



2013 Minerals Yearbook

BAUXITE AND ALUMINA [ADVANCE RELEASE]

BAUXITE AND ALUMINA

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In 2013, almost all of the 10.2 million metric tons (Mt) of bauxite consumed in the United States was imported. World production of bauxite was 283 Mt (tables 1, 11); the leading producing countries were, in descending order of production, Australia, Indonesia, China, Brazil, Guinea, and India. U.S. production and shipments of alumina (calcined equivalent) were 4.39 Mt and 4.40 Mt, respectively. An estimated 98% of domestic shipments was used for metal production. World production of alumina was estimated to be 103 Mt (tables 2, 12). China, Australia, and Brazil were, in descending order, the leading producing countries.

Production

Bauxite.—For many years, domestic mines have supplied less than 1% of the U.S. requirement for bauxite, and the United States imported almost all the bauxite that it required. All domestic production was used in nonmetallurgical products, such as abrasives, chemicals, proppants, and refractories.

Alumina.—U.S. production of alumina, which was derived exclusively from imported metallurgical-grade bauxite, was essentially unchanged in 2013 from that in 2012 (table 2). Increased production in the first half of the year compared with that in the first half of 2012 was offset by decreased production following the shutdown of a refinery in the second half of the year.

Ormet Corp. (Hannibal, OH) filed for Chapter 11 bankruptcy protection on February 25, 2013, citing low aluminum prices, high power costs, high debt levels, and legacy costs. As part of the divestment of assets in the restructuring, Ormet sold the 540,000-metric-ton-per-year (t/yr) Burnside, LA, alumina refinery to Almatris Inc. [a subsidiary of Almatris GmbH (Frankfurt, Germany)]. The deal was announced October 28 and closed December 12. The refinery shut down 360,000 t/yr of capacity in August and the remaining 180,000 t/yr of capacity in October, citing reduced demand owing to the shutdown of the downstream Hannibal, OH, aluminum smelter. The 270,000-t/yr smelter, which had been producing at the rate of 180,000 t/yr, was shut down at the beginning of August owing to a denial by the Public Utilities Commission of Ohio of a request by Ormet for lower power rates (Ormet Corp., 2013; Vaporean, 2013). Following the sale, Almatris restarted the refinery on December 13. Almatris said it would modify the refinery to produce chemical-grade alumina for its specialty alumina products used in the ceramics, polishing, and refractory industries and decrease capacity to 500,000 t/yr (Almatris GmbH, 2013; Matyi, 2013, 2014).

Consumption

Bauxite.—Domestic production and consumption data for bauxite and alumina were obtained by the U.S. Geological Survey from three voluntary surveys. The “Bauxite Consumption” survey was sent to 31 operations, 24 of which responded, representing approximately 89% of the bauxite consumed for uses other than cement listed in table 4.

Total domestic consumption of bauxite increased by 6% compared with that of 2012. In 2013, 96% of the bauxite consumed in the United States was refined to alumina [an estimated 2.24 metric tons (t) of dried bauxite was required to produce 1 t of alumina]; the remaining 4% was consumed in nonmetallurgical applications (table 4).

Alumina.—An estimated 92% of the net alumina imports and domestic alumina shipments by U.S. alumina refineries went to primary aluminum smelters for metal production. In 2013, 10 domestic primary aluminum smelters consumed 3.89 Mt of alumina, 6% less than the amount of alumina consumed in 2012. Consumption of various forms of alumina by the abrasives, chemicals, refractories, and other specialty industries accounted for the remainder of U.S. alumina use (table 2).

Prices

Most metallurgical-grade bauxite and alumina was purchased under long-term contracts, and contract terms normally were not made public. Spot prices for metallurgical-grade alumina and specialty forms of bauxite and alumina for nonmetallurgical applications, however, were published in trade journals.

The annual average delivered value of U.S. imports of metallurgical-grade bauxite (table 5) decreased by 12% in 2013 compared with that of 2012. In 2013, the average value of U.S. imports of calcined alumina (table 6), including cost, insurance, and freight at U.S. ports, was essentially unchanged at \$414 per metric ton. Yearend price ranges, as quoted in Industrial Minerals (2014), for refractory-grade bauxite in China were generally lower than those at yearend 2012, but in Guyana the prices were unchanged (table 7).

Foreign Trade

On January 1, 2013, the Government of China removed a 15% export tax on refractory-grade bauxite. In 2011, the European Union, Mexico, and the United States filed a complaint with the World Trade Organization (WTO) concerning Chinese export taxes on several mineral products, including refractory-grade bauxite. The WTO subsequently ruled that the export taxes violated international trade agreements, and China appealed

the ruling. The Appellate Body of the WTO rejected most of China's claims in the appeal, determining that China's export restraints on several raw materials, including refractory-grade bauxite, were inconsistent with China's WTO obligations (American Metal Market, 2012; World Trade Organization, 2012; China Metal Market—Alumina and Aluminum, 2013m).

