Lead

Patrick Chevalier

The author is with the Minerals and Metals Sector, Natural Resources Canada.
Telephone: (613) 992-4401
E-mail: pchevali@nrcan.gc.ca

According to preliminary figures from the International Lead and Zinc Study Group (ILZSG), the use of lead worldwide rose to a record level of 6.5 Mt in 2000, an increase of 3.5% over 1999. Although world mine production of lead decreased by 0.7% to 2.9 Mt from 1999, lead metal production rose by 4.7% to 6.6 Mt. Overall, there was a close balance between total supply and demand in the Western World, with the Western World shortfall made up from imports from former Eastern countries.

The decline in reported user stocks during 2000 was complemented by a decline in producer and London Metal Exchange (LME) lead stocks. The net result was a year-on-year decline in total stocks of 45 000 t in 2000. LME stocks stood at 131 000 t at the end of the year.

CANADIAN DEVELOPMENTS

Canada's mine production of lead declined for the second consecutive year, reaching 148 769 t in 2000 compared to 162 180 t in 1999. Lower-than-expected output at Myra Falls in British Columbia and temporary problems at the Brunswick mine in New Brunswick contributed to the lower output in Canada in 2000 (Figure 2).

Canadian lead metal production was 283 763 t in 2000, compared to 266 415 t in 1999. Lead production from recycled materials has grown in its share of total production and accounted for 124 571 t, or approximately 44% of total Canadian lead metal output in 2000 (Figure 3).

British Columbia

Rock stability problems at Cominco Ltd.'s Sullivan mine that had started at the end of 1999 continued to result in lower concentrate production in early 2000. Improvements at the mine during the first quarter, however, resulted in higher zinc and lead concentrate production. The mine is expected to continue to operate until the planned closure date in December 2001. In December 2000, Cominco announced that it would reduce metal production at its Trail smelter through to January 2001 as the result of a power swap agreement with a major U.S. energy company.

Yukon

Work continued throughout the year on the Finlayson project in southeastern Yukon Territory. Expatriate Resources Ltd. created the Finlayson project by consolidating its interests in its wholly owned mineral lands, its interest in the Wolverine Joint Venture (60% Expatriate, 40% Atna Resources Ltd.) and its mineral lands acquired from Cominco Ltd. In March, Expatriate announced the acquisition of Cominco's interest in the Kudz Ze Kayah deposit and surrounding mineral lands. With the acquisition of Kudz Ze Kayah, the emphasis of the prefeasibility study shifted to co-development of the Finlayson project. In November, Expatriate and Atna completed a prefeasibility study indicating that the Finlayson project is technically and economically viable.

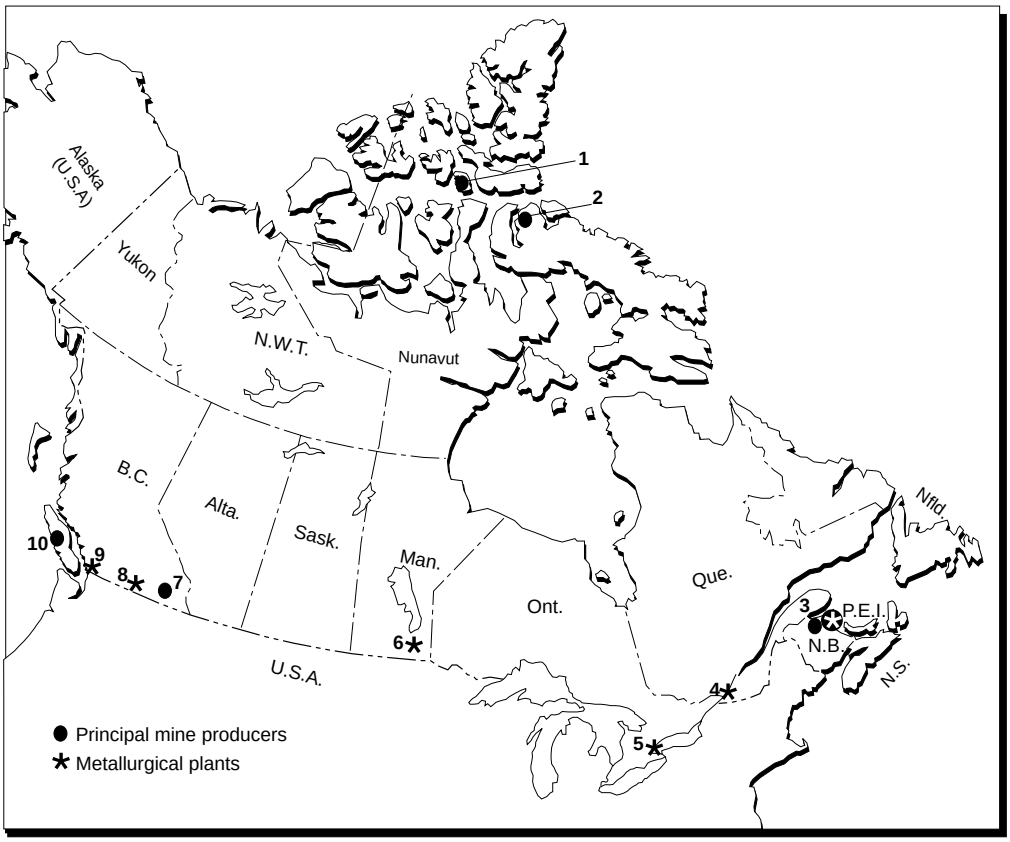
Ontario

Exide Technologies announced that it will re-open and upgrade its battery manufacturing plant in Maple, Ontario. Exide plans to produce industrial-type lead-acid batteries at the plant for the growing motive power and telecommunications markets. One type of battery to be produced at the Maple plant is used as a back-up power source for Internet and wireless-driven voice, data and multimedia networks. Exide closed the Maple plant, originally used to manufacture automotive-type lead-acid batteries, after its acquisition of GNB Technologies, Inc. in September 2000. Initial production was expected in April 2001 with full production in October 2001.

New Brunswick

Breakwater Resources Ltd.'s Caribou mine has remained on care and maintenance since August 1998. Based on pilot plant testing, a plan to restart the mine was completed in the first quarter of 1999.

Figure 1
Lead Producers in Canada, 2000



Numbers refer to locations on map above.

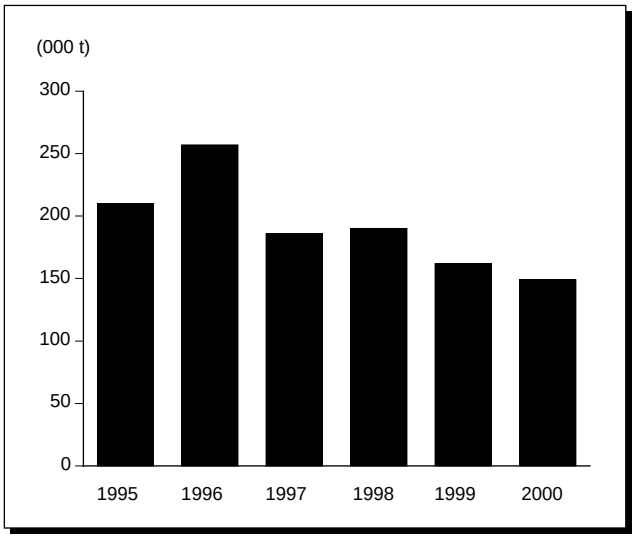
LEAD-PRODUCING MINES

1. Polaris, Cominco Ltd.
2. Nanisivik, Breakwater Resources Ltd.
3. Brunswick, Noranda Inc.
7. Sullivan, Cominco Ltd.
10. Myra Falls, Boliden Limited

