360	$8,310	$8,450	$9,200
Smelter production:						
Primary and secondary		542,000	523,000	501,000	617,000	574,000
Byproduct sulfuric acid, sulfur content	thousand metric tons	600	575	576	720	655 e
Refinery production:						
Primary materials:						
Electrolytic from domestic ores		531,000	524,000	531,000	702,000	603,000
Electrolytic from foreign materials		140,000	130,000	144,000	62,100	109,000
Electrowon		584,000	554,000	530,000	504,000	507,000
Total		1,260,000	1,210,000	1,210,000	1,270,000	1,220,000
Secondary materials (scrap), electrolytic and fire refined		50,800	47,200	44,800	46,000	53,800
Grand total		1,310,000	1,260,000	1,250,000	1,310,000	1,270,000
Secondary copper produced:						
Recovered from new scrap		774,000	769,000	819,000	767,000 r	697,000
Recovered from old scrap		191,000 r	183,000 r	151,000 r	158,000 r	155,000
Total		965,000	953,000	969,000 r	925,000 r	851,000
Copper sulfate production		25,100	25,600	19,500	22,600	22,000
Exports, refined		118,000	39,500	106,000	51,100	36,500
Imports, refined		807,000	1,000,000	1,070,000	829,000	724,000
Stocks, December 31:						
Blister and in-process material		51,400	44,300	18,800	26,300	19,800
Refined copper:						
Refineries		10,400	8,190	28,100	21,800	15,700
Wire-rod mills		20,300	20,400	21,500	20,600	22,600
Brass mills		21,500	24,500	34,500	10,400	8,340
Other industry		3,210 r	3,350 r	3,280 r	3,220 r	3,230
New York Commodity Exchange (COMEX)		43,700	6,180	30,900	13,500	31,300
London Metal Exchange (LME), U.S. warehouses		35,000	800	75,600	60,600	106,000
Total		134,000 r	63,500 r	194,000 r	130,000 r	187,000
Consumption:						
Refined copper, reported		2,410,000	2,270,000	2,110,000	2,140,000	2,020,000
Apparent consumption, primary refined and old scrap[2]		2,550,000 r	2,420,000 r	2,200,000 r	2,270,000 r	2,000,000
Price:						
Producer, weighted average	cents per pound	133.94	173.49	314.75	328.00	319.16
COMEX, first position	do.	128.97	168.23	308.94	322.17	313.35
LME, Grade A cash	do.	129.96	166.84	304.85	322.83	315.47
World, production:						
Mine	thousand metric tons	14,700	15,000	15,000 r	15,500 r	15,400 e
Smelter	do.	12,900	13,600 r	14,200 r	14,300	14,700 e
Refinery	do.	15,900	16,500 r	17,300	17,800 r	18,200 e

[e]Estimated. [r]Revised. do. Ditto.

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

[2]In 2004, 2005, 2006, 2007, and 2008, apparent consumption is calculated using general imports of 704,000 metric tons (t), 977,000 t, 1,080,000 t, 832,000 t, and 721,000 t, respectively.

TABLE 2

LEADING COPPER-PRODUCING MINES IN THE UNITED STATES IN 2008, IN ORDER OF OUTPUT[1]

Rank	Mine	County and State	Operator	Source of copper	Capacity (thousand metric tons)
1	Morenci	Greenlee, AZ	Freeport-McMoRan Copper & Gold Inc.	Copper-molybdenum ore, concentrated and leached	400
2	Bingham Canyon	Salt Lake, UT	Kennecott Utah Copper Corp.	Copper-molybdenum ore, concentrated	280
3	Bagdad	Yavapai, AZ	Freeport-McMoRan Copper & Gold Inc.	Copper-molybdenum ore, concentrated and leached	150
4	Ray	Pinal, AZ	Asarco LLC	Copper ore, concentrated and leached	120
5	Sierrita	Pima, AZ	Freeport-McMoRan Copper & Gold Inc.	Copper-molybdenum ore, concentrated and leached	90
6	Robinson	White Pine, NV	Quadra Mining Ltd.	Copper-molybdenum ore, concentrated	73
7	Chino	Grant, NM	Freeport-McMoRan Copper & Gold Inc.	Copper-molybdenum ore, concentrated and leached	135
8	Safford	Graham, AZ	do.	Copper ore, leached	80
9	Mission Complex	Pima, AZ	Asarco LLC	Copper-molybdenum ore, concentrated	70
10	Pinto Valley	Gila, AZ	BHP Billiton	Copper ore, concentrated and leached	55
11	Tyrone	Grant, NM	Freeport-McMoRan Copper & Gold Inc.	Copper ore, leached	50
12	Continental Pit	Silver Bow, MT	Montana Resources	Copper-molybdenum ore, concentrated	45
13	Silver Bell	Pima, AZ	Asarco LLC	Copper ore, leached	22
14	Phoenix	Lander, NV	Newmont Mining Corp.	Gold-copper ore, concentrated	12
15	Miami	Gila, AZ	Freeport-McMoRan Copper & Gold Inc.	Copper ore, leached	50
16	Lisbon Valley	San Juan, UT	Constellation Copper Corp.	do.	10
17	Mineral Park	Mohave, AZ	Mercator Minerals Ltd.	do.	7
18	Troy	Lincoln, MT	Revett Minerals Inc.	Copper-silver ore	7

do. Ditto.

[1]The mines on this list accounted for more than 99% of U.S. mine production in 2008.

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)

	2007		2008	
Source and treatment process	Gross weight[2]	Recoverable copper	Gross weight[2]	Recoverable copper
Mined copper ore:				
Concentrated	138,000,000	648,000	156,000,000	785,000
Leached	NA	504,000	NA	507,000
Total	NA	1,150,000	NA	1,290,000
Copper precipitates shipped, leached from tailings, dumps, and in-place material	NA	3,440	NA	3,490
Other copper-bearing ores[3]	5,270,000	13,500	5,300,000	12,000
Grand total	XX	1,170,000	XX	1,310,000

NA Not available. XX Not applicable.

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

[2]In 2008, 22,000 kilograms of gold and 275 metric tons of silver were recovered from concentrated ore. The average value of gold and silver per metric ton of ore concentrated was $3.77.