World Production

Bauxite.—In 2013, world production of bauxite was 9% more than that of 2012 (table 11). Total mine production of 283 Mt was reported from 25 countries. The leading producers of bauxite were, in decreasing order of tonnage mined, Australia, Indonesia, China, Brazil, Guinea, and India. These countries accounted for 88% of total world production; Australia, Indonesia, and China together accounted for 65% of the world's production.

Alumina.—World output of alumina increased by 6% in 2013 compared with that of 2012 (table 12). Total alumina production of 103 Mt was reported from 25 countries. The five leading producing countries, in descending order of quantity of alumina produced—China, Australia, Brazil, the United States, and India—accounted for 82% of world production; China and Australia together accounted for 64%.

World Review

Australia.—A 6% increase in bauxite production compared with that in 2012 was attributed to increased demand from and increased exports to China. Alumina refineries in China were reportedly stockpiling bauxite in anticipation of a ban on bauxite exports from Indonesia set to be imposed at the beginning of 2014 (CRU Alumina Monitor, 2013). Alumina production in 2013 increased slightly compared with production in 2012 because increased production from expansion projects completed in 2011 was mostly offset by the maintenance shutdown of capacity at another refinery and lower production at two refineries owing to weather issues. Rampup of the expansion at the Worsley alumina refinery near Boddington, Western Australia, to 4.6 million metric tons per year (Mt/yr) was completed in mid-2013. The refinery was a joint venture among BHP Billiton Ltd. (Melbourne) (86%), Japan Alumina Associates Pty. Ltd. (10%), and Sojitz Alumina Pty. Ltd. (4%) (BHP Billiton Ltd., 2014, p. 10, 15).

Rio Tinto plc (London, United Kingdom) continued ramping up new capacity at the Yarwun alumina refinery in Queensland throughout the year and production increased to 2.4 Mt, a 12% increase from that in 2012. However, design and construction issues were discovered in 2014, and completion of the rampup was delayed until the second half of 2015. The refinery capacity had been expanded to 3.4 Mt/yr in 2012 from 1.4 Mt/yr. A tropical storm was cited as the reason for production at the Queensland and Yarwun refineries decreasing by 17% and 30%, respectively, in the first quarter of the year compared with production in the fourth quarter of 2012. Both refineries were producing near planned capacity by the end of the first quarter. Strong demand from third party customers and the expanded Yarwun refinery were cited as the drivers for record bauxite production of 26.3 Mt at the Weipa Mine, which was 13% more

than that in 2012 (Rio Tinto plc, 2013a, p. 5, 12; 2014a, p. 15; 2014b, p. 4, 16).

Production from the 3.8-Mt/yr Gove refinery in Northern Territory was 17% less in 2013 than that in 2012. Rio Tinto cited unplanned maintenance after discovering problems with one of the refinery's digesters for a production decline in the first quarter of the year (Rio Tinto plc, 2013a, p. 5, 12; 2014b, p. 11). On November 29, 2013, Rio Tinto announced that it would shut down the Gove alumina refinery citing low alumina prices, high fuel costs, and unfavorable currency exchange rates. The shutdown was completed in May 2014, and the refinery was to remain in care-and-maintenance status. Production continued at the adjacent 8-Mt/yr bauxite mine for sale to third party customers (Rio Tinto plc, 2013b; 2014c, p. 4).

In May, Australia Minerals and Mining Group Ltd. (AMMG) began trial production of high purity alumina (99.99%) from high-alumina clay through its proprietary process. AMMG planned to sell high purity alumina for use in electronics and other high-tech products. AMMG owns a deposit in the Yilgarn Craton with a resource of 297 Mt of high-alumina clay (Australia Minerals and Mining Group Ltd., 2013).

Brazil.—Alumina production at the 3.6-Mt/yr Alumar refinery was a record-high 3.44 Mt, slightly higher than that of 2012. The refinery was a joint venture among Alcoa Inc. (38.4%), BHP Billiton (36%), Alumina Ltd. (15.6%), and Rio Tinto (10%); Alcoa was the refinery's operator (BHP Billiton Ltd., 2014, p. 10, 15).

Power failures in May and June at the 6.3-Mt/yr Alunorte alumina refinery forced a temporary shutdown. Production was restarted, but the refinery was still ramping up production at yearend (Norsk Hydro ASA, 2013a, b).

