

# Aluminum

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**A**luminum markets rallied during 1994 following three consecutive years of declining prices, increased inventories, poor demand growth, and high volume exports from the former Soviet Union. Increased economic growth in the major economies, led by the United States and Europe, resulted in strengthened demand for aluminum products as the year progressed. Earlier in the year, aluminum producers responded to weak market conditions that had persisted since 1991 by cutting production further. The Memorandum of Understanding between the governments of Australia, Canada, the European Union, Norway, the Russian Federation and the United States signed in March in Ottawa also contributed to increased market transparency and overall market confidence.

Aluminum prices averaged US\$1480/t (US67¢/lb) on the London Metal Exchange (LME) in 1994 compared to \$1139/t (52¢/lb) in 1993. The International Primary Aluminium Institute (IPAI) reported that Western World primary unwrought aluminum inventories increased to 2.062 Mt in December 1994 compared to 2.011 Mt in December 1993.

## CANADIAN DEVELOPMENTS

Canadian production of primary aluminum in 1994 decreased by 2.3% to 2.254 Mt compared to 2.309 Mt in 1993. Canadian exports of primary smelter products in 1994 rose to 1.88 Mt valued at \$3.8 billion, compared with 1.85 Mt valued at \$2.9 billion in 1993. Of this amount, exports to the United States totalled 1.39 Mt valued at \$2.8 billion, compared to 1.23 Mt valued at \$2 billion in the previous year.

In early January, Alcan announced temporary production cuts of 156 000 t/y of primary aluminum production capacity from its worldwide operations. The closures announced were in addition to the 102 000 t/y closed in 1991 and 1992. Together the

closures, totalling 258 000 t/y, reduced Alcan's operating rate to 85% of its world capacity. Alcan cut 60 000 t/y in the United States, 18 000 t/y in the United Kingdom, and 8000 t/y in Brazil. Reductions in Canada included 30 000 t/y at the Kitimat smelter in British Columbia and 40 000 t/y at various locations in Alcan's Quebec smelter system. The production cuts were made by a combination of potline closures, the non-replacement of potlinings, and amperage reduction.

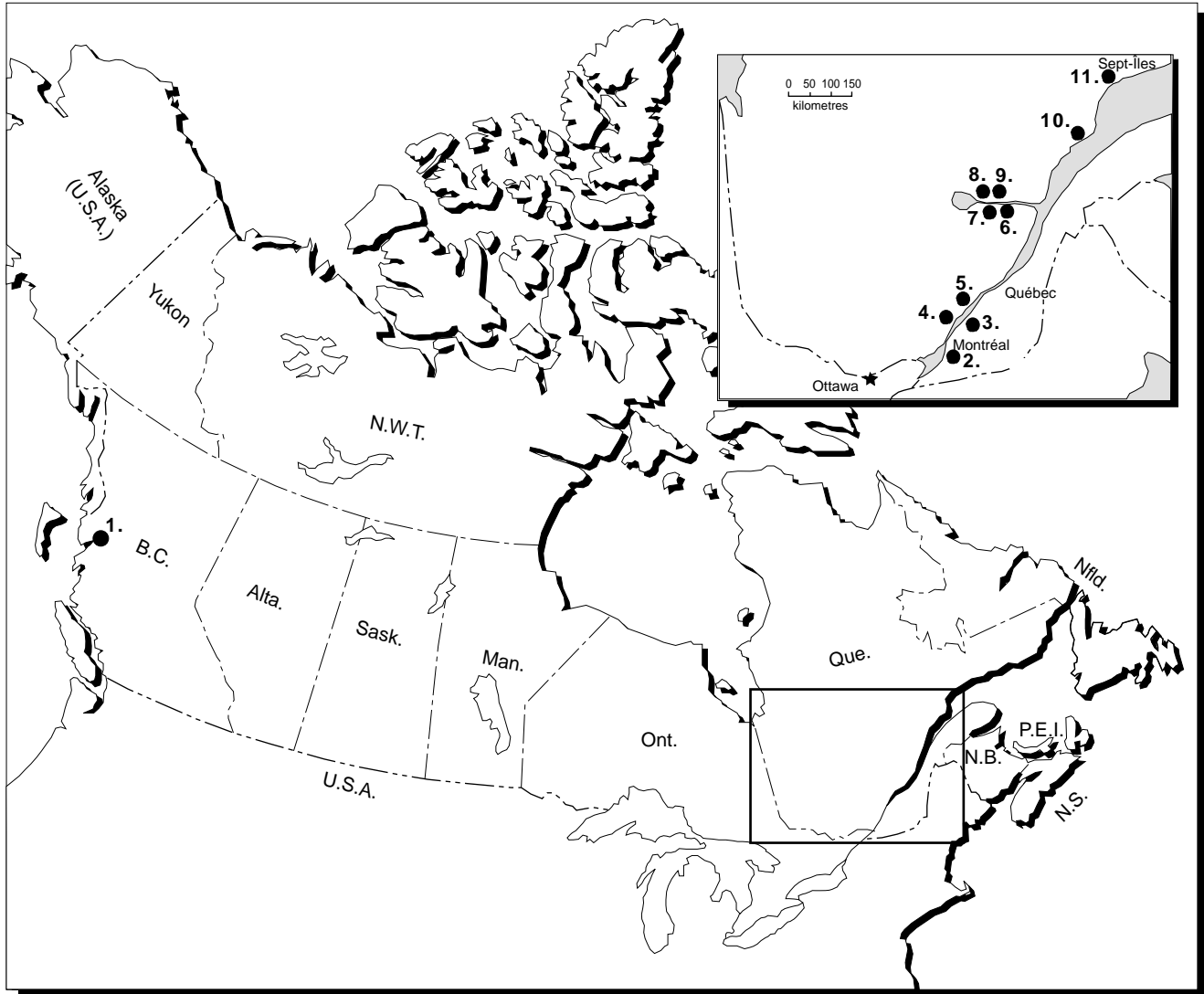
Pechiney AS of France announced in February that it would cut production from its share of the 360 000-t/y Aluminerie de Bécancour Inc. (ABI) smelter. Pechiney cut 10 000 t/y from its 90 180-t/y (25.05%) share of production at the smelter located at Bécancour, Quebec. The three other partners in the ABI consortium, Canadian Reynolds Metals Limited (25.05% share), Alumax Inc. (24.95%), and the Société générale de financement du Québec (SGF) (Albecour) (24.95%), maintained full production from their share of the operation.

In April, Hoogovens Groep BV of the Netherlands announced that it would cut 5000 t/y from its 43 000-t/y (20%) share in the 215 000-t/y Aluminerie Alouette Inc. smelter at Sept-Îles, Quebec. In a separate announcement in May, Germany's Vereinigte Aluminium-Werke AG (VAW) also announced a 5000-t/y cut from its 43 000-t/y (20%) share of production at the smelter, bringing the total cuts at the Alouette smelter to 10 000 t/y. The other members in the consortium, Austria Metall Aktiengesellschaft (20%), SGF (Alunor) (20%), and Marubeni (16.3%) and Kobe Steel (3.7%) of Japan, maintained full production from their share of the operation.

In other developments at the Alouette smelter, consortium members requested and received a three-month extension on the deadline to make a final decision concerning the smelter's future energy requirements. Because of the extension, no announcement of the consortium's decision on whether to double the smelter's capacity to 430 000 t/y is expected before the first quarter of 1995.

Canadian Reynolds announced in August that, as a result of strong market demand in the aluminum cable market, it would restart aluminum rod production at its 400 000-t/y aluminum smelter at

**Figure 1**  
**Aluminum Smelters, 1994**



SMELTER	COMPANY	CAPACITY (t/y)
1. Kitimat, B.C.	Alcan	272 000
2. Beauharnois, Que.	Alcan	48 000
3. Bécancour, Que.	A.B.I.	360 000
4. Shawinigan, Que.	Alcan	84 000
5. Deschambault, Que.	Lauralco	215 000
6. Grande-Baie, Que.	Alcan	180 000
7. Laterrière, Que.	Alcan	204 000
8. Isle-Maligne, Que.	Alcan	73 000
9. Arvida, Que.	Alcan	232 000
10. Baie-Comeau, Que.	Reynolds	400 000
11. Sept-Îles, Que.	Alouette	215 000

Baie-Comeau. The rod mill was closed in 1991 when demand for aluminum rod products was weak, and after Canadian Reynolds opened a new, more modern facility next to the ABI smelter at Bécancour. Canadian Reynolds estimates that the newly refurbished 11 000-t/y Baie Comeau rod mill will cost \$1 million and create 13 permanent jobs. Part of the rod production will be shipped to the Phillips Cable plant at La Malbaie, Quebec.

In September, Alcan completed the sale of its remaining aluminum extrusion operations in Canada and the United States as part of a long-term restructuring plan. Included in the sale were plants in Laval, Quebec, and in Pickering and Aurora, Ontario. Ontario-based Exal Aluminum Inc. purchased the two Ontario plants while Altex Extrusion purchased the Laval, Quebec facility. In December, Alcan announced that it had completed the sale of its Alcan Building Products divisions in North America to Genstar Capital Corporation of Toronto. Products from the divisions include a diversified range of aluminum, vinyl and steel building products for the renovation, replacement and new construction markets.

Can-stock production at Alcan's Kingston Works was discontinued in December. Production at Kingston Works will be devoted to sheet for the distributor/common alloy, building products and automotive markets.

Aluminerie Luralco Inc., a subsidiary of Alumax Inc. of the United States, continued to operate at full capacity throughout 1994. Inaugurated in September 1992, the smelter is located near Deschambault, Quebec, and produces about 215 000 t/y of high-quality T-ingots. It employs about 500 people and contributes an estimated \$50 million annually to the local economy.

The suspension of work on Alcan's half-built Kemano Completion Project near Kitimat, British Columbia, continued in 1994 pending the outcome of the B.C. Utilities Commission's (BCUC) review of the project. The report of the review was completed by mid-December, but was not made public before year-end. The \$1.4 billion project is the second phase of Alcan's hydro-electric development of the Nechako River System and was scheduled to add 540 megawatts to Alcan's Kemano Generating Station by 1994. Alcan has stated that it will not restart construction at Kemano until all uncertainties surrounding the project have been resolved.

## WORLD DEVELOPMENTS

World production of primary and secondary aluminum reached an estimated 24 Mt in 1994, of which 18.9 Mt was primary material. Western World smelter production reached 14.5 Mt in 1994. In response to poor market fundamentals at the beginning of the year, Western World aluminum producers

in a number of countries announced production cuts totalling some 900 000 t.

