

Copper

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Copper prices remained very strong in 1995 due to the combined influences of significant growth in worldwide demand and low stock levels. While demand for copper in the United States was down slightly from 1994, this was more than offset by increases in the Asian and European markets.

Despite the prospect of continued growth in worldwide copper demand in 1996, it is expected that the addition of a significant amount of new production capacity, particularly in Chile, will begin to exert some downward pressure on prices.

CANADIAN DEVELOPMENTS

In 1995, Canadian copper production (recoverable copper in concentrate) increased to 729 000 t from 617 000 t in 1994. During 1995, refined copper production increased to about 570 000 t from 550 000 t in 1994.

The increase in copper mine production in 1995 was the result of the reactivation of idled capacity in British Columbia and the realization of higher output at the Louvicourt mine in Quebec.

British Columbia

In August, Royal Oak Mines Inc. and Geddes Resources Limited concluded an agreement with the Province of British Columbia on compensation for the cancelled Windy Craggy copper project. The agreement extinguishes claims for Windy Craggy and paves the way for the investment of \$500 million by Royal Oak for the development of the Kemess South gold-copper property.

Under this agreement, Geddes will receive \$29 million in cash compensation and a \$20 million Mining Development Fund to be matched and managed by Geddes. Meanwhile, Royal Oak will receive an eco-

nomie assistance package to facilitate the development of the Kemess project. The entire package totals \$117 million (\$104 million in 1995 current dollars).

In a series of associated agreements, Royal Oak will acquire 100% of Geddes as well as El Condor Resources Ltd. and St. Philips Resources Inc., the owners of the Kemess gold-copper properties in northern British Columbia.

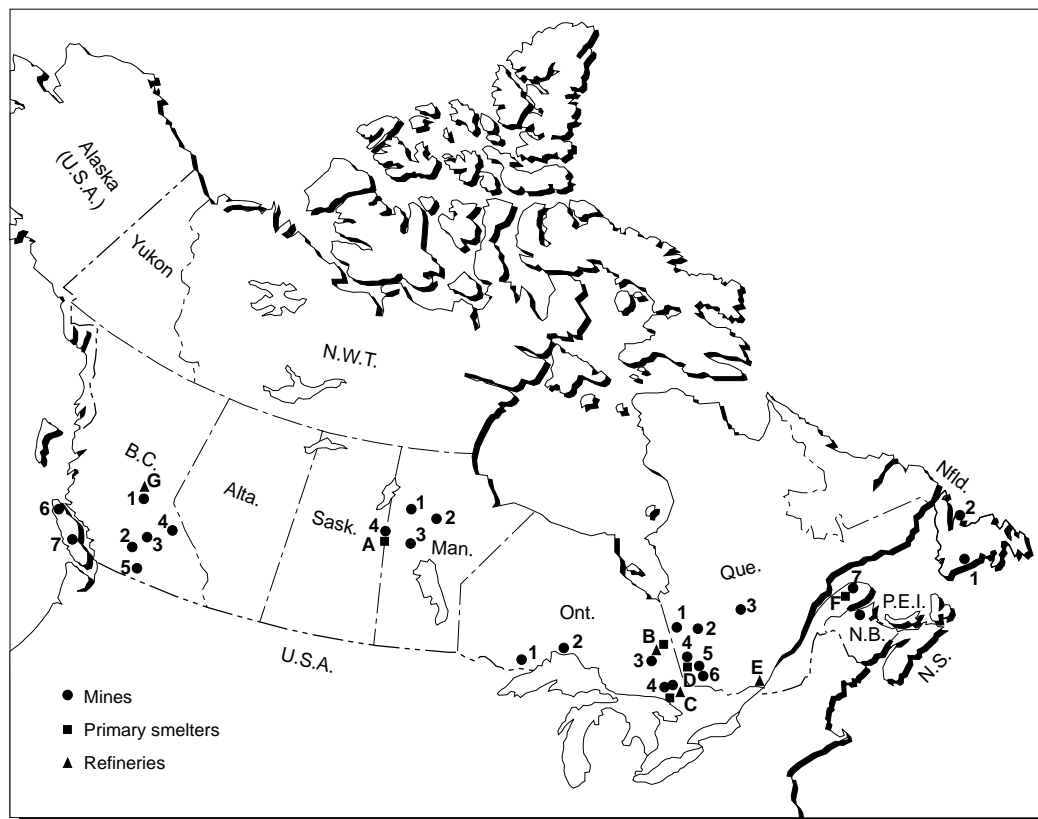
Permitting for the \$350 million Kemess development, which was originally expected to be completed by mid-October, was delayed due to environmental concerns about the impact of the project on a trout spawning stream. In January 1996, Royal Oak announced that the fisheries habitat issue had been resolved and the company anticipated that permitting, including the *Canadian Environmental Assessment Act* review process, would be completed in time to allow construction to begin by the end of March 1996.

The Kemess property, located about 300 km northwest of the town of Mackenzie, is expected to produce an average of about 6600 kg/y of gold and 26 000 t/y of contained copper over an estimated mine life of 15 years.

At its Tulsequah Chief property in northwestern British Columbia, Redfern Resources Ltd. completed a feasibility study that identified a mineable reserve of 7.2 Mt grading 1.2% copper, 1.2% lead and 6.3% zinc, plus gold and silver. At a mining rate of between 800 000 and 900 000 t/y, the operation will produce about 10 000 t/y of copper in concentrate. Redfern expects to file a project report under the B.C. *Environmental Assessment Act* in early 1996.

At the Red Chris project near Iskut, American Bullion Minerals Ltd. expects to complete a prefeasibility study in the first quarter of 1996. Teck Corporation, which holds a 20% interest in the project, can increase its stake to 55% by funding the project to production. Red Chris is estimated to contain a reserve of 157 Mt grading 0.5% copper and 0.4 g/t gold. American Bullion also plans to continue exploration work on two other deposits in the nearby Yellow Chris sector that have significant potential.

Figure 1
Copper Producers in Canada, 1995



MINES

British Columbia

1. Gibraltar Mines Limited
2. Highland Valley Copper¹
3. Afton Operating Corporation (Ajax mine)
4. Bethlehem Resources Corporation
5. Goldneve Resources Inc. (Goldstream mine)
6. Princeton Mining Corporation (Similco)
7. BHP Minerals Canada Ltd.
- Westmin Resources Limited

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)

Ontario

1. Noranda Mining and Exploration Inc., Geco Division
2. Inmet Mining Corporation (Winston Lake mine)
3. Falconbridge Limited (Timmins)
4. Falconbridge Limited (Sudbury area)
- Inco Limited (Sudbury area)

Quebec

1. Les Mines Selbaie
2. Noranda Mining and Exploration Inc. (Matagami Division)
3. MSV Resources Inc.
- Campbell Resources Inc.
4. Cambior Inc., Bouchard-Hébert mine
5. Agnico-Eagle Mines Limited (La Ronde mine)
- LAC Minerals Ltd. (Bousquet mine)
6. Aur Resources, Novicourt, Teck Corp. (Louvicourt mine)
7. Noranda Mining and Exploration Inc., Division Mines Gaspé

New Brunswick

Brunswick Mining and Smelting Corporation Limited
Noranda Mining and Exploration Inc. (Heath Steele mine)

Newfoundland

1. Royal Oak Mines Inc. (Hope Brook mine)
2. Ming Minerals Inc. (Ming mine)

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 Metallurgy Inc. (Noranda)
- F. Noranda Metallurgy Inc.

REFINERIES

- B. Falconbridge Limited (Timmins)
- C. Inco Limited (Sudbury area)
- E. Noranda Metallurgy Inc. (CCR Division)
- G. Gibraltar Mines Limited (SX-EW)

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

Note: For detailed production and ore grade information, refer to the nonferrous metal mine production table following the last commodity chapter.

In December 1995, the B.C. government issued a project certificate for the \$137 million Huckleberry copper mine development. The project is located in northwestern British Columbia, 123 km south of Houston. Huckleberry is owned 60% by Princeton Mining Corporation and 40% by a consortium of Japanese companies consisting of Mitsubishi Materials Corporation, Marubeni Corp., Dowa Mining Co. Ltd., and Furukawa Co. Ltd. The project is expected to produce an average of 27 300 t/y of contained copper over the mine's anticipated 17-year life. The deposit contains diluted mineable reserves of 91 Mt grading 0.51% copper, 0.06 g/t gold, 0.014% molybdenum and 2.8 g/t silver.

Despite an extensive review of Huckleberry by a project committee comprised of representatives from local, provincial and federal government agencies and First Nations, the Cheslatta Nation in British Columbia petitioned the B.C. Supreme Court to order a review of the provincial decision authorizing development. The native group stated that there were serious errors in the environmental review process, including major changes to the project that were never submitted for review. In addition to the provincial approval process, the Huckleberry project is also subject to federal approval under the *Canadian Environmental Assessment Act*.

At the Mount Polley copper-gold deposit northeast of Williams Lake, additional metallurgical testing by Imperial Metals Corporation has demonstrated new higher gold recoveries. With this information, the company increased reserves to 81.5 Mt grading 0.4 g/t gold and 0.3% copper. During a planned mine life of 14 years, the Mount Polley mine is expected to produce about 2000 kg/y of gold and 12 000 t/y of copper in concentrate. Sumitomo Corporation can earn a 35% interest in Mount Polley by funding in excess of \$85 million for development. Capital costs for the project are estimated at \$117 million. The cash costs for copper are projected at US\$53/lb with gold as a credit.

In mid-January 1996, Imperial Metals and Goldneve Resources Inc. suspended operations at their Goldstream mine near Revelstoke. However, the companies plan to put the operation on care and maintenance pending the completion of additional exploration and evaluation work at the mine. In recent years the mine has produced about 14 000 t/y of copper in concentrate.

The Island Copper mine of BHP Minerals Canada Ltd. closed at the end of 1995 due to the depletion of ore reserves. The mine, which produced about 50 000 t/y of copper in concentrate, began operations in 1971.

Manitoba/Saskatchewan

In September, Hudson Bay Mining & Smelting Co. Limited commenced production at its new Photo Lake

mine near Snow Lake. Mineable reserves at Photo Lake total 530 000 t grading 4.5% copper and 6% zinc, plus gold and silver.

In the Flin Flon area, Hudson Bay expects to complete a feasibility study on its copper-rich Konuto Lake deposit by mid-1996.

Ontario

Inco Limited continued work in 1995 on its Victor advanced exploration project located east of Sudbury. Victor's upper zone of mineralization contains a reserve of 5.4 Mt grading 0.5% copper and 2.7% nickel, while its lower zone contains 6.3 Mt grading 5.1% copper and 1.9% nickel plus gold and platinum group metals. The company expects to complete a feasibility study for the project in 1999.

Inco also continued development work on its McCreedy East mine. The first phase of the project will involve the mining of about 15 Mt of ore grading 4.3% copper and 1.4% nickel, beginning in 1996. Once the mine reaches full production in 1999, output will reach 11 000 t/y of contained nickel and 35 000 t/y of contained copper.

