## ALUMINUM

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In 2001, 11 domestic companies operated 23 primary aluminum reduction plants in 14 States that produced more than 2.6 million metric tons (Mt) of metal. Montana, Oregon, and Washington accounted for 6% of the production; Maryland, New York, Ohio, and West Virginia, 32%; and other States, 62%. The value of production was estimated to be \$4 billion.

Increased energy costs, particularly in the Pacific Northwest, and low metal prices led several aluminum smelters to continue to reduce production capacity during the year. By midyear, more than 1.6 million metric tons per year (Mt/yr) of primary smelter capacity was closed, a significant increase from the 729,000 metric tons per year (t/yr) of capacity that had been closed at yearend 2000. Only 25,000 t/yr of the 1.64 Mt/yr of engineered capacity for the 10 smelters in the region remained open.

Aluminum recovered from purchased scrap decreased by 14% to 2.98 Mt. Of this recovered metal, 60% came from new (manufacturing) scrap, and 40%, from old (discarded aluminum products) scrap. Aluminum used beverage cans (UBCs) accounted for more than one-half of the reported old scrap consumption in 2001. The recycling rate for aluminum UBCs decreased to 55.4%, compared with 62.1% in 2000.

The transportation and the container and packaging industries remained the largest domestic markets for aluminum products in 2001. The transportation industry accounted for 35% of domestic consumption; containers and packaging, 25%; building and construction, 15%; consumer durables, 8%; electrical, 7%; and other uses, 10%.

U.S. imports for consumption decreased in 2001 compared with those of 2000. Canada remained the largest shipper of aluminum materials to the United States, followed by Russia. Total exports from the United States decreased 10% in 2001.

The price of primary ingot on the domestic and the international markets fluctuated during the year but had a general downward trend. The 2001 monthly average domestic spot price decreased by about 11 cents per pound from January to December. The annual average decreased by almost 6 cents per pound compared with that of 2000.

At the end of 2001, world inventories, as reported by the International Aluminium Institute (IAI), decreased slightly compared with those of 2000. Inventories of primary metal held by the London Metal Exchange Ltd. (LME), however, increased dramatically.

Primary aluminum was produced in 43 countries in 2001. Russia and China surpassed the United States as the world's largest producers, Russia with 14% of the world total, followed by China with 13%. The United States and Canada each accounted for about 11% of the total world production. Despite a more than 1 Mt decline in U.S. output, world primary metal production was relatively unchanged compared with that of 2000.

### Production

**Primary**.—Domestic primary aluminum production, which totaled a reported 2,636,954 metric tons (t), decreased by 28% compared with that of 2000 (table 1). Production data were obtained from the 11 domestic producers, all of whom responded to the request from the U.S. Geological Survey (USGS) for data.

Increased energy costs, low demand, and falling prices led smelters in the Pacific Northwest to continue the cutbacks in production that were begun last year. By midyear, more than 1.6 Mt/yr of capacity in Montana, Oregon, and Washington was closed. All but 25,000 t/yr of capacity at the Goldendale, WA, smelter was closed in the region. Most of the smelters outside of this region were operated at or near their rated or engineered capacity.

Columbia Falls Aluminum Co. closed the remaining two and one-half potlines (84,000 t/yr) at its 168,000-t/yr Columbia Falls, MT, smelter, effective the end of January. The smelter remained closed for the rest of the year (Metal Bulletin, 2001f). There were several more closures announced in January. Kaiser Aluminum & Chemical Corp. closed the remaining 90,000 t/yr of capacity at its 200,000-t/yr Mead (Spokane), WA, smelter (CRU Aluminium Monitor, 2001a). Alcoa Inc. announced the closure of 80,000 t/yr of capacity at its Wenatchee, WA, smelter (Alcoa Inc., 2001a). Alcoa also announced the closure of 70,000 t/yr of capacity at its 278,000-t/yr Intalco smelter in Ferndale, WA (Mining Journal, 2001a). In March, Alcoa announced an additional 70,000 t/yr closure at Ferndale (Alcoa Inc., 20011), and in May, the remainder of smelter was closed (Alcoa Inc., 2001j). On February 27, Alcoa and Michigan Avenue Partners (MAP) announced that the sale of the Longview, WA, aluminum smelter to MAP had been completed (Alcoa Inc., 2001e). On February 28, MAP announced the immediate temporary closure of the 204,000-t/yr smelter (Platts Metals Week, 2001i).

In June, Alcoa and the Chelan Public Utility District (PUD) announced an agreement that the companies hoped would secure future long-term power needs. Alcoa would idle its Wenatchee smelter for approximate 15 months beginning July 1 and return the unused power to PUD. PUD would use the revenue generated from the sale of this returned power to acquire additional power sources for the future (Alcoa Inc., 2001d).

Bonneville Power Administration (BPA), which supplied most of the power to the Pacific Northwest smelters, sought power obligation cuts from the region's aluminum companies of 1,100 megawatts (MW) of capacity. As compensation for curtailing production, BPA paid the companies an average of \$20 per megawatt hour of unused power (Platts Metals Week, 2001d).

Alcoa Generating Corp., a subsidiary of Alcoa, assumed

operation of the 744-MW Warrick, IN, coal-fired powerplant from Southern Indiana Gas & Electric, which had been in charge of the facility for more than 40 years. The onsite powerplant supplied electricity to Alcoa's smelting and fabricating facilities at Warrick (Platts Metals Week, 2001c).

In April, Alcoa began restarting a potline that had been idled since 1992 at its Warrick smelter that would have brought the smelter to its full operating capacity of 309,000 t/yr (Platts Metals Week, 2001p). However, on December 5, Alcoa announced that four of the six potlines at its Warrick plant were forced to shut down owing to power failures at the onsite generating station. Work began immediately to bring the affected potlines back online (Alcoa Inc., 2001n).

Century Aluminum Co. completed the acquisition of the 237,000-t/yr NSA primary aluminum smelter at Hawesville, KY, from Southwire Co. and assumed operating and management control of the facility. Century holds an 80% share of the plant and Glencore AG, the remaining 20%. Southwire continued to operate an adjacent mill that produced aluminum rod and cable. Century entered into a long-term agreement to supply molten aluminum metal to the Southwire mill (Century Aluminum Co., 2001).

Alcoa signed a new 5-year labor agreement with the United Steelworkers of America (USWA). The new contract, which replaced the previous master contract that was scheduled to expire on May 31, 2002, was retroactive to June 1, 2001, and will run through May 31, 2006. It covers 12,000 employees at 19 U.S. facilities (Alcoa Inc., 2001f).

On April 6, Ormet Corp. announced the ratification of a new contract at the Hannibal, OH, rolling mill by members of the USWA. The new contract included increases in wage and pension benefits over the next 4 years along with profit sharing and achievement bonus programs. The agreement expires August 31, 2004 (Ormet Corp., 2001a).

Alcoa announced a \$90 million expansion plan for its sheet and plate facility in Davenport, IA. The plan would increase capacity for aerospace and tooling plate by 30% to meet growing worldwide aerospace demand. The expansion (which included a new state-of-the-art horizontal heat-treat furnace and quench system, a new plate stretcher, and a new plate saw) was expected to be completed by the end of 2002 (Alcoa Inc., 2001h).

Alcoa also announced plans to close its Lebanon, PA, heavygauge aluminum foil rolling mill. The plant produced automotive and appliance fin stock, brazing sheet, and formed container stock (American Metal Market, 2001a).

Ormet announced plans to temporarily curtail production at its Jackson, TN, foil mill. Foil production decreased from a range of 1,100 to 1,400 metric tons per month (t/mo) (2.5 to 3 million pounds per month) to approximately 360 t/mo (800,000 pounds per month) for consumption within the company (Ormet Corp., 2001b).

McCook Metals LLC, an aluminum sheet and plate producer affiliated with MAP, filed for voluntary Chapter 11 bankruptcy protection. MAP purchased the 250,000-t/yr Chicago, IL, rolling mill from Reynolds Metals Co. in June 1998. Scottsboro Aluminum LLC, another MAP affiliate, was forced into involuntary Chapter 11 bankruptcy. Scottsboro Aluminum operated a 140,000-t/yr (300-million-pound-per-year) rolling mill in northern Alabama (Platts Metals Week, 2001b).

Ohio Valley Aluminum Co. acquired Alumnitec Inc.'s Jeffersonville, IN, extrusion plant. The plant had three

extrusion presses—a 1,350-t 6-inch press, a 1,650-t 7-inch press, and a 2,500-t 9-inch press—as well as a paint line (Platts Metals Week, 2001m).

VAW AG announced plans to increase capacity at its extrusion plants in Arizona, Florida, and New York by 25%. VAW planned to add a fifth extrusion press at each of these locations whose total capacity prior to the expansions was more than 54,000 t/yr (120 million pounds per year) (Metal Bulletin, 2001p).

However, aluminum extruder Albex Aluminum Inc. announced that it was shutting down permanently. Albex had provided extrusions to truck trailer manufacturers (Worden, 2001d). Also, William L Bonnell Company, Inc., announced the closure of its El Campo, TX, aluminum extrusion plant. The plant, which Bonnell purchased from Reynolds in 1997, had four extrusion presses and two casting furnaces, as well as fabricated parts production facilities (Platts Metals Week, 2001e).

Alcoa sold its Thiokol Propulsion business to Alliant Techsystems Inc. (Alcoa Inc., 2001g). Thiokol, a supplier of rocket propulsion systems for space launch vehicles, became part of Alcoa with the acquisition of Cordant Technologies in May 2000 (Alcoa Inc., 2001m).

