

Copper

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The recovery in prices that began in the third quarter of 1999 continued over the course of 2000, driven by strong demand during the first half of the year and falling stock levels from the second quarter onward. Despite a dramatic decline in economic activity in the United States during the fourth quarter of 2000, global demand for refined copper grew by 7.5% in 2000, according to data published by the International Copper Study Group. This compares to an average long-term use growth rate of 3.3% per year. The supply of refined copper grew by a more modest 2.3% in 2000, and these market fundamentals produced a metal deficit of 457 000 t. The London Metal Exchange (LME) cash settlement price for Grade A copper averaged US\$1813/t (US\$2.4c/lb) in 2000, a 15.3% increase from 1999.

CANADIAN DEVELOPMENTS

Canada's provisional mine production of copper in 2000 totaled 622 300 t, about 7% higher than the 1999 total of 583 800 t (mine production figures are based on recoverable copper in concentrate shipped). Full production from the Highland Valley and Myra Falls mines, both of which were shut down temporarily in 1999, was offset by lower output from Falconbridge Limited's mines due to a strike at the Sudbury operations and lower ore grades at Kidd Creek. Canada's provisional production of refined copper metal in 2000 totaled 551 400 t, about 2% higher than the 540 500 t produced in 1999. In 2000, Canada ranked fifth in the world in terms of mine production (Table 3).

Quebec

In May, Breakwater Resources Ltd. acquired the Bouchard-Hébert and Langlois mines, located in

northwestern Quebec, from Cambior inc. Earlier in the year, Cambior had announced mechanical problems with the semi-autogenous grinding (SAG) mill at the Bouchard-Hébert mine, which resulted in a temporary shut-down of the mill. The repaired SAG mill was back in production in October and reached full capacity of 2900 t/d by year-end. In November, Breakwater announced that it would be temporarily suspending operations at the Langlois mine due to operating problems associated with the main ore pass system. In 1999, the Bouchard-Hébert mine produced 7200 t of copper in concentrate and the Langlois mine produced 1000 t of copper in concentrate.

Ontario

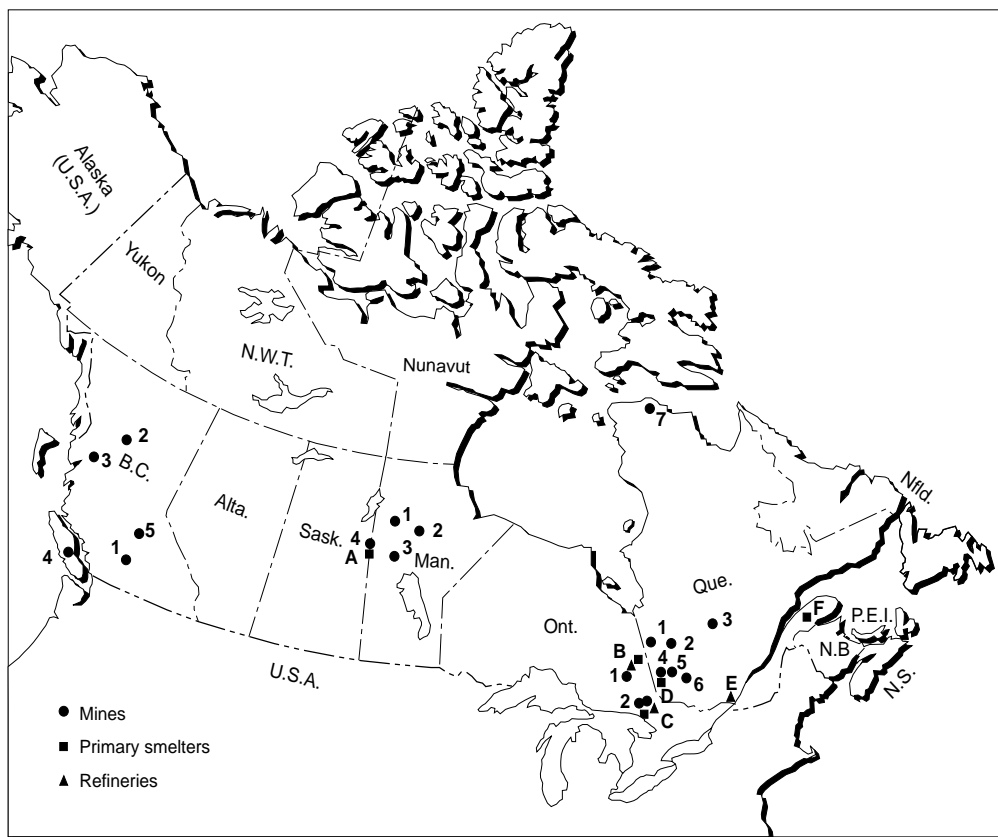
In July, Falconbridge announced that it will proceed with a \$640 million project to extend the depth of its Kidd Creek mine in Timmins, Ontario, by 1000 m to a total depth of 3100 m. At the new depth, the Kidd Creek mine will be the world's deepest base-metal mine. The extension is expected to contribute 2 Mt of ore annually when full production levels are reached. Production is expected to begin in 2004.

Falconbridge Limited and the production and maintenance workers in Sudbury (Canadian Auto Workers CAW Local 598) signed a 35-month collective agreement on February 20, 2001, ending a six-and-a-half-month strike.

Manitoba

A series of explosions in the main smelting furnace at Hudson Bay Mining and Smelting Co., Limited's Flin Flon, Manitoba, metallurgical complex on August 8, 2000, forced the company to shut down copper smelting operations and declare force majeure on copper shipments for a period of almost three months. The explosion was triggered when water being used to cool the furnace in preparation for rebricking came into contact with molten metal. One worker was killed and thirteen others were injured. Force majeure was lifted on November 27. The rated capacity of the smelter is 90 000 t/y of copper.

Figure 1
Copper Producers in Canada, 2000



Numbers refer to locations on map above.

MINES

BRITISH COLUMBIA

1. Highland Valley Copper
2. Northgate Exploration Ltd. (Kemess)
3. Imperial Metals Corporation (Huckleberry)
4. Boliden Limited (Myra Falls)
5. Imperial Metals Corporation (Mount Polley)

SASKATCHEWAN

Hudson Bay Mining and Smelting Co., Limited (Flin Flon)

MANITOBA

1. Hudson Bay Mining and Smelting Co., Limited (Ruttan mine)
2. Inco Limited (Thompson mine)
3. Hudson Bay Mining and Smelting Co., Limited (Photo Lake mine)
4. Hudson Bay Mining and Smelting Co., Limited (Flin Flon area mines including Konuto Lake)

ONTARIO

1. Falconbridge Limited (Timmins)
2. Falconbridge Limited (Sudbury area)
Inco Limited (Sudbury area)

QUEBEC

1. Les Mines Selbaie (Billiton Base Metals)
2. Noranda Inc. (Bell Allard mine)
3. Campbell Resources Inc. (Joe Mann mine)
4. Breakwater Resources Ltd. (Bouchard-Hébert mine)
5. Agnico-Eagle Mines Limited (La Ronde mine)
Barrick Gold Corporation (Bousquet mine)
6. Aur Resources, Inc., Novicourt Inc., Teck Corporation (Louvicourt mine)
7. Falconbridge Limited (Raglan)