[3]Includes gold ore, lead ore, silver ore, and zinc ore.

TABLE 4

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

(Metric tons)

Item	Brass mills	Wire-rod mills	Foundries, chemical plants, miscellaneous users	Smelters, refiners, ingot makers	Total
2007:					
Copper scrap	828,000 [2]	W	69,500 [r]	182,000	1,080,000 [r]
Refined copper[3]	476,000	1,610,000	46,100	4,520	2,140,000
Hardeners and master alloys	10,000	--	2,980	--	13,000
Brass ingots	--	--	78,800	--	78,800
Slab zinc	52,900	--	(4)	(4)	80,500
2008:					
Copper scrap	739,000 [2]	W	64,800	192,000	996,000
Refined copper[3]	479,000	1,490,000	45,500	4,410	2,020,000
Hardeners and master alloys	10,000	--	2,930	--	13,000
Brass ingots	--	--	77,000	--	77,000
Slab zinc	44,300	--	(4)	(4)	107,000

[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
2007:					
Wire-rod mills	1,610,000	--	--	733	1,610,000
Brass mills	317,000	24,200	42,700	92,600	476,000
Chemical plants	--	--	--	1,010	1,010
Ingot makers	W	W	W	4,520 [2]	4,520
Foundries	4,170	4,570	--	10,600	19,400
Miscellaneous[3]	W	W	W	25,700 [2]	25,700
Total	1,930,000	28,800	42,700	135,000	2,140,000
2008:					
Wire-rod mills	1,490,000	--	--	2,890	1,490,000
Brass mills	323,000	24,200	45,000	86,300	479,000
Chemical plants	--	--	--	344	344
Ingot makers	W	W	W	4,520 [2]	4,520
Foundries	4,670	4,440	--	11,300	20,400
Miscellaneous[3]	W	W	W	24,700 [2]	24,700
Total	1,820,000	28,600	45,000	130,000	2,020,000

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

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

[2]Includes items indicated by symbol W.

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

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

(Metric tons)

	2007	2008
Kind of scrap:		
New scrap:		
Copper-base	723,000	659,000
Aluminum-base	44,400 r	38,100
Nickel-base	18	18
Total	767,000 r	697,000
Old scrap:		
Copper-base	131,000 r	132,000
Aluminum-base	27,200 r	22,300
Nickel-base	275	275
Zinc-base	13	9
Total	158,000 r	155,000
Grand total	925,000 r	851,000
Form of recovery:		
As unalloyed copper	47,400	55,000
In brass and bronze	799,000 r	730,000
In alloy iron and steel	890	677
In aluminum alloys	72,600 r	60,400
In other alloys	13	8
In chemical compounds	5,040	5,040
Total	925,000 r	851,000

[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)

	From new scrap		From old scrap		Total	
Type of operation	2007	2008	2007	2008	2007	2008
Ingot makers	15,000	15,200	75,400 r	75,900	90,400	91,100
Refineries[2]	23,600	26,900	22,500	26,900	46,000	53,800
Brass and wire-rod mills	661,000	584,000	8,010	17,000	669,000	601,000
Foundries and manufacturers	18,100	27,200	24,700 r	12,300	42,800 r	39,500
Chemical plants	5,030	5,030	6	6	5,040	5,040
Total	723,000	659,000	131,000 r	132,000	853,000 r	791,000

[r]Revised.
[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Includes electrolytically refined based on source of material at smelter level.

TABLE 8

PRODUCTION OF SECONDARY COPPER AND COPPER-ALLOY PRODUCTS IN THE UNITED STATES, BY ITEM PRODUCED FROM SCRAP[1]

(Metric tons)

Item produced from scrap	2007	2008
Unalloyed copper products:		
Refined copper	46,000	53,800
Copper powder	1,240	1,070
Copper castings	114	136
Total	47,400	55,000
Alloyed copper products:		
Brass and bronze ingots:		
Tin bronzes	9,120	9,050
Leaded red brass and semired brass	65,300	65,300
High leaded tin bronze	10,400	10,400
Yellow brass	5,570	5,570
Manganese bronze	7,670	7,660
Aluminum bronze	6,680	6,600
Nickel silver	1,570	1,570
Silicon bronze and brass	5,740	5,750
Copper-base hardeners and master alloys	7,660	7,660
Miscellaneous	6,260	6,270
Total	126,000	126,000
Brass mill and wire-rod mill products	812,000	725,000
Brass and bronze castings	41,300 r	38,600
Brass powder	51	--
Copper in chemical products	5,040	5,040
Grand total	1,030,000	949,000

[r]Revised. -- Zero.

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

TABLE 9

COMPOSITION OF SECONDARY COPPER-ALLOY PRODUCTION IN THE UNITED STATES[1]

(Metric tons)

	Copper	Tin	Lead	Zinc	Nickel	Aluminum	Total
Brass and bronze ingot production:[2]							
2007	105,000 r	3,880 r	5,940 r	10,600 r	156 r	12	126,000
2008	105,000	4,190	6,250	10,500	160	12	126,000
Secondary metal content of brass mill products:							
2007	669,000	1,490	3,140	137,000	1,530	28	812,000
2008	601,000	1,400	2,580	118,000	1,390	18	725,000
Secondary metal content of brass and bronze castings:							
2007	36,800 r	1,340 r	1,020 r	1,930 r	82	83	41,300 r
2008	35,200	1,180	604	1,450	81	74	38,600

[r]Revised.

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

[2]Includes approximately 96% from scrap and 4% from other than scrap in 2007 and 2008.