In September, Falconbridge Limited officially opened its \$365 million Craig mine in the Sudbury area. Reserves at the mine, including limited past production, total 14.7 Mt grading 2% nickel and 0.74% copper. Also in the Sudbury area, Falconbridge reported that it would spend \$47 million to bring its Lockerby mine back into full production by 1998. The mine is expected to produce about 8000 t/y of nickel and 3500 t/y of copper.

In the second quarter of 1995, Inmet Mining Corporation (formerly Metall Mining Corporation) approved the \$26.5 million development of the Pick Lake deposit at its Winston Lake operation. Pick Lake, which hosts reserves of 1.3 Mt grading 0.9% copper and 16.7% zinc, is expected to extend the life of the Winston Lake operation to the year 2002.

In November, Noranda Inc. ceased operations at its Geco mine at Manitouwadge due to the depletion of ore reserves. The mine, which began operations in 1957, produced about 16 000 t/y of copper in concentrate.

Quebec

In January, Audrey Resources Inc. began production at its Bouchard-Hébert mine (formerly called the Mobrun mine). During 1995, Cambior inc. increased its ownership interest in Audrey Resources from 75% to 100%. In 1996, Cambior expects that the Bouchard-Hébert mine will produce about 6000 t of copper and 25 000 t of zinc in concentrate, as well as 600 kg of gold.

In January 1996, commercial production began at Cambior's Grevet zinc-copper project near Lebel-sur-Quévillon. The mine will produce about 62 000 t/y of zinc and 2600 t/y of copper.

In October, MSV Resources Inc. and Cache Explorations Inc. carried out a merger to help finance development of their Corner Bay/Inner Block copper property in the Chibougamau area. Development costs have been estimated at between \$15 million and \$17 million. It is expected that the new mine will produce about 10 000 t/y of copper in concentrate. The deposit hosts probable and possible reserves of about 1 Mt grading 5.3% copper. MSV expects to make a final decision on the project by mid-1996.

Inmet Mining Corporation expects to begin production at its Troilus gold-copper mine north of Chibougamau in the fourth quarter of 1996 and to reach commercial production in the first quarter of 1997. Annual production at Troilus is expected to be about 4700 kg of gold and 3400 t of copper. Mineable reserves at the deposit total 42.9 Mt grading 1.4 g/t gold and 0.12% copper, plus silver.

In February, Noranda Mining and Exploration Inc. announced that it will invest \$84 million to bring its Bell Allard deposit into production by 1998. The company's two existing mines at its Matagami Division, Norita East and Isle-Dieu, are scheduled to close in 1996 and 1997, respectively, due to the depletion of ore reserves. The Bell Allard deposit contains reserves of 3.2 Mt grading 13.8% zinc and 1.5% copper, plus silver and gold.

Noranda Mining and Exploration Inc. will also invest \$9.5 million over two years to develop the new E-34 orebody at its Mines Gaspé copper mine. The development of this orebody is expected to extend the life of the underground mine to mid-1999. Mineable reserves in the E-34 deposit are estimated at more than 1 Mt containing about 33 400 t of copper.

In August, Noranda Metallurgy Inc. announced that it was investing \$4 million to build a pilot plant to recover copper from stockpiled oxide ore at Mines Gaspé using a solvent extraction/electrowinning (SX/EW) process. A planned full-scale SX/EW plant at Mines Gaspé would produce about 8000 t/y of copper cathode over nine years.

Noranda Metallurgy Inc. will spend \$10.5 million for a new concentrate drying and injection system to increase the smelting capacity of its Gaspé smelter from 85 000 t/y to 110 000 t/y of copper. The company expects that these modifications will be completed in early 1996.

In May, Falconbridge Limited received environmental approval for its Raglan nickel-copper project on the Ungava Peninsula. Construction of the project, which began in the third quarter of 1995, is expected

to be completed by the end of 1997. The mine will produce about 5000 t/y of copper in concentrate. The Raglan deposit hosts geologic reserves of 18 Mt grading 3.1% nickel and 0.9% copper.

Newfoundland

On the basis of exploration results from the new Eastern Deeps discovery and indications of the significant potential in the Western Extension area of the deposit, the Voisey's Bay property of Diamond Fields Resources Inc. and Inco Limited in Labrador is now estimated to contain a resource of about 100 Mt of nickel, copper and cobalt mineralization. In June, preliminary reserves for the Ovoid orebody were reported to be 32 Mt grading 3.4% nickel, 1.7% copper and 0.12% cobalt. The Ovoid deposit would likely be amenable to open-pit mine development while the Eastern Deeps deposit would likely be developed by underground bulk mining methods.

While a feasibility study for Voisey's Bay is not scheduled to be completed until June 1996, there has been speculation that production could begin in 1999. However, the timing of development at Voisey's Bay will depend on the resolution of several important issues including native land claims, permitting and taxation.

In February 1996, Falconbridge launched a \$4.1 billion takeover bid for Diamond Fields Resources. At the time of writing, there was intense speculation that Inco would also make an offer for the company.

Ming Minerals Inc. commenced production at its Baie Verte area mine in the fourth quarter of 1995. The mine, which was formerly operated by Consolidated Rambler Mines Limited, had been idle since 1982. It is expected that Ming will produce about 8000 t/y of copper in concentrate.

Yukon

At the Carmacks Copper project of Western Copper Holdings Ltd. and Thermal Exploration Company, the development of an SX/EW operation is awaiting environmental approval. It is expected that Carmacks Copper will produce about 14 000 t/y of copper cathode over an 8.5-year mine life. Capital costs are estimated at \$62 million. In November, Prime Equities International Corp. acquired a 35.9% interest in Western Copper Holdings from Teck Corp.

Cominco Ltd. expects to complete a feasibility study in early 1996 on its Kudz Ze Kayah property in the Finlayson Lake area, 200 km northwest of Watson Lake. Preliminary reserve estimates total 13 Mt grading 5.5% zinc, 1% copper, 1.3% lead, 125 g/t silver and 1.2 g/t gold.

At the Wolverine zone of the Foot property, located about 20 km east of Kudz Ze Kayah, Westmin

Resources Limited and Atna Resources Ltd. have discovered a promising polymetallic deposit. Westmin can earn a 60% interest in the property by spending \$3 million on exploration over three years.

Pacific Sentinel Gold Corporation reported that it had completed extensive metallurgical testing and open-pit mine planning at its Casino copper-gold-molybdenum property in the southwestern Yukon. Mineable reserves of supergene and hypogene sulphide ore at Casino total 178 Mt grading 0.38 g/t gold, 0.30% copper and 0.03% molybdenum. Development plans for the project envisage an average annual output of about 22 000 t of copper and 2500 kg of gold over a 19-year mine life.

Minto Explorations Ltd. completed a positive feasibility study on its Minto copper-gold-silver project located 240 km northwest of Whitehorse, although the company has yet to finalize financing arrangements for the \$29.8 million development. It is expected that the mine will produce about 12 000 t/y of copper in concentrate, 300 kg/y of gold and 5000 kg/y of silver. The Minto property contains mineable reserves of 6.5 Mt grading 2.1% copper, 0.5 g/t gold and 7.5 g/t silver.

WORLD DEVELOPMENTS

World mine production of copper in 1995 was estimated at slightly more than 10 Mt compared to 9.5 Mt in 1994 (Table 3). During 1995, world production of refined copper increased to almost 11.6 Mt from 11.1 Mt in 1994 (Table 4).

Argentina

In January 1996, MIM Holdings Ltd. reported that the Bajo de la Alumbrera copper-gold project in northwestern Argentina was on schedule for production to begin in late 1997. In May, North Ltd. and Rio Algom Limited acquired a 50% interest in the project from International Musto Explorations Ltd. for \$510 million.

It is expected that the Alumbrera mine will produce 180 000 t/y of copper in concentrate and almost 20 000 kg/y of gold over a 19-year mine life. The cost of the project is estimated at between US\$900 million and \$1 billion. The deposit contains reserves of 752 Mt grading 0.51% copper and 0.65 g/t gold. Copper production costs are expected to be less than US30c/lb.

Elsewhere in Argentina, it was reported that the Agua Rica copper property of Broken Hill Proprietary Co. Ltd. (BHP) (70%) and Northern Orion Explorations Ltd. (30%) could be much larger than the Alumbrera copper-gold project. Additional exploration work is planned for 1996.

Chile

Chilean mine production of copper in 1995 totalled 2.5 Mt, an increase of 14.2% over 1994. State-owned companies, including Corporacion Nacional del Cobre (Codelco) and Empresa Nacional de Minería (ENAMI), accounted for 1.14 Mt, or 46% of total Chilean production.

At its Salvador Division, Codelco officially opened a new 25 000-t/y SX/EW plant, and also announced plans to develop the nearby Damiana deposit which hosts reserves of about 300 Mt grading 0.5% copper.

In September, Codelco announced that construction would begin by year-end on the Radomiro Tomic deposit near Chuquicamata. The first phase of the project, which will produce 150 000 t/y of copper cathode, is expected to begin production in late 1997. A second phase of the project would expand production to 225 000 t/y by 2002. Development costs for Radomiro Tomic are estimated at US\$461 million. Cash costs are expected to be about US38c/lb.

At the Chuquicamata Division, Codelco announced that it will develop 15 new copper oxide projects to replace oxide reserves that will be exhausted by the year 2003. It is expected that the new projects will produce in excess of 150 000 t/y of electrowon copper, slightly more than is presently produced. Codelco also reported that it will expand its low-grade sulphides plant at Chuquicamata from 14 600 t/y to 18 250 t/y.

At the Andina Division, Codelco is proceeding with a US\$200 million expansion project that will increase copper output to about 200 000 t/y by 1999 from 147 000 t/y in 1995.

At the El Teniente Division, Codelco is proceeding with the Esmeralda and Diamante projects, which will help maintain production at over 300 000 t/y. In order to comply with environmental legislation, Codelco also plans to construct two acid plants at its Caletones smelter. The first plant, which will reduce sulphur dioxide emissions by 40% and particulate emissions by 50%, is scheduled to begin operation in 1998. The second plant, which is to be completed by 2000, is expected to reduce sulphur dioxide emissions by a further 25% and to increase the capture of particulates to 99%.

By mid-1996, Minera Escondida Limitada expects to complete its Phase III expansion that will increase its copper mine output to 800 000 t/y. During 1995, Escondida experienced a number of technical problems with its new ammonia leach plant in Coloso. The company expects to have this plant operating at its full design capacity of 80 000 t/y of copper cathode by mid-1996.

Minera Escondida also plans to complete a feasibility study in February 1996 for a 125 000-150 000-t/y SX/EW operation at the Escondida mine. The Escondida deposit hosts about 300 Mt of oxide reserves.

Minera Disputada de Las Condes S.A. completed an expansion and modernization of its Chagres smelter in early 1995. However, the company was forced to suspend production in mid-April for four weeks due to technical problems.