Canada.—In August, Orbite Aluminae Inc. (Montreal, Quebec) suspended production of high-purity alumina at its refinery at Cap-Chat, Quebec. The refinery had been producing alumina that was 99.99% pure at a rate of less than 50 kilograms per day since trial production started in December 2012. Production was suspended in order to install equipment necessary for commercial production, and production resumed in October. When the refinery is completed, it will have a capacity of about 1,100 t/yr. Orbite was also planning to construct a 540,000-t/yr alumina refinery at Cap-Chat to produce smelter-grade alumina. The process developed by Orbite recovers alumina from high-alumina clay and can also recover other products such as gallium, iron oxide, rare-earth elements, and high-purity silica. Orbite's process can also use low-grade bauxite and red mud (Orbite Aluminae Inc., 2013a, b).

China.—China's production of alumina increased by 17% compared with that of 2012 as new capacity ramped up during the year, partially offsetting a 24% decline in alumina imports. Alumina imports in 2013 were 3.8 Mt, which accounted for about 8% of consumption in China. Alumina capacity increased to 61.4 Mt/yr at yearend and further capacity expansions under construction were expected to further increase production in future years. Bauxite production decreased slightly compared with that of 2012. In anticipation of a ban on exporting bauxite and other unprocessed minerals from Indonesia, many alumina refineries in China increased bauxite imports at the end of 2013. Total bauxite imports to China from all sources in October and

November were 6.97 Mt and 5.37 Mt, respectively, which represented increases of 239% and 49%, respectively, compared with imports during the same months in 2012. Total bauxite imports from all sources for the year were 71.5 Mt, double the amount of imports in 2012 (China Metal Market—Aluminum and Alumina Market, 2013h, p; 2014a, b; Yee, 2014).

In order to expand bauxite production in China, the Government was encouraging exploration for bauxite. In Henan Province, several bauxite deposits have been discovered underlying coal deposits, and exploration was underway to determine if similar deposits exist elsewhere (China Metal Market—Aluminum and Alumina Market, 2013b, d, f, n). Exploration was also being conducted in Anhui, Guizhou, Hebei, Liaoning, Shanxi, Sichuan, and Yunnan Provinces, and Nei Mongol Autonomous Region (China Metal Market—Aluminum and Alumina Market, 2013a, c, f, g, i, j).

Several pilot projects were underway to determine the feasibility of recovering alumina from coal ash as a way to decrease reliance upon imports of alumina and bauxite. Coal from several deposits in Nei Mongol Autonomous Region produce high-alumina ash (China Metal Market—Aluminum and Alumina Market, 2013g, n).

Guangxi Zhuang Autonomous Region.—In April, Guangxi Huayin Aluminium Ltd. restarted the 1 Mt/yr of capacity at its refinery that had been idled in mid-2012 owing to an equipment failure. The refinery was producing at full capacity by the end of May (China Metal Market—Alumina and Aluminum, 2013d; Mok, 2013a). Guangxi Baiyi Mining Co. Ltd. completed construction of its 1-Mt/yr bauxite mine in Longhe and started production in May (China Metal Market—Aluminum and Alumina Market, 2013f).

Guizhou Province.—In May, Aluminum Corp. of China (Chinalco) announced that it would permanently shut down its 1.2-Mt/yr alumina refinery in Guiyang. The local government decreed that the site where the refinery was located was to be redeveloped for commercial purposes instead of for industrial use. Chinalco planned to build a new refinery adjacent to the mine that was the principal source of bauxite for the Guiyang refinery (China Metal Market—Alumina and Aluminum, 2013f). Chinalco also commissioned its new Maiba Mine near Qingzhen in September. The underground bauxite mine had a capacity of 500,000 t/yr (China Metal Market—Alumina and Aluminum, 2013j).

Henan Province.—Chinalco completed construction of an underground bauxite mine in Jiayi, and production was expected to ramp up in the early part of 2014. The mine would supply the Zhongzhou alumina refinery. The capacity of the mine was not available (China Metal Market—Alumina and Aluminum, 2013i).

Shandong Province.—Shandong Qixing Alumina Ltd. finished construction of its 500,000-t/yr alumina refinery but delayed commissioning, citing low alumina prices and power supply issues (China Metal Market—Alumina and Aluminum, 2013d).

Shanxi Province.—In January, Zhaofeng Aluminum Co. Ltd. shut down its refinery, citing a shortage of coal following an explosion in the mine that supplied its powerplant. Alumina production was restarted in the fourth quarter of 2013. The 1.1-Mt/yr alumina refinery in Yangquan was completed in 2012. Ramp up was expected to be completed in 2014 (Mok, 2013f, 2014).

In June, Chinalco completed an 800,000-t/yr alumina refinery in Huaxing, Xing County. Production started in October and was to be ramped up in 2014. The refinery would be supplied by a 1.6-Mt/yr bauxite mine, which was completed in 2012 (China Metal Market—Alumina and Aluminum, 2013a, g; Leung, 2013). Shanxi Xinfu Chemical Engineering Co. Ltd. commissioned its new 800,000-t/yr alumina refinery in Xiaoyi in July. Production from half of the capacity was started in July and production from the remaining capacity, in August (China Metal Market—Alumina and Aluminum, 2013h).

