Lead

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According to preliminary figures from the International Lead and Zinc Study Group (ILZSG), world lead consumption rose to a record level of 6 054 000 t in 1997, an increase of 0.3% over 1996. Although world mine production of lead decreased by 2.3% to 2 933 000 t from 1996, largely due to the closure of the Faro mine in Canada, lead metal production rose by 2.8% to 6 046 000 t.

The rise in reported consumer stocks during 1997 was more than offset by a fall in producer and London Metal Exchange (LME) lead stocks. The net result was a year-on-year 12% decline in total stocks at the end of 1997. LME stocks stood at 111 000 t at the end of the year.

CANADIAN DEVELOPMENTS

Canada's mine production of lead totalled an estimated 184 000 t in 1997, compared to 257 000 t in 1996. The decrease was primarily due to the closure of the Faro operation.

Canadian lead metal production is estimated at 275 000 t for 1997, compared to 311 000 t in 1996. Reductions in output occurred in both the primary and secondary sectors, with the largest decline of about 16% coming from primary output. Annual secondary lead production declined by approximately 4% to 113 000 t in 1997, and accounts for approximately 40% of metal production in Canada.

British Columbia

Cominco Ltd. closed its aging 100 000-t/y lead smelter in April to coincide with the opening of the new 120 000-t/y Kivcet lead smelter and slag fuming furnace at Trail, British Columbia. The new smelter was shut down for more than five weeks in the fourth quarter as the result of required modifications and difficulties with the oxygen fuel supply from BOC Gases' on-site plant.

Development work increased at Cominco's Sullivan mine. Additional work is planned for 1998 to enable the mine to sustain its current annual production rate until its closure at the end of 2001.

Redfern Resources Ltd. is seeking a project approval certificate for mining the Tulsequah Chief deposit in northwestern British Columbia. The proposed production rate is 4000 t/y of lead in concentrate.

Yukon

In December 1996, Anvil Range Mining Corporation suspended mining at its Faro operation in the Yukon, partly due to weak metal prices and stripping delays. The milling of stockpiled material ceased in March 1997. Cominco acquired approximately a 28% interest in Anvil in February. Production resumed in November; however, falling base-metal prices forced the mine to close again in January 1998. Located about 170 km northeast of Whitehorse, the Faro operation is one of the largest lead-zinc mines in the world with an annual capacity of 98 000 t of lead in concentrate at full production.

In October, Cominco and the Liard First Nation (the local Aboriginal people) signed a socio-economic participation agreement related to the Sa Dena Hes mine in the southeastern Yukon. The mine, which closed in 1992 during a period of weak metal prices, was scheduled to re-open as early as the second quarter of 1998 and to produce 10 000 t/y of lead in concentrate. In December, plans to re-open the mine were cancelled because of a deterioration in market conditions. The property is jointly owned by Cominco (25%), Teck Corporation (25%) and Korea Zinc Co. Ltd. (50%).

Drilling by Westmin Resources Limited (60%) and Atna Resources Ltd. (40%) discovered a new zone (the Sable Zone), and thicker-than-expected precious-metal-rich massive sulphides on the eastern edge of the Wolverine deposit near Watson Lake. Metallurgical concerns, particularly the high selenium content, were also investigated during 1997. The mineral resource has been expanded to 6 237 000 t grading 1.76 g/t gold, 370.9 g/t silver, 1.33% copper, 1.55% lead and 12.66% zinc.

Northwest Territories

San Andreas Resources Corporation reached an agreement with the Nahanni Butte Dene Band to allow the company to build a 170-km access road to the Prairie Creek lead-zinc-silver project in the Nahanni River area. The agreement includes items such as mine options, an education centre, a scholarship trust fund, and employment opportunities for Nahanni members. It was also reported that a Nahanni member will sit on the mine's project management committee. A geological reserve of 6.2 Mt grading 14% lead, 12% zinc, 218 g/t silver and 0.4% copper has been identified, with the possibility of the existing 1200-t/d mill to produce 30 000 t/y of lead in concentrate.

Quebec

Nova Pb Inc. added a second rotary kiln and auxiliary technology to increase its lead smelting capacity from 60 000 to 90 000 t/y by 2000 in Sainte Catherine, Quebec. Nova Pb is the largest secondary lead producer in Canada.

New Brunswick

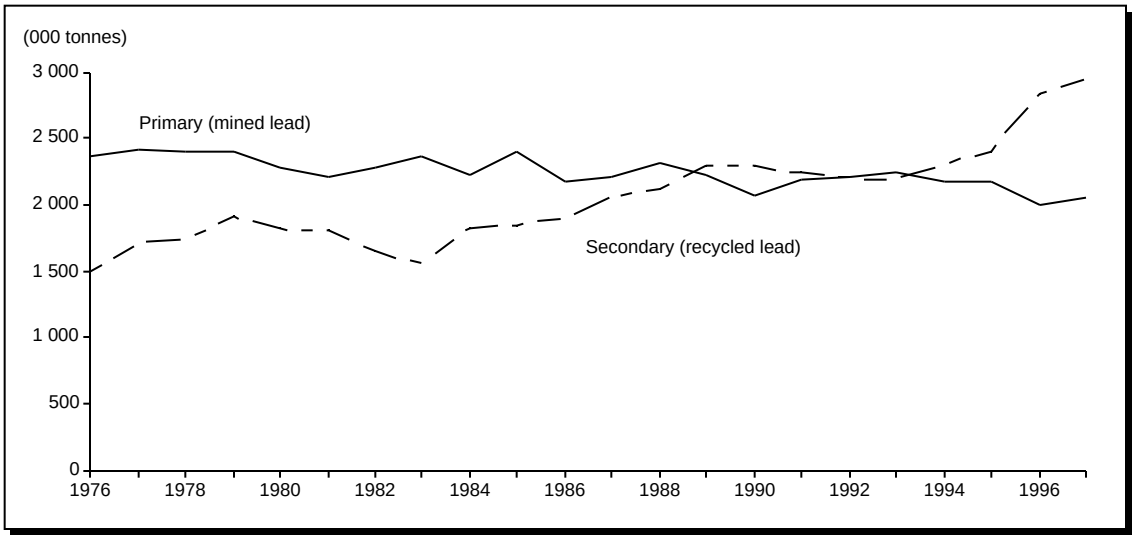
Breakwater Resources Ltd. opened the underground Caribou and open-pit Restigouche mines located 50 and 80 km west of Bathurst, respectively. Breakwater had suspended mining at Caribou in 1990. A new reagent scheme will reportedly boost recoveries, while its milling capacity has been increased to 3000 t/d. Together the mines will produce 32 000 t/y of lead in concentrate. The estimated mine life is reported to be 10 years with reserves of 13 Mt grading 3.52% lead, 8.18% zinc, 0.38% copper, 102 g/t silver and 1.4 g/t gold at Caribou, and 1.6 Mt grading 5.38% lead, 6.81% zinc, 122 g/t silver and 1.1 g/t gold at Restigouche.