LEAD METALLURGICAL PLANTS

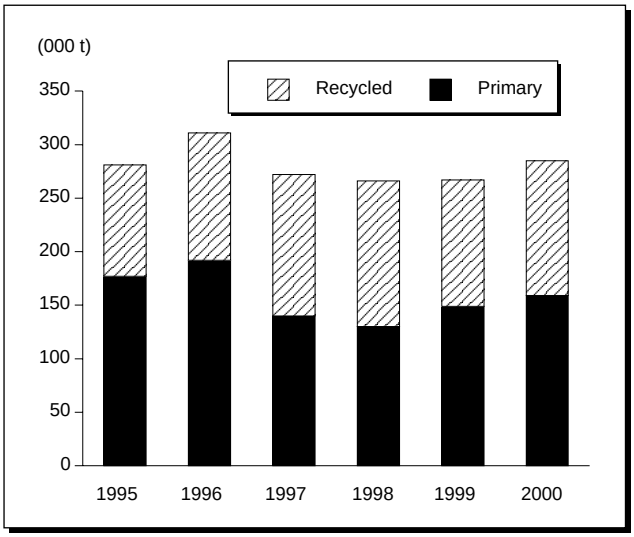
3. Belledune, Noranda Inc.
4. Nova Pb Inc., General Smelting Company of Canada, and American Iron and Metal Co. (1999) Inc.
5. Tonolli, Tonolli Canada Ltd. and Canada Metal Company
6. The Canada Metal (Western) Ltd.
8. Trail, Cominco Ltd.
9. Metalex Products Ltd.

Figure 2
Canadian Mine Production of Lead, 1995-2000



Source: Natural Resources Canada.

Figure 3
Canadian Refined Lead Metal Production, 1995-2000



Source: Natural Resources Canada.

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. The capital cost to restart the mine is approximately $12 million, excluding working capital. A decision to re-open the mine still awaits higher metal prices.

Noranda Inc. ratified new three-year collective agreements with unionized employees at the Brunswick smelter in Belledune, New Brunswick. In 1999, the Brunswick bulk concentrate facility handled some 360 000 t of zinc and lead concentrate. The lead smelter produced more than 100 000 t of lead and custom alloys.

WORLD DEVELOPMENTS

According to ILZSG data, world mine production of lead continued its downward trend for the third consecutive year to reach 2.958 Mt in 2000, down from 2.979 Mt in 1999. New mine capacity for 2000 totaling some 9000 t/y was more than offset by the closure of Western Metals Limited's 45 000-t/y Hellyer mine in Australia. In terms of production, cutbacks in the United States and lower-than-expected output in Canada and Poland were largely offset by higher production in Australia, Ireland and Mexico (Figure 4).

World lead metal production increased by 4.5% to 6.6 Mt in 2000 (Figure 5). Major expansions at Korea Zinc Co. Ltd.'s Onsan plant and a slight increase at Shadian in China were offset by closure of the Shenyang plant in China. Overall, Western World primary smelter capacity increased by 55 000 t in 2000. Six new lead recycling facilities were opened in 2000, adding some 124 000 t of new capacity. The largest increase was 70 000 t/y at Pulua Indah in Malaysia, which replaced an older facility at Selayang. Closures totaled 35 000 t in 2000 for a net overall gain in recycled lead smelter capacity of 89 000 t. Just over 60% of the total Western World output was produced from recycled material, mainly in the form of lead-acid batteries.

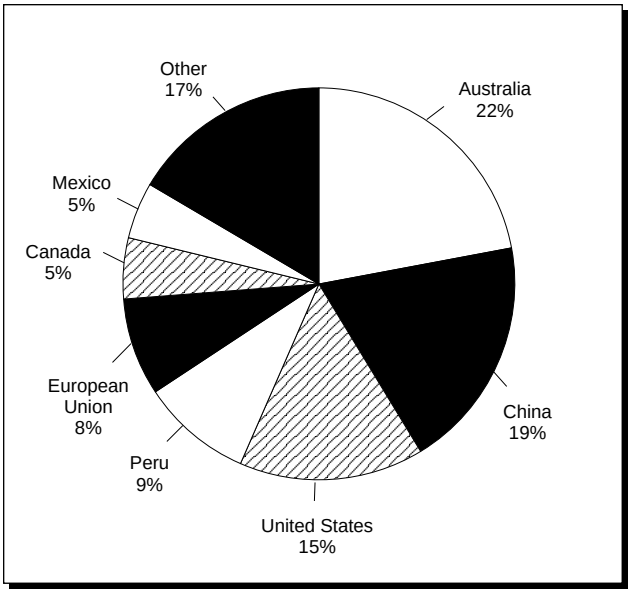
Asia/Oceania

Malaysia's Metal Reclamation (Industries) Sdn Bhd commissioned its new recycled lead smelter near Kuala Lumpur in September. The Pulua Indah smelter, which uses the MIM Isasmelt technology, has a production capacity of 70 000 t/y. The new plant will boost the company's total production capacity to 110 000 t/y.

The Jiyuan Gold smelter in Henan Province, China, started a 50 000-t/y lead expansion project that is expected to be completed by the end of 2001. Commercial production is officially scheduled to begin in early 2002. Its total production capacity of refined lead will reach 120 000 t/y once the project is complete. Elsewhere in China, the 70 000-t/y Shenyang primary lead smelter in Liaoning Province was declared bankrupt in August.

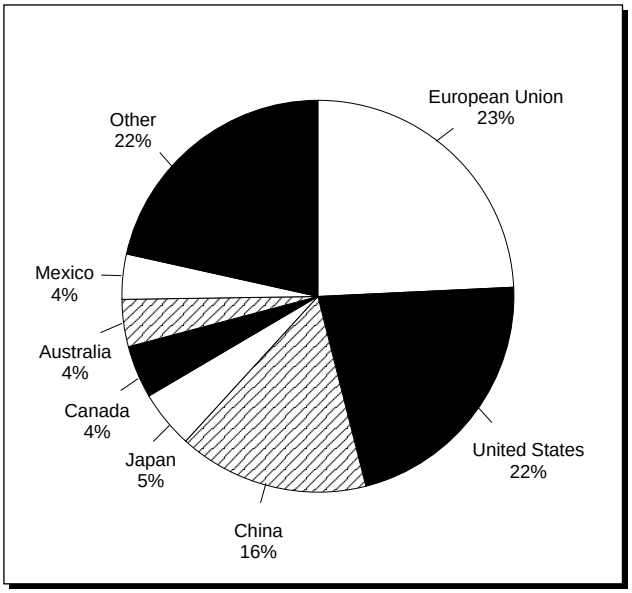
Also in August, Exide Industries Ltd. announced plans to establish an Rs120 million automotive battery unit in Bangladesh to produce around 100 000 batteries per year.

Figure 4
World Lead Mine Production, 2000



Source: International Lead and Zinc Study Group.

Figure 5
World Lead Metal Production, 2000



Source: International Lead and Zinc Study Group.

United States

In September, Cominco announced that it will rebuild and re-open the Pend Oreille zinc-lead mine near Metaline Falls, Washington. Cominco began the US$70 million project with a two-year construction program in October that involves refurbishment of the concentrator and the sinking of an internal shaft. The mine is scheduled to begin production in September 2002 at a rate of 84 000 t/y of zinc concentrates and 13 000 t/y of lead concentrates. The concentrates will be shipped to its nearby Trail smelter in southern British Columbia.