In March, a meeting between government officials from Australia, Canada, the European Union, Norway, the Russian Federation and the United States was held in Ottawa to conclude a Memorandum of Understanding (MOU). The MOU was designed to address the unprecedented circumstances in the world aluminum market as a result of increased aluminum exports from the former Soviet Union. As a result of the MOU, the government of the Russian Federation announced its intention to cut its aluminum production by 500 000 t/y in two stages for a period of no less than two years. The MOU relied on market forces for production decisions outside of the Russian Federation. No commitments, direct or implied, to cut production were made by the other participants.

All of the participants agreed that trade actions against Russian aluminum exports were not the preferred option and that existing restrictions would be lifted by the European Union. In addition, the signatories agreed to offer technical assistance to help the Russian aluminum industry integrate with the rest of the Western World industry. As part of the MOU process, the participants agreed that, in the interest of greater market transparency, the IPAI would enter negotiations with producers in the Russian Federation to integrate Russian aluminum production (and eventually stock) information into the IPAI's regular reporting process. This was accomplished after the July MOU meeting in Canberra, and Russian data was integrated for the first time into the European category (Area 6) in October. In addition, the participants have, since the MOU came into effect, published publicly available production and trade data on a monthly basis.

## United States

A total of 262 000 t of primary aluminum production capacity was idled in the United States in 1994. The continued electricity shortage in the Pacific Northwest, weak market conditions, and high costs combined to force producers to cut production. Imports of aluminum increased, including imports from Canada and Russia.

Alcoa reduced primary aluminum production by 100 000 t/y at its smelters at Rockdale, Texas, and Wenatchee, Washington, in response to weak market conditions. With reductions announced in 1993, Alcoa has idled a total of 410 000 t (31%) of its U.S. smelting capacity.

Alumax Inc. announced in February that it would reduce production of primary aluminum by 40 000 t/y by the end of March in addition to cuts already made at its North American operations. The cut in production was made at the Intalco aluminum smelter in Ferndale, Washington. Intalco is 75% owned by

Alumax, with the remaining 25% held by a group of Japanese companies headed by Mitsui & Co. Ltd. Total cuts at smelters operated by Alumax reached 146 000 t/y in 1994.

Fluor Daniel announced in September that it had been awarded a contract by Alcan Rolled Products Co., a subsidiary of Alcan, valued at US\$22 million. Fluor will provide engineering, procurement and construction management services for a 70 000-square-foot expansion of Alcan's existing facility in Oswego, New York. The expansion is expected to be completed in early 1995 and will provide molten aluminum for can-stock production.

In February, Noranda Aluminum Inc., a subsidiary of Noranda Inc., announced that it would cut primary aluminum output by about 10% from its 220 000-t/y New Madrid, Missouri smelter. The company achieved the cut by delaying the relining of 35 pots and by reducing amperage to the smelter. Noranda Inc. approved the investment of \$50 million to build an aluminum wheel plant in the U.S. Mid-West. The plant will produce one million wheels annually. Chrysler Corp. is expected to be the major customer.

Southwire Company, through its NSA Division, announced in January that it would cut aluminum production by 10% at its aluminum smelter in Hawesville, Kentucky. Production was cut to about 170 000 t/y by the end of the first quarter. Southwire achieved the reduction by removing pots from service and reducing the amperage supplied to the remaining pots.

## Jamaica

Jamaican bauxite officials reported that the industry's gross earnings for the first three quarters of 1994 rose for the first time since 1990. Gross foreign exchange earnings rose to US\$439 million for the first nine months, compared to US\$396 million over the same period in 1993. The Jamaica Bauxite Institute credited the rise to increased production and improved world market prices. The industry's earnings had been steadily declining, from US\$705 million in 1990 to US\$528 million in 1993. The Jamaica Bauxite Institute expects growth in earnings to continue based on increased growth in the major economies.

Jamaica will spend US\$1 million on a feasibility study for a proposed US\$1.5 billion alumina plant. The study on the 1-Mt/y plant should be completed in 1995, and construction could begin as early as 1996.

In November, members of the International Bauxite Association agreed to dissolve the association by year-end. The dissolution of the 20-year-old group followed the withdrawal in 1994 of Jamaica, which hosts the Association's headquarters. The Association received a setback in 1991 when Australia, one of the Association's most important members, withdrew its membership.

## South America

Reynolds Metals announced plans to build its third aluminum beverage can plant in Brazil. Construction of the plant near Sao Paulo will begin in early 1995, with production scheduled to start by September 1996. The plant's capacity will be 1.5 billion cans. The operation will be part of Reynolds Metals' Brazilian affiliate, Latas de Alumínio SA, and will be managed and operated by Reynolds Metals.

In November, the Brazilian government reduced the import tariff on aluminum to zero, from 5%, in an effort to control the rise in domestic aluminum prices. Brazil exported 684 500 t of aluminum in the first nine months of 1994, according to the Brazilian Aluminium Association.

In April, Reynolds Metals announced plans to build an aluminum beverage can plant in Buenos Aires, Argentina. When completed by the end of 1995, the plant will be capable of producing 750 million cans annually. The added capacity will lift Reynolds Metals' annual Latin American capacity, combined with the capacity of affiliate companies, to more than five billion cans per year.

## Europe

The poor market conditions that persisted at the beginning of 1994 forced several companies in the European Union to cut production totalling some 193 000 t, in addition to the cuts already made in 1992 and 1993. Most notably, cuts were made by Germany's VAW, Pechiney of France, Hoogovens of the Netherlands, Insepal of Spain, and British Alcan Aluminium (a wholly owned subsidiary of Alcan) in the United Kingdom.

In March, the European Commission (EC) announced that it would let the import quota restrictions on aluminum from the former Soviet Union expire under the terms of the aluminum MOU. The EC did not renew the quotas beyond the February 28 expiry date. In August 1993, the EC introduced a 60 000-t limit on aluminum imports from the former Soviet Union effective until the end of November 1993. The limit was subsequently extended by another 45 000 t to the end of February 1994. The imposition of the import quotas was seen as a temporary measure while negotiations for an agreed-upon level of imports continued.

In November, Swiss aluminum and packaging group Alusuisse-Lonza Holding AG announced that it planned to keep one third of its 50 000-t/y Steg aluminum smelter in Switzerland open until the first quarter of 1996. The company had originally planned to close the smelter by the end of this year.

In May, Aluminium Essen GmGH took over the activities of Alusuisse-Lonza's Leichtmetall-Gesellschaft mbH aluminum smelter at Essen, Germany. Pri-

mary aluminum production was subsequently increased from 15 000 t/y to 91 000 t/y by year-end. Total production in 1994 was estimated at about 70 000 t. The 91 000-t/y target for 1995 represents two thirds of the smelter's capacity. The Leichtmetall smelter was scheduled to close by the end of 1994, but the new management at the smelter decided to maintain operations.

VAW announced in December that it would permanently close its 82 000-t/y Toeging smelter in Germany by the end of 1995 and convert it into a casting plant. VAW's other two smelters in Germany, the 68 000-t/y Stade smelter and the 210 000-t/y Hamburg smelter, will remain open. VAW cut output in 1994, most notably at Toeging, which had dropped to 30 000 t/y from 90 000 t/y. High operating costs continue to call into question the long-term viability of the aluminum smelting industry in Germany.

Alcan Deutschland GmbH acquired the Leichtmetallwerke Nachterstedt GmbH aluminum rolling mill in the former German Democratic Republic. The mill was acquired from the government body charged with selling the state-owned companies of the former East Germany. Alcan plans to restructure the facility over the next two years. The plant will produce automotive sheet and painted and pre-treated sheet products for the building and industrial markets.

Pechiney SA cut its annual worldwide aluminum output by 120 000 t/y for a minimum of 18 months starting in April. The output cuts included the permanent closure of Pechiney's 28 000-t/y Venthon aluminum smelter in France. The rest of the cuts announced are temporary. The company reduced its aluminum output in Europe by 87 000 t, including 62 000 t in France and 25 000 t in the Netherlands and Greece. Of the temporary cuts in France, 22 000 t were cut at Pechiney's 215 000-t/y Dunkirk smelter, and a total of 12 000 t were cut at three other smelters at Saint-Jean de Maurienne, Lannemezan and Auzat. In the rest of Europe, the cuts were shared between Pechiney's Dutch Vlissingen smelter and its smelter in Greece. The cuts represent a 12% reduction in Pechiney's worldwide capacity, which is estimated at about 1 Mt.

Economic conditions forced Norwegian companies to idle a total of 88 000 t of production capacity throughout 1994. Elkem A/S announced plans to cut aluminum production by a total of 10 000 t/y from September 1994 to the end of 1995. The cuts were implemented at Elkem's smelters at Lista (82 000 t/y) and Mosjoen (122 000 t/y). Norsk Hydro A/S also announced temporary aluminum production cuts of more than 10% to reduce its annual capacity by 70 000 t. Norsk Hydro reduced capacity by 22 000 t at its 220 000-t/y Karmoy smelter and by 16 000 t each at its smelters at Sunndal (140 000 t/y), Aardal (180 000 t/y) and Hoyanger (65 000 t/y).

Norway's only other primary aluminum producer, Soer-Norge Aluminium AS (Soeral), also announced a production cut in 1994. The company reduced annual aluminum output by 11%, or 8000 t. Soeral operates the 80 000-t/y Husnes aluminum smelter and is jointly owned by Norsk Hydro (49.9%) and Alusuisse-Lonza (50.1%).

In July, the European Bank for Reconstruction and Development (EBRD) granted the first US\$40 million tranche of a \$110 million loan for a new 132 000-t/y aluminum smelter at Ziar nad Hronom in central Slovakia. The EBRD will invest another US\$15 million to earn a 10% interest in Slovalco, the aluminum smelting subsidiary of Zavod Slovensko Narodneho Povstania (ZSNP). Hydro Aluminium, a subsidiary of Norway's Norsk Hydro A/S, is supplying key smelter technology and is also expected to invest \$15 million for a 10% stake in Slovalco. ZSNP controls the remaining stock in Slovalco.

## Russian Federation

According to the Russian aluminum producers association, Concern Aluminiy, Russia produced 2.65 Mt of aluminum in 1994, down from 2.82 Mt in 1993. The drop in production was related to the cut in Russian aluminum production under the terms of the aluminum MOU signed in March. As a result of the drop in production, Russia's aluminum exports also fell to an estimated 2.1 Mt, down from 2.47 Mt in 1993.

Several announcements were made during the year concerning proposals for modernization projects for some of Russia's largest smelters. Pechiney announced that it will conduct a feasibility study to modernize the 800 000-t/y Krasnoyarsk smelter in southern Siberia. The modernization plans are aimed at controlling pollution and saving energy. Both Pechiney and Alcoa have submitted plans for a feasibility study to modernize the 820 000-t/y Bratsk smelter in eastern Siberia. No final decision on which proposal will be chosen was announced before year-end.