TABLE 10

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

(Metric tons, gross weight)

Scrap type and processor	2007 Consumption	2007 Stocks	2008 Consumption	2008 Stocks
Unalloyed scrap:				
No.1 wire and heavy:				
Smelters, refiners, and ingot makers	65,400	1,970 r	61,800	1,340
Brass and wire-rod mills	382,000	(2)	353,000	(2)
Foundries and miscellaneous manufacturers	19,300	(2)	19,000	(2)
No. 2 mixed heavy and light:				
Smelters, refiners, and ingot makers	28,400	1,210	42,000	2,910
Brass and wire-rod mills	13,700	(2)	12,600	(2)
Foundries and miscellaneous manufacturers	3,630	(2)	3,130	(2)
Total unalloyed scrap:				
Smelters, refiners, and ingot makers	93,800	3,180	104,000	4,240
Brass and wire-rod mills	396,000	15,500	366,000	13,500
Foundries and miscellaneous manufacturers	23,000	1,630	22,200	1,490
Alloyed scrap:				
Red brass:[3]				
Smelters, refiners, and ingot makers	26,600	1,720	26,600	1,720
Brass mills	11,200	(2)	11,700	(2)
Foundries and miscellaneous manufacturers	5,520	(2)	5,480	(2)
Leaded yellow brass:				
Smelters, refiners, and ingot makers	11,400	796	11,400	785
Brass mills	160,000	(2)	132,000	(2)
Foundries and miscellaneous manufacturers	980	(2)	1,230	(2)
Yellow and low brass, all plants	155,000	532	143,000	526
Cartridge cases and brass, all plants	90,700	(2)	74,100	(2)
Auto radiators:				
Smelters, refiners, and ingot makers	25,800	772	25,800	781
Foundries and miscellaneous manufacturers	5,880 r	(2)	1,950	(2)
Bronzes:				
Smelters, refiners, and ingot makers	12,900	847	12,700	899
Brass mills and miscellaneous manufacturers	16,500	(2)	16,100	(2)
Nickel-copper alloys, all plants	14,200	145	13,100	145
Low grade and residues; smelters, refiners, miscellaneous manufacturers	23,500	589	23,300	574
Other alloy scrap:[4]				
Smelters, refiners, and ingot makers	1,080	250	1,150	227
Brass mills and miscellaneous manufacturers	5,220	(2)	4,990	(2)
Total alloyed scrap:				
Smelters, refiners, and ingot makers	88,700	5,650	88,600	5,660
Brass mills	432,000	20,700	373,000	22,200
Foundries and miscellaneous manufacturers	46,500 r	2,070	42,600	1,350
Total scrap:				
Smelters, refiners, and ingot makers	182,000	8,830	192,000	9,900
Brass and wire-rod mills	828,000	36,200	739,000	35,800
Foundries and miscellaneous manufacturers	69,500 r	3,700	64,800	2,830

[r]Revised.

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

[2]Individual breakdown is not available; included in “Total unalloyed scrap,” “Total alloyed scrap,” and “Total scrap.”

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

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

TABLE 11

CONSUMPTION OF PURCHASED COPPER-BASE SCRAP[1, 2]

(Metric tons, gross weight)

Type of operation	From new scrap 2007	From new scrap 2008	From old scrap 2007	From old scrap 2008	Total 2007	Total 2008
Ingot makers	31,200	33,700	105,000	105,000	136,000	140,000
Smelters and refineries	23,600	28,700	22,600	25,100	46,300	53,800
Brass and wire-rod mills	819,000	721,000	8,260	17,200	828,000	739,000
Foundries and miscellaneous manufacturers	40,300	50,700	29,200 r	14,000	69,500 r	64,800
Total	915,000 r	835,000	165,000 r	161,000	1,080,000 r	996,000

[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	2007	2008
Tin bronzes	13,300	13,800
Leaded red brass and semired brass	48,900	47,000
Yellow, leaded, low brass[2]	7,220	7,030
Manganese bronze	3,940	3,460
Nickel silver[3]	748	498
Aluminum bronze	3,510	3,580
Hardeners and master alloys[4]	2,980	2,930
Lead free alloys[5]	1,210	1,650
Total brass ingot	81,800	80,000
Refined copper	46,100	45,500
Copper scrap	69,500 r	64,800

[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	Dealers' buying (New York) Red brass turnings and borings
2007[r]	311.03	282.42	221.29	137.26
2008	300.55	279.08	217.11	143.85

[r]Revised.

Source: American Metal Market.

TABLE 14

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

Country	Ore and concentrate[2]		Matte, ash and 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)
2007	134,000	$873,000	62,200	$119,000	51,100	$222,000	329,000	$1,320,000	15,700	$79,900	593,000	$2,620,000
2008:												
Belgium	259	1,990	61	221	--	--	2,570	7,370	101	537	421	2,750
Canada	28,100	192,000	43,800	88,000	12,600	69,900	9,830	65,900	10,000	30,700	94,500	380,000
China	97,800	460,000	1,640	8,560	8,620	30,300	186,000	787,000	243	1,910	108,000	501,000
Germany	--	--	281	799	256	922	4,280	14,200	2,420	8,920	2,950	10,600
Hong Kong	1	5	--	--	109	574	21,200	124,000	2,210	18,100	2,320	18,600
India	1	8	8	11	2,130	4,100	1,970	3,570	767	3,490	2,910	7,610
Japan	48,100	237,000	53	30	21	134	8,720	59,400	1,420	11,100	49,600	249,000
Korea, Republic of	4,810	33,300	--	--	129	477	19,800	123,000	1,510	8,670	6,450	42,400
Malaysia	--	--	--	--	--	--	98	723	299	2,800	299	2,800
Mexico	122,000	598,000	--	--	10,200	68,700	1,960	12,800	135	516	132,000	667,000
Peru	--	--	--	--	20	123	--	--	1	8	21	131
Singapore	32	226	55	122	--	--	473	608	137	812	224	1,160
Spain	1	6	298	142	(3)	5	766	3,920	534	2,930	833	3,080
Taiwan	--	--	1	8	188	239	4,900	26,400	723	5,650	911	5,890
Thailand	--	--	--	--	24	8	2,020	11,600	114	855	138	864
United Kingdom	--	--	--	--	944	3,430	20	154	171	877	1,120	4,310
Other	493	3,350	25	1,310	1,230	2,620	14,400	78,300	2,630	13,800	4,380	21,000
Total	301,000	1,530,000	46,200	99,200	36,500	182,000	278,000	1,320,000	23,500	112,000	407,000	1,920,000

-- Zero.

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

[2]Data for 2008 adjusted by the U.S. Geological Survey to reflect estimated copper content.

[3]Less than ½ unit.

Source: U.S. Census Bureau.

