

Aluminum

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Prices in aluminum markets continued the downward trend started in the last quarter of 1997 as the economic turmoil in world financial markets continued to put a damper on business confidence worldwide. Although demand in North America and Europe increased, the downturn in Asian economies resulted in 1% less demand worldwide. Average production rates were higher in 1998, reflecting decisions by some producers to restart idled capacity and to add new capacity at existing smelters. As could be expected, this placed downward pressure on prices. Should current low prices for aluminum continue, high-cost producers and those with older technology or high debt loads may face an increasingly difficult situation in 1999.

Aluminum cash settlement prices on the London Metal Exchange (LME) started 1998 at just over US\$1500/t (US69¢/lb) and continued a downward trend to end the year at US\$1240/t (US56¢/lb). The average price during the year was US\$1355/t (US62¢/lb) compared to an average of US\$1599/t (US73¢/lb) in 1997. Primary aluminum stocks on the LME started the year at 622 000 t and declined steadily until August when they reached 453 000 t. Stocks then began to rise to end the year at about 636 000 t. The International Primary Aluminium Institute (IPAI) reported that unwrought aluminum inventories held by IPAI members increased slightly over the course of the year to 1.682 Mt in December 1998, compared to 1.636 Mt in December 1997. Together the aggregated unwrought IPAI and LME stocks decreased until July to reach their lowest level since March 1991. Stocks then increased to end the year at about the same level as at the start of the year.

CANADIAN DEVELOPMENTS

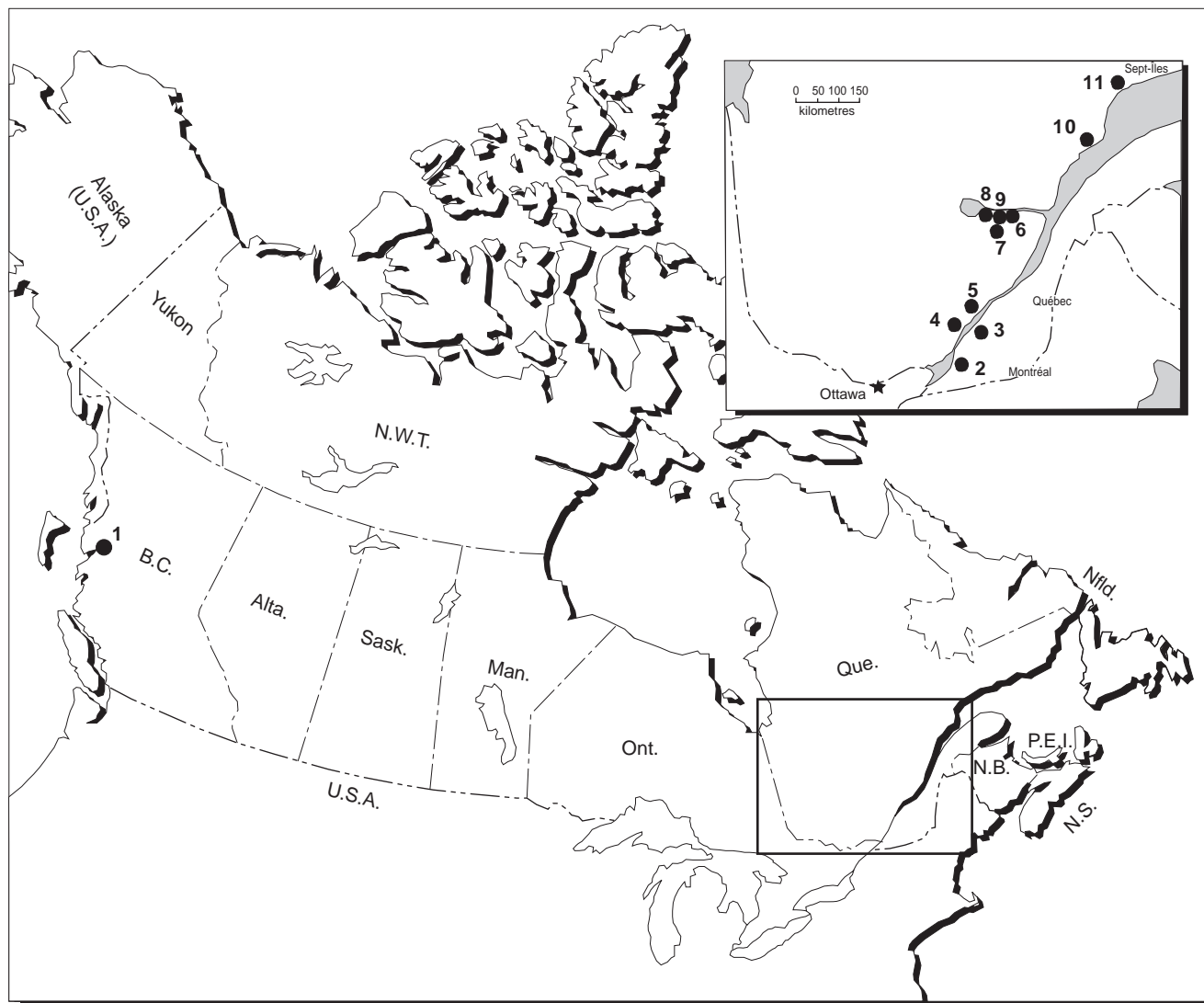
The production of primary aluminum increased by 2% to 2.374 Mt in 1998, compared to 2.327 Mt in 1997, ranking Canada third after the United States and Russia in terms of world production. The value of Canadian production is estimated at \$4.8 billion, compared to 1997 production of \$5.2 billion, reflecting the decrease in aluminum prices.

Canada is the second largest aluminum-exporting country in the world after Russia. Canadian exports of primary smelter products in 1998 fell to 1.856 Mt valued at \$4.285 billion, compared with 1.886 Mt valued at \$4.5 billion in 1997. Of this amount, exports to the United States totalled 1.44 Mt valued at \$3.39 billion, compared to 1.41 Mt valued at \$3.44 billion in 1997.

British Columbia's Power for Jobs Strategy makes surplus electrical power available to industry, under flexible terms and conditions, to create jobs and investment. One of the industries the province has targeted is aluminum. In August 1997, the province signed an agreement with Alcan Aluminium Limited that makes competitively priced power available to Alcan in return for adding smelting capacity to its Kitimat plant in northwestern British Columbia. In 1998, B.C. signed memoranda of understanding with Alumax Inc., Alcoa Inc. and Columbia Ventures Corporation to undertake planning and feasibility studies for the development of primary aluminum production plants and value-added facilities. (For further information, visit the Government of British Columbia's web site at <http://www.gov.bc.ca>.)

The Alcan and Columbia Ventures feasibility studies are expected to be completed in mid-to-late 1999. Alcoa has decided to suspend its feasibility study until market conditions improve. (Alumax has since been acquired by Alcoa.) The province is continuing to pursue discussions with other aluminum producers with the objective of securing investment in British Columbia.

Figure 1
Aluminum Smelters, 1998



SMELTER	COMPANY	CAPACITY (t/y)
1. Kitimat	Alcan	272 000
2. Beauharnois	Alcan	48 000
3. Bécancour	A.B.I.	372 000
4. Shawinigan	Alcan	84 000
5. Luralco	Alcoa Luralco	225 000
6. Grande-Baie	Alcan	180 000
7. Laterrière	Alcan	204 000
8. Isle-Maligne	Alcan	73 000
9. Arvida	Alcan	232 000
10. Baie-Comeau	Canadian Reynolds Metals	400 000
11. Alouette	Alouette	230 000

Alcan has made adjustments in its global operations to maintain its position as a low-cost supplier of bauxite, alumina and aluminum and to focus on its core business. (Additional information on Alcan can be obtained through its web site at <http://www.alcan.com/>.)

In March, Alcan started construction of a new 375 000-t/y primary aluminum smelter at Alma, Quebec, to replace the 73 000-t/y Isle-Maligne smelter and add new capacity. The smelter will employ about 650 people (including 425 from the existing Isle-Maligne smelter), and will cost approximately \$2.2 billion. The smelter is expected to start producing metal in the fall of 2000 and is expected to reach full capacity in mid-2001.

In November, Alcan announced that it had signed a 10-year, multi-billion-dollar agreement with General Motors Corporation. This agreement will ensure the supply of metal from Alcan to General Motors at a competitive cost and enable both companies to jointly explore new uses for aluminum, including aluminum-intensive vehicles. The agreement will ensure the long-term availability and sales of metal at a stable cost through new smelter investment and the use of third-party financial instruments.

Alcan also signed an 18-year agreement with its unionized employees in Quebec that commits parties to work together to resolve labour conflicts without resorting to traditional pressure tactics. This agreement is expected to result in increased stability in union/company relations.

In February 1998, Reynolds Metals Company announced that it had completed the sale of its Canadian aluminum extrusion plants in Richmond Hill, Ontario, and Sainte-Thérèse, Quebec, to Tredegar Industries. These plants manufacture aluminum products used in the construction, transportation, electrical, machinery and equipment, consumer durables, and climbing equipment markets.

U.S. aluminum producer Alcoa returned to Canada in 1998 with its acquisition of Alumax. Alcoa now owns the 230 000-t/y Luralco smelter and has a 24.95% interest in the 372 000-t/y Aluminerie de Bécancour Inc. (A.B.I.) smelter. Other partners include: Pechiney Reynolds Québec Inc. (50.1%), which is a joint venture of Pechiney Corporation of France and Reynolds Metals Company Limited of the United States, and Canadian Reynolds Metals, Company Limited (24.95%).

The merger announced in November 1998 between Alusuisse Lonza Group Ltd. of Switzerland and Viag Aktiengesellschaft of Germany is not expected to change Viag's 20% participation in the 230 000-t/y Alouette smelter at Sept-Îles. Other partners include: Aluminium Austria Metall Québec (20%),

VAW Aluminium Canada (20%), Hoogovens Aluminium Québec Inc. (20%), Société générale de financement du Québec (20%), Kobe Aluminium Canada Inc. (13.33%), and Marubeni Québec Inc. (6.66%).

The Aluminium Association of Canada is a non-profit organization formed by Canada's five aluminum producers: Alcan Aluminium Limited, Aluminerie Alouette Inc., Aluminerie de Bécancour Inc., Alcoa Aluminerie Luralco Inc., and Canadian Reynolds Metals Company, Limited. The Association provides a link between the Canadian aluminum industry, aluminum users, the public and government. (Web sites of the primary aluminum producers in Canada can be accessed through the Aluminium Association of Canada's web site at <http://www.aia.aluminium.qc.ca>.)