Alcoa and BHP Billiton merged their North American metal distribution services. The deal included Alcoa's Richmond, VA-based Reynolds Aluminum Supply Company (RASCO) and Billiton's U.S.-based Vincent Metal Goods and Canada-based Atlas Ideal Metals. The new 50-50 joint venture company, Integris Metals, will have more than 60 locations in 32 States and throughout Canada (Alcoa Inc., 2001b).

**Secondary.**—Metal recovered from new and old scrap decreased to 2.98 Mt in 2001 (table 3), according to data derived by the USGS from its "Aluminum Scrap" survey. Of the 76 companies and/or plants to which monthly or annual survey requests were sent, 49 responded, which represented 77% of the total scrap consumed, as listed in table 4.

According to figures released by the Aluminum Association Inc., the Can Manufacturers Institute, and the Institute of Scrap Recycling Industries, 55.6 billion aluminum UBCs were recycled in the United States in 2001, for a beverage can recycling rate of 55.4%. For 20 out of the past 21 years, the rate has exceeded 50% (Aluminum Association Inc., 2002a).

In response to increased energy costs, lower demand, and excess supply, several secondary aluminum companies announced closures during the year. Delta Group closed its 3,200-t/mo (7-million-pound-per-month) Muskegon, WI, smelter (Platts Metals Week, 20011).

Wabash Alloys LLC announced several plant closures and consolidations during the year. The 3,200-t/mo (7-million-pound-per-month) secondary alloy plant in Checotah, OK, was closed at the end of February, and production was cut by one-half at the 5,670-t/mo (12.5-million-pound-per-month) Guelph, Ontario, plant. The Russelville, AL, alloy plant with an annual capacity of approximately 32,000 t (70 million pounds) of A380 alloy, was closed in April and was expected to remain closed for about 2 years. The Oak Creek alloy plant near Milwaukee, WI, which had a rated capacity of about 5,000 t/mo (11 million pounds per month) of secondary aluminum alloys, was also closed in April. One of two furnaces at the company's Cleveland facility was taken down, decreasing alloy production capacity by about 2,200 t/mo (5 million pounds per month) (Platts Metals Week, 2001n). Wabash also announced plans to

close its Bellwood, VA, deoxidized aluminum plant and the aluminum foundry and diecasting plant in Syracuse, NY, in 2002. The Bellwood plant had a nameplate capacity of 6,400 t/mo (14 million pounds per month) of aluminum deox, nearly one-half of the total U.S. capacity (Worden, 2001f). The 6,400-t/mo (14-million-pound-per-month) Syracuse plant could be reopened if warranted by future demand (Platts Metals Week, 2001o).

West Coast secondary smelters also faced difficult times during the year. Tri-Alloys Inc., a specification alloy producer in Montclair, CA, operated just one of its two furnaces. A similar 50% capacity reduction reportedly was in effect at Vista Metals Corp.'s Fontana, CA, facility. Two of the three furnaces at Timco/Tandem Co., also in Fontana, CA, were idled. At another smelter, Liston Aluminum Co. in Corona, CA, alloy production had been halted and toll conversion of UBCs substituted (Worden, 2001e). By the end of the year, Liston had filed for Chapter 11 bankruptcy protection from its creditors (Worden, 2001b).

Indalex Aluminum Solutions Group announced the permanent closure of its 102,000-t/yr (225-million-pound-per-year) secondary aluminum billet casting facility in Ahoskie, NC. The plant remelted scrap aluminum, mostly painted aluminum extrusion scrap, and cast it into secondary billet for use by extruders. Indalex also announced a postponement in the construction of a new casting facility in Toronto, Canada, and a delay in the reopening of its Rockwell, TX, cast house. The company cited a slowdown in demand as part of the reason for its decisions (Platts Metals Week, 2001g).

Minerva Aluminum Co. Inc. (Minalco), however, increased capacity at its Minerva, OH, specification aluminum alloy plant. The installation of two additional furnaces increased capacity to 76,200 t/yr (168 million pounds per year) of product, mostly 356 alloys (Worden, 2001c).

Norsk Hydro ASA changed the name of its North American operations to Hydro Aluminum Products-North America (Hamp-N.A.). Hamp-N.A. included the newly completed remelt plant in Henderson, KY, a light metals research and development facility in Michigan, Wells Aluminum (acquired in 1999), and the recent investment in a new aluminum casthouse in Venezuela (American Metal Market, 2001g). In September, Hamp-N.A. announced plans to build a second remelt plant in Commerce, TX. The new 90,000-t/yr plant would use the same technology as the Henderson facility (Metal Bulletin, 2001j).

Wise Alloys LLC announced the planned closure of its Sheffield, AL, plant, which primarily applied coating to can stock and food containers. All coating will be done at the company's Lister Hill plant in Muscle Shoals, AL, which is undergoing a \$30 million modernization. The Lister hill rolling mill produces about 450,000 t/yr (1 billion pounds per year) of aluminum can sheet from UBCs (Platts Metals Week, 2001q). In November, an 80% interest in Wise Alloys was purchased by D'Addario Industries (Worden, 2001a).

#### Consumption

In 2001, the transportation industry accounted for slightly more that 3 Mt of total U.S. shipments of aluminum products (table 6). Shipments to the container and packaging industry, which was the second largest domestic end-use market, was 2.2 Mt. Total shipments of aluminum products to domestic users in 2001 decreased 12% compared with that of 2000. Automotive applications for aluminum increased by 4.5 to 5.4 kilograms (kg) (10 to 12 pounds) per vehicle. The average new family vehicle contained about 116 kg (256 pounds) of finished aluminum components. Casting alloys, such as A319, A380, and A356, dominated the gains in unit content because most of the automakers' new and expanding applications involved parts in the engines, drivelines, and suspension systems that are best served by castings (Wrigley, 2001c).

Despite this increase in per unit content of aluminum, several suppliers to the automotive industry were forced to close their operations. Hayes Lemmerz International Inc., one of the world's largest manufacturers of aluminum and steel automotive wheels, filed for Chapter 11 bankruptcy protection. Hayes said that it could be forced to close more plants than the two that had been announced—Petersburg, MI, and Bowling Green, KY. Twenty-two U.S. plants and one facility in Mexico were part of the bankruptcy filling. The company has 46 plants and half a dozen joint ventures globally, but facilities outside of North America were not included in the petition (Wrigley, 2001a).

American Racing Equipment (ARE), a wholly owned subsidiary of Noranda Inc., closed its Warsaw, KY, manufacturing facility and transferred the plant's production to other facilities within the company. Noranda cited the weak economic conditions and excess wheel industry capacity as reasons for its decision. ARE's other facilities are in Rancho Dominguez, CA, Gardena, CA, and Querétaro, Mexico (Noranda Inc., 2001b).

Intermet Corp. announced the closure of Alexander City Casting Co. The Alabama facility produced automotive components by lost foam casting for Ford Motor Co., General Motors Corp., and Daimler Chrysler AG (Wrigley, 2001b).

The slowdown in the U.S. economy also affected the beverage can industry. Rexam PLC, which entered the U.S. beverage can market following its acquisition of American National Can in the summer of 2000, closed its Houston, TX, (Rexam PLC, 2001a) and Brunswick, NJ, beverage can manufacturing plants. According to the company, the closures were designed to balance capacity and demand in the U.S. beverage can market (Rexam PLC, 2001b).

Ball Corp. announced plans to close its aluminum beverage can manufacturing plant in Moultrie, GA. The 20-year-old plant had two production lines capable of producing about 1 billion cans per year (Ball Corp., 2001a).

Coors Brewing Company and Ball Corp. signed an agreement for the manufacture and supply of approximately 4.5 billion aluminum beverage cans and ends used by Coors annually. The new 50-50 joint venture, Rocky Mountain Metal Container, LLC, will operate Coors existing can and end facilities in Golden, CO (Ball Corp., 2001b).

The transportation and packaging industries account for about one-half of the world's aluminum consumption, whereas about 20% of production goes into the building and construction sector, principally as sheet and extrusions. Aluminum consumption has grown significantly over the past 50 years and has been fueled in part by growth in the building and construction industry. In Europe alone, consumption of aluminum for construction has risen from over 100,000 t/yr in 1960 to more than 1.5 Mt/yr in 2000. Exterior building applications include curtain walling, window frames, exterior cladding (siding) and roofing, greenhouses and conservatories, scaffolding and ladders, and more recently the supporting frames for solar panels. Interior uses include partitions, cast door handles, staircases, and heating and air-conditioning systems (Metal Bulletin Monthly, 2001b).

#### Stocks

Domestic inventories of aluminum ingot, mill products, and scrap held by U.S. producers decreased to 1.30 Mt at yearend 2001 from 1.55 Mt at yearend 2000 (Aluminum Association Inc., 2002b). The LME reported, however, that primary aluminum metal ingot at its U.S. warehouses increased dramatically to 28,500 t at yearend 2001 from a mere 125 t at yearend 2000. The LME also reported that at yearend 2001 its U.S. warehouses still did not hold any stocks of aluminum alloy ingot (London Metal Exchange Ltd., 2001).

### Prices

The monthly average U.S. market price of primary aluminum metal, as reported by Platts Metals Week, fluctuated throughout the year but had a general downward trend. The monthly average price began the year at 75.2 cents per pound and, by December, had fallen to 64.1 cents per pound. The average price for the year decreased from 74.6 cents per pound in 2000 to 68.8 cents per pound in 2001.

The LME average monthly cash price for high-grade primary aluminum ingot and the average monthly spot settlement price for primary aluminum ingot on the Commodity Exchange (COMEX) followed the same general downward trend as the U.S. market price. The 2001 average annual LME cash price was 65.5 cents per pound. The COMEX monthly average spot settlement price declined from 74.8 cents per pound in January to 64.3 cents per pound in December.