East Hope Group Ltd. continued construction of an alumina refinery in Lingshi. When completed, the refinery would have capacity to produce 3 Mt/yr of aluminum hydroxide for aluminum-based chemicals, 2.4 Mt/yr of alumina, and 40 t/yr of gallium. A construction schedule was not available (China Metal Market—Alumina and Aluminum, 2013j). Shanxi Datong Coal Group Co. Ltd. and its partners, Shanxi Huayu Group Ltd. and Orient Patron Ltd., were building a 1-Mt/yr alumina refinery in Baode County. A 2-Mt/yr bauxite mine was also being constructed adjacent to the refinery, which was scheduled for completion in October 2014 (China Metal Market—Alumina and Aluminum, 2013f).

In August, Jinjiang Group Ltd. and Henan Zhengzhou Coal Corp. started construction of an 800,000-t/yr alumina refinery in Pinglu County. The refinery was to be completed by February 2015. Shanxi Qinxin Group Ltd. started construction of an alumina refinery in Changzhi. When completed, the refinery would have a capacity of 1.6 Mt/yr. A construction schedule was not available (China Metal Market—Alumina and Aluminum, 2013k).

Yunnan Province.—Yunnan Aluminum Co. Ltd. ramped up its 800,000-t/yr alumina refinery in Wenshan to full capacity during the first half of the year. The refinery was completed in 2011, but technical issues were cited for delaying production until April 2012 (China Metal Market—Alumina and Aluminum, 2013e; Platts Metals Week, 2012).

Ghana.—Bosai Ghana Bauxite Co. Ltd. (a subsidiary of Chongqing Bosai Mining Co. Ltd.) continued to ramp up production from the Awaso Mine, which had been acquired from Rio Tinto and reopened in 2012. Production was estimated at 1 Mt/yr and was expected to increase to between 1.5 and 2 Mt/yr by yearend 2014. The capacity of the mine was 3 Mt/yr (China Metal Market—Alumina and Aluminum, 2013c, o).

Guinea.—Strong demand from third party customers was cited for record production of 15.4 Mt of bauxite at the Sangaredi Mine, 10% more than that produced in 2012. The mine was a joint venture among the Government (49%), Alcoa (22.95%), Rio Tinto (22.95%), and Dadco Group (5.1%) (Rio Tinto plc, 2014b, p. 4, 16).

India.—Alumina production from the National Aluminum Co. Ltd. of India (Nalco) (Bhubaneswar) refinery in Damanjodi, Odisha State, increased by 12% compared with that in 2012, as capacity from an expansion completed in 2011 was ramped up. Expansion of the refinery to 2.28 Mt/yr from 2.1 Mt/yr was completed in December 2011. For the fiscal year ended March 31, 2014, Nalco's bauxite production was 6.29 Mt, 16% more than that of the previous fiscal year. An expansion project of the Panchpatmali Mine to increase capacity to 6.8 Mt/yr

from 6.3 Mt/yr was expected to be completed in 2014 (National Aluminium Co. Ltd., 2013, 2014a, b).

Hindalco Industries Ltd. (Mumbai) commissioned the 1.5-Mt/yr Utkal alumina refinery during the second quarter of the year. Production was to be ramped up to full capacity by mid-2014. The refinery was supplied by an adjacent 3-Mt/yr bauxite mine, which also was commissioned during the year (Hindalco Industries Ltd., 2013, p. 4; Phang and Lim, 2013).

Anrak Aluminium Ltd. (Visakhapatnam) completed construction of a 1.5-Mt/yr alumina refinery in Rachapalle, Andhra Pradesh State, and was conducting trial runs of production in the fourth quarter of 2013. However, uncertainty in bauxite supplies was cited for delaying commercial production of alumina at the refinery (Bayya, 2014).

In June, Vedanta Resources plc restarted the 1.4-Mt/yr Lanjigarh alumina refinery. At yearend, the refinery was operating at about 85% of capacity and was expected to be producing at full capacity in early 2014. Vedanta had shut down the refinery in December 2012, citing bauxite shortages owing to permitting delays for mining nearby deposits and an inability to purchase bauxite from other sources. Bauxite from suppliers in Chhattisgarh, Gujarat, and Jharkhand States was being used while Vedanta continued to seek mine permits (Lim and Phang, 2013b; Times of India, The, 2013; Vedanta Resources plc, 2013, 2014).