WORLD DEVELOPMENTS

According to ILZSG data, world mine production of lead totalled 2 933 000 t in 1997, a 68 000-t decrease from 1996. Approximately 94% of the reduction occurred in the Western World. Although production declined, eleven mines came on stream, expanded capacity or re-opened, and two mines closed during 1997. The result was a net increase in capacity of about 133 000 t/y of lead in concentrate. The new Cannington mine and the re-opened Caribou/Restigouche operation jointly accounted for more than 85% of the new capacity. Three mines are expected to re-open or expand production in 1998 with seven committed for production in 1999. Under current plans, these operations would result in additional lead-in-concentrate capacity of about 10 000 t in 1998 and 100 000 t in 1999.

World lead metal production rose by 2.8% to 6 046 000 t in 1997. Secondary production (from recycled materials) continues to surpass primary output and accounts for 59% of world metal production (Figure 1). During 1997, nine primary smelters or refineries and nine secondary smelters re-opened, expanded capacity or came on stream, while one smelter closed. The net increase in lead metal production capacity was about 280 000 t/y. In 1998, expansions and new plants are expected to contribute 213 000 t/y in new capacity, with an additional 100 000 t/y of lead smelting capacity planned for 1999.

Figure 1
World Lead Metal Production,[1] 1976-97



Source: International Lead and Zinc Study Group.
[1] Excludes Eastern European and socialist countries.

Asia/Oceania

In mid-1997, The Broken Hill Proprietary Company Limited (B.H.P.) commissioned the Cannington underground mine in Queensland, Australia. At full capacity it will be the world's largest lead mine producing 170 000 t/y of lead in concentrate with estimated reserves of 45 Mt grading 11.1% lead, 4.4% zinc and 500 g/t silver.

Pasminco expanded its lead smelting capacity by 13 000 t to 48 000 t/y at the Cockle Creek plant in Australia. The company also plans to expand its primary lead smelting and refining capacity at Port Pirie from 215 000 t/y to 250 000 t/y during 1998. In addition, Pasminco also acquired the Century zinc-lead-silver deposit from The RTZ Corporation PLC and CRA Limited. The open-pit mine, located in Queensland, is expected to come on stream in 1999 and to produce 41 000 t/y of lead in concentrate. Reserves are estimated at 118 Mt averaging 1.5% lead, 10.2% zinc and 36 g/t silver.

Development work began at Western Metals Ltd.'s Pillara (formerly Blendvale) zinc-lead deposit in Western Australia. A new mine producing 33 000 t/y of lead in concentrate is expected to come on stream in mid-1998.

Hindustan Zinc Ltd. expanded production capacity by 3500 t to 11 500 t/y of lead in concentrate at its Rampura Agucha open-pit mine in Rajasthan, India.

The Thai Lead Metal Co. expanded production from 12 000 t/y to 18 000 t/y at its primary smelter in Wangdong, Thailand. The modifications will allow the company to process both carbonate and sulphide concentrates.

Production capacity was also expanded from 1800 t/y to 9700 t/y of lead in concentrate at the state-owned Changba lead-zinc mine in Gansu Province, China.

In Japan, Toho Zinc Co. Ltd. expanded both its primary smelting and refining capacity at its Chigrishima facility to 120 000 t/y, an increase of 12% and 27%, respectively.

In Krasnoyarsk District, Russia, a 30 000-t/y secondary plant and a 50 000-t/y primary smelter are scheduled for start-up in 1998.

Americas

In the United States, ASARCO Incorporated's Leadville mine re-opened at a rate of 5000 t/y of lead in concentrate after reportedly being closed in 1996.

Construction to increase production by 50% to 90 000 t/y of lead in concentrate began in 1996 and will continue through to the early part of 1998 at Cominco's Red Dog mine in Alaska. The US$104 million expansion will include a new crushing plant, another semi-autogenous grinding (SAG) mill, another ball mill, and additional filtering and flotation capacity. Quoted reserves for the Main deposit are 50 Mt grading 5.3% lead, 19.5% zinc and 100 g/t silver, whereas the newly discovered Aqualuk Zone has an inferred resource of 76 Mt averaging 13.7% zinc, 3.6% lead and 66 g/t silver.

Exide-Schuylkill's Bâton Rouge secondary lead smelter, East Penn Manufacturing Co. Inc.'s Lyons Station secondary operation, and RSR Corporation's secondary plant in Middleton all installed new battery-breaking or other technologies to increase their capacity by 15 000 t to 75 000 t/y, by 20 000 t to 80 000 t/y, and by 10 000 t to 90 000 t/y, respectively, during 1997. Asset Recovery Inc. opened a new 50 000-t/y secondary lead plant in Muskogee, Oklahoma.