Purchase prices for aluminum scrap, as quoted by American Metal Market, also fluctuated during the year. The yearend price ranges for selected types of aluminum scrap were as follows: mixed low-copper-content aluminum clips, 44 to 45 cents per pound; old sheet and cast aluminum, 41 to 42 cents per pound; and clean, dry aluminum turnings, 40.5 to 41.5 cents per pound.

Aluminum producers' buying price range for processed and delivered UBCs, as quoted by American Metal Market, closed lower at yearend. The price range began the year at 53 to 54 cents per pound and closed the year at 44 to 45 cents per pound. Resource Recycling published a monthly transaction price for aluminum UBCs in its Container Recycling Report. During the year, the monthly average decreased significantly from 56.6 cents per pound in January to 46.3 cents per pound in December. The annual average price for aluminum UBCs decreased from 57.7 cents per pound in 2000 to 50.2 cents per pound in 2001.

The yearend indicator prices for selected secondary aluminum ingots, as published in American Metal Market, also decreased compared with those at the end of 2000. The closing prices for 2001 were as follows: alloy B380 (1% zinc content), 68.2 cents per pound; alloy A360 (0.6% copper content), 71 cents per pound; alloy A413 (0.6% copper content), 70.9 cents per pound; and alloy 319, 70 cents per pound. Platts Metals Week published an annual average U.S. price of 63.5 cents per pound for A380 alloy (3% zinc content). The average annual LME cash price for a similar A380 alloy was 53.2 cents per pound.

#### Trade

Total exports of aluminum materials from the United States decreased 10% in 2001 compared with those of 2000 (table 8). Exports of crude metals and alloys and semifabricated material decreased but exports of scrap increased slightly compared with those of 2000 (table 9). About two-thirds of total U.S. exports were accounted for by Canada and Mexico.

For the second consecutive year, imports for consumption decreased compared with those of the previous year (table 10). Canada remained the major source country by supplying almost two-thirds of the total imports in 2001 (table 11). Russia continued to be the second largest supplier of aluminum materials.

#### **World Review**

Despite the temporary closure of production capacity in the Pacific Northwest region of the United States, world production of primary aluminum metal remained relatively stable in 2001 compared with that of 2000 (table 12). Production losses in the United States were offset by increased production in other areas of the world, most notably Canada, China, and Mozambique where new production capacity continued to be brought onstream.

Unwrought aluminum inventories held by members of the IAI decreased slightly to 1.74 Mt at yearend 2001 from 1.79 Mt at yearend 2000. Unwrought aluminum is defined by the IAI as aluminum in its basic cast form made from primary metal or from scrap and which is unworked in the metallurgical sense. IAI total aluminum inventories decreased to 3.02 Mt at yearend 2001 from 3.09 Mt at yearend 2000. Total aluminum is unwrought aluminum plus unprocessed scrap, metal in process, and finished semifabricated (mill) products (International Aluminium Institute, 2002).

Yearend 2001 inventories of primary aluminum metal held by the LME increased dramatically to 821,000 t from 322,000 t at yearend 2000. Aluminum alloy inventories increased also to 121,000 t at yearend 2001 from 88,000 t at yearend 2000 (London Metal Exchange Ltd., 2001).

Industry merger.-On June 29, BHP Limited (BHP) and Billiton Plc (Billiton) announced the completion of their merger to form a diversified resources group to be known as BHP Billiton. BHP Billiton has grouped its major operating assets into the following "Customer Sector Groups" (CSG): Aluminium, Base Metals, Carbon Steel Materials, Stainless Steel Materials, Thermal (Steaming) Coal, Petroleum, and Steel (BHP Billiton, 2001a). The Aluminium CSG contains the aluminum assets formerly held by Billiton. The bauxite mining operations include a 14.8% share in Mineraçao Rio do Norte (MRN) in Brazil, a 76% share in Billiton Maatschappij Suriname (BMS) in Suriname, and an 86% interest in the Worsley bauxite mine in Australia. Alumina refining assets of BHP Billiton comprise a 36% interest in the Alumar refinery in Brazil, a 45% interest in the BMS refinery in Surname, and an 86% share in the Worsley refinery in Australia. Aluminum metal production assets include the wholly owned Bayside and Hillside smelters in South Africa, a 46% interest in both the Alumar and Valesul smelters in Brazil, and a 47.6% share in the Mozambique Aluminium Co. (Mozal) smelter in Mozambique. The attributable annual production capacity from these facilities was approximately 4 Mt of alumina and 1 Mt of aluminum

#### (Billiton Plc, 2001, p. 21-22).

*Armenia.*—Russky Aluminy (Russian Aluminium (RusAl)) increased its equity in the Armenal foil mill in Yerevan from 44% to 74%. The remainder of the company is held by the employees (7%) and the Ministry of Industry (19%) (Interfax Mining & Metals Report, 2001b). Voest-Alpine Industrieanlagenbau reportedly signed a contract with Armenal to upgrade six foil rolling mills at the plant. Upon completion of the upgrade, production was expected to triple (Interfax Mining & Metals Report, 2001c).

*Australia.*—Privately owned Aldoga Aluminium Pty. Ltd. announced a proposal to build a 500,000-t/yr smelter near Gladstone in Queensland. The \$1.65 billion smelter was expected to use Alcoa technology. Aldoga reportedly had agreements in place with local generators to provide 850 MW of generating capacity for the project. Environmental impact studies as well as engineering and design work was expected to be completed in 2002 (Platts Metal Week, 2001j).

Comalco Limited has begun an environmental impact study on the possible expansion of its 450,000-t/yr Boyne Island smelter to 600,000 t/yr. If a decision is made to proceed with the expansion, the additional capacity was not expected to come onstream until late in the decade (American Metal Market, 2001d).

VAW announced plans to spend about \$50 million on improvements at its 150,000-t/yr Kurri Kurri smelter in New South Wales. The upgrade of the existing pots was expected to reduce costs and emissions and to raise product quality. VAW was also considering the addition of a fourth potline, which would increase annual capacity at the smelter by 100,000 t. The company stated that the decision to expand would be dependent on the availability of a long-term, competitive electric power supply (Metal Bulletin, 2001q).

Capral Aluminium Limited closed its Granville remelt facility in Sydney, which recycled aluminum scrap from the company's extrusion plants throughout Australia. The scrap generated at these plants would be sold to other remelt operations (Metal Bulletin, 2001d).

**Bahrain**.—Aluminium Bahrain (Alba) will expand production at its 500,000-t/yr primary aluminum smelter to 750,000 t/yr, making Alba one of the largest single-site smelters in the world. The \$1.7 billion project includes the construction of a fifth potline, a new power station, a casthouse and carbon department, as well as fume treatment plants, raw material silos, a road network, and various utilities and services. Construction, which could begin in the first half of 2002, was expected to take 33 months to complete, with the first metal being produced after 28 months (Aluminium Bahrain, 2001).

**Bosnia and Herzegovina.**—In October, Aluminijj d.d. Mostar put into operation 10 fully upgraded electrolytic cells at its 92,000-t/yr smelter, marking the start of a modernization project that was scheduled for completion in 2002. All 256 cells at the smelter will be converted from side-worked cells to center-worked point feeder cells increasing capacity by 6,000 t/yr. Operating the cells at a higher amperage would increase capacity by an additional 16,000 t/yr, bringing the final smelter capacity to 114,000 t/yr upon completion of the project (Metal Bulletin Monthly, 2001a).

**Brazil**.—Drought conditions forced the Brazilian government to impose electricity rationing on the country's high-energy-consuming industries, including the aluminum industry. Smelters in the southeast and northeast were subject to a 25%

reduction in electricity consumption beginning June 1, while those in the north were subject to similar rationing on July 1. As a result, temporary curtailments in production were announced at aluminum smelters throughout the country (American Metal Market, 2001b).

Alcoa reduced production at its 90,000-t/yr Poços de Caldas smelter by 25%, or 22,500 t/yr, on June 1 and another 22,500 t/yr on September 4. Production at the 370,000-t/yr Alumar smelter in São Luis was cut by 63,000 t/yr on July 1 and an additional 29,500 t/yr on September 4 (Alcoa Inc., 2001i).

Alcan Inc. announced production cuts at its two smelters on June 1—7,900 t at its 51,000-t/yr Ouro Preto smelter and 8,100 t at its 58,000-t/yr smelter in Aratu (Metal Bulletin, 2001a).

Cia Brasileira de Alumínio (CBA) reported that production at its 240,000-t/yr smelter at Sao Paulo was reduced by 30,000 t/yr on June 1 (Platts Metals Week, 2001f).

Companhia Vale do Rio Doce (CVRD) reported that the company would reduce power usage at its 369,000-t/yr Alumínio Brasileiro S.A. (Albrás) smelter by 15.6% on July 1, resulting in a 31,000-t drop in production for the year (Platts Metals Week, 2001a). An additional reduction of 10,000 t, which took effect in August, reduced power consumption at the smelter by a total of 25% (Metal Bulletin, 2001c). CVRD also announced a 25% cut in production at its 94,000-t/yr Valesul smelter (CRU Aluminium Monitor, 2001b).

In December, CVRD inaugurated a 45,000-t/yr expansion at its Albrás smelter. Work on the \$55 million expansion, which began early in 2001, was completed in October, but was not brought onstream because of the energy rationing policy. The expansion increased capacity at the plant to 406,000 t/yr making it the largest aluminum smelter in Brazil (American Metal Market, 2001c).

*Canada.*—Alcan launched festivities marking the 100th anniversary of the first aluminum casting in Canada by donating the buildings where the historic event took place to the Corporation de la Cité de l'Énergie, a non-profit organization dedicated to promoting the industrial history of the region. Aluminum was cast for the first time at Shawinigan, Québec, on October 22, 1901. The original facilities comprised an aluminum smelter and a cable mill (Alcan Inc., 2001e). On March 1, Alcan Aluminium Limited changed its legal company name to Alcan Inc. (Alcan Inc., 2001c).