WORLD DEVELOPMENTS

Due to decreasing prices and competitive pressures, producers have increasingly focused on cost reductions and have rationalized production to take advantage of economies of scale. This has not gone on without some overall effect on existing operations. Some unions and companies have struggled to establish new labour contracts, while other companies have amalgamated operations, closing some plants and selling others to refocus on lower-cost operations. In general, many companies have made increases in productivity and production to maintain cash flows with the current low prices. Two large mergers, Alcoa Inc. with Alumax Inc. and Viag with Alusuisse, will likely result in continued readjustment among affected operations during the coming year.

Large consumers of aluminum often invest in primary metal joint ventures, taking their share of the metal for their own use. These arrangements and long-term supply agreements between producers and consumers are restructuring parts of the supply chain to reduce short-term demand to ensure a continuous supply of raw material at a low average cost. Primary producers are countering the effect of lower short-term primary aluminum prices through these agreements and by focussing on value-added operations to produce metal products with higher margins.

World production of primary and secondary aluminum reached an estimated 29.5 Mt in 1998, of which 22.4 Mt was primary material. Total Western World primary smelter production reached an estimated 16.5 Mt in 1998, up from 16.2 Mt in 1997.

Among IPAI members, the primary aluminum daily production rate increased from an average of 54 500 t in January to 55 500 t in December. The average rate for all of 1998 was 54 700 t/d compared with 53 400 t/d in 1997.

The IPAI reported that the world's total alumina production capacity increased to 48.2 Mt in 1998 from 47.5 Mt in 1997. World alumina production also rose to 45.0 Mt in 1998 from 43.3 Mt in 1997. (Further information on the IPAI can be obtained through its web site at <http://www.world-aluminum.org>.)

United States

The Aluminum Association reported that the United States, the world's largest producer of primary and secondary aluminum, produced a total of 3.712 Mt of primary aluminum in 1998, up from 3.603 Mt in 1997. In addition to primary production, secondary aluminum production is estimated at 3.3 Mt in 1998, representing roughly 45% of the total secondary aluminum produced worldwide. (Further information on the U.S. aluminum industry can be found on the Internet at <http://www.aluminum.org/>.)

Alcan has made several adjustments to its U.S. operations. It sold its Shelbyville, Tennessee, aluminum alloys plant to Imco Recycling Inc. The plant has a capacity to produce 55 000 t/y of specification alloys. A study on expanding its Sebree, Kentucky, smelter is expected to be completed early in 1999.

National Southwire Aluminum Co. started an expansion of its 188 000-t/y Hawesville, Kentucky, smelter. A fifth potline and solid waste disposal facility will be added to expand the smelter's capacity by 50 000 t to 238 000 t/y.

During the year, Reynolds Metals Company restarted idle capacity at its smelters in Massena, New York (41 000 t/y), Troutdale, Oregon (94 000 t/y), and Longview, Washington (47 000 t/y). These restarts will bring most of Reynolds' idled capacity back on stream.

In March, Alcoa Inc. announced that it was acquiring Alumax. Alcoa is the world's largest producer of aluminum and alumina with 250 operating locations in 30 countries. The combined company has primary aluminum production capacity of 3.3 Mt/y, approximately 100 000 employees, and sales of over US\$16 billion. Since the acquisition, Alcoa has sold its cast plate business to Century Aluminum and has made adjustments in the combined company, reducing production in some locations and increasing it in others for greater efficiencies. Alcoa has indicated that it will look for other acquisitions and joint ventures in 1999. (For further information on Alcoa, visit its web site at <http://www.alcoa.com/>.)

Noranda Inc. plans to build a US\$240 million aluminum foil plant in the U.S. Midwest while it phases out production in ageing factories in Tennessee, Arkansas and North Carolina. Noranda expects to pick a site within six months and to begin production two years later. Early in 1999, Noranda's Norandal

USA, Inc. business unit concluded negotiations to sell its sheet rolling mill in Scottsboro, Alabama, to Michigan Avenue Partners. The plant produces painted and bare aluminum sheet and welded aluminum tube with an annual capacity of 181 000 t. Michigan Avenue Partners is a privately held investment firm based in Chicago, Illinois.

The New York Mercantile Exchange (NYMEX) has proposed a new aluminum contract. The Board of the Exchange approved aluminum futures and options contracts late in 1998. The Exchange expects to have contracts trading in the second quarter of 1999. (Further information can be obtained by visiting the Exchange's web site at <http://www.nymex.com>.)

Trinidad and Tobago

On November 12, 1998, Norsk Hydro Produksjon a.s. signed a project agreement with the Government of Trinidad and Tobago to support a 474 000-t/y smelter at Point Lisas on the west coast of Trinidad in two equal stages. The first phase of the project to produce 237 000 t/y would cost US\$1.5 billion and would include a modern gas-fired power plant, harbour, a carbon anode paste plant and a cast house. The plant would use the best available technology to ensure high-quality operations at a low operating cost. Although a decision was still expected on the main study early in 1999, the company indicated in early 1999 that it was contemplating a delay in construction. Nevertheless, if all approvals are obtained in 1999, metal production could start in 2002.

South America

After three unsuccessful attempts to privatize Corporacion Venezolana de Guayana (CVG), the Venezuelan government indicated in early 1999 that it was planning to invest \$200 million to make its Puerto Ordaz complex more saleable to private investors. Late in 1998, company directors approved the shut-down of two older potlines at its Alcasa smelter, reducing production by 50 000 t to 170 000 t/y.

CVG also entered into an agreement in October 1998 to sell all of the Class A common stock it holds in Baltimore-based Wells Aluminum Corporation back to that company for an aggregate purchase price of \$3.1 million. Wells Aluminum is a fabricator of soft alloy aluminum products with seven facilities in the midwestern and southeastern United States.

Europe

In November, Alusuisse Lonza Group Ltd. (Algroup) of Switzerland and Viag Aktiengesellschaft (Viag) of Germany announced plans to merge to create the fourth largest integrated aluminum producer with sales of more than 50 billion marks (US\$31 billion).

This merger will require approvals from shareholders and regulatory authorities, and will take until mid-1999 to be completed. The companies intend to integrate their businesses to optimize the operation from bauxite mining to rolling operations and production of fabricated products.

Alcan Aluminium Limited announced, in January 1999, an agreement in principle with Glencore International AG of Baar of Switzerland for the sale of Alcan's Aughinish alumina refinery in Ireland. This 1.3-Mt/y alumina refinery located near Limerick, Ireland, produced alumina that is surplus to Alcan's needs and the sale reduces Alcan's alumina cost.

In January 1998, Gränges AB announced that it had reached an agreement to sell Gränges Metall AB, the operator of the company's 140 000-t/y Sundsvall aluminum smelter, to the management of Glencore Sverige AB. Glencore is an international group active in the mining, smelting and trading of metals and minerals. The new owners have signed a 10-year agreement with Glencore International AG of Barr, Switzerland, for the tolling of billet and slab. At the same time, Gränges AB entered an agreement to purchase a major portion of the group's requirements for billet and slab from Glencore. (For further information, visit Gränges' web site at <http://www.graenges.se/index2.htm>.)

In May, Norsk Hydro ASA's subsidiary, Hydro Aluminium a.s., indicated that it had restarted all of its idle capacity and that it expected to launch an international expansion program to increase its annual capacity to 1.4 Mt by 2005. Norway, Trinidad, Qatar and Poland were suggested as likely locations for this expansion. Although the company announced plans for the Trinidad expansion, lower profits announced early in 1999 may result in a delay. (For further information, visit Norsk Hydro's web site at <http://www.hydro.com/>.)

A modernization and expansion of Hydro Aluminium's Ardal aluminum and carbon plant, which started in 1997, is nearing completion. Modernization and a new production line for baked electrodes will increase capacity for electrodes from 110 000 t/y to 160 000 t/y. The aluminum potlines were also lengthened, increasing their capacity by 12 000 t/y. In addition, the casting facilities have been upgraded, resulting in an increase in capacity to 300 000 t/y.

Nordic Aluminum Corporation of Iceland (Nordurál), a subsidiary of U.S. Columbia Ventures Corporation, completed construction of its 60 000-t/y aluminum smelter. The smelter, at Grundartangi in western Iceland, started production in June and was working at near capacity by year-end. Due to tight power supplies in Iceland late in 1998, Columbia Ventures' original plan to increase production to 90 000 t/y will

be delayed until future power supplies are assured. Iceland's national power company, Landsvirkjun, has recently doubled its generating capacity through hydro-electric power and geothermal projects, and indicated early in 1999 that it was prepared to double its capacity again. (For further information, visit the company's web site at <http://www.lv.is>.)

When Pechiney SA was privatized in 1995, the Government of France kept 10.5% of the shares. In 1998, these residual shares were sold to banks, investment dealers, the Compagnie générale des matières nucléaires (COGEMA) and the French power company Électricité de France. Pechiney expected to restart idled capacity at its 120 000-t/y St. Jean de Maurice smelter and its 60%-owned, 150 000-t/y Aluminium de Grèce smelter by the end of 1998.

With the downward pressures on aluminum prices, the topic of European Union (EU) tariffs again came to the forefront. A 6% tariff is imposed on aluminum imported to the EU by North American and Gulf producers. A report by the Organization for Economic Co-operation and Development estimated that, in 1995, European consumers paid an extra US\$472 million to use the metal.

Russia

Sayan Aluminium will modernize its plant in Siberia to reduce energy costs and expand primary aluminum smelting capacity by 15% to 380 000 t/y. The project will incorporate foil and strip mills into the smelter.

Russia's biggest aluminum smelter, the Bratsk Aluminum plant, has announced plans to expand its capacity by 50 000 t to 900 000 t/y by 2000. Planning is also under way for a modernization of the facilities.

Volograd Aluminium expected to produce 130 000 t of aluminum in 1998, up from 119 000 t in 1997. The company cut production due to shortages of raw materials, and is also planning to modernize the smelter.

In March, Daewoo Corporation sold its 10% stake in the Krasnoyarsk aluminum smelter for approximately US\$30 million. The Krasnoyarsk smelter in southern Siberia produces 728 000 t/y, or 28% of Russia's output. The sale was prompted by uncertainty in the Russian economy and the financial problems of the smelter.

Middle East

In June, Dubai Aluminium Company Limited (Dubal) announced that it had awarded a contract for the provision of power equipment for its US\$725 million Condor project. This project (following its Falcon expansion project completed in 1997) will now

increase its smelter's capacity by 35% to 525 000 t/y. The company had raised US\$410 million in financing by September and expected to complete the project in 2000.