TABLE 15

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

Country	Pipes and tubing		Plates, sheets, foil, bars		Bare wire, including wire rod[2]		Wire and cable, stranded		Copper sulfate	
	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
2007	27,800	$236,000	31,500	$273,000	163,000	$1,270,000	27,100	$235,000	4,770	$8,480
2008:										
Australia	11	138	3	47	16	216	58	677	15	12
Brazil	145	976	29	434	84	856	45	1,460	--	--
Canada	7,120	66,900	21,600	177,000	36,300	281,000	7,090	55,500	2,500	5,560
China	101	1,010	666	13,000	1,500	8,410	1,070	8,930	295	572
Denmark	1	9	7	98	4	180	62	476	37	55
France	1	44	90	1,090	23	369	251	4,480	--	--
Germany	14	94	181	4,600	438	11,400	239	6,590	--	--
Hong Kong	--	--	56	1,390	524	3,520	305	3,470	29	56
Italy	5	37	55	719	22	437	8	196	10	19
Japan	11	192	75	1,520	4	187	335	5,090	5	4
Korea, Republic of	82	910	198	3,160	60	1,990	138	3,420	4	21
Malaysia	--	--	598	5,550	89	1,740	18	974	1	4
Mexico	15,300	136,000	6,190	53,000	96,800	807,000	4,230	33,000	70	93
Netherlands	112	1,410	79	1,130	2	75	21	570	6	13
Saudi Arabia	276	2,170	50	432	21	115	456	4,190	23	18
Singapore	99	509	241	1,590	15	166	239	3,640	7	5
Sweden	1	11	3	58	70	1,940	1	49	--	--
Taiwan	1	14	415	3,310	155	2,540	79	1,730	151	236
Thailand	5	76	331	3,250	91	589	17	242	--	--
United Kingdom	185	1,760	255	2,430	52	787	50	1,790	22	43
Other	1,380	13,300	776	9,410	3,050	34,000	5,960	59,400	2,260	2,990
Total	24,900	226,000	31,900	283,000	139,000	1,160,000	20,700	196,000	5,430	9,700

-- 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 2007were 144,000 metric tons (t) valued at $1,140 million, and in 2008, wire rod exports were 126,000 t valued at $1,010 million.

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 and 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)
2007	841	$1,030	1,660	$8,200	153,000	$1,120,000	829,000	$5,900,000	58,300	$357,000	1,040,000	$7,390,000
2008:												
Belgium	--	--	36	257	--	--	--	--	--	--	36	257
Brazil	--	--	--	--	--	--	598	4,090	3	21	602	4,110
Canada	406	617	319	1,140	84,800	601,000	242,000	1,830,000	11,300	72,600	339,000	2,510,000
Chile	--	--	--	--	32,900	249,000	334,000	2,400,000	9,540	65,700	377,000	2,710,000
Costa Rica	--	--	--	--	--	--	--	--	313	872	313	872
Dominican Republic	--	--	--	--	--	--	--	--	944	1,130	944	1,130
Finland	--	--	--	--	849	7,050	--	--	--	--	849	7,050
Germany	--	--	--	--	1	65	3,230	26,600	60	77	3,290	26,800
Honduras	--	--	--	--	--	--	--	--	1,780	5,700	1,780	5,700
Japan	--	--	6	43	13	843	4,680	42,300	29	85	4,730	43,300
Mexico	--	--	83	138	3,910	54,700	19,500	120,000	6,120	16,200	29,600	191,000
Peru	234	409	--	--	--	--	117,000	852,000	--	--	117,000	852,000
Taiwan	--	--	243	1,450	--	--	(3)	3	--	--	243	1,450
United Kingdom	--	--	--	--	6	231	(3)	8	--	--	6	239
Other	--	--	482	2,120	1	72	1,850	15,700	2,670	9,790	5,000	27,700
Total	640	1,030	1,170	5,140	122,000	913,000	724,000	5,290,000	32,800	172,000	881,000	6,380,000

-- Zero.

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

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

[3]Less than ½ unit.

Source: U.S. Census Bureau.

TABLE 17

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

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)
2007	1,190	$12,000	65,600	$570,000	229,000	$1,640,000	19,000	$153,000	57,000	$116,000
2008:										
Australia	(4)	8	--	--	3	40	--	--	--	--
Belgium	--	--	223	3,480	(4)	17	(4)	5	1	6
Brazil	2	48	1,120	9,500	(4)	3	2	8	--	--
Canada	33	325	48	693	116,000	863,000	1,180	9,220	10,100	10,200
Chile	--	--	5,790	46,500	500	3,470	--	--	3,860	9,170
China	80	774	2,830	23,300	270	3,070	882	8,240	8,180	22,000
Finland	16	362	3,450	34,600	700	6,580	--	--	--	--
France	9	311	2,520	21,900	41	1,430	25	607	--	--
Germany	553	6,590	18,000	164,000	1,090	10,400	359	4,510	1,180	1,260
Israel	--	--	--	--	(4)	49	1,780	19,300	10	34
Italy	--	--	202	1,610	1	122	7	207	1	4
Japan	4	52	3,320	37,800	495	7,550	1	44	37	591
Luxembourg	--	--	711	10,300	--	--	--	--	--	--
Mexico	200	1,790	5,160	42,400	14,600	107,000	684	3,770	27,600	68,300
Peru	--	--	6,490	53,900	1,050	7,670	36	315	575	1,350
Russia	19	200	--	--	27,400	195,000	38	264	616	1,400
Sweden	(4)	2	6,660	61,000	53	478	1	19	--	--
Taiwan	--	--	222	2,670	166	919	23	704	3,140	7,000
Turkey	--	--	--	--	15	87	12,400	112,000	--	--
United Kingdom	6	137	703	5,400	7	360	11	540	--	--
Other	48	509	3,690	36,500	984	13,200	1,100	11,800	1,500	3,660
Total	970	11,100	61,100	555,000	163,000	1,220,000	18,600	172,000	56,800	125,000

-- 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 2007 were 229,000 metric tons (t) valued at $1.55 billion, and in 2008, wire rod imports were 156,000 t valued at $1.52 billion.

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

[4]Less than ½ unit.

Source: U.S. Census Bureau.