Preliminary studies have begun on two new aluminum smelter projects. KAI Technology & Development (KTD) is finishing a pre-feasibility/feasibility study for a 360,000-t/yr smelter in Port Alberni near Vancouver, British Columbia. The estimated capital cost was \$1.5 billion, and the project reportedly would use KTD 160 thousand amp (kA) prebake technology (Regan, 2001a). Alcoa has signed a letter of intent with the Province of Newfoundland and Labrador to conduct a feasibility study on the construction of a hydro-electric powerplant on the Churchill River and an aluminum smelter that would use a portion of the plant's power (Regan, 2001b).

Because of low water levels in the Nechako reservoir and subsequent power shortages, Alcan reduced production at its 275,000-t/yr Kitimat, British Columbia, aluminum smelter by 50% over the course of the year (Alcan Inc. 2001b).

Alcan announced several closures and divestments as part of its restructuring plans. Alcan sold its Palco foil container plant in Madrid to Aliberico SA of Spain and 12 presses for smooth wall containers in Ohle, Germany to Alupak AG of Switzerland. These transactions were part of the divestment requirements imposed by the European Commission as a condition to its approval of the merger between Alcan and Alusuisse Group Ltd. in October 2000 (Alcan Inc., 2001d).

In addition, Alcan's foil fabrication plant in St. Laurent, Québec, was scheduled to close and transfer its operations to the company's foil fabrication plant in Toronto. The food flexible packaging plant in Toronto would be consolidated with the Weston, Ontario, plant. The food flexible plant in Carson, CA, was scheduled for closure. Extrusion operations in Malaysia and Thailand were expected to be sold in 2002. Alcan signed letters of intent to sell its glass packaging operations in Park Hills, MO, and in Mays Landing, Williamstown, and Millville, NJ, as well as its 46%-owned joint venture in Beijing, China, to Stölzle Oberglas, an Austrian packaging manufacturer. Alcan also agreed to sell its two Pharmatech rubber stopper and aluminum seals operation in Salisbury, MD, to Helvoet Pharma of Belgium (Alcan Inc., 2001a).

*Chile.*—Proyecto Alumysa Ltda., an affiliate of Noranda Inc., filed an Environmental Impact Study with the Environmental National Commission of Region XI, in southern Chile, for the construction of an aluminum smelter and its related hydroelectric facilities. The smelter was expected to have an annual capacity of 400,000 t (Noranda Inc., 2001a).

*China.*—Alcoa announced that it had finalized an agreement for a strategic alliance with Aluminum Corporation of China Limited (Chalco). Under the agreement, Alcoa and Chalco formed a 50-50 joint venture at Chalco's facilities in Pingguo and have agreed to increase capacity at both the refinery and smelter. There were plans to expand the 135,000-t/yr smelter by 220,000 t/yr, which would bring total capacity at the smelter to 355,000 t/yr by 2006 (Alcoa Inc., 2001c).

The Qingtongxia Aluminium Smelter in Ningxia reported the completion of a 200 kA potline that more than doubled its annual capacity from 100,000 t to 240,000 t. Initial output at the plant increased to 140,000 t/yr. Production will be increased gradually to reach full capacity (Wong, 2001).

Lanzhou Aluminium Plant completed a 120,000-t/yr expansion project that increased capacity at its smelter in Gansu to 205,000 t/yr. Increased production will be phased in over 2002 (Platts Metals Week, 2001h).

Novar plc, the parent company of Indalex, acquired 25% of China Aluminum Group, Asia's largest producer of aluminum extrusions. The acquisition reportedly strengthened Indalex's manufacturing and marketing capabilities and broadened its range of specialty extrusion, fabrication, and finishing products. Company officials said that the combined companies would become the world's second largest aluminum extruder (Indalex Aluminum Solutions Group, 2001).

*France.*—Pechiney was considering the possibility of building a new 450,000- to 500,000-t/yr smelter using its AP50 technology. Sites under consideration were Argentina, Australia, and South Africa, all of which had the potential to provide a cheap power source (Lauchlan, 2001). The AP50 technology is a higher amperage (500 kA per cell) development of the company's AP30 technology (Mining Journal, 2001f). The projected aluminum production capacity of one AP50 potline is 460,000 t/yr (Lauchlan, 2001).

*Iceland*.—On June 11, production began at the 30,000-t/yr expansion of the Nordic Aluminum (Nordural) smelter in Grundartangi. The expansion increased production capacity at the smelter to 90,000 t/yr (Nordic Aluminum, 2001).

India.—The Government of India sold a 51% interest in

Bharat Aluminum Co. (Balco) to Sterlite Industries. Balco's Korba complex consists of a 100,000-t/yr aluminum smelter, a 200,000-t/yr alumina refinery, and a 40,000-t/yr rolling mill. Following the announcement of the sale, workers walked off the job at the Korba complex (Mining Journal, 2001d), and molten metal froze in all of the smelter's 408 pots. Ten weeks later, workers returned to their jobs. However, full production was not restored at the smelter until December (Metal Bulletin, 2001e).

Hindalco Industries Limited commissioned the ninth potline at its 242,000-t/yr Renukoot smelter, adding 33,000 t/yr of capacity. Hindalco expected to complete the 100,000-t/yr expansion by the end of 2003, at which time the smelter's total annual capacity would reach 342,000 t (Metal Bulletin, 2001g).

Indian Aluminum Co. Ltd. (Indal) announced that it would increase capacity at its Hirakud aluminum smelter to 60,000 t/yr by moving 200 pots from its Belgaum smelter in Karnataka, which was closed in 1995. Some 44 pots were moved from Belgaum to Hirakud in 1998 raising capacity from 25,000 t/yr to 31,000 t/yr (Mining Journal, 2001e).

*Iran.*—Almahdi Aluminum Corp.'s primary aluminum smelter at Bandar Abbas failed to reach its full production capability as originally expected (Plunkert, 2002, p. 6.7). Funding problems reportedly slowed progress at the 110,000-t/yr smelter (Mining Journal, 2001c).

*Korea, Republic of.*—Alcoa purchased Dooray Air Metals Co. Ltd.'s aluminum extrusion assets in Changwon. The Changwon facility produces hard alloy extrusions for the industrial, transportation, defense, and aerospace industries. It is the only facility in Korea capable of producing aerospace hard alloy extrusion products (Alcoa Inc., 2001k).

*Mexico.*—IMCO Recycling Inc. formed a joint venture with Reciclaje y Maquila, S.A. de C.V. to recycle aluminum drosses and other scrap under a contract with Nemak, S.A. The facility, located next to Nemak's cylinder head foundry in Monterrey, was expected to have an annual capacity of 450,000 t (1 billion pounds) of aluminum and molten metal delivery capability. The joint venture is known as IMCO Reciclaje de Nuevo Leon S. de R.L. de C.V. (IMCO Recycling Inc., 2001).

*Mozambique.*—The joint owners of Mozal announced plans to expand their primary aluminum smelter near Maputo. The \$860 million project (Mozal 2) will double capacity at the 253,000-t/yr smelter to 506,000 t/yr. Ownership of Mozal 2 has been aligned with that of Mozal 1 with BHP Billiton holding a 47.11% interest; Mitsubishi Corp. of Japan, 25%; Industrial Development Corp. of South Africa, 24.04%; and the Government of Mozambique, 3.85%. Construction began in June and commissioning of the additional potline was scheduled for late 2003, with full production expected 6 months later (BHP Billiton, 2001b).

*Netherlands.*—SNC-Lavalin signed a services agreement with Pechiney to provide project engineering and construction management services for the modernization of the Vlissingen primary aluminum smelter. Pechiney expected the modernization program, scheduled for completion in late 2003, to increase capacity at the 175,000-t/yr smelter by 25% (Mining Journal, 2001b).

*New Zealand*.—Drought conditions and rising electricity prices forced Comalco New Zealand to decrease production at its 330,000-t/yr Tiwai Point primary aluminum smelter by 5.7% resulting in an annual production loss of about 19,000 t (Metal Bulletin, 2001m, n).

*Norway.*—Elkem ASA approved the acquisition by Alcoa of additional shares in the company. The purchase increased Alcoa's stake in Elkem to 39.5% (Metal Bulletin, 2001t).

Norsk Hydro started operating the new cold rolling and slitting system at its Holmestrand rolling mill. The new system produces thinner aluminum coil and will enable the company to supply the automotive heat transfer sector. Production capacity at Holmestrand, which uses secondary aluminum, increased from just over 70,000 t/yr to 90,000 t/yr (Metal Bulletin, 2001i).

**Poland**.—Austrian-based trading group Hovis GmbH bought the 50,000-t/yr Alumetal secondary aluminum smelter from Grupa Kety. The smelter produced casting alloys for the automotive industry and deox ingot for Polish steelmakers (Metal Bulletin, 2001h).

**Russia**.—As part of an ongoing modernization project, RusAL commissioned 64 new anodes at its 800,000-t/yr Krasnoyarsk smelter. This conversion of one-half of a bake insitu potline to new pre-bake technology increased high-grade aluminum production capacity at the smelter by 20,000 t/yr (Interfax Mining & Metals Report, 2001a).

JSC Volkov and JSC Pikalevo completed their merger and formed a new joint-stock company, JSC Metallurg. The merger of the 25,000-t/yr Volkov smelter and the 268,000-t/yr Pikalevo refinery was more of an internal corporate restructuring than a joining of separate groups since both companies were owned by the same proprietors (Metal Bulletin, 2001s).

In July, SUAL Holding announced the acquisition of the 140,000-t/yr Volgograd smelter. Earlier in the year, SUAL acquired a 37% interest in the 68,000-t/yr Nadvoitsky smelter (American Metal Market, 2001i).