In Iran, the first phase of the new Al-Mahdi aluminum smelter located near the port of Bandar Abbas had difficulty meeting its intended output of 110 000 t/y due to a lack of funds to complete the first phase of the project. Its output was expected to be only 10 000 t.

Alcoa signed a letter of intent in June with The Aluminium Company of Egypt (Egyptalum) to study the feasibility of forming a joint venture, or of Alcoa acquiring an interest in its aluminum business. The study will include a review of the technology and management of the operations. Egyptalum has a 180 000-t/y smelter and a rolling mill at Aluminium City in Nag-Hammadi, Egypt.

Asia

China's production of aluminum was reported to have risen by over 16% in 1997 and its exports of unwrought aluminum in 1998 were up almost 25% to 436 251 t compared to the previous year. The increase was much higher during the early part of the year (65% to June). The decrease in world aluminum prices, coupled with increased internal prices and demand from infrastructure projects, is expected to reduce exports in 1999. Aluminum demand strengthened in China because of stricter enforcement of customs rules on imports. China removed requirements for export licences and quotas on aluminum and aluminum alloys in mid-1998, which will allow more firms to export aluminum. However, only limited increases in exports are expected due to a 30% tariff.

In October, Alcoa announced that it had signed a Memorandum of Understanding with China's State Nonferrous Metals Industry Administration to study the feasibility of forming a joint venture on refining, smelting and fabricating facilities. The study will take six to twelve months to complete.

Continuing turmoil in Asia and in world financial markets has created a shortage of funds for some Chinese aluminum producers' expansion plans, and low prices and high energy costs have caused others to cut production. However, other producers have embarked on expansions of existing plants:

- China's Yunnan aluminum plant installed and started up additional capacity to increase its capacity from 40 000 t/y to 60 000 t/y, and plans to reach a capacity of 120 000 t/y in the second half of 1999.
- China's Qingtongxia aluminum plant in Ningxia plans to begin a third expansion phase to double

its capacity to 200 000 t/y in the next 30 months. Bank loans for this work were approved late in 1998.

- China Steel Aluminum Corp. is expanding its capacity by 65% to 122 000 t/y with expected completion in June 1999.
- Xin'an's aluminum smelter in Lianoming Province is planning to double its capacity to 55 000 t/y.
- The Zhongzhou alumina plant in Henan started an expansion of 70 000 t/y and plans to reach a capacity of 300 000 t/y by 2000.

In Indonesia, water shortages reduced the power available to Nippon Asahan Aluminum Co.'s Indonesian smelter. Its production is expected to be around 105 000 t, a rate that is about one half of 1997's production level.

Africa

Alcan Aluminium Limited reached an agreement with the Government of Ghana in March to purchase an additional 35% of Ghana Bauxite Company. This agreement increases Alcan's interest to 80% with the Government of Ghana retaining 20%. Alcan expects to expand its bauxite production to 1 Mt/y.

A joint venture comprising Billiton plc (47%), Industrial Development Corporation of South Africa (24%), Mitsubishi Corporation (25%) and the Mozambique government (4%) started construction in July on its 250 000-t/y Mozal smelter in Maputo, Mozambique. The project is a duplicate of Billiton's Alusaf Hillside smelter in South Africa and will use an updated version of Pechiney technology. This US\$1.2 billion smelter is expected to produce aluminum ingot in 2000 and to reach its full capacity in 2001. (For further information on the Mozal project, visit the web site at <http://www.mozal.com>.)

The Government of Mozambique signed a Memorandum of Understanding to carry out a feasibility study for the development of a 240 000-t/y smelter project in Beira on the coast of Mozambique. The study, sponsored by the U.S. Trade and Development Agency, is expected to be completed late in 1999.

In October, the Government of Guinea acquired the 51% it did not already own in the Kimbo bauxite mine and the Fria alumina refinery held by Frialco. The government then solicited bids for privatization of the mine and the 600 000-t/y Fria alumina refinery with a closing date early in 1999. New investment is required to reduce operating costs and to bring the facilities up to current standards.

Insufficient rainfall in Ghana again resulted in Kaiser Aluminum & Chemical Corporation's 90%-

owned Volta Aluminium Company Limited (Valco) smelter operating only one potline during much of 1998. However, rainfall late in the year increased available power supplies from the Volta River Authority, allowing Valco to increase output. The company expects to operate three of five potlines during 1999, which will produce 120 000 t of the smelter's rated capacity of 200 000 t/y.

India

In June, Alcan announced that a public offer for the purchase of an additional 20% of the shares of Indian Aluminium Company, Limited (Indal) had been completed. Alcan now owns a majority and controlling interest (54.6%) in Indal. Alcan joined Indal and Hydro Aluminium a.s. as an equity partner in the proposed \$1 billion Utkal export-oriented alumina project. Alcan has provided the technical services for the feasibility study as well as the technology for the proposed joint venture to be known as Utkal Alumina International Ltd. The proposal is to set up a 1-Mt/y greenfield alumina plant in the state of Orissa.

Early in 1998, India's Cabinet approved an expansion of the government-owned National Aluminium Co. Ltd.'s (Nalco) capacity to 345 000 t/y from 230 000 t/y. The cost of this work is expected to be around US\$528 million. However, Nalco experienced problems with power tripping and excessive heat in its existing plant early in 1998 and its production suffered. Its output for 1998 is expected to fall by about 50 000 t with a corresponding increase in the export of its alumina. The company also plans to double the capacity of its bauxite mines at Panchpatmali to 1.58 Mt/y and of its alumina refinery at Damanjodi to 4.8 Mt/y.

Australia

In February, Alcan South Pacific Pty Ltd. and Comalco Aluminium Ltd. signed an agreement to integrate their operations on Western Cape York Peninsula. Alcan's bauxite mining operations at Ely in North Queensland, Australia, will be integrated with existing Comalco infrastructure in Wepa, approximately 20 km from the Ely mine site. Economies of scale will ensure lower costs for Alcan's alumina refinery at Gladstone in Queensland and at other refineries around the world. Lower costs and additional revenues resulting from economies of scale and from the provision of mining services will accrue to Comalco.

Tomago Aluminium Company Pty Limited announced that a program to increase its production capacity by 10% to 440 000 t/y was on schedule for completion by early 1999. Production at the smelter was increased by expanding a third potline. Tomago Aluminium is a joint venture between Gove Aluminium Finance Limited (36.05%), Pechiney Pacific

Pty Limited (36.05%), VAW Australia Pty Limited and VAW of America Inc. (12.4%), and TOA Pty Limited (15.5%). (For further information on Tomago Aluminium, visit its web site at <http://www.tomago.com.au>.)

In December, the Government of New South Wales announced a feasibility study to build a 500 000-t/y smelter at Lithgow, located approximately 50 km west of Sydney. Australia's Aust-Pac Aluminium, set up by SNC-Lavalin Inc. of Canada, will conduct an A\$7 million feasibility study into an A\$3.0 billion smelter, which could be in operation by 2001.

Also in December, Comalco Aluminium Ltd. announced that it had selected five bidders for a contract to construct and operate a gas-fired power station in Gladstone, Queensland, to power a proposed new alumina refinery. However, the company said that a final decision had not been made on the location (between Gladstone and Sarawak, Malaysia). Early in 1999, the Government of Australia announced that it would offer Comalco an investment incentive of A\$100 million to develop a \$3 billion greenfield alumina refinery in Queensland, conditional on an agreement for gas. (For further information on developments in Australia, visit the following web sites: <http://www.comalco.com.au/>, <http://www.isr.gov.au> and <http://www.riotinto.com>.)

RECYCLING

Western World production of secondary aluminum fell to an estimated 7.2 Mt in 1998, compared to 7.4 Mt in 1997. Decreased scrap prices and lower recycling margins likely resulted in this drop. Despite this decrease, there has been a general increase in secondary production over the past few years that can be attributed to continuing improvements in scrap collection systems and increased recycling of consumer products.

The recycling of aluminum requires less than 5% of the energy used to make the original metal. As a result, energy represents only 2% of a secondary aluminum smelter's operating cost, compared to about 26% for a primary smelter. The automotive industry is the largest consumer of secondary aluminum, consuming some 80% of secondary production either through direct sales or to casters that supply the automotive industry. As requirements for lighter vehicles increase, it is likely that demand for secondary aluminum will also increase significantly.

In 1998, the largest secondary aluminum producers were the United States at 3.3 Mt, Japan at 1.2 Mt, and Italy and Germany at 0.5 Mt each. Reported Canadian consumption of secondary aluminum metal (excluding the direct use of scrap) increased to 222 891 t in 1997 from 164 070 t in 1996. (Part of this

increase is due to an increase in the number of companies reporting.)

In Canada, about 1.5 billion scrap aluminum cans are recovered and exported annually to the United States to be recycled. There are no facilities in Canada to recycle aluminum beverage cans. Cans are collected and then shipped to the United States for recycling into can sheet.

Philip Services Corporation sold three of its aluminum recycling plants to Wabash Alloys Inc. The plants included operations in Guelph, Ontario; Syracuse, New York; and Bellwood, Virginia.

PRODUCTION AND CONSUMPTION

World primary aluminum production is estimated to have increased to 22.4 Mt in 1998 from 21.8 Mt in 1997. Aluminum production in 1998 is expected to reach 3.6 Mt in the United States, 3.6 Mt in Western Europe, and 3.0 Mt in Russia.

Total world consumption of primary aluminum is expected to be an estimated 22.1 Mt in 1998, about 1% lower than the revised figure of 22.2 Mt recorded in 1997. Western World demand is expected to have increased by less than 1% to 18.7 Mt in 1998. Total reported Canadian consumption of aluminum metal at the first processing stage, including secondary aluminum, was 781 268 t in 1997, up from 686 969 t in 1996.

