

Zinc

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Zinc markets recovered somewhat in 1999 after a disappointing year in 1998 despite continued poor demand in major Japanese markets, slow growth in Europe, and increased mine production worldwide. New mine capacity in Australia and Ireland, and expansions in the United States and elsewhere, coupled with strong exports from China, continued to dampen a full recovery for zinc prices despite a continued decline in stock levels.

World zinc consumption reached 8.357 Mt in 1999, according to preliminary figures from the International Lead and Zinc Study Group (ILZSG), a total that was just slightly less than total world refined zinc metal production of 8.369 Mt. Western World zinc demand exceeded production by 886 000 t. This supply deficit was largely offset, however, by net exports of zinc metal to the West by eastern countries. Zinc metal stocks held on the London Metal Exchange (LME) fell steadily through the year to 279 050 t, a decline of 38 000 t from the end of 1998.

Cash settlement prices on the LME averaged US\$1077/t in 1999, up 5.3% over 1998.

CANADIAN DEVELOPMENTS

Preliminary data indicate that Canadian mine production of zinc totaled 1 008 955 t in 1999, or 5% lower than in 1998. The closure of Inmet Mining Corporation's Winston Lake operations in Ontario and lower production at other Canadian operations contributed to the lower mine output. For 2000, mine production is expected to decline slightly to just under 1 Mt. Canada ranks third after China and Australia in terms of zinc mine production.

Zinc metal production in Canada was up 4% from 745 131 t in 1998 to 784 767 t in 1999, primarily as a

result of increased production at Noranda Inc.'s Valleyfield, Quebec, refinery. Canada ranked second after China in terms of zinc metal production in 1999.

British Columbia

Boliden Limited restarted operations at its Myra Falls operation, located in Strathcona Provincial Park, on March 24, 1999, after a three-month suspension. Work was suspended at the mine to allow the company to carry out a US\$9.8 million rehabilitation and development project. The rehabilitation and development work is expected to result in lower operating costs and more efficient and controlled mining of the Battle and Gap zones of the mine.

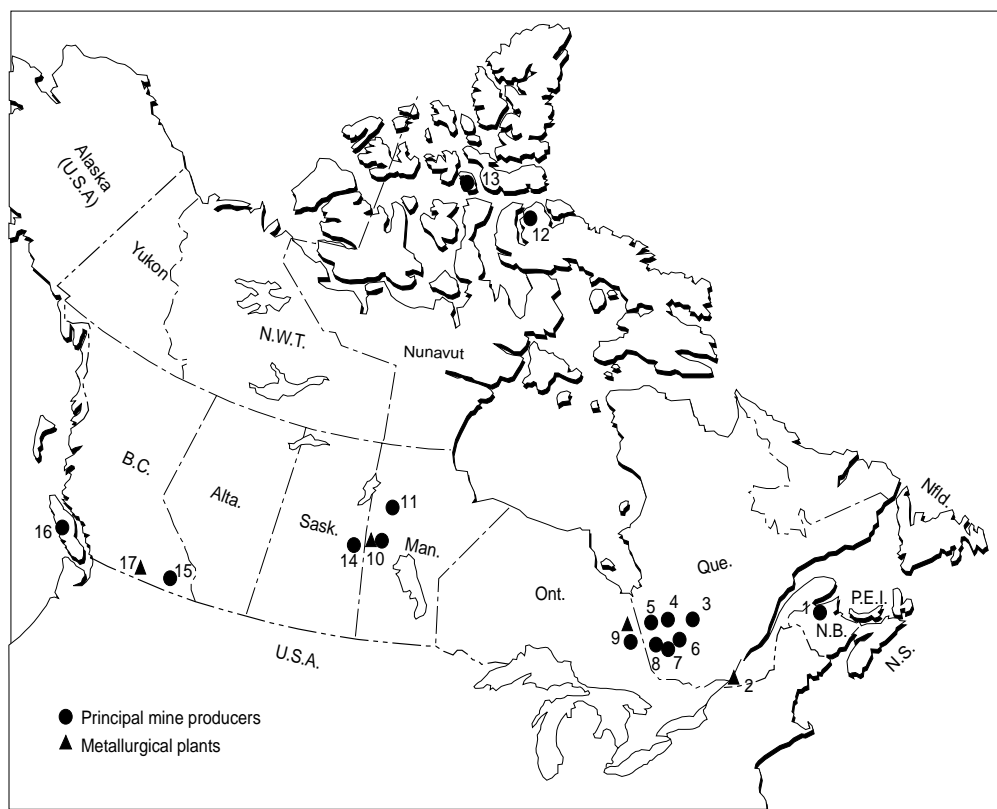
Redfern Resources Ltd. continued efforts to develop the Tulsequah Chief mine in northwestern British Columbia in 1999. After receiving the necessary environmental permits in March 1998, uncertainty remains regarding when the company will be able to begin development work. Despite the involvement of the State of Alaska and the U.S. government in the environmental assessment process, the United States has asked Canada to agree to the International Joint Commission (IJC) holding a review of the project because of Alaska's continuing concerns that liquid effluent from the mine could potentially harm salmon and trout in the nearby Taku River, which flows across the border into Alaska. In February 1999, the Tlingit First Nation asked the B.C. Supreme Court to set aside the provincial government's approval of the project. Members of the Tlingit asserted that Redfern did not provide the environment assessment process with enough information on the impact that a proposed 160-km road from the mine to the town of Atlin will have on the region's wildlife.

Cominco Ltd. announced in June that it would process its existing 215 000 t of stockpiled lead smelter slag at Trail, British Columbia, by refurbishing and restarting its No. 2 slag fuming furnace before the end of 1999. In addition to lead, the slag stockpile is estimated to contain 35 000 t of zinc.

Yukon

Cominco Limited entered into a five-year agreement with the federal government that gives it control of

Figure 1
Zinc Producers in Canada, 1999



Numbers refer to locations on map above.