The U.S. Defense Logistics Agency sold 31 121 t of lead from its strategic stockpile in fiscal year 1997, which ended on September 30, 1997. The amount authorized for sale was 54 000 t, and the same amount is authorized for fiscal year 1998. The stockpile contained about 360 000 t at the end of the 1997 calendar year.

In Mexico, a 40 000-t/y expansion of Enermex's 60 000-t/y secondary lead smelter in Cienga de Flores is scheduled for completion in early 1998.

Europe

In the United Kingdom, the Northfleet primary lead refinery and Avonmouth ISF (imperial smelting furnace) smelter expanded their capacity by 40 000 t to 280 000 t/y and by 7000 t to 52 000 t/y, respectively.

Marnten's secondary lead smelter in Piraeus, Greece, expanded its capacity from 6000 t/y to 12 000 t/y.

Ivernia West Plc and Minorco SA began construction of the Lisheen mine in County Tipperary, Ireland. The underground operation is expected to come on stream in 1999 and to produce 25 000 t/y of lead in concentrate.

Africa

Cie Minière de Guemassa increased capacity at its Hajar mine in Morocco by 7000 t to 27 000 t/y of lead in concentrate.

CONSUMPTION AND USES

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.

On the basis of preliminary statistics from the ILZSG, world lead demand grew 0.3% in 1997 from

6 033 000 t in 1996. Although Western World demand declined 13% to 5 235 000 t in 1997, it continued to exceed Western World supply by 232 000 t. Net imports from Eastern countries and a draw-down on stocks contributed to a relatively balanced market in 1997. Europe and the United States accounted for 32% and 28%, respectively, of world lead demand, while China and Japan each consumed over 5%. The Republic of Korea (South Korea) reported the greatest drop in annual consumption, a 4.8% decline to 276 000 t in 1997.

Lead-acid batteries constitute the largest market for lead, representing about 70% of total usage in the Western World. 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.

A 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.

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. The "Big Three" automobile producers (General Motors Corporation, Ford Motor Company and Chrysler Corp.) are experimenting with different battery prototypes, but are concerned that ZEVs will not be commercially viable in sufficient quantities before the year 2000. Studies by California and New York State in 1995 supported the view that, based on current technology, the ZEVs may be too expensive to capture a sufficient portion of the market to meet current targets.

In December 1996, General Motors became the first major motor vehicle manufacturer to launch an electric vehicle that was developed from the ground up. The company's new "Impact" electric car is currently powered by a lead-acid battery that weighs about 270 kg. The vehicle can reportedly travel about 120 km before recharging is required, and it can be 50% recharged in a few minutes and fully charged in 3.5 hours.

This new demand for lead will also increase the incentive to develop a longer-lasting, more efficient and cost-competitive substitute for the lead-acid battery. Some experts believe that the lead-acid battery is the only technology that can be counted on to meet new electric vehicle demand in the short to medium term. Compared with other battery systems, these batteries are easily recycled, relatively inexpensive, and considered to be free from safety concerns.

The second largest use of lead is in pigments and compounds, which accounted for 11% of Western World demand in 1996. 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. In 1997, Northern Telecom (Nortel) demonstrated a lead-free interconnection technology for printed circuit boards used in a telephone.

Lead is also used with tin in foil for wine bottle capsules. However, this practice has been phased out in many countries because of environmental or health concerns. The European Union banned the use of tin-lead capsules as of January 1, 1993. Aluminum, plastics (PVC) and tin-based products have been used to replace lead foil.

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.

New uses for lead-acid batteries are also being developed. A high-tech use was developed in 1992 when U.S. and Russian scientists successfully focused cold neutrons into a beam that can penetrate substances and show where contaminants lie in a silicon semiconductor, or discern how quickly atoms diffuse through aerospace alloys. The focused beam was created with a lens constructed of lead-silica glass. It was also reported that companies using advanced materials will benefit the most from cold-neutron focusing.

MARKETS, PRICES AND STOCKS

With the expansion of secondary and primary smelter capacity, continued net exports from Eastern countries, and sales from the U.S. defense stockpile, the Western World lead market moved from a 99 000-t supply deficit in 1996 to a 5000-t surplus in 1997. Soft demand in the replacement battery market combined with the Asian economic crisis also contributed to the supply surplus and helped place downward pressure on prices during the year. The LME price for lead peaked at US32.9¢/lb in February, and then slowly declined to a two-year low of 23.9¢/lb in December 1997.

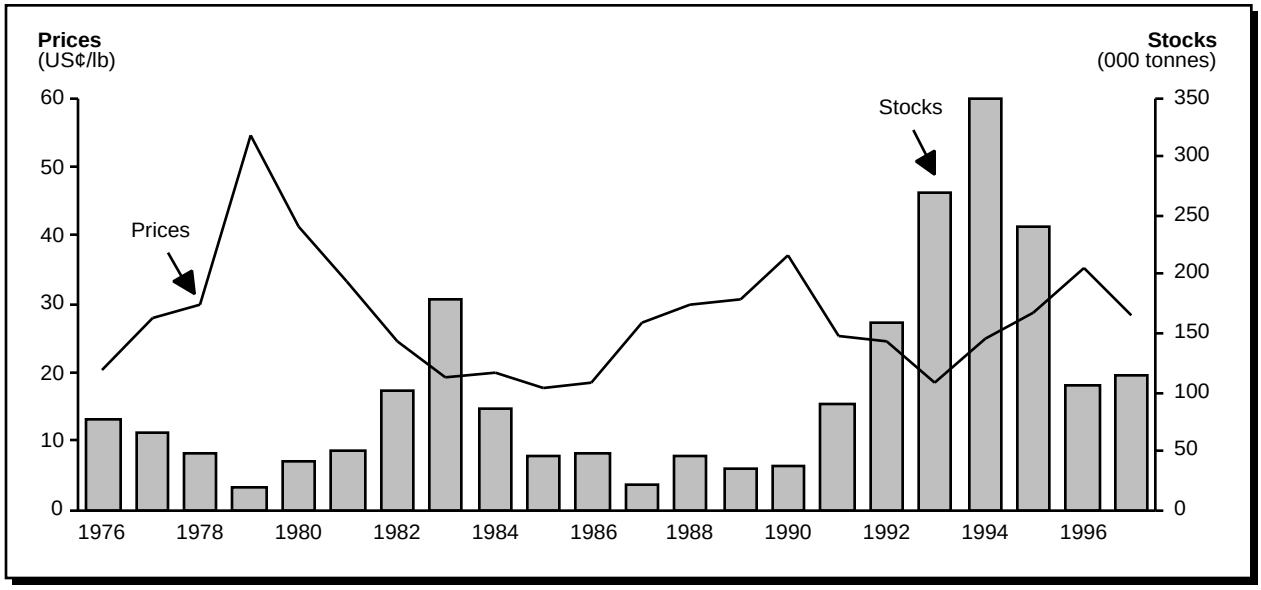
At the end of 1996, total lead stocks stood at 560 000 t, including 119 000 t on the LME. By the end of 1997, producer and LME stocks had been drawn down by about 11% and 6.5% respectively. The decline in LME and producer stocks was offset by a rise in consumer inventories, with total year-end stocks for 1997 remaining at about four weeks of metal consumption, which is essentially unchanged from 1996.

