

Zinc

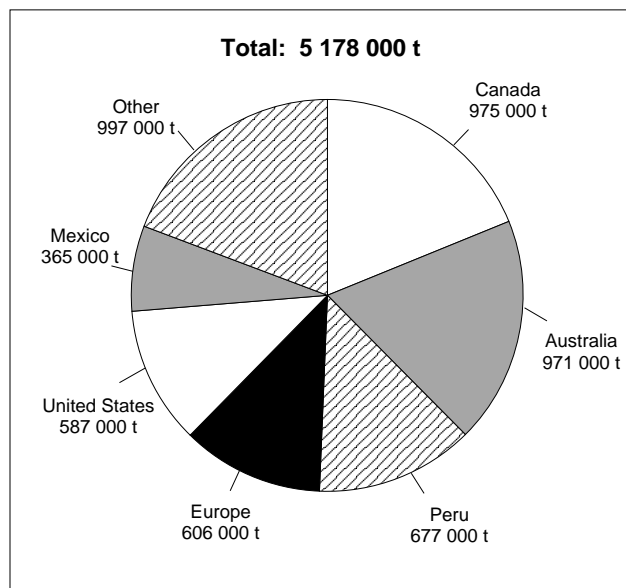
Philip Wright

The author is with the Mining Sector,
Natural Resources Canada.
Telephone: (613) 992-4403

Western World zinc consumption reached 5 721 000 t in 1994, surpassing 1993 consumption by 3.5%. Demand continued to be strong in North America and Asia (with the exception of Japan) and improved in Western Europe. High levels of zinc exports continued from China, North Korea and countries of the C.I.S. (Commonwealth of Independent States), and zinc stocks on the London Metal Exchange (LME) rose to a record 1 239 000 t before beginning a slow decline late in the year.

Western World mine production of zinc decreased in 1994 to 5 178 000 t compared to 5 227 000 t in 1993, according to preliminary figures from the International Lead and Zinc Study Group (ILZSG), as

Figure 1
Western World Mine Production of Zinc, 1994^P



Source: International Lead and Zinc Study Group.

^P Preliminary.

production cuts initiated in 1993 took effect. As a result, world concentrate surpluses, accumulated in previous years, were greatly reduced.

Western World zinc metal production decreased to 5 383 000 t in 1994 from 5 450 000 t in 1993. Production cuts were initiated in Europe and Japan, and C.I.S. output was reduced due to technical problems and difficulties in obtaining concentrates.

CANADIAN DEVELOPMENTS

Preliminary figures indicate that Canadian mine production of zinc in 1994 totalled 984 000 t, a decline for the second consecutive year, but enough for Canada to remain the world's largest producer. The decline was primarily the result of the closure of the Faro mine in the Yukon for the full year (it stopped milling in April 1993).

Two mines closed in Manitoba during the year. However, this was more than offset by the opening of the Louvicourt mine in Quebec and the re-opening of the Heath Steele mine in New Brunswick.

Zinc metal production totalled 689 000 t in 1994, a 4% increase over 1993, as smelters operated at high capacities to satisfy strong North American demand. Canada ranked second in 1994 in zinc metal production after China.

Yukon

The assets of the Faro lead-zinc mine were purchased by Anvil Range Mining Corp. from Curragh's receivers. The cost to re-open the mine is estimated at \$120 million. Anvil Range completed the necessary financing through a combination of share issues, silver royalty certificates and a \$30 million loan against future concentrate production. Hyundai Corp. agreed to market 50% of the concentrate produced. Anvil Range has also negotiated with the Canadian government the establishment of a mine reclamation fund, capped at \$100 million and funded by a sliding scale royalty based on zinc prices. Stripping of the Grum deposit began late in the year and commercial production is expected in the latter part of 1995.

Korea Zinc Co. Ltd., along with Teck Corporation and Cominco Ltd., completed the purchase of the Sa Dena Hes lead-zinc mine near Watson Lake from the receivers of bankrupt Curragh Inc. The mine closed in December 1992 due to low lead and zinc prices. Korea Zinc holds 50% of Sa Dena Hes, with Teck and Cominco each holding 25%.

Cominco announced the discovery of a polymetallic base-metal deposit on its TAG claims, northwest of Watson Lake. In early November the company indicated that it had placed the orebody, containing an inferred geological reserve of 13 Mt grading 5.5% zinc, 1% copper, 1.3% lead, 125 g/t silver and 1.2 g/t gold, on the fast track to development.

British Columbia

In March, Cominco sold the rights to expand power production at two company-owned power dams to the province of British Columbia. This will allow Cominco to undertake a \$170 million expansion to replace the inoperative QSL lead smelter and to make improvements in the zinc refinery by the end of 1996. Zinc capacity would increase by 20 000 t to 290 000 t/y of refined zinc.

A 16-month labour dispute at Westmin Resources Limited's Myra Falls copper-zinc mine on Vancouver Island ended in August and production resumed in September. During the dispute, staff at the mine carried out limited exploration, development and production. The Myra Falls mine produced 30 365 t of zinc in concentrate in 1992.

A consortium of Teck, Cominco and Korea Zinc purchased the Cirque zinc-lead deposit near Mackenzie from Curragh's receivers. The deposit contains a geological reserve of 52 Mt grading 8% zinc and 2% lead, with appreciable silver. No announcement on development of the deposit has been made.

In early November, Treminc Resources Ltd. announced the sale of its Silvana silver-lead-zinc mine and 125-t/d mill near New Denver to Amcorp Industries Ltd. The Silvana mine, which produced 1200 t of zinc in concentrate in 1992, closed in April 1993 due to low metal prices.

Bethlehem Resources Corporation suspended milling operations from March 1 to April 15 at its Goldstream mine near Revelstoke due to slower-than-planned underground development and changes in the geometry of the orebody. During the period, the decline was extended to give access to additional production levels.

Surface and underground drilling continued at Redfern Resources Ltd.'s Tulsequah Chief project in northwestern British Columbia, and permitting and feasibility studies were under way late in the year. A geological reserve of 8.5 Mt grading 6.9% zinc, 1.5% copper, 1.2% lead, 103.4 g/t silver and 2.6 g/t gold has been outlined.

Northwest Territories

The two existing zinc mines in the Northwest Territories operated smoothly, although Nanisivik Mines Ltd. increased the milling rate at its Nanisivik mine on Baffin Island in response to lower zinc grades. Rio Algom Ltd. acquired a 25% royalty interest in production from Cominco's Polaris mine on Little Cornwallis Island and a 25% participation interest in nearby exploration property.

Drilling and metallurgical studies continued on San Andreas Resources Corporation's Prairie Creek deposit in the Nahanni River area. A full feasibility study is expected to be completed in the spring of 1995. The orebody was developed in 1969 and again in the early 1980s when a 1200-t/d mill was constructed on site. Prairie Creek currently has a reserve of 3.9 Mt grading 14.7% zinc, 13.0% lead and 202 g/t silver.

Metall Mining Corporation completed a feasibility study on its Izok Lake zinc-copper project in the Contwoyto Lake area. Metall concluded that developing the orebody would not be economic without assistance to build a 238-km road from the mine to tide-water and for associated port facilities. Izok Lake contains a reserve of 13.6 Mt grading 14.6% zinc, 2.5% copper, 1.6% lead, and 77 g/t silver.

Manitoba

Hudson Bay Mining & Smelting Co., Limited's (HBMS) Stall Lake and Chisel mines at Snow Lake closed in March due to depletion of reserves. This resulted in the closure of the 20 000-t/y capacity Snow Lake mill.

HBMS acquired a 100% interest in the Trout Lake mine at Flin Flon by purchasing the interests of partners Granges Inc. and Manitoba Mineral Resources Ltd. HBMS plans to undertake a shaft deepening and development program to extend the life of the mine.

Ontario

Falconbridge Limited continued deep drilling beneath the current workings of its Kidd Creek No. 3 mine at Timmins. Results indicate the presence of a large mineralized zone between the 2380-m and 3000-m levels. An exploration drift has been started on the 2070-m level, 95 m above the shaft bottom, to provide a better base for further drilling.

