

BAUXITE AND ALUMINA

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Bauxite is a naturally occurring, heterogeneous material composed primarily of one or more aluminum hydroxide minerals, plus various mixtures of silica (SiO_2), iron oxide (Fe_2O_3), titania (TiO_2), aluminosilicates (clay, etc.), and other impurities in trace amounts. The principal aluminum hydroxide minerals found in varying proportions within bauxite are: gibbsite, $\text{Al}(\text{OH})_3$; and the polymorphs boehmite and diaspore, both $\text{AlO}(\text{OH})$.

Bauxites are typically classified according to their intended commercial applications: abrasive, cement, chemical, metallurgical, refractory, etc. Of all bauxite mined, approximately 85% is converted to alumina (Al_2O_3) for the production of aluminum metal, an additional 10% goes to nonmetal uses as various forms of specialty alumina, and the remaining 5% goes to nonmetallurgical bauxite applications. Therefore, the bulk of world bauxite production is currently used as feed for the manufacture of alumina via a wet chemical caustic leach process known as the Bayer process. The majority of the alumina produced from this refining process is smelted to produce aluminum metal by electrolytic reduction in a molten bath of natural or synthetic cryolite (NaAlF_6), the Hall-Héroult process.

The nonmetallurgical or specialty applications of bauxite comprise 5% of total worldwide crude ore production. Specifications for these premier grades of bauxite are more stringent than for bauxite used to produce metal and are based on the processing requirements and special properties required of their final commercial products. The natural chemical impurities that exist within these specialty-grade raw materials are not chemically removed from the ore during a refining procedure, as is the case for metallurgical-grade bauxite. Nonmetallurgical ores are utilized in an essentially unrefined chemical form, as direct feed for the production of their ultimate end products. Figures on bauxite production and consumption within nonmetallurgical markets are not commonly available. It is currently accepted, however, that the principal industrial end uses for nonmetallurgical-grade bauxite are in the refractories and abrasives fields, followed by cement applications. In addition, the aluminum chemicals and steel industries also consume significant quantities of bauxite for other applications.

In 1996, 25 countries reported bauxite mine production, and total world production amounted to 114 million metric tons, a 6% increase compared with the production in 1995. Australia, Brazil, Guinea, and Jamaica accounted for about 70% of the total bauxite mined in 1996. The principal sources of nonmetallurgical-grade bauxite are very limited and comprise only a handful of countries: abrasive grade—Australia, China,

Guinea, and Guyana; and refractory grade—Brazil, China, and Guyana.

Total known world reserves of bauxite are sufficient to meet cumulative world primary aluminum metal demand well into the 21st century. Although bauxite reserves are unevenly distributed throughout the world, with approximately 90% occurring in about a dozen countries, the sheer magnitude of these reserves (23 billion tons) is sufficient to ensure a readily accessible supply for the future.

U.S. production of alumina (calcined equivalent), derived almost exclusively from imported metallurgical-grade bauxite, increased 4% in 1996 compared with that of 1995. An estimated 88% of the alumina shipped by U.S. refineries went to domestic primary smelters for aluminum metal production. Consumption in various forms by the abrasives, chemicals, refractories, and specialties industries accounted for the remainder of the U.S. alumina usage.

World output of alumina increased slightly in 1996. The four principal producing countries, in descending order of quantity of alumina produced, were Australia, the United States, Jamaica, and China. These countries accounted for more than one-half of the world's production.

Legislation and Government Programs

In October 1996, the Defense Logistics Agency (DLA) released its Annual Materials Plan (AMP) for the National Defense Stockpile (NDS) for fiscal year 1997. The new AMP, which went into effect on October 1, 1996, provided for the sale of 915,000 tons (900,000 long tons) of metallurgical-grade bauxite, of which 610,000 tons (600,000 long tons) was Jamaica-type and 305,000 tons (300,000 long tons) was Suriname-type. Additionally, as part of the program, the DLA was authorized to dispose of 81,000 calcined tons (80,000 long calcined tons) of refractory-grade bauxite in fiscal year 1997. These were the maximum amounts recommended for disposal during the fiscal year, and the actual level of sales was dependent upon prevailing market conditions.