Indonesia.—In anticipation of a ban on exporting bauxite and other unprocessed minerals from Indonesia, many alumina refineries in China increased bauxite imports at the end of 2013. Bauxite exports to China from Indonesia through the end of November 2013 were 45.2 Mt, 73% more than the amount exported to China in the same period in 2012. The export ban, which would take effect on January 12, 2014, was part of the 2009 Mining Law and was intended to increase economic development in the country through investment in mineral processing facilities. Several alumina refineries in Indonesia have been proposed by Chinese and Russian companies (Mok, 2013c, e; Yulisman, 2013; Singh, 2014).

In October, the 300,000-t/yr Tayan refinery was commissioned. Commercial production of chemical-grade alumina was to begin in the second quarter of 2014. The project was a joint venture between PT Aneka Tambang Tbk (Antam) (80%) and Japan-based Showa Denko K.K. (20%). The refinery used bauxite from a nearby deposit in West Kalimantan Province (PT Aneka Tambang Tbk, 2013, 2014).

In July, ground was broken for an alumina refinery in Ketapang, West Kalimantan, and construction was expected to begin in 2014. The refinery capacity would be 1 Mt/yr and was scheduled to be completed by yearend 2016. The project was a joint venture among Chinese companies Hongqiao Group Ltd. (60%) and Winning Investment Co. Ltd. (10%) and Indonesian companies Harita Group Ltd. (25%) and PT Danpac (5%) (Mok, 2013d).

Russia.—Construction started on an expansion of the Cheryomukhovskaya-Glubokaya Mine. Production from the mine was suspended during expansion work, and production was 12% less than that in 2012 (United Company RUSAL Plc, 2014).

Saudi Arabia.—Saudi Arabian Mining Co. (Ma'aden) and Alcoa continued construction of the 4-Mt/yr Al Ba'itha bauxite mine and a 1.8-Mt/yr alumina refinery in Ras al Khair that were expected to be completed in 2014. The mine and refinery were part of an aluminum complex that included a 740,000-t/yr smelter and a 380,000-t/yr rolling mill in Ras al Khair that were completed in 2013. Ma'aden owned 74.9% of the joint venture, and Alcoa owned 25.1% (Lim and Phang, 2013a).

United Arab Emirates.—In July, Emirates Aluminium Co. Ltd. (EMAL) and Dubai Aluminium Co. Ltd. (Dubal) merged to form Emirates Global Aluminium Co. Ltd. In addition to Dubal's 1-Mt/yr smelter at Taweelah and EMAL's 800,000-t/yr smelter at Jebel Ali, the new company also included the Guinea Alumina Corp. In May, EMAL's parent company, Mubadala Development Co., and Dubal acquired the 66.7% share of Guinea Alumina Ltd. that they did not already own from Global Alumina Ltd. and BHP Billiton. Guinea Alumina had an exploration and development project for bauxite and alumina in Guinea (Carlisle, 2013).

Venezuela.—Alumina production from Corporación Venezolana de Guayana's (CVG) Bauxilum refinery in Ciudad Guayana was 25% less in 2013 than in 2012. The refinery produced at about 30% of its 2-Mt/yr capacity owing to deteriorating equipment and machinery. The 5.8-Mt/yr Los Pijiguaos Mine experienced problems with mining equipment and transportation issues. Nearly all the production was during the second half of the year after new mining equipment was purchased and installed (Soules, 2013a, b).

Vietnam.—State-owned Vietnam National Coal and Mineral Industries Group began producing alumina from the alumina refinery in Tan Rai, Lam Dong Province. Although the refinery had a capacity of 600,000 t/yr, initial production was at half that rate. Shipments of alumina to China started in July, but were mostly to nonsmelter customers because the granularity of the alumina was not optimal for use by smelters (Mok, 2013b).

Outlook

Consumption of bauxite and alumina are expected to closely follow the trend of aluminum production. Aluminum prices, which had decreased during the second half of 2013, were generally stable during the first half of 2014, before increasing during the second half of 2014. World demand for aluminum in 2014 is expected to increase only slightly from that in 2013 because the rate of economic expansion in China is slower than in prior years and aluminum consumption in Europe continues to stagnate. Wider use of aluminum for automobile body sheet applications is expected to increase demand for primary aluminum, which would also increase demand for bauxite and alumina in coming years. World consumption of bauxite and alumina for nonmetallurgical uses is expected to increase slightly, attributable to continued growth in consumption of aluminum-hydroxide-based fire retardant materials. Demand for high-purity alumina for devices such as smart phones, laptops, and tablets is expected to continue to increase, although the effect on total demand for bauxite and alumina would be minimal because of the limited volume of this market relative to aluminum smelting. Also, new

entrants to the high-purity alumina market are expected to use high-alumina clay instead of bauxite as the raw material for their processes.