Metall Mining began underground exploration of the Pick Lake massive sulphide zone at its Winston Lake zinc-copper mine near Schreiber. A 2.5-km drift was driven to access the zone for test mining and further definition drilling. A diluted reserve of 1.25 Mt grading 1% copper, 17% zinc and 44 g/t silver is indicated from surface drilling. The original Winston Lake orebody is due to be depleted in early 1997.

North American Oxide Inc. of Clarksville, Tennessee, bought Purity Zinc Metals Co. Ltd. in May. Purity Zinc operates a secondary zinc plant in Stoney Creek which has a capacity of 8000 t/y of remelt-grade zinc. The company produces zinc dust, zinc alloys, and marine and electroplating anodes.

Quebec

The Louvicourt copper-zinc mine, owned by Aur Resources Inc., Teck and Novicourt Inc., began milling in July. Commercial production was reached in December. At full capacity the mine will produce 40 000 t/y of zinc in concentrate. In April, Aur announced a downward revision of ore reserves to 15.7 Mt grading 3.4% copper, 2.2% zinc, 31 g/t silver and 0.9 g/t gold. At the planned mining rate of 4000 t/d of ore, the revision reduces the mine life from 17 to 12 years. However, the Louvicourt orebody has not been fully delineated and underground exploration drilling is being carried out in conjunction with mining to more fully understand the complex structure of the massive sulphide mineralization.

Development continued on Audrey Resources Inc.'s 1100 Lens project at its formerly producing Mobrurn mine near Rouyn-Noranda. The \$36 million pre-production program consisted of underground development and definition drilling, construction of surface infrastructure and a backfill plant, and a mill expansion and raising of the tailings pond dykes. Production is scheduled for January 1995 with the mine producing 26 000 t/y of zinc in concentrate at full capacity.

Cambior inc. approved the feasibility study on its Grevet zinc-copper orebody near Lebel-sur-Quévillon and began pre-production in July. A total of \$18 million was spent by the end of 1994, with the remaining \$62 million approved in January 1995 upon receipt of environmental permits. Development plans call for construction of a 2500-t/d mill and eventual production of 72 000 t/y of zinc in concentrate. Probable and possible mineable reserves at Grevet are 11 Mt grading 8.5% zinc, 0.5% copper, 35 g/t silver and 0.1 g/t gold.

Les Mines Selbaie began production from the A-1 zone open pit at its Selbaie mine near Joutel upon closure of the underground mine early in the year. Production of 7600 t/d was maintained. In July, Les Mines Selbaie's parent, the Royal Dutch/Shell Group, sold its metals assets, including the Selbaie mine, to Gencor Limited of South Africa.

At Matagami, Noranda Minerals Inc. continued drilling on the Bell Allard copper-zinc deposit near its Isle Dieu mine. Isle Dieu is scheduled for depletion by the end of 1997. A decision on whether to go further underground to explore the Bell Allard deposit has not yet been made.

New Brunswick

Brunswick Mining and Smelting Corporation Limited laid off 58 staff at its Brunswick #12 mine near Bathurst early in the year in an effort to further reduce operating costs. The company maintained production levels at the mine at 10 000 t/d.

In October, Brunswick Mining and Smelting re-opened its Heath Steele zinc-lead mine near Newcastle. The mine had been closed since June 1993 due to worldwide concentrate surpluses and low metal prices. Heath Steele has a capacity of 40 000 t/y of zinc in concentrate.

WORLD DEVELOPMENTS

The Western World's mine production of zinc was 5 178 000 t in 1994 compared to 5 227 000 t in 1993. Increases in Peru and the United States were more than offset by decreases in Canada, Australia and Europe.

Europe

Arcon International Resources Plc received planning approval for its Galmoy lead-zinc mine in County Kilkenny, Ireland. The total cost of the project is estimated at US\$65 million, with production scheduled for June 1996. The Galmoy mine would have a capacity of 66 000 t/y of zinc in concentrate. Also in Ireland, Ivernia West Plc won a court decision allowing it to acquire Chevron Minerals Ltd.'s 52.5% interest in the Lisheen zinc-lead deposit in County Tipperary. The decision allows the development of Lisheen, which is due to start up in early 1997 at a cost of US\$184 million. The mine would produce 180 000 t/y of zinc in concentrate.

In Spain, Andaluza de Piritas S.A. re-opened its Aznalcollar mine in June after a 12-month closure due to a shortage of mill process water brought about by drought conditions. The mine has a capacity of 54 000 t/y of zinc in concentrate. The company is examining the possibility of developing the nearby Los Frailes deposit, which would extend its mine life and allow for increased production.

Australia

Construction of MIM Holdings Ltd.'s McArthur River lead-zinc-silver mine in the Northern Territory continued throughout the year with commissioning scheduled for mid-1995. Development also includes construction of a gas pipeline, a gas-fired power station, and port facilities. McArthur River will produce a bulk concentrate containing 160 000 t/y of zinc.

CRA Ltd. began bulk sampling at its Century project in Queensland as part of a final feasibility study. The 50 000-t bulk sample was sent to European smelters

for metallurgical testing. CRA will decide in March 1995 whether to go ahead with full development of the mine which, at full production in 1998, would produce 5 Mt/y of ore containing 500 000 t/y of zinc in concentrate. Century contains reserves of 118 Mt grading 10.2% zinc, 1.5% lead and 36 g/t silver.

An underground drilling program at Broken Hill Proprietary Company Limited's Cannington lead-zinc deposit, also in Queensland, has resulted in a revision of reserve estimates to 45 Mt grading 11.1% lead, 4.4% zinc and 500 g/t silver. No development decision is expected before mid-1995.

Pasminco Ltd. announced that it planned to invest US\$35 million over the next four years to define and develop 10 Mt of ore below the current workings at its Rosebery zinc-lead-copper mine in Tasmania. The program would include mine development and diamond drilling. Preliminary exploration drilling intersected encouraging results in this area.

United States

Cominco shipped 517 000 t of zinc in concentrate during 1994 from its Red Dog mine, a 41% increase over 1993 shipments. The increase was due to greater mill throughput and some further improvement in metallurgical recoveries.

RFC Resources Finance Corporation completed a feasibility study on its Pend Oreille zinc-lead project in Washington. An underground mine producing 46 000 t/y of zinc in concentrate is recommended. However, development awaits improvement in the zinc market. Current mineable reserves are 3.5 Mt grading 9.1% zinc and 1.3% lead, but the orebody has not been fully delineated.

Mexico

Met-Mex Penoles SA de CV started production at its Tizapa polymetallic mine in July. At full capacity, Tizapa will produce 15 000 t/y of zinc in concentrate. The zinc concentrates are being shipped to Japan's Dowa Mining Co. Ltd., which owns 39% of the mine. Development of Tizapa was facilitated by exploration assistance from the Metal Mining Agency of Japan and the Japan International Cooperation Agency.

Greenland

Platinova A/S has calculated a geological resource of 12 Mt grading 8% zinc and 1% lead at its Peary Land zinc project in Northeastern Greenland. The company completed a 9600-m drill program on a 3-km interval of the 10-km mineralized trend and plans to conduct drilling on the remainder in the spring of 1995.

South America

Privatization plans progressed in Peru where state-owned Centromin Peru S.A. announced it was spending US\$8 million on an environmental clean-up program at its mining and refining operations. In addition, the Peruvian government has assumed liability for past environmental damage as a means of making the sale of Centromin more attractive. The assets for sale include Centromin's seven mines and its La Oroya metallurgical complex, which includes a 70 000-t/y capacity electrolytic zinc refinery.

The Brazilian company Cia Paraibuna de Metais, along with partners Minerero Peru, Cia de Minas Buenaventura S.A. and Perubar S.A., plans to develop the Iscaycruz mine, northeast of Lima, Peru, by January 1996. At a capital cost of US\$40 million, the mine would produce 60 000 t/y of zinc in concentrate that will be shipped to Paribuna's zinc refinery in Brazil.