NEW BRUNSWICK

Noranda Inc. (Brunswick mine)

PRIMARY SMELTERS

- A. Hudson Bay Mining and Smelting Co., Limited (Flin Flon)
- B. Falconbridge Limited (Timmins)
- C. Inco Limited (Sudbury area)
Falconbridge Limited (Sudbury area)
- D. Noranda Inc. (Noranda)
- F. Noranda Inc. (Gaspé)

REFINERIES

- B. Falconbridge Limited (Timmins)
- C. Inco Limited (Sudbury area)
- E. Noranda Inc. (CCR Division)

1 Highland Valley Copper is a partnership of Cominco Ltd., Teck Corporation and Rio Algom Limited.

British Columbia

In October, Cominco Engineering Services Ltd. signed a memorandum of understanding with Taseko Mines Limited to begin a \$3 million study to investigate the feasibility of constructing a 35 000-t/y copper refinery at the Gibraltar mine site near Williams Lake, British Columbia. The refinery would use Cominco's hydro-metallurgical technology to leach copper concentrate. The study will be completed in early 2001.

In November 2000, London-based Billiton Plc acquired 100% control of Toronto-based Rio Algom Limited. Rio Algom's operations in Canada include a 33.6% partnership interest in the Highland Valley Copper (HVC) copper mine in British Columbia. Rio Algom's other copper interests include a 100% interest in the Cerro Colorado mine in northern Chile, a 25% interest in the Alumbrera copper-gold mine in Argentina, and a 33.75% interest in the Antamina copper-zinc mine in Peru. Billiton's operations in Canada include Les Mines Selbaie, a wholly owned copper-zinc mine located in northwestern Quebec. Following exhaustion of current ore reserves, processing is expected to continue at Selbaie until June 2004 from low-grade ore stockpiled during the mining period. A trust fund is also in place to guarantee closure and reclamation costs.

WORLD DEVELOPMENTS

World mine production of copper was 13.2 Mt in 2000 compared to 12.7 Mt in 1999 (Table 3). During 2000, world production of refined copper (which includes refined copper from both primary and recycled material) increased to 14.8 Mt from 14.5 Mt in 1999 (Table 4). The price recovery had a positive effect on copper scrap supplies in 2000. Within the total world production of refined copper, the recycled component increased slightly to 2.1 Mt in 2000.

Chile

Total Chilean copper mine production in 2000 was 4.6 Mt, a 5% increase over 1999 production. Chile is the world's largest copper producer and its output accounted for 35% of total world copper mine production in 2000. Approximately two thirds of 2000 output came from private-sector producers, with the remaining one third coming from the Corporacion Nacional del Cobre de Chile (Codelco-Chile), the state-owned copper producer. Planned expansions announced during 2000, anticipated new projects, and further exploration should ensure that Chile maintains its dominant position in the world copper industry.

Codelco-Chile announced in August that it will invest US\$640 million to expand production at the El Teniente Division by 130 000 t/y to 480 000 t/y by 2003.

In February, Noranda Inc. announced plans to proceed with a US\$170 million, two-stage expansion of its Altonorte smelter located in northern Chile. The first stage will involve a technology upgrade of some equipment by the end of 2001. The second stage comprises an expansion from 160 000 t/y to 290 000 t/y of anode and blister and will be completed in early 2003.

In November, BHP Limited (BHP) and its joint-venture partners in the Escondida copper mine in northern Chile announced the approval of the US\$1 billion Phase IV expansion project. The project will increase average annual copper production by 400 000 t to 1.2 Mt/y over the first five years of full production. The expansion will be completed by the end of 2002. Escondida is owned by BHP of Australia (57.5%), Rio Tinto of the United Kingdom (30%), and the Japanese consortium, Jeco, led by Mitsui & Co., Ltd. (10%) and the International Finance Corporation (IFC) (2.5%).

Japan

Sumitomo Metal Mining Co., Ltd. announced plans in April to raise copper production from 230 000 t/y to 400 000 t/y by 2005.

Indonesia

On May 4, 2000, a waste-water spill occurred at the Grasberg mine's Wanagon Basin at the Grasberg main complex in Irian Jaya, Indonesia, the third such incident since 1998 according to BAPADEL, Indonesia's environment agency. Following the spill, acting on a recommendation from the Indonesian government, the mine's owners, P.T. Freeport Indonesia Company (PTFI), made a small production cut from the open pit to reduce environmental pressures from tailings and overburden. In addition, overburden dumping in Lake Wanagon was halted and geotechnical studies were ordered and will be reviewed by Freeport and local and national government agencies to determine the longer-term implications of the spills on current and future operations. The Grasberg complex is the world's largest gold-copper mine. In 1999, it produced 1 630 700 t of copper.

Zambia

Government-owned Zambia Consolidated Copper Mines Limited (ZCCM) completed the privatization of Zambia's largest and most promising mining and metallurgical assets. The sale was made under two separate agreements. The first was the sale of ZCCM's Mufulira Division and part of the Nkana Division to a new company called Mopani Copper Mines, formed by a consortium comprising Canadian-based First Quantum Minerals Ltd. (44%), Swiss-based Glencore International AG (46%), and ZCCM

(10%). The second transaction was the sale of the Konkola Division, including the Konkola Deep project, the Nchanga Division and the Nampundwe pyrite mine, to a newly formed company called Konkola Copper Mines, owned 65% by Anglo American plc's subsidiary Zambian Consolidated Investments Limited, 20% by ZCCM, and 15% by the World Bank's Commonwealth Development Corporation and the IFC (7.5% each).

Peru

In November 2000, Cambior announced the sale of its La Granja copper project in Peru to Billiton for approximately \$37.5 million.

United States

After failing to find a buyer for its Atlanta-based Carrollton copper refinery, Southwire announced in April that it now plans to close the facility. The plant used 200 000 t/y of recycled copper when running at full capacity. Industry analysts cited the cost of compliance with metro Atlanta's environmental regulations as a factor in the closure. Southwire's rod mill will continue to operate.

Copper Usage

World copper usage increased to 15.3 Mt in 2000 from 14.2 Mt in 1999 (this includes refined copper from both primary and recycled material). Canadian refined copper usage increased to 274 000 t in 2000 from 266 500 t in 1999 (Table 5).

Copper's properties, particularly its high electrical and thermal conductivity, good tensile strength, elevated melting point, non-magnetic properties and resistance to corrosion, make it and its alloys very attractive for electrical transmission, water tubing, castings and heat exchangers. Copper is the most efficient conductor of electrical power, signals and heat of all the industrial metals. In Canada, more than half of the refined copper consumed annually is used for electrical applications, mostly as wire. Copper's surface lustre makes it attractive for sculpting, jewellery and architectural applications.