At the 120 000-t/y La Candelaria mine, which began production in 1994, Phelps Dodge Corporation (80%) and Sumitomo Metal Mining Co. Ltd. (20%) are considering the possible doubling of capacity.

Antofagasta Holdings plc (Luksic Group) has undertaken a feasibility study for a US\$1 billion expansion at its Los Pelambres mine from 23 000 t/y to 230 000 t/y of copper in concentrate. The expansion would likely be completed by the end of 1998. Reserves at Los Pelambres are estimated at about 3 billion t grading slightly less than 1% copper.

Antofagasta Holdings, through Orengo Minas SA, is participating with Equitorial Mining NL of Australia in a project to jointly exploit several copper properties in the El Tesoro district of northern Chile. The partners expect to produce about 60 000 t/y of copper cathode over 15 years. The cost of this project is estimated at about US\$200 million.

Cyprus Amax Minerals is proceeding with the development of the El Abra copper deposit, which the company owns jointly with Codelco. El Abra is expected to produce about 225 000 t/y of copper cathode beginning by the end of 1996.

The Quebrada Blanca mine, which is owned 47% by Cominco, 29% by Teck and 24% by Chilean interests, began production in August 1994. The mine's full design production rate of 75 000 t/y of copper cathode is expected to be reached in early 1996.

On June 7, Placer Dome Inc. and Outokumpu Copper Resources B.V. commenced production at their US\$600 million Zaldivar SX/EW project in northern Chile. The mine is expected to reach a production rate of about 125 000 t/y of copper cathode in 1997. Production costs at Zaldivar are expected to be US49¢/lb.

Rio Algom completed an expansion at its Cerro Colorado SX/EW mine in the fourth quarter of 1995 to increase capacity from 37 000 t/y to 56 000 t/y of copper cathode. The company has reported that its average cash costs were US55¢/lb. In the first half of 1995, Rio Algom announced that ore reserves at Cerro Colorado had been increased to 193 Mt grading 1.1% copper.

In May 1995, Falconbridge and Minorco SA completed the purchase of Shell Petroleum Company Limited's one-third interest in the Collahuasi copper project for US\$195 million. As a result of this transaction, the ownership interest for both Falconbridge and Minorco in Collahuasi increased to 50%. A feasibility study for the project proposes the production of 330 000 t/y of copper in concentrate and 50 000 t/y of copper cathode for the first six years of a planned 25-year project life. It is expected that construction for the US\$1.7 billion project will begin in 1996 with production likely to begin in late 1998. The Collahuasi deposit contains ore reserves of 3.1 billion t grading 0.82% copper.

At the end of 1995, Falconbridge and Minorco agreed to sell a 12% interest in Collahuasi to a consortium of Japanese companies, which includes Mitsui and Co. Ltd., Nippon Mining and Metals Co., and Mitsui Mining and Smelting Co. Ltd., for about US\$80 million. The Japanese group has also agreed to take about one third of the copper concentrates produced at the mine.

In 1996, Empresa Minera de Mantos Blancos S.A. is expected to complete an expansion of its Chilean operations that will increase its copper output to about 120 000 t/y. This increase includes the expansion of the company's existing open-pit mine (Santa Barbara project) as well as the start-up of the new Mantoverde mine which will produce about 38 000 t/y of copper cathode.

Minera Rayrock Inc. began production at its Ivan copper project near Antofagasta in January. In 1996, the company plans to increase production capacity from about 12 000 t/y to over 14 000 t/y of copper cathode.

Yuma Gold Mines and North Lily Mining Co. expect to begin production at their Tuina SX/EW copper mine in northern Chile in the fourth quarter of 1996. The operation is expected to produce about 38 000 t of cathode copper over a seven-year period. Reserves at the property total 4.5 Mt grading 0.91% copper.

In December, Gibraltar Mines Limited completed a positive feasibility study on its Lomas Bayas property in northern Chile, which hosts reserves of 284 Mt grading 0.36% copper. Copper production is expected to average about 54 000 t/y over 12 years. Capital costs for the project are estimated at US\$196 million.

Canada Tungsten Inc. (70%) and Compania Minera del Pacifico SA (30%) expect that production at their Andacollo copper project will begin in November 1996. Output at the Andacollo mine will be about 20 000 t/y of copper cathode. Andacollo hosts a mineable reserve of 34.6 Mt grading 0.87% copper.

ENAMI has embarked on a US\$43 million modernization of its Las Ventanas smelter to reduce sulphur

dioxide and particulate emissions. As part of this project, ENAMI will close its reverberatory furnace in 1997 and smelt all of its copper concentrates in Teniente-type converters. The company also plans to expand its sulphuric acid plant to increase sulphur dioxide capture from 50% to 94%. While the modernization will result in a small reduction in smelting throughput from 460 000 t/y to 420 000 t/y of copper concentrates, the company plans to increase its refining capacity by nearly 100 000 t/y to 320 000 t/y by the end of 1996. The company also reported that a similar modernization program was under way at its Paipote smelter in northern Chile. Throughput at that plant is expected to fall from 260 000 t/y to 240 000 t/y of copper concentrate.

In August, Noranda Metallurgy Inc. completed the purchase of a 24.8% interest in Fundicion Refimet SA, the operator of a 90 000-t/y smelter near Antofagasta. As a result of this purchase, the ownership interest of Barrick Chile Limitada, a subsidiary of Barrick Gold Corporation, was reduced to 25.1%, while the share of the company controlled by Chilean investors dropped to 50.1%. At the time of the Noranda investment, the company announced that it would proceed with a US\$43 million expansion that would increase its smelter capacity to about 160 000 t/y of copper anode and blister copper. Early in 1996 it was reported that Refimet was considering a further expansion to 275 000 t/y.

Peru

In October, Empresa de Minera Mantos Blancos S.A. completed a positive feasibility study on its Quellaveco copper project. Construction, however, will be deferred until 1999 or 2000 after a decision was made to switch from a bio-leach technology to a conventional flotation process. It is expected that Quellaveco will produce about 200 000 t/y of copper in concentrates. The cost of the project is now estimated at between US\$650 million and \$700 million. The deposit hosts oxide reserves of 2.7 billion t grading 0.89% copper.

At the beginning of 1996, Southern Peru Copper Corporation (SPCC) officially inaugurated a new US\$103 million sulphur dioxide plant at its Ilo smelter. The plant, which will produce about 175 000 t/y of sulphuric acid, is expected to reduce the smelter's sulphur dioxide emissions by 18%. The company also announced plans to build a new US\$500 million smelter to increase copper production and to meet world environmental standards.

In January 1996, production commenced at SPCC's new 36 000-t/y SX/EW plant at its Toquepala mine. In September, the company increased ore reserves at its Cuajone mine to 850 Mt grading 0.73% copper, while reserves at the Toquepala mine were increased to 305 Mt grading 0.8% copper.

Barrick Gold Corporation expects to make a decision on its 75%-owned Cerro Corona gold-copper project by May or June 1996. The deposit contains 93 000 kg of gold and 450 000 t of copper.

Cambior expects to complete a pre-feasibility study on its La Granja copper project in early 1996. At the end of 1995 estimated reserves at this property totalled 725 Mt grading 0.69% copper. Development costs for the project, which would produce around 125 000 t/y of copper in concentrate, are estimated at US\$700 million.

Brazil

Minorco reported that it was considering a number of options for the Salobo copper project which it may develop jointly with Companhia Vale do Rio Doce (CVRD). These include the possible construction of an associated smelter and refinery owing to the high fluorine content of copper concentrates. It is expected that the Salobo mine will produce between 150 000 and 200 000 t/y of copper in concentrate.

Panama

Teck expects to complete a feasibility study in November 1996 on the Petaquilla copper project. By completing the feasibility study and fulfilling other requirements, Teck can earn one half of Adrian Resources Ltd.'s 52% interest in the property. Inmet Mining holds the remaining 48% share of the Petaquilla project. The feasibility study is considering several options for the project including a possible doubling of initial production to 230 000 t/y of contained copper in concentrate plus almost 6000 kg/y of gold. Mineral reserves are estimated at about 1.1 billion t grading 0.11 g/t gold, 0.48% copper and 0.014% molybdenum.

Mexico

Grupo Mexico SA announced during 1995 that it had awarded a contract to increase anode capacity at its La Caridad smelter in the state of Senora from 180 000 t/y to 300 000 t/y with the addition of a Teniente-type converter. The project is expected to be completed by the end of 1996. Once the project is completed, the Cananea smelter will be phased out of production.

Grupo Mexico also announced that it would build a new 180 000-t/y copper refinery at the company's La Caridad mining complex. The project is expected to cost US\$120 million, and production is expected to begin in 1997. An additional production increase to 300 000 t/y is also being considered.

In May, Grupo Mexico began production at a new 22 000-t/y SX/EW plant at the La Caridad operation. At Cananea, the company plans to increase SX/EW

capacity from 34 000 t/y to 63 000 t/y in 1998 and to 84 600 t/y by the year 2005. During 1995, concentrate production capacity at Cananea was expanded from about 44 000 t/y of contained copper to over 80 000 t/y as the result of a mine expansion program. A further expansion to 120 000 t/y is expected to be completed by 1998.

United States

Kennecott Corporation commenced production at its new 280 000-t/y smelter in Utah in April. However, the company was forced to suspend operations at the smelter from September to early December due to an explosion caused by a water leak. Meanwhile, during the last two weeks of December, the facility's continuous flash converting furnace was closed due to leaks in the acid plant.

In early 1996, Magma Copper expects to begin production at its Robinson mine in Nevada. The company is studying a possible expansion of Robinson that would increase its copper output to over 110 000 t/y of copper in concentrate. During 1995, Magma closed its San Manuel leach circuit.

In January 1996, BHP announced that it had completed its US\$2.4 billion merger with Magma. The new company, BHP Copper Group, will be the world's second largest copper company, producing about 900 000 t of copper in 1996.

Asarco Incorporated resumed full production at its Ray mine in Arizona during the second quarter of 1995. In February it was reported that Asarco and Mitsui & Co. Ltd. would participate in a project to build an SX/EW facility at Asarco's Silver Bell mine in Arizona. The facility will produce about 16 000 t/y of copper cathode.

Sumitomo Metal Mining Co., Ltd. and Phelps Dodge completed the Southside project at the Morenci operation in Arizona. It is expected that the US\$200 million project will increase copper cathode production by 68 000 t/y to 227 000 t/y.

In December, Azco Mining Inc. concluded the sale of its interest in the Sanchez copper project in southeastern Arizona to Phelps Dodge. This SX/EW operation is expected to produce about 25 000 t/y of copper cathode.

In Michigan, Inmet Mining suspended operations at its Copper Range smelter in February and suspended mining and milling operations at its White Pine mine in September. The company announced that the Copper Range refinery would continue to operate until March 1996 with anode feed from Hudson Bay's Flin Flon smelter in Manitoba. Inmet plans to keep the White Pine mine on care and maintenance pending the completion of a feasibility study on possible solution mining. The company stated that if solution mining is introduced, there may be justification for

the resumption of conventional mining at some point in the future.