The Bolivian government commenced the process of privatization of its lead-zinc, tin and precious metals mining industry during the year. A private consultant was hired to draft a privatization program. Privatization of the state-owned Corporacion Minera de Bolivia (Comibol) is expected by June 1995. Meanwhile, Comibol opened its Bolivar lead-zinc-silver mine in December. At full production Bolivar will produce 27 000 t/y of zinc in concentrate.

Commonwealth of Independent States

The mine production of zinc continued to fall in C.I.S. countries. Mines experienced higher freight costs, technical problems due to a lack of adequate investment to replace ageing equipment, and difficulties in receiving payments from smelters. The ILZSG forecasts C.I.S. zinc-in-concentrate production to fall from 399 000 t in 1993 to 373 000 t in 1994, and to 350 000 t in 1995.

Output at Russia's Gaiski Complex is reported to have fallen by 25% due to weak concentrate demand caused by the fall in C.I.S. zinc metal production. Russian mines are not permitted to export mine production.

Privatization of the Zyrjanovsk polymetallic mine proceeded with the European Bank for Reconstruction and Development (EBRD) assisting the Kazakh government with the privatization process. The EBRD hired a consultant to evaluate the market value of the assets which include a lead-zinc-silver mine and concentrator.

The Nerchinsky open-pit zinc-lead mine in eastern Siberia closed during the year with the loss of 8000 t/y of zinc in concentrate. Also, pre-stripping of the Ozernovskoye open-pit zinc-lead mine in Buryatia

was completed, but further development was put on hold due to a lack of infrastructure. The mine's capacity would be 27 000 t/y of zinc in concentrate.

Asia

Zinc-in-concentrate production in China was expected to increase slightly in 1994. However, China's zinc mine capacity is still far below its zinc smelter capacity. China is attempting to attract foreign investment in its domestic mining industry.

The Chinese state-owned Changba zinc-lead open-pit mine in Gansu province came on stream during the year. Production at the Changba mine is to be expanded by 12 000 t/y to 50 000 t/y of zinc in concentrate by the end of 1996. Construction also continued at the Lanping open-pit zinc-lead mine in Yunnan province. The mine is expected to come on stream in 1995 and, at full capacity in 1996, will produce 60 000 t/y of zinc in concentrate.

Two mining projects in China in which Canadian company Asia Minerals Corp. has an interest have been put on hold. Pre-feasibility studies have been completed on the Cai-Jai-Ying lead-zinc-silver project in Hebei province and the Ashele copper-zinc project in Xinjiang province, but problems between Asia Minerals and the State over technical and commercial issues have yet to be resolved.

Hindustan Zinc Ltd. plans to expand production at its Rampura-Agucha open-pit zinc-lead mine in India's Rajasthan State by 50 000 t/y to 140 000 t/y of zinc in concentrate by 1997. Meanwhile, Hindustan Zinc has discovered a second zinc-lead deposit in the vicinity of the Rampura-Agucha mine and has entered into an agreement with BHP of Australia to explore and develop the new orebody. Hindustan Zinc suspended concentrate exports in September following flooding that halted operations at its Rajpura-Dariba mine, also in Rajasthan State.

Arabian Shield Development Company received a positive feasibility study on its Al Masane copper-zinc project in Saudi Arabia. Arabian Shield is currently arranging financing for the project, which is expected to cost US\$81 million. The mine, which would produce 31 000 t/y of zinc in concentrate, is scheduled to come on stream in mid-1996.

Metall Mining Corporation and partner Etibank opened their Cayeli copper-zinc mine in Turkey at the end of November at a capital cost of US\$154 million. When in full production in 1996, the mine is expected to produce 35 000 t/y of zinc in concentrate and should have a minimum life of 15 years.

Africa

Société minière de Bougrine opened its Bougrine zinc-lead mine in Tunisia in May. The mine was

scheduled to reach full capacity at year-end, producing 35 000 t/y of zinc in concentrate, which will be shipped to smelters in Western Europe. The capital cost to bring Bougrine into production was US\$80 million.

Zambia Consolidated Copper Mines Limited closed its Kabwe underground zinc-lead-silver mine and associated zinc refinery in June due to rising operating costs. The mine had a capacity of 20 000 t/y of zinc in concentrate. The Zambian government has been examining proposals to use the Kabwe site to reprocess copper, lead and zinc slags, and slurries.

SMELTING

Western World production of zinc metal reached 5 383 000 t in 1994, compared to 5 450 000 t in 1993. The decrease was primarily the result of production cuts initiated in Europe and Japan due to high zinc inventories, low prices, and concentrate shortages. The strong yen also contributed to reductions in Japan.

Europe

European zinc metal production in 1994 was 2 112 000 t, a 3% decrease from 1993. Lower production was recorded in Germany, Spain and France.

Early in the year, European zinc producers halted talks on a coordinated shut-down of some smelter capacity due to excess capacity and low zinc prices. It was concluded that numerous issues would have to be addressed, resulting in major delays in taking action.

MIM Holdings and Metallgesellschaft AG (MG) restructured their German smelting interests in February. Under the agreement, MIM acquired 100% interest in the 100 000-t/y Duisburg zinc smelter while MG became the sole owner of the 200 000-t/y Datteln zinc refinery. Shortly after the restructuring, MG announced that it was cutting production at the Datteln refinery to 90 000 t/y of refined zinc.

Metaleurop S.A.'s Noyelles-Godault zinc smelter in France was closed in January after an explosion in a zinc refining column. A similar accident occurred in July 1993. Following the closure, Metaleurop began exporting production from the Imperial Smelting Furnace (ISF) to Belgium and Germany for final refining. The company hoped to restart refining by the second quarter of 1995.

Asturiana de Zinc S.A. announced in January that it was cutting zinc production at its 320 000-t/y San Juan de Nieva refinery in Spain by 70 000 t in 1994. Production at San Juan de Nieva was curtailed due to concentrate shortages, especially with the closure of the Faro mine in the Yukon.

Norzink A/S announced in September that it would cut 1995 zinc production at its Odda refinery in Norway by up to 20% due to low zinc prices and high LME stocks. The Odda refinery has a capacity of 140 000 t/y of refined zinc.

Japan

Nippon Mining & Metals Company Limited and MIM Holdings cancelled their Hachinohe ISF zinc-lead smelter project due to low lead and zinc prices and a rapid appreciation of the Japanese yen. The zinc smelter would have had a capacity of 120 000 t/y of refined zinc. The existing Hachinohe zinc refinery was damaged in an earthquake on December 28. Production of Special High Grade zinc will be suspended for about two months, but production of Prime Western Grade zinc is unaffected.

Nippon Mining, Mitsui Mining & Smelting Co. Ltd., Sumitomo Metal Mining Co. Ltd., Dowa Mining Co. Ltd., and Toho Zinc Co. Ltd. cut zinc metal production for the first half of fiscal year 1994, which began April 1, due to reduced demand, especially for coated steel sheet used in the automotive industry. Later in the year, Mitsui, Sumitomo and Dowa reversed the production cuts for the second half of fiscal year 1994 due to increased domestic demand. However, Nippon Mining announced that it would make further cuts at its Mikkaichi smelter due to the strong yen, high LME zinc stocks, and low zinc prices. For the 1994 calendar year, Japanese zinc production was 662 000 t, down 5% from 1993.

United States

In October, Zinc Corporation of America announced that it would not re-open its 54 000-t/y Bartlesville, Oklahoma, zinc refinery, which closed in September 1993 for maintenance and environmental retrofit.

In May, the U.S. Senate turned down the U.S. Defense Logistics Agency's (DLA) request to increase the limit for stockpile zinc sales in fiscal year 1994 from 45 000 t to 68 000 t. Furthermore, under the Defense Appropriations Bill for fiscal year 1995, a six-month moratorium was placed on sales of stockpiled zinc outside the U.S. government. The DLA can ask Congress for permission to sell stockpile zinc after April 1, 1995. However, the DLA cannot sell zinc if the world price falls 5% or more below the price on October 1, 1994.