During calendar year 1996, the DLA announced the sale of 610,000 tons (600,000 long tons) of Jamaica-type, metallurgical-grade bauxite, of which 305,000 tons was awarded to Reynolds Metals Co. and the remaining 305,000 tons was awarded to Kaiser Aluminum & Chemical Corp. The total sales price was \$6.1 million. At yearend, the NDS uncommitted inventory for metallurgical-grade bauxite was 10.5 million tons of Jamaica-type and 4.98 million tons of Suriname-type. The NDS calcined refractory-grade bauxite inventory was 153,000 tons.

Production

Bauxite.—C-E Minerals acquired the mineral reserves of Harbison-Walker Refractories Division at Eufala, AL. C-E reported that by buying these reserves, it has ensured that the company will have strategic reserves to last well into the next millennium. Harbison-Walker announced that it was discontinuing the production of its Ucal range of high-alumina clays to concentrate on manufacturing and selling lightweight refractory aggregates (Skillen, 1996).

Alumina.—The Aluminum Co. of America (Alcoa) reported that a 365,000-ton-per-year (t/yr) expansion at its Point Comfort, TX, refinery had been completed, increasing annual capacity to 2.3 million tons. Approximately 20% of the refinery's output supplies industrial chemicals operations at that location (Aluminum Company of America, 1997). (See table 2.)

The oversupply of alumina and the drop in market prices were factors in Reynolds' decision to temporarily curtail 250,000 t/yr of production at its Sherwin refinery near Corpus Christi, TX. Alcoa also announced that it was temporarily curtailing production by 350,000 t/yr. However, Alcoa's production cutback was to be spread over the company's refinery system worldwide (Metal Bulletin, 1996e). (See table 3.)

C-E Minerals purchased the Baton Rouge, LA, calcined and tabular alumina plant of LaRoche Industries Inc. However, LaRoche will continue to own and operate its activated alumina manufacturing facilities also located at this site (Industrial Minerals, 1996a).

Consumption

Total domestic consumption of bauxite was at the same level as that of 1995. Approximately 95% of the bauxite consumed in the United States in 1996 was refined to alumina, and an estimated 2.2 tons of dried bauxite was required to produce 1 ton of alumina. Domestic production and consumption data for bauxite and alumina were obtained by the U.S. Geological Survey from three separate, voluntary surveys of U.S. operations. Typical of these surveys is the "Bauxite Consumption" survey, sent to 50 operations, 35 of which responded, representing 89% of the total bauxite consumed shown in table 4.

An estimated 88% of the alumina shipped by U.S. alumina plants went to domestic primary smelters for aluminum metal production. Twenty-one primary aluminum smelters reported a consumption of 7.12 million tons of alumina in 1996. Consumption in various forms by the abrasives, chemicals, refractories, and specialties industries accounted for the remainder of U.S. alumina usage.

Prices

Most metallurgical-grade bauxite and alumina are purchased

under long-term contracts. Contract terms for these commodities normally are not made public. However, spot prices for metallurgical-grade alumina and specialty forms of bauxite and alumina for nonmetallurgical applications are published in trade journals.

Industrial Minerals magazine quoted prices at the end of the year for several types of imported refractory-grade bauxite from China and Guyana. The price quotes for Chinese refractory-grade bauxite, minimum 87% Al₂O₃, f.o.b. Chinese ports were as follows: Shanxi, shaft, lump, \$70 to \$80 per ton; Shanxi, rotary, lump, \$95 to \$105 per ton; and Guizhou, round, lump, \$78 to \$85 per ton. The price ranges for Guyanese refractory-grade bauxite were \$155 to \$165 per ton f.o.b. barge, U.S. Gulf Coast and \$165 to \$175 per ton c.i.f. Europe. (See table 8.)

The market or spot prices for alumina decreased substantially during most of the year. According to *Metal Bulletin*, metallurgical-grade alumina spot prices on international markets began the year at \$220 to \$250 per ton. The price range reached a low for the year of \$145 to \$150 per ton in late July. The price remained at this level through mid-November before rising slightly to \$150 to \$160 per ton, and held steady at this level through the end of the year. Trade data released by the U.S. Bureau of the Census indicated the average value of U.S. imports of calcined alumina was \$221 per ton, f.a.s. port of shipment, and \$234 per ton, c.i.f. U.S. ports.