The Doe Run Company announced in mid-April that it would implement further production cutbacks at its lead facilities in Missouri. Together with the cutbacks announced by the company in January, its production of lead in concentrate was reduced by about 50 000 t.

U.S. battery manufacturer and lead recycling company Exide Corporation acquired GNB Technologies, Inc., the global battery business of Pacific Dunlop Limited, for US$368 million and renamed the combined companies Exide Technologies. GNB supplied about 20% of the North American market for industrial batteries and was also a maker of lead-acid automotive batteries.

Latin Amercia

Industrias Peñoles S.A de C.V. opened the US$39 million Rey de Plata mine in Tehuixtla, Guerrero, Mexico in October. A joint-venture project between Peñoles (51%), Dowa Mining Co. Ltd. (39%) and Sumitomo Corporation (10%), the mine will produce some 5000 t/y of lead in concentrates.

In Peru, Sociedad Minera El Brocal S.A. upgraded the treatment capacity of its concentrator at the Colquijirca mine near Cerro de Pasco for an increase in capacity of 4000 t/y.

Europe

The Lisheen mine was officially opened in June in Ireland. An equal joint-venture project between Toronto-based Ivernia West Inc. and Anglo American plc, the Lisheen mine, located near Thurles, County Tipperary, is the fifth largest zinc-lead mine in the world. It is expected to produce 4.83 Mt of zinc and lead concentrates during its 14-year lifespan. Full production is expected by mid-year 2001. At full production, Lisheen will process 1.5 Mt/y of ore and produce some 25 000 t/y of contained lead in concentrates.

Eco-Bat Technologies PLC agreed to purchase Exide Technologies' Gast recycled lead smelter in Pont-Sainte-Maxence, France. In addition to the purchase, a new furnace was installed, increasing the production capacity to 35 000 t/y, up from 25 000 t/y.

Africa

Breakwater Resources signed a letter of intent with Algeria's natural resource agency, the Office National

de la Recherche Géologique et Minière (ORGM). The letter entitles Breakwater to earn up to a 90% interest in the Oued Amizour lead-zinc deposit with a total resource estimated at 30.2 Mt grading 5.5% zinc and 1.4% lead. Under the agreement, Breakwater must complete a feasibility study, arrange financing, and construct and bring the project into production. ORGM will retain a 10% net profit interest in the project once Breakwater recovers its full capital investment. Breakwater will pay ORGM US$5 million for the property from the net profits of the operation over a five-year period beginning in the first year of production.

Australia

Noranda announced in December that it had decided to exercise its option to acquire a 75% stake in the Lady Loretta project for $17 million from Buka Minerals Limited. The project is located some 140 km northwest of Mt. Isa in Queensland. Noranda's drilling program increased the estimated mineral resource from an estimated 8.3 Mt grading 18.4% zinc, 8.3% lead and 125 g/t silver to 13.6 Mt grading 17.1% zinc, 5.9% lead and 97 g/t silver.

The new Century mine, owned and operated by Pasminco Limited, was officially opened in April. The A$100 million project was completed under budget and ahead of schedule; it comprises a mine, located at Lawn Hill, and a port and dewatering facility at Karumba in Queensland. The mine and port are connected by a 304-km underground pipeline that pumps zinc and lead concentrate from the mine site to the port. The first shipment of lead concentrate was made in August and was expected to reach a rate of 40 000 t/y by year-end. By the end of 2001, the mine will have an annual capacity of 5 Mt of ore yielding 888 000 t of zinc concentrate and 70 000 t of lead concentrate.

The McArthur River zinc-lead-silver mine achieved record production of 30 000 t of lead in concentrate in 2000. The mine is a joint-venture project between M.I.M. Holdings Limited (M.I.M.) of Australia (70%) and ANT Minerals Pty. Ltd., a consortium of Japanese companies (30%) comprising Nippon Mining & Metals Co. Ltd. and Toyoha Mines Co. Ltd. M.I.M. also commissioned the George Fisher zinc-lead-silver mine at Mt. Isa in October. Average annual production is planned to be 100 000 t of lead. Ore from the George Fisher mine is hoisted through the former Hilton mine.

LEAD USAGE

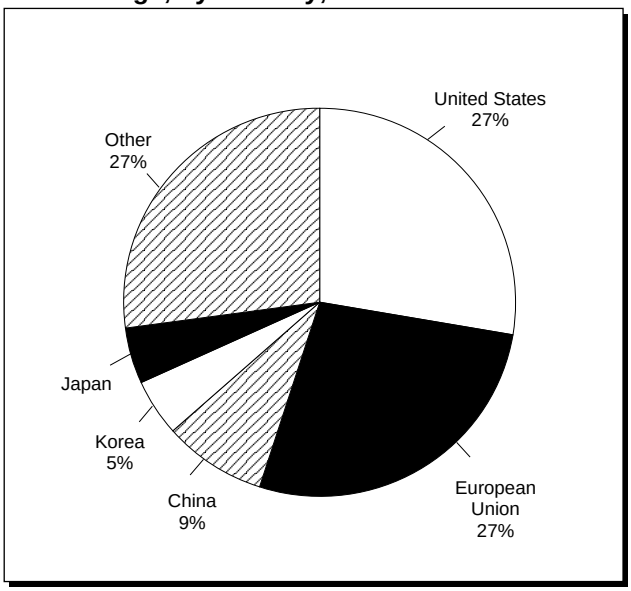
Lead is a dense, bluish-white metal whose physical and chemical properties find application in a variety of uses in the manufacturing, construction and chemical industries.

Preliminary statistics from the ILZSG indicate total world lead demand grew 3.4% from 6.3 Mt in 1999 to just under 6.5 Mt in 2000. Western World demand increased 2.8% to 5.6 Mt in 2000. Europe and the United States accounted for 32% and 28%, respectively, of world lead demand while China accounted for another 9% (Figure 6).

Lead-acid batteries constitute the largest market for lead, representing about 75% of total Western World usage. In the United States, battery manufacturing constitutes about 80% of total lead demand. The largest market for batteries, representing about 80% of lead used in the industry, is the automotive sector. The average automobile battery contains about 10 kg of lead. Some factors that influence lead demand in the automotive sector are new vehicle production, trends and age in vehicle population, and climatic conditions. For example, hotter summers and colder winters in North America and Europe during the last few years have contributed to a greater number of battery failures and increased replacement battery demand (Figure 7).

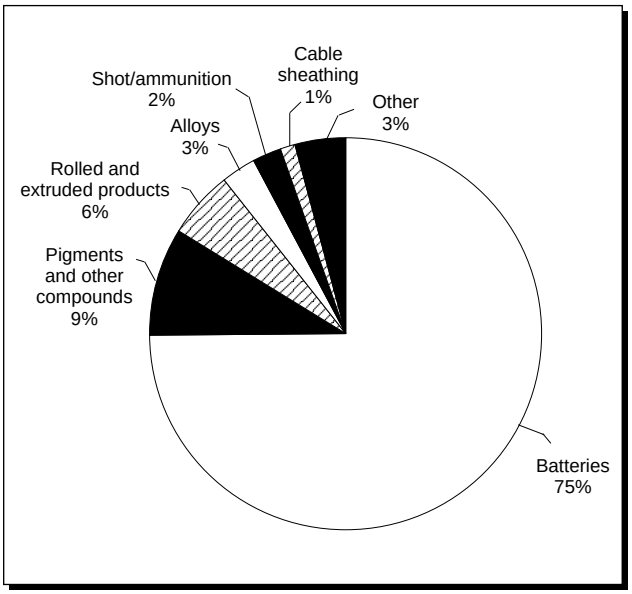
One potential growth area for the lead-acid battery is in energy storage facilities for utilities. A series of batteries are charged during low-use periods of the day and are then used to supplement existing generators during the peak morning and evening hours without drawing on other energy sources or building new power plants. In addition, the growth in cellular telephone networks has increased the demand for lead-acid batteries for stand-by power applications in the telecommunications industry.