The decision to curtail sales came after strong concerns were raised by the zinc industry and the governments of several zinc-producing countries over DLA sales during poor market conditions for zinc.

South America

As part of the privatization of the Peruvian mining industry, Cominco and partner Marubeni Corpora-

tion of Japan purchased Minero Peru Comercial S.A.'s 102 000-t/y Cajamarquilla zinc refinery in early November for US\$193 million. The companies also made a commitment to spend an additional \$20 million on upgrading and expanding the refinery. Cajamarquilla was forced to cut production in August due to a damaged transformer that was expected to be repaired by year-end. Lost production has been estimated at about 6000 t of refined zinc.

In Brazil, Cia Mercantil e Industrial INGA announced in January that it plans to expand capacity at its 50 000-t/y Itagua zinc refinery by an initial 12 000 t/y by 1995, with a further increase to 110 000 t/y of refined zinc being possible. Meanwhile, Cia Mineraria de Metais completed expansion of its Tres Marais refinery, also in Brazil. However, commissioning will be delayed until late 1995 in the hope that zinc prices will improve.

China

China was the world's largest producer of refined zinc in 1994 accounting for an estimated 860 000 t, compared to 857 000 t in 1993 when it also ranked first. An expansion at the state-owned Zhuzhou refinery in Hunan province was completed in November, raising refined zinc capacity by 15 000 t/y to 130 000 t/y.

An expansion at the Shaoguan ISF smelter in Guangdong province is also in progress. When completed in 1995, it will raise capacity at the state-owned smelter by 60 000 t/y to 120 000 t/y of refined zinc. Strong domestic zinc prices and continued strong demand have influenced the decision to expand Chinese zinc refining capacity despite the current shortage of domestic concentrates.

Other

Industrial Minera Mexico SA de CV (IMMSA) announced that it planned to increase zinc production at its San Luis Potosi, Mexico, zinc refinery to 105 000 t/y by 1996 from 95 000 t/y in 1993. IMMSA is using more zinc concentrate to replace the zinc oxide portion of its smelter feed that it had obtained from its now-closed Monterrey lead smelter.

Metallgesellschaft AG (MG) withdrew from the 90 000-t/y Rayong ISF smelter project in Thailand, which led to the project's cancellation. MG's partner, Padaeng Industry Co. Ltd., and the replacement Sino-Thai Group are consequently conducting a feasibility study on constructing a 120 000-t/y electrolytic refinery at Rayong. Meanwhile, Padaeng Industry is also examining the possibility of expanding its 70 000-t/y Tak refinery to 100 000 t/y of refined zinc.

Binani Zinc Ltd. completed the first stage of its zinc refinery expansion in India. Capacity was raised by 5000 t/y to 25 000 t/y of refined zinc. A second-stage expansion is planned for 1995 to bring capacity to 30 000 t/y.

Korea Zinc completed a 20 000-t/y expansion of its 200 000-t/y Onsan zinc refinery in October. Korea's two zinc smelters cut production late in the year due to drought-related electricity shortages. Korean refined zinc production was 258 000 t in 1993.

In South Africa, Eskom, the state electrical utility, commissioned Lurgi GmbH of Germany to conduct a feasibility study for a 200 000-t/y zinc smelter at the east coast port of Richards Bay. South Africa's existing 100 000-t/y zinc refinery in the Transvaal currently supplies the domestic needs of both South Africa and Namibia.

SECONDARY ZINC

Zinc from secondary sources has become increasingly important in recent years. Figures from the ILZSG indicate that the total recovery of zinc from secondary materials in the Western World in 1993 was 1.88 Mt. Secondary zinc includes high-purity refined zinc, remelted zinc of a purity less than 98.5% zinc, and scrap zinc used in the production of zinc alloys.

With increasing use of zinc galvanized steel in the automobile and construction industries, secondary zinc from Electric Arc Furnace dusts has become a significant source of zinc. These dusts contain various elements in a form that renders the dusts inappropriate for disposal in standard landfill sites. Consequently, Electric Arc Furnace dusts must be put into landfills for hazardous wastes. The decreasing space available at such sites and the associated increases in disposal costs have provided a further incentive for recycling. As vehicles manufactured in the 1980s begin to be recycled, the recovery of zinc from flue dusts should rise.

In recent years, technologies for recycling these zinc-bearing materials have been developed. The Waelz kiln is the most common method of processing Electric Arc Furnace dusts. Waelz oxides are treated in Imperial Smelting Furnaces for the production of refined zinc. The requirement of Waelz kilns to be near their feed source, i.e., steel mill complexes, would suggest that treatment of these dusts will be most important in the United States, Japan and Western Europe. U.S. steel companies are currently examining an Italian electrochemical process called "Ezinex" which recovers zinc electrolytically from a zinc-amino chloride solution produced from the leaching of flue dusts.

Canada does not currently process Electric Arc Furnace dusts. Canada's secondary zinc facilities, Federated Genco Ltd. and Purity Zinc Metals Co. Ltd., have a capacity to produce 17 000 t/y of remelted zinc. Materials that are reprocessed by remelting include drosses and skimmings from both the primary refining and galvanizing processes.

In 1994, Korea Zinc commissioned Australian company Ausmelt Pty Ltd. to build a 125 000-t/y plant incorporating the Ausmelt metallurgical process to recover zinc fume from jarosite, goethite and primary leach residues. The plant, to be commissioned in May 1995, would be the first commercial installation of its kind.

The fertilizer and chemical industries also make use of zinc-bearing wastes to create zinc sulphate and chloride compounds. The chemicals are then used in the production of fertilizer micro-nutrients.

CONSUMPTION AND USES

Western World consumption of zinc increased to 5 721 000 t in 1994, an increase of 3.5% from its 1993 level. Demand continued to improve in North America and in Asia, but not in Japan. European demand rebounded after two years of decline. However, a further decline occurred in the C.I.S., primarily in Russia.

The use of zinc for galvanizing has grown steadily in recent years and this trend is expected to continue in the future. Galvanizing represented 48% of zinc consumption in 1993. Zinc is used extensively in the automotive and construction industries for corrosion protection and remains the most cost-effective means of protecting steel against corrosion. The galvanization of steel is the fastest growing usage of zinc, and it has grown steadily in recent years at the expense of almost all other end uses. This trend is expected to continue in the future.

Galvanized steel is used in automobile construction to protect steel from corrosion. The brightest prospects for galvanized steel in the automobile industry are currently in Asia. Japanese and other Asian manufacturers are using increasing amounts of galvanized sheet in response to demands for increased corrosion protection. In North America, where galvanized steel is already extensively used in automobile construction, applications of dual-sided galvanized steel have become increasingly important for exposed body surfaces.

Galvanized steel is also used in construction for structural components, roofing, siding, and reinforcement bars. Zinc and zinc-aluminum thermally sprayed coatings are used for long-term corrosion protection of large steel structures such as bridges and hydro-electric transmission towers. With the high cost of lumber, fabricated hot-dipped structural steel is becoming cost-competitive for use in residential home construction. The number of steel-framed homes built in the United States has risen from 500 in 1992 to an estimated 75 000 in 1994.

A number of zinc alloy coatings have been developed over the years that have more superior qualities than pure zinc in specific applications. These include

Galfan (90% zinc, 5% aluminum and the remainder rare earth elements) and Galvalume (55% aluminum, 43.4% zinc and 1.6% silicon), as well as zinc-iron and zinc-nickel alloys. Galfan, for example, exhibits higher formability and paintability than other coatings, and zinc-nickel alloys reduce the reactivity of high-silicon steels.

Canada's hot-dip galvanized steel and galvalume capacity of 1 902 000 t is located in Ontario at the facilities of Dofasco Inc. and Stelco Inc. in Hamilton and DNN Galvanizing Corporation in Windsor, and in Quebec at Sorevco in Coteau-du-Lac.

The manufacture of brass and bronze is the second most important use of zinc, accounting for 1 023 000 t, or 18% of consumption, in 1993. These alloys are used in plumbing fittings, heating and air conditioning components, and other products. Consumption of brass and bronze is highly dependent upon the performance of the construction industry.