Foreign Trade

In addition to the trade data shown in tables 9, 10, and 11, various specialty aluminum compounds were also exported from and imported into the United States. Specialty aluminum compounds exported included 2,840 tons of aluminum sulfate, 8,090 tons of aluminum chloride, 11,900 tons of aluminum oxide abrasives, and 20,900 tons of various fluoride-base compounds of aluminum, including synthetic cryolite and aluminum fluoride. Specialty aluminum compounds imported included 40,400 tons of aluminum sulfate, 2,690 tons of aluminum chloride, 131,000 tons of aluminum oxide abrasives, and 18,300 tons of various fluoride-base aluminum compounds.

World Review

World production of bauxite and alumina increased slightly in 1996 in response to a slight increase in metal production. Twenty-five countries reported mine production in 1996, and total world production amounted to about 114 million tons, 6% higher than that in 1995. Australia, Guinea, Jamaica, and Brazil, in decreasing order of tonnage mined, continued to be the largest producers of bauxite and accounted for about 70% of total world production. (See table 12.)

World output of alumina increased about 1% in 1996 compared with that of 1995. The four principal producing countries, in order of quantity of alumina produced, were Australia, the United States, Jamaica, and China. These countries accounted for more than one-half of the world's production. (See table 13.)

Australia.—Alcan Aluminium Ltd. commissioned its Australian subsidiary, Alcan South Pacific Pty. Ltd., to generate a detailed feasibility study and environmental impact statement on the development of its Cape York Peninsula bauxite reserves in Northern Queensland. The site contains approximately 175 million tons of proven bauxite reserves. The studies should be completed by early 1997 and, if viability is confirmed, mining could commence in late 1999. The ore from this mine would replace third-party purchases and would be dedicated to Alcan's alumina production requirements at nearby Queensland Alumina Ltd. (21.4% ownership) and at Aughinish Alumina Ltd. (100% ownership) in Ireland (Alcan Aluminium Ltd., 1996).

Comalco Ltd. announced a major overhaul of its Weipa bauxite operations to improve its competitive position, enhance the long-term security of the mine, and facilitate Comalco's proposed alumina refinery investment. The plan includes reduction and renewal of the mine's truck fleet, extension of the mine railway network, and upgrading of the bauxite beneficiating plant (Comalco Ltd., 1996).

Worsley Alumina Pty. Ltd. announced a 150,000-t/yr expansion at its 1.7-million-t/yr refinery near Collie in Western Australia. The expansion was expected to be completed by late 1997. The company also has begun a feasibility study to assess a subsequent and much larger expansion program that would increase capacity to 3.5 million t/yr (Mining Magazine, 1996).

Azerbaijan.—Responsibility for the management of the 400,000-t/yr Gyandzha alumina refinery reportedly was transferred to Azeral, a subsidiary of Trans-World Metals, a London-based trading and industrial holding group. The refinery has been at a virtual standstill for some time, and Trans-World estimates that a minimum initial investment of about \$45 million would be required to carry out essential repairs and to provide working capital for the plant. When working at capacity, Trans-World forecasts that about 300,000 t/yr of alumina could be produced from imported bauxite, while the remaining 100,000 t/yr would be produced from locally available alunite. The plant would also produce about 80,000 t/yr of high-grade potassium sulfate as fertilizer for local use and 200,000 t/yr of sulfuric acid (Metal Bulletin, 1996f).

Brazil.—Mineração Rio do Norte S.A. (MRN) announced that bauxite production at its mines reached a record 9.6 million tons. MRN also reported that the domestic market consumed about 5 million tons of this bauxite, a 39% increase compared with consumption in 1995 (Mineração Rio do Norte S.A., 1997).

Companhia Vale do Rio Doce (CVRD) reported that production at its Alunorte alumina refinery reached 826,000 tons, almost 80% of the refinery's nominal capacity, during its second year of operation. With the addition of alumina production at Alunorte, CVRD has become a fully integrated primary aluminum producer (Companhia Vale do Rio Doce, 1997).