According to figures compiled by CRU International Limited, 75% of copper is used in wire and cable, of which two thirds is used in energy cables (power cables, building wire, etc.). The next largest market is magnet wire, used in cars and appliances, which has shown rapid growth in recent years. Of the copper used annually, 22% is manufactured into tube, sheet and rod for use in various applications, including building construction, industrial machinery and equipment, and consumer and general products.

Table 8 presents preliminary end-use data for 1999 and 2000 for the United States collected by the

Copper Development Association Inc. (detailed statistics on copper use are not officially collected in Canada).

MARKETS

In Canada, copper tube and fittings are now being used in houses and other buildings to carry natural gas. The growth of this market has been dramatic, with copper quickly becoming the preferred material, replacing steel pipe. This market is being heavily promoted by the Canadian Copper & Brass Development Association (CCBDA) with the financial support of the ICA. The CCBDA will make special promotional efforts in areas of eastern Canada that have recently gained, or will soon gain, access to natural gas distribution. The CCBDA and the Copper Development Association Inc. of the United States have also jointly undertaken major North American initiatives on the promotion of plumbing tube and fittings, as well as architectural applications.

In addition, the CCBDA is actively involved in the promotion of electrical wire and cable, with particular emphasis on the use of larger conductors to improve energy efficiency and power quality, and on industrial and commercial power cable for building applications.

In recent years, copper has benefited from increasing consumer demand for large and small appliances, household convenience items, computers, and automotive options. In North America, there has been a noticeable increase in the intensity of copper use in residential applications. Part of this change is attributable to the construction of larger houses and the growth of home-based offices. In many homes there is a need for multiple phone lines to handle faxes, modems and security systems.

Although the use of fibre-optic cable in the communications and telecommunications sectors has increased in recent years, the development of new technologies has permitted copper wire to remain competitive, particularly in low-density applications, including communication connections to individual homes and for internal network links such as desk-to-desk telephone and computer connections.

The use of additional electronics has also stimulated growth in demand for copper wire from the automotive industry in recent years. However, the introduction of multiplex electronic systems could limit copper demand in this application.

With technological advances and design innovations, new brazed copper-brass radiators have been developed that are 35-40% lower in weight than traditional copper-brass radiators. According to the ICA, these brazed radiators are produced more easily and at a lower cost than comparable aluminum radiators.

A number of other promising new markets for copper could also provide significant growth opportunities. These include the use of copper as an additive in roofing shingles to prevent the formation of algae and fungus and its use in fire suppression systems, natural gas systems, solar power generation equipment, and the storage of spent nuclear fuel.

Copper Recycling

There were 5 153 000 t of scrap copper recovered in 1999. Copper scrap recovery includes the production of both recycled refined copper and the direct scrap copper used by manufacturers. The United States is the largest source of scrap copper; it is estimated that the United States recovered 1 297 000 t of scrap copper in 1999. According to annual surveys conducted by Natural Resources Canada, a total of 107 000 t of contained copper in scrap was recovered in Canada in 1999.

The useful service life of copper-containing products is estimated to be 35 years for residential housing, 30 years for electrical plants, 15 years for non-electrical machinery, 10 years for transportation applications, and generally 10 years for other end uses. Due to the long life of many consumer and industrial products containing copper, the calculation of pure recycling rates presents a challenge. The Statistical Committee of the International Copper Study Group is proposing to focus on obtaining more reliable and comprehensive statistics on the production and use of scrap copper. In Canada, Statistics Canada and Natural Resources Canada are working jointly to improve data on metals recycling. New recycling data for the major metals recycled in Canada, including copper, will be available in early 2003 for the reference year 2001.

Scrap copper competes directly with primary forms. Smelters and refineries can, to some extent, substitute scrap for concentrate or blister copper. Foundries and other consumers may use either primary refined copper or scrap. Scrap copper accounts for 35-40% (Table 11) of the raw material input of global refined copper production.

Copper wire is the single most important source of copper scrap. For recovery purposes, scrap copper is segregated into four principal categories: No. 1 copper wire, No. 2 copper wire, No. 3 copper wire, and copper-bearing scrap. The differentiation between No. 1 and No. 2 copper wire relates to the minimum copper content of the wire. Other major sources of scrap copper include copper tubing, electrical motors and copper sheeting. Copper scrap also arises in the form of residues and can be recovered from metallurgical compounds, metallic dusts, electronic scrap, copper-containing ashes, and copper-containing sludges. Bronze alloys contain varying percentages of copper and tin as their principal elements. They

may also contain smaller proportions of both lead and zinc. Brass alloys contain copper and zinc as their principal elements and may also contain smaller proportions of both tin and lead. Brass and bronze scrap arises in forms such as water valves, plumbing fixtures, auto radiators, cast machinery, train brake linings, ship propellers, brass pipes, water condenser tubes, and lighting fixtures.

The recovery of copper from recycled sources can have significant energy savings when compared to the production of primary copper.

RELATIVE ENERGY REQUIREMENTS TO PRODUCE COPPER FROM VARIOUS SOURCES (PRIMARY = 100)

Copper Source	Energy Requirements (%)
No. 1 scrap copper	3
No. 2 scrap copper	14
Copper-bearing scrap	35
Brass and bronze scrap	6

Source: Kusik & Kenahan, *Energy Use Patterns for Metal Recycling*.

COPPER AND HEALTH

Copper is essential to plant, animal and human health. Deficiencies, as well as excesses, can be detrimental to health. At a Task Group meeting of the International Programme on Chemical Safety (IPCS) held in Brisbane in June 1996, there was a recognition that copper is an essential trace element for human health and that there are greater risks, in Europe and the Americas in particular, of health effects from copper deficiency than from excess copper intake.

The World Health Organization (WHO) has suggested a recommended daily intake of copper of 130 to 200 micrograms (μg) of copper per kg of body weight for infants from birth to six months, 80 to 120 $\mu\text{g}/\text{kg}$ for infants over six months and young children up to age 10, and 30 to 60 $\mu\text{g}/\text{kg}$ for children of 10 years and above and adults.

Acute copper poisoning is infrequent in humans, largely restricted to the voluntary or accidental ingestion of copper salts. According to the Copper Development Association Inc., the WHO and the U.S. Food and Agricultural Administration (FAA) are likely to suggest that the population's mean intake of copper

should not exceed 12 mg/d for adult males and 10 mg/d for adult females. These levels are regarded as the lowest intake levels likely to produce the slightest biochemical evidence of undesirable effects in all but a small number of the population.

Sources of dietary copper include liver and other organ meat, pork and beef, vegetables (potatoes, peas, beans, lettuce and tomatoes), seafood (oysters, shrimp, trout, flounder and tuna), chocolate, nuts, grains, seeds and fruit.

Many regulatory agencies, including Health Canada, have chosen 1 part per million (ppm) as the maximum desirable concentration of copper in drinking water. It signifies more of an aesthetic limit than a health limit; water containing more than 1 ppm can stain laundry and persons with a keen sense of taste may perceive a metallic flavour in the water.