TABLE 18

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

	Unalloyed copper scrap				Copper-alloy scrap			
	2007		2008		2007		2008	
Country	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
Belgium	1,310	$6,300	2,570	$7,370	15,100	$31,800	17,900	$41,700
Canada	12,000	76,300	9,830	65,900	37,100	139,000	39,000	156,000
China	217,000	828,000	186,000	787,000	403,000	958,000	421,000	977,000
Germany	8,330	34,100	4,280	14,200	7,770	32,400	10,300	48,500
Hong Kong	9,810	35,500	21,200	124,000	27,600	48,700	50,800	100,000
India	14,000	9,760	1,970	3,570	10,400	37,100	9,340	26,900
Japan	8,990	59,200	8,720	59,400	9,480	54,600	13,100	65,500
Korea, Republic of	24,500	157,000	19,800	123,000	13,700	71,600	21,900	86,500
Mexico	389	2,030	1,960	12,800	3,020	20,300	5,970	37,200
Taiwan	17,700	53,600	4,900	26,400	12,700	22,500	9,920	16,800
Other	14,900	63,600	17,800	95,300	37,600	94,200	30,600	86,700
Total	329,000	1,320,000	278,000	1,320,000	577,000	1,510,000	630,000	1,640,000

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

Source: U.S. Census Bureau.

TABLE 19

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

	Unalloyed copper scrap		Copper-alloy scrap		
Country or territory	Quantity (metric tons)	Value[2] (thousands)	Gross weight (metric tons)	Copper content[3] (metric tons)	Value[2] (thousands)
2007	58,300	$357,000	74,800	53,800	$308,000
2008:					
Canada	11,300	72,600	30,900	22,300	146,000
Chile	9,540	65,700	7	5	4
Costa Rica	313	872	1,490	1,080	6,930
Dominican Republic	944	1,130	1,180	849	887
Guatemala	306	1,990	1,620	1,170	9,440
Honduras	1,780	5,700	515	371	1,300
Jamaica	183	226	357	257	826
Mexico	6,120	16,200	31,500	22,700	120,000
Nicaragua	251	828	103	74	228
United Kingdom	--	--	369	266	1,920
Other	2,030	6,930	5,470	3,940	25,800
Total	32,800	172,000	73,500	53,000	313,000

-- Zero.

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

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

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

Source: U.S. Census Bureau.

TABLE 20

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

(Metric tons)

Country	2004	2005	2006	2007	2008[e]
Argentina	177,143	187,317	180,144	180,200	156,900 [3]
Armenia[e]	17,700	16,400 [3]	18,000	17,600	18,800
Australia:					
Concentrates	795,800	865,300	806,400	828,000 [r, e]	833,000
Leaching, electrowon	58,300	51,000	52,400	42,000 [e]	53,000
Total	854,100	916,300	858,800	870,000 [r, e]	886,000
Bolivia	576 [r]	35 [r]	218	606 [r]	731 [3]
Botswana[e]	22,500 [3]	26,100	24,000	24,000	29,000
Brazil	103,153	133,325	147,836	205,728 [r]	206,000 [p]
Bulgaria	94,000 [r]	95,000 [r]	110,000	109,600 [r]	105,000
Burma, leaching, electrowon	31,756	34,478	19,500 [r]	15,100 [r]	7,000 [3]
Canada, concentrates	562,795	595,383	603,295	596,249 [r]	606,999 [p, 3]
Chile:[4]					
Concentrates	3,776,200	3,735,900	3,669,000	3,724,900	3,356,600 [p, 3]
Leaching, electrowon	1,636,300	1,584,600	1,691,800	1,832,100	1,973,700 [p, 3]
Total	5,412,500	5,320,500	5,360,800	5,557,000	5,330,300 [p, 3]
China:[e]					
Concentrates	742,000	762,000	873,000	928,000	940,000
Leaching, electrowon	10,000	15,000	16,000	18,000	20,000
Total	752,000	777,000	889,000	946,000	960,000
Colombia	1,701	1,259	2,902 [r]	4,196 [r]	3,000
Congo (Kinshasa):[5]					
Concentrates[e]	31,800	44,200	83,000 [r]	108,000 [r]	189,000
Leaching, electrowon	41,546	49,538	53,285 [r]	41,000 [r, e]	46,000
Total	73,346	93,738	136,285 [r]	149,000 [r, e]	235,000
Cyprus, leaching, electrowon	1,240	--	--	300 [e]	300
Ecuador[e]	242	-- [3]	--	--	--
Finland	15,500	15,000	13,000	13,600	13,000
Georgia[e]	12,000	10,000	9,000	11,000	11,000
India	29,500	26,900	27,400	33,900 [r, e]	28,000
Indonesia[5]	840,318	1,064,200 [r]	818,000 [r]	796,900 [r]	632,600 [3]
Iran:[e]					
Concentrates	140,000	150,000	208,000	241,000	241,000
Leaching, electrowon	11,000	10,000	9,000	8,000	8,000
Total	151,000	160,000	217,000	249,000	249,000
Kazakhstan[e]	462,100 [3]	422,000	457,000	405,000	420,000
Korea, North[e]	12,000	12,000	12,000	12,000	12,000
Laos:					
Concentrates	--	--	--	--	24,929 [3]
Leaching, electrowon	--	30,480 [r]	60,803 [r]	60,541 [r]	64,075 [3]
Total	--	30,480	60,803	60,541	89,004 [3]
Mexico:					
Concentrates	327,432	336,376	241,536 [r]	230,500 [r]	172,093 [p, 3]
Leaching, electrowon	78,108	92,675	86,000 [r]	107,000 [r]	74,500 [p, 3]
Total	405,540	429,051	327,536 [r]	337,500 [r]	246,593 [p, 3]
Mongolia	132,000	126,547	129,693	130,160	129,500 [3]
Morocco	4,400	3,800 [r]	4,600 [r]	5,572 [r]	5,600
Namibia	11,174	10,900	6,262 [r]	8,500 [r, e]	8,300
Pakistan	15,000	17,700	19,100	18,800 [r, e]	18,700
Papua New Guinea	173,370	192,978	194,355	169,184	159,650 [3]

See footnotes at end of table.