Cambior expects to receive environmental approval for its Carlota copper deposit in the Miami-Globe region of Arizona in the first half of 1996 and to begin construction on this project in the third quarter. The mine is expected to have a capacity of over 30 000 t/y of copper cathode.

Summo Metals Corporation completed a positive feasibility study on its Lisbon Valley SX/EW project in Utah. The mine, which will produce about 15 000 t/y of copper cathode, could begin production in late 1997.

In September, Southwire Co. announced that it had closed its 120 000-t/y copper rod mill at Gaston, South Carolina. Prior to the closure, the plant was operating at only 60% of capacity. At the beginning of 1995, Southwire had announced that it would close its 90 000-t/y secondary copper smelter, also located at Gaston. Also during 1995, Westinghouse Electric Corporation closed its copper rod mill in Pittsburgh.

Newmont Gold Corporation and Dupont announced a new cyanide processing technology, known as "Augment," that offers significant potential for the development of low-grade deposits, the treatment of waste ore dumps, and the recovery of gold from copper concentrates.

Australia

For a six-month period ending in August, copper output at MIM Holdings Ltd.'s Mount Isa mines was affected by labour problems. With additional technical difficulties at the company's smelter, MIM Holdings reported a decline of about 18 000 t of copper for the 12 months ending in June 1995, compared to the previous year.

MIM Holdings announced that it plans to expand its copper smelting capacity at Mount Isa from 190 000 t/y to 250 000 t/y. The cost of the expansion is estimated at A\$65 million.

Western Mining Corporation completed an expansion of its Olympic Dam mine that is expected to increase production to 84 000 t/y of copper in concentrate. The company expects to complete a feasibility study by June 1996 for a further expansion that would increase copper production to 150 000 t/y by the year 2000. The cost of this project is estimated at A\$1 billion. In January 1996, the company reported that it had discovered a new high-grade copper zone at the Olympic Dam mine site.

The Northparkes copper-gold mine of North Ltd. (80%), Sumitomo Metal Mining Co. Ltd. (13.3%) and Sumitomo Corp. (6.7%) commenced copper production in late 1995. The mine is expected to produce about 65 000 t/y of copper in concentrate as well as 2500 kg/y of gold over 21 years.

Placer Pacific Limited began commercial production at its new Osborne copper-gold mine property in northwest Queensland in August. The US\$115 million project is expected to produce about 29 000 t/y of copper and 1150 kg/y of gold over an 11-year mine life.

In November, MIM Holdings and Savage Resources Ltd. announced that they would proceed with the development of their A\$400 million Ernest Henry copper-gold deposit in northwest Queensland. The open-pit mine, which will produce about 95 000 t/y of copper in concentrate and 3700 kg/y of gold, is expected to begin production before the end of 1997.

Gold Mines of Australia Ltd. re-opened its Mt. Lyell copper-gold mine in Tasmania at the end of 1995. The mine was closed by its former owner, Renison Goldfields Consolidated Limited, in December 1994. At a planned mining rate of 3.2 Mt/y, annual production will be about 35 000 t of copper in concentrate and 1250 kg of gold.

Nord Pacific Ltd. announced in October that it was increasing processing capacity at its Girilambone copper mine from 16 300 t/y of copper cathode to over 18 000 t/y. The mine is owned 40% by Nord and 60% by Straits Resources Ltd.

Amalg Resources Ltd. expects to start production at its Eloise copper-gold property in Queensland in the first quarter of 1996. The Eloise deposit contains an estimated resource of 2.63 Mt grading 5.3% copper and 1.3 g/t of gold.

In June it was reported that Glencore International had agreed to fund the expansion of the Cobar copper operation of Shamrock Mines. It is expected that the expansion will increase production from about 33 000 t/y to 43 500 t/y of copper in concentrate.

Philippines

Climax Mining Ltd. expects to complete a feasibility study on its Didipio copper-gold project in early 1996. The deposit contains a measured and inferred resource of 108 Mt grading 1 g/t gold and 0.4% copper.

In December, Astron Ltd. signed an agreement with Atlas Consolidated Mining and Development Corporation to re-open Atlas's Carmen copper mine on the island of Cebu that had closed in February as a result of typhoon damage and high operating costs. Proven reserves at the Carmen mine total 206 Mt grading 0.41% copper plus gold and silver.

Indonesia

In the first half of 1995, Freeport-McMoRan Copper & Gold Inc. sold an 11.8% interest in its Grasberg mine to RTZ Corporation plc. While a mine and mill

expansion at its Grasberg copper-gold orebody to 115 000 t/d was just completed in 1995, the partners are evaluating a possible further increase to 200 000 t/d. With the completion of the recent expansion, the Grasberg mine has the capacity to produce 500 000 t/y of copper in concentrate plus 46 650 kg/y of gold. At the end of 1995, Freeport-McMoRan reported an increase in its ore reserves to 1.7 billion t grading 1.3% copper, 1.4 g/t gold and 4 g/t silver.

Construction of the new Gresik copper smelter is expected to begin in the second quarter of 1996. The smelter, which would be owned 70% by Mitsubishi Materials Corporation, 20% by Freeport-McMoRan and 10% by Fluor Daniel Eastern Inc., will have a capacity of 200 000 t/y of copper. Capital costs for the project are estimated at US\$450 million.

Korea

In December, Mitsubishi Materials Corporation announced that it would supply smelting technology to LG Metals Corp. for a project to increase the Korean company's smelting capacity to 400 000 t/y from 240 000 t/y.

Mongolia

In early 1996, it was announced that Marubeni Corporation would provide funding for the construction of a new 15 000-t/y SX/EW plant. The plant, to be completed in 1997, will be built at the Erdenet copper mine located 300 km northwest of Ulan Bator.

People's Republic of China

Chinese production of refined copper was estimated at 844 000 t in 1995 compared to 736 000 t in 1994. Meanwhile, China's consumption of refined copper in 1995 was estimated at 912 000 t, compared to 798 000 t in 1994 and 982 000 t in 1993.

A number of copper smelter/refinery projects are currently under way in China with several others under consideration. The Tongling Non-ferrous Metals Corp. of China, Sumitomo Metal Mining, Sumitomo Corp., and Itochu Corp. of Japan, along with Sharp Line International Co. Ltd. of Hong Kong, will build a 100 000-t/y copper smelter in Tongling. The plant will also produce about 360 000 t/y of sulphuric acid. The US\$240 million facility is expected to begin production at the end of 1996. The new plant will replace the 20 000-t/y Tongling Number One smelter that was built in 1953.

In January 1996, Ausmelt Pty Ltd. of Australia was awarded a contract by Zhong Tiao Corp. and China National Nonferrous Metal Import & Export Corp. for the development of a 35 000-t/y blister copper plant at Houma City in Shanxi Province. The cost of the project is estimated at US\$55 million, and production is expected to begin in 1998.

The Chinese government expects that copper consumption will increase to between 1.25 and 1.35 Mt in the year 2000, and rise to 1.7 Mt in 2010. As a result of this rapidly escalating demand for copper but only limited growth in mine capacity, China will need to import increasing amounts of copper throughout the next decade. However, with the construction of significant new copper smelting capacity, it is expected that most of China's import requirements will be in the form of copper concentrates and copper scrap.

Thailand

In early 1996, Union Minière SA acquired a 10% stake in Thai Copper Industries Public Company Limited, which plans to build a 165 000-t/y smelter/refinery complex in Rayong Province. The operation is expected to begin production by the end of 1998. A similar plan involving Padaeng Industry Co. Ltd. was shelved in 1994.

India

Hindustan Copper Limited plans to increase the capacity of its Khetri copper smelter from 31 000 t/y to 100 000 t/y by 1998. The project is expected to cost US\$125 million. The company is also considering a \$300 million underground mining project at Malanjkhanda in Madhya Pradesh.

Metdist Ltd. expects to complete its US\$545 million smelter/refinery project in the state of Gujarat by the end of 1998 or early 1999. The operation will have a capacity of 150 000 t/y of copper cathode. Mitsubishi Materials Corporation will hold an 18% interest in the project. The smelter will use the Mitsubishi continuous copper smelting process and the Kidd refinery process.

Indo Gulf Fertilizers & Chemicals Corporation Ltd. expects to complete construction of a new 100 000-t/y copper smelter and refinery at Dahej in Gujarat in 1997. The smelter, which will utilize Outokumpu flash smelting technology, may eventually be expanded to 150 000 t/y.

Sterlite Industries (India) Limited expects to begin production at its new smelter in Tuticorin in the first half of 1996. The initial capacity of this facility will be 60 000 t/y of copper, although the company is considering an eventual expansion to 100 000 t/y. The Sterlite smelter will use MIM's Isasmelt technology.

In addition to the three new smelters mentioned above, another project is the 50 000-t/y secondary smelter and refinery at Jhagadia in Gujarat involving SWIL Ltd. It is expected that this facility, which will utilize the Boliden process, will begin production at the end of 1997. Master Alloys also plans to build a 40 000-t/y smelter/refinery complex near Pondicherry in southern India. The cost of this project is estimated at US\$150 million.

Pakistan

The Saindak mine project of Pakistan's Resource Development Corporation and the Metallurgical Construction Corporation of China began production in July, while the project's new smelter began commercial production in December. Annual production will be about 15 000 t of copper, 1500 kg of gold and 2800 kg of silver.

Kazakhstan

At the end of 1995, Cam Finance S.A. of Switzerland won a tender to buy a 29% interest in the Balkhashmys (formerly Balkhashmet) Metallurgical Complex and an option to buy a further 10% interest by the year 2000. Cam Finance will also invest US\$510 million in the enterprise over the next five years. Balkhashmys produces about 125 000 t/y of copper cathode.

Russia

Udokan Mining Company is undertaking a feasibility study on the Udokan copper project, which is expected to produce about 70 000 t/y of copper, including 40 000 t/y of copper cathode. The Udokan deposit hosts proven and probable reserves of 915 Mt grading 1.5% copper and an additional 420 Mt of indicated/inferred reserves grading 1.4% copper.

Norilsk Nickel Concern reported that its production of refined copper in 1995 was 339 000 t. The company expects that its copper production in 1996 will be about 375 000 t. Norilsk Nickel also reported that it had sufficient ore reserves to sustain current production levels until at least the year 2050. The company also estimated that total Russian copper production would increase to about 590 000 t in 1996 from 549 000 t in 1995.

Poland

KGHM Polska Miedz SA announced a major investment program over the next five years to maintain its current production capacity, modernize its technology, and improve its environmental performance. In early 1996 it was reported that KGHM had awarded a 45 million zloty contract for a desulphurization plant at its Glogow smelter. At the end of 1995, there were reports that the Polish government was preparing to sell a 24% interest in KGHM.

Finland

In August, Outokumpu Oy officially inaugurated an expansion and modernization of its copper and nickel production facilities. The project included the expansion of copper smelting capacity at the Harjavalta smelter from 100 000 t/y to 160 000 t/y, while the copper cathode capacity at the Pori copper refinery increased from 70 000 t/y to 125 000 t/y.