The technology division of Germany's VAW announced in October that it will help to modernize the Novokuznetsk smelter in a five-year program costing US\$280 million. VAW, which carried out the feasibility study for a complete overhaul of the smelter, will provide engineering services worth \$20 million. The program will improve environmental standards and working conditions and will reduce energy use at the facility, which currently comprises two plants. Plant 1, with a capacity of 108 000 t/y, will be phased out when modernization of Plant 2, where capacity will be raised to 250 000 t/y from 173 000 t/y, is completed.

In May, a new bulk alumina discharging facility became operational at Russia's east coast port of Vanino, opening one of the bottlenecks that had

hindered the import of raw material to Russia's aluminum industry. Trans-World Metals built the new facility as part of a joint-venture project with the Vanino Port Authority. The first shipment of 25 600 t of alumina, from Alcoa in Australia, was successfully discharged in May. The British-designed facility has a discharge rate of 2000 t/d, but it could rise to 6000 t/d if the second phase of the project is completed.

In July, Reynolds Metals and its subsidiary Reynolds International Inc. announced the signing of a technology transfer and technical assistance agreement with the Samara Metallurgical Co. The agreement will help convert a substantial portion of the defence and aerospace plant at Samara into a manufacturer of aluminum can-sheet products. The agreement is the first step towards the introduction of the aluminum beverage can in Russia.

## Middle East

Aluminium Bahrain BSC (Alba), the Gulf region's largest aluminum producer, announced in March that it was cutting annual output by 20 000 t in response to weak market conditions. Alba produced a record 450 000 t of primary aluminum in 1993 after doubling capacity at its smelter to 460 000 t/y in 1992. In November, the company announced that it plans to raise its production capacity by an additional 25 000 t/y by 1997.

Construction on the new aluminum smelter at Bandar Abbas in Iran continued in 1994 and was reportedly running ahead of schedule. The first phase of the 110 000-t/y smelter is expected to begin production in 1995. The project includes plans to build a second 110 000-t/y phase with the funds provided from the first. The project is owned by the Al-Mahdi Aluminium Corp. (60% owned by the Ministry of Mines and Metals and 40% by the Dubai-based International Development Corp., which includes Dubai's Al-Tajir Corp., Britain's George Wimpey Plc and ABB Asea Brown Boveri Ltd.).

## Asia

Indian Aluminium Company Ltd. (Indal) announced in December that it may partially restart its smelter at Belgaum in Karnataka state after a 28-month shut-down. The 75 000-t/y Belgaum smelter was shut down in August 1992 due to high electricity charges. The plan called for a start-up to 12 000 t initially and to gradually increase production to 25 000 t. The Belgaum smelter is the largest of Indal's three smelting plants in India in capacity terms. Indal is 35% owned by Alcan.

Elsewhere in India, the government cut import duties on aluminum metal and aluminum waste and scrap from 25% to 10% ad valorem. The cut was prompted by repeated requests from aluminum fabricators to lower the duties and to bring about parity

between domestic and international aluminum prices.

Indonesia's PT Indonesia Asahan Aluminium (Inalum) announced plans to increase output to the full capacity of 225 000 t/y in 1995. Inalum has been producing below capacity since 1982 because of reduced electricity supply due to low water levels in the Toba Lake reservoir. Inalum produced about 210 000 t in 1994, compared with 200 000 t in 1993. Increased rainfall in 1994 raised the level of water in the reservoir so that higher electricity supplies will be delivered to the smelter next year. The Indonesian government owns 40% of the smelter and the Japanese government and a Japanese consortium share the rest.

Tajikistan's 520 000-t/y Tursunzade aluminum smelter produced 237 000 t of aluminum in 1994, down slightly from 252 000 t in 1993 and 345 000 t in 1992. The Tursunzade smelter is the single largest enterprise in the southernmost former Soviet republic. Output at the smelter, which is down to 60% of capacity, has fallen amid civil unrest, shortages of alumina coming from Russia via Uzbekistan, and shortages of electricity.

The China National Nonferrous Metals Industry Corporation (CNNC), Kobe Steel Ltd. of Japan, and Alcoa of the United States announced in March that they had concluded a final agreement to cooperate in developing China's aluminum industry. The companies have formed a joint study team to explore a range of opportunities from mining raw materials to fabricating aluminum products.

China plans to expand annual capacity at two existing aluminum smelters by a total of 170 000 t by 1998. Capacity at the Qingtongxia smelter is expected to increase to 220 000 t/y from the current 100 000 t/y, while capacity at the Baiyin smelter will be doubled to 100 000 t/y. The CNNC hopes to use foreign export credits to buy technology and equipment for the expansions. Construction of a new smelter, with a capacity of as much as 250 000 t/y, is also being studied by the CNNC but is not likely to be completed before the year 2000.

China's largest aluminum smelting complex began operations in September. The Guangxi Pinguo Aluminum Smelting Complex, located in the southern Guangxi Zhuang Autonomous Region, employs 4700 workers. Production capacity at the complex includes 300 000 t/y of alumina and 100 000 t/y of aluminum. The plant is operated by the Guangxi government and the CNNC.

Japan's tax advisory panel approved a plan by the Ministry of International Trade and Industry (MITI) to abolish the tariff on primary aluminum ingot imports. Under the Uruguay Round of global trade talks, Japan had already agreed to cut the 1.0% tariff to 0.8% from January 1995. The government now

wants to abolish the tariff entirely at the start of the next fiscal year on April 1, 1995. Tariffs on aluminum products are not affected.

## Africa

Construction continued in 1994 on Alusaf Ltd.'s new 466 000-t/y Hillside aluminum smelter at Richard's Bay, South Africa. The project, which is running ahead of schedule and under budget, will start production in June 1995 when 25% of the pots in the first line will be switched on. Full production is expected by June 1996. After the scheduled completion of the Hillside project, Alusaf may consider expanding its existing 170 000-t/y Bayside smelter by an additional 40 000 t. Alusaf was also expected to decide by year-end whether to acquire an interest in an all-purpose rolling mill to be built by Hulett Aluminium. The project will focus on can-stock production for South Africa's domestic market.

In April, Kaiser Aluminum Corp. announced that it would cut 40 000 t of primary aluminum capacity at its 90%-owned Volta Aluminium Company Ltd. (Valco) smelter in Ghana in response to weak market conditions. In August, the Volta River Authority (VRA) notified Kaiser that electricity supplies to the Valco smelter would be curtailed due to low water levels in the utility's reservoir. Kaiser and the VRA reached an agreement in September that averted the complete shut-down of the 200 000-t/y smelter. Under the terms of the agreement, Valco shut one of the three and one-half potlines still operating. By November, Kaiser announced that the idled potlines would be restarted and restored to full production by early February 1995.

Work continued, despite delays, on the construction of a 180 000-t/y smelter at Ikot Abasi, Nigeria. Aluminium Smelter Co. of Nigeria (Alscon) announced that the project is 50% complete and is scheduled to begin production in 1996, three years later than originally planned.

## Australia

In response to weak market conditions, Australian aluminum producers cut a total of 141 000 t, or 10%, from their 1.39-Mt annual production capacity. In February, Tomago Aluminium Co. Pty. Ltd. announced a 10%, or 39 000-t/y, cut from its smelter in New South Wales. Tomago is jointly owned by a consortium comprising Pechiney SA (35%), the Australian Mutual Provident Society (25.5%), CSR Ltd. (24.5%), VIAG AG (12%), and Hunter Douglas NV (3%).

Comalco Ltd. also reduced its production by 30%, or 36 000 t/y, at its Bell Bay operation. Alcoa of Australia Ltd., a joint venture between Alcoa and Australia's Western Mining Corp. Holdings Ltd., cut production at its Point Henry smelter by 14%, or 25 000 t/y. Other Australian smelter reductions

included a 26 000-t/y cut at the Portland smelter, partly owned by Alcoa, and a 15 000-t/y cut at Alcan Australia's Kurri Kurri smelter.

Comalco Ltd. purchased the Gladstone power station in Queensland from the Queensland government for A\$750 million. The station will be owned by a joint venture that is 42% owned by Comalco and operated by NRG Energy Inc., a unit of Northern States Power Co. Other shareholders are NRG (with 37.5%) and a group of Japanese companies. The purchase of the power station is the precursor to the addition of a third potline to the Boyne Island aluminum smelter, due to begin construction by June 1995. The third potline will raise the smelter's capacity to 460 000 t/y from the current 260 000 t/y.

Alcan sold its 73.3% interest in Alcan Australia Ltd. for US\$245 million in July to a range of institutional investors in Australia, Europe, North America and Asia. Alcan Australia's main asset was the 150 000-t/y Kurri Kurri smelter in New South Wales. A new name for the company is expected to be chosen sometime in 1995. Alcan Australia accounted for about 4% of Alcan's total assets, 5% of total revenue, and 9% of the total primary aluminum production of the consolidated group.

Alcan will continue to supply alumina and technology to the company under long-term agreements and to market the company's primary aluminum in Asian markets. Alcan will retain its bauxite mining rights in Australia and its 21.4% interest in Queensland Alumina Ltd.

## RECYCLING

Secondary aluminum production continues to increase worldwide. Western World production of secondary aluminum in 1993 was estimated at 5.61 Mt, compared to 5.58 Mt in 1992. Production in the first nine months of 1994 was about 4.6 Mt. The increase in secondary production can be attributed to continuing improvements in scrap collection systems and increased recycling.

Recycling 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 supplying the automotive industry. As requirements for lighter vehicles increase, it is likely that the demand for secondary aluminum will increase significantly.

In 1993, the largest secondary producers were the United States at 2.48 Mt, Japan at 1.0 Mt, and Germany at 0.4 Mt. Canada produced about 86 000 t of secondary aluminum in 1993 and consumed about 131 174 t, compared with 127 818 t in 1992 (excluding the direct use of scrap).

The most important sources of aluminum scrap in the United States are from the packaging (principally used beverage containers) and transportation sectors. U.S. recycling of aluminum cans fell in 1993 to 63.1% of can shipments, down from 67.9% in 1992. It was the first decline since recycling records began in 1972, according to a joint announcement by the Aluminum Association, the Can Manufacturers Institute and the Institute of Scrap Recycling Industries. The number of aluminum cans collected in 1993 fell to 59.5 billion, down from 62.7 billion the year before.

In Canada, about 1.5 billion scrap aluminum cans are recovered and exported annually to the United States to be recycled for a recycling rate of about 80%. There are no facilities in Canada to recycle aluminum beverage cans. Alcan announced that it had recycled a record 11 billion aluminum beverage cans, accounting for one in five aluminum cans recycled in the United States in 1993, up 8% from the 1992 level of slightly more than 10 billion cans. The company recycled 170 000 t of cans in 1993 at facilities in Greensboro, Georgia; Oswego, New York; and Berea, Kentucky, where Alcan operates the world's largest aluminum can recycling plant. An additional 44 000 t of consumer-generated aluminum scrap, other than cans, including used cookware, siding, auto parts and old lawn chairs, was recycled at Alcan's plants in Shelbyville, Tennessee, and Guelph, Ontario. The value of the aluminum recycled by Alcan in North America approached US\$190 million in 1993.