ZINC-PRODUCING MINES

1. Brunswick #12	Noranda Inc.
Heath Steele	Noranda Inc.
3. Langlois	Cambior Inc.
4. Bell Allard	Noranda Inc.
5. Selbaie	Les Mines Selbaie
6. Louvicourt	Aur Resources Inc./Novicourt Inc.
7. LaRonde	Agnico Eagle Mines Limited
8. Bouchard-Hébert	Cambior Inc.
9. Kidd Creek	Falconbridge Limited
10. Callinan	Hudson Bay Mining and Smelting Co., Limited
Trout Lake	Hudson Bay Mining and Smelting Co., Limited
11. Ruttan	Hudson Bay Mining and Smelting Co., Limited
12. Nanisivik	Breakwater Resources Ltd.
13. Polaris	Cominco Ltd.
14. Konuto Lake	Hudson Bay Mining and Smelting Co., Limited
15. Sullivan	Cominco Ltd.
16. Myra Falls	Boliden Limited

ZINC METALLURGICAL PLANTS

2. Valleyfield	Canadian Electrolytic Zinc Limited
9. Kidd Creek	Falconbridge Limited
10. Flin Flon	Hudson Bay Mining and Smelting Co., Limited
17. Trail	Cominco Ltd.

the inactive Faro lead and zinc mine. Under the Faro agreement, a trust would be set up by the federal government, the Yukon government and Cominco to provide money and management to enable the Faro mine to meet the environmental regulations until it is re-opened. The trustee will manage the assets through a holding company and prepare it for its possible re-opening or sale when metal prices improve. The Faro mine was granted court protection from its creditors by the Ontario Superior Court in early 1998. Cominco will have the first option to operate the mine on behalf of a holding company being set up by the trust. Should Cominco decide not to operate the mine on behalf of the holding company, the federal and Yukon governments can search for a buyer.

Expatriate Resources Ltd. and Atna Resources Ltd. announced the results of a metallurgical study and plans for a prefeasibility study for the Wolverine zinc-lead project. The metallurgical study addressed concerns related to the marketability of selenium-bearing concentrates from Wolverine. Two potential processes to produce readily saleable products were identified with the preferred option being one that separates the selenium by converting the zinc sulphide concentrate to a high-grade zinc oxide using traditional roasting. The selenium and other elements would be captured through standard recovery technology.

Boliden Westmin (Canada) Limited entered into a definitive agreement with Expatriate Resources Ltd. for the sale of Boliden's Finlayson Lake District mineral properties in return for 4 750 000 common shares of Expatriate Resources issued from treasury. Under the agreement, 3 750 000 common shares will be issued on closing with the balance issuable thereafter upon Boliden's request.

Saskatchewan/Manitoba

Anglo American plc is investing US\$240 million in its wholly owned Canadian zinc-copper operation, Hudson Bay Mining and Smelting Co. Limited (HBMS), at Flin Flon, Manitoba. The project includes a new shaft to develop the 777 deposit, which contains some 14.5 Mt of proven and probable reserves. The 777 project also includes improvements to the mill and the replacement of an existing electrolytic tankhouse with modern technology, along with modifications to the plant's casting facilities and zinc pressure leach and purification sections. When completed in the next two years, the project will increase the plant's production by 15% to 114 000 t/y of cast metal. It is also expected to extend the life of HBMS to 2016. Work also continued on development of the Chisel North mine in the Snow Lake region of northern Manitoba.

In September, HBMS officially opened the Konuto Lake copper-zinc mine near Denare Beach,

Saskatchewan. The mine opened three months ahead of schedule and under the \$30 million projected cost. A group of 25 miners from the West Arm mine, which closed in 1997, outbid other contracting companies to develop the mine. The mine is located 15 km west of Flin Flon from where ore is trucked to the main Flin Flon complex at a rate of approximately 300 000 t/y.

Ontario

Production at Falconbridge Limited's Kidd Creek mine and smelter near Timmins was interrupted by a 26-day strike in July and early August. Ground control and grade problems during the third quarter also contributed to lower-than-expected mine output.

Inmet Mining Corporation suspended operations at the Winston Lake zinc mine in December 1998 and permanently closed the mine in the first quarter of 1999. Lower-than-anticipated ore reserve estimates in the lower Pick Lake zone and significant dilution associated with weak hanging wall rocks contributed to the poor economics of the project. Inmet concluded that it was no longer economical to continue operations.

Quebec

Work continued at Agnico Eagle Mines Limited's new zinc circuit at the LaRonde mine in northwestern Quebec, which came on stream at the end of September 1998. The company will spend US\$104 million to the end of 2002 to complete the expansion program, including mill expansion and shaft sinking. In June, Agnico announced its decision to expand the mine by a further 39%. The LaRonde mine is expected to produce 52 000 t/y of zinc in concentrate by the end of 2000.

Noranda Inc. completed development of the \$113 million Bell-Allard zinc-copper mine in the Matagami region of Quebec in June. With an estimated mill throughput rate of 2000 t/d, the mine is expected to operated for about five years. Commercial production is expected to begin in January 2000.

New Brunswick

Breakwater Resources Ltd.'s Caribou mine remained closed throughout 1999. It was placed on care and maintenance in August 1998. Based on additional pilot plant testing and a review of the operating parameters, a re-opening plan was completed during the first quarter of 1999. The plan indicated that the flotation capacity of the mill will have to be expanded by about 40% in order to achieve the desired metallurgical results and that the capital costs required to accomplish this and restart the mine would be in the order of \$7 million, excluding working capital. A

decision to re-open the mine awaits higher metal prices.

Noranda's Heath Steele mine in New Brunswick was closed during the fourth quarter of 1999 due to the depletion of economic reserves.

WORLD DEVELOPMENTS

Total world mine production of zinc was 7.86 Mt in 1999, an increase of about 4.0% from 1998. World zinc metal production reached 8.37 Mt, an increase of 4.0% over 1998, due largely to increased production in Kazakhstan and Russia. According to ILZSG figures, Western World zinc mine production increased 2.7% in 1999 to a total of 5.85 Mt.

Western World zinc metal production rose for the fourth consecutive year by 2.2% to 5.85 Mt in 1999. Increases came primarily from a rise in Australian output at Pasmenco Limited's Risdon plant and the opening of Sun Metals Corporation's zinc refinery at Townsville near year-end. In Asia, production increased in China, South Korea, Japan and India. European production fell by just under 1% as the result of plant closures in Italy and reduced output at refineries in Germany, Spain and elsewhere.

United States

Zinc mine production in the United States increased in 1999 despite the closure of the Clinch Valley mine

in Tennessee and the Leadville mine in Colorado. Increased mine output at Cominco's Red Dog mine in Alaska, the leading producer in the United States, more than offset mine production losses.