Indonesia's restrictions on exports of mineral resources is expected to continue to effect the flow of bauxite and the construction of new alumina refineries in the future. The policy of China's Government that encourages companies to make investments in power-intensive industries in other countries is also expected to continue to affect the location of new alumina refineries. Subject to available financing, several new alumina refineries are expected to be constructed in Indonesia in the coming years, at the same time as fewer expansions of alumina refineries in China are expected. Some Chinese refineries are also expected to source more bauxite from Australia and counties in West Africa.

Emerging technology to recover alumina from clay and coal ash might provide an alternate feed material to bauxite in the near future if these projects prove to be economically feasible. Exploration and development of bauxite deposits in Australia, China, and many nations in Africa and Southeast Asia, are expected to increase supplies of bauxite and alumina. Limited access to bauxite deposits in India may restrain expansion of mines and alumina refineries.

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TABLE 1
SALIENT BAUXITE STATISTICS¹

(Thousand metric tons)

	2009	2010	2011	2012	2013
United States:					
Exports, as shipped:					
Crude and dried	9	21	22	11	4
Calcined	21	19	31	18	10
Imports for consumption, as shipped:					
Crude and dried	6,970	8,120	9,540	10,300	9,830
Calcined	461	690	353	406 ^r	581
Consumption, dry equivalent	4,960	8,180	8,820	9,560	10,200
World, production	209,000 ^r	239,000 ^r	260,000 ^r	259,000 ^r	283,000 ^e

^rEstimated. ^rRevised.

¹Data are rounded to no more than three significant digits.

TABLE 2
SALIENT ALUMINA STATISTICS¹

(Thousand metric tons)

	2009	2010	2011	2012	2013
United States:					
Production:					
Calcined alumina	2,130	3,420	3,740	3,960 ^r	4,310
Other alumina ²	370	483	543	645	575
Total:					
As produced or shipped ³	2,500	3,900	4,280	4,610 ^r	4,890
Calcined equivalent	2,370	3,470	3,790	4,370 ^r	4,390
Shipments:					
Calcined alumina	2,130	3,410	3,730	3,990 ^r	4,320
Other alumina ²	365	485	551	461	572
Total:					
As produced or shipped ³	2,500	3,900	4,280	4,630 ^r	4,890
Calcined equivalent	2,370	3,470	3,790	4,400 ^r	4,400
Stocks, yearend ^{4,5}	257	381	961	363 ^r	280
Imports for consumption ⁵	1,860	1,720	2,160	1,900 ^r	2,050
Exports ⁵	946	1,520	1,660	1,720 ^r	2,300
Consumption, apparent ^{5,6}	3,660	3,540	3,710	5,170 ^r	4,230
World, production ⁵	77,200 ^r	85,500	91,900 ^r	97,000 ^r	103,000

^rRevised.

¹Data are rounded to no more than three significant digits.

²Trihydrate, activated, tabular, and other aluminas. Does not include calcium and sodium aluminates.

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

⁴Does not include consumer stocks other than those at primary aluminum plants.

⁵Calcined equivalent.

⁶Defined as domestic production plus imports minus exports plus adjustments for industry stock changes.

TABLE 3
CAPACITIES OF DOMESTIC ALUMINA PLANTS, DECEMBER 31^{1,2}

(Thousand metric tons per year)

Company and plant	2012	2013
Alcoa Inc., Point Comfort, TX	2,300	2,300
Noranda Alumina LLC, Gramercy, LA	1,200	1,200
Almatis Inc., Burnside, LA ³	540	500
Sherwin Alumina Co., Corpus Christi, TX ⁴	1,600	1,600
Total	5,640	5,600

¹Capacity may vary depending on the bauxite used.

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

³Sold to Almatis Inc. by Ormet Corporation in December 2013.

⁴Owned by Glencore International AG.

TABLE 4
U.S. CONSUMPTION OF BAUXITE, BY INDUSTRY¹

(Thousand metric tons, dry equivalent)

Industry	2012	2013
Alumina	9,330	9,810
Other ²	227	369
Total	9,560	10,200

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

²Includes abrasive, chemical, and refractory uses.

TABLE 5
AVERAGE VALUE OF U.S. IMPORTS OF CRUDE AND DRIED BAUXITE¹

(Dollars per metric ton)

Country	2012		2013	
	Port of shipment f.a.s. ²	Delivered to U.S. ports c.i.f. ³	Port of shipment f.a.s. ²	Delivered to U.S. ports c.i.f. ³
Brazil	35.95	53.91	35.23	49.53
Guinea	33.79	48.72	30.85	44.40
Jamaica	21.29	36.79	21.56	31.17
Weighted average ⁴	28.46	44.43	27.46	39.29

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

²Free alongside ship valuation.

³Cost, insurance, and freight valuation.

⁴Weighted average of major suppliers.