RusAl appointed SNC-Lavalin to prepare a feasibility study for the possible expansion of its Sayansk primary aluminum smelter. The expansion project reportedly would increase capacity at the smelter to 660,000 t/yr from 400,000 t/yr (Platts Metals Week, 2001k).

*Slovakia.*—Norsk Hydro and the European Bank for Reconstruction and Development (EBRD) acquired a controlling interest in the 110,000-t/yr Slovalco aluminum smelter in Zar-Nad-Hronom. Norsk Hydro and EBRD purchased 40.8% of the outstanding shares of stock from the state-owned holding company, Zavod Slovenskeho Narodneho Povstania (ZSNP) for \$76.5 million, giving each company 40% of the voting shares of Slovalco. ZSNP retained the remaining 20% of the shares. The deal also gives Norsk Hydro the option to take over EBRD's shares prior to the end of 2006. Slovalco embarked on an \$80 million expansion project. Based on Norsk Hydro's potroom technology, HAL230, the project was expected to add 37,000 t/yr of capacity. Upon completion in 2004, capacity at the smelter would increase to 155,000 t/yr (Norsk Hydro ASA, 2001).

*Sweden.*—Sapa AB reached an agreement on the sale of its aluminum foil rolling operations to Pechiney and Comital SpA for \$131 million. Pechiney purchased the Dudelange plant in Luxembourg and the Flemalle facility in Belgium, which have a combined production capacity of 50,000 t/yr. Italy's Comital acquired the rolling mill located in Skultana, Sweden (American Metal Market, 2001h).

Elkem acquired a controlling interest in Sapa, representing 35.7% of issued shares and votes in the company (Elkem ASA, 2001).

*Thailand.*—The increased demand for aluminum in automotive applications for both the domestic and export

markets prompted the expansion of aluminum facilities in Thailand. MC Aluminum (Thailand) announced the installation of a new furnace at its secondary smelter in Chachengsao. Capacity at the smelter, which produced aluminum alloys for castings, increased to 20,000 t/yr. MC Aluminum (Thailand) is owned by MC Aluminum (Japan), 45%; Enkai Corp., one of Japan's largest manufacturers of cast aluminum auto and motorbike wheels, 40%; and Mitsubishi Corp., 15% (Metal Bulletin, 2001k).

Muang-Max (Thailand) doubled the capacity of its extrusion plant to 360 t/mo. The plant produced extruded aluminum tubes for heat exchangers used in automotive air conditioning systems. Muang-Max (Thailand) is owned by Mitsubishi Aluminum, 33%; MALC-Thailand, 17%; Muang-Thong Aluminum Industry, 34%; and 8% each by Mitsubishi Corp. and THAI-MC (Metal Bulletin, 20011).

*Turkey*.—Eti Holdings announced a \$300 million modernization project at its 60,000-t/yr primary aluminum smelter. Upon completion, capacity at the Seydisehir smelter would increase to 110,000 t/yr (Mining Journal, 2001g).

*Ukraine.*—The Ukrainian high court overturned the sale of the Government's 68% interest in the Zaporozhye Aluminum Works (ZALK) to Kremenchug Auto Works (Kraz) Foreign Trade Company, which had been announced late last year (Plunkert, 2002, p. 6.9). The State Property Fund then signed an agreement with AvtoVAZ-Invest whereby AvtoVAZ-Invest would purchase 68% of ZALK for \$70 million, as well as assuming the plant's debt and agreeing to undertake a \$200 million, 5-year modernization program. The modernization program would increase capacity at the 110,000-t/yr smelter to 200,000 t/yr. The State planned to retain a 25% stake in the smelter and the employees held the remaining 7%. AvtoVAZ-Invest was a joint venture between Russian auto maker AvtoVAZ and trader Arlan and reportedly was backed by Russia's Vnesheconombank (Metal Bulletin, 2001o).

**United Kingdom**.—Pechiney acquired British Aluminum Specialty Extrusions from Luxfer Holdings Plc. The plant, which operated three extrusion presses with a combined capacity of 10,000 t/yr, manufactured hard alloy aluminum extrusions for transportation and general engineering applications (Pechiney, 2001).

Later in the year, Luxfer agreed to purchase an aluminum gas-cylinder manufacturing facility from Pechiney. The French facility, Societe Metallurgique de Gerzat, reportedly produced 400,000 high-pressure cylinders per year. High-pressure aluminum cylinder uses include fire extinguishers, breathing apparatus, diving equipment, medical and industrial gases, beverage dispensers, and, in recent years, paint-ball guns (American Metal Market, 2001f).

IMCO announced plans to build a \$7.4 million aluminum scrap and dross recovery plant in Warrington. The new plant would be used to recover aluminum from dross and other production residues generated at Alcan's aluminum UBC plant also located in Warrington. Plans called for the new plant to use a gas-fired tilting rotary furnace and to produce about 35,000 t/yr of secondary aluminum (American Metal Market, 2001e).

*Venezuela.*—Corporación Venezolana de Guayana (CVG) announced the restart of production on Potline 1 at its Aluminios del Caroni, S.A. (Alcasa) aluminum smelter. Potlines 1 and 2, which were taken offline in 1998, are being modernized and should be fully operational by mid-2002.

Glencore AG, which is investing \$16 million in the project, will be reimbursed with metal produced by the two lines over the next 2 years. The reactivation of these lines, each with a capacity of 25,000 t/yr, will increase capacity at the smelter to 210,000 t/yr (Metal Bulletin, 2001b).

CVG also announced that it had undertaken the administrative unbundling of its four aluminum sector companies—Alcasa, Industria Venezolana de Aluminio C.A. (Venalum), CVG Bauxilum C.A. (Bauxilum), and CVG Carbones del Orinoco C.A. (Carbonorca). Corporación Aluminios de Venezuela (Cavsa), the state-owned holding company that was formed in 1997 to facilitate the sale of these companies as a single block, was dissolved at the end of the year. The four companies will continue to be state-owned through CVG but would revert to the management structures they had prior to 1997 (Kinch, 2001).

*Vietnam*.—Vietnam National Mineral Corp. (Vimico) announced plans to construct a 73,000-t/yr primary aluminum smelter in Lam Dong Province. Plans originally called for a 100,000-t/yr smelter but were scaled back because of tight energy supplies. Pechiney was expected to provide technological support for the \$600 million project (Metal Bulletin, 2001r).

#### **Current Research and Technology**

Alcoa announced that a new technology for the treatment of spent potliners has been approved by the Environmental Protection Authority of Victoria, Australia. The Alcoa Portland SPL Process reportedly renders harmless what has been classified as a hazardous waste in many countries including the United States. The process produces aluminum fluoride and a granulated vitreous material referred to as "synthetic sand." The aluminum fluoride can be used in the aluminum smelting process and the synthetic sand has been approved for use in commercial applications such as roadmaking and concrete (Alcoa Inc., 2001o).

#### Outlook

The world aluminum market continued to be in an oversupply situation during the first half of 2002. By mid-June, inventories on the LME had risen to more than 1.2 Mt. Aluminum demand was showing some signs of increasing but did not appear to be high enough to draw down inventories and to absorb the production from new and/or previously idled capacity that was coming onstream.

Demand is expected to increase over the next few years as the world economies begin to grow. If announced expansion plans are completed, then supply should be adequate to meet the anticipated growth in demand.

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## TABLE 1 SALIENT ALUMINUM STATISTICS 1/

#### (Thousand metric tons, unless otherwise specified)

	1997	1998	1999	2000	2001
United States:					
Primary production	3,603	3,713	3,779	3,668	2,637
Value (million dollars)	\$6,120	\$5,360	\$5,470	\$6,030	\$4,000
Price (average cents per pound), U.S. market (spot)	77.1	65.5	65.7	74.6	68.8
Inventories (December 31):					
Aluminum industry 2/	1,860	1,930	1,870	1,550	1,300
LME stocks in U.S. warehouses 3/	8	13	14	(4/)	28
National Defense Stockpile	(4/)				
Secondary recovery: 5/	3,550	3,440	3,690	3,450	2,980
New scrap	2,020	1,950	2,120	2,080	1,770
Old scrap	1,530	1,500	1,570	1,370	1,210
Exports (crude and semicrude)	1,570	1,590	1,640	1,760	1,590
Imports for consumption (crude and semicrude)	3,080	3,550	4,000	3,910	3,740
Aluminum industry shipments 6/	8,880	9,260	9,840	9,830 r/	8,640
Supply, apparent 7/	8,740	9,040	9,890	9,610	8,000
Consumption, apparent 8/	6,720	7,090	7,770	7,530	6,230
World, production	21,700	22,600	23,600	24,400 r/	24,400 e/

e/ Estimated. r/ Revised. -- Zero.

1/ Data are rounded to no more than three significant digits, except "Primary production."

2/ Includes ingot, semifabricated material, and scrap. 1997 and 1998 data from Current Industrial Reports, Series M33-D, U.S. Department of Commerce, U.S. Census Bureau. 1999 through 2001 data from the Aluminum Association Inc.

3/ Includes aluminum alloyed material.

4/ Less than 1/2 unit.

5/ Metallic recovery from purchased, tolled, or imported new and old scrap expanded for full industry coverage.

6/ Shipped to domestic industry.

7/ Defined as domestic primary metal production plus secondary recovery plus imports minus exports plus adjustments for Government and industry stocks changes.

8/ Apparent supply less recovery from purchased new scrap.