Programs are currently in place in the United States and Canada to promote the recycling of other types of household aluminum products in addition to beverage cans. Advertising campaigns to promote the recycling of aluminum foil and other aluminum products were started by Reynolds Metals, Alcoa and Alcan. Alcan's Arvida Research and Development Centre develops new technologies for recycling a variety of household aluminum products. Barriers to wider recycling of aluminum foil products include the lack of public awareness, municipal curb-side recycling programs that do not accept such products, and aluminum producers that do not handle foil or other household sources of aluminum.

The Ford Motor Company of Canada opened a new aluminum casting plant in Windsor, Ontario. The plant makes semi-finished parts from primarily secondary aluminum. The parts to be produced include cylinder heads and engine blocks for Ford's new 2.5-L V6 Ford Contour and Mercury Mystique models. Engine blocks will also be cast for Ford's 4.6-L V8 Lincoln Continental, which is scheduled for production in 1995.

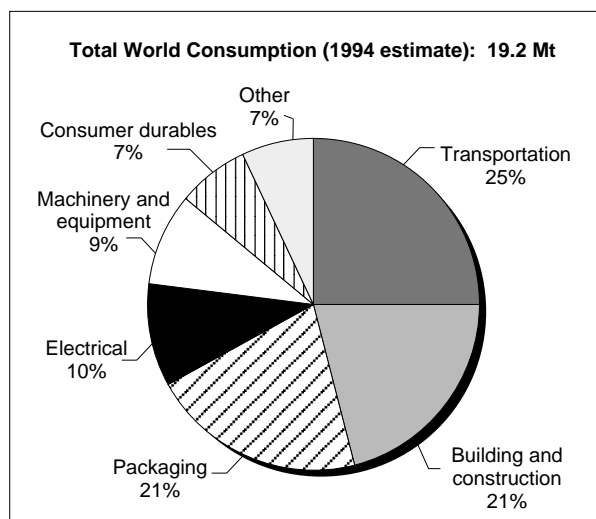
## CONSUMPTION AND USES

Total world consumption of primary aluminum is estimated at 19.3 Mt in 1994, compared to 18.7 Mt in 1993. Canada consumed an estimated 492 500 t of primary aluminum in 1993 compared to 420 400 t in 1992. Total Western World consumption of primary aluminum increased to 16.1 Mt in 1994 compared to 15.7 Mt in 1993. Total reported Canadian consumption of aluminum metal at the first processing stage, including secondary aluminum, was 598 155 t in 1993.

Aluminum is the most abundant metal in the earth's crust. Unlike most of the other major metals, aluminum does not occur in its native state, but mainly as an oxide. When combined with water and other impurities, it produces the main ore of aluminum known as bauxite. Pure aluminum is a bluish silver-white, malleable, ductile metal with one third the density of steel. Aluminum's dull lustre results from a thin coating of oxygen that forms when it is exposed to air. It is this characteristic that accounts for aluminum's resistance to corrosion. Aluminum is an excellent conductor of electricity. 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%.

**Figure 2**  
**Aluminum Markets, 1994**



Source: Natural Resources Canada.



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 (25%), building and construction (21%), packaging (21%), electrical (10%), consumer durables (7%), and machinery and equipment (9%). Geographically, North America is the largest consuming region, accounting for 36% of total Western World production, followed by Europe at 30% and Asia at 25%.

## HEALTH, SAFETY AND THE ENVIRONMENT

The Canadian aluminum industry continued to work on finding a process to treat spent potliners (SPLs) produced in Canada. Five processes were reviewed by the Quebec Aluminum Industry Association (AIAQ) and its members. A working group of Canadian aluminum producers evaluated the different methods of treating SPLs already developed by Alcan, Reynolds Metals, Elkem, Comalco and Pechiney.

The U.S. Environmental Protection Agency (EPA) classified SPLs as a hazardous waste in 1988. SPLs contain the residues, including cyanides, from the carbon linings that line the electrolytic cells. The linings must be changed after 2000 to 3000 days of production. Currently, several Canadian producers export their SPLs to the United States, where they are treated at Reynolds Metals' new 120 000-t/y SPL treatment plant at Gum Springs, Arkansas. Aluminum smelters in the province of Quebec, where 10 of the 11 Canadian smelters are located, currently produce close to 30 000 t of SPLs annually.

Alcan has developed a process to treat SPLs using a leaching technology that destroys the cyanides and recovers other soluble chemical products such as fluoride, caustic soda and alumina, and uses the residual solids as a non-toxic combustible product. The Alcan process has already been successfully tested at the Quebec Mineral Research Centre (Centre de recherches minérales).

The Reynolds Metals plant uses a different approach by rendering the residues inert, but does not allow the components to be recycled as in the Alcan process. Reynolds Metals has reportedly signed a letter of intent with JTM Industries to market the residue by-product, which can be used for a number of applications including abrasives and refractory bricks.

The Elkem process, developed in Norway, combines the SPLs and iron oxide to obtain a commercial product. Comalco's process uses a special calciner to remove the hazardous cyanides. A scale prototype is currently operating at Comalco's Boyne Island smelter in Australia. The Pechiney SPLIT (Spent Potlining Insolubilization Technology) process thermally destroys the cyanides and includes the fluo-

rides in synthetic non-leachable minerals so that the final product is compatible with regular landfill.

In addition to work on SPLs, the aluminum industry continued to study the effects of a group of stable, nontoxic chemicals called polyfluorinated carbon compounds, or polyfluorocarbons (PFCs), believed to contribute to global warming. One source of the long-lasting PFC emissions is through the production of primary aluminum. A jointly financed study by the Aluminum Association of the United States, the European Aluminium Association (EAA) and the AIAQ focused on assessing the worldwide levels of PFCs emitted from aluminum smelters, assessing the short- and long-term effects of such emissions, and determining the methods to reduce or control PFC emissions from the aluminum reduction process. The results of the studies, including one conducted for Environment Canada, indicated that the contribution by PFCs to the greenhouse effect was 0.5% less than the level produced by gases from anthropogenic sources (an atmospheric concentration of 0.070 parts per billion (ppb) vs. 350 000 ppb for CO<sub>2</sub>). Results from the study have led to a better understanding of the processes involved in the production of PFCs and have also led to improved operating methods for smelters (in order to reduce anode effects).

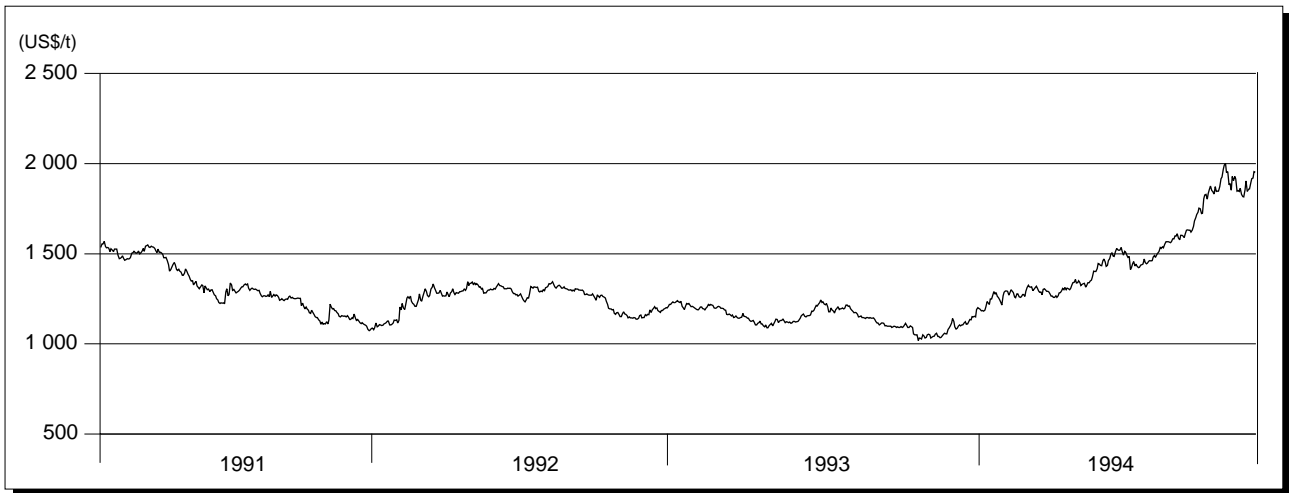
In Canada, in an outline to implement measures for inclusion in a national action program to address climate change under the Climate Change Task Group, the AIAQ and Environment Canada began evaluating the technical and economic feasibility of developing new low-emission PFC technology for existing smelters in Canada. Once complete, the AIAQ and Environment Canada will coordinate the development of an "Aluminum Industry Challenge Program" aimed at securing voluntary agreements for emission reductions from specific smelters.

## PRICES AND STOCKS

Settlement prices on the London Metal Exchange (LME) for primary aluminum averaged US\$1480/t (US67¢/lb) in 1994, compared to \$1139/t (52¢/lb) in 1993. The LME settlement price for aluminum began the year weak at \$1111/t, but continued to strengthen through the year, peaking in November at just over \$2000/t and falling back to finish the year at \$1952/t.