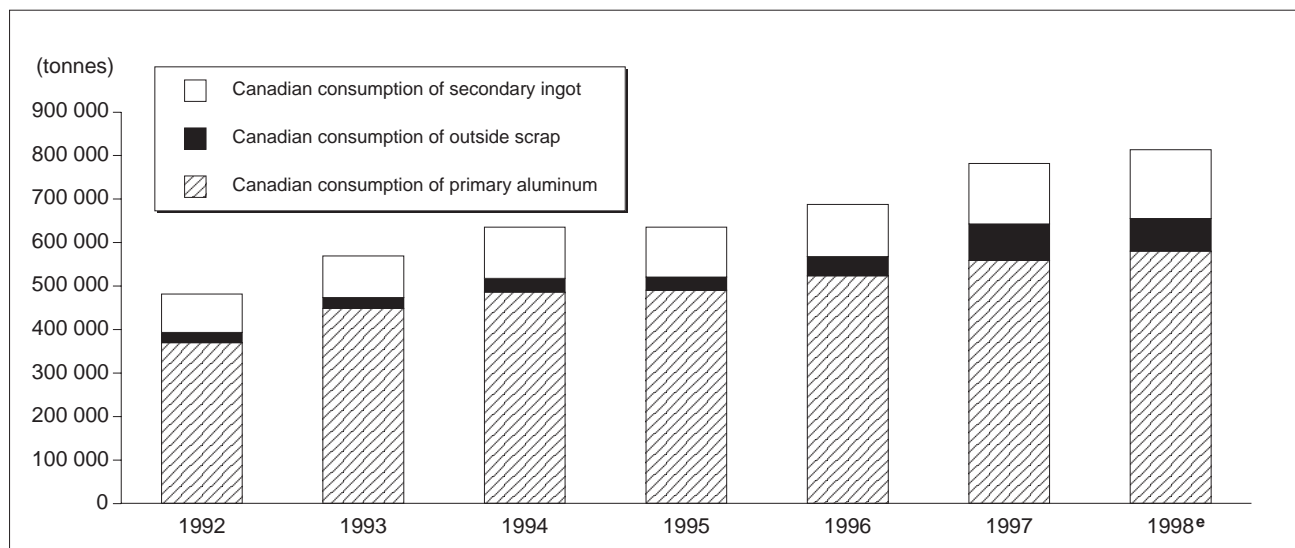
OCCURRENCE, CHARACTERISTICS AND USES

Aluminum is the most abundant metal in the earth's crust (estimated at 8% of the earth's crust). Aluminum does not naturally occur in its native or pure state, but it is found in oxides, hydroxides, halides, sulphates, silicates and as complexes with organic matter.

Both igneous rocks and sedimentary rocks can contain up to 20% aluminum. Aluminum silicates are a major component of soils (contained in clay minerals, sand and rock fragments), glacial tills and the bedrock underlying much of Canada. The aluminum contents of C horizon soils and glacial tills average approximately 8% and range from 3.5% to more than 10%. Aluminum oxide, combined with water and other impurities, is the main ore of aluminum known as bauxite.

Aluminum compounds move through the environment by both anthropogenic (human) activities and natural processes. Natural processes far outweigh the direct anthropogenic redistribution of aluminum in the environment. The chemistry of aluminum in the environment is complex and dependent on many factors. The mobility and subsequent transportation of aluminum ions and compounds are dependent on factors, including the geological weathering environment, chemical speciation (form), soil-water interaction, other elements and compounds present, and composition of the underlying bedrock. The mobiliza-

Figure 2
Reported Canadian Consumption of Aluminum, 1992-98



Source: Natural Resources Canada.

^e Estimated.

tion of aluminum in the environment by human activity results predominantly from often distant activities that produce acidic precipitation. In general, a lowering of pH results in the increased mobility of some forms of aluminum.

Pure aluminum is a silver-white, malleable, ductile metal with one third the density of steel. Aluminum's dull lustre results from a thin coating of oxide that forms when it is exposed to air. It is this characteristic that accounts for aluminum's resistance to corrosion. Gram for gram, aluminum has twice the electrical conductance of copper. It is also an efficient conductor of heat and a good reflector of light and radiant heat.

Combining aluminum with other metals to produce alloys enhances its characteristics and increases its versatility. The most common metals used in combination with aluminum are copper, magnesium, manganese, silicon and zinc. Aluminum's tensile strength, hardness, corrosion resistance, and heat-treatment properties improve when alloyed with one or more of these metals. Some copper-aluminum alloys, for example, can exceed the tensile strength of mild steel by as much as 50%.

In both its pure and alloyed forms, aluminum is used to make a variety of products for the consumer and capital goods markets. The largest markets for aluminum are transportation (26%), building and construction (20%), packaging (20%), electrical (9%), machinery and equipment (8%), and consumer goods (6%). Geographically, North America is the largest consuming region accounting for 33% of total Western World consumption of aluminum, followed by

Europe at 25% and Asia at 26%. The United States is the largest consuming country followed by Japan.

The substitution of aluminum for steel in automobile manufacturing helps reduce weight while maintaining vehicle size. Fuel consumption and, consequently, greenhouse gas emissions are decreased and the lowered weight can also increase safety by reducing stopping distances. Transportation uses are one of the fastest growing areas for aluminum use, growing at a rate of about 4%/y.

PRICES AND STOCKS

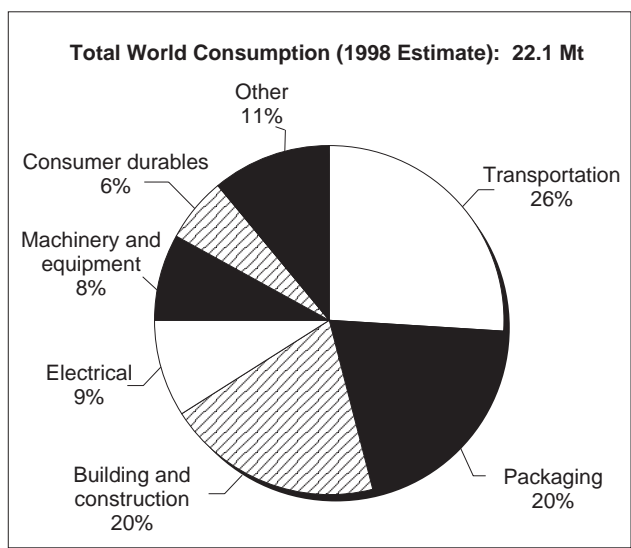
The continuing turmoil in world financial markets put a damper on business confidence in parts of the world throughout the year. This reduced demand, coupled with increased production, continued the downward pressure on prices that started in late 1997. Cash settlement London Metal Exchange (LME) prices started the year at US\$1512/t (US\$69¢/lb), falling throughout the year to a near five-year low of US\$1238/t (US\$56¢/lb) at the end of December, with an average for the year of US\$1355/t (US\$62¢/lb).

The International Primary Aluminium Institute (IPAI) reported that Western World primary aluminum inventories increased to 1.688 Mt at the end of December 1998, compared to 1.636 Mt in December 1997. Total stocks, including all forms of aluminum scrap, primary and secondary ingot, and metal in process, totalled 3.161 Mt at the end of 1998, compared with 3.163 Mt at the end of 1997. Primary stocks on the LME followed a steady decline from about 622 000 t at the start of the year to a minimum of 453 000 t at the end of August before rising to end the year at 636 000 t. Total primary inventories followed the same trend as primary stocks, starting the year at 2.304 Mt, decreasing to 2.070 Mt in July, and then rising to 2.324 Mt at the end of the year.

Prices on the LME for aluminum alloy reflected the general downward trend for primary aluminum. Aluminum alloy settlement prices started 1998 at US\$1366/t (US\$62¢/lb), following a downward trend to end the year at \$1028/t (US\$47¢/lb). For 1998, alloy prices averaged \$1203/t (US\$55¢/lb), compared to an average of US\$1463/t (66¢/lb) in 1997. LME aluminum alloy stocks in LME warehouses started the year at around 43 000 t and increased steadily to end the year at approximately 96 000 t.

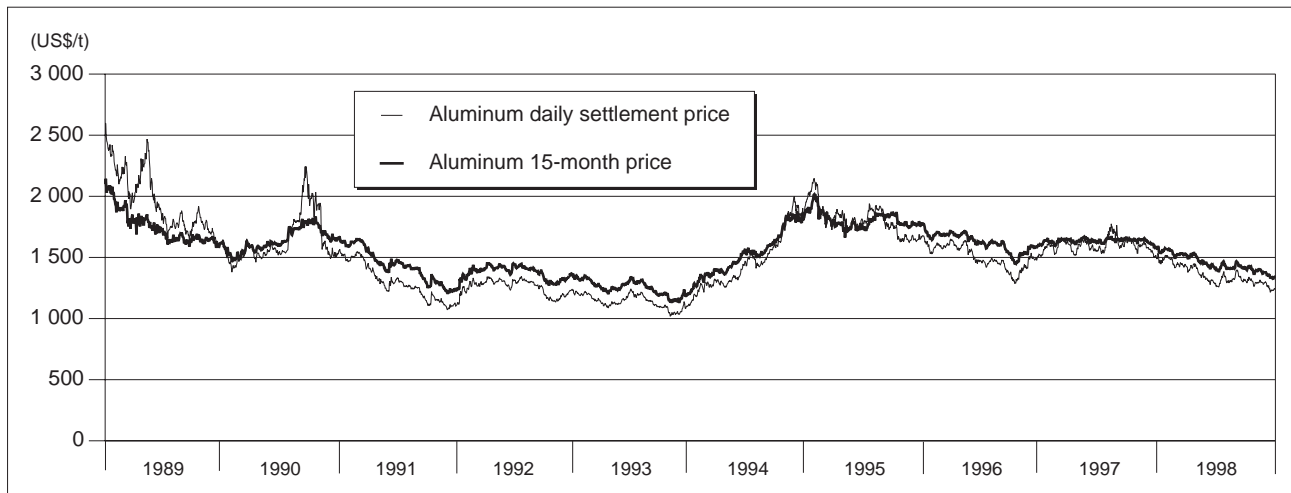
Trading in metallurgical-grade alumina followed the trends set by primary and secondary aluminum prices. Prices for alumina started the year at around US\$230/t and declined to US\$140-\$160/t by year-end. Spot prices for alumina are expected to remain low in 1999 due to the underlying weakness in metal prices and the restarting of idled capacity.