Belgium

Union Minière plans to build a new smelter at its Hoboken plant, which will result in a drastic simplification of the processing of primary and secondary materials containing lead, copper, nickel and precious metals. The smelter, which is expected to begin production in late 1997, will produce about 40 000 t/y of copper from a wide variety of feed materials including scrap and concentrates.

Spain

Freeport McMoRan Copper & Gold Inc. completed an expansion of its copper smelter at Huelva from 190 000 t/y to 270 000 t/y. An expansion of refining capacity at the operation from 135 000 t/y to 215 000 t/y is expected to be completed in June 1996.

Zambia

In January 1996, Anglo American Corporation reached an agreement with the Government of Zambia whereby that company will lead a consortium to develop the US\$600 million Konkola Deep Mining Project with state-run Zambia Consolidated Copper Mines Ltd. (ZCCM). Konkola, which hosts ore reserves of 340 Mt grading 3.8% copper, is expected to produce about 180 000 t/y of copper and 600 t/y of cobalt.

African Minerals Corporation of Canada is proposing to develop the Konkola North deposit at a cost of between US\$500 million and \$1 billion.

Zaire

Copper output in Zaire in 1995 was expected to be about 30 000 t. By comparison, Zaire produced 465 000 t of copper in 1988.

Gecamines, the state-owned mining corporation, plans to exploit new cobalt and copper deposits in the southern region of Shaba Province. It is expected that the new deposits will yield about 2800 t/y of cobalt and 6500 t/y of copper.

Namibia

Great Fitzroy Mines NL and Namibian Copper Mines Inc. are undertaking a feasibility study on their Haib copper project. The project, which would produce 85 000 t/y of copper cathode, is expected to cost US\$600 million. Cash costs are projected at US\$59c/lb.

International Copper Study Group

Membership in the International Copper Study Group (ICSG) has increased with the addition of Mexico in April 1995 and the Russian Federation in

January 1996. Several other nations have expressed an interest in joining the organization. In 1995 the ICSG held meetings in Lisbon, Portugal, and Santiago, Chile.

At the Santiago meeting, the ICSG announced that it had signed an agreement with the International Copper Association to undertake a market research project in India. The Group also approved a market research project for Latin America. In addition, the ICSG decided to proceed with plans to hold a world conference on copper recycling in 1997.

The ICSG will hold two meetings in Lisbon during 1996 with the first being held during the week of June 24, 1996.

CONSUMPTION AND USES

World copper consumption increased to about 12.0 Mt in 1995 from about 11.5 Mt in 1994 (this includes refined copper from both primary and secondary material). In 1995 over 3.1 Mt of copper scrap were used directly by consumers. Altogether, 4.6 Mt of copper scrap were recovered in 1995. Canadian refined copper consumption was estimated to have decreased to 189 700 t in 1995 from 199 300 t in 1994.

During 1995, the Royal Canadian Mint announced that it planned to replace the copper alloy 1¢ coin with either a copper-plated steel or copper-plated zinc coin. The change is expected to result in cost savings of between \$3 million and \$5 million depending on the prices for steel and zinc. While the Mint will replace the copper alloy 1¢ coin, a new \$2 coin with an aluminum-bronze alloy core was introduced in February 1996.

In December, Hussy Copper Ltd. of the United States and Techanocuisse Inc. of Quebec formed a new company, Cobronze Technologies Ltd., that will produce pre-aged copper roofing sheet using a proprietary chemical process that oxidizes copper in minutes to achieve a blue-green patina.

In January 1996, Alcatel Canada Wire Inc. announced that it was cutting 400 jobs and closing its Toronto plant in response to slow demand for electrical cable products and an increasingly competitive market. The company expected that it would transfer as many as 100 jobs to factories in Québec City, Fergus, Ontario, and Weyburn, Saskatchewan.

Table 8 presents preliminary end-use data for 1993 and 1994 for the United States collected by the Copper Development Association Inc. (detailed copper consumption statistics are not officially collected in Canada).

NEW 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 and Brass Development Association (CCBDA) with the financial support of the International Copper Association, Ltd.

The CCBDA is also actively involved in the promotion of electrical wire and cable with particular emphasis on the use of larger conductors to improve energy efficiency. Other areas receiving attention include brass forgings for engineered components and the use of copper-based materials in applications to control zebra mussels. The CCBDA and the Copper Development Association of the United States have also jointly undertaken major North American initiatives on the promotion of architectural applications as well as plumbing tube and fittings.

In the automotive industry, the use of additional electronics offers significant growth potential for copper wire. Despite the significant penetration of aluminum into the original-equipment automotive radiator market, particularly in the United States, the International Copper Association (ICA) has reported that copper still controls about two thirds of the global radiator market. According to the ICA, copper is particularly dominant in heavy-duty applications and in the aftermarket where the metal has an 80% market share. The ICA estimates that worldwide copper usage for radiators is about 190 000 t/y.

With the development of new solders and new processing methods for coating and core baking, as well as a new brazed structure, it is possible that copper can regain a large share of the original-equipment market in view of its superior heat exchange efficiency.

Despite a number of technological advances in the communications and telecommunications sectors in recent years that promised to reduce copper consumption, including fibre optics, multiplexing and gauge reduction, the decline in copper usage in these sectors has slowed. Recent technological breakthroughs for copper enable more information to be transmitted than previously possible.

Copper continues to be the preferred metal for electrical wiring applications in building construction. As houses increase in size and incorporate more labour-saving electrical devices, the use of copper in household wiring applications could increase by up to 40%.

A number of other promising new markets for copper could also provide significant growth opportunities. These include certain roofing uses, fire suppression systems, natural gas systems, solar power genera-

tion, data communication, and the storage of spent nuclear fuel.

In October it was reported that Shinku Seiko (Chigasaki-shi, Kanagawa) had developed a new technique called "metal surface reforming" that increases the mechanical strength of copper parts by utilizing high-density thermal energy in electron beams.

HEALTH AND THE ENVIRONMENT

Copper is an essential element for normal healthy growth and the reproduction of all higher plants and animals. While copper may be toxic at elevated levels, copper deficiency in soils can have a serious impact on crop yields and animal health.

In plants, copper is an essential element of several proteins, mostly enzymes, that have varied but important metabolic functions. In certain regions, copper may have to be applied to soils to achieve minimum copper requirements.

In animal health, copper is an essential element in a number of critical enzymes. For humans, it is estimated that the daily minimum copper intake requirement for adults is between 1.6 and 2.0 mg. The World Health Organization (WHO) has established a recommended dietary allowance of 2.0 to 3.0 mg of copper per day.

Many regulatory agencies have chosen 1 mg/L 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 mg/L can stain laundry, and persons with a keen sense of taste may perceive a metallic flavour in the water.

In the first half of 1995, the Commission of the European Communities issued a revised drinking water directive to reduce the parametric value of copper in water from 3 mg to 2 mg/L. The copper industry voiced considerable concern that there was no scientific basis for the more stringent limits on copper.

While the levels of copper in water proposed by the Commission were the same as the revised guideline values for copper in drinking water that were issued by the WHO in 1993, the WHO is expected to re-examine this issue in 1996.

RECYCLING

In Japan, the National Institute for Resources and Environment of the Agency of Industrial Science and Technology has developed a new technique to recover copper from waste printed circuit boards. The process, which separates materials according to specific shape characteristics for each in grain form, can

recover about 90% of the copper in these waste boards. The process is also reported to have a lower cost than alternate methods.

During 1995 there were reports in the United States that the classification of copper residues, slags, bag-house dust, drosses and splatters by certain states as hazardous materials was forcing recyclers out of the business.

The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal is an environmental agreement designed to restrict the transboundary movement of hazardous wastes to protect countries (particularly developing countries) that may not have the capability and technology to properly handle the wastes. The Basel Convention defines "waste" to include recyclable metals. Accordingly, recyclables that exhibit a hazardous characteristic are classified as hazardous wastes and are subject to strict Basel Convention movement control procedures.

At the September 1995 third Conference of Parties to the Basel Convention, member countries offered no opposition to amending the Convention to immediately ban the export of hazardous wastes arising ostensibly from OECD countries and destined for final disposal outside the OECD region. The amendment also bans by December 31, 1997, the export of hazardous recyclables arising from OECD countries and destined for recovery operations in non-OECD countries. As of February 1996, no member country had ratified this ban amendment.

Basel member countries have no harmonized definition of "hazardous waste." This was recognized by the third Conference of Parties as a problem that could cause interpretive difficulties in implementing a ban amendment. Accordingly, member countries mandated a Technical Working Group to compile lists of hazardous wastes that would be subject to the ban amendment. The Technical Working Group was further mandated to compile a list of recyclable materials that would not be subject to the Basel Convention.

The Technical Working Group met in December 1995 to begin the compilation of hazardous waste lists that will be subject to the Basel ban amendment. The Technical Working Group provisionally accepted a list of recyclable metals, including copper, that would not be subject to the Basel Convention provided they are in massive form, have been prepared to specifications, and are not contaminated with hazardous elements. It was further agreed that alloys of these metals could contain a hazardous element if that element was an essential component of a commercial-grade alloy.

There was general agreement that the Technical Working Group should discuss environmentally

sound management practices as a means of reducing the risk inherent in the use of hazardous substances. The next meeting of the Technical Working Group is tentatively scheduled for April 1996.

STOCKS

Combined copper stocks on the London Metal Exchange (LME) and the Commodities Exchange, Inc. (COMEX) declined through the first half of 1995 to 167 000 t at the end of July. For the remainder of the year, combined stocks increased to reach 306 000 t at the end of December. At year-end, total copper stocks, including those at producers, merchants, consumers and exchanges, totalled 1 034 000 t, compared to 1 020 000 t at the end of 1994 and 1 367 000 t at the end of 1993. Figure 2 shows both exchange copper stocks and prices for the 1987-95 period.

PRICES

Copper prices on the LME averaged about US\$2935/t (\$1.33/lb) in 1995 (Figure 3) compared to US\$2310/t (\$1.05/lb) the previous year.