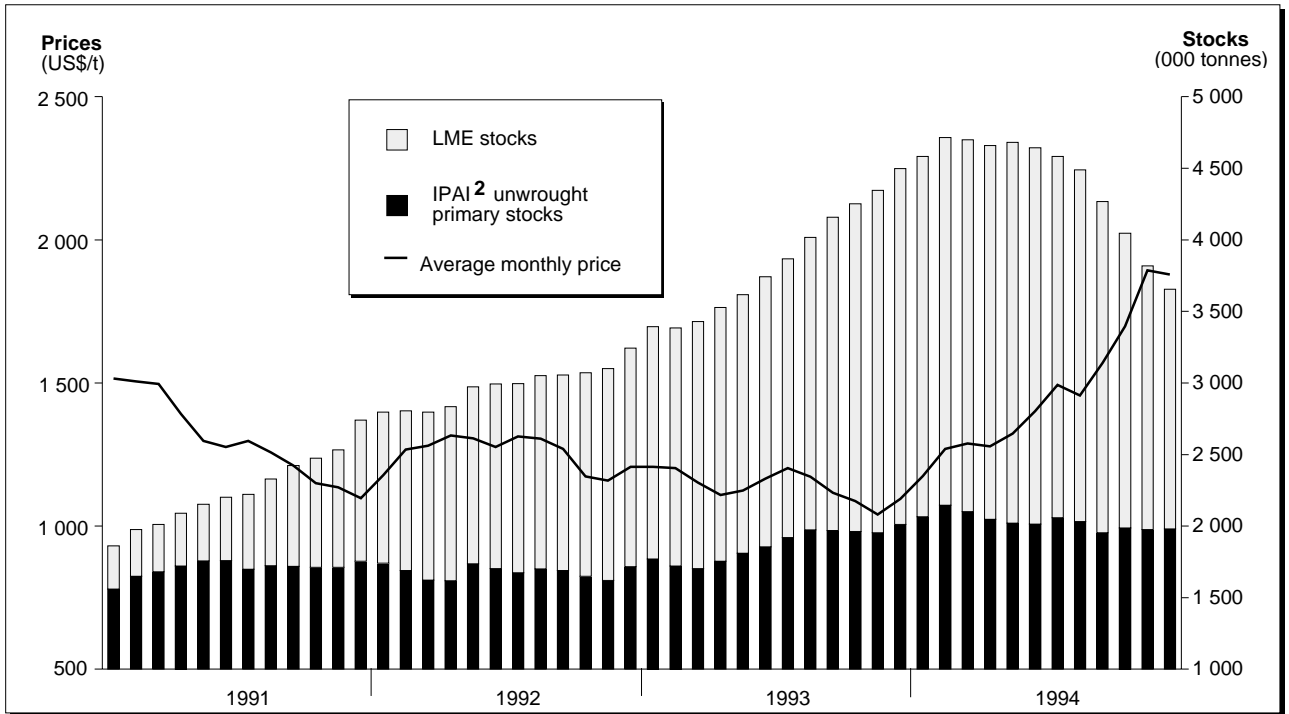
The International Primary Aluminium Institute reported that Western World primary aluminum inventories increased to 2.062 Mt at the end of December 1994, compared to 2.011 Mt in December 1993. Total stocks, including all forms of aluminum scrap, primary and secondary ingot and metal in process, totalled 3.584 Mt at the end of 1994, compared with 3.536 Mt at the end of 1993. LME stocks increased from 1.5 Mt at the beginning of the year and peaked at a record level of 2.6 Mt in June before starting a gradual decline. LME stocks ended the year at 1.7 Mt.

**Figure 3**  
**London Metal Exchange Aluminum Prices, 1991-94**  
 Daily Official Settlement Prices



Source: Natural Resources Canada.

**Figure 4**  
**Aluminum Prices and Stocks, 1991-94**  
 LME<sup>1</sup> Settlement Prices and Primary Stocks

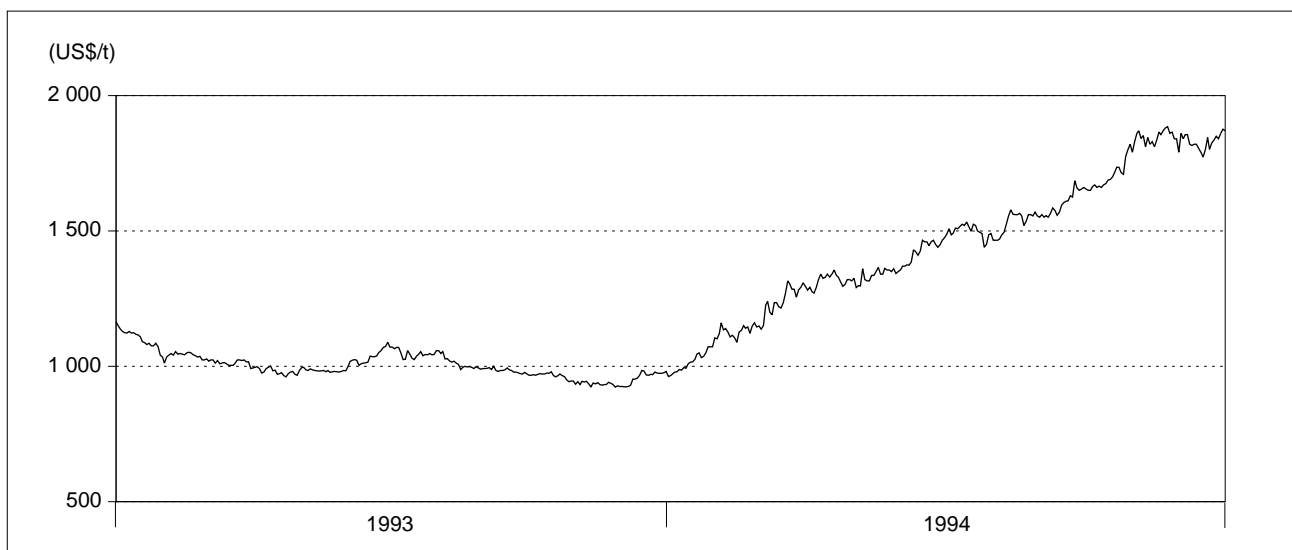


Source: Natural Resources Canada.

<sup>1</sup> London Metal Exchange.

<sup>2</sup> International Primary Aluminium Institute.

**Figure 5**  
**London Metal Exchange Aluminum Alloy Prices, 1993 and 1994**  
 Daily Settlement Prices



Source: Natural Resources Canada.

Prices on the LME for aluminum alloy traded stronger this year, and even traded higher than primary aluminum for a significant portion of the year. Aluminum alloy started trading at just under US\$1000/t (US45¢/lb) in January, but ended the year at \$1870/t (85¢/lb). Alloy prices averaged \$1460/t (66.2¢/lb) in 1994, compared to an average of \$1036/t (47¢/lb) in 1993. The stronger prices reflected both the increased demand in the automotive sector in North America and Europe, and lower stock levels. LME aluminum alloy stocks ended the year at 30 480 t, down from 49 000 t at the end of 1993.

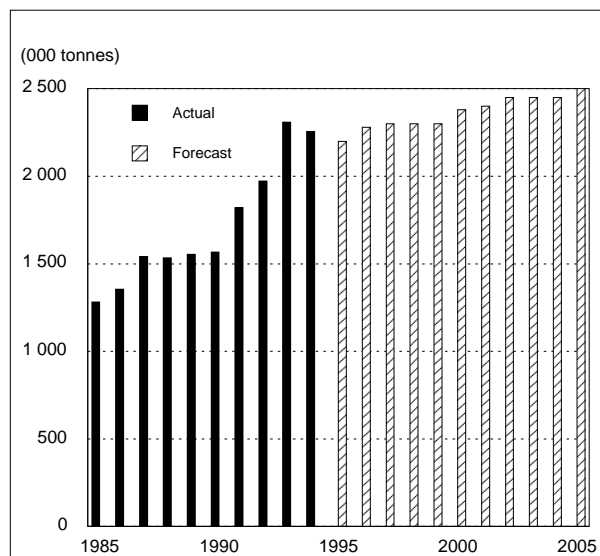
The range in average spot alumina prices was reportedly trading between US\$110/t and \$120/t (f.o.b.) by the end of 1994, down about \$10/t from the third quarter of 1994. Prices are forecast to remain in the US\$125-\$135/t range in 1995. The decrease in spot prices during 1994 was mainly the result of increased alumina production, particularly in Australia, India and Europe, coupled with flat demand, as smelters cut production in response to weak market conditions.

## OUTLOOK

Canada produced 2.3 Mt of primary aluminum in 1994 valued at an estimated \$2.9 billion, ranking third after the United States and Russia. As a result of the production cuts announced in 1994, Canada will produce about 2.2 Mt in 1995. Canadian aluminum production capacity increased substantially during the latter half of the 1980s; however, Canadian production capacity is forecast to increase

at a slower rate to the year 2005. A decision on whether to double capacity at the 215 000-t/y Alouette smelter is pending. Plans by Alcan to build a new smelter at Alma, Quebec, to replace older Söderburg smelters are pending better economic conditions. World aluminum production is forecast to increase only slightly to 19.1 Mt in 1995. No significant amount of smelter capacity that was idled in

**Figure 6**  
**Canadian Primary Aluminum Production, 1985-2005**



Source: Natural Resources Canada.

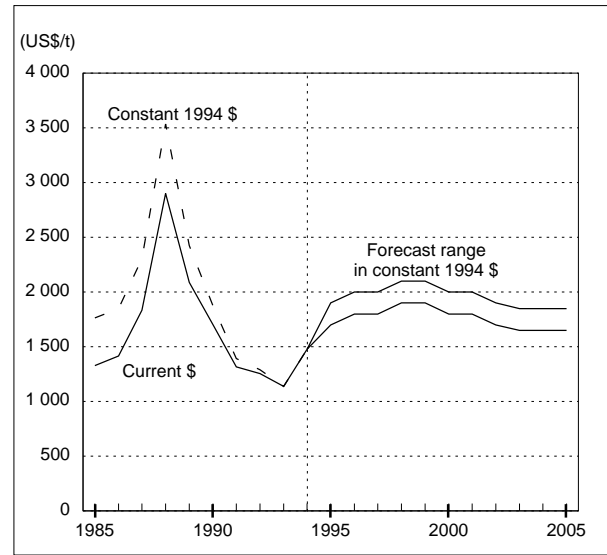
1993 and 1994 is expected to come back on stream before the end of 1995. Except for the new Hillside aluminum smelter in South Africa, no major net increases in new smelter capacity are expected in 1995.

Total world consumption increased about 3% in 1994 to 19.3 Mt and was strong in the United States (up 8%) and Europe (up 7%), and was recovering in Japan (up 2.5%). World demand for aluminum is expected to increase a further 4% to 20.1 Mt in 1995. Strong growth of between 3% and 4% is forecast for the remainder of the decade. The transportation and packaging (in particular, beverage can) markets are expected to lead the increase in demand for aluminum to the year 2005. Total Canadian aluminum consumption (primary and secondary) is expected to remain strong at about 600 000 t/y in 1995.

The continued recovery of aluminum markets in North America, Europe and Japan will lead to a decrease in the level of world stocks and stronger prices in 1995. Prices are forecast to range between \$1800 and \$2000/t in 1995. World stocks, which are currently still high, are expected to fall to more normal levels of around 55 days of consumption by 1996. In the longer term, prices are expected to average between US\$1650 and \$1850/t (75¢ and 85¢/lb) in constant 1994 dollars.