Figure 3
Aluminum Markets, 1998



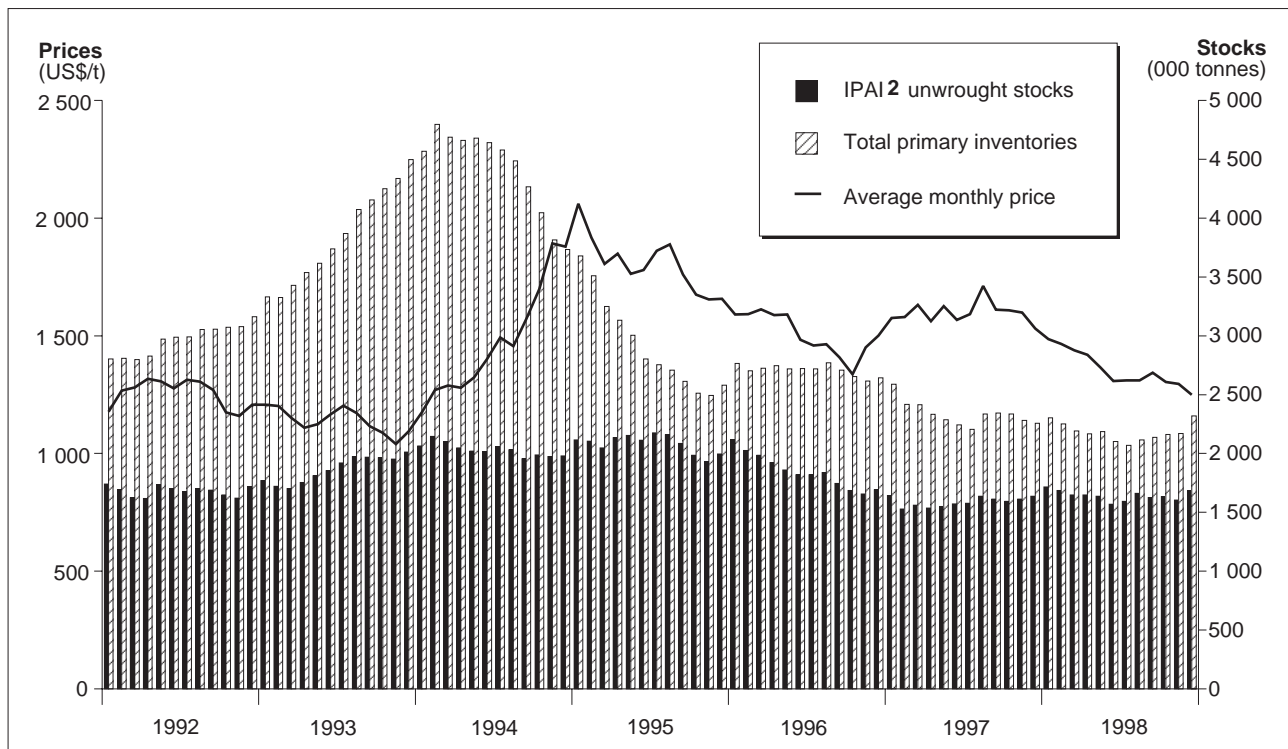
Source: Natural Resources Canada.

Figure 4
London Metal Exchange Aluminum Prices, 1989-98



Sources: Natural Resources Canada; London Metal Exchange.

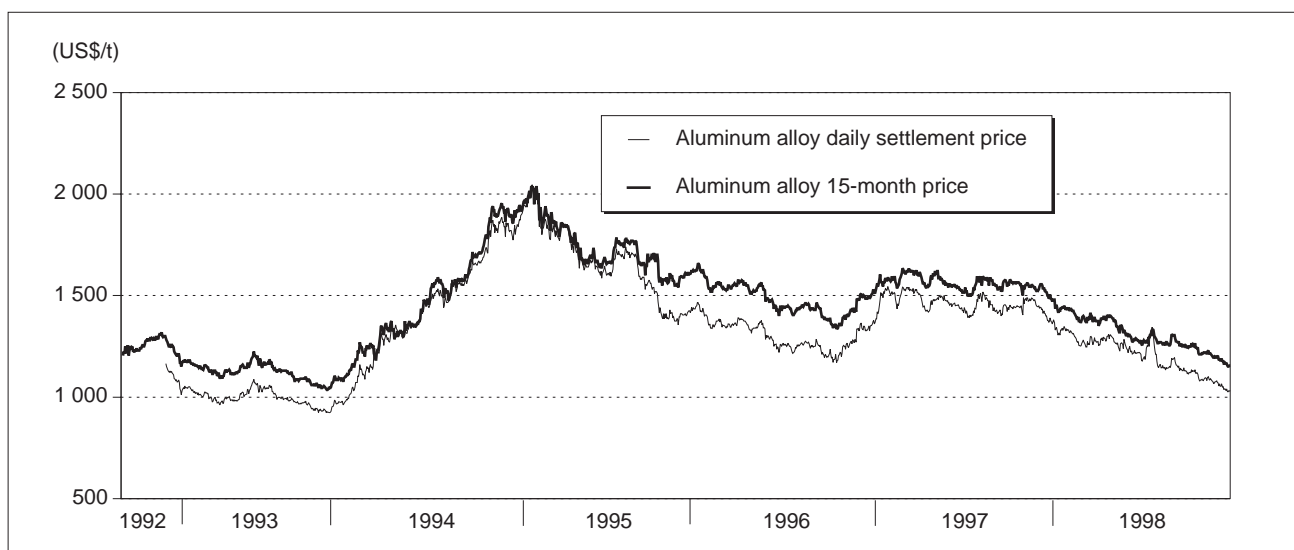
Figure 5
Aluminum Prices and Stocks, 1992-98
 LME¹ Settlement Prices and Primary Stocks



Source: Natural Resources Canada.

¹London Metal Exchange. ²International Primary Aluminium Institute.

Figure 6
London Metal Exchange Aluminum Alloy Prices, 1992-98
 Daily Settlement Prices



Sources: Natural Resources Canada; London Metal Exchange.

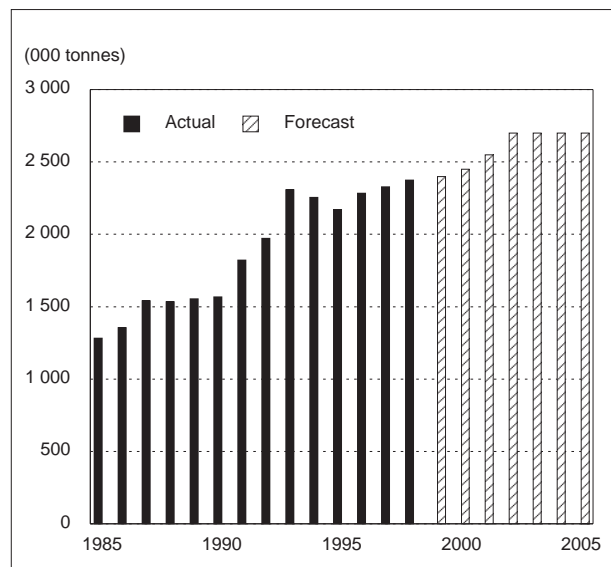
OUTLOOK

Canada is forecast to produce 2.4 Mt of primary aluminum in 1999. Canadian aluminum production capacity increased substantially during the latter half of the 1980s, but is forecast to increase at a slower rate to the year 2005. Apart from Alcan's Alma smelter, no decisions have been made to increase primary production capacity. Work is continuing on proposed projects by Alcan at Kitimat and on a number of other smelter expansion projects in Quebec (at Alouette, Bécancour and Lauralco); however, these latter projects are dependent on new power supply contracts to be negotiated with Hydro-Québec. Canada's reported consumption of primary aluminum in 1999 is expected to remain strong at about 600 000 t.

In 1999, demand for primary aluminum is forecast to be 0.5% higher in the United States, 0.8% lower in Europe, and 3.5% lower in Japan. Total world demand for aluminum is expected to increase by about 1% to 22.2 Mt in 1999. In the longer term, annual growth of 1-3% is forecast for the early part of the next decade. The transportation and packaging markets are expected to lead the increase in demand for aluminum to the year 2005.

IPAI figures show world primary production is expected to rise about 2% to 21.7 Mt in 1999 from 21.3 Mt at the end of 1998, with comparable

Figure 7
Canadian Primary Aluminum Production, 1985-2005



Source: Natural Resources Canada.

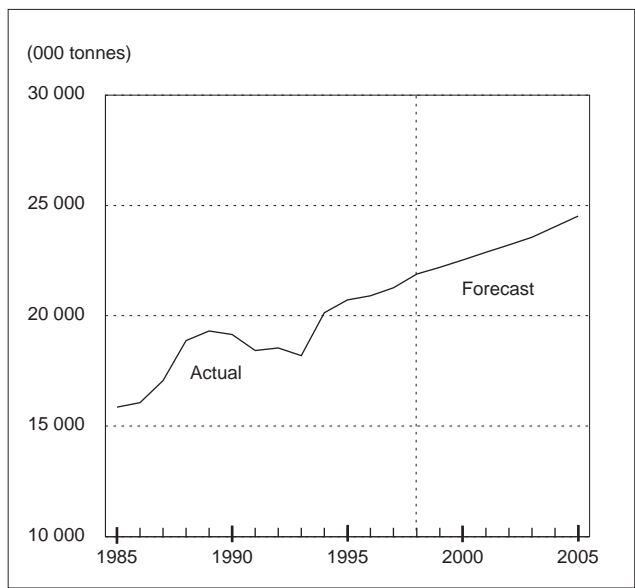
increases in the two following years. The increases in Western World capacity expected in 1999 will come primarily from smelter expansions in the United States, Brazil, Argentina, Dubai and Australia.

Current production rates will continue to place downward pressure on prices unless the number of closures of inefficient facilities or those with high debt

loads increases. For 1999, prices are forecast to average between US\$1000 and \$1400/t. In the longer term, prices are expected to average between \$1400 and \$1850/t (64¢ and 84¢/lb) in constant 1998 dollars.

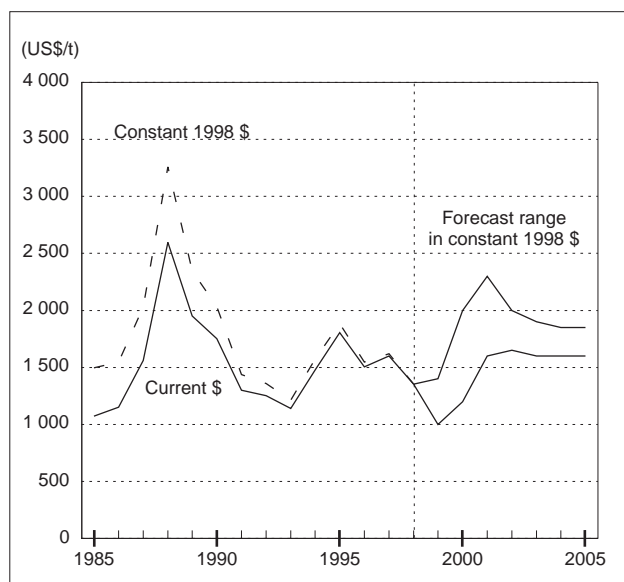
Note: Information in this review was current as of February 20, 1999.

Figure 8
World Aluminum Consumption, 1985-2005



Sources: Natural Resources Canada, World Nonferrous Metal Statistics Group.

Figure 9
LME Daily Official Aluminum Settlement Price, 1985-2005



Source: Natural Resources Canada.