INTERNATIONAL ORGANIZATIONS

The International Lead and Zinc Study Group was formed in 1959 to improve market information and to provide opportunities for regular intergovernmental 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.

The 42nd Session of the Study Group was held in Dublin in October 1997, and was attended by representatives of 22 member countries as well as by observers from several nations and organizations.

Figure 2
Lead Prices[1] and Stocks,[2] 1976-97



Source: International Lead and Zinc Study Group.

[1] Annual average London Metal Exchange (LME) prices. [2] Annual average of LME month-end stocks.

The 1997 session examined statistical trends, current new mine and smelter projects, trade patterns, changes to the U.S. strategic stockpile, and certain environmental issues such as the Basel Convention. The ILZSG also initiated a study to assess the economic and environmental image of lead during 1997.

HEALTH, SAFETY AND THE ENVIRONMENT

The Organization for Economic Co-operation and Development (OECD) published *Risk Reduction Monograph No. 1: Lead* in 1993, which documents lead's commercial life cycle, exposure, releases and control mechanisms in place in various OECD countries. The report revealed lead's high recycling rate (over 50% of refined lead production is derived from scrap). The document also showed how lead is being used more than ever before, while the average levels of lead in air, food and blood in the general population have declined to below national levels of concern in all countries that monitor lead in the environment. Declines in exposure are partly a result of the phase-out of dissipative uses of lead, while the overall increase in lead consumption reflects strong demand for batteries and other non-dissipative uses.

In September 1994, Canada hosted an OECD Workshop on Lead Products as part of a process to determine if there were concerns that require international solutions. Approximately 200 experts from 14 countries participated in the workshop in Toronto and agreed that most concerns were not transboundary or international in nature and, for those that were, they could be resolved through national, regional or bilateral initiatives or through existing international institutions (e.g., the International Organization for Standardization).

In February 1996, OECD environment ministers adopted a Ministerial Declaration for Lead that recognizes the value of voluntary industry initiatives to reduce risks from exposure to lead. The Declaration also calls on OECD countries to take action, if they consider it to be necessary, and provides examples of possible exposures that could be considered for action depending on national circumstances.

Lead producers in Canada (Cominco and Noranda) and other OECD countries responded favourably to the Ministerial Declaration and have voluntarily established an International Lead Management Centre (ILMC). This industry-funded non-profit organization, with public reporting, is designed to assist countries and others to resolve concerns about lead. Its activities range from the identification of country problems and possible solutions to technology-transfer opportunities. Mexico offered to be a pilot country for the ILMC. Discussions between the ILMC and Mexico identified a number of possible opportunities for joint cooperation, including ways to reduce occupational risks from exposure to lead in battery-recycling and manufacturing facilities. In 1997, the ILMC began a similar project in the Philippines and began considering projects in other regions such as Africa.

The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal came into force in May 1992 and, as of March 1998, approximately 117 countries had ratified the Convention, with the United States being the most notable exception. The Convention is an environmental agreement designed to restrict the transboundary movement of hazardous wastes to protect countries (particularly developing countries) that may not have the capability and technology to properly manage the waste.

In September 1995, the third Conference of Parties (COP) adopted an amendment decision to the Convention that bans, for ratifying countries, all movements of hazardous wastes from countries listed in Annex VII that are destined for final disposal in countries not listed in Annex VII. In addition, ratifying countries listed in Annex VII are required to ban the export of hazardous wastes destined for recovery operations in countries not listed in Annex VII as of December 31, 1997. Annex VII countries include parties and other states that are members of the OECD, the European Union and Liechtenstein. The ban amendment will require the ratification of 65 countries to enter into force. As of March 1997, seven member countries (Finland, Norway, Denmark, Sweden, Luxembourg, Spain and the United Kingdom) had ratified the amendment.

Since the third COP, the Technical Working Group of the Basel Convention has provisionally compiled two lists of recyclable materials: List A recyclables that will be considered as being subject to bans, and List B recyclables that will be considered to be beyond the scope of the Basel Convention.

The 4th COP to the Basel Convention was held February 23-27, 1998, in Malaysia. The COP agreed to amend the Convention to include two new annexes. The first annex comprises a list of hazardous wastes that will become subject to the movement ban agreed to at the third COP if and when it enters into force. Canada has, as yet, made no decision on ratification of this movement ban. The second annex comprises a list of materials that are generally considered not to be hazardous and to be beyond the scope of the Basel Convention. Most recyclable metals are included on the second non-hazardous annex list. The COP further agreed to extend the mandate of the Technical Working Group to formally establish a review mechanism to revise and update the new annexes as required.