The third most important use of zinc, accounting for 14% of consumption in 1993, is in the die-casting industry for products such as builders' hardware and automobile fittings. The goal of weight reduction in automobiles for increased fuel efficiency has led to a reduction in the use of zinc die-castings. The development of new alloys and manufacturing techniques like thin-walled die-casting has taken place in recent years to make zinc alloy castings more competitive relative to plastics and other substitute materials. Zinc castings also have the ability to hold closer tolerances than aluminum castings.

One promising series of alloys is ACuZinc which contains 5-11% copper and 2.8-4.0% aluminum, with the balance being zinc. These alloys increase the durability and performance or reduce the thickness of automotive die-castings compared to many other zinc alloys.

The balance of zinc consumption is for such items as zinc semi-manufactures, oxides, chemicals and zinc dust. Zinc oxide is an important component in the manufacture of tires and rubber products. Rolled zinc has been a popular roofing material in parts of Europe for many years.

Increased research has been conducted in recent years into the use of zinc in batteries. A long run-time, rechargeable zinc-air battery for use in portable personal computers is currently being developed that is designed to provide power up to 10 times longer than conventional batteries. Zinc-air batteries are also being tested for use in electric vehicles. In Germany, both the German Post Office and the National Telecommunications Agency have undertaken two-year programs to convert up to 40 000 vehicles to electric power and are testing zinc-air batteries to provide that power. The zinc-air battery is said to have considerable cost advantages over competing battery systems.

INTERNATIONAL LEAD AND ZINC STUDY GROUP

The International Lead and Zinc Study Group (ILZSG) was formed in 1959 to improve market information and to provide opportunities for regular inter-governmental consultations on lead and zinc markets. Particular attention is given to providing regular and frequent information on supply and demand, and on the outlook for lead and zinc.

The Study Group is headquartered in London, England. Its membership includes most major lead- and zinc-producing and consuming countries. While it has an extensive information-gathering and dissemination role, the Group has no market intervention powers. It holds a general session each year in the fall. Member countries' delegations include industry representatives as advisors. Canada has been an active member since its inception.

The 39th Session of the ILZSG was held in Vienna, Austria, in October 1994 and was attended by representatives of 28 member countries as well as observers from several nations and organizations. The 1994 session examined statistical trends, current new mine and smelter projects, trade patterns, and the U.S. Strategic Stockpile, as well as environmental issues such as the OECD (Organization for Economic Co-operation and Development) Workshop on lead products held in Toronto in September. For the first time, statistical data from Eastern and Socialist countries were integrated into Study Group forecasts.

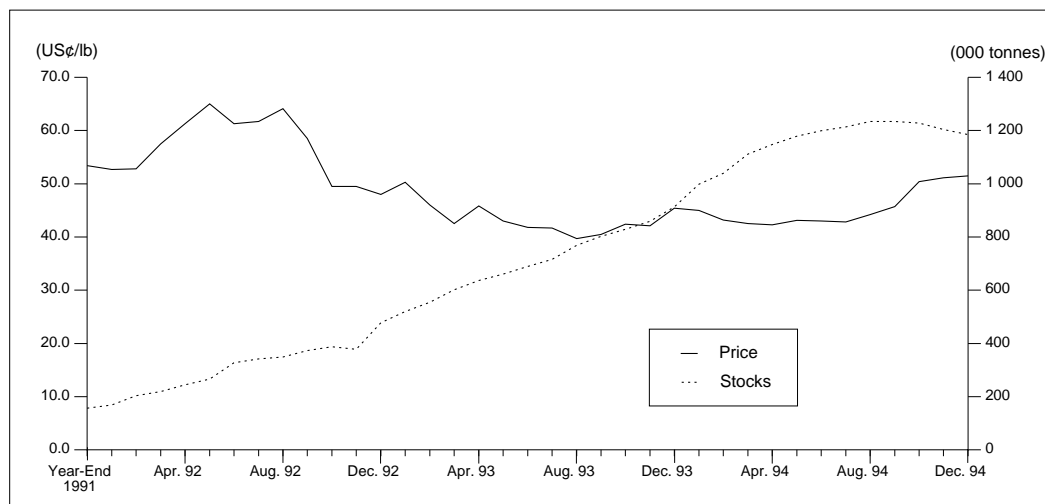
PRICES AND STOCKS

Stocks rose for most of the year. However, by October, with increasing world demand and smelter cuts in Europe and Japan, LME stocks began a very gradual decline. The average price on the LME for 1994 was US45.3¢/lb.

Zinc prices began 1994 at US45¢/lb and traded in a narrow range through the first four months of the year, reaching the year's low of 41¢/lb on April 21 and 22. Despite rising LME stocks and few cuts in zinc refining capacity, speculative activity kept prices from falling to reflect market conditions. Prices then rose very slowly through the summer and fall, again reflecting speculative activity in other base metals, especially copper, as well as a levelling off and then a gradual decline in LME stocks. Zinc reached the year's high of 53.6¢/lb on November 16 and closed the year at 51.5¢/lb.

Zinc stocks stood at 1 594 000 t at the end of 1993, including 907 000 t on the LME. Continued exports by China, North Korea and the C.I.S., and high levels of Western World refined zinc production, resulted in increasing LME stocks, which reached a high of 1 239 000 t in October before beginning a gradual

Figure 2
LME Zinc Stocks vs. LME Settlement Price, 1992-94



Sources: Reuters; World Nonferrous Metal Statistics.
Note: End-of-month data.

decline for the remainder of the year. At the end of 1994, total stocks stood at 1 619 000 t representing 15 weeks of consumption. Of that total, 1 185 200 t were LME stocks.

OUTLOOK

World zinc consumption is expected to increase by 3.5% in 1995 as demand strengthens in Western Europe and continues to grow in the United States and Southeast Asia, including limited growth in Japan. In Eastern Europe and China, a slow improvement in zinc consumption is expected, but a further deterioration in consumption in C.I.S. countries is forecast. Total world zinc consumption is expected to reach 6.9 Mt in 1995.

World mine production of zinc is forecast to increase by 4% in 1995. With zinc prices remaining at levels higher than market fundamentals would dictate in 1994, some temporary closures were reversed. In addition, new mine projects have come on stream. According to the ILZSG's *New Mines and Smelters* publication, a net increase in capacity of 238 000 t took place in 1994, with an additional 127 000 t in new and reactivated capacity scheduled to come on stream in 1995. The largest production increases are likely to take place in Canada, Australia, and South America.

World zinc metal production for 1995 is forecast to be slightly greater than in 1994. Increases in Canada, Australia, India, Mexico and Brazil should be partially offset by declines in Europe, while production from Eastern and Socialist countries should remain relatively constant or decline slightly due to a lack of foreign investment for capital development and maintenance.

Exports to the West from China are likely to remain high as that country continues to use sales of nonferrous metals to finance the purchase of steel. China has inadequate steel capacity for its rapidly growing demand. Exports from C.I.S. countries will likely continue to decline as production is affected by concentrate shortages and a lack of capital investment.

With the prospects for continuing strong demand in 1995, a deficit in supply versus demand is expected that should result in a small but steady reduction in zinc stocks. The average price for the year is forecast to be US50¢/lb. However, should speculative activity on zinc continue, the price could average a few cents higher.

Beyond 1995, Western World zinc consumption is forecast to increase by an average 2.5% to 2005. Progressive growth in China for the same period is expected, with a gradual improvement in C.I.S. economies also taking place by 2000. A gradual reduction in LME stocks is expected as demand rises, particularly in China, which has been a net exporter of zinc metal in recent years. This should result in a gradual increase in prices from a range, in constant 1993 cents, of US45¢-55¢/lb in 1996 to US53¢-63¢/lb by 2002. A decline for the remainder of the forecast period to US45¢-55¢/lb by 2005 is then forecast.