TARIFFS

Item No.	Description	Canada			United States	EU	Japan ¹
		MFN	GPT	USA	Canada	MFN	WTO
2606.00.00	Aluminum ores and concentrates	Free	Free	Free	Free	Free	Free
2818.20.00	Aluminum oxide, other than artificial corundum	Free	Free	Free	Free	4.3%	Free
7601.10	Unwrought aluminum, not alloyed	Free	Free	Free	Free	6%	0.2%
7601.20	Unwrought aluminum alloys	Free	Free	Free	Free	6%	0.2%
7602.00	Aluminum waste and scrap	Free	Free	Free	Free	Free-0.6%	Free
76.03	Aluminum powders and flakes	3.5-5%	Free	Free	Free	5.1-5.3%	3.6%
76.04	Aluminum bars, rods and profiles	Free-5%	Free	Free	Free	8%	8.3-8.6%
76.05	Aluminum wire	Free-4%	Free	Free	Free	8%	8.3-8.6%
76.06	Aluminum plates, sheets and strip, of a thickness exceeding 0.2 mm	Free-6.5%	Free-5%	Free	Free	8%	Free-2.2%
76.07	Aluminum foil not exceeding 0.2 mm	Free-6.5%	Free-5%	Free	Free	8-10%	8.6%
76.08	Aluminum tubes and pipes	Free-5%	Free	Free	Free	Free-8%	8.6%
7609.00	Aluminum tube or pipe fittings	5.5%	3%	Free	Free	7%	3.6%
76.10	Aluminum structures (excluding prefabricated buildings of heading no. 94.06) and parts of structures, aluminum plates, rods, profiles, tubes and the like, prepared for use in structures	6.5%	5%	Free	Free	6.2-7%	1-3.4%
7611.00	Aluminum reservoirs, tanks, vats and similar containers, for any material	Free-6.5%	Free-5%	Free	Free	6.2%	3.6%
76.12	Aluminum casks, drums, cans, boxes and similar containers, for any material	6.5%	2.5-5%	Free	Free	6.2%	3.6%
7613.00	Aluminum containers for compressed or liquefied gas	6.5%	5%	Free	Free	6.2%	3.6%
76.14	Stranded wire, cables, plaited bands and the like, of aluminum, not electrically insulated	4.5%	3%	Free	Free	6.2%	4%
76.15	Table, kitchen or other household articles and parts thereof, of aluminum	6.5%	Free-5%	Free	Free	6.2%	1%
76.16	Other articles of aluminum	Free-6.5%	Free-5%	Free	Free	6.2%	3.4%

Sources: Customs Tariff, effective January 1999, Revenue Canada; Harmonized Tariff Schedule of the United States, 1999; Worldtariff Guidebook on Customs Tariff Schedules of Import Duties of the European Union (38th Annual Edition: 1998); Custom Tariff Schedules of Japan, 1998.

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

TABLE 1. CANADA, ALUMINUM PRODUCTION AND TRADE, 1997 AND 1998P

Item No.	1997		1998P		
	(tonnes)	(\$000)	(tonnes)	(\$000)	
PRODUCTION	2 327 188	..	2 374 118	..	
IMPORTS					
2606.00	Aluminum ores and concentrates				
	Australia	641 062	19 024	1 117 883	63 967
	Brazil	1 374 412	48 091	1 584 427	59 733
	Guinea	762 080	25 749	772 361	26 673
	Guyana	217 638	7 092	310 215	11 097
	United States	62 570	5 239	74 754	6 048
	China	49 710	4 141	29 004	2 857
	Other countries	55 349	1 610	68	5
	Total	3 162 821	110 946	3 888 712	170 380
2620.40	Ash and residues containing mainly aluminum				
		1 774	1 381	4 520	4 333
2818.20	Aluminum oxide (excluding artificial corundum)				
	Australia	1 521 664	372 870	1 379 872	373 646
	United States	912 661	279 782	1 046 902	337 419
	Jamaica	768 695	220 168	721 190	197 967
	Brazil	28	44	21 048	6 259
	China	4 876	1 059	7 271	3 962
	Austria	2 715	3 068	1 631	3 136
	Other countries	50 229	17 659	5 347	6 305
	Total	3 260 868	894 650	3 183 261	928 694
2818.30	Aluminum hydroxide				
		14 895	8 195	15 604	9 413
7601.10	Unwrought aluminum, not alloyed				
	United States	19 958	52 961	30 670	71 241
	Tajikistan	288	480	788	1 366
	Russia	691	1 507	1 052	340
	Other countries	321	589	129	318
	Total	21 258	55 537	32 639	73 265
7601.20	Unwrought aluminum, alloyed				
	United States	147 466	290 056	149 544	306 341
	Russia	4 601	8 995	12 649	26 014
	United Kingdom	803	2 022	2 452	5 178
	Tajikistan	120	211	2 304	4 605
	Netherlands	2 138	4 862	723	1 453
	Other countries	631	1 753	1 360	3 454
	Total	155 759	307 899	169 032	347 045
7602.00	Aluminum waste and scrap				
		92 600	138 877	107 425	151 770
76.03	Aluminum powders and flakes				
		2 065	8 103	2 151	8 804
76.04	Aluminum bars, rods and profiles				
7604.10	Of aluminum, not alloyed				
	United States	7 737	29 907	8 593	33 301
	Belgium	566	3 054	560	3 116
	Austria	1	6	577	1 570
	Other countries	712	2 701	387	1 724
	Total	9 016	35 668	10 117	39 711
7604.21 to 7604.29	Of aluminum alloys				
	United States	23 995	126 768	29 598	153 352
	Sweden	448	4 118	180	1 836
	France	212	1 120	383	1 835
	China	45	186	262	1 063
	Other countries	821	5 049	958	5 461
	Total	25 521	137 241	31 381	163 547
76.05	Aluminum wire				
		4 585	22 138	5 582	26 142
76.06	Aluminum plates, sheets and strip, of a thickness exceeding 0.2 mm				
		376 680	1 315 831	402 612	1 446 029

TABLE 1 (cont'd)

Item No.	1997		1998p		
	(tonnes)	(\$000)	(tonnes)	(\$000)	
IMPORTS (cont'd)					
76.07	Aluminum foil not exceeding 0.2 mm	41 105	176 788	38 257	174 294
76.08	Aluminum tubes and pipes	8 660	42 308	9 592	48 781
76.09	Aluminum tube or pipe fittings	..	27 393	..	29 038
		(number 000)		(number 000)	
76.10	Aluminum structures and parts of structures, aluminum plates, rods, profiles, tubes and the like, prepared for use in structures	..	66 590	..	76 859
76.11	Aluminum reservoirs, tanks, vats and similar containers, for any material	...	1 142	1	8 073
76.12	Aluminum casks, drums, cans, boxes and similar containers, for any material	879 164	134 369	1 343 082	214 720
76.13	Aluminum containers for compressed or liquefied gas	122	14 379	108	16 594
		(tonnes)		(tonnes)	
76.14	Stranded wire, cables, plaited bands and the like, of aluminum, not electrically insulated	1 422	4 239	317	1 110
76.15	Table, kitchen or other household articles and parts thereof, of aluminum	..	84 479	..	85 736
76.16	Other articles of aluminum	..	202 352	..	236 629
EXPORTS					
2606.00	Aluminum ores and concentrates				
	United States	372	53	47	4
	Switzerland	184	71	-	-
	Total	556	124	47	4
2620.40	Ash and residues containing mainly aluminum	13 020	8 369	11 314	8 087
2818.20	Aluminum oxide (excluding artificial corundum)				
	United States	59 506	47 991	58 217	47 052
	Saudi Arabia	34	57	84	139
	Belgium	312	203	41	78
	Other countries	1 180	1 572	51	63
	Total	61 032	49 823	58 393	47 332
7601.10	Unwrought aluminum, not alloyed				
	United States	627 010	1 464 171	611 498	1 362 741
	Netherlands	165 893	342 711	174 126	368 711
	Japan	34 187	69 414	39 693	78 131
	South Korea	25 367	61 445	22 519	49 323
	United Kingdom	19 742	36 209	16 200	31 568
	Other countries	18 325	42 743	6 324	14 817
	Total	890 524	2 016 693	870 360	1 905 291
7601.20	Unwrought aluminum alloys				
	United States	783 337	1 974 439	825 139	2 027 645
	Japan	127 384	285 085	117 118	243 890
	South Korea	35 540	87 447	17 790	41 914
	United Kingdom	4 366	11 942	4 727	12 769
	Italy	8 393	19 338	4 107	9 833
	Netherlands	9 487	23 047	3 453	8 305
	Israel	11 394	30 645	2 819	7 126
	Lebanon	3 921	10 714	2 004	5 320
	Ireland	3 598	10 595	1 995	5 319
	Other countries	8 091	21 498	6 794	17 547
	Total	995 511	2 474 750	985 946	2 379 668

TABLE 1 (cont'd)

Item No.	1997		1998 ^p	
	(tonnes)	(\$000)	(tonnes)	(\$000)
EXPORTS (cont'd)				
7602.00	Aluminum waste and scrap			
	242 554	436 391	258 645	439 526
	United States			
	9 973	24 029	8 367	18 822
	Japan			
	5 066	12 064	6 842	15 795
	Netherlands			
	948	1 088	1 980	2 438
	China			
	12 716	20 142	5 342	7 973
	Other countries			
	271 257	493 714	281 176	484 554
	Total			
76.03	1 475	3 368	1 359	3 612
	Aluminum powders and flakes			
76.04	63 973	281 731	75 545	350 508
	Aluminum bars, rods and profiles			
76.05	81 951	226 744	82 978	220 316
	Aluminum wire			
76.06	261 649	813 850	290 465	896 800
	Aluminum plates, sheets and strip, of a thickness exceeding 0.2 mm			
76.07	30 210	149 853	32 862	142 778
	Aluminum foil not exceeding 0.2 mm			
76.08	5 669	28 747	6 110	30 890
	Aluminum tubes and pipes			
76.09	..	12 390	..	12 502
	Aluminum tube or pipe fittings			
76.10	..	136 767	..	182 349
	Aluminum structures and parts of structures, aluminum plates, rods, profiles, tubes and the like, prepared for use in structures			
	(number 000)		(number 000)	
7611.00	2	1 006	1	802
	Aluminum reservoirs, tanks, vats and similar containers, for any material			
76.12	609 734	89 492	335 177	79 504
	Aluminum casks, drums, cans, boxes and similar containers, for any material			
7613.00	1 541	3 815	870	5 182
	Aluminum containers for compressed or liquefied gas			
	(tonnes)		(tonnes)	
76.14	8 541	20 789	7 920	27 896
	Stranded wire, cables, plaited bands and the like, of aluminum, not electrically insulated			
76.15	..	56 751	..	56 447
	Table, kitchen or other household articles and parts thereof, of aluminum			
76.16	..	129 159	..	163 315
	Other articles of aluminum			

Sources: Natural Resources Canada; Statistics Canada.