Figure 6
Lead Usage, by Country, 2000



Source: International Lead and Zinc Study Group.

Figure 7
Western World Lead Markets, 1999



Source: International Lead and Zinc Study Group.

Electric cars may prove to be the largest new use for lead-acid batteries in the future. Since 1990, California and some other U.S. states have introduced stringent automobile emission standards that would require a certain percentage of new vehicles to be zero-emission vehicles (ZEVs), such as electric-powered vehicles.

In order to meet consumer demand for increased electrical options and advanced features, automakers are now faced with having to upgrade their vehicles' electrical systems. Automakers are in the process of switching from the traditional 12-volt electrical system to a 42-volt system with a 36-volt battery that will take loads off the engine, making it more fuel-efficient. To maintain costs, automotive manufacturers are looking at a new system that is a valve-regulated lead-acid (VRLA) battery. VRLA batteries are widely used in a number of applications and, while other battery chemistries like lithium and nickel metal hydride offer more power and less weight, lead-acid batteries have cost and recycling advantages.

The second largest use of lead is in pigments and compounds, which accounted for 8.9% of Western World demand in 1999. The principal uses are in PVC stabilizers, which prevent degradation during processing or from ultraviolet radiation; in colour pigments; and in the manufacture of glass, including crystal, light bulbs, insulators and television/computer screens. While lead is still used for some specific paint applications, its general use in this application has declined significantly due to the potential risk involved in exposure to weathered or flaked paint.

Until the mid-1970s, the production of lead additives for gasoline, including tetraethyl lead, constituted one of the most important markets for the metal. However, with the adoption of environmental regulations that have either prohibited or severely restricted the use of such additives, the demand for lead in this application has declined dramatically. In Canada, lead as an additive in gasoline for general consumption was eliminated through legislation at the end of 1990.

Lead is alloyed with tin in the production of solder used in both the electronics and plumbing sectors. In the plumbing industry, the demand for lead has decreased primarily as a result of the increasing use of plastic piping. While metal systems are still used for potable water systems, new regulations that have been adopted or are being considered will reduce or eliminate the use of lead in solder. In the electronics field, the move to miniaturization has also reduced the demand for lead in solder. Some companies are developing alternatives to lead-based solders.

Other important applications of both lead metal and lead alloys include: the production of free machining steel and brass, rolled sheet and strip for roofing applications, power and communication cable sheathing, especially for underground or submarine environments, and as a sound barrier material in construction.

Lead's high resistance to gamma radiation and X rays makes it the preferred metal for shielding around X-ray equipment and at nuclear installations.

Potential new uses for lead include: nuclear waste disposal applications; liquid metal (magnetohydrodynamics), a method of generating electricity by passing an electrically conducting fluid through a magnetic field; additives to extend the life of asphalt; barriers or shields against radon gas and electromagnetic fields; and as a damper to protect buildings from vibrations during earthquakes.

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 inter-governmental 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 2000, 28 countries, representing most of the

world's major lead- and zinc-producing and using 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 lead and zinc production, trade and use. 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 45th Session of the Study Group, chaired by Mr. Alek Ignatow of Canada, was held in London, England, in October 2000 and was attended by some 250 registered participants, including representatives of 26 member countries and observers from several invited nations, industry and non-governmental organizations. Delegates elected a new Secretary General, Mr. Don Smale of Australia, to replace Mr. Francis Labro of France, who retired as Secretary General at the end of the year. The next annual meeting of the Group will take place October 16-18, 2001, in New Delhi, India.

The Group continued to work on updating its capacity to deliver, through electronic means, its monthly statistical bulletin. It is expected that the bulletin will be available to member countries and subscribers through the Group's web site by mid-2001.

More information about the Group's activities and the availability of a wide range of publications pertaining to lead and zinc can be obtained from its web site at www.ilzsg.org. For information on the Group's activities in partnership with the International Copper Study Group and the International Nickel Study Group related to the contribution nonferrous metals make to sustainable development and the Consultative Forum, visit their joint web site at www.nfmsd.org.

HEALTH, SAFETY AND THE ENVIRONMENT

The Danish Environment and Energy Minister recently signed an executive order that will make Denmark the first country in the world to impose a wide-ranging ban on the use of lead. The ban is to become effective in March 2001. It will affect the use of lead and lead compounds in the construction and electronics industries as well as their use as a stabilizer in plastics and their use in ballasts and weights. Applications where there is no alternative to lead, such as in lead-acid batteries, currently are exempt from the ban. The action taken by Denmark had been opposed by 12 of the 15 European Union (EU) member states and the European Commission (EC). The objections raised by the EU states and the EC were supported in a decision by the EC's Scientific Committee on Toxicology, Ecotoxicology and the Environment in mid-2000. In that decision, the committee concluded that the Danish plan to ban lead for health reasons was scientifically unjustified.

PRICES AND STOCKS

The LME cash settlement price for lead maintained a downward trend, mirroring the steady rise in stocks through the first half of the year, falling from a peak of US$493/t in January to a low of US$399/t in April, the lowest price for the year. As prices fell, cuts in mine production, aggressive buying by China and reduced availability of scrap quickly turned a balanced market into deficit. To meet consumer demand, stocks began to follow a steady decline in late May and early June from a peak of just under 209 000 t. As a result, prices began to recover and reached a peak of US$518.50/t in late September. The recovery, however, came to an abrupt end in early October when a large volume of hidden stocks suddenly made an appearance, rising by 57 000 t to 157 000 t in a matter of one week. Prices subsequently fell back to finish the year at US$471/t. Overall, settlement prices averaged US$454.22/t for the year while three-month prices averaged $468.07/t. LME stocks ended the year at 130 650 t, down 44 950 t from the start of the year (Figures 8 and 9).