Alcoa Aluminio S.A. operates the Alumar Consortium (Alumar), a joint venture that owns a large refining and smelting project near São Luis. In late 1996, the Alumar refinery was

expanded by 260,000 t/yr, bringing total annual capacity to 1.3 million tons (Aluminum Company of America, 1997).

Canada.—In July, severe flooding in the Saguenay-Lac-Saint-Jean region of Quebec destroyed a water pumping station that supplied the 1.2-million-t/yr Vaudreuil alumina complex. Operations were temporarily disrupted, resulting in the loss of approximately 70,000 tons of alumina production (Alcan Aluminium Ltd., 1997).

China.—Prejon International BV, a Netherlands-based mineral distributor, entered into a joint venture with Guizhou Xianghai Industry Trading Co. to develop a bauxite deposit in southwestern Guizhou Province. The deposit reportedly has estimated bauxite reserves of 200 million tons. The companies expect the new mine to produce 100,000 t/yr of bauxite (Industrial Minerals, 1996b).

Alcoa World Alumina & Chemicals reportedly signed an agreement with China National Nonferrous Metals Industry Corp. (CNNC) to supply 400,000 t/yr of alumina to CNNC's aluminum smelter system for the next 30 years (Regan, 1996).

Guinea.—According to the Ministry of Mines and Geology, Guinea is seeking to increase its bauxite production. In addition to improvements at existing mines to bring production back to planned capacity levels, two new projects are under consideration. Dian-Dian, one of Guinea's richest deposits, reportedly has reserves of more than 500 million tons of bauxite grading 45% to 52% alumina. The \$1.9 billion project is designed to produce about 11 million tons of bauxite per year, of which 7.5 million tons would be exported. The second project is the Dabola project that would initially produce about 600,000 t/yr of bauxite for export to Iran. A \$2 million feasibility study is also under way for the construction of a 1.2-million-t/yr alumina plant at Dabola (Metal Bulletin, 1996a).

Hungary.—Hungalu Magyar Aluminiumpari Rt reported progress in its efforts to privatize the country's aluminum industry. Two of Hungalu's three alumina refineries have been sold, and the third, Ajka Aluminium, has been offered for sale. Magyaróvár Alumina and Alundum Ltd.'s alumina refinery, a producer of nonmetallurgical alumina products, was sold to Altus-GPS, a Hungarian consortium. The Aloxid Almásfüzitő refinery was sold to Hungalumina, a consortium consisting of Alucan (50%), Alfer (25%) and Metalservice (25%), (Metal Bulletin, 1996b).

India.—India's Cabinet Committee on Economic Affairs reportedly approved National Aluminium Co. Ltd.'s proposal for expansion of its bauxite mines and alumina refinery. The project involves the doubling of bauxite mine capacity from 2.4 million t/yr to 4.8 million t/yr and increasing alumina refinery capacity from 800,000 t/yr to almost 1.6 million t/yr (Metal Bulletin, 1996c).

Kazakhstan.—An investment agreement reportedly has been signed with TransWorld Group to finance the construction of a new aluminum smelter and the expansion of alumina production capacity. The Pavlodar refinery was expected to have its capacity increased from 1.1 million t/yr to 2 million t/yr (Platt's Metals Week, 1996).

Romania.—Balli Trading of the United Kingdom acquired a 51% interest in the Alum alumina refinery and developed a production program to increase output at the plant, currently 250,000 t/yr, to 370,000 t/yr in 1997 and to 600,000 t/yr in the near future (Metal Bulletin, 1996d).

Ukraine.—The Industry Ministry announced plans to close the 245,000-t/yr Zaporozhye alumina plant because of high energy requirements and the need for extensive reconstruction and modernization. The alumina requirements of the adjacent smelter would be supplied by Ukraine's other alumina refinery, the 1.1-million-t/yr Nikolayev refinery (American Metal Market, 1996).