	Yearend cap	acity	
	(thousand met	ric tons)	
Company	2000	2001	2001 ownership
Alcan Aluminum Corp., Sebree, KY	186	196	Alcan Inc., 100%.
Alcoa Inc.: 2/			
Alcoa, TN	210	210	Alcoa Inc., 100%.
Badin, NC	115	120	Do.
Evansville, IN (Warrick)	300	309	Do.
Ferndale, WA (Intalco)	272	278	Alcoa Inc., 61%; Mitsui & Co. Ltd., 32%; YKK Corp., 7%
Frederick, MD (Eastalco)	174	192	Do.
Massena, NY (St. Lawrence)	123	125	Alcoa Inc., 100%.
Massena, NY	125	130	Do.
Mount Holly, SC	215	212	Alcoa Inc., 50.3%; Century Aluminum Co., 49.7%.
Rockdale, TX	315	340	Alcoa Inc., 100%.
Troutdale, OR	121	121	Do.
Wenatchee, WA	220	227	Do.
Total	2,190 r/	2,260	
Century Aluminum Co.:			
Hawesville, KY	237	237	Century Aluminum Co., 80%; Glencore AG, 20%.
Ravenswood, WV	168	170	Century Aluminum Co., 100%.
Total	405	407	-
0 0 1 1 1 0 11			

 TABLE 2

 PRIMARY ANNUAL ALUMINUM PRODUCTION CAPACITY IN THE UNITED STATES, BY COMPANY 1/

See footnotes at end of table.

## TABLE 2--Continued PRIMARY ANNUAL ALUMINUM PRODUCTION CAPACITY IN THE UNITED STATES, BY COMPANY 1/

	Yearend c	1 2	
	(thousand m		
Company	2000	2001	2001 ownership
Columbia Falls Aluminum Co., Columbia Falls, MT	168	168	Glencore AG, 100%.
Goldendale Aluminum Co., Goldendale, WA	168	168	Private interest, 60%; employees, 40%.
Kaiser Aluminum & Chemical Corp.:			
Mead, WA (Spokane)	200	200	MAXXAM Inc., 100%.
Tacoma, WA	73	73	Do.
Total	273	273	
Longview Aluminum, L.L.C., Longview, WA	204	204	Michigan Avenue Partners, 100%.
Noranda Aluminum Inc., New Madrid, MO	222	230	Noranda Mines Ltd., 100%.
Northwest Aluminum Corp., The Dalles, OR	82	82	Private interests, 100%.
Ormet Primary Aluminum Corp., Hannibal, OH	257	257	Ormet Corp., 100%.
Vanalco Inc., Vancouver, WA	116	116	Vanalco Inc., 100%.
Grand total	4,270	4,370	

r/ Revised.

1/ Data are rounded to no more three significant digits; may not add to totals shown.

2/ Individual plant capacities in 2000 are U.S. Geological Survey estimates based on company reported total.

# TABLE 3U.S. CONSUMPTION OF AND RECOVERY FROM PURCHASED NEW<br/>AND OLD ALUMINUM SCRAP, BY CLASS 1/ 2/

#### (Metric tons)

		Calculated	d recovery
Class	Consumption	Aluminum	Metallic
2000:			
Secondary smelters	1,960,000	1,350,000	1,450,000
Integrated aluminum companies	1,060,000	873,000	930,000
Independent mill fabricators	800,000	689,000	736,000
Foundries	95,600	80,200	85,800
Other consumers	14,600	14,600	14,600
Total	3,940,000	3,010,000	3,220,000
Estimated full industry coverage	4,220,000	3,220,000	3,450,000
2001:			
Secondary smelters	1,640,000	1,140,000	1,230,000
Integrated aluminum companies	946,000	772,000	823,000
Independent mill fabricators	695,000	601,000	642,000
Foundries	89,000	74,800	80,000
Other consumers	12,100	12,100	12,100
Total	3,390,000	2,600,000	2,790,000
Estimated full industry coverage	3,630,000	2,790,000	2,980,000

1/ Excludes recovery from other than aluminum-base scrap.

2/ Data are rounded to no more than three significant digits; may not add to totals shown.

#### TABLE 4 U.S. STOCKS, RECEIPTS, AND CONSUMPTION OF PURCHASED NEW AND OLD ALUMINUM SCRAP AND SWEATED PIG IN 2001 1/ 2/

#### (Metric tons)

	Stocks,	Net	Consump-	Stocks,
Class of consumer and type of scrap	January 1	receipts 3/	tion	December 31
Secondary smelters:	_			
New scrap:	_			
Solids	18,300	253,000	252,000	19,900
Borings and turnings	9,660	265,000	270,000	5,040
Dross and skimmings	4,080	423,000	424,000	3,260
Other 4/	3,060	176,000	178,000	1,170
Total	35,100	1,120,000	1,120,000	29,300
Old scrap:	_			
Castings, sheet, clippings	4,730	309,000	307,000	6,320
Aluminum-copper radiators	1,710	16,500	16,500	1,660
Aluminum cans 5/	1,350	94,300	94,300	1,390
Other 6/	5,990	91,700	92,100	5,620
Total	13,800	512,000	510,000	15,000
Sweated pig	191	10,500	10,500	137
Grand total	49,100	1,640,000	1,640,000	44,400
Integrated aluminum companies, foundries, independent				
mill fabricators, other consumers:				
New scrap:	_			
Solids		727,000	734,000	9,600
Borings and turnings	318	17,800	17,800	352
Dross and skimmings	137	8,490	8,480	148
Other 4/	6,710 r/	158,000	157,000	7,770
Total	23,800 r/	911,000	917,000	17,900
Old scrap:				
Castings, sheet, clippings	6,940	135,000	137,000	4,210
Aluminum-copper radiators	241	5,270	5,180	324
Aluminum cans	26,900	656,000	651,000	31,500
Other 6/	22	29,800	29,800	22
Total	34,100	825,000	823,000	36,000
Sweated pig	179	1,490	1,640	33
Grand total	58,100 r/	1,740,000	1,740,000	53,900
All scrap consumed:			, ,	,
New scrap:	_			
Solids	- 35,000 r/	980,000	985,000	29,500
Borings and turnings	9,970	283,000	288,000	5,400
Dross and skimmings	4,210	431,000	432,000	3,410
Other 4/	9,770 r/	334,000	335,000	8,940
Total	58,900 r/	2,030,000	2,040,000	47,200
Old scrap:		,,	,,	,200
Castings, sheet, clippings	11,700	444,000	445,000	10,500
Aluminum-copper radiators	1,960	21,700	21,700	1,990
Aluminum cans	28,300	750,000	745,000	32,900
Other 6/	6,010	121,000	122,000	5,640
Total	47,900	1,340,000	1,330,000	51,000
Sweated pig	370	12,000	12,200	170
Grand total	- <u>107,000 r/</u>	3,380,000	3,390,000	98,400
	107,000 1/	5,500,000	5,570,000	70,700

r/ Revised.

1/ Includes imported scrap. According to reporting companies, 24.1% of total receipts of aluminum-base scrap, or

818,000 metric tons, was received on toll arrangements.

2/ Data are rounded to no more than three significant digits; may not add to totals shown.

3/ Includes inventory adjustment.

4/ Includes data on foil, can stock clippings, and other miscellaneous.

5/ Used beverage cans toll treated for primary producers are included in secondary smelter tabulation.

6/ Includes municipal wastes (includes litter) and fragmentized scrap (auto shredder).

#### TABLE 5 PRODUCTION AND SHIPMENTS OF SECONDARY ALUMINUM ALLOYS BY INDEPENDENT SMELTERS IN THE UNITED STATES 1/

	tons)

	2	000	2001		
		Net		Net	
	Production	shipments 2/	Production	shipments 2/	
Diecast alloys:		-			
13% Si, 360, etc. (0.6% Cu, maximum)	30,600	30,200	21,500	22,800	
380 and variations	515,000	526,000	388,000	391,000	
Sand and permanent mold:					
95/5 Al-Si, 356, etc. (0.6% Cu, maximum)	127,000	126,000	61,400	62,100	
No. 319 and variations	137,000	139,000	128,000	133,000	
F-132 alloy and variations	30,400	30,200	24,300	25,000	
Al-Mg alloys	639	639	639	639	
Al-Zn alloys	2,240	2,930	1,780	1,940	
Al-Si alloys (0.6% to 2.0% Cu)	2,020	2,020	2,020	2,020	
Al-Cu alloys (1.5% Si, maximum)	2,290	2,290	2,290	2,290	
Al-Si-Cu-Ni alloys	949	951	949	950	
Other	1,320	1,350	1,340	1,310	
Wrought alloys, extrusion billets	210,000	210,000	208,000	207,000	
Miscellaneous:					
Steel deoxidation	W	W	W	W	
Pure (97.0% Al)	W	W	W	W	
Aluminum-base hardeners	3,470	3,470	3,470	3,470	
Other 3/	122,000	124,000	101,000	103,000	
Total	1,190,000	1,200,000	944,000	956,000	
Less consumption of materials other than scrap:					
Primary aluminum	77,600	XX	70,900	XX	
Primary silicon	50,200	XX	42,200	XX	
Other	16,700	XX	9,300	XX	
Net metallic recovery from aluminum scrap and sweated pig					
consumed in production of secondary aluminum ingot 4/	1,040,000	XX	822,000	XX	

W Withheld to avoid disclosing company proprietary data; included with "Miscellaneous: Other." XX Not applicable. 1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes inventory adjustment.

3/ Includes other die-cast alloys.

4/ No allowance made for melt-loss of primary aluminum and alloying ingredients.

#### TABLE 6 DISTRIBUTION OF END-USE SHIPMENTS OF ALUMINUM PRODUCTS IN THE UNITED STATES, BY INDUSTRY 1/

	200	00	20	01
	Quantity	Percentage	Quantity	Percentage
	(thousand	of	(thousand	of
Industry	metric tons)	grand total	metric tons)	grand total
Containers and packaging	2,260	20.4	2,200	22.6
Building and construction	1,450	13.1	1,310	13.5
Transportation	3,600	32.4 r/	3,010	30.9
Electrical	771 r/	6.9	624	6.4
Consumer durables	767 r/	6.9	655	6.7
Machinery and equipment	679	6.1	582	6.0
Other markets	293	2.6	247	2.5
Total to domestic users	9,830 r/	88.5 r/	8,640	88.7
Exports e/	1,280 r/	11.5 r/	1,100	11.3
Grand total	11,100	100.0	9,740	100.0

e/ Estimated. r/ Revised.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

Source: The Aluminum Association Inc.