OUTLOOK

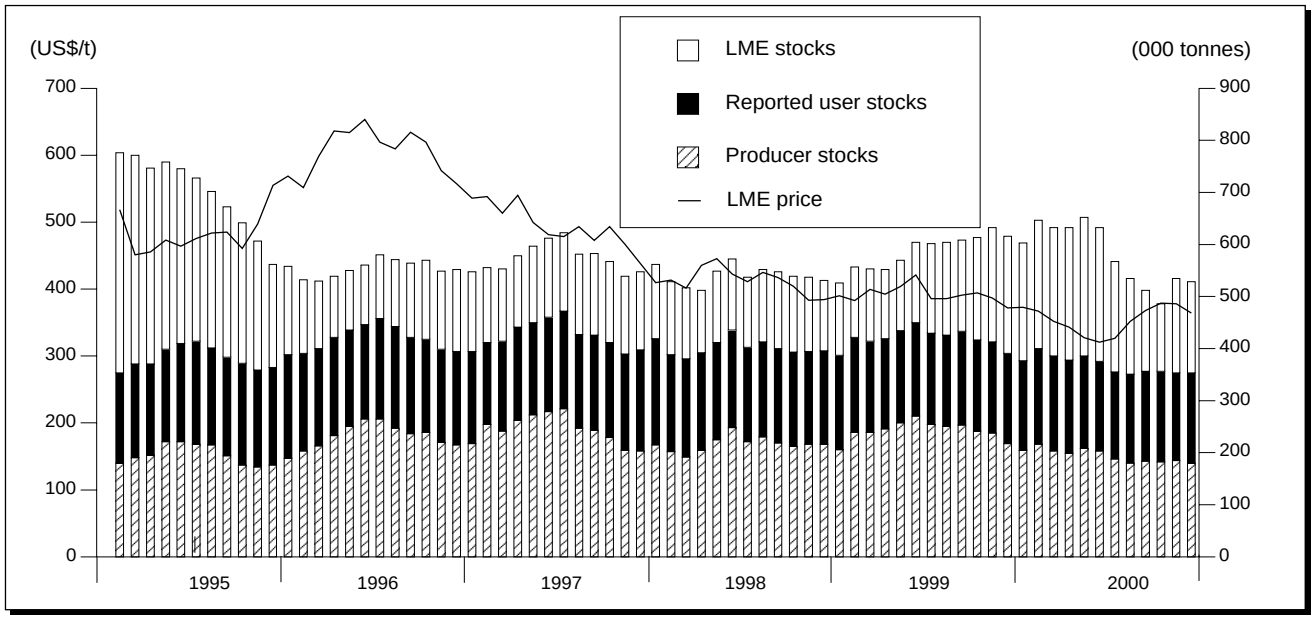
For 2001, the lead market, according to information gathered by the member countries of ILZSG, is expected to result in a deficit of about 59 000 t. A forecast rise of 2.9% is expected to result in global lead mine output of 3.03 Mt, the first time mine output will exceed 3 Mt. Western World mine production is expected to rise 2.2% to 2.27 Mt. The world supply of refined lead metal is forecast to increase by 0.9% to 6.64 Mt in 2001. Western World production, however, will fall by 0.2% to 5.06 Mt. Cash prices are expected to average between US$480 and US$490/t in 2001. In the longer term, prices are expected to average between US$500 and US$550/t to the year 2005 (Figures 10 and 11).

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 July 16, 2001. (3) This and other reviews, including previous editions, are available on the Internet at http://www.nrcan.gc.ca/mms/cmy/index_e.html.

NOTE TO READERS

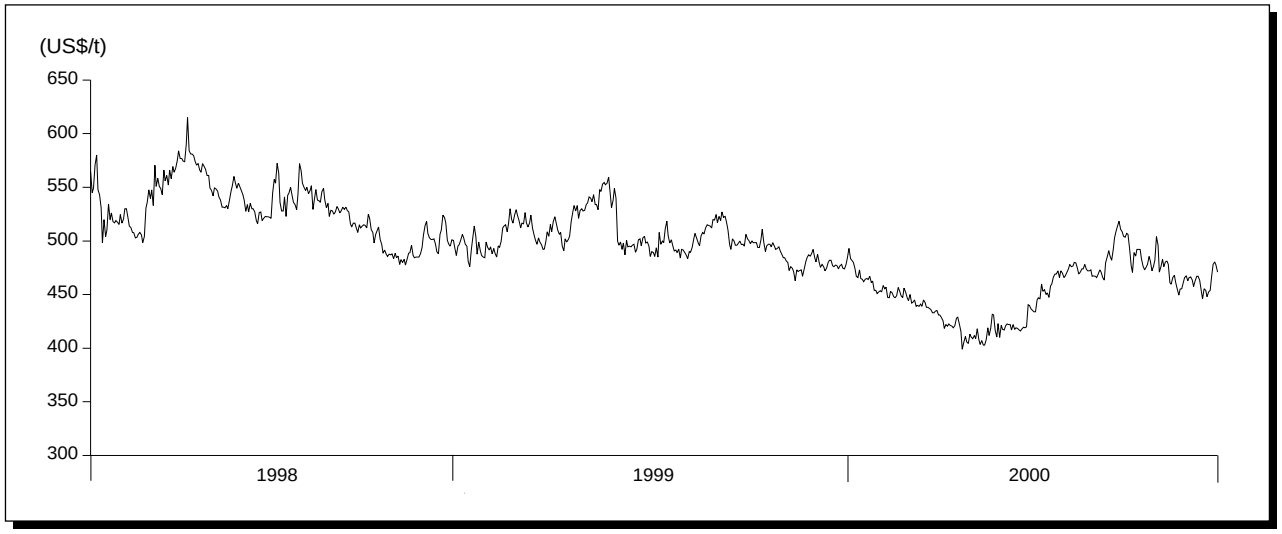
The intent of this document is to provide general information and to elicit discussion. It is not intended as a reference, guide or suggestion to be used in trading, investment, or other commercial activities. The author and Natural Resources Canada make no warranty of any kind with respect to the content and accept no liability, either incidental, consequential, financial or otherwise, arising from the use of this document.

Figure 8
LME Monthly Average Settlement Prices and Total Stocks, 1995-2000



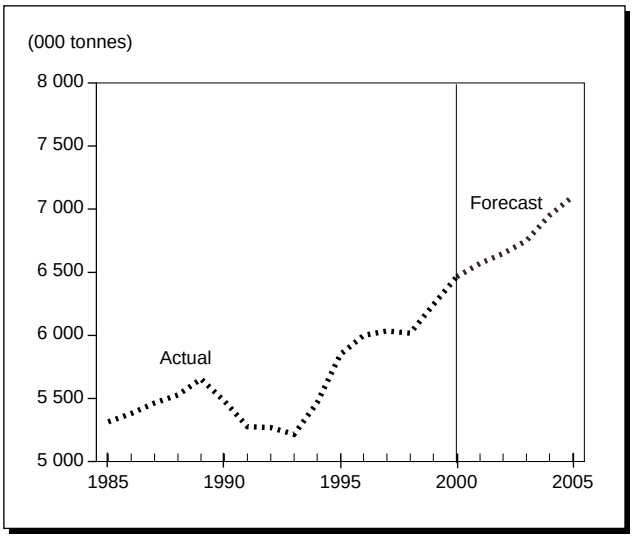
Source: International Lead and Zinc Study Group.

Figure 9
LME Daily Official Cash Settlement Prices, 1998-2000



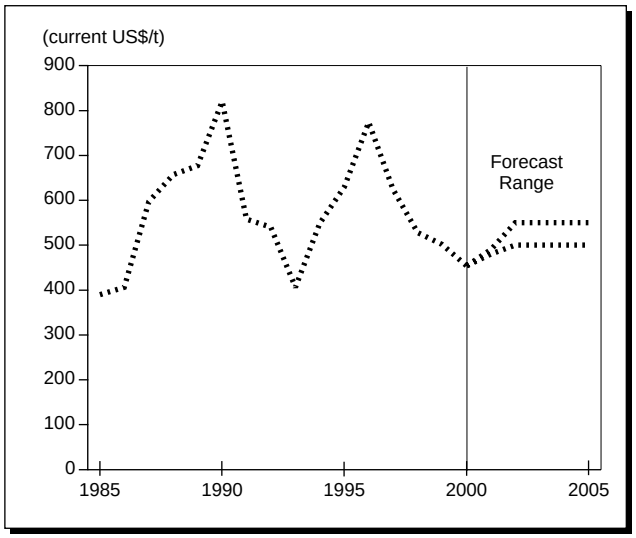
Source: London Metal Exchange.

Figure 10
World Lead Use, 1985-2005



Source: International Lead and Zinc Study Group.

Figure 11
Average Cash Settlement Lead Prices, 1985-2005
Annual LME Settlement



Source: Natural Resources Canada.