In 1993, the WHO included copper in a group of chemicals of health significance in drinking water and recommended a guideline value of 2 mg/L. The recommendation was deemed provisional due to uncertainties regarding copper toxicity in humans. As a result, scientific discussions were conducted internationally and the WHO revised its recommendation in 1997 with the guideline value of 2 mg/L for copper now defined on the basis of the potential for

acute gastrointestinal effects. The recommendation remains provisional in view of the remaining uncertainties regarding copper toxicity in humans.

STOCKS

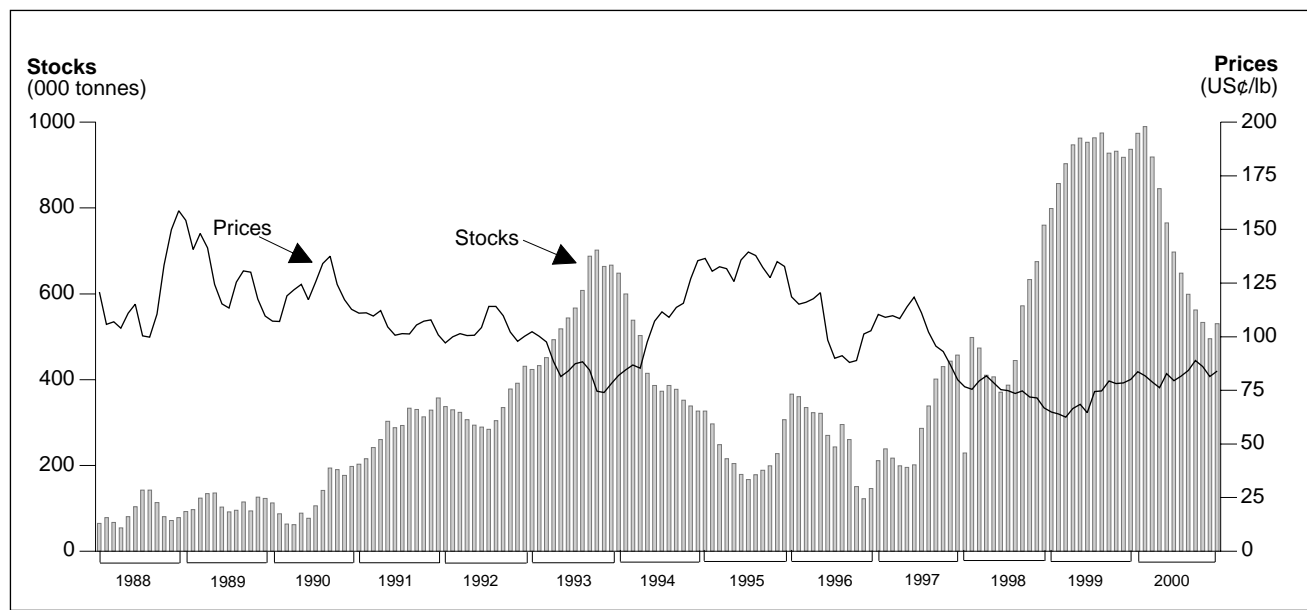
Combined copper stocks on the London Metal Exchange (LME), the Commodities Exchange, Inc. (COMEX) and the Shanghai Metal Exchange declined substantially during the year. At the end of December 2000, stocks at the above-mentioned metal exchanges stood at 523 700 t, compared to 936 500 t at the end of 1999.

Total copper stocks, including those at producers, merchants, consumers and exchanges, totaled 1 230 800 t at the end of 2000, compared to 1 619 000 t at the end of 1999. Figure 2 shows both total copper stocks and prices for the period 1990-2000.

PRICES

Copper prices on the LME averaged US\$1813/t (US82.4¢/lb) in 2000 (Figure 2), compared to US\$1573/t (US71¢/lb) in 1999.

Figure 2
Copper Prices¹ and Exchange² Stocks, 1988-2000



Source: Natural Resources Canada.

¹ Average monthly LME cash prices. ² Combined exchange stocks at end of the month.

OUTLOOK

Copper prices have been declining in 2001, mainly due to a substantial slowdown in demand for copper in the first six months of 2001 brought about by a sharp drop in economic activity in most of the major copper-using regions (the United States, Europe and Asia). While global growth in demand for copper in 2000 was a very healthy 7.5%, current forecasts indicate that demand growth will be negative in 2001 ranging from -0.8% to -3.5%. This compares with an increase in supply in 2000 of 2.3% and a forecast increase in growth in supply in 2001 of 3.9%.

The decline in demand has pushed the supply/demand balance for copper metal from a deficit in 2000 of 457 000 t to a surplus at the end of June 2001 of 100 000 t. In addition, by mid-2000, stock levels at exchanges had begun to rise dramatically as manufacturers/fabricators destocked or reduced inventories in response to weakening demand for their products. These supply/demand fundamentals drove the copper price down from US81¢/lb (or US\$1794/t) in the first quarter of 2001 to US66¢/lb (US\$1485/t) by the end of August. This period of destocking is expected to come to an end; however, any sustained recovery in price will be tied to the recovery in global economies. The key factor will be the timing of a recovery in the North American economy and the extent of demand in China. North America accounts for 25% of refined copper use but more than this is imported in the form of semi-fabricated products and finished goods. China will continue to be the swing factor in determining whether copper markets are in a surplus or deficit. In 2000, China's use of copper metal accounted for 12% of global demand. Chinese copper use is still growing rapidly and will continue to outpace increases in China's production capacity. Therefore, the extent of China's need to import copper will continue to influence copper prices.

Currently, most analysts are forecasting prices to decline somewhat further in the third quarter of 2001 to the US62¢-64¢/lb level before recovering, based on the assumption that the decline in industrial production has reached an end and that demand for copper will begin to recover in the fourth quarter of 2001. For the full year of 2001, prices are forecast to average in the US73¢-75¢/lb range, or US\$1600-1654/t.

Looking ahead to 2002, growth in use is expected to reach 5-5.5% while growth in supply is expected to reach between 3 and 3.5%. This should bring the supply/demand back into balance; however, the overhang of metal stocks will dampen the price recovery. Thus, in 2002, the copper price is expected to average around US80.5¢/lb (US\$1775/t). Beyond 2002, the

price outlook becomes much more bullish as growth in demand is anticipated to outstrip supply. This could push prices up to the US\$1.00/lb level (US\$2205/t) in the 2003/04 period.

Notes: (1) For definitions and valuation of mineral production, shipments and trade, please refer to Chapter 65. (2) Information in this review, used for the outlook for copper markets, was current as of August 15, 2001. (3) This and other reviews, including previous editions, are available on the Internet at http://www.nrcan.gc.ca/mms/cmy/index_e.html.