– Nil; .. Not available or not applicable; . . . Amount too small to be expressed; ^p Preliminary.

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

TABLE 2. CANADA, ALUMINUM SMELTER CAPACITY

Company	As of December 31, 1998
	(tonnes/year)
Alcan Aluminium Limited	
Quebec	
Grande-Baie	180 000
Arvida, Jonquière	232 000
Isle-Maligne, Alma	73 000
Shawinigan	84 000
Beauharnois	48 000
Laterrière	204 000
British Columbia	
Kitimat	272 000
Total Alcan capacity	1 093 000
Canadian Reynolds Metals Company, Limited	
Quebec	
Baie-Comeau	400 000
Aluminerie de Bécancour Inc.	
Quebec	
Bécancour	372 000
Aluminerie Alouette Inc.	
Quebec	
Sept-Îles	230 000
Alcoa Aluminerie Loralco Inc.	
Quebec	
Deschambault	225 000
Total Canadian capacity	2 320 000

Source: Natural Resources Canada.

TABLE 3. CANADA, CONSUMPTION¹ OF ALUMINUM METAL⁴ AT FIRST PROCESSING STAGE, 1995-97

	1995	1996 ^a	1997 ^a			
	(tonnes)					
CASTINGS						
Permanent mould	80 943 ^r	86 766 ^r	92 288 ^r			
Sand	2 663	2 742 ^r	3 351 ^r			
Die and other	100 671 ^r	120 793	150 829 ^r			
Total	184 277 ^r	210 301	246 469 ^r			
WROUGHT PRODUCTS						
Sheet, plate, coil and foil	164 221	191 754	180 745			
Extrusions, including tubing	110 084	111 363	149 958 ^r			
Other wrought products (including rods, forgings and slugs)	138 836	139 245	165 039 ^r			
Total	413 141	442 362	495 742 ^r			
OTHER USES						
Destructive uses (deoxidizer), non-aluminum base alloys, powder and paste and other uses	37 984	34 306	39 057 ^r			
Total consumed	635 402 ^r	686 969	781 268 ^r			
Aluminum metal used for the production of secondary aluminum ingot ²	146 987	138 762	128 515 ^r			
	Metal Entering Plant		On Hand at December 31			
	1995	1996	1997	1995	1996	1997
Primary aluminum ingot and alloys	526 205	560 146 ^r	572 606 ^r	16 986	16 434 ^r	16 892 ^r
Secondary aluminum	113 607	120 561 ^r	138 771 ^r	4 351	5 198 ^r	5 315 ^r
Scrap originating outside plant	162 275 ^r	146 198	199 926 ^r	5 763 ^r	3 958 ^r	6 902 ^r
Total	802 087 ^r	826 905 ^r	911 302 ^r	27 101 ^r	25 590 ^r	29 109 ^r
Aluminum shipments ³				25 804	2 829	1 696

Source: Natural Resources Canada.

^r Revised.^a Increase in number of companies being surveyed; therefore, the closing inventory of the previous year does not equal the opening inventory of the current year.¹ Available data as reported by consumers. ² Aluminum metal used in the production of secondary aluminum is not included in consumption totals. ³ Aluminum metal shipped without change. Does not refer to shipments of goods of own manufacture. ⁴ Aluminum metal refers to primary aluminum ingot and alloys, purchased secondary aluminum ingot, and outside aluminum scrap.

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

TABLE 4. AVERAGE ALUMINUM PRICES

Year	Month	LME Cash ¹	<i>Metals Week</i> U.S. Markets ¹
		(US\$/t)	(US¢/lb)
ANNUAL AVERAGES²			
1987		1 560.90	72.3
1988		2 597.80	110.1
1989		1 951.50	87.8
1990		1 751.80	75.0
1991		1 302.70	59.5
1992		1 254.60	57.5
1993		1 139.40	53.3
1994		1 477.20	71.2
1995		1 806.10	85.9
1996		1 506.00	71.3
1997		1 599.70	77.1
1998		1 357.80	65.6
MONTHLY AVERAGES			
1997	January	1 576.05	76.1
	February	1 580.43	76.4
	March	1 623.71	79.6
	April	1 561.77	75.6
	May	1 625.65	78.7
	June	1 567.90	75.5
	July	1 592.37	76.3
	August	1 711.18	80.1
	September	1 611.00	77.0
	October	1 608.30	76.7
	November	1 599.38	78.1
	December	1 530.93	74.8
1998	January	1 486.10	71.9
	February	1 465.95	70.4
	March	1 438.02	69.2
	April	1 418.60	68.8
	May	1 365.13	66.0
	June	1 307.59	63.4
	July	1 309.57	63.5
	August	1 311.25	63.3
	September	1 342.66	65.5
	October	1 304.41	62.9
	November	1 295.29	61.9
	December	1 249.41	60.1

Sources: Natural Resources Canada; *Metals Week*.

¹ Highest grade sold. ² Primary ingots, minimum 99.7% purity; prior to October 1988, minimum 99.5% purity.

**TABLE 5. AVERAGE ALUMINUM ALLOY
(SECONDARY) PRICES**

Year	Month	LME Alloy ¹ Cash
		(US\$/t)
ANNUAL AVERAGES		
1993		1 005.2
1994		1 452.9
1995		1 656.0
1996		1 302.8
1997		1 461.0
1998		1 203.8
MONTHLY AVERAGES		
1997	January	1 491.3
	February	1 497.2
	March	1 523.1
	April	1 454.2
	May	1 481.7
	June	1 447.4
	July	1 425.3
	August	1 475.9
	September	1 426.6
	October	1 442.6
	November	1 470.3
	December	1 396.4
1998	January	1 329.6
	February	1 291.0
	March	1 270.6
	April	1 284.3
	May	1 263.7
	June	1 223.8
	July	1 241.8
	August	1 147.5
	September	1 152.3
	October	1 112.2
	November	1 083.1
	December	1 045.3

Source: *Metals Week*.¹ Alloy ingots meeting LME specifications.

TABLE 6. WORLD MINE PRODUCTION OF BAUXITE, 1994-97

	World Rank in 1997	1994	1995	1996	1997 ^p
(000 tonnes)					
Australia	1	41 646.0	42 655.0	43 063.0	44 465.0
Brazil	4	8 673.3	10 214.1	11 060.1	11 503.8
China	5	6 621.3	8 255.5	8 878.8	9 000.0
France	20	128.0	131.0	165.0	100.0
Ghana	15	426.1	513.0	473.2	519.2
Greece	12	2 196.4	2 200.2	2 230.0	1 875.9
Guinea	2	14 833.4	17 733.3	18 492.6	19 250.0
Guyana	11	1 911.1	2 028.1	2 475.5	2 467.3
Hungary	14	835.7	1 014.6	1 055.8	742.6
India	6	4 809.1	5 240.0	5 757.5	5 800.3
Indonesia	13	1 342.4	899.0	842.0	808.7
Iran ^e	21	100.0	100.0	100.0	100.0
Italy		23.4	11.2	—	—
Jamaica	3	11 563.5	10 857.5	11 862.7	11 983.1
Kazakhstan	10	2 584.0	3 318.5	3 346.0	3 400.0
Malaysia	18	161.9	184.4	218.7	279.0
Mozambique	24	9.6	11.2	11.5	8.2
Pakistan	25	4.6	3.1	4.1	3.0
Romania	19	184.1	175.0	175.2	127.5
Russia	8	3 633.0	3 706.0	3 928.0	3 991.0
Serbia and Montenegro	16	1.3	60.0	323.0	470.0
Sierra Leone	23	734.7	0.0	32.8	99.6
Suriname	9	3 803.1	3 596.3	3 695.3	3 877.2
Turkey	17	445.0	232.3	544.5	412.8
United States	22	100.0	100.0	100.0	100.0
Venezuela	7	4 419.2	5 022.0	4 806.9	5 083.9
Total world		111 190.2	118 261.3	123 642.2	126 468.1

Sources: Natural Resources Canada; International Consultative Group on Nonferrous Metals Statistics.
 — Nil; ^e Estimated; ^p Preliminary.

TABLE 7. WORLD PRODUCTION OF ALUMINA (HYDRATE), 1994-97

	World Rank in 1997	1994	1995	1996	1997 ^P
(000 tonnes)					
Australia	1	12 792.0	13 147.0	13 349.0	13 385.0
Azerbaijan	27	70.0	27.0	—	80.0
Bosnia	29	—	25.0	25.0	—
Brazil	4	1 867.5	2 142.9	2 759.0	3 088.0
Canada ¹	11	1 170.0	1 064.0	1 060.0	1 165.0
China	5	1 846.9	2 222.7	2 616.0	3 063.4
France	19	438.0	525.0	542.0	589.0
Germany ¹	16	950.7	994.0	792.0	850.0
Greece	18	607.5	629.7	619.8	615.7
Guinea	20	648.4	630.4	622.0	527.0
Hungary	24	243.4	353.5	358.7	111.1
India	7	1 455.8	1 672.0	1 706.0	1 940.0
Ireland	10	1 140.0	1 186.0	1 234.0	1 300.0
Italy	15	852.1	857.0	881.0	914.0
Jamaica	3	3 221.2	3 030.2	3 200.0	3 414.0
Japan	17	674.6	743.2	718.9	720.0
Kazakstan	13	822.0	1 022.0	1 083.4	1 094.2
Romania ¹	21	301.6	322.8	258.5	280.0
Russia	6	2 168.4	2 254.0	2 148.0	2 379.8
Serbia and Montenegro	23	60.6	35.3	105.0	160.0
Slovakia	28	90.0	65.0	56.0	46.8
South Korea	26	—	—	100.0	100.0
Spain	12	1 070.6	1 094.8	1 094.8	1 110.3
Suriname	9	1 498.1	1 588.8	1 600.0	1 600.0
Turkey	22	155.3	172.0	159.3	164.3
Ukraine	14	1 081.0	1 198.0	1 161.0	1 074.5
United Kingdom	25	110.0	108.0	99.0	100.0
United States ¹	2	4 860.0	4 533.0	4 700.0	5 093.0
Venezuela	8	1 551.5	1 742.0	1 775.0	1 775.0
Total world		41 747.2	43 385.3	44 822.9	46 740.1

Sources: Natural Resources Canada; International Consultative Group on Nonferrous Metals Statistics.