The 4th COP reviewed the requests submitted by Monaco, Israel and Slovenia for accession to Annex VII. Annex VII countries may trade hazardous recyclables amongst themselves, but trade

with non-Annex VII countries is prohibited. The COP rejected all accession requests to join Annex VII prior to the Basel ban entering into force. Many countries were of the opinion that allowing countries to join Annex VII would only serve to weaken the Basel ban amendment. The COP further refused to develop technical criteria that could assist countries in a self-evaluation of their hazardous waste management capacities. The development of technical criteria was perceived as a step towards allowing countries to join Annex VII and was rejected by most member countries.

OUTLOOK

Western World lead consumption in 1997 was essentially unchanged from 1996, but is expected to increase by about 2% as Asian economies recover during 1998. However, growth in Western World demand will likely again be outstripped by rising production and net exports from Eastern countries. In the absence of unforeseen production cuts or disruptions, such as start-up difficulties at new or expanding mines or smelters, it is expected that rising stocks will place downward pressure on prices, which are forecast to range between US21¢ and 29¢/lb in 1998. Prices may be further suppressed if demand softens as the result of continued sluggish economic growth in Southeast Asia or a weak replacement battery market resulting from mild climatic conditions.

In the long term, lead demand is expected to maintain an average growth rate of 1.0-1.5%/y into the early part of the next century. The battery sector will account for most of the growth, with the newly industrialized nations of Southeast Asia expected to record the most rapid growth as the vehicle population expands.

Greater secondary output and primary production from new and re-opened mines will likely continue to surpass demand and place downward pressure on prices in the medium term, but they should recover in the long term as demand increases and range between US24¢ and 30¢/lb in constant 1996 dollars.

In 1998, Canadian mine output of lead is forecast to increase to 195 000 t as newly re-opened mines complete a full year of production. In the long term, it is expected that production will rise as new mines, such as Cominco's Kudz Ze Kayah project, and previously closed operations (e.g., Sa Dena Hes) come on stream. However, output may again decline early in the next century unless additional reserves are found at existing mines or through new discoveries. New smelting capacity is expected to contribute to Canada's lead metal production reaching an annual record high of about 350 000 t in 1998.

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 January 31, 1998.

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%	3.2-4.82 yen/kg
7801.10.90	Other	2.5%	Free	Free	Free	2.5%	3.2-4.82 yen/kg
7801.91	Other: Containing by weight antimony as the principal other element	Free	Free	Free	Free	2.5%	2.6% or 2.32 yen/kg whichever is greater to 4.4% or 4.18 yen/kg whichever is greater
7801.99	Other						
7801.99.10	Lead bullion	2.5%	Free	Free	Free	Free	2.4% to 4.1%, 3.2 yen/kg to 4.82 yen/kg
7801.99.20	Lead alloys	2.5%	Free	Free	Free	2.5%	3.7% or 5.9 yen/kg, whichever is greater
7801.99.90	Other	2.5%	Free	Free	Free	2.5%	2.4% to 4.1%, 3.2 yen/kg to 4.82 yen/kg
7802.00	Lead waste and scrap	Free	Free	Free	Free	Free	2.5%
7803.00	Lead bars, rods, profiles and wire						
7803.00.10	Bars and rods, not alloyed	2.5%	Free	Free	Free	6.2%	4.1%
7803.00.90	Other	3%	Free	Free	Free	6.2%	4.1%
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	6.2%	4.4%
7804.11.90	Other	3%	Free	Free	Free	6.2%	4.4%
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	6.2%	5.1%
7804.19.20	Of lead-antimony-tin alloys	2.5%	Free	Free	Free	6.2%	5.1%
7804.19.90	Other	2.5%	Free	Free	Free	6.2%	5.1%
7804.20	Powders and flakes						
7804.20.10	Powders, not alloyed	2.5%	Free	Free	Free	0.9%	4.4%
7804.20.20	Alloyed powders; flakes	2.5%	Free	Free	Free	0.9%	4.4%
7805.00	Lead tubes, pipes, and tube or pipe fittings	3%	Free	Free	Free	6.6%	4.7%
7806.00	Other articles of lead	3%	Free	Free	Free	2.4% to 6.2%	4.1%

Sources: Customs Tariff, effective January 1998, Revenue Canada; Harmonized Tariff Schedule of the United States, 1998; Worldtariff Guidebook on Customs Tariff Schedules of Import Duties of the European Union (37th Annual Edition: 1997); Customs Tariff Schedules of Japan, 1997.
[1] WTO rate is shown; lower tariff rates may apply circumstantially.