NOTE TO READERS

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TARIFFS

Item No.	Description	Canada			United States	EU	Japan ¹
		MFN	GPT	USA	Canada	MFN	WTO
2603.00	Copper ores and concentrates						
2603.00.00.10	Copper content	Free	Free	Free	Free	Free	Free
2825.50	Copper oxides and hydroxides	Free	Free	Free	Free	3.2%	4.8%
28.33	Sulphates; alums; peroxosulphates (persulphates)						
	Other sulphates:						
2833.25	Of copper						
2833.25.10	Cupric sulphate	Free	Free	Free	Free	3.2%	3.9%
2833.25.90	Other copper sulphates	5.5%	Free	Free	Free	3.2%	3.9%
74.01	Copper mattes; cement copper (precipitated copper)						
7401.10	Copper mattes	Free	Free	Free	Free	Free	Free
7401.20	Cement copper (precipitated copper)	Free	Free	Free	Free	Free	Free
7402.00	Unrefined copper; copper anodes for electrolytic refining	Free	Free	Free	Free	Free	Free-3%
74.03	Refined copper and copper alloys, unwrought						
	Refined copper:						
7403.11	Cathodes and sections of cathodes	Free	Free	Free	Free	Free	Free-3%
7403.12	Wire bars	Free	Free	Free	Free	Free	Free-3%
7403.13	Billets	Free	Free	Free	Free	Free	Free-3%
7403.19	Other	Free	Free	Free	Free	Free	Free-3%
	Copper alloys:						
7403.21	Copper-zinc base alloys (brass)	Free	Free	Free	Free	Free	Free
7403.22	Copper-tin base alloys (bronze)	Free	Free	Free	Free	Free	Free-3%
7403.23	Copper-nickel base alloys (cupro-nickel) or copper-nickel-zinc base alloys (nickel-silver)	Free	Free	Free	Free	Free	Free-3%
7403.29	Other copper alloys (other than master alloys of heading no. 74.05)	Free	Free	Free	Free	Free	Free-3%
7404.00	Copper waste and scrap	Free	Free	Free	Free	Free	Free
7405.00	Master alloys of copper	Free	Free	Free	Free	Free	3%
74.06	Copper powders and flakes	Free	Free	Free	Free	Free	3%
74.07	Copper bars, rods and profiles	Free-3%	Free	Free	Free	4.8%	3%
74.08	Copper wire, of refined copper	Free-3%	Free	Free	Free	4.8%	3%
74.09	Copper plates, sheets and strip, of a thickness exceeding 0.15 mm	Free	Free	Free	Free	4.8%	3%
74.10	Copper foil (whether or not printed or backed with paper, paperboard, plastics or similar backing materials) of a thickness (excluding any backing) not exceeding 0.15 mm	Free	Free	Free	Free	5.2%	3%
74.11	Copper tubes and pipes	2-2.5%	Free	Free	Free	4.8%	3%
74.12	Copper tube or pipe fittings (for example, couplings, elbows, sleeves)	3%	Free	Free	Free	5.2%	Free
7413.00	Stranded wire, cables, plaited bands and the like, of copper, not electrically insulated	3%	Free	Free	Free	Free-5.2%	3%
74.14	Cloth (including endless bands), grill and netting, of copper wire; expanded metal of copper	3%	Free	Free	Free	4.3%	Free
74.15	Nails, tacks, drawing pins, staples (other than those of heading no. 83.05) and similar articles, of copper or of iron or steel with heads of copper; screws, bolts, nuts, screw hooks, rivets, cotters, cotter-pins, washers (including spring washers) and similar articles, of copper	Free-3%	Free	Free	Free	3-4%	Free
7416.00	Copper springs	3%	Free	Free	Free	4%	Free
7417.00	Cooking or heating apparatus of a kind used for domestic purposes, non-electric and parts thereof, of copper	3%	Free	Free	Free	4%	Free
74.18	Table, kitchen or other household articles and parts thereof, of copper; pot scourers and scouring or polishing pads, gloves and the like, of copper; sanitary ware and parts thereof, of copper	3%	Free	Free	Free	3%	Free
74.19	Other articles of copper	Free-9.5%	Free-5%	Free	Free	3%	Free

Sources: *Customs Tariff*, effective January 2001, Canada Customs and Revenue Agency; *Harmonized Tariff Schedule of the United States*, 2001; *Worldtariff Guidebook on Customs Tariff Schedules of Import Duties for European Union* (40th Annual Edition: 2000); *Custom Tariff Schedules of Japan*, 2000.

¹ WTO rate is shown; lower tariff rates may apply circumstantially.

TABLE 1. CANADA, COPPER PRODUCTION AND TRADE, 1999 AND 2000P

Item No.	1999		2000P		
	(tonnes)	(\$000)	(tonnes)	(\$000)	
SHIPMENTS¹					
	Newfoundland	—	—	—	
	Prince Edward Island	—	—	—	
	Nova Scotia	—	—	—	
	New Brunswick	10 636	24 984	9 423	25 507
	Quebec	133 669	313 989	92 778	251 150
	Ontario	206 798	485 768	203 711	551 446
	Manitoba	52 109	122 404	47 258	127 928
	Saskatchewan	174	408	625	1 692
	Alberta	—	—	—	—
	British Columbia	178 197	418 585	269 656	729 959
	Yukon	—	—	—	—
	Northwest Territories	—	—	—	—
	Total	581 583	1 366 138	623 451	1 687 681
	Refinery output	548 563	..	552 200	..
EXPORTS					
2603.00.10	Copper ores and concentrates				
	Copper content				
	Japan	205 990	148 447	219 555	187 289
	China	—	—	147 342	113 334
	Philippines	28 092	16 768	47 541	37 255
	South Korea	34 711	24 729	32 423	24 741
	Other countries	2	3	33 267	24 778
	Total	268 795	189 947	480 128	387 397
2604.00.00.10, 2607.00.00.10, 2608.00.00.10, 2616.10.00.10	Other ores and concentrates				
	Copper content				
	Italy	1 798	1 467	—	—
	Total	1 798	1 467	—	—
2620.30	Copper ash and residues				
	United Kingdom	—	—	3 887	2 462
	United States	4	6	...	49
	Total	4	6	3 887	2 511
2825.50	Copper oxides and hydroxides	—	—	—	—
2833.25	Copper sulphates				
	United States	5 966	8 023	5 902	7 328
	Total	5 966	8 023	5 902	7 328
7401.10	Copper mattes				
	Norway	18 852	36 809	12 190	28 501
	United Kingdom	1 185	2 965	907	2 613
	United States	—	—	1	10
	Total	20 037	39 774	13 098	31 124
7401.20	Copper mattes; cement copper (precipitated copper)				
	United States	—	—	20	82
	Total	—	—	20	82
7402.00	Copper anodes				
	United States	79 768	348 245	53 807	234 008
	Total	79 768	348 245	53 807	234 008

TABLE 1 (cont'd)