TABLE 20—Continued

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

(Metric tons)

Country	2004	2005	2006	2007	2008[e]
Peru:					
Concentrates	868,574	844,369 [r]	874,601 [r]	1,018,156 [r]	1,107,789 [3]
Leaching, electrowon	167,000	165,530	173,871	172,118	160,078 [3]
Total	1,035,574	1,009,899 [r]	1,048,472 [r]	1,190,274 [r]	1,267,867 [3]
Philippines	15,984	16,323	17,161	22,862 [r]	21,235 [3]
Poland	531,000	512,000	497,000	452,000	429,000 [3]
Portugal	95,743	89,541	78,600	90,200 [e]	89,000 [3]
Romania[6]	18,767	15,000	12,132	2,213	2,000
Russia[e]	675,000	700,000	725,000	740,000	750,000
Saudi Arabia	652	668	730	750 [e]	1,200
Serbia	12,000 [r, 7]	12,900 [r, 7]	12,000 [r]	16,500 [r]	18,800
South Africa	87,000 [r]	88,600 [r]	89,500 [r]	97,000 [r]	109,000 [p, 3]
Spain	1,448	7,900	6,600	6,300 [e]	7,100 [3]
Sweden	90,600	97,800	86,746	62,905 [r]	57,400
Tanzania, in concentrates and bullion	4,240	3,462 [r]	3,285	3,276 [r]	2,700
Turkey[e, 6]	49,000	54,000	46,000	81,000 [r]	83,000
United States:[5]					
Concentrates	576,000	586,000	667,000	665,000	801,000 [3]
Leaching, electrowon	584,000	554,000	530,000	504,000	507,000 [3]
Total	1,160,000	1,140,000	1,200,000	1,170,000	1,310,000 [3]
Uzbekistan[e]	110,000	110,000	100,000	95,000	95,000
Zambia:					
Concentrates	320,300	330,000 [e]	350,000	341,000 [r]	383,000
Leaching, electrowon	82,600	102,000	124,000 [e]	168,000 [r, e]	163,000
Total	402,900	432,000	474,000	509,000 [r]	546,000
Zimbabwe, concentrates	2,383	2,570	2,581	3,000 [e]	2,000
Grand total	14,700,000	15,000,000	15,000,000 [r]	15,500,000 [r]	15,400,000
Of which:					
Concentrates	12,000,000	12,400,000 [r]	12,300,000 [r]	12,600,000 [r]	12,400,000
Leaching, electrowon	2,700,000	2,660,000 [r]	2,760,000 [r]	2,910,000 [r]	3,040,000

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

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

[2]Table represent copper content by analysis of concentrates produced (includes cement copper, if applicable), except where otherwise noted. Table includes data available through July 14, 2009.

[3]Reported figure.

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

[5]Recoverable content.

[6]Excludes copper content of pyrite.

[7]Montenegro and Serbia formally declared independence in June 2006 from each other and dissolved their union.

TABLE 21

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

(Metric tons, gross weight)

Country	2004	2005	2006	2007	2008
Armenia, primary	7,500 e	9,881	8,791	6,954	5,945
Australia, primary	443,000	410,000	377,000	399,000	449,000
Austria, secondary	59,100 r	52,200 r	46,100 r	54,700 r	67,100
Belgium, secondary	107,000	99,200	114,600	115,000 e	124,500
Bolivia, primary	441	--	--	--	--
Botswana, primary[3]	21,195	26,704	24,255	19,996	23,146
Brazil, primary	208,020	199,043	219,700 r	218,367 r	220,000 p
Bulgaria:					
Primary	215,800	225,000	217,000	217,600	257,100
Secondary[e]	11,400	15,000	24,000	11,500	21,200
Total	227,200	240,000	241,000	229,100	278,300
Canada:					
Primary	446,209	441,325	484,675 r	470,713 r	443,798
Secondary	29,962	30,525	35,826 r	46,101 r	41,777 p
Total	476,171	471,850	520,501 r	516,814 r	485,575
Chile, primary	1,517,600	1,558,100	1,565,400	1,514,300	1,369,200
China:[e]					
Primary	1,500,000	1,700,000	1,920,000	2,110,000 r	2,500,000
Secondary	440,000	540,000	700,000	800,000	870,000
Total	1,940,000	2,240,000	2,620,000	2,910,000 r	3,370,000
Congo (Kinshasa), primary, electrowon	20,000	10,000	10,000 e	1,800 r	--
Finland:					
Primary	166,577 r	175,206 r	190,235	147,206 r	172,354
Secondary[e]	2,000	2,000	2,000	2,000	2,000
Total	168,577 r	177,206 r	192,235	149,206 r	174,354
Germany:					
Primary	278,600	257,200	273,800	270,200 r	295,000
Secondary	262,600	251,400	266,300	273,400 r	293,300
Total	541,200	508,600	540,100	543,600 r	588,300
India:					
Primary	401,000	486,600	610,000	700,000 r	651,000 e
Secondary[e]	--	38,000	15,000	15,000	11,000
Total	401,000	524,600	625,000	715,000 r	662,000 e
Indonesia, primary	211,600	275,000 e	201,200	277,100 r	261,300
Iran, undifferentiated[4]	184,814	227,000	242,000 e	250,000 e	248,000 e
Japan:					
Primary	1,270,495	1,319,247	1,409,087	1,367,310	1,366,310
Secondary	194,927	198,516	219,203	245,208	259,060
Total	1,465,422	1,517,763	1,628,290	1,612,518	1,625,370
Kazakhstan, undifferentiated	445,200	426,000	426,000 e	409,000 e	430,000 e
Korea, North, primary and secondary[e]	15,000	15,000	15,000	15,000	15,000
Korea, Republic of:					
Primary	392,500	436,600	449,200	475,000	500,000 e
Secondary	50,000	49,900	34,800	40,000	44,300 e
Total	442,500	486,500	484,000	515,000	544,000 e
Mexico:					
Primary	271,000	301,200	260,200	222,200	200,200
Secondary[e]	5,000	5,000	5,000	5,000	5,000
Total	276,000	306,200	265,200	227,200	205,200
Namibia, primary[e, 5]	24,704 [6]	23,300	22,000	21,000	18,600
Oman, primary[e]	25,000	25,000	25,000	25,000 r	25,000

See footnotes at end of table.