— Nil; ^P Preliminary.¹ Calcined.

TABLE 8. WORLD PRODUCTION OF ALUMINUM, 1994-97

	World Rank in 1997	1994	1995	1996p	1997e
(000 tonnes)					
Argentina	22	175.0	185.5	183.9	183.7
Australia	5	1 310.8	1 292.6	1 370.3	1 490.1
Azerbaijan	46	10.0	11.0	0.0	0.0
Bahrain	12	451.9	453.9	464.5	489.9
Bosnia	42	—	—	—	4.0
Brazil	6	1 184.6	1 188.1	1 197.4	1 189.1
Cameroon	32	81.1	79.3	82.3	90.9
Canada	3	2 254.7	2 172.0	2 283.2	2 327.2
China	4	1 462.2	1 676.1	1 770.9	2 046.3
Egypt	23	181.5	180.3	179.2	178.2
France	13	384.1	364.5	380.1	399.4
Germany	10	505.0	575.2	576.5	571.9
Ghana	25	140.7	135.4	137.0	151.6
Greece	26	138.0	130.9	130.9	132.6
Hungary	38	30.7	34.9	33.5	32.5
Iceland	27	98.6	100.2	103.4	122.9
India	11	472.0	536.5	530.6	547.4
Indonesia	19	221.9	228.1	223.1	222.7
Iran	31	116.0	117.0	80.1	92.3
Italy	21	175.6	177.8	184.4	187.7
Japan	41	17.0	18.0	17.0	16.7
Mexico	35	0.0	10.4	61.5	66.4
Netherlands	18	219.4	215.6	227.0	231.8
New Zealand	16	268.0	273.3	284.5	310.3
Nigeria	43	0.0	0.0	0.0	2.0
Norway	7	858.2	846.7	862.3	918.6
Poland	37	49.5	55.7	51.9	51.6
Romania	24	119.6	140.5	140.9	154.0
Russia	2	2 670.5	2 790.0	2 874.2	2 906.0
Serbia and Montenegro	33	10.6	26.0	51.1	80.6
Slovakia	28	33.0	59.0	111.5	110.1
Slovenia	34	74.3	70.2	65.8	74.4
South Africa	8	172.7	233.3	617.0	682.9
South Korea	44	0.0	0.0	0.0	0.0
Spain	15	338.1	361.9	361.8	359.9
Suriname	40	26.7	28.1	26.0	23.1
Sweden	30	83.9	94.5	98.3	98.4
Switzerland	39	24.2	20.7	26.6	27.3
Tajikistan	20	236.5	237.0	198.3	188.9
Taiwan	45	0.0	0.0	0.0	0.0
Turkey	36	59.7	61.5	62.1	62.0
Ukraine	29	102.0	95.1	90.7	100.5
United Arab Emirates	14	246.9	247.4	258.5	377.7
United Kingdom	17	231.2	237.9	240.0	247.7
United States	1	3 298.5	3 375.1	3 577.2	3 603.4
Venezuela	9	585.4	627.9	634.9	640.8
Total World		19 120.3	19 765.1	20 850.4	21 795.5

Sources: Natural Resources Canada; International Consultative Group on Nonferrous Metals Statistics.
 — Nil; e Estimated; p Preliminary.

TABLE 9. WORLD CONSUMPTION OF ALUMINUM, 1995-98

	World Rank in 1997	1995r	1996r	1997p	1998e
(000 tonnes)					
Albania ^e	72	1.0	1.0	1.0	1.0
Algeria	66	5.0	5.0	5.0	5.0
Argentina	32	84.0	86.4	95.3	98.0
Australia	15	351.8	324.4	362.1	330.0
Austria	25	150.0	155.0	162.0	152.0
Bahrain	28	135.0	137.0	137.0	137.0
Bangladesh ^e	61	10.0	10.0	10.0	10.0
Belgium/Luxembourg	14	340.0	331.0	345.0	382.2
Brazil	10	499.8	497.0	478.6	545.0
Bulgaria	62	6.0	6.7	7.0	8.0
Cameroon	50	21.0	18.0	24.7	24.7
Canada	8	611.9	619.9	642.4	650.0
Chile ^e	57	15.0	13.9	15.5	15.0
China ^e	2	1 874.9	2 033.1	2 087.0	2 245.7
Colombia	58	33.3	18.0	16.0	15.0
Croatia	51	24.4	20.7	12.9	21.0
Cuba	73	1.0	1.0	1.0	1.0
Czech Republic	40	58.9	53.0	55.0	53.2
Denmark	52	27.6	27.0	36.0	20.0
Egypt	33	77.4	79.2	97.9	95.0
Finland	45	31.0	30.4	33.1	40.0
France	6	743.8	671.7	723.6	700.0
Germany	4	1 510.0	1 355.0	1 567.4	1 860.0
Ghana	55	16.1	16.1	16.0	16.0
Greece	26	162.8	156.4	203.8	150.0
Hong Kong	18	116.6	149.4	226.8	196.0
Hungary	22	120.6	158.6	171.5	171.5
Iceland	70	1.0	1.0	1.7	1.7
India	9	581.0	584.8	585.0	560.0
Indonesia ^e	38	147.7	161.3	206.0	60.0
Iran ^e	30	120.0	120.0	120.0	120.0
Iraq ^e	74	1.0	1.0	1.0	0.0
Ireland	64	3.3	3.8	5.8	5.0
Israel	43	43.1	45.0	45.0	45.0
Italy	5	631.0	614.0	671.0	760.0
Japan	3	2 336.4	2 392.6	2 434.3	2 140.0
Lebanon	60	7.0	10.0	12.0	12.0
Macedonia	67	2.0	2.8	2.0	4.0
Malaysia	37	114.0	140.0	102.4	62.5
Mexico	34	40.0	92.7	83.2	87.0
Morocco	69	2.0	1.6	2.0	2.0
Netherlands	24	150.0	145.0	155.0	155.0
New Zealand	47	38.6	38.9	37.0	37.0
Nigeria	63	7.0	7.0	7.0	7.0
North Korea	46	20.0	20.0	40.0	40.0
Norway	17	157.0	169.0	197.0	200.0
Other Europe	65	0.0	0.0	2.0	5.0
Pakistan	56	13.0	15.0	15.0	15.0
Peru ^e	68	4.5	3.6	4.0	4.0
Philippines	48	31.4	26.3	34.2	27.0
Poland	31	88.4	88.3	101.5	110.0
Portugal	35	66.7	58.1	75.4	85.0
Romania	39	34.3	37.3	48.0	56.0
Russia	11	476.0	444.1	508.7	510.0
Saudi Arabia	41	30.0	47.1	48.0	48.0

TABLE 9 (cont'd)

	World Rank in 1997	1995 ^r	1996 ^r	1997 ^p	1998 ^e
(000 tonnes)					
Serbia and Montenegro	53	9.0	17.3	23.7	20.0
Singapore	54	39.2	40.0	40.0	19.0
Slovakia	49	25.0	25.0	25.0	25.0
Slovenia	36	56.9	49.5	61.3	74.0
South Africa	29	119.7	101.6	126.0	130.0
South Korea	12	675.3	674.3	666.3	400.9
Spain	13	350.0	360.0	410.0	400.0
Sweden	20	116.0	129.0	142.0	180.0
Switzerland	23	143.3	140.2	164.0	170.0
Taiwan	16	362.5	310.3	374.3	320.0
Thailand	21	253.5	220.2	232.8	175.0
Tunisia	71	3.3	3.5	1.0	1.0
Turkey	27	144.0	136.0	144.0	144.0
United States	1	5 300.0	5 500.0	5 800.0	5 875.0
United Arab Emirates	44	50.1	51.0	60.0	44.0
United Kingdom	42	24.6	30.0	30.0	48.0
Venezuela	7	620.0	600.0	620.0	660.0
Vietnam ^e	19	183.0	206.9	193.4	190.0
Other	59	13.9	15.0	15.0	15.0
Total world		20 714.3	20 911.9	22 263.6	22 051.4

Sources: Natural Resources Canada; International Consultative Group on Nonferrous Metals Statistics.
^e Estimated; ^p Preliminary; ^r Revised.

TABLE 10. WESTERN WORLD PRODUCTION OF SECONDARY ALUMINUM, 1993-98

	1993	1994	1995	1996	1997 ^p	1998 ^e
	(000 tonnes)					
Africa	32.0	32.0	37.5	37.0	37.2	31.0
Argentina	14.4	14.4	10.0	15.8	15.8	16.0
Australia	34.8	55.0	37.7	57.1	53.8	57.2
Austria	43.3	52.5	93.5	97.5	116.5	116.5
Brazil	76.8	91.0	116.7	145.6	163.4	163.4
Canada	90.0	95.0	97.0	101.0	100.0	100.0
Croatia	28.1	29.9	33.6	38.2	21.2	18.3
Denmark	14.0	14.0	14.0	14.0	14.0	14.0
Finland	29.9	31.0	33.5	33.6	38.2	34.2
France	222.4	253.4	253.6	236.8	241.7	241.5
Germany	408.1	438.1	418.8	416.9	432.5	453.3
Iran	15.1	26.0	26.0	26.0	26.0	26.0
Italy	346.1	355.8	396.6	376.6	442.9	530.0
Japan	1 005.6	1 173.5	1 180.5	1 191.8	1 278.3	1 154.7
Mexico	40.7	145.2	128.6	85.0	123.2	135.6
Netherlands	139.1	150.0	191.5	150.0	150.4	150.4
New Zealand	7.3	8.2	8.0	8.0	8.0	8.0
Norway	55.8	49.2	71.9	59.7	58.6	62.4
Portugal	2.0	3.0	3.0	3.0	3.0	3.2
Spain	99.7	103.5	107.0	153.8	153.8	154.0
Sweden	19.0	21.5	23.0	24.5	25.0	25.0
Switzerland	4.2	6.2	5.3	6.0	7.9	7.9
Taiwan	64.0	64.0	67.0	67.0	67.0	67.0
United States	2 994.9	2 958.8	3 188.0	3 205.5	3 543.4	3 333.8
United Kingdom	236.2	224.3	229.7	257.2	236.6	236.6
Venezuela	34.8	31.9	27.5	21.4	21.4	21.4
Yugoslavia	n.a.	n.a.	n.a.	5.0	5.2	5.2
Total	6 058.3	6 427.4	6 799.5	6 834.0	7 385.0	7 166.6

Source: World Bureau of Metal Statistics.

^e Estimated; n.a. Not applicable.