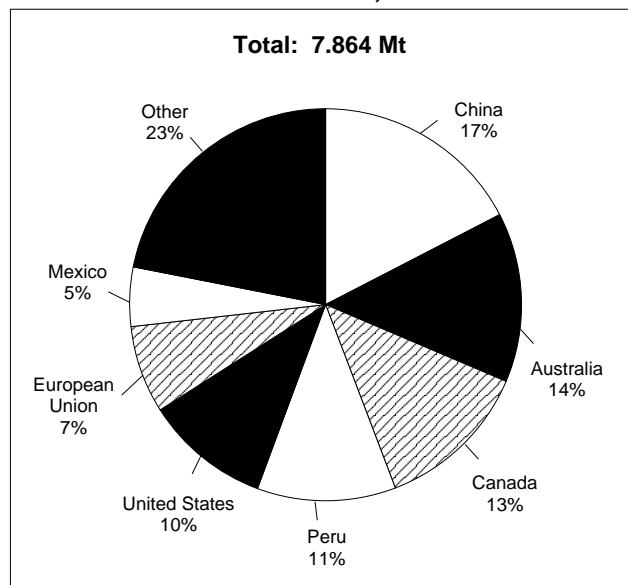
The planned refinery expansion project at the Clarksville, Tennessee, smelter was suspended by Pasmenco Limited of Australia following its successful takeover of Savage Resources Limited in February. U.S. consumption of zinc metal continued to rise to 1.4 Mt as a result of the increased use of galvanized steel.

In August, Cominco American Incorporated, a wholly owned subsidiary of Cominco Ltd., announced new drilling results with significant zinc and lead mineralization on its property north of the Red Dog mine. The drilling program ended in October with the onset of winter and is expected to start again in the Spring of 2000. The Red Dog mine produced a record 944 000 t of zinc concentrate containing 521 000 t of metal in 1999.

Latin America

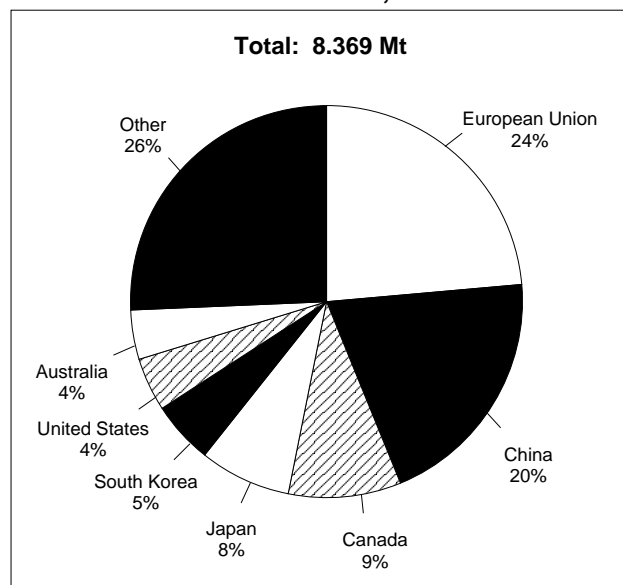
Rio Algom Limited, Noranda Inc., Teck Corporation and Mitsubishi Corporation announced the closing and first drawdown of funds from the US\$1.3 billion project financing for the Antamina copper-zinc project in Peru. They also announced the completion of the sale of 10% of Compañía Minera Antamina S.A. (CMA) to Mitsubishi. CMA is now owned 33.75% by each of Noranda and Rio Algom, 22.5% by Teck, and

Figure 2
World Zinc Mine Production, 1999



Source: International Lead and Zinc Study Group.

Figure 3
World Zinc Metal Production, 1999



Source: International Lead and Zinc Study Group.

10% by Mitsubishi. Close to half of the engineering for the project has been completed, while construction is over 15% complete with more than 4000 workers on the project. Work focussed on engineering, road construction, mass earth works for the concentrator and crusher sites, and preparatory work in the tailings area and ore conveyor tunnel. A major milestone was reached near the end of August with the pouring of the first structural concrete. Development of the port facilities began in the fourth quarter, and work on the pipeline is scheduled to begin early in 2000. Construction is expected to be completed during the third quarter of 2001 with full production being reached early in 2002.

In May, Cominco Ltd. and Marubeni Corporation announced the deferred start-up of construction for the production capacity expansion at the Cajamarquilla zinc refinery in Peru. Construction is now expected to begin in 2000. The Phase I expansion, completed in May 1998, increased zinc production by 20 000 t to 120 000 t/y. Phase II, previously scheduled to be ready for start-up by the end of 2000, will double annual capacity to 240 000 t/y. Sociedad Minera Refineria de Zinc de Cajamarquilla produces continuous galvanizing and special high-grade zinc in slab and jumbo form.

Breakwater Resources Ltd. announced in early January that milling operations at its El Toqui mine in southern Chile would restart after an 18-week shut-down. During the shut-down, the company made modifications to the processing facilities while continuing with mine development. In March, Breakwater restarted mining operations at El Toqui.

Europe

Ivornia West Plc and 50/50 joint-venture partner Anglo American plc started producing ore in September from their Lisheen zinc mine in central Ireland. The final capital expenditure for the project is estimated to be US\$280 million. The mine is expected to build up to full production during 2000, reaching a production rate of 141 500 t/y of zinc and 29 800 t/y of lead in concentrate by the end of the year.

The Italian state energy group Enirisorse announced the closure of the Pertusola Sud zinc smelter at Crotona in southern Italy in February. Pertusola Sud had been operating at a rate of some 90 000 t/y of zinc. Talks were continuing in an attempt to find a buyer for the facility. In June, the company announced the sale of its wholly owned subsidiary, Portovesme Srl, to Ammizinc BV, a subsidiary of Glencore International AG of Switzerland. Portovesme Srl owned and operated the Portovesme and San Gavino Monreale plants located in Sardinia. The plant produces 181 000 t/y of zinc and 135 000 t/y of lead, as well as some other associated metals (gold, silver and cadmium).

Boliden Limited announced in April that its Spanish subsidiary, Boliden Apirsa SL, would restart full operations at its Los Frailes mine near Seville, Spain. Apirsa received the necessary permits to restart operations in March. At full production the Los Frailes mine produces up to 125 000 t/y of zinc. Operations had been closed since a tailings dam failure at the mine in April 1998.

The United Kingdom's Zinc Development Association (ZDA) began the process of winding down its activities and will close in September 2000. The ZDA was established 60 years ago by major U.K. zinc companies. Much of the work is now covered by IZA Europe and other associations.

Asia

Korea Zinc Co. Ltd. announced plans to expand its lead-zinc refinery at Onsan, South Korea. The company plans to increase zinc production capacity by 50 000 t to 400 000 t/y. Korea Zinc also increased capacity at its Sukpo smelter from 102 000 t/y of zinc in 1998 to 110 000 t/y in 1999.

In Japan, Akita Zinc completed a 10 000-t/y expansion to raise the Iijima refinery's total capacity to 196 000 t/y of zinc. Akita Zinc is owned by Dowa Mining Co., Ltd. (57%), Nippon Mining & Metals Co. Ltd. (24%), Sumitomo Metal Mining Co., Ltd. (14%), and Mitsubishi Materials Corporation (5%).