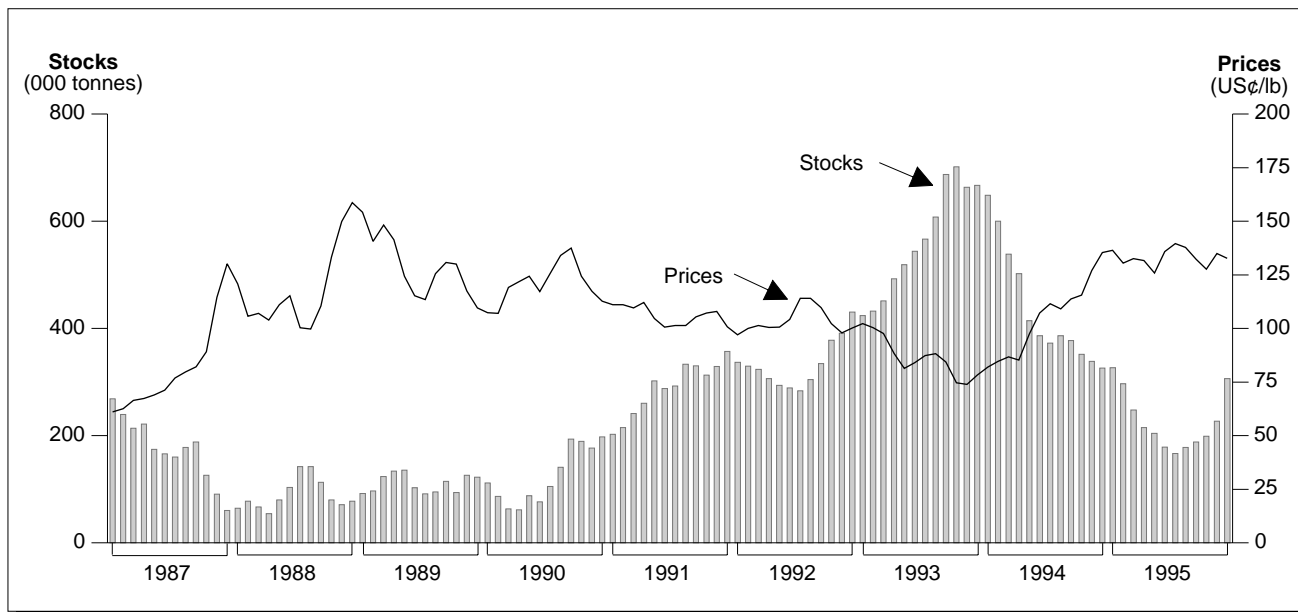
In the fourth quarter of 1995 and first quarter of 1996, Canadian producers sold refined copper in the United States at COMEX (High Grade first position close) plus a premium of US3.3¢/lb, while in Canada prices were set at the Canadian dollar equivalent of COMEX plus 4.5¢-4.6¢/lb. For sales in Europe in 1996, Canadian producers have established a price of LME (Grade A Settlement Price) plus an average premium of US\$30/t. The base premium in 1995 was US\$18/t.

In November, the LME launched an investigation of the copper market in response to extreme volatility and high backwardation levels. The investigation was launched amid speculation of squeezes and large market positions. It was reported that this investigation, which would make inquiries as to what extent the copper market reflected the current supply/demand situation, would examine the nature of clients' positions, credit lines and trader-customer relationships.

In January 1996 there were reports that the Securities and Investments Board (SIB) in the United Kingdom, the body that regulates the LME, was conducting an investigation with regard to the copper market. There were also reports that the SIB was cooperating with the Commodity Futures Trading Commission of the United States in monitoring the copper market.

On April 1, 1995, the LME opened its first copper warehouses in the United States.

Figure 2
Copper Prices¹ and Exchange² Stocks, 1987-95

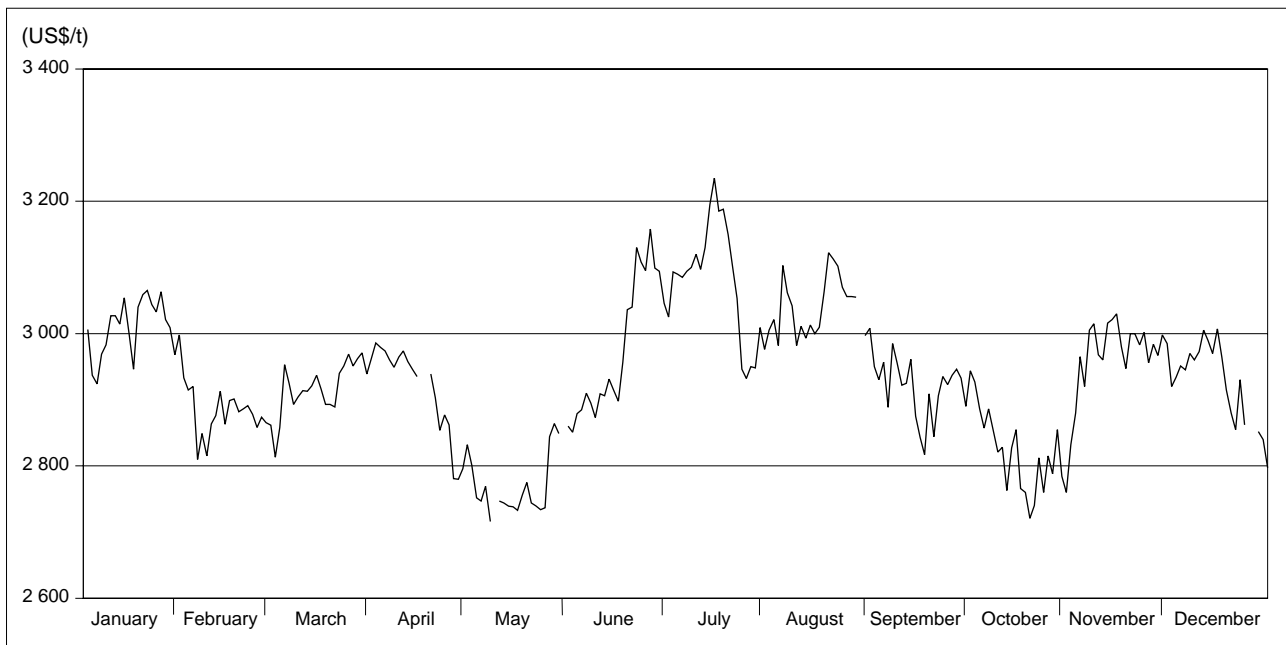


Source: Natural Resources Canada.

¹ Average monthly LME cash prices.

² Combined LME and COMEX stocks at end of the month.

Figure 3
Daily London Metal Exchange Copper Prices, 1995
 Grade A



Source: Reuters.

TREATMENT AND REFINING CHARGES

With an increase in the availability of copper concentrates, treatment and refining charges (TC/RCs) for copper increased throughout 1995. From a level of below US15¢/lb combined in mid-1994, spot rates were reported to have increased to over 30¢/lb combined at the end of 1995. For 1996 it was reported that Freeport-McMoRan had agreed to a combined TC/RC of 24.14¢/lb (US\$90-\$95/t for TCs and 9.5¢/lb for RCs) compared to a rate of 17.8¢ combined in 1995. It was reported that Highland Valley Copper (40.5% copper concentrate) had settled for a TC of US\$104/t and an RC of 9.5¢/lb, while OK Tedi Mining Limited was reported to have settled for \$98.50/t and 9.5¢/lb respectively.

OUTLOOK

World consumption of refined copper in 1996 is forecast to increase to 12.2 Mt. For the period 1996 to 2005, copper consumption is expected to grow at an annual average rate in excess of 3%. The largest increases in copper consumption are forecast to occur in the construction, transportation, and electrical and electronics industries.

It is also expected that a large share of the forecast growth in demand will occur in the Asian markets, particularly China and India. The Metal Mining Agency of Japan expects that demand for refined copper in Asia will grow at an average rate of 6%/y over the next 10 years, or from 3.9 Mt in 1995 to 6.3 Mt in 2005.

With the closure of several mines, it is expected that Canadian mine production of copper will decline in 1996. While there is only limited new copper mine capacity under development at the present time, there are a significant number of Canadian projects that are currently awaiting the completion of permitting procedures and/or the finalization of financing arrangements. These projects, which could begin production as early as 1997 or 1998, include Carmacks Copper and Minto in the Yukon; Huckleberry, Kemess, Mount Polley and Tulsequah Chief in British Columbia; and Corner Bay in Quebec. In the longer term, a number of other Canadian projects offer significant promise for increased Canadian production. These include the Kudz Ze Kayah, Wolverine and Casino prospects in the Yukon; the Red Chris, Prosperity (formerly Fish Lake) and Mount Milligan properties in British Columbia; and the Voisey's Bay property in Newfoundland/Labrador.

While copper consumption is forecast to remain strong into 1996, it is expected that prices will begin to be adversely affected by major increases in copper mine production capacity, particularly in Chile. However, given the expected high growth in world-

wide copper demand, it is expected that any downturn in copper prices will be relatively short-lived.

From an average range of between US\$1.05 and \$1.15/lb in 1996, copper prices are likely to fall to below US\$1.00/lb in 1997. In the longer term, copper prices are expected to trade in a range between \$0.90 and \$1.10/lb (constant 1995 dollars).

Notes: (1) For definitions and valuation of mineral production, shipments and trade, please refer to Chapter 70. (2) Information in this review was current as of February 20, 1996.

TARIFFS

Item No.	Description	Canada			United States	EU	Japan ¹
		MFN	GPT	USA	Canada	MFN	GATT
2603.00 2603.00.00.10	Copper ores and concentrates Copper content	Free	Free	Free	Free	Free	Free
2825.50	Copper oxides and hydroxides	Free	Free	Free	Free	3.2%	5.6%
28.33	Sulphates; alums; peroxosulphates (persulphates) Sodium sulphates:						
2833.25	Of copper						
2833.25.10	Cupric sulphate	6.3%	Free	Free	Free	3.2%	4.5%
2833.25.90	Other copper sulphates	7.7%	5.0%	Free	Free	3.2%	4.5%
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	6.4%
74.03	Refined copper and copper alloys, unwrought Refined copper:						
7403.11	Cathodes and sections of cathodes	Free	Free	Free	Free	Free	18.74 yen/kg
7403.12	Wire-bars	1.0%	Free	Free	Free	Free	18.74 yen/kg
7403.13	Billets	Free	Free	Free	Free	Free	18.74 yen/kg
7403.19	Other:						
7403.19.10	Ingots, ingot-bars and slabs	Free	Free	Free	Free	Free	18.74 yen/kg
7403.19.90	Other	1.0%	Free	Free	Free	Free	18.74 yen/kg
7403.21	Copper alloys:						
7403.21.10	Copper-zinc base alloys (brass)						
7403.21.10	Ingots, ingot-bars, slabs and billets	1.0%	Free	Free	Free	Free	16.8 yen/kg
7403.21.90	Other	1.0%	Free	Free	Free	Free	16.8 yen/kg
7403.22	Copper-tin base alloys (bronze)	1.0%	Free	Free	Free	Free	18.74 yen/kg
7403.23	Copper-nickel base alloys (cupro-nickel) or copper-nickel-zinc base alloys (nickel silver)						
7403.23.10	Ingots, ingot-bars, slabs and billets	Free	Free	Free	Free	Free	18.74 yen/kg
7403.23.90	Other	1.0%	Free	Free	Free	Free	18.74 yen/kg
7403.29	Other copper alloys (other than master alloys of heading no. 74.05)						
7403.29.10	Copper beryllium or copper phosphor alloys	1.0%	Free	Free	Free	Free	18.74 yen/kg
7403.29.90	Other	1.0%	Free	Free	Free	Free	18.74 yen/kg
7404.00	Copper waste and scrap Not alloyed:						
7404.00.11	Spent anodes; waste and scrap with a copper content of less than 94% by weight	Free	Free	Free	Free	Free	Free
7404.00.19	Other	Free	Free	Free	Free	Free	Free
7404.00.21	Copper-zinc base alloys (brass): With a copper content of less than 94% by weight	Free	Free	Free	Free	Free	Free
7404.00.29	Other	Free	Free	Free	Free	Free	Free
7404.00.91	Other: With a copper content of less than 94% by weight	7.3%	4.0%	Free	Free	Free	Free
7404.00.99	Other	7.3%	4.0%	Free	Free	Free	Free
7405.00	Master alloys of copper	2.1%	1.0%	Free	Free	Free	5.4%
74.06	Copper powders and flakes	Free-1.8%	Free-1%	0.8-2.1%	0.6-1.0%	1.1-5.0%	6.4%
74.07	Copper bars, rods and profiles	2.0-3.0%	Free-3.0%	Free-2%	Free-1.2%	5.8%	5.2-6.4%
74.08	Copper wire	1.6-7.4%	Free-4.0%	Free-2%	Free-0.8%	5.8%	5.2-6.4%
74.09	Copper plates, sheets and strip, of a thickness exceeding 0.15 mm	Free-7.4%	Free-4.0%	Free-2%	Free-1.3% ^a	5.8%	5.2-5.8%
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-1.0%	Free	Free-2%	Free-0.2% ^a	6.2%	5.4-5.8%
74.11	Copper tubes and pipes	Free-7.4%	Free-4.0%	Free-2%	Free-1.0% ^a	5.8%	5.8-7.2%