Canadian mine production of zinc is forecast to rebound to 1 075 000 t in 1995 with the return to production at the Heath Steele and Myra Falls mines and full production being reached at the Louvicourt and Moberly mines. Production is forecast to increase to 1 267 000 t by 1998, but to fall to 1 000 000 t by 2001 as older mines become exhausted.

Notes: (1) For definitions and valuation of mineral production, shipments and trade, please refer to Chapter 60. (2) Information in this review was current as of January 15, 1995.

TARIFFS

Item No.	Description	Canada			United States	E.U.	Japan ¹
		MFN	GPT	USA	Canada	MFN	GATT
2603.00	Copper ores and concentrates						
2603.00.00.30	Zinc content	Free	Free	Free	Free	Free	Free
2607.00	Lead ores and concentrates						
2607.00.00.30	Zinc content	Free	Free	Free	0.5¢/kg on lead content	Free	Free
2608.00	Zinc ores and concentrates						
2608.00.00.30	Zinc content	Free	Free	Free	0.5¢/kg on lead content	Free	Free
2616.10	Silver ores and concentrates						
2616.10.00.30	Zinc content	Free	Free	Free	Free	Free	Free
26.20	Ash and residues (other than from the manufacture of iron or steel), containing metals or metallic compounds containing mainly zinc						
2620.11	Hard zinc spelter	Free	Free	Free	0.4%	Free	Free
2817.00	Zinc oxide; zinc peroxide	10%	Free	3.1%	Free	11%	6.5%
28.33	Sulphates; alums; peroxosulphates (persulphates)						
2833.26	Of zinc	8.5%	6%	Free	Free	9%	5.8%
79.01	Unwrought zinc						
7901.11	Zinc, not alloyed: Containing by weight 99.99% or more of zinc	Free	Free	Free	0.4%	3.5%	8 yen/kg
7901.12	Containing by weight less than 99.99% of zinc	Free	Free	Free	0.4-5.7%	3.5%	8 yen/kg
7901.20	Zinc alloys:						
7901.20.10	Containing by weight 90% or more but less than 97.5% of zinc	Free	Free	Free	5.7%	3.5%	7.2-7.8 yen/kg
7901.20.20	Containing by weight less than 90% of zinc	14.6%	11.5%	5.2%	5.7%	3.5%	7.2-7.8 yen/kg
7902.00	Zinc waste and scrap	Free	Free	Free	Free	Free	1.9%
79.03	Zinc dust, powders and flakes						
7903.10	Zinc dust	Free	Free	Free	0.2¢/kg	4.4%	5.8%
7903.90	Other:						
7903.90.10	Powders, not alloyed	3.8%	Free	1.2%	0.2¢/kg	4.4%	5.8%
7903.90.20	Alloyed powders; flakes	8.8%	6.5%	3%	2.8%	4.4%	5.8%
7904.00	Zinc bars, rods, profiles and wires						
7904.00.10	Bars, rods or profiles, containing by weight 90% or more of zinc	Free	Free	Free	1.2%	8%	4.8%
7904.00.21	Bars, rods or profiles; wire, coated or covered	8.8%	6.5%	3%	1.2%	8%	4.8%
7904.00.22	Wire, not coated or covered	7%	5%	2.4%	1.2%	8%	4.8%
7905.00	Zinc plates, sheets, strip and foil containing by weight 90% or more of zinc						
7905.00.11	Of a thickness exceeding 0.15 mm but less than 4.75 mm, for making offset printing plates; of a thickness exceeding 0.15 mm but less than 4.75 mm, not polished, coated on one side with acid-resisting material, imported for use by grinders and polishers, to be prepared for use in photo-engraving	Free	Free	Free	1.2%	8%	7.2%
7905.00.19	Other:	5%	3.5%	1.6%	1.2%	8%	7.2%
7905.00.20	Containing by weight less than 90% of zinc	8.8%	6.5%	3%	1.2%	8%	7.2%
7906.00	Zinc tubes, pipes and tube or pipe fittings (for example, couplings, elbows, sleeves)	8.8%	6.5%	3%	1.1%	8%	4.8%
79.07	Other articles of zinc						
7907.10	Gutters, roof capping, skylight frames and other fabricated building components	8.8%	6.5%	3%	1.7%	7%	4.9%
7907.90	Other:						
7907.90.10	Anodes for electroplating	Free	Free	Free	1-1.7%	7%	5.8%
7907.90.20	Discs or slugs, containing by weight 90% or more of zinc	5%	3.5%	1.6%	1-1.7%	7%	5.8%
7907.90.90	Other:	8.8%	6.5%	3%	1-1.7%	7%	5.8%
7907.90.90.11	Not alloyed	8.8%	6.5%	3%	1-1.7%	7%	5.8%
7907.90.90.12	Alloyed	8.8%	6.5%	3%	1-1.7%	7%	5.8%

Sources: Customs Tariff, effective January 1995, Revenue Canada; Harmonized Tariff Schedule of the United States, 1995; The "Bulletin International des Douanes," Journal Number 14 (16th Edition), European Economic Community, 1992-1993, "Conventional" column; 1st Supplement to Journal Number 14 (16th Edition), European Economic Community, 1993-1994, "Conventional" column; Customs Tariff Schedules of Japan, 1994.

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

Note: Where there is a tariff "range," a complete match of the HS code was not available; therefore, the high and low for the product in question is shown.

TABLE 1. CANADA, ZINC PRODUCTION AND TRADE, 1993 AND 1994, AND CONSUMPTION, 1991-93

Item No.	1993		1994 ^p		
	(tonnes)	(\$000)	(tonnes)	(\$000)	
PRODUCTION					
All forms ¹					
New Brunswick	303 985	377 246	273 000	366 093	
Quebec	131 852	163 629	141 708	190 030	
Ontario	179 049	222 200	158 487	212 531	
Manitoba	89 658	111 265	93 580	125 491	
British Columbia	107 457	133 354	113 899	152 738	
Yukon	35 204	43 688	-	-	
Northwest Territories	143 521	178 110	180 730	242 359	
Total	990 727	1 229 493	961 405	1 289 242	
Mine output ²	1 004 367	..	984 334	..	
Refined ³	659 881	..	689 400	..	
EXPORTS					
2608.00.30	Zinc content in zinc ores and concentrates				
	Germany	114 982	91 522	89 997	72 627
	Belgium	64 668	38 326	98 931	63 376
	Spain	63 519	31 294	40 073	29 587
	Italy	50 018	27 780	36 047	25 924
	France	45 835	33 255	32 713	22 427
	Finland	17 718	16 371	22 417	19 629
	Netherlands	24 476	13 140	25 227	16 169
	Norway	15 346	10 587	19 760	14 123
	United Kingdom	3 957	3 656	8 483	7 635
	Japan	13 905	9 135	4 704	4 031
	Other countries	38 084	19 042	4 137	2 849
	Total	452 508	294 113	382 489	278 382
2600.00	Zinc content in other ores and concentrates ⁴	3 445	1 263	9	6
2603.00.30	Zinc content in copper	3 445	1 263	-	-
2607.00.30	Zinc content in lead	-	-	9	6
2616.00.30	Zinc content in silver	-	-	-	-
2620.11	Ash and residues containing hard zinc spelter				
	India	411	291	80	67
	United States	10	5	-	-
	Total	421	297	80	67
2620.19	Ash and residues containing mainly zinc, n.e.s.				
	United States	7 608	6 323	9 422	7 727
	India	1 306	1 011	998	650
	South Korea	114	56	126	102
	United Kingdom	118	101	110	90
	Colombia	-	-	17	11
	Taiwan	36	30	22	8
	Nepal	-	-	20	8
	People's Republic of China	21	8	-	-
	Total	9 203	7 530	10 715	8 600
2817.00	Zinc oxide; zinc peroxide				
	United States	23 400	32 378	25 496	37 796
	France	-	-	41	22
	Singapore	30	43	20	22
	Other countries	-	-	15	18
	Total	23 430	32 421	25 572	37 859
2833.26	Zinc sulphate	4	3	217	103
7901.11	Zinc, not alloyed, unwrought, containing by weight 99.99% or more of zinc				
	United States	250 402	331 496	286 163	391 201
	Taiwan	6 677	9 471	6 232	9 179
	Japan	2 388	3 296	1 808	2 445
	New Zealand	-	-	1 123	1 573
	Hong Kong	74	93	1 051	1 502
	Cayman Islands	-	-	600	829
	Philippines	412	437	396	582
	Malaysia	-	-	359	506
	Other countries	2 751	3 705	491	641
	Total	262 704	348 502	298 223	408 464