## TABLE 7 U.S. NET SHIPMENTS OF ALUMINUM WROUGHT AND CAST PRODUCTS, BY PRODUCERS 1/2/

(Thousand metric tons)

#### 1999 2000 2001 Wrought products: 4,840 5,000 4,340 Sheet, plate, foil Pipe, tube, extruded, shapes 1,640 1,640 r/ 1,320 Rod, bar, wire, cable 549 588 r/ 479 108 Forgings (including impacts) 106 84 Powder, flake, paste 54 59 56 7,360 7,230 6,280 Total Castings: Sand 158 148 NA Permanent and semipermanent mold 484 r/ 474 NA 1,020 r/ 1,020 NA Die Other 130 r/ 129 NA Total 1,790 r/ 1,770 NA 9,010 Grand total 9,150 r/ NA

r/ Revised. NA Not available.

1/ Net shipments derived by subtracting the sum of producers' domestic receipts of each mill shape from the domestic industry's gross shipments of that shape.

2/ Data are rounded to no more than three significant digits; may not add to totals shown.

Source: The Aluminum Association Inc. and U.S. Department of Commerce.

 TABLE 8

 U.S. EXPORTS OF ALUMINUM, BY COUNTRY 1/

	Metals and a		Plates, sheets		Sei			otal
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Country or territory	(metric tons)	(thousands)	(metric tons)	(thousands)	(metric tons)	(thousands)	(metric tons)	(thousands)
2000:								
Brazil	829	\$1,520	31,900	\$98,100	159	\$180	32,900	\$99,800
Canada	125,000	208,000	504,000	1,310,000	225,000	221,000	854,000	1,740,000
Czech Republic	5	9	21	285			26	294
France	. 30	122	5,530	29,400	1,790	3,290	7,350	32,800
Germany	858	5,130	4,980	30,100	1,150	2,820	6,990	38,100
Hong Kong	1,440	2,420	2,610	13,000	28,900	34,400	33,000	49,900
Italy	. 33	111	2,070	12,000	8	11	2,110	12,100
Japan	44,300	74,400	9,840	74,400	27,800	35,500	81,900	184,000
Korea, Republic of	3,640	11,900	20,500	77,000	34,100	38,100	58,200	127,000
Mexico	87,700	140,000	156,000	523,000	78,000	105,000	321,000	768,000
Netherlands	244	1,020	3,280	12,900	415	621	3,940	14,500
Philippines	. 41	61	774	3,530	265	435	1,080	4,020
Russia			211	1,180	47	64	258	1,250
Saudi Arabia	. 1	11	8,380	20,300	2	6	8,380	20,300
Singapore	414	1,160	2,630	15,700	346	459	3,390	17,300
Slovakia	<b></b>		11	35			11	35
Slovenia			(3/)	4			(3/)	4
South Africa	24	220	80	919	15	68	118	1,210
Taiwan	2,200	3,540	8,430	31,000	30,300	31,500	40,900	66,000
Thailand	822	1,720	6,860	24,300	1,020	1,420	8,700	27,400
Ukraine			1	25			1	25
United Kingdom	1,090	3,770	20,400	94,700	5,450	5,910	26,900	104,000
Venezuela	63	125	17,200	40,200	33	117	17,300	40,500
Other	4,790 r/	12,400	102,000	353,000	141,000	167,000	248,000	532,000
Total	273,000	468,000	907,000	2,770,000	576,000	648,000	1,760,000	3,880,000
2001:								
Brazil	530	914	42,000	125,000	12	10	42,600	126,000
Canada	87,000	134,000	459,000	1,170,000	215,000	206,000	761,000	1,510,000
Czech Republic			36	458			36	458
France	161	454	7,130	35,000			7,290	35,500
Germany	987	9,800	2,530	17,900	1,740	7,490	5,250	35,200
Hong Kong	1,510	2,580	2,020	14,400	11,400	16,300	14,900	33,300
Italy	. 29	117	2,120	13,800	258	189	2,410	14,100
Japan	8,580	19,200	9,420	85,800	23,700	26,400	41,700	131,000
Korea, Republic of	1,880	4,170	13,500	59,300	50,600	54,500	66,000	118,000
Mexico	85,700	131,000	131,000	416,000	52,100	64,000	269,000	610,000
Netherlands	83	471	2,190	10,700	161	199	2,430	11,400
Philippines	51	160	764	3,240			815	3,400
Russia	9	106	578	2,480			588	2,590
Saudi Arabia	107	225	9,320	24,300	19	4	9,450	24,600
Singapore	40	176	2,930	12,600	122	269	3,090	13,100
Slovakia			1	19			1	19
Slovenia								
South Africa	4	13	169	1,090	13	150	187	1,250
Taiwan	335	927	5,200	21,700	28,500	29,100	34,000	51,700
Thailand	1,250	1,840	11,000	28,800	1,250	1,900	13,500	32,600
Ukraine			93	244			93	244
United Kingdom	726	4,590	15,200	96,000	2,950	4,490	18,900	105,000
Venezuela	21	82	12,600	31,900	107	511	12,700	32,500
Other	2,880	9,460	84,900	306,000	192,000	176,000	280,000	492,000
Total	192,000	320,000	814,000	2,480,000	580,000	588,000	1,590,000	3,390,000

r/ Revised. -- Zero.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes castings, forgings, and unclassified semifabricated forms.

3/ Less than 1/2 unit.

Source: U.S. Census Bureau.

## TABLE 9U.S. EXPORTS OF ALUMINUM, BY CLASS 1/

	20	00	2001		
	Quantity	Value	Quantity	Value	
Class	(metric tons)	(thousands)	(metric tons)	(thousands)	
Crude and semicrude:					
Metals and alloys, crude	273,000	\$468,000	192,000	\$320,000	
Scrap	576,000	648,000	580,000	588,000	
Plates, sheets, bars, strip, etc.	845,000	2,380,000	751,000	2,120,000	
Castings and forgings	14,700	137,000	18,100	149,000	
Semifabricated forms, n.e.c.	48,000	248,000	44,500	215,000	
Total	1,760,000	3,880,000	1,590,000	3,390,000	
Manufactures:					
Foil and leaf	61,100	219,000	59,200	225,000	
Powders and flakes	9,600	47,500	8,660	40,100	
Wire and cable	29,500	122,000	28,300	84,100	
Total	100,000	388,000	96,200	349,000	
Grand total	1,860,000	4,270,000	1,680,000	3,740,000	

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

Source: U.S. Census Bureau.

TABLE 10
U.S. IMPORTS FOR CONSUMPTION OF ALUMINUM, BY CLASS 1/

	20	00	2001		
	Quantity	Quantity Value		Value	
Class	(metric tons)	(thousands)	(metric tons)	(thousands)	
Crude and semicrude:	_				
Metals and alloys, crude	2,490,000	\$4,030,000	2,560,000	\$3,930,000	
Plates, sheets, strip, etc., n.e.c. 2/	628,000	1,530,000	553,000	1,320,000	
Pipes, tubes, etc.	20,800	109,000	16,400	90,400	
Rods and bars	142,000	449,000	114,000	352,000	
Scrap	625,000	744,000	497,000	552,000	
Total	3,910,000	6,860,000	3,740,000	6,250,000	
Manufactures:					
Foil and leaf 3/	87,800	293,000	86,600	306,000	
Flakes and powders	5,020	14,000	5,360	16,300	
Wire	118,000	231,000	91,700	162,000	
Total	211,000	538,000	184,000	484,000	
Grand total	4,120,000	7,400,000	3,920,000	6,740,000	

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes plates, sheets, circles, and disks.

3/ Excludes etched capacitor foil.

Source: U.S. Census Bureau.