In India, Hindustan Zinc Ltd. announced plans to proceed with a 100 000-t/y smelter at Kapasan in Rajasthan. The company's expansion of the Debari and Vishkhapatnam smelters also proceeded as planned with capacity at both plants raised by 10 000 t to 55 000 t/y at the Debari smelter and 40 000 t/y at Vishkhapatnam.

Australia

Pasminco Limited made its first shipments of 10 000 t of zinc concentrates from its 780 000-t/y Century zinc mine in northwestern Queensland in December. Construction of the mine was completed in September, ahead of schedule and below cost. The mine, mill, pipeline and port facilities are all operating at target levels and monthly shipments are expected to start by the end of January 2000 and to reach full production capacity before the end of 2001.

Elsewhere in Australia, Korea Zinc Co. Ltd.'s new US\$425 million Townsville refinery in north Queensland started production in October. The refinery, operated by Korea Zinc's wholly owned subsidiary Sun Metals Corporation, is expected to reach full capacity of 170 000 t/y of zinc by the end of the first quarter of 2000. It will consume about 400 000 t/y of zinc concentrates sourced from Cominco Ltd.'s Red Dog mine in Alaska, Western Metals Ltd. in Western

Australia, and M.I.M. Holdings Limited's George Fisher mine and Pasminco's Century mine in Queensland.

SECONDARY ZINC

Secondary zinc includes high-purity zinc refined from the treatment of electric arc furnace (EAF) dusts, remelted zinc with a purity less than 98.5% zinc, and scrap zinc used in the production of zinc alloys. According to ILZSG, the amount of secondary zinc recovered in the Western World has risen steadily in recent years, reaching 1.47 Mt in 1999.

The recycling of galvanized steel has become an important source of secondary zinc with processes developed to treat EAF dusts or to de-zinc steel before it is remelted. The Waelz kiln is the most common method of processing EAF 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.

CONSUMPTION AND USES

World zinc consumption grew by about 6.0% in 1999 to reach 8.4 Mt. Preliminary figures from ILZSG indicate that Western World demand increased from 5.2 Mt in 1998 to 5.4 Mt in 1999.

Galvanic protection of steel has been the predominant end use of zinc in recent years and currently represents 47% of zinc consumption. 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. Zinc coatings act as a physical barrier and as an oxidant. The oxide, in turn, acts as a further barrier to corrosion.

The desire to reduce weight and improve fuel efficiency has led to the increased use of galvanized steel in the automotive industry to protect the thinner gauges of steel from corrosion. In North America, the consumer trend towards all-purpose vehicles or sport utility vehicles has increased the consumption of zinc-coated automotive sheet. Both hot-dipped and electro-galvanized steel are used, the thicker coating of hot-dipped steel giving more corrosion protection to unexposed surfaces and the thinner coating of electro-galvanized steel providing a smoother finish for exposed painted surfaces.

Galvanized steel is also used in construction for structural components, roofing, siding and reinforcement bars. Nails and other building materials are

often hot-dipped galvanized. Zinc and zinc-aluminum thermally sprayed coatings are used for the long-term corrosion protection of large steel structures such as bridges and hydro-electric transmission towers.

With the relatively 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 yearly in the United States has risen steadily and was estimated at 250 000 in 1997.

Galvanized steel studs have a number of advantages over wood, including less volatile prices, less weight, immunity to warping or termites, fire resistance, and recyclability. However, disadvantages include their tendency to bend or dent if improperly handled and the need for specialized training and tools.

A number of zinc alloy coatings have been developed over the years with superior qualities over 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-dipped galvanized steel and Galvalume capacity of 1 902 000 t/y 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 19% of consumption. Consumption of brass and bronze is highly dependent on the performance of the construction industry as these alloys are used in plumbing fittings, heating and air conditioning components, and other products. The addition of zinc to copper alloys improves their machinability, strength and resistance to corrosion.

The third most important use of zinc, accounting for 14% of consumption, is in zinc-based alloys for the creation of die-cast 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 although, in the last few years, zinc-based alloys have regained some of their former market share. The major reasons for this have been the development of direct injection die castings, the popularity of zinc-aluminum die-casting alloys, and diversification away from over-reliance on the automotive sector.

One promising series of alloys is ACuZinc, which contains 5-11% copper and 2.8-4.0% aluminum, with the

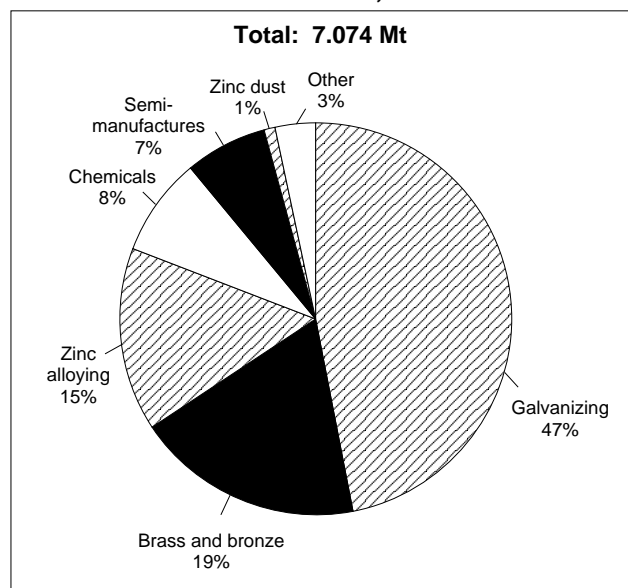
balance being zinc. These alloys increase the durability and performance, and reduce the thickness, of automotive die castings compared to many other zinc alloys.

Zinc semi-manufactures represent about 8% of zinc consumption and include rolled zinc for roofing applications and the production of coinage. Rolled zinc roofing is especially popular in Europe.

The remainder of zinc consumption is for oxides and other chemicals and zinc dust. Zinc oxide has a variety of applications, the most important of which is as an accelerator in the curing of rubber. High-purity zinc oxide is used in the pharmaceutical industry and zinc oxide-based salves and ointments have long been known for their healing properties. Other grades are used in the zinc plating industry, as an anti-corrosion agent in lubricants, and in paints, animal feeds and a variety of chemicals.

Zinc-air batteries are a promising development in the race to create viable electric vehicles. The zinc-air battery has a range three to four times that of comparatively sized lead-acid batteries. Its slow recharge time can be overcome by the introduction of replaceable cassettes that house a zinc anode and two cathodes that extract oxygen from air to fuel the chemical reaction. When removed, these cassettes can be taken to a regeneration facility where electrowinning cells turn the zinc oxide back into zinc. Such a system is ideal for fleet vehicles that return to a centralized location each day, but for passenger vehicles the plan requires considerable infrastructure.