TARIFFS (cont'd)

Item No.	Description	Canada			United States	EU	Japan ¹
		MFN	GPT	USA	Canada	MFN	GATT
74.12	Copper tube or pipe fittings (for example, couplings, elbows, sleeves)	7.4%	4.0%	2.0%	0.6-2.2% ^a	6.2%	4.6%
7413.00	Stranded wire, cables, plaited bands and the like, of copper, not electrically insulated	3.9%	2.0%	2.0%	0.9-1.1% ^a	Free-6.2%	6.4%
74.14	Cloth (including endless bands), grill and netting, of copper wire; expanded metal of copper	3.9-4.8%	2.0-3.0%	2.0%	0.8-2.0%	6.1%	3.9-4.6%
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	3.9-4.8%	2-3%	2.6%	0.2-1.1% ^a	4.5-6.0%	4.6%
7416.00	Copper springs	4.5%	3.0%	Free	Free	6.0%	4.6%
7417.00	Cooking or heating apparatus of a kind used for domestic purposes, non-electric and parts thereof, of copper	8.7%	5.0%	2.4%	0.8%	6.0%	4.6%
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	7.4%	4.0%	2-2.6%	0.7-0.9%	4.5%	4.1%
74.19	Other articles of copper	Free-12.9%	Free-8.0%	Free-3.0%	1.0-1.7% ^a	4.5%	4.6-8.0%

Sources: Customs Tariff, effective January 1996, Revenue Canada; Harmonized Tariff Schedule of the United States 1996; The Bulletin International des Douanes, "Year 1994-1995 European Union, Journal Number 14 (17th edition), "Conventional" column; Custom Tariff Schedules of Japan, 1995.

^a Lower tariff rates may apply circumstantially.

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

TABLE 1. CANADA, COPPER PRODUCTION AND TRADE, 1994 AND 1995

Item No.	1994		1995P		
	(tonnes)	(\$000)	(tonnes)	(\$000)	
SHIPMENTS¹					
	Newfoundland	548	1 772	2 414	9 755
	Prince Edward Island	-	-	-	-
	Nova Scotia	-	-	-	-
	New Brunswick	8 562	27 675	13 617	55 025
	Quebec	69 150	223 521	110 000	444 510
	Ontario	224 801	726 643	250 587	1 012 620
	Manitoba	41 293	133 475	46 754	188 932
	Saskatchewan	-	-	-	-
	Alberta	-	-	-	-
	British Columbia	246 430	796 558	281 492	1 137 510
	Yukon	-	-	-	-
	Northwest Territories	-	-	-	-
	Total	590 784	1 909 644	704 863	2 848 352
	Refinery output	549 869	..	557 902	..
EXPORTS					
2603.00.10	Copper ores and concentrates				
	Copper content				
	Japan	140 690	294 174	164 265	516 758
	South Korea	9 350	18 846	30 239	93 152
	People's Republic of China	-	-	20 036	69 000
	Spain	11 758	23 371	19 975	62 974
	Philippines	20 207	46 480	13 988	43 796
	Other countries	36 343	89 834	7 451	26 294
	Total	218 348	472 705	255 954	811 974
2620.30	Copper ash and residues				
	United States	1 054	990	574	1 137
	India	237	226	971	921
	Other countries	-	-	306	291
	Total	1 291	1 216	1 851	2 349
2825.50	Copper oxides and hydroxides				
	United States	1	2	-	-
	Hong Kong	2	10	-	-
	Total	3	12	-	-
2833.25	Copper sulphates				
	United States	3 610	3 720	1 960	2 060
	Total	3 610	3 720	1 960	2 060
7401.10	Copper mattes				
	Norway	18 537	41 771	12 282	43 159
	United Kingdom	668	1 567	1 198	3 979
	Singapore	1	2	-	-
	Total	19 206	43 340	13 480	47 138
7403.11 to 7403.19	Refined copper and copper alloys, unwrought				
	United States	270 060	842 351	283 418	1 163 775
	United Kingdom	37 932	127 341	61 533	253 786
	Italy	35 299	108 085	24 002	99 750
	France	5 429	18 854	15 402	63 924
	Sweden	8 025	27 725	9 847	40 588
	Other countries	31 823	110 048	33 277	135 040
	Total	388 568	1 234 404	427 479	1 756 863

TABLE 1 (cont'd)

Item No.		1994		1995P	
		(tonnes)	(\$000)	(tonnes)	(\$000)
EXPORTS (cont'd)					
7403.21 to	Other copper alloys				
7403.29	United States	193	746	295	1 222
	Singapore	—	—	190	616
	Indonesia	—	—	139	398
	Thailand	—	—	201	369
	Taiwan	3	40	80	239
	Other countries	24	149	90	329
	Total	220	935	995	3 173
7404.00	Copper waste and scrap				
	United States	97 727	232 323	101 218	280 036
	Hong Kong	1 395	1 719	4 355	7 254
	People's Republic of China	3 840	5 052	4 075	5 677
	India	1 606	1 873	3 807	4 812
	Italy	2 129	4 515	1 790	3 427
	Japan	1 317	2 831	1 221	3 382
	Other countries	2 874	5 069	3 974	6 364
	Total	110 888	253 382	120 440	310 952
7405.00	Master alloys of copper				
	United States	1	10	937	1 476
	Total	1	10	937	1 476
7406.10, 7406.20	Copper powders and flakes				
	United States	36	413	69	654
	Taiwan	64	612	43	476
	Thailand	15	118	13	128
	Syrian Arab Republic	10	50	15	77
	Hong Kong	14	155	6	71
	Indonesia	24	236	—	—
	Venezuela	16	164	—	—
	Other countries	33	317	18	246
	Total	212	2 065	164	1 652
7407.10 to 7407.29	Copper and copper alloy rods and profiles				
	United States	8 296	37 823	7 025	38 396
	Ireland	307	1 176	459	1 743
	Colombia	142	578	—	—
	Jamaica	41	139	—	—
	Other countries	. . .	19	5	36
	Total	8 786	39 735	7 489	40 175
7408.11 to 7408.29	Copper and copper alloy wire				
	United States	25 380	85 193	39 245	169 027
	Cuba	1	7	50	406
	Japan	—	—	61	199
	Hong Kong	—	—	63	77
	Saudi Arabia	11	147	1	5
	Italy	22	106	. . .	3
	Colombia	398	1 638	—	—
	Other countries	35	243	53	180
	Total	25 847	87 334	39 473	169 897
7409.11 to 7410.22	Copper and copper alloy plates, sheets, strip and foil				
	United States	12 753	59 824	10 920	63 266
	United Kingdom	484	1 974	755	3 720
	Saudi Arabia	404	1 778	484	2 802
	Taiwan	126	470	339	1 836
	Thailand	—	—	240	1 288
	Other countries	186	1 078	690	3 867
	Total	13 953	65 124	13 428	76 779

TABLE 1 (cont'd)

Item No.	1994		1995P		
	(tonnes)	(\$000)	(tonnes)	(\$000)	
EXPORTS (cont'd)					
7411.10 to 7411.29	Copper and copper alloy tubes and pipes				
	United States	12 085	65 625	14 580	93 027
	Israel	307	1 231	287	1 499
	Saudi Arabia	—	—	58	432
	Sweden	—	—	12	124
	United Kingdom	—	—	27	114
	Cuba	1	5	22	104
	Other countries	47	261	49	293
	Total	12 440	67 122	15 035	95 593
7412.10, 7412.20	Copper and copper alloy tube and pipe fittings				
	United States	..	17 642	..	19 174
	Germany	..	6 685	..	7 595
	Spain	..	3 981	..	6 845
	United Kingdom	..	1 808	..	2 584
	Greece	..	382	..	1 857
	Other countries	..	1 671	..	2 310
	Total	..	32 169	..	40 365
7413.00	Stranded wire, cables, plaited bands and the like, of copper, not electrically insulated				
	Indonesia	—	—	1 287	4 731
	Egypt	—	—	234	737
	United States	208	878	74	393
	Tunisia	—	—	37	205
	France	35	169	22	78
	Other countries	38	214	18	91
	Total	281	1 261	1 672	6 235
7414.10, 7414.90 7415.10 to 7415.39 7419.10 to 7419.99	Copper, other items of				
	United States	..	13 352	..	18 652
	Saudi Arabia	..	9	..	548
	United Kingdom	..	146	..	450
	Hong Kong	..	1 003	..	314
	Lebanon	—	—	..	301
	Kuwait	..	9	..	273
	Other countries	..	355	..	1 157
	Total	..	14 874	..	21 695
IMPORTS²					
2603.00.00.10	Copper ores and concentrates				
	Copper content				
	United States	132 563	260 787	116 518	312 398
	Portugal	20 100	41 394	14 063	44 769
	Indonesia	5 983	17 628	6 348	21 178
	Australia	2 931	4 652	4 730	17 178
	Chile	12 900	35 366	4 761	12 315
	Bulgaria	2 225	3 704	1 745	4 881
	Other countries	4 031	8 615	473	1 170
	Total	180 733	372 146	148 638	413 889
2604.00.00.10, 2607.00.00.10, 2608.00.00.10, 2616.10.00.10	Other ores and concentrates				
	Copper content				
	United States	975	1 940	1 013	2 200
	Mexico	—	—	236	746
	Peru	135	185	25	38
	Total	1 110	2 125	1 274	2 984

TABLE 1 (cont'd)