TARIFFS

Item No.	Description	Canada MFN	Canada GPT	Canada USA	United States Canada[1]	EU MFN	Japan[1] WTO
2607.00	Lead ores and concentrates	Free	Free	Free	Free	Free	Free
78.01	Unwrought lead						
7801.10	Refined lead						
7801.10.10	Pig and block	Free	Free	Free	Free	2.5%	Free-2.70 yen/kg
7801.10.90	Other	2.5%	Free	Free	Free	2.5%	Free-2.70 yen/kg
7801.91	Other: Containing by weight antimony as the principal other element	Free	Free	Free	Free	2.5%	Free to 3% or 3.10 yen/kg, whichever is greater
7801.99.10	Lead bullion	2.5%	Free	Free	Free	Free	3% or 4.50 yen/kg, whichever is greater
7801.99.20	Lead alloys	2.5%	Free	Free	Free	2.5%	Free to 2.70 yen/kg
7801.99.90	Other	2.5%	Free	Free	Free	2.5%	3% or 4.50 yen/kg, or whichever is greater
7802.00	Lead waste and scrap	Free	Free	Free	Free	Free	2.1%
7803.00	Lead bars, rods, profiles and wire						
7803.00.10	Bars and rods, not alloyed	2.5%	Free	Free	Free	5%	3%
7803.00.90	Other	3%	Free	Free	Free	5%	3%
7804.11	Lead sheets, strip and foil of a thickness (excluding any backing) not exceeding 0.2 mm						
7804.11.10	Of lead-tin alloys, whether or not containing antimony	Free	Free	Free	Free	5%	3%
7804.11.90	Other	3%	Free	Free	Free	5%	3%
7804.19	Other						
7804.19.10	Not alloyed, of a thickness exceeding 0.2 mm but not exceeding 5 mm, and a width exceeding 600 mm	2.5%	Free	Free	Free	5%	3%
7804.19.20	Of lead-antimony-tin alloys	2.5%	Free	Free	Free	5%	3%
7804.19.90	Other	2.5%	Free	Free	Free	5%	3%
7804.20	Powders and flakes						
7804.20.10	Powders, not alloyed	2.5%	Free	Free	Free	Free	3%
7804.20.20	Alloyed powders; flakes	2.5%	Free	Free	Free	Free	3%
7805.00	Lead tubes, pipes, and tube or pipe fittings	3%	Free	Free	Free	5%	3%
7806.00	Other articles of lead	3%	Free	Free	Free	Free to 5%	3%

Sources: *Customs Tariff*, effective January 2001, Canada Customs and Revenue Agency; *Harmonized Tariff Schedule of the United States*, 2001; *Worldtariff Guidebook on Customs Tariff Schedules of Import Duties of the European Union* (40th Annual Edition: 2000); *Customs Tariff Schedules of Japan*, 2000.
[1] WTO rate is shown; lower tariff rates may apply circumstantially.

TABLE 1. CANADA, LEAD PRODUCTION AND TRADE, 1999 AND 2000, AND USE, 1998 AND 1999

Item No.		1999		2000p	
		(tonnes)	($000)	(tonnes)	($000)
SHIPMENTS[1]					
	New Brunswick	71 978	53 696	66 570	44 602
	British Columbia	40 278	30 048	44 596	29 880
	Nunavut	43 112	32 162	31 883	21 361
	Total	155 369	115 905	143 049	95 843
	Mine output[2]	162 180	..	152 765	..
	Refined production				
	Primary	148 526	..	158 133	..
	Recycled	117 889	..	124 719	..
	Total	266 415	..	282 852	..
EXPORTS					
2603.00.20	Lead content of copper ores and concentrates	–	–	1 000	269
2607.00	Lead ores and concentrates				
	Sweden	33 786	25 062	23 786	17 224
	Germany	2 262	1 686	8 842	6 470
	China	2 166	370	3 691	1 141
	Belgium	4 016	2 995	1 355	1 011
	Italy	1 383	1 032	–	–
	Other countries	4 971	3 708	–	–
	Total	48 584	34 853	37 674	25 846
2607.00.20	Lead content of lead ores and concentrates	48 581	34 722	37 674	25 846
2608.00.20	Lead content of zinc ores and concentrates	10 250	3 574	12 227	3 761
2616.10.20	Lead content of silver ores and concentrates	–	–	–	–
7801.10	Refined lead, unwrought				
	United States	131 793	113 842	146 223	122 216
	Spain	1 203	902	602	420
	Japan	39	56	199	266
	Germany	519	391	120	83
	Other countries	4 943	3 722	–	–
	Total	138 497	118 913	147 144	122 985
7801.91	Lead, unwrought, containing by weight antimony as the principal other element	13 529	13 095	19 717	18 901
7801.99	Lead, unwrought, n.e.s.	68 937	63 387	56 203	48 090
7802.00	Lead waste and scrap				
	United States	6 443	2 766	4 016	1 320
	Other countries	22	11	31	39
	Total	6 465	2 777	4 047	1 359
7803.00	Lead bars, rods, profiles and wire				
	United States	591	1 455	485	1 398
	Other countries	10	27	1	1
	Total	601	1 482	486	1 399
7804.11	Lead sheets, strip and foil of a thickness (excluding any backing) <0.2 mm	9	53	47	117
7804.19	Lead plates, sheet, strip and foil, n.e.s.	515	739	745	1 156
7804.20	Lead powders and flakes	–	–	6	61
7805.00	Lead tubes, pipes, and tube or pipe fittings (i.e., couplings, elbows, sleeves)	33	83	18	152
7806.00	Other articles of lead				
	United States	..	4 449	..	4 752
	Other countries	..	58	..	21
	Total	..	4 507	..	4 773
IMPORTS[3]					
2607.00	Lead ores and concentrates				
	Peru	37 147	28 883	26 786	43 103
	United States	13 148	15 726	14 318	21 457
	Mexico	1 374	19 226	4 699	6 064
	Honduras	–	–	3 269	3 923
	Chile	–	–	10	3 131
	Morocco	–	–	9	2 712
	Other countries	5 474	10 863	1 487	2 532
	Total	57 143	74 698	50 578	82 922

TABLE 1 (cont'd)

Item No.		1999		2000p	
		(tonnes)	($000)	(tonnes)	($000)
IMPORTS (cont'd)					
2607.00.00.20	Lead content of lead ores and concentrates	55 877	43 829	47 300	56 373
2608.00.00.20	Lead content of zinc ores and concentrates	474	656	380	529
2616.10.00.20	Lead content of silver ores and concentrates	2 630	1 558	4 359	2 113
7801.10.10	Refined lead, unwrought, pig and block	6 037	5 169	4 747	4 370
7801.10.90	Refined lead, unwrought, other	184	235	179	206
7801.91	Lead, unwrought, containing by weight antimony as the principal other element	4 867	4 731	4 177	4 241
7801.99	Lead, unwrought, other	2 488	10 111	8 431	38 157
7802.00	Lead waste and scrap				
	United States	109 954	23 819	65 616	14 334
	Other countries	156	115	54	40
	Total	110 110	23 934	65 670	14 374
7803.00	Lead bars, rods, profiles and wire				
	United States	1 075	1 999	1 535	2 104
	Other countries	21	105	11	20
	Total	1 096	2 104	1 546	2 124
7804.11	Lead sheets, strip and foil of a thickness (excluding any backing) <0.2 mm	217	341	311	387
7804.19	Lead plates, sheet, strip and foil, n.e.s.	101	195	152	230
7804.20	Lead powders and flakes	28	51	93	169
7805.00	Lead tubes, pipes, and tube or pipe fittings (i.e., couplings, elbows, sleeves)	40	113	25	39
7806.00	Other articles of lead				
	United States	4 827	4 017	3 933	4 568
	Japan	841	1 055	508	657
	Germany	84	79	98	91
	China	16	27	45	56
	Other countries	100	145	109	102
	Total	5 868	5 323	4 693	5 474