Vietnam.—The Prime Minister reportedly has approved a prefeasibility study for the construction of an aluminum complex in the Province of Lam Dong. The proposed refinery and smelter would produce between 150,000 and 200,000 t/yr of alumina and 75,000 t/yr of metal. The facility would be supplied with bauxite from a local mine with estimated reserves of 300 million tons (Mining Journal, 1996).

Outlook

Presently identified world bauxite reserves are sufficient to meet cumulative world demand well into the next century. Considering the high probability of discovering additional bauxite deposits, plus the added possibility of employing lower grade bauxite occurrences and various alternative sources of alumina, world resources of aluminum remain adequate to satisfy demand for the foreseeable future.

The quality and quantity of bauxite resources within the former Eastern bloc nations are incapable of sustaining an economically viable market-based aluminum industry. Therefore, significant amounts of imported bauxite and alumina will be required to supply their primary aluminum production facilities. In addition, China recently has become a fairly significant buyer of alumina on the spot market. The rapid expansion of its primary aluminum industry has led to periodic shortages of feed material, and China has turned to the spot market to fill these needs.

During the first half of 1997, production of alumina appears to have increased slightly. The temporary production cutbacks announced by Alcoa and Reynolds during the latter part of 1996 have begun to come back on-stream. In the long term, worldwide demand for aluminum is expected to grow steadily, thereby increasing the demand for bauxite and alumina feedstocks.

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¹Prior to January 1996, published by the U.S. Bureau of Mines.

TABLE 1
SALIENT BAUXITE STATISTICS 1/

(Thousand metric tons and thousand dollars)

	1992	1993	1994	1995	1996
<u>United States:</u>					
Production: Crude ore (dry equivalent)	W	W	W	W	W
Value	W	W	W	W	W
<u>Exports (as shipped)</u>					
Crude and dried	54	85	114	86	92
Calcined	9	5	15	22	40
<u>Imports for consumption (as shipped)</u>					
Crude and dried	10,900	11,600	10,700	10,100	10,200
Calcined	346	238	349	482	352
Consumption (dry equivalent)	11,900	12,200	11,200	10,900	10,900
World: Production	105,000	109,000 r/	104,000 r/	107,000 r/	114,000 e/

e/ Estimated. r/ Revised. W Withheld to avoid disclosing company proprietary data.

1/ Data are rounded to three significant digits.

TABLE 2
PRODUCTION AND SHIPMENTS OF ALUMINA IN THE UNITED STATES 1/

(Thousand metric tons)

Year	Calcined alumina	Other alumina 2/	Total	
			As produced or shipped 3/	Calcined equivalent
<u>Production: e/</u>				
1995	4,030	730	4,760	4,530
1996	4,150	807	4,960	4,700
<u>Shipments: e/</u>				
1995	4,120	740	4,860	4,630
1996	4,140	806	4,950	4,700

e/ Estimated.

1/ Data are rounded to three significant digits.

2/ Trihydrate, activated, tabular, and other aluminas. Excludes calcium and sodium aluminates.

3/ Includes only the end product if one type of alumina was produced and used to make another type of alumina.

TABLE 3
CAPACITIES OF DOMESTIC ALUMINA PLANTS, 1/ 2/ DECEMBER 31

(Thousand metric tons per year)

Company and plant	1995	1996
<u>Aluminum Co. of America:</u>		
Point Comfort, TX	1,740	2,300
St. Croix, VI 3/	600	600
Total	2,340	2,900
<u>Kaiser Aluminum & Chemical Corp.: Gramercy, LA</u>		
Ormet Corp.: Burnside, LA	1,000	1,050
Reynolds Metals Co.: Corpus Christi, TX	600	600
Total	1,600	1,600
Total	5,540	6,150

1/ Capacity may vary depending on the bauxite used.

2/ Data are rounded to three significant digits; may not add to totals shown.

3/ Purchased from Virgin Islands Alumina Co. in 1995.

TABLE 4
U.S. CONSUMPTION OF BAUXITE, BY INDUSTRY 1/

(Thousand metric tons, dry equivalent)

Industry	1995	1996
Alumina	10,100	10,300
Abrasive	133	118
Chemical	201	21
Refractory	394	386
Other	55	55
Total	10,900	10,900

1/ Data are rounded to three significant digits; may not add to totals shown.