Item No.		1994		1995P	
		(tonnes)	(\$000)	(tonnes)	(\$000)
IMPORTS (cont'd)					
2620.30	Copper ash and residues				
	United States	18 843	20 050	21 180	28 800
	Romania	7 425	10 174	10 237	5 375
	India	1 692	4 087	—	—
	Sweden	2 222	2 024	—	—
	Other countries	1 236	1 926	612	325
	Total	31 418	38 261	32 029	34 500
2825.50	Copper oxides and hydroxides	928	2 914	1 354	4 570
2833.25	Copper sulphates	4 301	4 065	9 842	10 732
7401.10	Copper mattes	210	545	4 973	10 775
7403.11 to 7403.19	Refined copper and copper alloys, unwrought Refined copper				
	Total	19 593	60 952	24 312	91 762
7403.21 to 7403.29	Refined copper and copper alloys, unwrought Other copper alloys				
	Total	2 706	9 428	8 527	28 297
7404.00	Waste and scrap, copper or copper alloy				
	United States	99 102	172 572	159 284	349 666
	Mexico	—	—	2 380	7 979
	Sweden	459	1 271	882	2 423
	Russia	347	398	1 956	2 349
	Spain	—	—	1 327	1 246
	Netherlands	531	1 292	—	—
	Other countries	557	604	1 407	2 097
	Total	100 996	176 137	167 236	365 760
7405.00	Master alloys of copper	177	548	28	127
7406.10, 7406.20	Copper powders and flakes				
	Total	1 816	9 156	1 833	11 081
7407.10 to 7407.29	Bars, rods and profiles of refined copper				
	United States	31 483	106 382	31 797	124 542
	Poland	1 394	3 580	1 511	4 836
	Germany	953	3 246	521	2 624
	Turkey	545	1 411	648	2 130
	South Korea	—	—	631	1 897
	New Zealand	303	1 104	322	1 447
	United Kingdom	276	1 416	243	1 172
	Other countries	1 111	3 422	1 010	4 070
	Total	36 065	120 561	36 683	142 718
7408.11 to 7408.29	Copper and copper alloy wire				
	Total	16 541	64 594	16 386	73 782
7409.11 to 7409.90, 7410.11 to 7410.22	Copper and copper alloy plates, sheets, strip and foil				
	Total	26 429	141 984	27 202	169 048

TABLE 1 (cont'd)

Item No.	1994		1995 ^p		
	(tonnes)	(\$000)	(tonnes)	(\$000)	
IMPORTS (cont'd)					
7411.10	Pipes and tubes, refined copper	9 095	40 059	7 988	40 811
7411.21	Pipes and tubes, copper-zinc base alloy	3 947	25 228	3 901	25 473
7411.22	Pipes and tubes, copper-nickel base alloy or copper-nickel-zinc base alloy	339	2 403	342	2 450
7411.29	Plates and tubes, copper alloy, n.e.s.	414	2 241	826	4 787
7412.10	Fittings, pipe or tube, of refined copper	491	5 696	454	5 361
7412.20	Fittings, pipe or tube, copper alloy	3 721	43 223	3 722	46 418
7413.00	Stranded wire, cable, plaited bands and the like, of copper, not electrically insulated	4 505	20 175	2 946	16 154
7414.10	Copper wire for machinery, endless bands	. .	3	. .	4
7414.90	Cloth, grill and netting of copper wire and expanded metal of copper	97	619	107	665
7415.10	Nails, tacks, drawing pins, staples and similar articles of copper or of iron or steel with copper heads	96	642	102	684
7415.21	Washers, copper, including spring washers	220	1 319	211	1 363
7415.29	Articles of copper, not threaded, n.e.s., similar to those of headings 7415.10 and 7415.21	306	1 684	301	1 728
7415.31	Screws, copper, for wood	17	98	67	386
7415.32	Screws, bolts and nuts of copper, excluding wood screws	604	3 870	781	4 966
7415.39	Articles of copper, threaded, n.e.s., similar to bolts, nuts and screws	468	2 899	448	2 862
7416.00	Copper springs	. .	214	. .	227
7419.10	Chain and parts thereof of copper	. .	596	. .	566
7419.91	Articles of copper, not further worked than cast, moulded, stamped or forged	483	3 807	775	6 029
7419.99	Articles of copper, n.e.s.	. .	46 182	. .	44 641

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 CONSUMPTION, 1975, 1980 AND 1985-95

	Production		Exports			Imports Refined	Consumption ³ Refined
	Shipments ²	Refinery Output	Concentrates and Matte	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 ^r	385 761	732 603 ^r	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	19 593	199 349
1995 ^p	704 863	557 902	269 434	427 479	696 913	24 312	189 721

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, 1994 AND 1995

	1994	1995 ^p
	(000 t)	
Australia	398	391
Canada	617	729
Chile	2 220	2 488
China	396	396
Indonesia	334	462
Kazakstan	202	205
Mexico	306	331
Papua New Guinea	206	222
Peru	320	311
Poland	378	384
Russia	573	591
South Africa	184	200
United States	1 848	1 866
Zambia	365	329
Other	1 123	1 115
Total	9 470	10 020

Source: International Copper Study Group.

^p Preliminary.

TABLE 4. WORLD REFINERY PRODUCTION OF COPPER, 1994 AND 1995

	1994	1995 ^p
	(000 t)	
Australia	318	282
Belgium/Luxembourg	375	401
Brazil	170	163
Canada	550	560
Chile	1 277	1 491
China	736	844
Germany	592	616
Japan	1 119	1 188
Kazakstan	277	283
Mexico	197	202
Peru	254	282
Philippines	155	187
Poland	405	393
Republic of Korea	222	233
Russia	502	552
Spain	188	164
United States	2 230	2 252
Zambia	352	323
Other	1 125	1 173
Total	11 044	11 589

Source: International Copper Study Group.
^p Preliminary.

TABLE 5. WORLD REFINED COPPER CONSUMPTION, 1994 AND 1995

	1994	1995 ^p
	(000 t)	
Belgium/Luxembourg	407	373
Brazil	183	202
Canada	200	190
China	798	912
France	495	544
Germany	1 000	1 085
Italy	480	496
Japan	1 375	1 415
Republic of Korea	476	543
Russia	161	180
Spain	178	178
Taiwan	547	569
United Kingdom	377	398
United States	2 680	2 526
Other	2 261	2 362
Total	11 618	11 973

Source: International Copper Study Group.
^p Preliminary.

TABLE 6. COPPER AND COPPER-NICKEL SMELTERS IN CANADA, 1995

Company and Location	Product	Rated Annual Capacity ¹	Feed Material	Remarks
		(thousand tonnes)		
Falconbridge Limited Falconbridge, Ontario	Copper-nickel matte	22.5	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	132	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	124	Copper concentrates, scrap	Mitsubishi-type smelting, separation and converting furnaces, acid plant and oxygen plant to treat continuous copper concentrate feed stream to yield molten 99%-pure copper. Hazelett continuous cast anodes.
Noranda Metallurgy Inc. Horne smelter Noranda, Quebec	Copper anodes	205	Copper concentrates, scrap	One continuous Noranda process reactor, five converters and an acid plant.
Noranda Metallurgy Inc. Gaspé smelter Murdochville, Quebec	Copper anodes	100	Copper concentrates	Green charge reverberatory furnace, two converters, rotary anode furnace and an acid plant.
Hudson Bay Mining and Smelting Co., Limited (HBMS) Flin Flon, Manitoba	Copper anodes	85	Copper concentrates	Five roasting furnaces, one reverberatory furnace and two converters. Project to replace concentrate roasting and calcine smelting with Noranda continuous converter technology has been postponed.

Source: Data provided by each company.

¹ Copper in matte, blister and anode.**TABLE 7. COPPER REFINERIES IN CANADA, 1995**

Company and Location	Rated Annual Capacity	Remarks
	(tonnes)	
Noranda Metallurgy Inc. CCR Division East Montréal, Quebec	360 000	Refines anodes from Noranda's Horne and Gaspé smelters, from the Flin Flon smelter, and also from purchased scrap and blister. Precious metals, selenium and tellurium recovered from slimes.
Inco Limited Copper Cliff, Ontario	175 000	Casts and refines anodes from molten converter copper from the Copper Cliff smelter; also refines purchased scrap. Gold, silver, selenium and tellurium cake recovered from anode slimes. Recovers and electrowins copper from Copper Cliff nickel refinery residue.
Inco Limited Copper Cliff, Ontario	15 000	Electrowinning plant processes copper-bearing fluids.
Falconbridge Limited Timmins, Ontario	104 000	Refines anodes from the Kidd Creek smelter.
Gibraltar Mines 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.

Source: All data provided by the companies.

TABLE 8. SUPPLY OF WIRE MILL, BRASS MILL, FOUNDRY AND POWDER PRODUCTS, AND THEIR CONSUMPTION IN END-USE MARKETS, 1993 AND 1994

United States	1993		1994 ^p	
	(000 t)	(% of total)	(000 t)	(% of total)
SUPPLY				
Domestic mill products				
Building wire	507	16.7	556	16.2
Magnet wire	258	8.5	295	8.6
Telecommunications cable	190	6.2	159	4.6
Power cable	137	4.5	145	4.2
Automotive wire and cable	111	3.6	118	3.4
Other wire and cable	299	9.8	351	10.2
Strip, sheet, plate and foil	454	14.9	526	15.3
Rod and bar	433	14.2	485	14.1
Tube and pipe	437	14.4	496	14.5
Mechanical wire	30	9.9	31	0.9
Foundry products	170	5.6	194	5.7
Powder products	17	0.6	21	0.6
Total, domestic mill products	3 042	100.0	3 376	98.4
Imported mill products	0	0	54	1.6
Total supply	3 042	100.0	3 430	100.0
USES				
Building construction	1 250	41.1	1 418	41.3
Electrical/electronic products	744	24.5	795	23.2
Industrial machinery/equipment	395	13.0	432	12.6
Transportation equipment	376	12.4	437	12.7
Consumer and general products	276	9.1	349	10.2
Total	3 042	100.0	3 430	100.0

Source: Copper Development Association Inc.

^p Preliminary.

Note: Percentages may not add due to rounding.

**TABLE 9. YEARLY AVERAGE
COPPER PRICES,¹ 1980-95**

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

Source: International Copper Study Group.

¹ Settlement price for highest grade of copper sold.

TABLE 10. MONTHLY AVERAGE COPPER PRICES, 1994 AND 1995

	LME ¹		COMEX ²	
	1994	1995	1994	1995
(current US¢/lb)				
January	81.9	136.5	83.7	139.9
February	84.6	130.5	87.1	133.8
March	86.8	132.6	89.8	139.0
April	85.3	131.7	87.9	134.0
May	97.5	125.8	100.3	127.9
June	107.2	132.8	108.6	137.8
July	111.5	139.5	111.7	138.0
August	109.1	137.8	109.4	137.8
September	113.7	132.3	120.5	132.1
October	115.6	127.6	118.9	128.0
November	127.1	135.0	130.0	136.5
December	135.4	132.7	136.9	131.8

Source: International Copper Study Group.

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