 TABLE 11

 U.S. IMPORTS FOR CONSUMPTION OF ALUMINUM, BY COUNTRY 1/

	Metals and alloys, crude		Plates, sheets, bars, etc. 2/		Scrap		Total	
C	Quantity	Value (the sugar da)	Quantity	Value (theusende)	Quantity	Value (they can de)	Quantity (matria tana)	Value (theyaan da
Country 2000:	(metric tons)	(thousands)	(metric tons)	(thousands)	(metric tons)	(thousands)	(metric tons)	(thousands
Argentina	59,000	\$100,000	1,360	\$2,950	1,300	\$1,710	61,700	\$105,00
Australia	23,000	38,800	2,840	6,300	1,500	\$1,710 	25,800	45,10
Bahrain	22,000	37,300	22,000	45,100	103	49	44,100	43,10
Belgium	22,000	97,500	3,690	11,600	99	120	3,810	11,80
Brazil	42,800	69,700	,	17,200	32,900	48,900	· · · ·	136,00
Canada	42,800	2,390,000	9,810 435,000	1,050,000	289,000	48,900	85,500 2,150,000	3,780,00
Croatia	1,420,000	2,390,000	435,000	1,030,000	289,000	· · ·	2,130,000	5,780,00
Czech Republic	21	29	307	1,040			328	1,07
France	869		10,400			9,820	22,700	
		8,230	,	43,200	11,400	· · · ·		61,30
Germany	643	4,810	41,700	163,000	6,740	8,380	49,100	176,00
Italy	200	265	2,980	10,700	35	44	3,220	11,00
Japan	336	787	21,400	80,500	753	1,360	22,500	82,70
Korea, Republic of	89	274	13,300	33,900	514	1,050	13,900	35,20
Mexico	4,570	6,670	22,000	79,000	76,000	85,800	102,000	171,00
Netherlands	218	626	4,200	13,000	2,510	2,620	6,930	16,30
Norway	7,010	13,500	106	418			7,110	14,00
Panama	12	14	1,480	4,710	7,200	9,040	8,690	13,80
Russia	670,000	996,000	66,500	159,000	100,000	122,000	837,000	1,280,00
Slovakia	255	273	2	9			257	28
Slovenia			4,350	14,000			4,350	14,00
South Africa	24,000	36,400	23,300	53,500	599	660	47,900	90,60
Spain	343	644	402	1,630	161	205	905	2,47
Ukraine	10,200	12,600			6,830	7,240	17,000	19,80
United Arab Emirates	53,300	94,900			4,990	6,080	58,300	101,00
United Kingdom	5,290	8,210	15,400	60,700	5,650	6,340	26,300	75,20
Venezuela	120,000	165,000	24,900	47,900	19,800	23,300	165,000	236,00
Other	25,800	42,400	63,700	187,000	58,400	64,200	148,000	293,00
Total	2,490,000	4,030,000	791,000	2,080,000	625,000	744,000	3,910,000	6,860,00
2001:		,,						
Argentina	53,800	88,000	105	216	2,840	3,910	56,700	92,10
Australia	121,000	188,000	125	549	18	12	121,000	189,00
Bahrain	8,210	13,200	16,100	32,600			24,300	45,80
Belgium	60	279	3,210	10,100	37	52	3,310	10,40
Brazil	35,000	55,500	4,360	8,810	20,900	29,700	60,200	94,00
Canada	1,670,000	2,590,000	405,000	928,000	283,000	315,000	2,360,000	3,830,00
Croatia	1,070,000	2,370,000	211	664	205,000	515,000	2,500,000	5,850,00
Czech Republic			87	295			87	29
France		4,810	5,250	23,000	7,840		13,800	34,60
	691	· · · ·	,	,	· · · ·	6,810	· · · ·	
Germany	677	4,300	50,300	189,000	7,140	7,490	58,200	200,00
Italy	(3/)	8	2,730	11,000	62	61	2,790	11,10
Japan Vice De Litic C	501	1,020	11,100	47,400	386	693	12,000	49,10
Korea, Republic of	766	1,380	6,810	20,600	59	142	7,630	22,10
Mexico	3,930	6,190	16,500	67,000	67,000	70,100	87,400	143,0
Netherlands	644	1,940	2,490	7,420	2,710	4,620	5,840	14,00
Norway	7,850	13,300	1,160	1,910	1,680	2,970	10,700	18,20
Panama			972	3,040	5,820	6,070	6,790	9,11
Russia	377,000	533,000	37,700	81,300	39,700	45,200	454,000	660,00
Slovakia	131	138					131	13
Slovenia			3,350	10,600			3,350	10,6
South Africa	19,400	27,700	26,300	62,800	31	42	45,800	90,50
Spain	802	1,130	71	867	37	26	910	2,03
Ukraine	11,000	19,300	1	4	840	970	11,800	20,3
United Arab Emirates	62,500	105,000			3,140	3,470	65,600	109,0
United Kingdom	3,660	7,740	11,900	46,900	4,290	4,190	19,900	58,8
Venezuela	159,000	236,000	17,400	33,200	7,890	7,640	184,000	277,0
Other	24,700	36,000	59,500	180,000	42,400	42,700	127,000	259,00
	27,700	50,000	57,500	100,000	-±,±00	-±2,700	127,000	257,0

-- Zero.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes circles, disks, rods, pipes, tubes, etc.

3/ Less than 1/2 unit.

Source: U.S. Census Bureau.

#### TABLE 12

#### ALUMINUM, PRIMARY: WORLD PRODUCTION, BY COUNTRY 1/2/

#### (Thousand metric tons)

1997	1998	1999	2000	2001 e/
187	187	206 r/	262 r/	250
1,495	1,627	1,718	1,769	1,798 3/
5 3/				
490	501	503	509	510
15	28	70	90	110
1,200	1,208	1,250	1,271 r/	1,131 3/
91	82	92	95	81 3/
2,327	2,374	2,390	2,373	2,583 3/
1,960	2,340	2,530	2,800 r/	3,250
18 r/	16 r/	14 r/	14 r/	15
178	195	193	193 e/	193
399	424	455	441	462
572	612	634	644	652
152	56	104	156	162 3/
133	146	170 r/	168 r/	163
35	35	34 r/	35	35
123	173	222 r/	226 r/	243
484	542	614 r/	644 r/	630
216 3/	133 r/	106 r/	160	180
92	124	137	140 e/	140
188	187 r/	187	189	187
17	16	11	7	7
66	62	63 r/	65 r/ e/	65
			54	266 3/
232	264 e/	286 r/	302 r/	294
310	318	327	328 r/	322 3/
3	20	16		
919	996	1,020	1,026	1,068 3/
54	54	51 r/	47 r/	55
163	174 r/	174	179 r/	175
2,906	3,005	3,146	3,245	3,300
66	60 r/	73	88 r/	70
110	108	109	110	110
74 r/	74 r/	77 r/	100 r/	100
673	677	689 r/	674 r/	663 3/
360	362	364	366	376
32	29 3/	6 r/		
98	96	99	101	102
27	32	34	35 e/	35
206	196	229	300	340
62 3/	62	62	60	60
101	107	115 r/	119 r/	122
381 r/	352 r/	440 e/	470 r/ e/	500
248	258	272	305	341
				2,637 3/
,	,	· · · · · · · · · · · · · · · · · · ·	· · ·	,
634	585	570	569 r/	570
	187 1,495 5 3/ 490 15 1,200 91 2,327 1,960 18 r/ 178 399 572 152 133 35 123 484 216 3/ 92 188 17 66  232 310 3 919 54 163 2,906 66 110 74 r/ 673 360 32 98 27 206 62 3/ 101 381 r/	187         187         187           1,495         1,627         5           5         3/            490         501         15           15         28         1,200           15         28         1,200           91         82         2,327         2,374           1,960         2,340         18         r/           18         r/         16         r/           178         195         399         424           572         612         152         56           133         146         35         35           123         173         484         542           216         3/         133         r/           92         124         188         187           17         16         66         62            -         232         264         e/           310         318         3         20         919         996           54         54         163         174         r/           2,906         3,005         66         60         r/           110 </td <td>187         187         206 r/           1,495         1,627         1,718           5 3/         -         -           490         501         503           15         28         70           1,200         1,208         1,250           91         82         92           2,327         2,374         2,390           1,960         2,340         2,530           18 r/         16 r/         14 r/           178         195         193           399         424         455           572         612         634           152         56         104           133         146         170 r/           35         35         34 r/           123         173         222 r/           484         542         614 r/           216 3/         133 r/         106 r/           92         124         137           188         187 r/         187           17         16         11           66         62         63 r/           310         318         327           3</td> <td>187         187         206 r/         262 r/           1,495         1,627         1,718         1,769           5 3/         -         -         -           490         501         503         509           15         28         70         90           1,200         1,208         1,250         1,271 r/           91         82         92         95           2,327         2,374         2,390         2,373           1,960         2,340         2,530         2,800 r/           18 r/         16 r/         14 r/         14 r/           178         195         193         193 e/           399         424         455         441           572         612         634         644           152         56         104         156           133         146         170 r/         168 r/           35         35         34 r/         35           123         173         222 r/         226 r/           484         542         614 r/         644 r/           216 3/         133 r/         106 r/         160           <t< td=""></t<></td>	187         187         206 r/           1,495         1,627         1,718           5 3/         -         -           490         501         503           15         28         70           1,200         1,208         1,250           91         82         92           2,327         2,374         2,390           1,960         2,340         2,530           18 r/         16 r/         14 r/           178         195         193           399         424         455           572         612         634           152         56         104           133         146         170 r/           35         35         34 r/           123         173         222 r/           484         542         614 r/           216 3/         133 r/         106 r/           92         124         137           188         187 r/         187           17         16         11           66         62         63 r/           310         318         327           3	187         187         206 r/         262 r/           1,495         1,627         1,718         1,769           5 3/         -         -         -           490         501         503         509           15         28         70         90           1,200         1,208         1,250         1,271 r/           91         82         92         95           2,327         2,374         2,390         2,373           1,960         2,340         2,530         2,800 r/           18 r/         16 r/         14 r/         14 r/           178         195         193         193 e/           399         424         455         441           572         612         634         644           152         56         104         156           133         146         170 r/         168 r/           35         35         34 r/         35           123         173         222 r/         226 r/           484         542         614 r/         644 r/           216 3/         133 r/         106 r/         160 <t< td=""></t<>

e/ Estimated. r/ Revised. -- Zero.

1/ World totals and estimated data are rounded to no more than three significant digits; may not add to totals shown.
2/ Primary aluminum is defined as "The weight of liquid aluminum as tapped from pots, excluding the weight of any alloying materials as well as that of any metal produced from either returned scrap or remelted materials." International reporting practices vary from country to country, some nations conforming to the foregoing definition and others using different definitions. For those countries for which a different definition is given specifically in the source publication, that definition is provided in this table by footnote. Table includes data available through May 11, 2002.

3/ Reported figure.

4/ Primary ingot plus secondary ingot.

5/ Ingot and rolling billet production.

6/ Primary ingot.

7/ Excludes high-purity aluminum containing 99.995% or more as follows, in metric tons: 1997--36,136; 1998--35,063;

1999--34,893; 2000--40,956; and 2001--26,586.

8/ Primary unalloyed ingot plus secondary unalloyed ingot.

9/ Primary unalloyed metal plus primary alloyed metal, thus including weight of alloying material.