Figure 4
Western World Zinc Markets, 1999



Source: International Lead and Zinc Study Group.

Zinc-air batteries are being tested for use in electric vehicle fleets in Germany and Sweden. The Electric Power Research Institute (EPRI) in the United States agreed in June to introduce the zinc-air battery in North America. The EPRI will assess the performance, market acceptance and environmental impact of the battery, as well as the feasibility of establishing a zinc regeneration infrastructure in the United States.

INTERNATIONAL LEAD AND ZINC STUDY GROUP

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

The Study Group is headquartered in London, England. In 1999, 28 countries, representing most of the world's major lead- and zinc-producing and consuming nations, were members of the Group. The Group has an extensive information-gathering and dissemination role and acts as an effective mechanism for increasing market transparency related to the production, consumption and trade of lead and zinc. The Group is also an important forum for communication among governments, among industry, and between governments and industry. It holds a general session each year in October. Member countries' delegations include industry representatives as advisors. Canada has been an active member of the Group since its inception.

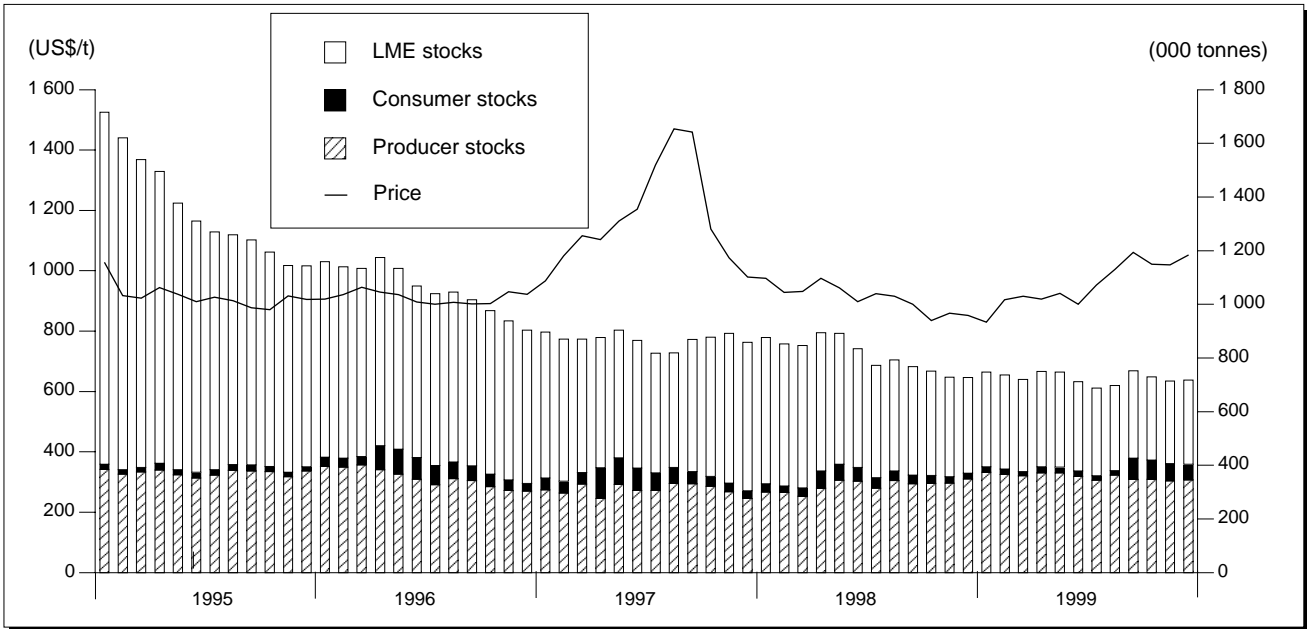
The 44th Session of the Study Group was held in Paris, France, in October 1999 and was attended by representatives of 25 member countries and observers from several nations and intergovernmental organizations.

More information on the Group's activities and the availability of a wide range of publications pertaining to lead and zinc can be obtained from its recently redesigned web site at <http://www.ilzsg.org>.

PRICES AND STOCKS

The LME cash settlement prices for zinc maintained an upward trend through most of the first three quarters of 1999, peaking at US\$1226/t in September before falling back to the US\$1150/t range at the end of October, and then rallying to finish the year at its maximum price of US\$1239/t. The overall cash settlement price averaged US\$1077/t in 1999, up 5.3% over 1998. The forward three-month price averaged

Figure 5
LME Monthly Average Settlement Prices and Total Stocks, 1995-99



Source: International Lead and Zinc Study Group.

Figure 6
LME Daily Official Settlement Prices, 1996-99



Source: Reuters.

US\$1093/t, an increase of 4.5%. Higher prices reflected the strong demand in North America and a continued downward trend in stock levels. Stocks on the LME fell from a peak of 321 000 t in January to a low of 279 050 t at the end of the year. This represents about 5.7 weeks of supply in the Western World, the lowest level since 1991.

OUTLOOK

World demand for refined zinc is expected to increase about 3.3% in 2000. The market is expected to begin its recovery in Japan, while further growth is expected in China and other Southeast Asian nations. Growth in the United States is expected to rise by 3.8% and, after a flat year in 1999, Europe is expected to see a growth in demand of about 2.8%. Prices are expected to average about US\$1150/t (52¢/lb) for the year.

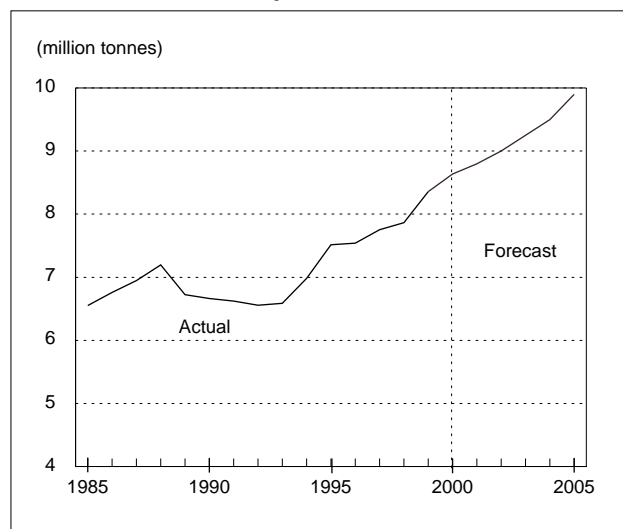
Beyond 2000, investments made in the zinc industry in recent years are expected to result in large increases in mine and smelter capacity. Continued growth in galvanizing markets, combined with a gradual recovery in overall markets, is expected in the remainder of the forecast period with zinc prices rising to US\$1200-\$1300/t by 2005.