TABLE 6
AVERAGE VALUE OF
U.S. IMPORTS OF ALUMINA¹

(Dollars per metric ton)

	2012	2013
January	418	409
February	471	393
March	432	403
April	396	607
May	389	384
June	512	382
July	408	375
August	360	409
September	381	379
October	417	436
November	418	361
December	388	430
Average	416	414

¹Metallurgical grade; cost, insurance, and freight valuation. Computed from quantity and value data reported to U.S. Customs Service and compiled by the U.S. Census Bureau.

TABLE 7
REFRACTORY GRADE BAUXITE PRICES

(Dollars per metric ton)

Material	2012 ¹	2013 ¹
China:		
Guizhou Province, round kiln, lump	470–525	400–430
Shanxi Province, round kiln, lump	405–440	400–435
Guyana, rotary kiln, lump	460–510	460–510

¹Port of shipment, 87% Al₂O₃, free-on-board ship valuation, yearend.

Source: Industrial Minerals.

TABLE 8
U.S. EXPORTS AND IMPORTS FOR CONSUMPTION
OF BAUXITE, CRUDE AND DRIED, BY COUNTRY¹

(Thousand metric tons)

Country	2012	2013
Exports:		
Canada	9	4
Other	2	(2)
Total	11	4
Imports:		
Brazil	2,590	2,480
Guinea	2,760	2,510
Jamaica ³	4,720	4,710
Other	255 ^r	126
Total	10,300	9,830

^rRevised.

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

²Less than ½ unit.

³Data from the Jamaica Bauxite Institute.

Note: Total U.S. imports of crude and dried bauxite as reported by the U.S. Census Bureau were as follows:
2012—5.63 million metric tons (Mt) and 2013—6.16 Mt.

Source: U.S. Census Bureau.

TABLE 9
U.S. EXPORTS AND IMPORTS FOR CONSUMPTION OF CALCINED BAUXITE, BY COUNTRY¹

(Thousand metric tons and thousand dollars)

Country	2012				2013			
	Refractory grade		Other grade		Refractory grade		Other grade	
	Quantity	Value ²	Quantity	Value ²	Quantity	Value ²	Quantity	Value ²
Exports:								
Canada	4	538	--	--	7	618	--	--
Mexico	1	533	12	2,130	1	263	--	--
Other	1	438	(3)	103	2	484	(3)	46
Total	6	1,510	12	2,240	10	1,370	(3)	46
Imports:								
Australia	--	--	93	2,920	--	--	128	4,360
Brazil	2 ^r	1,390 ^r	2	1,560	8	5,930	89	4,110
China	37 ^r	16,500 ^r	11	2,970	65	29,100	13	5,040
Greece	--	--	81	4,440	--	--	50	3,110
Guyana	46	19,400	102	5,830	57	23,700	169	8,610
Singapore	--	--	25	579	--	--	--	--
Other	(3)	206 ^r	7	1,200 ^r	(3)	37	2	930
Total	85^r	37,500^r	321	19,500	130	58,700	451	26,200

^rRevised. -- Zero.

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

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

³Less than ½ unit.

Source: U.S. Census Bureau; data adjusted by U.S. Geological Survey.

TABLE 10
U.S. EXPORTS AND IMPORTS FOR CONSUMPTION OF ALUMINA,
BY COUNTRY¹

(Thousand metric tons, calcined equivalent and thousand dollars)

Country	2012		2013	
	Quantity	Value ²	Quantity	Value ²
Exports:				
Canada	757 ^r	262,000 ^r	785	261,000
China	57	49,100 ^r	130	31,700
Egypt	82	26,400	391	117,000
Georgia	228	73,300	156	46,600
Iceland	246	74,200	291	89,500
Mexico	33	18,100 ^r	29	25,500
Netherlands	32	21,900	4	12,000
Russia	120	35,600	215	66,300
Other	167 ^r	180,000	302	220,000
Total	1,720^r	740,000^r	2,300	870,000
Imports:				
Australia	632	191,000	760	230,000
Brazil	241	79,800	241	71,300
Canada	48 ^r	10,600 ^r	52	37,100
China	51 ^r	33,200 ^r	26	28,600
France	19	29,800 ^r	19	38,000
Germany	65 ^r	42,000 ^r	35	94,300
Jamaica ³	51	19,000	168	63,200
Suriname	754	229,000	724	219,000
Other	34 ^r	75,900 ^r	25	60,400
Total	1,900^r	711,000^r	2,050	842,000

^rRevised.

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

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

³Data from the Jamaica Bauxite Institute.

Source: U.S. Census Bureau.