Item No.		1999		2000P	
		(tonnes)	(\$000)	(tonnes)	(\$000)
EXPORTS (cont'd)					
7403.11 to 7403.19	Refined copper and copper alloys, unwrought				
	United States	258 304	623 105	267 774	762 729
	United Kingdom	25 049	52 565	13 164	40 602
	France	3 286	8 138	3 441	9 400
	Colombia	714	3 204	1 307	5 908
	Sweden	2 882	7 245	1 826	5 030
	Dominican Republic	—	—	316	1 444
	Taiwan	2 766	6 372	400	1 049
	Other countries	1 105	4 187	107	488
	Total	294 106	704 816	288 335	826 650
7403.21 to 7403.29	Other copper alloys				
	United States	2 826	7 645	3 137	8 884
	Spain	1	3	6	21
	Other countries	19	26	3	17
	Total	2 846	7 674	3 146	8 922
7404.00	Copper waste and scrap				
	United States	54 957	101 949	63 547	128 653
	China	3 509	3 346	6 063	8 542
	South Korea	387	570	1 206	1 713
	India	2 248	3 107	821	1 074
	Japan	199	255	311	817
	Hong Kong	770	923	362	684
	Belgium	2 550	881	213	75
	Other countries	533	998	574	1 144
	Total	65 153	112 029	73 097	142 702
7405.00	Master alloys of copper				
	United States	37	55	2	7
	Total	37	55	2	7
7406.10 to 7406.20	Copper powders and flakes				
	United States	39	483	46	283
	Taiwan	39	383	25	248
	Other countries	27	212	20	298
	Total	105	1 078	91	829
7407.10 to 7407.29	Copper bars, rods and profiles of refined copper				
	United States	8 779	35 866	9 956	43 687
	Chile	18	68	252	1 131
	Other countries	1 447	5 525	20	96
	Total	10 244	41 459	10 228	44 914
7408.11 to 7408.29	Copper and copper alloy wire				
	United States	101 381	261 804	116 427	359 083
	Argentina	—	—	29	400
	Other countries	83	598	20	175
	Total	101 464	262 402	116 476	359 658

TABLE 1 (cont'd)

Item No.		1999		2000P	
		(tonnes)	(\$000)	(tonnes)	(\$000)
EXPORTS (cont'd)					
7409.11 to 7410.22	Copper and copper alloy plates, sheets, strip and foil				
	United States	13 320	61 924	16 205	77 698
	Thailand	268	970	787	3 236
	United Arab Emirates	132	539	700	3 006
	Saudi Arabia	658	2 720	544	2 502
	United Kingdom	765	2 519	681	2 474
	Jordan	402	1 528	471	2 028
	Other countries	1 860	7 464	1 992	8 655
	Total	17 405	77 664	21 380	99 599
7411.10 to 7411.29	Copper and copper alloy tubes and pipes				
	United States	17 814	90 773	21 300	116 250
	United Kingdom	84	752	267	2 008
	Chile	87	282	143	691
	Other countries	469	2 743	299	1 958
	Total	18 454	94 550	22 009	120 907
7412.10 to 7412.20	Copper and copper alloy tube and pipe fittings				
	United States	..	22 743	..	27 529
	Spain	..	3 710	..	3 647
	United Kingdom	..	2 186	..	2 501
	Germany	..	6 729	..	2 337
	Other countries	..	4 913	..	4 400
	Total	..	40 281	..	40 414
7413.00	Stranded wire, cables, plaited bands and the like, of copper, not electrically insulated				
	United States	1 125	5 384	1 049	4 809
	Other countries	42	231	41	292
	Total	1 167	5 615	1 090	5 101
7414, 7415, 7416, 7419	Copper, other items of				
	United States	..	30 257	..	60 633
	United Kingdom	..	59	..	308
	Other countries	..	885	..	797
	Total	..	31 201	..	61 738
	Total exports		1 966 286		2 373 891
IMPORTS²					
2603.00.00.10	Copper ores and concentrates				
	Copper content				
	Chile	52 846	95 601	103 304	202 662
	United States	37 868	72 352	45 585	98 844
	Argentina	20 152	34 892	14 365	29 004
	Indonesia	3 271	13 887	12 485	25 523
	Portugal	12 487	11 382	12 656	16 924
	Other countries	11 037	15 192	22 893	43 399
	Total	137 661	243 306	211 288	416 356

TABLE 1 (cont'd)

Item No.	1999		2000P		
	(tonnes)	(\$000)	(tonnes)	(\$000)	
IMPORTS (cont'd)					
2604.00.00.10,	Other ores and concentrates				
2607.00.00.10,	Copper content				
2608.00.00.10,	372	880	485	792	
2616.10.00.10	60	141	130	197	
	Total	432	1 021	615	989
2620.30	Copper ash and residues				
	United States	14 129	26 617	13 190	14 097
	Sweden	21	1 419	257	2 593
	United Kingdom	901	2 894	585	1 283
	Bulgaria	15 118	9 028	—	—
	Other countries	7 844	12 965	310	973
	Total	38 013	52 923	14 342	18 946
2825.50	Copper oxides and hydroxides				
		1 658	5 093	1 648	4 130
2833.25	Copper sulphates				
		13 350	11 315	15 379	13 642
2836.99.90.10	Copper carbonates				
		4	9	4	10
2837.19.00.10	Copper cyanides				
		40	245	49	294
3212.90.00.12	Pigments based on copper or copper alloy powders and flakes				
		—	—	—	—
3212.90.90.12	Other, pigments based on copper or copper alloy powders and flakes				
		8	134	5	87
7401.10	Copper mattes				
		12 287	22 429	489	2 292
7401.20	Copper mattes; cement copper (precipitated copper)				
		9 891	17 783	1 550	5 845
7402.00	Copper anodes				
		27 713	71 232	11 484	23 909
7403.11 to 7403.19	Refined copper and copper alloys, unwrought Refined copper				
	Total	16 474	38 887	11 780	34 679
7403.21 to 7403.29	Refined copper and copper alloys, unwrought Other copper alloys				
	Total	8 094	22 592	12 006	38 127
7404.00	Waste and scrap, copper or copper alloy				
	United States	68 026	110 012	85 530	155 958
	Bulgaria	972	2 188	2 994	8 239
	Chile	—	—	1 501	3 301
	Cuba	740	933	1 207	1 970
	United Kingdom	350	964	318	602
	Finland	4 057	10 884	—	—
	Other countries	684	1 240	624	868
	Total	74 829	126 221	92 174	170 938
7405.00	Master alloys of copper				
		181	763	294	1 255
7406.10 to 7406.20	Copper powders and flakes				
	Total	2 510	12 831	2 304	12 367

TABLE 1 (cont'd)