Notes: (1) For definitions and valuation of mineral production, shipments and trade, please refer to Chapter 65. (2) Information in this review was current as of May 5, 2000. (3) This and other reviews, including previous editions, are available on the Internet at http://www.nrcan.gc.ca/mms/cmy/index_e.html.

NOTE TO READERS

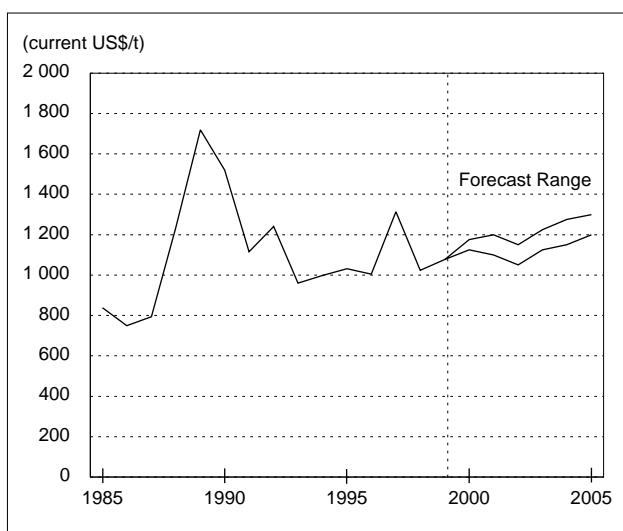
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Figure 7
World Zinc Consumption, 1985-2005



Source: Natural Resources Canada.

Figure 8
Zinc Prices, 1985-2005
Annual LME Settlement



Source: Natural Resources Canada.

TARIFFS

Item No.	Description	Canada			United States	EU	Japan ¹
		MFN	GPT	USA	Canada	MFN	WTO
2603.00 2603.00.00.30	Copper ores and concentrates Zinc content	Free	Free	Free	Free	Free	Free
2607.00 2607.00.00.30	Lead ores and concentrates Zinc content	Free	Free	Free	Free	Free	Free
2608.00 2608.00.00.30	Zinc ores and concentrates Zinc content	Free	Free	Free	Free	Free	Free
2616.10 2616.10.00.30	Silver ores and concentrates 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 metal compounds containing mainly zinc						
2620.11	Hard zinc spelter	Free	Free	Free	Free	Free	Free
2817.00	Zinc oxide; zinc peroxide	Free-7.5%	Free	Free	Free	8.3%	4.3%
28.33	Sulphates; alums; peroxosulphates (persulphates)						
2833.26	Of zinc	Free	Free	Free	Free	5.5%	3.9%
79.01	Unwrought zinc Zinc, not alloyed:						
7901.11	Containing by weight 99.99% or more of zinc	Free	Free	Free	Free	2.5%	4.30 yen/kg
7901.12	Containing by weight less than 99.99% of zinc	Free	Free	Free	Free	2.5%	4.30 yen/kg
7901.20	Zinc alloys:						
7901.20.00.10	Containing by weight 90% or more but less than 97.5% of zinc	Free	Free	Free	Free	2.5%	4.20 yen/kg
7901.20.00.20	Containing by weight less than 90% of zinc	Free	Free	Free	Free	2.5%	Free-4.20 yen/kg
7902.00	Zinc waste and scrap	Free	Free	Free	Free	Free	Free
79.03	Zinc dust, powders and flakes						
7903.10	Zinc dust	Free	Free	Free	Free	2.5%	3%
7903.90	Other:	Free	Free	Free	Free	2.5%	3%
7904.00	Zinc bars, rods, profiles and wires	Free	Free	Free	Free	5%	3%
7905.00	Zinc plates, sheets, strip and foil	Free	Free	Free	Free	5%	3%
7906.00	Zinc tubes, pipes, and tube or pipe fittings (for example, couplings, elbows, sleeves)	3%	Free	Free	Free	5%	3%
7907.00	Other articles of zinc						
7907.00.10	Anodes for electroplating	Free	Free	Free	Free	5%	3%
7907.00.20	Discs or slugs, containing by weight 90% or more of zinc; gutters, roof capping, skylight frames and other fabricated building components	3%	Free	Free	Free	5%	3%
7907.00.90	Other	3%	3%	Free	Free	5%	3%

Sources: Customs Tariff, effective January 2000, Canada Customs and Revenue Agency; Harmonized Tariff Schedule of the United States, 2000; Worldtariff Guidebook on Customs Tariff Schedules of Import Duties of the European Union (39th Annual Edition: 1999); Customs Tariff Schedules of Japan, 1999.

¹ WTO 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 are shown.

TABLE 1. CANADA, ZINC PRODUCTION AND TRADE, 1998 AND 1999, AND CONSUMPTION, 1996-98

Item No.	1998		1999P	
	(tonnes)	(\$000)	(tonnes)	(\$000)
PRODUCTION				
All forms ¹				
Newfoundland	-	-	-	-
Prince Edward Island	-	-	-	-
Nova Scotia	-	-	-	-
New Brunswick	288 827	439 017	285 698	456 260
Quebec	161 098	244 869	176 380	281 679
Ontario	103 381	157 139	87 708	140 070
Manitoba	93 476	142 084	88 256	140 944
Saskatchewan	1 141	1 734	308	493
Alberta	-	-	-	-
British Columbia	152 245	231 413	125 490	200 407
Yukon	14 984	22 776	-	-
Northwest Territories	176 432	268 177	-	-
Nunavut	-	-	196 258	313 425
Total	991 584	1 507 208	960 099	1 533 278
Mine output ²	1 061 645	..	1 008 955	..
Refined ³	745 131	..	784 767	..
EXPORTS				
2608.00.30	Zinc content in zinc ores and concentrates			
	66 562 ^r	62 064 ^r	81 280	90 991
Belgium	47 868	73 295	46 895	80 057
Sweden	59 305	70 981	38 590	51 626
Germany	60 207	49 139	43 234	45 609
Spain	27 501	40 039	25 883	43 885
Finland	22 912	23 176	19 939	25 259
Norway	24 138	22 927	12 012	17 266
Italy	6 461	9 893	8 575	14 576
Peru	110 387	84 940	50 517	38 176
Other countries				
Total	425 341	436 454	326 925	407 445
2600.00	Zinc content in other ores and concentrates ⁴			
	-	-	-	-
2603.00.30	Zinc content in copper			
	-	-	737	500
2607.00.30	Zinc content in lead			
	-	-	-	-
2616.10.30	Zinc content in silver			
	-	-	-	-
2620.11	Ash and residues containing hard zinc spelter			
United States	88	151	175	280
Total	88	151	175	280
2620.19	Ash and residues containing mainly zinc, n.e.s.			
United States	9 003 ^r	9 406 ^r	9 311	8 850
India	99	100	164	152
Other countries	52	70	42	40
Total	9 154 ^r	9 576 ^r	9 517	9 042
2817.00	Zinc oxide; zinc peroxide			
United States	32 952	53 922	35 801	58 171
France	162	271	206	320
Norway	18	29	54	86
Hong Kong	108	190	36	67
Other countries	83	117	52	91
Total	33 323	54 529	36 149	58 735
2833.26	Zinc sulphate			
United States	206	169	48	117
Total	206	169	48	117
7901.11	Zinc, not alloyed, unwrought, containing by weight 99.99% or more of zinc			
United States	320 321	537 422	363 869	610 591
Taiwan	10 505	16 898	11 143	18 127
Malaysia	2 192	3 765	5 245	8 309
Indonesia	6 009	10 016	5 094	8 265
Philippines	4 849	8 138	4 878	7 604
Singapore	2 364	3 818	4 180	6 814
Hong Kong	4 556	7 673	2 503	4 114
Japan	4 420	7 237	1 299	2 151
Other countries	2 366	3 599	1 753	2 764
Total	357 582	598 566	399 964	668 739