TABLE 1. CANADA, LEAD PRODUCTION AND TRADE, 1996 AND 1997, AND CONSUMPTION, 1995 AND 1996

Item No.		1996		1997[p]	
		(tonnes)	($000)	(tonnes)	($000)
SHIPMENTS[1]					
	New Brunswick	74 022	77 945	72 479	63 129
	British Columbia	50 195	52 855	46 045	40 105
	Yukon	90 709	95 516	26 810	23 352
	Northwest Territories	26 826	28 247	25 046	21 815
	Total	241 751	254 564	170 380	148 401
	Mine output[2]	257 253	..	184 076	..
	Refined production				
	Primary	192 877	..	162 241	..
	Secondary	117 914	..	113 096	..
	Total	310 791	..	275 337	..
EXPORTS					
2607.00	Lead ores and concentrates				
	Korea, Republic of	28 831[r]	36 745[r]	30 308	20 286
	United States	1 819	14 294	3 210	18 837
	Sweden	10 136	10 537	19 947	16 947
	Australia	15 054	9 179	8 995	6 835
	Germany	14 147[r]	14 706[r]	5 963	5 009
	Italy	9 515	8 963	3 129	2 371
	Belgium	17 583[r]	16 429[r]	823	709
	Other countries	9 757	9 665	1 606	1 383
	Total	116 842[r]	120 518[r]	73 981	72 377
2607.00.20	Lead content of lead ores and concentrates	113 968[r]	73 822[r]	73 575	41 733
2603.00.20	Lead content of copper ores and concentrates	948	426	238	142
2608.00.20	Lead content of zinc ores and concentrates	39 492	13 420	36 321	11 991
2616.10.20	Lead content of silver ores and concentrates	289	178	753	940
7801.10	Refined lead, unwrought				
	United States	139 921	152 424	135 493	131 318
	Malaysia	3 371	4 057	2 397	2 609
	Singapore	1 760	2 128	2 383	2 604
	Thailand	4 394[r]	5 004[r]	2 088	2 198
	Other countries	9 559	11 157	8 236	8 484
	Total	158 985[r]	174 770[r]	150 597	147 213
7801.91	Lead, unwrought, containing by weight antimony as the principal other element	7 676	8 236	7 960	7 171
7801.99	Lead, unwrought, n.e.s.	47 754[r]	57 274[r]	49 591	50 610
7802.00	Lead waste and scrap				
	United States	9 589	5 450	12 876	6 737
	Other countries	103[r]	43[r]	97	78
	Total	9 692[r]	5 493[r]	12 973	6 815
7803.00	Lead bars, rods, profiles and wire				
	Argentina	–	–	1 145	1 094
	Czech Republic	–	–	1 041	1 017
	United States	532[r]	1 013[r]	513	876
	Other countries	33	83	1 608	1 586
	Total	565[r]	1 096[r]	4 307	4 573
7804.11	Lead sheets, strip and foil of a thickness (excluding any backing) <0.2 mm	35	67	12	23
7804.19	Lead plates, sheet, strip and foil, n.e.s.	271	425	585	820
7804.20	Lead powders and flakes	4	32	–	–
7805.00	Lead tubes, pipes, and tube or pipe fittings (i.e., couplings, elbows, sleeves)	12	27	20	41
7806.00	Other articles of lead				
	United States	..	4 097	..	3 795
	China	–	–	..	63
	Other countries	..	222[r]	..	14
	Total	..	4 319[r]	..	3 872
IMPORTS[3]					
2607.00	Lead ores and concentrates				
	Peru	23 540	30 222	23 040	23 886
	United States	24 809	10 725	6 852	5 763
	Mexico	6 247	9 810	3 488	5 214
	Switzerland	–	–	3 129	1 904
	South Africa	10 753	8 495	–	–
	Other countries	4 540	4 318	–	–
	Total	69 889	63 570	36 509	36 767

TABLE 1 (cont'd)

Item No.		1996		1997p	
		(tonnes)	($000)	(tonnes)	($000)
2607.00.00.20	Lead content of lead ores and concentrates	69 342	38 805	35 647	18 837
2603.00.00.20	Lead content of copper ores and concentrates	228	109	20	13
2608.00.00.20	Lead content of zinc ores and concentrates	10 620	15 692	10 404	15 084
2616.10.00.20	Lead content of silver ores and concentrates	9 535	7 994	3 803	2 321
7801.10.10	Refined lead, unwrought, pig and block	2 949	3 294	4 780	4 373
7801.10.90	Refined lead, unwrought, other	556	646	132	145
7801.91	Lead, unwrought, containing by weight antimony as the principal other element	3 862	4 363	5 397	5 352
7801.99	Lead, unwrought, other	20 785	50 459	26 116	105 952
7802.00	Lead waste and scrap				
	United States	76 858	13 655	84 095	16 552
	Peru	–	–	1 025	387
	Other countries	134	78	172	75
	Total	76 992	13 733	85 292	17 014
7803.00	Lead bars, rods, profiles and wire				
	United States	239	410	315	609
	Other countries	7	11	13	22
	Total	246	421	328	631
7804.11	Lead sheets, strip and foil of a thickness (excluding any backing) <0.2 mm	237	407	307	443
7804.19	Lead plates, sheet, strip and foil, n.e.s.	109r	183r	141	236
7804.20	Lead powders and flakes	82	137	134	182
7805.00	Lead tubes, pipes, and tube or pipe fittings (i.e., couplings, elbows, sleeves)	1	4	16	36
7806.00	Other articles of lead				
	United States	2 684	4 050	3 396	4 693
	Japan	93	78	161	194
	Germany	98	113	135	159
	Other countries	118	207	59	86
	Total	2 993	4 448	3 751	5 132

	1995			1996		
	Primary	Secondary[5]	Total	Primary	Secondary[5]	Total
	(tonnes)					
CONSUMPTION[4]						
Lead used for or in the production of:						
Antimonial lead	x	xr	xr	x	x	x
Batteries and battery oxides	19 292	16 142	35 434	18 696	14 703	33 399
Chemical uses: white lead, red lead, litharge, tetraethyl lead, etc.	x	x	x	x	x	x
Copper alloys: brass, bronze, etc.	101	8	109	94r	7	101r
Lead alloys:						
Solders	668	1 165	1 834	484	699	1 183
Others (including babbitt, type metals, etc.)	916	5 006	5 922	41	2 555	2 596
Semi-finished products:						
Pipe, sheet, traps, bends, blocks for caulking, ammunition, etc.	1 128	1 252	2 380	1 380	771	2 151
Other lead products	3 895r	1 888r	5 783r	2 920	1 053	3 973
Total, all categories	34 860r	56 311r	91 171r	32 466r	60 907	93 373r

Sources: Natural Resources Canada; Statistics Canada.
– Nil; .. Not available; n.e.s. Not elsewhere specified; p Preliminary; r Revised; 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 consumers. 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[1] AND CONSUMPTION, 1975, 1980 AND 1985-97

	Production				Exports[1]			Imports	
		Refined			In Ores and				
	All Forms[2]	Primary	Secondary	Total	Concentrates	Refined	Total	Refined	Consumption[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[r]	121 444	292 026[r]	11 734[r]	88 408
1990	233 372	87 180	96 465	183 645	221 566	84 007	305 573	11 781[r]	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[r]
1994	167 584	153 035	98 605	251 640	55 923	133 203	189 126	5 119[r]	95 764[r]
1995	204 227	178 019	103 372	281 391	90 254	140 478	230 732	3 976[r]	91 171[r]
1996	241 751	192 877	117 914	310 791	154 696[r]	159 859[r]	314 555[r]	4 180[r]	93 373[r]
1997[p]	170 380	162 241	113 096	275 337	110 887	155 501	266 388	5 818	..