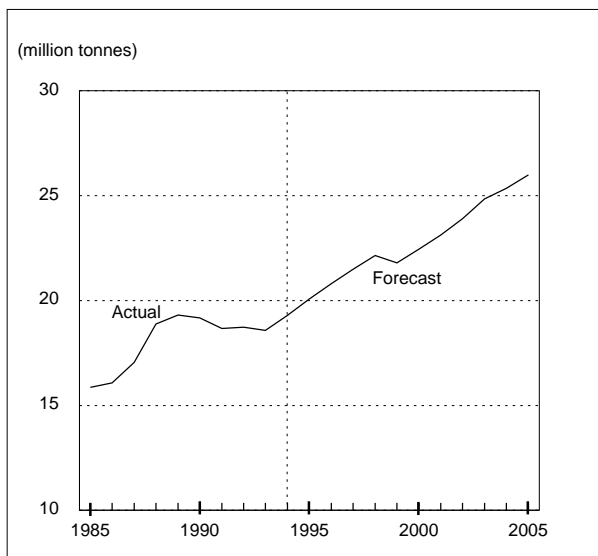
*Note: Information in this review was current as of January 18, 1995.*

**Figure 8**  
**Aluminum Prices, 1985-2005**  
Annual LME Settlement



Source: Natural Resources Canada.

**Figure 7**  
**World Aluminum Consumption, 1985-2005**



Source: Natural Resources Canada.

## TARIFFS

Item No.	Description	Canada			United States
		MFN	GPT	USA	Canada
2606.00.00	Aluminum ores and concentrates	Free	Free	Free	Free
2818.20.00	Aluminum oxide, other than artificial corundum	Free	Free	Free	Free
7601.10	Unwrought aluminum, not alloyed				
7601.10.10	Billets, blocks, ingots, notched bars, pigs, slabs and wire bars	Free	Free	Free	Free
7601.10.91	Granules, cut from ingots, for use in the manufacture of cleaning compounds	1.85¢/kg	Free	Free	Free
7601.10.99	Other	9.6%	6.5%	Free	Free
7601.20	Unwrought aluminum alloys				
7601.20.10	Billets, blocks, ingots, notched bars, pigs, slabs and wire bars	Free	Free	Free	Free
7601.20.91	Granules, cut from ingots, for use in the manufacture of cleaning compounds	1.83¢/kg	Free	Free	Free
7601.20.99	Other	9.6%	6.5%	Free	Free
7602.00	Aluminum waste and scrap	Free	Free	Free	Free
76.03	Aluminum powders and flakes	8.6-9.6%	Free-6.5%	Free	Free
76.04	Aluminum bars, rods and profiles	2-9.6% BPT - Free	Free-6.5%	Free	Free
76.05	Aluminum wire	2%-9.6%	Free-6.5%	Free	Free
76.06	Aluminum plates, sheets and strip, of a thickness exceeding 0.2 mm	Free-9.6%	Free-6.5%	Free-3%	Free-1.9%
76.07	Aluminum foil not exceeding 0.2 mm	Free-11.4%	Free-8%	Free-3.6%	0.9-1.7%
76.08	Aluminum tubes and pipes	6.5-7.6% BPT - Free	Free	Free	Free
7609.00	Aluminum tube or pipe fittings	9.6%	6.5%	Free	Free
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	9.6%	6.5%	3%	1.7%
7611.00	Aluminum reservoirs, tanks, vats and similar containers, for any material	Free-9.6%	Free-6.5%	Free-3%	0.7%
76.12	Aluminum casks, drums, cans, boxes and similar containers, for any material	9.6%	6.5%	3%	0.7-1.7%
7613.00	Aluminum containers for compressed or liquefied gas	9.6%	6.5%	3%	1.5%
76.14	Stranded wire, cables, plaited bands and the like, of aluminum, not electrically insulated	9.5%	6.5%	3%	1.4-1.7%
76.15	Table, kitchen or other household articles and parts thereof, of aluminum	9.5-10.6%	Free-6.5%	3-3.4%	1.1-1.7%
76.16	Other articles of aluminum	Free-9.6%	Free-6.5%	Free-3%	Free-1.8%

Sources: Customs Tariff, effective January 1995, Revenue Canada; Harmonized Tariff Schedule of the United States, 1995.  
BPT British Preferential Tariff.

**TABLE 1. CANADA, ALUMINUM PRODUCTION AND TRADE, 1993 AND 1994p**

Item No.	1993		1994p	
	(tonnes)	(\$000)	(tonnes)	(\$000)
<b>PRODUCTION</b>	2 308 867	..	2 254 442	..
<b>IMPORTS</b>				
2606.00.00 Aluminum ores and concentrates				
Brazil	1 724 831	54 586	1 645 563	53 377
Guinea	145 014	7 958	527 883	19 756
United States	89 421	9 799	124 379	12 036
Australia	281 448	10 164	159 319	7 146
Guyana	138 703	6 177	161 936	6 805
Sierra Leone	79 595	3 477	144 686	5 188
People's Republic of China	55 947	3 004	65 071	3 919
Other countries	345 733	12 115	100 573	2 965
Total	2 860 692	107 287	2 929 410	111 196
2620.40.00 Ash and residues containing mainly aluminum	2 331	964	3 065	1 540
2818.20.00 Aluminum oxide (excluding artificial corundum)				
Australia	1 755 107	375 213	1 744 925	384 532
Jamaica	675 708	148 271	782 151	174 645
United States	831 865	205 565	715 079	172 039
Brazil	275	180	41 352	9 314
Venezuela	—	—	37 265	7 666
Japan	142	200	7 950	2 470
Germany	423	1 672	780	1 909
Other countries	1 702	2 050	3 527	3 063
Total	3 265 222	733 155	3 333 029	755 645
2818.30.00 Aluminum hydroxide	10 528	7 828	14 807	8 927
7601.10 Unwrought aluminum, not alloyed				
7601.10.10 Billets, blocks, ingots, notched bars, pigs, slabs and wire bars				
United States	18 919	33 446	18 225	40 990
United Kingdom	—	—	11 868	20 962
Russia	13 760	24 269	2 863	4 404
Tajikistan	978	1 237	1 467	2 701
Other countries	549	1 017	1 556	3 062
Total	34 206	59 971	35 979	72 125
7601.10.91 Aluminum granules, unwrought, not alloyed, cut from ingots, for use in the manufacture of cleaning compounds	20	44	—	—
7601.10.99 Other	651	1 460	1 205	3 119
7601.20 Unwrought aluminum, alloyed				
7601.20.10 Billets, blocks, ingots, notched bars, pigs, slabs and wire bars				
United States	52 875	90 385	86 297	175 938
Russia	8 263	11 983	1 774	4 701
United Kingdom	1 354	3 297	1 863	4 118
Norway	—	—	200	913
Ghana	—	—	318	870
Other countries	1 946	3 236	498	1 107
Total	64 438	108 906	90 950	187 651
7601.20.91 Granules, cut from ingots, for use in the manufacture of cleaning compounds	113	144	86	163
7601.20.99 Other	9 743	15 578	13 355	27 483
7602.00.00 Aluminum waste and scrap	53 811	64 728	63 361	86 687
76.03 Aluminum powders and flakes	1 345	4 790	1 744	6 686
76.04 Aluminum bars, rods and profiles				
7604.10 Of aluminum, not alloyed				
United States	3 534	13 389	3 023	14 146
Other countries	56	378	106	545
Total	3 590	13 767	3 129	14 691

TABLE 1 (cont'd)

Item No.	1993		1994p		
	(tonnes)	(\$000)	(tonnes)	(\$000)	
<b>IMPORTS (cont'd)</b>					
7604.21 to 7604.29	Of aluminum alloys				
	United States	3 534	13 389	3 023	14 146
	Other countries	56	378	106	545
	Total	3 590	13 767	3 129	14 691
76.05	Aluminum wire	2 661	11 415	5 993	22 083
76.06	Aluminum plates, sheets and strip, of a thickness exceeding 0.2 mm	318 833	810 151	368 220	1 072
76.07	Aluminum foil not exceeding 0.2 mm	23 495	93 461	25 926	111 602
76.08	Aluminum tubes and pipes	6 944	30 387	7 198	33 984
76.09	Aluminum tube or pipe fittings	..	9 498	..	13 489
		<b>(number 000)</b>		<b>(number 000)</b>	
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	..	44 480	..	50 982
76.11	Aluminum reservoirs, tanks, vats and similar containers	...	1 281	...	104
76.12	Aluminum casks, drums, cans, boxes and similar containers	447 171	55 586	400 745	58 217
76.13	Aluminum containers for compressed or liquefied gas	93	6 613	108	7 705
		<b>(tonnes)</b>		<b>(tonnes)</b>	
76.14	Stranded wire, cables, plaited bands and the like, of aluminum, not electrically insulated	111	434	112	495
76.15	Table, kitchen or other household articles and parts thereof, of aluminum	..	59 095	..	69 497
76.16	Other articles of aluminum	..	103 508	..	118 823
<b>EXPORTS</b>					
2606.00	Aluminum ores and concentrates				
	Switzerland	-	-	2 378	533
	United States	11 312	688	13 133	430
	Netherlands	-	-	371	86
	Total	11 312	688	15 882	1 051
2620.40	Ash and residues containing mainly aluminum	3 709	991	3 018	921
2818.20	Aluminum oxide (excluding artificial corundum)				
	United States	69 305	44 479	68 615	49 301
	Germany	1 964	2 050	1 428	1 662
	Thailand	-	-	173	707
	Other countries	2 213	2 362	1 608	1 905
	Total	73 482	48 896	71 824	53 581
7601.10	Unwrought aluminum, not alloyed				
	United States	684 160	1 048 815	680 513	1 317 297
	Netherlands	205 972	331 945	114 316	203 929
	Japan	56 947	80 584	53 230	96 243
	South Korea	25 647	39 451	44 735	89 263
	United Kingdom	97 047	157 474	26 959	49 590
	Norway	2 364	4 015	9 618	17 848
	Other countries	26 453	42 613	20 299	42 289
	Total	1 098 590	1 704 911	949 670	1 816 468

TABLE 1 (cont'd)

Item No.	1993		1994 <sup>p</sup>		
	(tonnes)	(\$000)	(tonnes)	(\$000)	
<b>EXPORTS (cont'd)</b>					
7601.20	Unwrought aluminum alloys				
	United States	541 244	904 089	713 159	1 510 206
	Japan	107 602	167 309	115 734	224 423
	South Korea	25 871	43 996	31 649	69 145
	Italy	5 420	9 232	15 169	33 745
	Israel	8 936	15 897	8 949	20 720
	Turkey	12 424	22 198	7 021	16 073
	Ireland	1 340	2 256	6 376	15 311
	Netherlands	8 472	14 421	7 956	14 256
	Other countries	36 552	64 227	21 220	48 017
	Total	747 861	1 243 637	927 233	1 951 909
7602.00	Aluminum waste and scrap				
	United States	178 440	218 791	213 488	344 102
	Japan	16 981	24 064	11 788	20 531
	Taiwan	911	763	5 508	6 991
	Hong Kong	1 486	1 278	2 590	3 396
	Other countries	1 136	1 454	1 452	1 982
	Total	198 954	246 356	234 826	377 009
76.03	Aluminum powders and flakes	604	1 215	617	1 164
76.04	Aluminum bars, rods and profiles	21 877	59	67 282	205 139
76.05	Aluminum wire	36 743	66 893	28 727	64 745
76.06	Aluminum plates, sheets and strip, of a thickness exceeding 0.2 mm	217 658	523 369	225 091	611 416
76.07	Aluminum foil not exceeding 0.2 mm	15 085	67 217	20 312	92 421
76.08	Aluminum tubes and pipes	1 424	7 094	1 456	7 094
7609.00	Aluminum tube or pipe fittings	..	3 020	..	6 716
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	..	46 040	..	55 468
		<b>(number 000)</b>		<b>(number 000)</b>	
7611.00	Aluminum reservoirs, tanks, vats and similar containers	2	493	3	670
76.12	Aluminum casks, drums, cans, boxes and similar containers	362 504	55 816	601 154	81 504
7613.00	Aluminum containers for compressed or liquefied gas	183	570	301	1 242
		<b>(tonnes)</b>		<b>(tonnes)</b>	
76.14	Stranded wire, cables, plaited bands and the like, of aluminum, not electrically insulated	3 232	7 052	7 122	20 985
76.15	Table, kitchen or other household articles and parts thereof, of aluminum	..	14 529	..	24 889
76.16	Other articles of aluminum	..	57 698	..	77 297

Sources: Natural Resources Canada; Statistics Canada.

