

COPPER

(Data in thousand metric tons of copper content, unless otherwise noted)

Domestic Production and Use: Domestic mine production in 2002 declined to 1.13 million metric tons and was valued at about \$1.9 billion. The principal mining States, in descending order, Arizona, Utah, and New Mexico, accounted for 99% of domestic production; copper was also recovered at mines in three other States. Although copper was recovered at 22 mines operating in the United States, just 13 mines accounted for more than 99% of production. Three primary smelters, 4 electrolytic and 3 fire refineries, and 12 solvent extraction-electrowinning facilities operated during the year. Refined copper and direct melt scrap were consumed at about 35 brass mills; 13 rod mills; and 600 foundries, chemical plants, and miscellaneous consumers. Copper and copper alloy products consumed¹ in building construction totaled 44%; electric and electronic products, 25%; transportation equipment, 11%; industrial machinery and equipment, 10%; and consumer and general products, 10%.

Salient Statistics—United States:	1998	1999	2000	2001	2002^e
Production:					
Mine	1,860	1,600	1,450	1,340	1,130
Refinery:					
Primary	2,140	1,890	1,590	1,630	1,450
Secondary	349	230	209	172	95
Copper from all old scrap	466	381	357	316	250
Imports for consumption:					
Ores and concentrates	217	143	(2)	46	95
Refined	683	837	1,060	991	900
Unmanufactured	1,190	1,280	1,350	1,400	1,220
Exports:					
Ores and concentrates	37	64	116	45	20
Refined	86	25	94	23	30
Unmanufactured	412	395	650	556	400
Consumption:					
Reported refined	2,890	2,980	3,030	2,620	2,500
Apparent unmanufactured ³	3,030	3,130	3,100	2,500	2,700
Price, average, cents per pound:					
Domestic producer, cathode	78.6	75.9	88.2	76.9	75
London Metal Exchange, high-grade	75.0	71.3	82.2	71.6	70
Stocks, yearend, refined, held by U.S. producers, consumers, and metal exchanges	532	565	334	952	1,020
Employment, mine and mill, thousands	13.0	10.3	9.1	8.2	7
Net import reliance ⁴ as a percentage of apparent consumption	14	27	37	22	37

Recycling: Old scrap, converted to refined metal and alloys, provided 250,000 tons of copper, equivalent to 9% of apparent consumption. Purchased new scrap, derived from fabricating operations, yielded 900,000 tons of contained copper; about 90% of the copper contained in new scrap was consumed at brass or wire-rod mills. Of the total copper recovered from scrap (including aluminum- and nickel-base scrap), brass mills recovered 70%; copper smelters and refiners, 8%; ingot makers, 11%; and miscellaneous manufacturers, foundries, and chemical plants, 11%. Copper in all old and new, refined or remelted scrap contributed 32% of the U.S. copper supply.

Import Sources (1998-2001): Unmanufactured: Canada, 30%; Chile, 23%; Peru, 19%; Mexico, 15%; and other, 13%. Refined copper accounted for 68% of unwrought copper imports.

Tariff: Item	Number	Normal Trade Relations⁵ 12/31/02
Unrefined copper; anodes	7402.00.0000	Free.
Refined and alloys; unwrought	7403.00.0000	1.0% ad val.
Copper powder	7406.10.0000	Free.
Copper wire (rod)	7408.11.6000	3.0% ad val.

Depletion Allowance: 15% (Domestic), 14% (Foreign).

Government Stockpile: The stockpile of about 20,000 tons of refined copper was liquidated in 1993. The stockpile of about 8,100 tons of brass was liquidated in 1994. Details on inventories of beryllium-copper master alloys (4% beryllium), can be found in the section on beryllium.