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] Consumption of lead, primary and secondary in origin, as measured by a survey of consumers.

TABLE 3. CANADA, LEAD SMELTING AND REFINING CAPACITY, 1997

Company and Location	Annual Rated Capacity	
	Smelting	Refining
	(000 t of refined lead)	
Cominco Ltd.[2] Trail, British Columbia	120	160
Metalex Products Ltd.[1] Burnaby, British Columbia	6	5
Canada Metal Company [1] Winnipeg, Manitoba	5	5
Canada Metal Company [1] Toronto, Ontario	12	12
Tonolli Canada Ltd. [1] Mississauga, Ontario	35	35
Nova Lead Inc.[1] Ville Ste-Catherine, Quebec	80	80
American Iron and Metal Co. (1969) Inc. [1] Montréal, Quebec	–	20
Fonderie Générale du Canada[1] Lachine, Quebec	–	3
Brunswick Mining and Smelting Corporation Limited[2] Belledune, New Brunswick	100	100
Total Canada	358	420

Source: Natural Resources Canada.
– Nil.
[1] Processes lead-bearing scrap. [2] Processes lead-bearing concentrate and scrap.

TABLE 4. ANNUAL AVERAGE LEAD PRICES, 1975-97

Year	London Metal Exchange			
	Settlement		Three Months	
	(US$/t)	(US¢/lb)	(US$/t)	(US¢/lb)
1975	413.48	18.755	441.93	18.821
1976	451.51	20.480	469.03	21.275
1977	617.78	28.022	626.84	28.433
1978	658.87	29.886	659.07	29.895
1979	1 203.15	54.574	1 149.95	52.161
1980	909.12	41.237	911.46	41.343
1981	734.73	33.327	750.12	34.025
1982	544.08	24.679	562.53	25.516
1983	425.27	19.290	440.55	19.983
1984	444.36	20.156	445.25	20.196
1985	394.10	17.876	394.12	17.877
1986	406.89	18.456	407.26	18.473
1987	597.41	27.098	567.38	25.736
1988	655.83	29.748	635.68	28.834
1989	676.14	30.669	659.36	29.908
1990	817.85	37.097	790.82	35.871
1991	557.84	25.303	568.90	25.805
1992	540.04	24.496	553.56	25.109
1993	406.38	18.433	420.36	19.067
1994	549.01	24.903	564.10	25.587
1995	630.51	28.599	638.88	28.979
1996	773.96	35.106	771.22	34.982
1997	624.08	28.308	633.01	28.713

Sources: London Metal Exchange; *Metals Week*.

TABLE 5. MONTHLY AVERAGE LEAD PRICES, 1996 AND 1997

	London Metal Exchange			
	Settlement		Three Months	
	(US$/t)	(US¢/lb)	(US$/t)	(US¢/lb)
1996				
January	709.50	32.182	702.98	31.887
February	769.67	34.912	765.99	34.745
March	817.93	37.101	785.81	35.644
April	815.00	36.968	802.28	36.391
May	840.24	38.113	834.42	37.849
June	796.50	36.129	800.68	36.318
July	783.65	35.546	790.77	35.869
August	815.67	36.998	814.64	36.951
September	796.36	36.122	796.87	36.145
October	741.89	33.652	747.05	33.886
November	716.55	32.502	722.67	32.780
December	688.78	31.243	693.68	31.465
1997				
January	692.25	31.400	700.31	31.766
February	660.23	29.948	666.40	30.227
March	694.63	31.508	688.80	31.243
April	642.52	29.144	646.55	29.327
May	618.60	28.059	629.13	28.537
June	614.93	27.893	627.17	28.448
July	634.33	28.773	646.28	29.315
August	608.10	27.583	621.18	28.176
September	634.25	28.769	643.40	29.184
October	600.26	27.227	611.74	27.748
November	563.40	25.555	578.43	26.237
December	526.62	23.887	539.50	24.471

Source: *Metals Week*.

TABLE 6. NON-SOCIALIST WORLD LEAD CONSUMPTION, 1993-96

	1993		1994		1995		1996	
	(000 t)	(%)	(000 t)	(%)	(000 t)	(%)	(000 t)	(%)
Batteries	2 609.7	65.7	2 923.6	68.4	3 205.1	69.5	3 365.8	72.0
Cable sheathing	137.9	3.5	126.2	3.0	112.0	2.4	97.6	2.1
Rolled and extruded products	264.4	6.7	271.1	6.3	294.2	6.4	270.5	5.8
Shot/ammunition	118.6	3.0	115.7	2.7	127.3	2.8	113.2	2.4
Alloys	136.8	3.4	141.5	3.3	131.1	2.8	114.4	2.5
Pigments and other compounds	492.8	12.4	485.3	11.4	515.2	11.2	502.6	10.8
Gasoline additives	55.3	1.4	53.1	1.2	52.1	1.1	48.2	1.0
Miscellaneous	155.0	3.9	158.7	3.7	175.3	3.8	159.6	3.4
Total	3 970.5	100.0	4 275.2	100.0	4 612.3	100.0	4 671.9	100.0

Source: International Lead and Zinc Study Group.
Note: Statistics are for Australia, Austria, Belgium, Brazil, Canada, Finland, France, Germany, India, Italy, Japan, Mexico, the Netherlands, New Zealand, the Republic of Korea, Scandinavia, South Africa, Southeast Asia, Spain, Switzerland, Thailand, the United Kingdom and the United States.