TABLE 5
PRODUCTION AND SHIPMENTS OF SELECTED ALUMINUM
SALTS IN THE UNITED STATES IN 1995 1/

Item	Number of producing plants	Production (thousand metric tons)	Total shipments, including interplant transfers	
			Quantity (thousand metric tons)	Value (thousands)
Aluminum sulfate:				
Commercial and municipal (17% Al ₂ O ₃)	66	1,040	999	\$109,000
Iron-free (17% Al ₂ O ₃)	17	155	161	17,300
Aluminum chloride:				
Liquid and crystal	7	28	W	W
Anhydrous (100% AlCl ₃)	3	28	28	19,800
Aluminum fluoride, technical	3	W	W	W
Aluminum hydroxide, trihydrate [100% Al(OH) ₃]	11	960	1,000	227,000
Aluminates	15	183	182	38,200
Other aluminum compounds 2/	XX	XX	XX	189,000

W Withheld to avoid disclosing company proprietary data. XX Not applicable.

1/ Data are rounded to three significant digits.

2/ Includes light aluminum hydroxide, cryolite, etc.

Source: Data are based on Bureau of the Census 1994 Current Industrial Reports, Series MA-28A, "Inorganic Chemicals."

TABLE 6
STOCKS OF BAUXITE IN THE UNITED STATES, 1/ 2/ DECEMBER 31

(Thousand metric tons, dry equivalent)

Sector	1995	1996
Producers, processors, and consumers	1,730	2,060
Government	16,300	15,700
Total	18,100	17,800

1/ Data are rounded to three significant digits; may not add to totals shown.

2/ Domestic and foreign bauxite; crude, dried, calcined, activated, all grades.

TABLE 7
STOCKS OF ALUMINA IN THE UNITED STATES, 1/ 2/ DECEMBER 31

(Thousand metric tons, calcined equivalent)

Sector	1995	1996
Producers	325	326
Primary aluminum plants	1,100	1,020
Total	1,420	1,350

1/ Data are rounded to three significant digits; may not add to totals shown.

2/ Excludes consumers stocks other than those at primary aluminum plants.

TABLE 8
AVERAGE VALUE OF U.S. IMPORTS OF CRUDE AND DRIED BAUXITE 1/

(Per metric ton)

Country	1995		1996	
	Port of shipment (f.a.s.)	Delivered to U.S. ports (c.i.f.)	Port of shipment (f.a.s.)	Delivered to U.S. ports (c.i.f.)
Australia	\$10.60	\$20.05	\$19.64	\$31.54
Brazil	23.31	31.93	29.83	39.28
Guinea	22.45	28.89	26.57	33.60
Guyana	25.00	38.93	25.19	37.09
Jamaica	25.02	30.50	25.83	31.34
Weighted average	23.51	30.64	26.89	34.24

1/ Computed from quantity and value data reported to U.S. Customs Service and compiled by the Bureau of the Census, U.S. Department of Commerce. Not adjusted for moisture content of bauxite or differences in methods used by importers to determine value of individual shipments.

TABLE 9
U.S. IMPORTS FOR CONSUMPTION AND EXPORTS OF BAUXITE,
CRUDE AND DRIED, 1/ BY COUNTRY

(Thousand metric tons)

Country	1995	1996
Imports: 2/		
Australia	134	84
Brazil	1,720	2,080
Guinea	3,890	3,420
Guyana	793	693
Indonesia	23	--
Jamaica 3/	3,550	3,920
Other	7	36
Total	10,100	10,200
Exports:		
Canada	82	70
Mexico	1	1
Other	2	22
Total	86	92

1/ Data are rounded to three significant digits; may not add to totals shown.

2/ Includes bauxite imported to the U.S. Virgin Islands from foreign countries.

3/ Dry equivalent of shipments to the United States.

NOTE.--Total U.S. imports of crude and dried bauxite (including the U.S. Virgin Islands) as reported by the Bureau of the Census were as follows:
1995--10,000,000 tons and 1996--9,930,000 tons.

Sources: Bureau of the Census and the Jamaica Bauxite Institute.