Item No.		1999		2000P	
		(tonnes)	(\$000)	(tonnes)	(\$000)
IMPORTS (cont'd)					
7407.10 to 7407.29	Bars, rods and profiles of refined copper				
	United States	35 693	113 708	37 107	129 131
	United Kingdom	78	396	2 389	7 913
	South Korea	1 643	3 646	5 348	7 476
	Poland	2 938	5 017	3 024	6 389
	Turkey	1 122	2 455	3 001	5 953
	Other countries	1 815	6 209	2 328	7 975
	Total	43 289	131 431	53 197	164 837
7408.11 to 7408.29	Copper and copper alloy wire				
	Total	21 562	66 722	28 845	95 966
7409.11 to 7409.90, 7410.11 to 7410.22	Copper and copper alloy plates, sheets, strip and foil				
	Total	41 514	238 062	49 464	303 526
7411.10	Pipes and tubes, refined copper	8 755	37 299	10 593	48 573
7411.21	Pipes and tubes, copper-zinc base alloy	3 825	21 581	4 324	23 885
7411.22	Pipes and tubes, copper-nickel base alloy or copper-nickel-zinc base alloy	530	3 542	392	2 508
7411.29	Plates and tubes, copper alloy, n.e.s.	1 068	5 102	1 953	11 971
7412.10	Fittings, pipe or tube, of refined copper	764	10 321	923	11 305
7412.20	Fittings, pipe or tube, copper alloy	5 065	64 755	5 573	70 744
7413.00	Stranded wire, cable, plaited bands and the like, of copper, not electrically insulated	4 953	16 410	5 822	24 300
7414.20	Cloth (including endless bands), grill and netting of copper wire and expanded metal of copper	..	184	..	245
7414.90	Cloth, grill and netting of copper wire and expanded metal of copper	294	1 272	348	1 621
7415.10	Nails, tacks, drawing pins, staples and similar articles of copper or of iron or steel with copper heads	187	1 113	244	1 403
7415.21	Washers, copper, including spring washers	291	1 794	270	1 832
7415.29	Articles of copper, not threaded, n.e.s., similar to those of headings 7415.10 and 7415.21	498	2 838	904	4 367
7415.31	Screws, copper, for wood	61	312	39	237
7415.32	Screws, bolts and nuts of copper, excluding wood screws	..	5 532	..	6 267
7415.39	Articles of copper, threaded, n.e.s., similar to bolts, nuts and screws	1 042	5 633	837	4 502
7416.00	Copper springs	..	452	..	558
7419.10	Chain and parts thereof of copper	61	413	62	462
7419.91	Articles of copper, not further worked than cast, moulded, stamped or forged	3 252	23 329	10 754	1 366 735
7419.99	Articles of copper, n.e.s.	..	51 294	..	56 606
	Total Imports		1 315 720		2 946 316

Sources: Natural Resources Canada; Statistics Canada.

– Nil; .. Not available or not applicable; . . . Amount too small to be expressed; n.e.s. Not elsewhere specified; P Preliminary;

1 Anode copper recovered in Canada from domestic concentrates plus exports of payable copper in concentrate and matte.

2 Imports from "other countries" may include re-imports from Canada.

Note: Numbers may not add to totals due to rounding.

TABLE 2. CANADA, COPPER PRODUCTION, TRADE¹ AND USE, 1975, 1980 AND 1985-2000

	Production		Concentrates and Matte	Exports		Imports Refined	Use ³ Refined
	Shipments ²	Refinery Output		Refined	Total		
	(tonnes)						
1975	733 826	529 197	314 518	320 705	635 223	10 908	196 106
1980	716 363	505 238	286 076	335 022	621 098	13 466	208 590
1985	738 637	499 626	320 619	280 033	600 652	19 131	222 466
1986	698 527	493 445	341 390	306 822	648 212	20 901	225 586
1987	794 149	491 124	381 126	288 800	669 926	16 583	231 288
1988	758 478	528 723	348 404	268 680	617 084	4 659	236 280
1989	704 432	515 216	348 739	321 690	670 429	4 408	213 046
1990	771 433	515 835	374 875	335 941	710 816	2 611	180 605
1991	780 362	538 339	348 080	377 985	726 065	2 321	159 170
1992	761 694	539 302	346 842	385 761	732 603	8 916	156 132
1993	709 650	561 580	319 840	408 364	728 204	21 155	185 565
1994	590 784	549 869	237 554	388 568	626 122	19 594 ^r	199 350 ^r
1995	700 843	572 616	274 493 ^r	434 693 ^r	709 186 ^r	24 176 ^r	189 550 ^r
1996	652 499	559 200	409 577	384 338	793 915	28 700	218 280
1997	647 779	560 582	515 547	381 476	897 023	22 602	224 777
1998	690 762	562 261	450 867	355 825	806 692	18 685	246 212
1999	581 583	548 563	290 630	294 106	584 736	16 474	266 504
2000 ^p	623 451	552 200	493 226	288 335	781 561	11 780	271 981

Sources: Natural Resources Canada; Statistics Canada.

^p Preliminary; ^r Revised.

¹ Beginning in 1988, exports and imports are based on the new Harmonized System and may not be in complete accordance with previous method of reporting. ² From 1975 to 1988, anode copper recovered in Canada from domestic concentrate plus exports of payable copper in concentrates and matte. Starting in 1989 to date, recoverable copper in concentrate shipped. ³ Producers' domestic shipments of refined copper plus imports of refined shapes.

TABLE 3. WORLD MINE PRODUCTION OF COPPER, 1998-2000

	1998	1999	2000 ^p
	(000 t)		
Chile	3 687	4 391	4 602
United States	1 886	1 623	1 454
Indonesia	809	786	1 005
Australia	607	719	829
Canada	705	620	634
China	480	520	589
Peru	483	536	554
Russia	500	510	525
Poland	436	463	456
Kazakhstan	339	374	436
Mexico	385	381	365
Zambia	315	270	241
Papua New Guinea	152	188	203
South Africa	188	161	148
Other	1 761	1 640	1 141
Total	12 228	12 733	13 182

Source: International Copper Study Group.

^p Preliminary.

TABLE 4. WORLD REFINERY PRODUCTION OF COPPER, 1998-2000

	1998	1999	2000P
	(000 t)		
Chile	2 335	2 666	2 668
United States	2 489	2 132	1 800
Japan	1 277	1 342	1 437
China	1 211	1 174	1 370
Russia	640	750	816
Germany	696	696	709
Canada	563	549	551
Australia	286	419	487
Poland	447	470	486
South Korea	373	450	469
Peru	411	434	452
Belgium/Luxembourg	368	388	423
Mexico	447	427	411
Kazakhstan	325	362	395
Spain	304	305	316
Scandinavia	280	263	273
Zambia	280	258	225
Brazil	167	193	185
Philippines	152	148	139
Other	1 011	1 075	1 210
Total	14 062	14 501	14 822

Source: International Copper Study Group.
P Preliminary.

TABLE 5. WORLD REFINED COPPER USE, 1998-2000

	1998	1999	2000P
	(000 t)		
United States	2 889	2 995	3 019
China	1 422	1 506	1 879
Japan	1 254	1 294	1 349
Germany	1 147	1 138	1 310
South Korea	566	789	861
Italy	590	635	674
Taipei, China	584	655	628
Mexico	302	412	447
Belgium/Luxembourg	345	353	348
Australia	298	290	342
Brazil	298	290	342
United Kingdom	363	300	323
Scandinavia	279	292	318
Poland	263	268	290
Spain	235	255	284
Canada	246	267	274
India	253	264	265
Russia	150	158	180
Other	1 971	2 027	2 167
Total	13 455	14 188	15 300

Source: International Copper Study Group.
P Preliminary.