	1998			1999p		
	Primary	Recycled[5]	Total	Primary	Recycled[5]	Total
	(tonnes)					
QUANTITY USED[4]						
Lead used for or in the production of:						
Antimonial lead	x	x	x	x	x	x
Batteries and battery oxides	11 421	17 106	28 527	16 741	20 024	36 765
Chemical uses: white lead, red lead, litharge, tetraethyl lead, etc.	x	x	x	x	x	x
Copper alloys: brass, bronze, etc.	94	13	107	14	11	25
Lead alloys:						
Solders	451	408	859	462	910	1 373
Others (including babbitt, type metals, etc.)	x	x	x	x	x	x
Semi-finished products:						
Pipe, sheet, traps, bends, blocks for caulking, ammunition, etc.	1 611	657	2 268	2 914	241	3 155
Other lead products	2 054	721	2 774	2 375	844	3 219
Total, all categories	28 109	59 447	87 466	34 108	58 449	92 557

Sources: Natural Resources Canada; Statistics Canada.
– Nil; . . Not available; n.e.s. Not elsewhere specified; p Preliminary; x Confidential.
1 Production includes recoverable lead in ores and concentrates shipped valued at the Montréal Exchange average price for the year. 2 Lead content of domestic ores and concentrates exported. 3 Imports from "other countries" may include re-imports from Canada. 4 Available data, as reported by users. 5 Includes all remelt scrap lead used to make antimonial lead.
Note: Numbers may not add to totals due to rounding.

TABLE 2. CANADA, LEAD PRODUCTION, TRADE AND USE, 1975, 1980 AND 1985-2000

	Production				Exports[1]			Imports	Quantity
		Refined			In Ores and				
	All Forms[2]	Primary	Recycled	Total	Concentrates	Refined	Total	Refined	Used[3]
					(tonnes)				
1975	349 133	171 516	. .	171 516	211 909	110 882	322 791	1 962[a]	89 192
1980	251 627	162 463	72 117	234 580	147 008	126 539	273 547	2 602[a]	106 836
1985	268 291	173 220	66 791	240 011	93 657	113 993	207 650	5 675[a]	104 447
1986	334 342	169 934	87 746	257 680	118 373	111 831	230 204	4 247[a]	94 680
1987	373 215	139 475	91 186	230 661	207 936	100 204	308 140	12 558[a]	97 281
1988	351 148	179 461	88 615	268 076	200 822	179 946	380 768	15 132	88 728
1989	268 887	157 330	85 515	242 845	170 582	121 444	292 026	11 734	88 408
1990	233 372	87 180	96 465	183 645	221 566	84 007	305 573	11 781	72 203
1991	248 102	106 420	105 946	212 366	175 150	86 631	261 781	7 553	80 253
1992	339 626	151 252	101 633	252 885	190 822	131 546	322 368	8 289	92 420
1993	183 105	147 907	69 107	217 014	96 428	124 610	221 038	11 612	91 915
1994	167 584	153 035	98 605	251 640	55 923	133 203	189 126	5 119	95 764
1995	204 227	178 019	103 372	281 391	90 254	140 478	230 732	3 967[r]	91 171
1996	241 751	192 877	117 914	310 791	154 697	159 860[r]	314 557[r]	4 179[r]	93 373
1997	170 847	139 736	131 659	271 395	112 694	155 639	268 333	5 843	92 997
1998	150 019	129 750	135 737	265 487	52 250	145 358	197 608	6 458	87 466
1999	155 369	148 526	117 889	266 415	58 831	139 622	198 453	7 663	92 557
2000[p]	143 049	158 133	124 719	282 852	50 901	148 428	199 329	7 028	. .

Sources: Natural Resources Canada; Statistics Canada.
. . Not available; [p] Preliminary; [r] Revised.
[a] Lead in pigs, blocks and shot.
[1] Beginning in 1988, exports and imports are based on the new Harmonized System and may not be in complete accordance with previous method of reporting. Ores and concentrates include HS classes 2603.00.20, 2607.00.20, 2608.00.20 and 2616.10.20. Refined exports include HS classes 7801.10, 7803.00, 7804.11, 7804.19 and 7804.20. Refined imports include HS classes 7801.10.10, 7801.10.90, 7803.00, 7804.11, 7804.19 and 7804.20. [2] Recoverable lead in ores and concentrates shipped. [3] Primary and recycled in origin, as measured by a survey of users.

TABLE 3. ANNUAL AVERAGE LEAD PRICES, 1975-2000

	London Metal Exchange			
	Settlement		Three Months	
	(US$/t)	(US¢/lb)	(US$/t)	(US¢/lb)
1975	413.48	18.75	441.93	18.82
1976	451.51	20.48	469.03	21.28
1977	617.78	28.02	626.84	28.43
1978	658.87	29.89	659.07	29.90
1979	1 203.15	54.57	1 149.95	52.16
1980	909.12	41.24	911.46	41.34
1981	734.73	33.33	750.12	34.03
1982	544.08	24.68	562.53	25.52
1983	425.27	19.29	440.55	19.98
1984	444.36	20.16	445.25	20.20
1985	394.10	17.88	394.12	17.88
1986	406.89	18.46	407.26	18.47
1987	597.41	27.10	567.38	25.74
1988	655.83	29.75	635.68	28.83
1989	676.14	30.67	659.36	29.91
1990	817.85	37.10	790.82	35.87
1991	557.84	25.30	568.90	25.81
1992	540.04	24.50	553.56	25.11
1993	406.38	18.43	420.36	19.07
1994	549.01	24.90	564.10	25.59
1995	630.51	28.60	638.88	28.98
1996	773.96	35.11	771.22	34.98
1997	624.08	28.31	633.01	28.71
1998	528.42	23.97	533.29	24.19
1999	502.24	22.78	508.89	23.08
2000	454.22	20.60	468.07	21.23

Source: London Metal Exchange.

TABLE 4. LME MONTHLY AVERAGE LEAD PRICES, 1999 AND 2000

	London Metal Exchange			
	Settlement		Three Months	
	(US$/t)	(US¢/lb)	(US$/t)	(US¢/lb)
1999				
January	492.30	22.33	489.00	22.18
February	513.65	22.30	515.35	23.38
March	507.83	23.04	508.72	23.08
April	519.33	23.56	508.72	23.08
May	541.53	24.56	543.13	24.64
June	496.11	22.50	505.16	22.91
July	495.80	22.49	505.86	22.95
August	502.65	22.80	511.05	23.18
September	507.32	23.01	520.11	23.59
October	497.10	22.55	508.79	23.08
November	478.32	21.70	489.09	22.19
December	479.05	21.73	494.35	22.42
2000				
January	472.08	21.41	488.18	22.14
February	452.38	20.52	470.24	21.33
March	441.30	20.02	456.59	20.71
April	421.14	19.10	439.75	19.95
May	412.12	18.69	430.43	19.52
June	419.59	19.03	436.36	19.79
July	452.12	20.51	462.60	20.98
August	473.09	21.46	485.82	22.04
September	487.05	22.09	493.26	22.37
October	486.14	22.05	493.00	22.36
November	468.02	21.23	481.27	21.83
December	462.34	20.97	477.11	21.64

Source: International Lead and Zinc Study Group.