TABLE 1 (cont'd)

Item No.		1998		1999p	
		(tonnes)	(\$000)	(tonnes)	(\$000)
EXPORTS (cont'd)					
7901.12	Zinc, not alloyed, unwrought, containing by weight less than 99.99% of zinc				
	United States	185 487	314 744	179 197	299 763
	Malaysia	2 190	3 933	6 466	10 775
	Hong Kong	6 120	11 365	4 806	8 797
	Japan	4 911	8 309	5 004	8 759
	Other countries	20 636	33 853	15 294	25 946
	Total	219 344	372 204	210 767	354 040
7901.20	Zinc alloys, unwrought				
	United States	381	676	574	1 111
	Total	381	676	574	1 111
7902.00	Zinc waste and scrap				
	United States	26 635	22 366	24 335	18 399
	Taiwan	210	244	1 052	1 172
	India	195	206	100	91
	Other countries	59	24	41	47
	Total	27 099	22 840	25 528	19 709
7903.10	Zinc dust				
	United States	5 319	12 527	6 242	14 151
	Trinidad and Tobago	—	—	15	23
	Total	5 319	12 527	6 257	14 174
7903.90	Zinc powders and flakes				
	United States	6 492	17 951	7 251	19 816
	Other countries	106	198	326	540
	Total	6 598	18 149	7 577	20 356
7904.00	Zinc bars, rods, profiles and wire				
	United States	107	496	93	593
	Other countries	—	—	2	10
	Total	107	496	95	603
7905.00	Zinc plates, sheets, strip and foil				
	United States	73	324	19	104
	Other countries	—	—	18	78
	Total	73	324	37	182
7906.00	Zinc tubes, pipes and tube or pipe fittings (for example, couplings, elbows, sleeves)				
	United States	848r	8 334r	1 610	11 567
	Other countries	2	19	—	—
	Total	850r	8 353	1 610	11 567
7907.00	Other articles of zinc				
	United States	2 029r	16 677r	2 763	20 941
	Other countries	29	261	14	99
	Total	2 058r	16 938r	2 777	21 040
IMPORTS					
2608.00.00.30	Zinc content in zinc ores and concentrates	210 495	129 035	266 455	130 596
2603.00.00.30	Zinc content in copper ores and concentrates	3	2	3	3
2607.00.00.30	Zinc content in lead ores and concentrates	269	443	1 165	999
2616.10.00.30	Zinc content in silver ores and concentrates	14 179	11 834	37 798	30 781
2620.11	Ash and residues containing hard zinc spelter	—	—	4	5
2620.19	Ash and residues containing mainly zinc, n.e.s.	1 963	2 103	1 050	853
2817.00	Zinc oxide; zinc peroxide	4 420	5 895r	5 803	7 717
2833.26	Zinc sulphate	4 336	3 200r	4 415	3 179
7901.11	Zinc, not alloyed, unwrought, containing by weight 99.99% or more of zinc	2 072	2 783	2 425	3 789
7901.12	Zinc, not alloyed, unwrought, containing by weight less than 99.99% of zinc	1 364	2 095	1 589	2 399
7901.20	Zinc alloys, unwrought	10 312	20 347	8 354	15 544

TABLE 1 (cont'd)

Item No.	1998		1999 ^p		
	(tonnes)	(\$000)	(tonnes)	(\$000)	
IMPORTS (cont'd)					
7902.00	Zinc waste and scrap	680	710	831	747
7903.10	Zinc dust	2 334	4 935	3 632	7 425
7903.90	Zinc powders and flakes	375	686	369	587
7904.00	Zinc bars, rods, profiles and wire	3 770	6 937	8 483	13 981
7905.00	Zinc plates, sheets, strip and foil	1 492	4 679	1 038	2 940
7906.00	Zinc tubes, pipes and tube or pipe fittings (for example, couplings, elbows, sleeves)	1 542 ^r	11 032 ^r	1 911	11 484
7907.00	Other articles of zinc	6 067 ^r	24 404 ^r	5 840	24 046
	Total imports		231 120		257 075

	1996			1997 ^a			1998 ^{pa}		
	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	3 018	x	x	2 717	x	x	2 987
Galvanizing: electro	x	x	2 159	x	x	2 349	x	x	2 662
hot dip	x	x	79 047	x	x	77 034	x	x	76 208
Zinc die-cast alloys	x	x	23 049 ^r	x	x	20 747 ^r	x	x	27 402
Other products (including rolled and ribbon zinc, zinc oxides)	x	x	27 514	x	x	30 706	x	x	29 164
Total	130 259 ^r	4 528	134 787 ^r	131 035 ^r	2 518	133 553 ^r	137 610	814	138 424
Consumer stocks, year-end	7 595	292	7 887	10 133	65	10 198	8 994	59	9 053

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 2616.10.30. 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 AND EXPORTS,¹ 1975, 1980 AND 1986-99

	Production		Exports		
	All Forms ²	Refined ³	In Ores and Concentrates	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
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	816 885	551 521	1 368 406
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	976 309	690 965	450 320	551 168	1 001 488
1995	1 094 703	720 346	609 575	533 179	1 142 754
1996	1 162 720	716 467	670 789 ^r	581 604	1 252 393 ^r
1997	1 026 864 ^r	703 798 ^r	489 697 ^r	546 964 ^r	1 036 661 ^r
1998	991 584	745 131	425 341	576 926	1 002 267
1999 ^p	960 099	784 767	327 662	610 931	938 393

Sources: Natural Resources Canada; Statistics Canada.