TABLE 10
U.S. IMPORTS FOR CONSUMPTION AND EXPORTS OF CALCINED BAUXITE, BY COUNTRY 1/

(Thousand metric tons and thousand dollars)

Country	1995				1996			
	Refractory grade		Other grade		Refractory grade		Other grade	
	Quantity	Value 2/	Quantity	Value 2/	Quantity	Value 2/	Quantity	Value 2/
Imports:								
Australia	--	--	15	1,140	--	--	(3/)	28
Brazil	3	284	38	3,210	6	654	6	553
China	131	5,940	154	8,770	119	7,410	118	8,890
Guyana	71	9,460	--	--	59	8,110	26	633
Other	17	1,370	54	1,830	17	1,730	1	72
Total	223	17,000	259	14,900	201	17,900	151	10,200
Exports:								
Canada	1	227	1	102	(3/)	84	8	657
Japan	13	2,650	--	--	22	5,240	--	--
Mexico	2	284	2	221	3	371	1	188
Other	1	134	1	241	3	871	1	413
Total	18	3,300	4	564	29	6,570	11	1,260

1/ Data are rounded to three significant digits; may not add to totals shown.

2/ Value at foreign port of shipment as reported to U.S. Customs Service.

3/ Less than 1/2 unit.

Source: Bureau of the Census.

TABLE 11
U.S. IMPORTS FOR CONSUMPTION AND EXPORTS OF ALUMINA, BY COUNTRY 1/

(Thousand metric tons, calcined equivalent, and thousand dollars)

Country	1995		1996	
	Quantity	Value 2/	Quantity	Value 2/
Imports:				
Australia	2,910	552,000	3,120	590,000
Brazil	24	8,970	6	5,410
Canada	80	50,500	102	63,800
France	9	12,400	11	14,800
Germany	35	66,000	42	76,100
India	147	29,800	68	27,100
Jamaica	270	61,000	351	68,100
Japan	10	20,200	7	15,400
Suriname	305	49,200	379	76,500
Trinidad	116	23,300	147	27,900
Venezuela	18	8,110	35	21,900
Other	73	26,500	58	34,600
Total	4,000	908,000	4,330	1,020,000
Exports:				
Brazil	28	9,500	2	3,370
Canada	744	185,000	712	187,000
Finland	(3/)	634	(3/)	439
Mexico	39	20,900	44	36,900
Netherlands	13	14,400	21	19,000
Norway	(3/)	124	(3/)	162
Russia	138	24,200	75	15,100
Sweden	(3/)	141	(3/)	486
Other	81	98,600	64	111,000
Total	1,040	353,000	918	374,000

1/ Data are rounded to three significant digits; may not add to totals shown.

2/ Value at foreign port of shipment as reported to U.S. Customs Service.

3/ Less than 1/2 unit.

Source: Bureau of the Census.

TABLE 12
BAUXITE: WORLD PRODUCTION, BY COUNTRY 1/ 2/

(Thousand metric tons)

Country	1992	1993	1994	1995	1996 e/
Albania e/	4	2	2	1	1
Australia	39,746	41,320	41,733	42,655	43,100 3/
Bosnia and Herzegovina e/	200 3/	100	75	75	75
Brazil	9,366	9,669	8,673	9,700 r/	9,700
China e/	2,700	3,500	3,700	5,000	6,200
Croatia	7	2	1 e/	-- r/	--
Ghana	338	424	426	530 r/	473
Greece	2,078	2,205	2,196	2,006 r/	2,168 3/
Guinea e/ 4/	13,800	14,100	11,300 r/	12,000 r/	14,000
Guyana e/ 4/	2,376 3/	2,126 3/	2,100	2,100	2,000 3/
Hungary	1,721	1,561	900 r/	840 r/	1,044 3/
India	4,898	5,277	4,809	5,163 r/	5,100
Indonesia	804	1,320	1,342	899	1,000
Iran e/	100	100	100	100	100
Italy e/	98 3/	90	23 r/	11 r/	--
Jamaica 4/ 5/	11,302	11,391	11,564	10,857	11,829 3/
Kazakhstan	3,036	3,000 e/	2,425	3,071 r/	3,140
Malaysia	331	269	162	184	219 3/
Mozambique	8	6 e/	10	11 e/	9
Pakistan	3	5	5	3 r/	4 3/
Romania	175	186	184	174	175 3/
Russia	4,578	4,260	3,000 e/	3,100 e/	3,300
Serbia and Montenegro	792	102	--	60 r/	320
Sierra Leone	1,250 e/	1,165	735	-- r/	-- 3/
Suriname	3,250	3,412	3,772	3,530 r/	4,000
Turkey 6/	613	538	445	232 r/	200
United States	W	W	W	W	W
Venezuela	1,052	2,910 e/	4,419	5,184	5,600 p/
Total	105,000	109,000	104,000 r/	107,000 r/	114,000