TABLE 21—Continued

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

(Metric tons, gross weight)

Country	2004	2005	2006	2007	2008
Pakistan, primary	13,000 r	18,600 r	23,600 r	18,200 r, e	17,800 e
Peru, primary	377,800	381,600	381,300	296,100	360,400
Philippines, primary	217,300	201,300	239,600	219,900	246,700
Poland:					
Primary	542,000	527,000	445,000	438,100 r	416,900
Secondary[e]	33,000	30,000	80,000	40,000	43,900
Total	575,000	557,000	525,000	478,100 r	460,800
Romania:					
Primary	61	--	--	--	--
Secondary[e]	10	10	10	10	--
Total	71	10 e	10 e	10 e	--
Russia:[e]					
Primary	662,000	696,000	635,000	650,000	630,000
Secondary	257,000	262,000	312,000	290,000	235,000
Total	919,000	958,000	947,000	940,000	865,000
Serbia:[e]					
Primary	13,900 r, 7	30,000 r, 7	80,000 r	40,000 r	46,800
Secondary	1,100 7	1,000 r, 7	1,000 r	1,000 r	1,000
Total	15,000 r, 7	31,000 r, 7	81,000 r	41,000 r	47,800
Slovakia, secondary	13,300	15,500	22,000 e	20,600 e	27,500
South Africa, primary[e]	112,025 r, 6	92,000 r	100,000 r	105,000 r	95,000
Spain:					
Primary	210,200	278,600	263,100	249,400	256,900
Secondary[e]	14,100	5,600	6,482 r, 6	6,700	3,000
Total	224,300	284,200	269,582 r	256,100 r	259,900
Sweden:[e]					
Primary	206,000	217,000 r	228,000 r	228,107 r, 6	200,000
Secondary	30,000	30,000	30,000	30,000	25,000
Total	236,000	247,000 r	258,200 r, 6	258,107 r, 6	225,000
Thailand:[e]					
Primary	17,700 6	28,600	1,000	5,600 6	--
Secondary	1,900	2,000	100	500	--
Total	19,600	30,600	1,100	6,100 6	--
Turkey, undifferentiated[8]	34,700	27,600	30,000 e	30,000 e	35,000 e
United States, undifferentiated	542,000	523,000	501,000	617,000	574,000
Uzbekistan, undifferentiated[e]	94,000	105,000	95,000	92,000	92,000
Vietnam, primary	--	--	--	--	2,200 e
Zambia, primary	280,000	270,000	290,000	224,000	232,000 e
Grand total:	12,900,000	13,600,000 r	14,200,000 r	14,300,000	14,700,000
Of which					
Primary:					
Electrowon	20,000 r	10,000 r	10,000 r	1,800 r	--
Other	10,100,000 r	10,600,000 r	10,900,000 r	10,900,000 r	11,300,000
Secondary	1,510,000 r	1,630,000	1,910,000	2,000,000 r	2,070,000
Undifferentiated	1,320,000	1,320,000	1,310,000	1,410,000	1,390,000

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

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

[2]This table includes total production of smelted copper metal, including low-grade cathode produced by electrowinning methods. The smelter feed maybe derived from ore, concentrates, copper precipitate or matte (primary), and/or scrap (secondary). To the extent possible, primary and secondary output of each country is shown separately. In some cases, total smelter production is

TABLE 21—Continued

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

officially reported, but the distribution between primary and secondary has been estimated. Table includes data available through July 14, 2009.

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

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

[5]Includes 8,000 to 10,000 metric tons per year for 2004–06 produced from imported toll concentrates.

[6]Reported figure.

[7]Montenegro and Serbia formally declared independence in June 2006 from each other and dissolved their union.

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

TABLE 22

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

(Metric tons)

Country	2004	2005	2006	2007	2008
Argentina, secondary[e]	16,000	16,000	16,000	16,000	16,000
Australia, primary:					
Electrowon	58,300	50,900	52,400	42,000	53,000
Other	439,700	418,100	377,000 r	400,000 r	450,000
Total	498,000	469,000	429,400 r	442,000 r	503,000
Austria, secondary	74,200 r	72,300 r	72,600	81,400 r	106,700
Belgium:[e]					
Primary[3]	223,000	252,900 [4]	238,000	228,500 [4]	228,500 [4]
Secondary	174,000	130,000	153,000	165,600 [4]	165,000
Total	397,000	382,900 [4]	391,000	394,100 [4]	393,500 [4]
Brazil, primary	208,020	199,043	219,700	218,367 r	223,000 p
Bulgaria:[e]					
Primary	52,300	60,500	65,500 [4]	69,900 r	114,000
Secondary	3,000	3,000	3,000	5,000	13,000
Total	55,300	63,500	68,500	74,900 r	127,000
Burma, electrowon	31,756	34,500	19,500 r	15,100 r	--
Canada:					
Primary	495,835	484,123	465,000 r	407,000 r	400,000
Secondary	30,000 r	31,000 r	36,000 r	46,000 r	42,000
Total	525,835 r	515,123 r	501,000 r	453,000 r	442,000
Chile, primary:					
Electrowon	1,636,300	1,584,600	1,691,800	1,832,100	1,973,700
Other	1,200,400	1,239,400	1,119,500	1,104,400	1,086,600
Total	2,836,700	2,824,000	2,811,300	2,936,500	3,060,300
China:[e]					
Primary					
Electrowon	10,000	15,000	20,000	20,000	20,000
Other	1,580,000	1,850,000	2,000,000	2,280,000 r	2,680,000
Secondary	620,000	750,000	1,000,000	1,200,000 r	1,200,000
Total	2,210,000	2,615,000 [4]	3,020,000	3,500,000 r	3,900,000
Congo (Kinshasa), electrowon	--	--	--	6,200 e	31,000 e
Cyprus, electrowon	1,240	--	1,000	2,900	2,800
Egypt, secondary[e]	4,000 r	4,000 r	4,000 r	4,000 r	4,000
Finland:					
Primary	116,133 r	108,225 r	111,151 r	90,987 r	111,819
Secondary[e]	16,000	16,000	16,000	10,000	10,000
Total	132,133 r	124,225 r	127,151 r	100,987 r	121,819
Germany:					
Primary	283,686	293,812	312,092	301,702	300,470
Secondary	368,956	344,446	350,246	363,815	389,300
Total	652,642	638,258	662,338	665,517	689,770
Hungary, secondary[e]	10,000	10,000	10,000	10,000	--
India:					
Primary, electrolytic	399,000 e	477,000	614,000	698,600 r	654,200
Secondary[e]	20,000	20,000	15,000	15,000	15,000
Total	419,000 e	497,000 e	629,000 e	713,600 r	669,200
Indonesia, primary	210,500	262,900	217,600	221,400 r	181,300

See footnotes at end of table.