^p Preliminary; ^r Revised.

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, 2607.00.30 and 2616.10.30. 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, 1995-99

	1995	1996	1997	1998	1999 ^p
	(000 tonnes)				
Mine production (zinc content)	5 342	5 565	5 490	5 690	5 846
Metal production	5 487	5 509	5 583	5 719	5 846
Metal consumption	6 289	6 238	6 446	6 499	6 732

Source: International Lead and Zinc Study Group.
^p Preliminary.

TABLE 4. WORLD MINE PRODUCTION OF ZINC, 1995-99

	1995	1996	1997	1998	1999 ^p
	(000 tonnes)				
EUROPE					
Finland	16	27	32	31	20
Ireland	184	163	193	180	224
Poland	155	159	158	158	153
Russia	131	126	121	114	120
Spain	172	140	147	128	174
Sweden	169	160	155	161	177
Others	142	123	124	103	82
Subtotal	969	898	930	875	950
AFRICA					
Morocco	80	82	90	112	115
Namibia	30	35	37	42	37
South Africa	74	77	71	70	70
Others	50	38	10	36	56
Subtotal	234	232	208	260	278
OCEANIA					
Australia	882	1 008	972	1 020	1 122
AMERICAS					
Bolivia	146	145	155	152	152
Brazil	136	128	124	88	93
Canada	1 121	1 223	1 077	1 062	1 009
Mexico	364	378	379	395	390
Peru	692	761	865	869	900
United States	644	628	632	755	810
Others	94	103	103	88	108
Subtotal	3 197	3 366	3 335	3 409	3 462
ASIA					
China	1 011	1 121	1 210	1 273	1 280
India	154	154	142	194	182
Iran	78	76	77	82	82
Japan	95	79	72	68	63
Kazakstan	155	157	223	224	245
North Korea	90	80	60	44	37
Thailand	14	19	15	25	21
Turkey	65	68	64	58	54
Others	37	38	28	31	32
Subtotal	1 699	1 792	1 891	1 999	1 996
Total world	6 981	7 296	7 336	7 563	7 808
Total Western World	5 341	5 565	5 490	5 690	5 915

Source: International Lead and Zinc Study Group.
^p Preliminary.

TABLE 5. WORLD ZINC METAL PRODUCTION, 1995-99

	1995	1996	1997	1998	1999p
	(000 tonnes)				
EUROPE					
Belgium	211	207	203	205	231
Finland	177	179	176	199	225
France	314	324	317	320	324
Germany	322	362	348	361	346
Italy	260	269	268	232	150
Netherlands	208	207	203	217	222
Norway	131	135	136	138	144
Poland	165	163	171	175	178
Russia	166	172	189	192	209
Spain	364	363	378	385	378
Others	265	277	289	262	263
Subtotal	2 583	2 658	2 678	2 686	2 670
AFRICA					
Algeria	27	30	30	31	34
South Africa	99	101	110	107	114
Others	—	—	—	—	—
Subtotal	126	131	140	138	148
AMERICAS					
Argentina	36	36	39	39	40
Brazil	194	187	186	177	183
Canada	720	716	704	745	781
Mexico	223	222	230	230	238
Peru	159	173	173	184	189
United States	363	366	367	368	361
Subtotal	1 695	1 700	1 699	1 743	1 792
ASIA					
China	1 077	1 185	1 434	1 486	1 695
India	159	149	166	180	187
Japan	664	599	603	608	633
Kazakstan	169	169	185	240	244
North Korea	100	90	55	43	40
South Korea	279	287	336	390	426
Others	150	147	181	194	173
Subtotal	2 598	2 626	2 960	3 141	3 398
OCEANIA					
Australia	322	327	307	311	338
Total world	7 324	7 442	7 784	8 019	8 346
Total Western World	5 463	5 509	5 583	5 719	5 843

Source: International Lead and Zinc Study Group.
 — Nil; p Preliminary.

TABLE 6. WORLD ZINC CONSUMPTION, 1995-99

	1995	1996	1997	1998	1999p
	(000 tonnes)				
EUROPE					
Belgium	250	235	260	260	275
France	271	248	271	285	294
Germany	505	501	530	573	556
Italy	345	336	354	373	371
Russia	130	130	146	110	107
Spain	159	150	160	197	190
United Kingdom	224	226	224	219	222
Others	600	597	626	632	644
Subtotal	2 484	2 423	2 571	2 649	2 659
AFRICA					
South Africa	95	95	98	91	93
Others	61	60	57	62	64
Subtotal	156	155	155	153	157
OCEANIA					
Australia	180	177	183	192	201
New Zealand	20	20	20	21	22
Subtotal	200	197	203	213	223
AMERICAS					
Brazil	179	185	190	177	185
Canada	149	151	161	170	169
Mexico	119	152	178	186	192
United States	1 234	1 210	1 258	1 282	1 415
Others	138	151	159	157	156
Subtotal	1 819	1 849	1 946	1 972	2 117
ASIA					
China	750	829	830	920	950
India	202	214	220	232	246
Japan	752	736	742	659	633
South Korea	350	364	343	318	388
Taiwan	205	194	225	241	271
Others	595	589	548	518	546
Subtotal	2 854	2 926	2 908	2 888	3 034
Total world	7 513	7 550	7 783	7 875	8 190
Total Western World	6 261	6 238	6 446	6 499	6 778

Source: International Lead and Zinc Study Group.
P Preliminary.

TABLE 7. CANADA, ZINC METAL CAPACITY, 1999

Company and Location	Annual Rated Capacity
	(000 tonnes of slab zinc)
PRIMARY	
Canadian Electrolytic Zinc Limited Valleyfield, Quebec	250
Falconbridge Limited Timmins, Ontario	133
Hudson Bay Mining and Smelting Co., Limited Flin Flon, Manitoba	95
Cominco Ltd. Trail, British Columbia	290
Total primary, Canada	768

Source: Natural Resources Canada.

TABLE 8. MONTHLY AVERAGE ZINC PRICES, 1998 AND 1999

	LME Special High Grade Settlement
	(US\$/t)
1998	
January	1 096.7
February	1 043.6
March	1 047.2
April	1 096.6
May	1 060.8
June	1 009.5
July	1 039.8
August	1 029.4
September	1 000.0
October	940.1
November	966.8
December	958.8
Yearly average	1 024.1
1999	
January	932.7
February	1 017.3
March	1 030.0
April	1 019.0
May	1 040.7
June	1 000.5
July	1 072.1
August	1 130.6
September	1 193.7
October	1 148.7
November	1 147.2
December	1 183.7
Yearly average	1 077.3

Source: World Bureau of Metal Statistics.