– Nil; .. Not available or not applicable; . . . Amount too small to be expressed; <sup>p</sup> Preliminary.

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



**TABLE 2. CANADA, ALUMINUM SMELTER CAPACITY**

Company	As of December 31, 1994
	(tonnes/year)
Alcan Aluminium Limited	
Quebec	
Grande-Baie	180 000
Arvida	232 000
Isle-Maligne	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	360 000
Aluminerie Alouette Inc.	
Quebec	
Sept-Îles	215 000
Aluminerie Luralco Inc.	
Quebec	
Deschambault	215 000
Total Canadian capacity	2 283 000

Source: Natural Resources Canada.

**TABLE 3. CANADA, CONSUMPTION<sup>1</sup> OF ALUMINUM METAL<sup>4</sup> AT FIRST PROCESSING STAGE, 1991-93**

	1991a	1992a	1993a			
	(tonnes)					
<b>CASTINGS</b>						
Sand	2 974 <sup>r</sup>	2 428 <sup>r</sup>	2 363 <sup>r</sup>			
Permanent mould	71 678 <sup>r</sup>	81 303 <sup>r</sup>	89 222 <sup>r</sup>			
Die and other	57 901 <sup>r</sup>	69 753 <sup>r</sup>	78 625 <sup>r</sup>			
Total	132 554 <sup>r</sup>	153 484 <sup>r</sup>	170 210 <sup>r</sup>			
<b>WROUGHT PRODUCTS</b>						
Extrusions, including tubing	86 280	94 945 <sup>r</sup>	110 798 <sup>r</sup>			
Sheet, plate, coil and foil	141 703	142 619	160 493			
Other wrought products (including rods, forgings and slugs)	76 984	81 461 <sup>r</sup>	121 456 <sup>r</sup>			
Total	304 967	319 025 <sup>r</sup>	392 747 <sup>r</sup>			
<b>OTHER USES</b>						
Destructive uses (deoxidizer, non-aluminum base alloys, powder and paste and other uses)	30 282 <sup>r</sup>	34 236 <sup>r</sup>	35 198 <sup>r</sup>			
Total consumed	467 802 <sup>r</sup>	506 745 <sup>r</sup>	598 155 <sup>r</sup>			
Secondary aluminum <sup>2</sup>	101 503 <sup>r</sup>	127 818	131 174			
	<b>Metal Entering Plant</b>		<b>On Hand December 31</b>			
	1991 <sup>r</sup>	1992	1993	1991 <sup>r</sup>	1992	1993
Primary aluminum ingot and alloys	386 943	405 216 <sup>r</sup>	480 615 <sup>r</sup>	13 753	13 221 <sup>r</sup>	14 613
Secondary aluminum	74 068	88 638	97 157 <sup>r</sup>	4 670	4 803	5 935
Scrap originating outside plant	117 759	161 361	170 484	6 583	5 929	7 231
Total	578 771	655 215 <sup>r</sup>	748 257 <sup>r</sup>	25 007	23 953 <sup>r</sup>	27 778
Aluminum shipments <sup>3</sup>				8 133	21 706	15 548

Source: Natural Resources Canada.

<sup>r</sup> Revised.<sup>a</sup> Increase in number of companies being surveyed. Therefore, closing inventory of previous year does not equal opening inventory of current year.<sup>1</sup> Available data as reported by consumers. <sup>2</sup> Aluminum metal used in the production of secondary aluminum is not included in consumption totals. <sup>3</sup> Aluminum metal shipped without change. Does not refer to shipments of goods of own manufacture. <sup>4</sup> 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	M.W.
		Cash <sup>1</sup>	U.S. Markets <sup>1</sup>
		(US\$/t)	(US¢/lb)
<b>ANNUAL AVERAGES<sup>2</sup></b>			
1984		1 245.6	61.1
1985		1 073.3	48.8
1986		1 150.8	55.9
1987		1 560.9	72.3
1988		2 597.8	110.1
1989		1 951.5	87.8
1990		1 751.8	75.0
1991		1 302.7	59.5
1992		1 254.6	57.5
1993		1 139.4	53.3
1994		1 477.2	71.2
<b>MONTHLY AVERAGES</b>			
1993	January	1 207.10	56.1
	February	1 202.18	55.5
	March	1 151.63	53.5
	April	1 108.80	51.8
	May	1 124.26	52.3
	June	1 165.64	53.8
	July	1 202.50	56.1
	August	1 172.48	55.0
	September	1 115.73	52.5
	October	1 087.45	51.1
	November	1 040.16	49.9
	December	1 094.62	52.2
1994	January	1 174.93	56.0
	February	1 270.30	60.4
	March	1 289.35	61.7
	April	1 279.08	61.4
	May	1 322.93	63.0
	June	1 400.93	67.1
	July	1 492.86	71.9
	August	1 455.77	70.3
	September	1 569.59	77.0
	October	1 698.45	82.6
	November	1 893.07	92.1
	December	1 878.80	90.5

Sources: Natural Resources Canada; *Metals Week*.

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

**TABLE 5. AVERAGE ALUMINUM ALLOY  
(SECONDARY) PRICES, 1993 AND 1994**

Year	Month	LME Alloy <sup>1</sup>	M.W.
		Cash	356 Alloy <sup>2</sup>
		(US\$/t)	(US¢/lb)
<b>ANNUAL AVERAGES</b>			
1993		1 005.2	..
1994		1 452.9	81.3
<b>MONTHLY AVERAGES</b>			
1993	January	..	..
	February	1 038.93	..
	March	1 012.78	..
	April	979.75	..
	May	987.82	..
	June	1 019.23	61.67
	July	1 048.85	62.78
	August	1 015.52	63.28
	September	983.52	60.78
	October	963.71	59.16
	November	932.91	58.88
	December	960.21	62.14
1994	January	1 016.18	65.06
	February	1 126.75	72.19
	March	1 240.57	74.83
	April	1 314.18	76.38
	May	1 330.95	74.50
	June	1 413.30	76.81
	July	1 496.02	80.72
	August	1 526.07	81.78
	September	1 599.57	84.94
	October	1 702.98	90.44
	November	1 842.20	97.07
	December	1 826.08	101.06

Source: *Metals Week*.

.. Not available.

<sup>1</sup> Alloy ingots meeting LME specifications. <sup>2</sup> Aluminum die-cast alloy.

**TABLE 6. WORLD MINE PRODUCTION OF BAUXITE, 1990-93**

	1990	1991	1992	1993 <sup>p</sup>
	(000 tonnes)			
Albania	26.0	8.0	—	—
Australia	41 391.0	40 510.0	39 476.0	41 132.0
Brazil	9 875.6	10 364.2	9 365.6	9 409.8
China <sup>e</sup>	3 655.0	5 926.0	6 000.0	6 500.0
Dominican Republic	85.2	6.5	—	—
France	489.8	183.3	104.0	151.0
Ghana	381.3	333.8	338.2	423.7
Greece	2 495.9	2 133.5	2 042.1	2 155.2
Guinea	16 150.0	17 065.0	15 997.0	17 040.2
Guyana	1 424.0	2 205.6	2 313.0	2 083.0
Hungary	2 559.0	2 037.0	1 721.1	1 561.3
India	5 277.0	4 738.0	4 898.3	5 223.3
Indonesia	1 205.7	1 406.1	803.5	1 320.4
Iran	54.0	80.0	92.0	100.0
Italy	0.3	8.7	97.5	90.1
Jamaica	10 936.7	11 608.6	11 368.0	11 169.1
Kazakhstan	n.a.	3 062.0	3 036.0	3 000.0
Malaysia	398.2	376.4	330.6	68.8
Mozambique	6.6	7.7	8.8	6.0
Pakistan	2.6	4.2	3.5	10.0
Romania	247.0	200.0	173.4	186.6
Russia	n.a.	4 808.0	4 578.0	4 260.0
Sierra Leone	1 455.0	1 288.3	1 262.2	1 122.0
Surinam	3 267.0	3 136.0	3 159.5	3 156.1
Turkey	772.7	483.4	613.0	594.6
U.S.S.R. <sup>e</sup>	9 246.0	n.a.	n.a.	n.a.
United States	495.0	50.0	45.0	40.0
Venezuela	771.4	1 992.3	1 118.0	2 550.0
Ex-Yugoslavia	2 951.0	258.1	798.9	1 794.0
Total world	115 609.0	114 280.7	109 743.2	115 147.0

Sources: Natural Resources Canada; International Consultative Group on Nonferrous Metals Statistics.  
 — Nil; <sup>e</sup> Estimated; n.a. Not applicable; <sup>p</sup> Preliminary.