TABLE 1 (cont'd)

Item No.		1993		1994P	
		(tonnes)	(\$000)	(tonnes)	(\$000)
EXPORTS (cont'd)					
7901.12	Zinc, not alloyed, unwrought, containing by weight less than 99.99% of zinc				
	United States	172 488	228 375	205 913	290 600
	Taiwan	22 239	28 295	13 485	16 404
	Philippines	10 753	13 634	9 978	11 373
	Indonesia	11 030	13 798	8 794	9 619
	Japan	5 490	6 949	3 731	4 529
	Brazil	690	995	1 990	2 841
	Malaysia	1 962	2 557	2 441	2 790
	Thailand	—	—	1 990	2 268
	Hong Kong	1 154	1 472	1 517	1 697
	New Zealand	—	—	992	1 313
	Sri Lanka	918	1 282	640	697
	Other countries	3 836	5 103	1 493	1 895
	Total	230 560	302 472	252 964	346 032
7901.20	Zinc alloys, unwrought				
	Hong Kong	2 095	3 025	4 748	4 605
	Japan	617	849	715	722
	United States	1	1	546	643
	Taiwan	815	1 141	549	516
	Thailand	765	1 190	308	291
	Philippines	195	265	280	277
	Malaysia	—	—	238	224
	Singapore	5	7	120	124
	Other countries	279	375	—	—
	Total	4 772	6 858	7 504	7 405
7902.00	Zinc waste and scrap				
	United States	36 558	18 640	49 251	27 261
	Taiwan	3 294	2 385	3 212	3 033
	People's Republic of China	876	221	2 076	511
	Other countries	236	140	386	258
	Total	40 964	21 389	54 925	31 065
7903.10	Zinc dust				
	United States	7 842	14 760	5 424	11 518
	Mexico	—	—	1	4
	Italy	16	37	—	—
	Total	7 858	14 798	5 425	11 522
7903.90	Zinc powders and flakes				
	United States	3 860	6 964	2 333	3 857
	Singapore	270	564	25	53
	Other countries	—	—	22	23
	Total	4 130	7 529	2 380	3 935
7904.00	Zinc bars, rods, profiles and wire				
	United States	82	262	43	245
	Other countries	1	5	1	3
	Total	83	268	44	248
7905.00	Zinc plates, sheets, strip and foil				
	United States	48	160	108	253
	Total	48	160	108	253
7906.00	Zinc pipes or tubes and fittings				
	United States	62	859	210	2 915
	Germany	—	—	1	11
	Total	62	859	211	2 926
7907.90	Articles of zinc, n.e.s.				
	United States	1 652	8 592	1 506	8 131
	Portugal	5	33	9	81
	United Kingdom	9	140	12	62
	Other countries	48	334	5	50
	Total	1 714	9 104	1 532	8 328
IMPORTS					
2608.00.00.30	Zinc content in zinc ores and concentrates	108 730	44 517	152 305	92 104
2603.00.00.30	Zinc content in copper ores and concentrates	706	911	280	382
2607.00.00.30	Zinc content in lead ores and concentrates	376	366	810	900
2616.10.00.30	Zinc content in silver ores and concentrates	1 266	463	2 079	2 228
2620.11	Ash and residues containing hard zinc spelter	—	—	—	—
2620.19	Ash and residues containing mainly zinc, n.e.s.	1 054	745	1 350	674

TABLE 1 (cont'd)

Item No.	1993		1994 ^p		
	(tonnes)	(\$000)	(tonnes)	(\$000)	
IMPORTS (cont'd)					
2817.00	Zinc oxide; zinc peroxide	4 373	4 919	4 935	5 669
2833.26	Zinc sulphate	3 530	2 106	4 045	2 570
7901.11	Zinc, not alloyed, unwrought, containing by weight 99.99% or more of zinc	1 186	1 478	2 266	3 117
7901.12	Zinc, not alloyed, unwrought, containing by weight less than 99.99% of zinc	186	249	2 754	3 763
7901.20	Zinc alloys, unwrought	7 327	11 813	7 470	12 207
7902.00	Zinc waste and scrap	1 974	1 892	1 049	899
7903.10	Zinc dust	314	582	1 005	1 138
7903.90	Zinc powders and flakes	325	642	436	895
7904.00	Zinc bars, rods, profiles and wire	395	1 158	370	986
7905.00	Zinc plates, sheets, strip and foil	510	1 295	553	1 657
7906.00	Zinc pipes or tubes and fittings	1 241	4 729	1 362	5 028
7907.90	Articles of zinc, n.e.s.	3 010	8 990	3 473	11 774
Total Imports		136 503	86 855	186 542	145 991

	1991 ^a			1992			1993 ^{p,a}		
	Primary	Secondary	Total	Primary	Secondary	Total	Primary	Secondary	Total
(tonnes)									
CONSUMPTION^{5,6}									
Zinc used for or in the production of:									
Copper alloys (brass, bronze, etc.)	x	x	3 547	x	x	3 154	x	x	2 850
Galvanizing: electro	x	x	2 047	x	x	2 075	x	x	2 205
hot dip	x	x	52 266	x	x	63 946	x	x	62 750
Zinc die-cast alloys	x	x	20 748 ^r	x	x	21 132	x	x	20 655
Other products (including rolled and ribbon zinc, zinc oxides)	x	x	26 295 ^r	x	x	24 418	x	x	24 071
Total	101 187 ^r	3 715	104 902 ^r	109 093	5 632	114 725	108 687	3 844	112 531
Consumer stocks, year-end	7 363 ^r	287	7 650 ^r	10 272	726	10 998	9 084	614	9 698

Sources: Natural Resources Canada; Statistics Canada.

– Nil; . . Not available; n.e.s. Not elsewhere specified; ^p Preliminary; ^r Revised; x Confidential.^a Increase in number of companies being surveyed.

¹ New refined zinc produced from domestic primary materials (concentrates, slags, residues, etc.) plus estimated recoverable zinc in ores and concentrates shipped for export. ² Zinc content of ores and concentrates produced. ³ Refined zinc produced from domestic and imported ores. ⁴ Includes HS classes 2603.00.30, 2607.00.30 and 2616.00.30. ⁵ Consumer survey does not represent 100% of Canadian consumption and is therefore consistently less than apparent consumption. ⁶ Due to sensitivity in some end-use categories, a breakdown of primary and secondary sources is not provided in order to be consistent.

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

TABLE 2. CANADA, ZINC PRODUCTION, EXPORTS¹ AND DOMESTIC SHIPMENTS, 1975, 1980 AND 1985-94

	Production		In Ores and Concentrates	Exports	
	All Forms ²	Refined ³		Refined	Total
			(tonnes)		
1975	1 055 151	426 902	705 088	247 474	952 562
1980	883 697	591 565	434 178	471 949	906 127
1985	1 049 275	692 406	396 103	555 621	951 724
1986	988 173	570 981	450 249	427 176	877 425
1987	1 157 936	609 909	613 185	441 227	1 054 412
1988	1 370 000	703 206	816 884	551 521	1 368 405
1989	1 272 854	669 677	614 223	495 061	1 109 284
1990	1 179 372	591 786	716 185	452 251	1 168 436
1991	1 083 008	660 552	566 815	520 508	1 087 323
1992	1 195 736	671 702	678 172	509 744	1 187 916
1993	990 727	659 881	455 953	493 264	949 217
1994 ^p	961 405	689 400	382 498	551 187	933 685

Sources: Natural Resources Canada; Statistics Canada.

^p Preliminary.