TABLE 5. WESTERN WORLD LEAD MARKETS, 1996-99

	1996		1997		1998		1999	
	(000 t)	(%)	(000 t)	(%)	(000 t)	(%)	(000 t)	(%)
Batteries	3 395.2	72.1	3 402.7	72.7	3 457.1	74.2	3 566.6	74.9
Cable sheathing	99.0	2.1	77.5	1.7	64.0	1.4	59.1	1.2
Rolled and extruded products	278.2	5.9	282.5	6.0	290.6	6.2	264.6	5.6
Shot/ammunition	108.6	2.3	109.5	2.3	111.9	2.4	113.4	2.4
Alloys	149.9	3.2	143.8	3.1	127.9	2.7	136.5	2.9
Pigments and other compounds	476.9	10.1	465.5	9.9	421.2	9.0	423.7	8.9
Gasoline additives	44.2	0.9	37.0	0.8	31.5	0.7	27.6	0.6
Miscellaneous	156.2	3.3	162.6	3.4	157.0	3.4	170.8	3.6
Total	4 708.2	100.0	4 681.0	100.0	4 661.2	100.0	4 762.3	100.0

Source: International Lead and Zinc Study Group.

TABLE 6. MINE PRODUCTION OF LEAD, BY COUNTRY, 1997-2000

	1997	1998	1999	2000p
		(000 t)		
EUROPE				
Bulgaria	32	22	14	14
Greece	19	23	19	16
Ireland	45	36	39	57
Italy	12	7	8	7
Macedonia	28	30	27	26
Poland	55	60	68	50
Romania	17	15	21	18
Russia	16	13	14	14
Spain	23	19	29	51
Sweden	109	112	118	107
Yugoslavia	14	16	9	2
Other Europe	7	5	–	–
Total Europe	377	358	366	362
AFRICA				
Morocco	77	80	80	84
Namibia	18	14	12	12
South Africa	83	84	80	75
Other Africa	2	4	7	9
Total Africa	180	182	179	180
AMERICAS				
Canada	186	190	162	149
Mexico	174	166	120	138
Peru	262	258	271	271
United States	459	491	513	451
Other Americas	195	180	132	149
Total Americas	1 129	1 146	1 105	1 047
ASIA				
China	712	581	549	570
India	33	38	38	36
Iran	19	13	15	15
Japan	5	6	6	9
Kazakhstan	29	26	31	39
Korea, South	35	30	26	22
Thailand	6	7	12	11
Turkey	10	12	14	10
Other Asia	17	12	4	1
Total Asia	858	722	696	718
OCEANIA				
Australia	486	584	633	652
Total Western World	2 130	2 243	2 255	2 230
Total World	3 030	2 992	2 979	2 958

Sources: Natural Resources Canada; International Lead and Zinc Study Group.
– Nil; p Preliminary.

TABLE 7. REFINED LEAD PRODUCTION, BY COUNTRY, 1997-2000

	1997	1998	1999	2000p
		(000 t)		
EUROPE				
Belgium	111	92	110	119
Bulgaria	73	77	82	84
Czech Republic	22	24	25	28
France	283	289	273	262
Germany	329	353	353	387
Italy	212	199	215	231
Poland	65	64	70	70
Russia	52	36	44	32
Spain	90	90	86	120
Sweden	86	87	79	78
United Kingdom	399	370	372	335
Other Europe	168	167	138	144
Total Europe	1 890	1 848	1 847	1 890
AFRICA				
Morocco	64	62	65	69
South Africa	43	50	52	52
Other Africa	17	15	14	13
Total Africa	124	127	131	134
AMERICAS				
Brazil	53	48	52	50
Canada	271	266	266	285
Mexico	259	259	199	244
Peru	98	104	111	116
United States	1 431	1 436	1 447	1 433
Other Americas	70	69	61	63
Total Americas	2 182	2 182	2 136	2 191
ASIA				
China	708	757	918	1 034
India	60	66	64	67
Japan	297	302	293	312
Kazakhstan	82	92	159	208
Korea, North	30	25	22	19
Korea, South	182	180	190	220
Malaysia	36	29	33	35
Taiwan	36	39	45	42
Other Asia	171	163	164	158
Total Asia	1 602	1 653	1 888	2 095
OCEANIA				
Australia	229	200	271	257
New Zealand	6	6	6	5
Total Oceania	235	206	277	261
Total Western World	4 972	4 912	4 933	5 059
Total World	6 033	6 016	6 279	6 572

Sources: Natural Resources Canada; International Lead and Zinc Study Group.
p Preliminary.

TABLE 8. REFINED LEAD USE, BY COUNTRY, 1997-2000

	1997	1998	1999	2000p
		(000 t)		
EUROPE				
Austria	61	66	64	64
Belgium	60	58	51	57
France	256	251	260	268
Germany	340	356	372	395
Ireland	29	26	32	31
Italy	259	262	279	281
Netherlands	57	51	30	32
Poland	57	59	64	68
Russia	103	92	95	83
Spain	170	188	192	231
United Kingdom	345	310	329	325
Other Europe	231	232	230	249
Total Europe	1 968	1 951	1 998	2 084
AFRICA				
Algeria	20	21	21	21
Egypt	9	8	8	9
South Africa	63	74	67	69
Other Africa	29	29	32	32
Total Africa	121	132	128	131
AMERICAS				
Brazil	110	110	108	114
Canada	71	67	70	68
Mexico	148	163	179	185
United States	1 664	1 744	1 791	1 789
Other Americas	112	114	100	113
Total Americas	2 105	2 198	2 248	2 269
ASIA				
China	485	505	524	550
India	88	95	112	119
Indonesia	66	40	45	46
Iran	68	70	75	75
Japan	330	308	289	301
Korea, South	292	236	272	306
Malaysia	73	62	76	84
Taiwan	141	132	150	145
Thailand	48	46	66	96
Other Asia	180	179	198	207
Total Asia	1 771	1 673	1 807	1 929
OCEANIA				
Australia	63	54	56	41
New Zealand	7	10	8	9
Total Oceania	70	64	64	50
Total Western World	5 259	5 238	5 433	5 626
Total World	6 034	6 018	6 244	6 463

Sources: Natural Resources Canada; International Lead and Zinc Study Group.
p Preliminary.

TABLE 9. WESTERN WORLD PRODUCTION OF RECYCLED[1] LEAD, 1997-2000

	1997	1998	1999	2000[p]
		(000 t)		
EUROPE				
Austria	22	23	24	24
Belgium	27	33	77	107
France	159	158	150	137
Germany	198	192	192	216
Ireland	12	13	11	9
Italy	146	142	148	163
Netherlands	19	17	18	21
Spain	90	90	86	120
Sweden	43	48	44	47
United Kingdom	189	184	183	179
Other Europe	42	38	41	36
Total Europe	947	938	974	1 059
AFRICA				
Algeria	7	6	6	6
Morocco	4	4	4	4
South Africa	43	50	52	52
Other Africa	9	9	7	7
Total Africa	63	69	69	69
AMERICAS				
Brazil	53	48	52	50
Canada	132	136	118	126
Mexico	80	87	91	96
United States	1 089	1 099	1 097	1 091
Other Americas	65	68	60	55
Total Americas	1 419	1 438	1 418	1 418
ASIA				
India	17	17	19	25
Indonesia	30	22	18	18
Iran	28	29	28	26
Japan	154	158	168	182
Korea, South	61	47	50	50
Malaysia	36	29	33	35
Taiwan	36	39	45	42
Thailand	15	19	23	24
Other Asia	70	69	70	72
Total Asia	447	429	454	474
OCEANIA				
Australia	25	28	32	34
New Zealand	6	6	6	5
Total Oceania	31	34	37	38
Total Western World	2 907	2 908	2 953	3 058

Sources: Natural Resources Canada; International Lead and Zinc Study Group.
p Preliminary.
1 Refined lead and lead alloys (lead content) produced from scraps, wastes and residues.