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Events, Trends, and Issues: The strong growth trend in world mine production that began in 1995 came to an abrupt halt in 2002 when producers, primarily in the United States and Chile, instituted cutbacks. The reduced output occurred despite a growth of more than 400,000 tons in world mine capacity. According to preliminary data compiled by the International Copper Study Group,⁶ however, world refinery production for the first 7 months of 2002 was essentially unchanged from that in 2001. World copper use for the first 7 months of the year, buoyed by a 19% rise in China's apparent consumption, rose by about 1%. The surplus of refined production that saw global inventories rise by 800,000 tons in 2001, continued; inventories rose by an additional 250,000 tons before showing signs of reversing at midyear. Copper prices rose during the first half of the year; the COMEX price averaged \$0.76 per pound in June, but by September had fallen back to the December 2001 average of \$0.68.

Production cutbacks previously imposed in the United States continued into 2002. In January, Phelps Dodge Corp. implemented most of the cutbacks announced in October 2001, curtailing 165,000 tons per year of production by closing its Miami (AZ) leach operations and halving production at the Sierrita (AZ) and Bagdad (AZ) mines. Its Chino (NM) electrowon operation, however, continued to operate. It also closed its Chino smelter and Miami refinery.⁷ Secondary refined production and copper recovery from old scrap fell sharply following the sudden closure of the sole remaining U.S. secondary smelter in November 2001. ASARCO Incorporated, facing cashflow problems and large environmental remediation costs, was seeking to raise capital by selling its share of Southern Peru Copper Corp. to its Mexican-based parent company, but has been temporarily enjoined from doing so following intervention by the U.S. Department of Justice. (For details, see USGS Mineral Industry Surveys, Copper in July 2002.)

World Mine Production, Reserves, and Reserve Base: Reserves and reserve base estimates for Australia, Chile, China, and Poland have been revised upward based on new information from official country sources. Revisions to other countries were based on updated tabulations of resources reported by companies or individual properties.

	Mine production		Reserves ⁸	Reserve base ⁸
	2001	2002 ^e		
United States	1,340	1,130	35,000	70,000
Australia	869	850	24,000	43,000
Canada	633	625	10,000	23,000
Chile	4,740	4,450	160,000	370,000
China	590	580	26,000	63,000
Indonesia	1,050	1,100	28,000	38,000
Kazakhstan	470	450	14,000	20,000
Mexico	367	330	27,000	40,000
Peru	722	850	35,000	60,000
Poland	474	500	31,000	50,000
Russia	620	680	20,000	30,000
Zambia	300	320	19,000	35,000
Other countries	<u>1,510</u>	<u>1,500</u>	<u>60,000</u>	<u>110,000</u>
World total (may be rounded)	13,700	13,400	480,000	950,000

World Resources: Land-based resources are estimated to be 1.6 billion tons of copper, and resources in deep-sea nodules are estimated to be 700 million tons. In the United States, discovered resources are estimated to contain 350 million tons of copper, and undiscovered deposits are estimated to contain 290 million tons of copper.

Substitutes: Aluminum substitutes for copper in various products, such as electrical power cables, electrical equipment, automobile radiators, and cooling/refrigeration tubing. In some applications titanium and steel are used in heat exchangers, and steel is used for artillery shell casings. Optical fiber substitutes for copper in some telecommunications applications. Plastics also substitute for copper in water pipe, plumbing fixtures, and many structural applications.

^eEstimated.

¹Some electrical components are included in each end use. Distribution by Copper Development Association, 2002.

²Less than ½ unit.

³Defined as primary refined production + copper from old scrap converted to refined metal and alloys + refined imports - refined exports ± changes in refined stocks. In 1998, 1999, 2000, 2001, and 2002, general imports of 725,000 tons, 915,000 tons, 1,020,000 tons, 1,200,000 tons, and 1,100,000 tons, respectively, were used to calculate apparent consumption.

⁴Defined as imports - exports + adjustments for Government and industry stock changes for refined copper.

⁵No tariff for Canada and Mexico for items shown.

⁶International Copper Study Group, 2002, Copper Bulletin: Lisbon, Portugal, International Copper Study Group, v. 9, no. 10, 46 p.

⁷Phelps Dodge Corp., 2001, Phelps Dodge addresses current economic environment: Phoenix, Phelps Dodge news release, October 23, 3 p.

⁸ See Appendix C for definitions.