TABLE 11
BAUXITE: WORLD PRODUCTION, BY COUNTRY^{1,2}

(Thousand metric tons)

Country	2009	2010	2011	2012	2013 ^e
Australia	65,231	68,414	69,976	76,282 ³	81,109 ³
Bosnia and Herzegovina	556	844	708	800 ^{r,3}	800
Brazil	26,074	32,028	33,625 ^r	34,956 ^r	32,481 ³
China ^e	40,000	44,000	45,000	47,000	46,000
Fiji	--	--	50	300 ^r	460 ³
Ghana	490	595	408	753 ^r	827
Greece	1,935	1,902	1,900 ^e	2,100	2,100
Guinea ⁴	13,600	15,300	15,300 ^r	16,041 ^r	18,763 ³
Guyana ⁴	1,485	1,083	1,818 ^r	2,214 ^{r,3}	1,713 ³
Hungary	267	307	278	250	290
India ^e	16,000	18,000	19,000	19,000	15,400
Indonesia ^e	14,700 ^r	27,400 ^r	40,600 ^r	31,400 ^r	55,700
Iran	522	681	818 ^r	820 ^{r,e}	820
Jamaica ^{4,5}	7,817	8,540	10,189	9,339 ³	9,435 ³
Kazakhstan	5,130	5,310	5,495	5,170 ³	5,400
Malaysia	263	124	188	122 ^r	150
Montenegro	46	61	50 ^{r,e}	-- ^r	--
Mozambique	4	9	10	8 ^{r,3}	13
Pakistan	11	10	10 ^e	12	12
Russia	5,775	5,690	5,943	5,166	5,322 ³
Sierra Leone	757	1,089	1,300	776 ³	616 ³
Suriname	3,388	3,104	3,236	3,400	2,700
Tanzania ^e	123 ³	39 ^r	30 ^r	58 ^r	50
Turkey	1,473	1,311	1,025	541 ^{r,3}	550
United States	NA	NA	NA	NA	NA
Venezuela	3,611 ^r	3,126 ^r	2,455	2,286 ^r	2,160
Vietnam ^e	80	80	100	100	250
Total	209,000 ^r	239,000 ^r	260,000 ^r	259,000 ^r	283,000

^eEstimated. ^rRevised. NA Not available. -- Zero.

¹World totals and estimated data are rounded to no more than three significant digits; may not add to totals shown.

²Includes data available through June 15, 2014.

³Reported figure.

⁴Dry bauxite equivalent of crude ore.

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

TABLE 12
ALUMINA: WORLD PRODUCTION, BY COUNTRY^{1,2,3}

(Thousand metric tons)

Country	2009	2010	2011	2012	2013
Australia	19,948	19,956	19,399	21,357	21,528
Azerbaijan ^e	164 ^r	10 ^r	6 ^r	15 ^r	200
Bosnia and Herzegovina	192	269	262	202 ^r	200 ^e
Brazil	8,618	9,433	10,182	10,321 ^r	10,200 ^e
Canada	1,125	1,301	1,363	1,397	1,439
China ^e	23,800	29,000	34,100	37,700	44,000
France	348	481	524	540 ^e	540
Germany	1,154	1,485	1,405	1,364	1,360
Greece	719	725 ^r	725 ^e	800 ^e	800 ^e
Guinea	530	597	574	150	-- ⁴
Hungary	185	214	250 ^r	170 ^r	200 ^e
India	3,900	3,640	3,880	4,347	4,040
Iran ^e	210	250 ^r	225	225	225
Ireland	1,245	1,850	1,927	1,926	1,935
Italy	92	--	--	--	--
Jamaica	1,774	1,591	1,960	1,758	1,855
Japan ^{e,5}	310	300	280	250	250
Kazakhstan	1,608	1,639	1,670	1,510	1,600 ^e
Montenegro	59	--	--	--	--
Romania	44	450 ^r	520 ^r	414	391
Russia	2,794	2,930	2,825	2,719	2,659
Spain ^e	1,500	1,500	1,500	1,500	1,400
Suriname	1,536	1,486	1,421	1,500 ^{r,e}	1,300
Turkey ^e	100 ^r	160	210 ^r	220 ^r	230
Ukraine	1,524 ^r	1,534 ^r	1,601 ^r	1,429 ^r	1,494
United States	2,370	3,470	3,790	4,370 ^r	4,390
Venezuela	1,376	1,244	1,266	808	600
Vietnam	--	--	--	--	115
Total	77,200 ^r	85,500	91,900 ^r	97,000 ^r	103,000

^eEstimated. ^rRevised. -- Zero.

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

²World totals, U.S. data, and estimated data are rounded to no more than three significant digits; may not add to totals shown.

³Includes data available through June 15, 2014.

⁴Reported figure.

⁵Data presented are for alumina used principally for specialty applications. Information on aluminum hydrate for all uses is not adequate to formulate estimates of production levels. Production of aluminum hydroxide, in metric tons was: 2009—710,000; 2010—700,000; 2011—690,000; 2012—650,000; and 2013—690,000 (estimated).