TABLE 6. COPPER AND COPPER-NICKEL SMELTERS IN CANADA, 2000

Company and Location	Product	Rated Annual Capacity ¹	Feed Material	Remarks
		(000 tonnes)		
Falconbridge Limited Falconbridge, Ontario	Copper-nickel matte	23	Nickel-copper concentrates	Copper-nickel concentrate processed in fluid bed roasters and an electric furnace; 1800-t/d sulphuric acid plant treats roaster gases. Matte from the smelter is refined in Norway.
Inco Limited Sudbury, Ontario	Molten "blister" copper, nickel sulphide and nickel sinter for the company's refineries; nickel oxide sinter for market, soluble nickel oxide for market	135	Bulk nickel-copper concentrates, scrap	Oxygen flash-smelting of copper sulphide concentrate. Copper converters produce blister copper. Oxygen flash furnace for smelting of nickel-copper concentrate; converters for production of nickel-copper Bessemer matte. Production of matte followed by matte treatment, flotation, separation of copper and nickel sulphides, then by roasting to make nickel oxides for refining and marketing. Oxygen flash conversion of copper sulphide to semi-blister followed by pyrorefining to blister copper.
Falconbridge Limited Timmins, Ontario	Molten "blister" copper	125	Copper concentrates, scrap	Mitsubishi-type smelting, separation and converting furnaces. Hazelett continuous cast anodes. Incremental expansion increased capacity to 140 000 t/y in 1999.
Noranda Inc. Horne smelter Rouyn-Noranda, Quebec	Copper anodes	200	Copper concentrates, scrap	New continuous converter commissioned in 1997.
Noranda Inc. Gaspé smelter Murdochville, Quebec	Copper anodes	135	Copper concentrates	Green charge reverberatory furnace, three converters, one rotary anode furnace and an acid plant.
Hudson Bay Mining and Smelting Co., Limited (HBMS) Flin Flon, Manitoba	Copper anodes	90	Copper concentrates	Five roasting furnaces, one reverberatory furnace and two converters. Modernization planned but delayed indefinitely.

Source: Data were provided by the companies listed.
¹ Copper in matte, blister and anode.

TABLE 7. COPPER REFINERIES IN CANADA, 2000

Company and Location	Rated Annual Capacity	Remarks
	(tonnes)	
Noranda Inc. CCR Refinery Montréal-Est, Quebec	350 000	Refines anodes from Noranda's Horne and Gaspé smelters, and also from purchased scrap and anode scrap. Precious metals, selenium and tellurium are recovered from slimes. Modernization program completed in July 1999 will raise capacity to 360 000 t/y by 2001.
Inco Limited Copper Cliff, Ontario	140 000	Cast and refines anodes from molten converter copper from the Copper Cliff smelter, and also refines purchased scrap. Gold, silver, selenium and tellurium cake are recovered from anode slimes. Recovers and electrowins copper from Copper Cliff nickel refinery residue. Annual capacity is a function of copper content in concentrates produced.
Inco Limited Copper Cliff, Ontario	9 000	Electrowinning plant processes copper-bearing fluids.
Falconbridge Limited Timmins, Ontario	120 000	Refines anodes from the Kidd Creek smelter. Incremental expansion increased capacity to 147 000 t/y in 2000.
Boliden Limited McLeese Lake, British Columbia	2 000	Dissolved copper-in-solution from heap leaching operations is treated in a solvent extraction plant and then electrowinned to produce copper cathode. Production suspended in December 1998. Operation sold to Taseko Mines Limited in April 1999.

Source: Data were provided by the companies listed.

TABLE 8. U.S. SUPPLY OF WIRE MILL, BRASS MILL, FOUNDRY AND POWDER PRODUCTS, AND THEIR USE, 1999 AND 2000

United States	1999	2000 ^p
	(000 t)	
SUPPLY		
Domestic mill products		
Building wire	645	650
Magnet wire	353	363
Telecommunications cable	295	306
Power cable	142	145
Automotive wire and cable	172	179
Electronic wire and cable	118	136
Other wire and cable	301	311
Strip, sheet, plate and foil	610	646
Rod and bar	562	566
Tube and pipe	583	567
Mechanical wire	43	45
Foundry products	174	175
Powder products	20	21
Total, domestic mill products	4 017	4 110
Imported mill products	142	222
Total supply	4 159	4 332
USES		
Building construction	1 690	1 696
Electrical/electronic products	1 093	1 196
Industrial machinery/equipment	449	458
Transportation equipment	492	497
Consumer and general products	435	485
Total	4 159	4 332

Source: Copper Development Association Inc.

^p Preliminary.

Note: Numbers may not add to totals due to rounding.

TABLE 9. YEARLY AVERAGE COPPER PRICES,¹ 1980-2000

Year	LME
	(current US¢/lb)
1980	99.0
1981	79.0
1982	67.1
1983	72.1
1984	62.5
1985	64.3
1986	62.3
1987	80.9
1988	117.9
1989	128.9
1990	121.0
1991	106.2
1992	103.7
1993	86.8
1994	104.7
1995	132.9
1996	104.1
1997	103.2
1998	75.0
1999	71.3
2000	82.4

Source: International Copper Study Group.

¹ Grade A, Cash.

TABLE 10. MONTHLY AVERAGE COPPER PRICES, 1999 AND 2000

	LME ¹		COMEX ²	
	1999	2000	1999	2000
	(current US¢/lb)			
January	64.9	83.6	65.1	84.8
February	64.0	81.7	63.9	82.4
March	62.5	78.9	62.5	79.6
April	66.5	76.2	67.0	77.4
May	68.6	82.8	69.1	82.8
June	64.5	79.5	65.2	80.7
July	74.4	81.6	76.0	83.9
August	74.7	84.2	75.9	86.7
September	79.4	88.9	80.9	91.5
October	78.2	86.1	79.3	87.6
November	78.4	81.4	79.1	83.2
December	80.1	83.9	81.3	86.9

Source: International Copper Study Group.

¹ LME cash price for Grade A copper. ² COMEX First Position High Grade price.

TABLE 11. WORLD COPPER SCRAP RECOVERY AS A PERCENTAGE OF TOTAL REFINED PRODUCTION, 1997-99

	1997		1998		1999	
	(000 tonnes)	%	(000 tonnes)	%	(000 tonnes)	%
Europe	2 109	15.5	2 088	14.8	2 186	15.1
Asia	1 526	11.2	1 415	10.0	1 327	9.2
Africa	37	0.3	37	0.3	33	0.2
America	1 783	13.1	1 681	11.9	1 547	10.7
Oceania	46	0.3	45	0.3	60	0.4
Total ¹	5 501	40.5	5 266	37.2	5 153	35.6

Source: World Bureau of Metals Statistics.

¹ Final percentage calculation includes refined copper from other countries.