¹ Beginning in 1988, exports are based on the new Harmonized System and may not be in complete accordance with previous method of reporting. Ores and concentrates include HS classes 2608.00.30, 2603.00.30 and 2607.00.30. Refined includes HS classes 7901.11 and 7901.12. ² New refined zinc produced from domestic primary materials (concentrates, slags, residues, etc.) plus estimated recoverable zinc in ores and concentrates shipped for export.

³ Refined zinc produced from domestic and imported ores.

TABLE 3. WESTERN WORLD, PRIMARY ZINC STATISTICS, 1990-94

	1990	1991	1992	1993	1994 ^p
			(000 tonnes)		
Mine production (zinc content)	5 396	5 586	5 678	5 228	5 178
Metal production	5 206	5 405	5 445	5 467	5 383
Metal consumption	5 200	5 379	5 398	5 545	5 721

Source: International Lead and Zinc Study Group.

^p Preliminary.

TABLE 4. WORLD ZINC MINE PRODUCTION, 1990-94

	1990	1991	1992	1993	1994 ^p
	(000 tonnes)				
EUROPE					
Finland	52	55	31	22	17
Germany	59	54	14	–	17
Ireland	166	187	194	194	194
Spain	257	265	208	157	150
Sweden	158	157	171	167	158
Yugoslavia	76	74	47	31	31
Others	182	131	124	79	39
Subtotal	950	923	789	650	606
AFRICA					
Namibia	41	36	36	29	33
South Africa	75	64	72	78	75
Zaire	62	43	45	13	4
Morocco	18	27	23	66	69
Others	46	34	25	24	18
Subtotal	242	204	201	210	199
OCEANIA					
Australia	884	1 048	1 013	1 007	971
AMERICAS					
Bolivia	104	130	144	123	110
Canada	1 203	1 157	1 325	1 007	984
Mexico	307	317	352	359	365
Peru	598	638	602	665	677
United States	543	547	552	513	587
Others	206	211	223	226	238
Subtotal	2 961	3 000	3 198	2 893	2 961
ASIA					
India	70	102	153	156	143
Japan	127	133	134	119	99
Thailand	81	87	69	69	66
Iran	15	31	66	77	99
Others	66	75	176	47	34
Subtotal	359	411	477	468	441
Total, Western World	5 396	5 586	5 678	5 228	5 178
EASTERN COUNTRIES					
People's Republic of China	619	710	706	775	..
C.I.S.	610	580	506	452	..
Poland	153	145	152	151	..
Korea, D.P.R. ^e	100	120	120	110	..
Other countries	88	79	79	90	..
Total, Eastern Countries	1 570	1 634	1 563	1 578	..
Total, World	6 966	7 220	7 241	6 806	..

Source: International Lead and Zinc Study Group.
 – Nil; .. Not available; ^e Estimated; ^p Preliminary.

TABLE 5. WORLD ZINC METAL PRODUCTION, 1990-94

	1990	1991	1992	1993	1994p
	(000 tonnes)				
EUROPE					
Belgium	290	298	217	210	207
Finland	175	170	170	170	172
France	264	299	304	310	309
Germany	338	346	383	381	360
Italy	248	256	253	254	257
Netherlands	207	201	205	206	207
Spain	257	274	368	342	298
Others	365	350	299	306	211
Subtotal	2 144	2 194	2 199	2 179	2 112
AFRICA					
Algeria	24	29	32	28	22
South Africa	92	92	83	96	93
Zaire	38	28	19	4	2
Others	11	7	7	5	-
Subtotal	165	156	141	133	117
AMERICAS					
Argentina	32	36	35	31	34
Brazil	172	172	180	188	198
Canada	592	661	672	662	689
Mexico	199	189	151	209	212
Peru	120	154	124	158	151
United States	358	376	400	399	360
Subtotal	1 473	1 588	1 562	1 647	1 644
ASIA					
Japan	687	731	729	696	666
Korea, Republic of	257	232	256	258	271
India	86	92	137	150	157
Others	91	86	89	87	94
Subtotal	1 121	1 141	1 211	1 191	1 188
OCEANIA					
Australia	303	326	332	317	322
Total, Western World	5 206	5 405	5 445	5 467	5 383
EASTERN COUNTRIES					
People's Republic of China	526	577	648	857	..
C.I.S.	644	575	540	502	..
Poland	132	126	135	149	..
Korea, D.P.R. ^e	110	130	120	115	..
Other countries	96	61	67	93	..
Total, Eastern Countries	1 508	1 469	1 510	1 716	..
Total, World	6 714	6 874	6 955	7 183	..

Source: International Lead and Zinc Study Group.
 - Nil; .. Not available; ^e Estimated; ^p Preliminary.

TABLE 6. WORLD ZINC CONSUMPTION, 1990-94

	1990	1991	1992	1993	1994p
	(000 tonnes)				
EUROPE					
Belgium	185	200	189	210	219
France	284	289	258	219	231
Germany	484	540	532	495	492
Italy	275	283	300	294	303
Spain	125	129	112	119	135
United Kingdom	193	184	190	196	199
Others	352	379	339	324	327
Subtotal	1 898	2 004	1 920	1 857	1 906
AFRICA					
South Africa	85	91	85	87	93
Others	60	55	53	58	58
Subtotal	145	146	138	145	151
OCEANIA					
Australia	114	113	119	142	159
New Zealand	16	17	15	16	16
Subtotal	130	130	134	158	175
AMERICAS					
Brazil	125	106	98	125	132
Canada	122	121	126	134	149
Mexico	111	110	107	112	106
United States	992	931	1 057	1 142	1 179
Others	120	126	131	137	129
Subtotal	1 470	1 394	1 519	1 650	1 695
ASIA					
India	130	130	140	155	168
Japan	814	845	784	719	734
Korea, Republic of	230	269	257	292	305
Taiwan	71	126	128	171	172
Others	312	335	378	398	415
Subtotal	1 557	1 705	1 687	1 735	1 794
Total, Western World	5 200	5 379	5 398	5 545	5 721
EASTERN COUNTRIES					
People's Republic of China	500	530	551	530	..
C.I.S.	640	520	400	330	..
Poland	109	82	84	81	..
Other countries	215	129	126	132	..
Total, Eastern Countries	1 464	1 261	1 161	1 073	..
Total, World	6 664	6 640	6 559	6 618	..

Source: International Lead and Zinc Study Group.

.. Not available; P Preliminary.

TABLE 7. CANADA, ZINC METAL CAPACITY, 1994

Company and Location	Annual Rated Capacity (000 tonnes of slab zinc)
PRIMARY	
Canadian Electrolytic Zinc Limited (CEZ) Valleyfield, Quebec	230
Falconbridge Limited Timmins, Ontario	133
Hudson Bay Mining and Smelting Co., Limited (HBMS) Flin Flon, Manitoba	95
Cominco Ltd. Trail, British Columbia	272
Total primary, Canada	730
SECONDARY	
Federated Genco Ltd. Burlington, Ontario	9
Purity Zinc Metals Co. Ltd. Stoney Creek, Ontario	8
Total secondary, Canada	17

Source: Natural Resources Canada.

TABLE 8. MONTHLY AVERAGE ZINC PRICES, 1993 AND 1994

	North American Special High Grade	LME Special High Grade Settlement
	(US¢/lb)	
1994		
January	47.8	45.2
February	47.0	44.0
March	44.8	42.5
April	44.5	41.9
May	46.1	43.4
June	47.1	43.8
July	47.7	43.7
August	46.9	42.9
September	49.8	45.0
October	53.6	48.0
November	58.5	52.3
December	57.3	50.6
Year average	49.3	45.3
1993		
January	50.5	48.2
February	50.9	48.7
March	47.3	45.2
April	48.1	45.6
May	47.2	44.5
June	44.8	42.0
July	45.1	42.1
August	42.9	40.1
September	42.4	39.7
October	43.9	41.5
November	44.3	42.1
December	46.4	44.2
Year average	46.2	43.7

Sources: *Metals Week*; Reuters.