e/ Estimated. p/ Preliminary. r/ Revised. W Withheld to avoid disclosing company proprietary data; not included in "Total."

1/ World totals and estimated data are rounded to three significant digits; may not add to totals shown.

2/ Table includes data through June 25, 1997.

3/ Reported figure.

4/ Dry bauxite equivalent of crude ore.

5/ Bauxite processed for conversion to alumina in Jamaica plus kiln-dried ore prepared for export.

6/ Public-sector production only.

TABLE 13
ALUMINA: WORLD PRODUCTION, 1/ BY COUNTRY 2/ 3/

(Thousand metric tons)

Country	1992	1993	1994	1995	1996 e/
Australia	11,783	12,598	12,892	13,147	13,318 4/
Azerbaijan e/	300	200	100	27 4/	5
Bosnia and Herzegovina e/	100	50	50	50	50
Brazil	1,833	1,853	1,868	1,883 r/	1,870
Canada	1,104	1,180	1,170	1,064	1,000
China e/	1,580	1,820	1,850	2,200	2,490
Czechoslovakia e/ 5/ 6/	143	XX	XX	XX	XX
France	508	476	438	519 r/	500
Germany	857	840	824	825 e/	850
Greece	612	615	584	598 r/	601 4/
Guinea	561	656	640 r/	566 r/	600
Hungary	548	421	177	184 r/	208 4/
India	1,484 r/	1,490 r/	1,456 r/	1,650 r/	1,700
Ireland	973	1,103 r/	1,786 r/	1,186 r/	1,234 4/
Italy 7/	762	840 e/	852 r/	857 r/	850
Jamaica	2,917	2,989	3,221	3,030	3,200 4/
Japan 8/	316	327	322	320 e/	300
Kazakstan e/	1,100	1,000	900	1,022 r/ 4/	1,083 4/
Romania	280	293	302	323	259 4/
Russia	2,718 r/	2,500 e/	2,254	2,300 r/ e/	2,105 4/
Serbia and Montenegro	197	12	--	54 r/	50
Slovakia e/ 6/	XX	140	75	100	100
Slovenia e/	45	40	40	40	40
Spain 7/	959	1,060 e/	1,071 r/	1,095 r/	1,000
Suriname	1,576	1,507 r/	1,497 r/	1,589 r/	1,600
Turkey	156	169	155	173 r/	155
Ukraine e/	1,100	1,010	1,070	1,100	1,000
United Kingdom e/	120	105	105	108 r/	100
United States	5,190	5,290	4,860	4,530	4,700 4/
Venezuela	1,308	1,500	1,300 e/	1,641	1,700
Total	41,100 r/	42,100 r/	41,900 r/	42,200 r/	42,700

e/ Estimated. r/ Revised. XX Not applicable.

1/ Figures represent calcined alumina or the total of calcined alumina plus the calcined equivalent of hydrate when available; exceptions, if known, are noted.

2/ World totals, U.S. data, and estimated data are rounded to three significant digits; may not add to totals shown.

3/ Table includes data available through July 25, 1997.

4/ Reported figure.

5/ Dissolved Dec. 31, 1992.

6/ All production in Czechoslovakia for 1992 came from Slovakia.

7/ Hydrate.

8/ Data presented are for alumina used principally for specialty applications. Gross weight of aluminum hydrate for all uses was as follows, in thousand metric tons: 1992--714; 1993--704; and 1994-96--not available.