TABLE 22—Continued

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

(Metric tons)

Country	2004	2005	2006	2007	2008
Iran:					
Primary:[5]					
Electrowon[e]	12,000	10,000	9,000	8,000	7,000
Other	102,000	123,100	140,000 [e]	145,000 [e]	140,000 [e]
Secondary	38,000	40,000	45,000	55,000 [e]	53,000 [e]
Total	152,000	173,100	194,000 [e]	208,000 [e]	200,000 [e]
Italy, secondary	34,000	32,200	36,400	28,600	24,200 [e]
Japan:					
Primary	1,188,491	1,227,528	1,342,350	1,369,814	1,328,157
Secondary	191,653	167,756	189,705	207,004	211,681
Total	1,380,144	1,395,284	1,532,055	1,576,818	1,539,838
Kazakhstan, primary	445,268	418,356	427,723	406,091	398,000
Korea, North, primary[e]	15,000	15,000	15,000	15,000	15,000
Korea, Republic of:					
Primary	450,952	481,566	541,492	536,467 [r]	489,000
Secondary	45,000	45,000	34,000	45,000	42,000
Total	495,952	526,566	575,492	581,467 [r]	531,000
Laos, electrowon	--	30,480	60,803	62,541	64,100
Mexico:					
Primary:					
Electrowon	78,108	92,675	89,076	107,000 [r]	74,500
Other	290,200	317,700	284,300	238,900 [r]	215,500
Secondary[e]	6,000	6,000	6,000	6,000	6,000
Total	374,308	416,375	379,376	351,900 [r]	296,000
Mongolia, electrowon	2,376	2,475	2,618	3,007 [r]	2,800 [e]
Norway, primary[6]	35,600	38,500	38,500 [e]	43,000 [r]	32,000
Oman, primary[e]	24,000	24,000	24,000	24,000	24,000
Peru, primary:					
Electrowon	166,998 [r]	165,530	173,871	172,118	160,078
Other	338,308	346,206	333,839	237,719 [r]	303,855
Total	505,306 [r]	511,736	507,710	409,837 [r]	463,933
Philippines, primary	174,628	172,000	181,000	160,200 [r]	173,600
Poland:					
Primary	520,000	530,000	476,100	493,200	483,000
Secondary	30,000	30,000	80,500	39,800	43,700
Total	550,000	560,000	556,600	533,000	526,700
Romania:					
Primary	22,526	18,739	18,583	15,584	12,000 [e]
Secondary[e]	2,000	2,000	3,000	3,000	3,000
Total	24,526	20,739	21,583	18,584	15,000 [e]
Russia:					
Primary	682,000	684,000	635,000	650,000	610,000
Secondary	237,000	249,000	312,000	289,000	250,000
Total	919,000	933,000	947,000	939,000	860,000
Serbia:					
Primary	11,000 [r, 7]	30,100 [r, 7]	40,000 [r]	30,600 [r]	32,800
Secondary[e]	1,000 [r, 7]	1,000 [r, 7]	1,000 [r]	1,000 [r]	1,000
Total	12,000 [r, 7]	31,100 [r, 7]	41,000 [r]	31,600 [r]	33,800
South Africa, primary[6]	91,295 [r]	99,439 [r]	104,052	112,799	92,972 [p]

See footnotes at end of table.

TABLE 22—Continued

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

(Metric tons)

Country	2004	2005	2006	2007	2008
Spain:					
Primary	194,100	242,700	235,300	243,000	243,000 e
Secondary[e]	64,300	66,000	64,000	65,000	65,000
Total	258,400	308,700	299,300	308,000	308,000 e
Sweden:					
Primary	191,300 r	180,000 r	187,800 r	175,500 r	184,674
Secondary	43,700 r	43,500 r	41,200 r	38,500 r	43,100
Total	235,000	223,500 r	229,000	214,000	227,774
Taiwan, secondary[e]	4,000	4,000	4,500	4,500	4,500
Thailand:					
Primary	16,200 r	11,000 r	18,600 r	11,914 r	--
Secondary	1,900	2,000	100	800	--
Total	18,100	13,000	18,700	12,714	--
Turkey:[e]					
Primary	64,000	90,000 r	101,000 r	100,000 r	94,600
Secondary	5,000	5,000	5,000	5,000	5,000
Total	69,000	95,000 r	106,000 r	105,000 r	99,600
Ukraine, secondary	20	20	20	20	20
United States:					
Primary:					
Electrowon	584,000	554,000	530,000	504,000	507,000
Other	671,000	654,000	675,000	764,000	713,000
Secondary	50,800	47,200	44,800	46,000	53,800
Total	1,310,000	1,260,000	1,250,000	1,310,000	1,270,000
Uzbekistan, primary	93,770	103,870	92,300 e	89,655	90,000 e
Vietnam, primary	--	--	-- r	-- r	2,200 e
Zambia, primary:[e]					
Electrowon[8]	124,000 4	155,000 4	178,000	200,000 r	175,000
Other	286,000 4	244,000	240,000	230,000	240,000
Total	410,000 4	399,000	418,000	430,000 r	415,000
Zimbabwe, primary[e]	7,000	7,000	7,000	6,798 r, 4	3,072 4
Grand total	15,900,000	16,500,000 r	17,300,000	17,800,000 r	18,200,000
Of which:					
Primary:					
Electrowon	2,710,000	2,690,000	2,830,000	2,980,000 r	3,070,000
Other	11,100,000	11,700,000	11,900,000	12,100,000 r	12,300,000
Secondary	2,090,000 r	2,140,000 r	2,540,000 r	2,750,000 r	2,770,000

[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 14, 2009.

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

[4]Reported figure.

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

[6]May include secondary.

[7]Montenegro and Serbia formally declared independence in June 2006 from each other and dissolved their union.

[8]Electrowon covers only high-grade electrowon cathodes reported as “finished production leach cathodes.”