TABLE 7. REFINED LEAD CONSUMPTION BY COUNTRY, 1993-97

	1993	1994	1995	1996	1997p
			(000 t)		
EUROPE					
Austria	62	64	65	58	56
Belgium	74	65	69	53	60
France	226	237	263	255	259
Germany	352	354	360	342	341
Italy	228	251	271	268	266
Netherlands	48	57	62	57	57
Poland	59	55	55	62	65
Russian Federation	92	103	93	95	103
Spain	102	112	131	137	143
United Kingdom	353	355	355	368	382
Other Europe	216	224	245	284	279
Total Europe	1 822	1 877	1 969	1 979	2 011
AFRICA					
Algeria	18	18	19	20	20
Egypt	7	6	6	9	10
South Africa	59	59	60	63	67
Other Africa	24	27	27	27	26
Total Africa	108	110	112	119	123
AMERICAS					
Brazil	81	92	102	110	115
Canada	92	96	91	93	90
Mexico	152	155	134	141	148
United States	1 367	1 513	1 592	1 687	1 665
Other Americas	69	71	69	63	82
Total Americas	1 761	1 927	1 988	2 094	2 100
ASIA					
China, People's Republic of	300	290	445	470	470
India	70	80	82	85	88
Indonesia	75	91	90	87	66
Iran	60	60	67	70	72
Japan	370	345	334	330	330
Korea, Republic of	201	233	272	290	292
Malaysia	51	53	70	75	73
Taiwan	117	121	132	124	142
Thailand	48	62	63	80	48
Other Asia	179	162	161	159	154
Total Asia	1 471	1 497	1 716	1 770	1 735
OCEANIA					
Australia	62	78	77	67	63
New Zealand	5	4	4	4	4
Total Oceania	67	82	81	71	67
Total Western World	4 613	4 908	5 127	5 248	5 247
Total World	5 229	5 493	5 866	6 033	6 036

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

TABLE 8. MINE PRODUCTION OF LEAD BY COUNTRY, 1993-97

	1993	1994	1995	1996	1997 p
			(000 t)		
EUROPE					
Bulgaria	34	32	33	28	28
Greece	26	20	21	8	18
Ireland	45	54	46	45	45
Italy	7	14	15	12	6
Macedonia	33	29	25	27	32
Poland	49	53	55	54	51
Romania	17	21	20	19	20
Russian Federation	34	25	23	18	16
Spain	25	23	30	24	23
Sweden	104	113	100	99	109
Yugoslavia, Former	9	9	12	22	21
Other Europe	8	5	3	7	6
Total Europe	391	398	383	363	375
AFRICA					
Morocco	79	70	68	74	78
Namibia	18	21	22	20	18
South Africa	100	96	88	89	83
Other Africa	9	5	8	6	2
Total Africa	206	192	186	189	181
AMERICAS					
Canada	183	171	210	257	184
Mexico	141	170	164	172	174
Peru	225	233	238	249	258
United States	362	370	394	436	424
Other Americas	39	35	41	42	46
Total Americas	950	979	1 047	1 156	1 086
ASIA					
China, People's Republic of	338	462	520	643	700
India	30	30	34	35	33
Iran	15	18	16	16	20
Japan	17	10	10	8	5
Kazakstan	104	38	40	28	29
Korea, D.P.R.	70	55	50	40	35
Thailand	5	7	12	21	6
Turkey	11	10	10	10	10
Uzbekistan	30	19	12	10	2
Other Asia	12	5	10	8	8
Total Asia	632	654	714	819	848
OCEANIA					
Australia	521	487	424	475	490
Western World	2 019	2 004	2 000	2 160	2 097
Total World	2 700	2 710	2 754	3 002	2 980

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

TABLE 9. REFINED LEAD PRODUCTION BY COUNTRY, 1993-97

	1993	1994	1995	1996	1997p
			(000 t)		
EUROPE					
Belgium	112	123	122	121	111
Bulgaria	60	62	72	74	73
Czech Republic	23	25	22	22	18
France	259	260	297	301	283
Germany	334	332	314	238	329
Italy	198	223	189	210	212
Poland	65	63	70	70	72
Russian Federation	45	34	30	30	52
Spain	62	75	82	91	88
Sweden	82	83	83	84	86
United Kingdom	416	416	387	406	438
Other Europe	150	143	158	183	195
Total Europe	1 806	1 839	1 826	1 830	1 957
AFRICA					
Morocco	72	64	62	62	64
Namibia	31	24	27	19	2
South Africa	32	32	32	32	42
Other Africa	19	15	20	18	18
Total Africa	154	135	141	131	126
AMERICAS					
Brazil	67	55	54	48	53
Canada	217	252	281	311	275
Mexico	262	220	237	228	263
Peru	87	89	90	95	98
United States	1 196	1 249	1 358	1 411	1 423
Other Americas	48	52	61	65	61
Total Americas	1 877	1 917	2 081	2 158	2 173
ASIA					
China, People's Republic of	412	468	608	706	707
India	51	60	62	67	60
Japan	309	292	288	287	297
Kazakstan	245	145	93	69	84
Korea, D.P.R.	65	50	45	40	30
Korea, Republic of	128	130	181	141	182
Malaysia	29	33	33	36	36
Taiwan	31	36	36	41	41
Other Asia	131	117	125	141	151
Total Asia	1 401	1 331	1 471	1 528	1 588
OCEANIA					
Australia	236	236	237	228	220
New Zealand	5	6	6	6	6
Total Oceania	241	242	243	234	226
Total Western World	4 526	4 587	4 785	4 830	4 994
Total World	5 479	5 464	5 762	5 881	6 070

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