**TABLE 7. WORLD PRODUCTION OF ALUMINA (HYDRATE), 1990-93**

	1990	1991	1992	1993 <sup>p</sup>
	(000 tonnes)			
Australia	11 231.0	11 713.0	11 783.0	12 598.0
Azerbaijan <sup>e</sup>	n.a.	300.0	300.0	200.0
Brazil	1 654.8	1 742.5	1 833.0	1 833.1
Canada	1 087.0	1 131.0	1 104.0	1 182.0
China <sup>e</sup>	1 464.0	1 522.2	1 582.9	1 894.5
Czechoslovakia <sup>e</sup>	209.0	187.0	142.7	n.a.
France	606.0	538.0	508.0	476.0
Germany	1 172.8	1 148.3	1 128.0	1 110.0
Germany, Democratic Republic of	27.0	n.a.	n.a.	n.a.
Greece	585.0	641.2	632.0	648.5
Guinea	642.1	650.9	603.2	642.3
Hungary	848.0	661.0	555.9	447.3
India	1 334.0	1 435.0	1 484.0 <sup>e</sup>	1 454.0
Ireland	926.5	981.0	1 007.0	1 103.3
Italy	752.0	804.5	762.1	840.1
Jamaica	2 868.8	3 014.6	2 917.2	2 989.4
Japan	890.0	864.3	714.1	704.1
Kazakhstan	n.a.	1 035.0	1 053.0	1 000.0
Romania <sup>e</sup>	440.0	310.0	279.7	293.2
Russia <sup>e</sup>	n.a.	2 670.0	2 582.0	2 706.0
Spain	1 001.6	1 004.0	959.1	1 060.0
Surinam	1 531.0	1 510.0	1 591.0	1 506.0
Turkey	177.1	159.1	156.5	169.2
Ukraine	n.a.	1 272.0	1 229.0	1 250.0
United Kingdom	131.4	120.0	120.0 <sup>e</sup>	120.0 <sup>e</sup>
U.S.S.R. <sup>e</sup>	5 639.0	n.a.	n.a.	n.a.
United States	5 430.0	5 230.0	5 185.0	5 290.0
Venezuela	1 404.8	1 481.0	1 282.8	1 562.9
Ex-Yugoslavia	1 086.0	780.0	340.0 <sup>e</sup>	200.0 <sup>e</sup>
Total world	43 138.9	42 905.6	41 835.2	43 370.7

Sources: Natural Resources Canada; International Consultative Group on Nonferrous Metals Statistics.  
<sup>e</sup> Estimated; n.a. Not applicable; <sup>p</sup> Preliminary.

**TABLE 8. WORLD PRODUCTION OF ALUMINUM, 1991-94**

	1991	1992	1993p	1994e
	(000 tonnes)			
Argentina	168.3	155.6	172.9	170.0
Australia	1 228.6	1 235.5	1 375.6	1 315.0
Austria	80.4	32.9	n.a.	n.a.
Azerbaijan	25.0	24.0	7.0	10.0
Bahrain	213.7	292.5	449.0	450.0
Brazil	1 139.6	1 193.3	1 172.0	1 185.0
Cameroon	85.6	82.5	86.5	86.0
Canada	1 821.6	1 971.8	2 308.9	2 250.0
China <sup>e</sup>	963.0	1 080.0	1 220.4	1 440.0
Czechoslovakia	66.3	62.0	n.a.	n.a.
Dubai	239.0	244.6	242.3	248.0
Egypt	177.7	177.8	178.5	180.0
France	286.1	417.7	426.2	400.0
Germany	690.3	602.8	551.9	500.0
Ghana	173.4	179.0	174.1	140.0
Greece	152.4	152.8	147.7	145.0
Hungary	63.3	26.8	27.9	25.0
Iceland	89.2	89.9	94.2	100.0
India	503.9	496.3	466.4	465.0
Indonesia	174.8	188.8	204.0	215.0
Iran	67.4	79.3	91.5	100.0
Italy	217.7	160.7	155.6	175.0
Japan	32.4	18.9	18.3	17.0
Mexico	50.8	24.8	n.a.	n.a.
Netherlands	263.9	235.1	231.8	225.0
New Zealand	258.5	241.6	266.9	265.0
Norway	885.9	866.5	888.0	855.0
Poland	45.8	43.6	46.9	45.0
Romania <sup>e</sup>	158.4	112.0	112.4	115.0
Russia	2 734.0	2 715.1	2 702.0	2 530.0
Slovakia	n.a.	n.a.	39.7	40.0
South Africa	171.1	174.0	174.7	172.0
Spain	355.2	359.0	355.9	337.0
Surinam	31.0	32.4	30.1	27.0
Sweden	96.9	77.2	82.4	83.0
Switzerland	65.9	52.4	36.4	31.0
Tadjikistan	380.0	345.0	252.0	237.0
Turkey	55.8	58.6	58.5	60.0
Ukraine	111.0	105.0	104.0	100.0
United Kingdom	314.0	244.2	239.1	235.0
United States	4 121.2	4 042.1	3 694.8	3 300.0
Venezuela	609.7	567.4	567.6	635.0
Ex-Yugoslavia	314.0	177.7	100.5	100.0
Total world	19 637.3	19 415.2	19 547.6	18 968.0

Sources: Natural Resources Canada; International Consultative Group on Nonferrous Metals Statistics.  
 – Nil; <sup>e</sup> Estimated; n.a. Not applicable; <sup>p</sup> Preliminary.

TABLE 9. WORLD CONSUMPTION OF ALUMINUM, 1991-94

	1991	1992	1993 <sup>p</sup>	1994 <sup>e</sup>
	(000 tonnes)			
Albania <sup>e</sup>	1.0	1.0	1.0	1.0
Algeria	8.0	8.0	8.0	8.0
Argentina	102.8	108.3	110.0	113.0
Australia	298.0	309.2	339.6	355.0
Austria	168.0	165.0	140.0	155.0
Bahrain	105.8	124.7	114.5	125.0
Bangladesh <sup>e</sup>	15.0	10.0	10.0	10.0
Belgium/Luxembourg	323.0	291.8	270.0	275.0
Brazil	354.2	377.1	363.8	370.0
Bulgaria	n.a.	4.5	2.4	4.0
Canada	408.2	420.3	492.5	510.0
Cameroon	20.1	15.5	19.0	21.0
Chile <sup>e</sup>	5.6	6.0	14.2	15.0
China <sup>e</sup>	938.1	1 246.3	1 318.1	1 500.0
Colombia	22.5	31.2	30.0	30.0
Cuba	1.0	1.0	1.0	1.0
Czechoslovakia	83.0	63.8	n.a.	n.a.
Czech Republic	n.a.	n.a.	38.9	40.0
Denmark	26.4	24.0	20.0 <sup>e</sup>	24.5
Egypt	95.7	57.0	83.8	85.0
Finland	17.4	15.0	16.3	18.0
France	725.9	722.8	665.0	690.0
Germany	1 360.9	1 457.1	1 300.0	1 350.0
Ghana	9.8	32.4	14.7	15.0
Greece	99.4	120.1	118.0	123.0
Hong Kong	36.7	45.9	45.1	45.0
Hungary	96.4	112.3	140.1	145.0
India	430.2	414.3	475.3	495.0
Indonesia <sup>e</sup>	89.5	95.7	138.3	140.0
Iran <sup>e</sup>	120.0	120.0	116.0	120.0
Iraq <sup>e</sup>	1.0	1.0	1.0	1.0
Ireland	6.9	6.0	5.0	6.0
Israel	24.2	21.4	22.0	24.0
Italy	670.2	660.0	554.0	630.0
Japan	2 403.3	2 271.6	2 139.0	2 275.0
Lebanon <sup>e</sup>	10.0	10.0	10.0	10.0
Malaysia	66.6	74.9	81.7	82.0
Mexico	94.4	78.1	97.9	100.0
Netherlands	119.8	123.3	115.0	120.0
New Zealand	18.3	22.3	27.1	30.0
Nigeria	12.0	5.0	7.0	10.0
North Korea <sup>e</sup>	40.0	20.0	20.0	20.0
Norway	157.2	170.0	205.7	200.0
Pakistan	11.1	8.5	10.0	10.0
Peru <sup>e</sup>	5.0	5.0	5.0	5.0
Philippines	17.4	24.9	23.0	25.0
Poland	31.9	54.8	67.7	70.0
Portugal	48.4	58.1	55.0 <sup>e</sup>	55.0
Romania	94.0	20.6	39.4	40.0
Russia	n.a.	1 378.8	1 107.6	900.0
Saudi Arabia	23.9	25.0	25.0	25.0
Singapore	13.5	27.5	22.4	25.0
Slovakia	n.a.	n.a.	23.7	25.0
South Africa	90.8	87.9	78.4	90.0
South Korea	383.3	397.0	524.8	575.0
Spain	297.0	309.0	306.0 <sup>e</sup>	310.0
Sweden	73.3	89.4	97.5	110.0
Switzerland	156.7	145.2	131.1	140.0
Taiwan	262.9	265.8	299.1	320.0
Thailand	146.5	147.4	177.4	180.0
Turkey	114.0	128.6	165.9	165.0
U.S.S.R. <sup>e</sup>	2 409.0	n.a.	n.a.	n.a.
United Arab Emirates	10.4	12.4	14.0	15.0
United Kingdom	412.4	468.0	450.0	500.0
United States	4 124.1	4 534.1	4 877.1	4 908.0
Venezuela	148.4	131.6	146.2	150.0
Vietnam <sup>e</sup>	4.0	7.0	10.0	10.0
Ex-Yugoslavia	140.0	75.0	67.3	60.0
Other	74.4	472.0	169.7	154.0
Total world	18 678.9	18 737.5	18 584.3	19 158.5

Sources: Natural Resources Canada; International Consultative Group on Nonferrous Metals Statistics.  
 – Nil; <sup>e</sup> Estimated; n.a. Not applicable; <sup>p</sup> Preliminary.



**TABLE 10. WESTERN WORLD PRODUCTION OF SECONDARY ALUMINUM,<sup>1</sup> 1991-94**

	1991	1992	1993p	1994e
	(000 tonnes)			
Argentina	9.2	19.1	19.1	19.0
Australia	29.6	40.0	40.0	40.0
Austria	33.6	45.4	43.3	47.0
Belgium	3.0	—	—	—
Brazil	66.4	67.1	76.8	77.0
Canada	67.7	86.0	86.0	90.0
Denmark	12.0	14.1	14.0	14.0
Finland	22.1	27.3	29.9	30.0
France	226.0	235.7	222.4	230.0
Germany	541.6	535.6	408.1	450.0
Iran	39.4	39.4	15.1	15.5
Italy	343.0	353.2	346.1	325.0
Japan	1 096.4	1 073.7	1 005.6	1 100.0
Mexico	63.8	83.6	83.6	85.0
Netherlands	114.3	150.2	150.0	150.0
New Zealand	4.7	6.7	6.7	6.7
Norway	7.0	40.0	40.0	40.0
Portugal	2.0	2.0	2.0	2.0
Spain	96.0	96.5	99.7	100.0
Sweden	18.5	16.5	19.0	19.5
Switzerland	35.8	10.7	4.2	10.0
Taiwan	64.0	64.0	64.0	64.0
United Kingdom	195.1	251.8	274.4	275.0
United States	2 136.8	2 230.4	2 475.6	2 875.0
Venezuela	10.0	34.7	34.7	35.0
Ex-Yugoslavia	50.5	25.0	25.0	25.0
Total world	5 333.5	5 576.6	5 613.3	6 124.7

Sources: Natural Resources Canada; World Bureau of Metal Statistics.

— Nil; e Estimated; p Preliminary.

<sup>1</sup> Excluding the direct use of aluminum in the form of scrap.