



2014 Minerals Yearbook

BAUXITE AND ALUMINA [ADVANCE RELEASE]

BAUXITE AND ALUMINA

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In 2014, almost all of the 9.8 million metric tons (Mt) of bauxite consumed in the United States was imported. World production of bauxite was 245 Mt (tables 1, 11); the leading producing countries were, in descending order of production, Australia, China, Brazil, Guinea, India, and Jamaica. U.S. production and shipments of alumina (calcined equivalent) were both 4.39 Mt. An estimated 87% of domestic shipments was used for metal production. World production of alumina was estimated to be 108 Mt (tables 2, 12). The leading producing countries, in descending order of production, were China, Australia, and Brazil.

Production

Bauxite.—Domestic mines operated by two companies supplied about 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, cement, chemicals, proppants, and refractories.

Alumina.—U.S. production of alumina, which was derived exclusively from imported metallurgical-grade bauxite, was essentially unchanged in 2014 from that in 2013 (table 2). In June, Sherwin Alumina Co. LLC (a subsidiary of Glencore International Ltd.) temporarily shut down one of the five production units at the 1.65-million-metric-ton-per-year (Mt/yr) alumina refinery in Gregory, TX. Decreased demand was cited for the shutdown. Glencore reported that alumina production from the refinery in the third quarter of 2014 was 23% less than that of the same quarter in 2013, and in the fourth quarter of 2014, production was 31% less than that of the same quarter in 2013 (Glencore International Ltd., 2015, p. 128; Phang, 2014a). On October 11, Glencore locked out 450 employees represented by the United Steelworkers Union at the alumina refinery after the employees rejected a contract offer on October 10. Issues in the contract dispute included health care contributions, pay for unscheduled work, and wages. Production at the alumina refinery was continued by management employees and temporary workers (Fitzgerald, 2015; Laliberte, 2014; Lim, 2014b; Matyi, 2014).

Consumption

Domestic production and consumption data for bauxite and alumina were obtained by the U.S. Geological Survey from three separate voluntary surveys.

Bauxite.—The “Bauxite Consumption” survey was sent to 30 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 decreased by 4% compared with that of 2013. In 2014, 97% of the bauxite consumed in the United States was refined to alumina [an estimated 2.17 metric tons (t) of dried bauxite was required to

produce 1 t of alumina]; the remaining 3% was consumed in nonmetallurgical applications (table 4).

Alumina.—The “Alumina Production” survey was sent to all four domestic alumina refineries, one of which responded, another reported production in public reports, and production was estimated for the other two. Alumina consumption by domestic primary aluminum smelters was estimated from the responses to the “Aluminum” survey, which was received from all three companies that operated eight primary aluminum smelters. Consumption by other users was estimated for two companies that did not respond to the “Alumina Production” survey. An estimated 87% of domestic alumina consumption (net alumina imports and domestic alumina shipments by U.S. alumina refineries) was for metal production at primary aluminum smelters. In 2014, eight domestic primary aluminum smelters consumed 3.42 Mt of alumina, 12% less than the amount of alumina consumed in 2013. The remainder of U.S. consumption of various forms of alumina was by abrasives, chemicals, refractories, and other specialty industries (table 2).

Prices

Most metallurgical-grade bauxite 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 average annual delivered value of U.S. imports of metallurgical-grade bauxite (table 5) decreased by 4% in 2014 compared with that of 2013. In 2014, the average value of U.S. imports of calcined alumina (table 6), including cost, insurance, and freight at U.S. ports, was slightly lower at \$409 per metric ton. Yearend price ranges, as quoted in Industrial Minerals (2015), for refractory-grade bauxite exported from China were 8% to 9% lower than those at yearend 2013, but in Guyana the export prices were unchanged (table 7).

World Industry Structure

Bauxite.—In 2014, world production of bauxite was 13% less than that of 2013 (table 11). Total mine production of 245 Mt was reported from 27 countries. The leading producers of bauxite were, in decreasing order of tonnage mined, Australia, China, Brazil, Guinea, India, and Jamaica. These countries accounted for 87% of total world production; Australia, China, and Brazil together accounted for 69% of the world’s production. In 2013, Indonesia was the second-leading bauxite-producing country, accounting for 20% of world production, but because bauxite exports were banned in January 2014, production in Indonesia dropped to 1% of the world total.

Alumina.—World output of alumina increased by 4% in 2014 compared with that of 2013 (table 12). Although 28 countries reported production, the five leading producing countries, in descending order of quantity of alumina produced—China, Australia, Brazil, India, and the United States—accounted for 81% of world production; China and Australia together accounted for 63%.

Mergers and Acquisitions.—On December 1, Alcoa World Alumina and Chemicals Ltd. (AWAC) sold its 55% share of Jamalco (Jamaica) to Noble Group Ltd. as part of its ongoing plan to sell or shut down some of its high-cost upstream assets in order to focus on more value-added downstream assets. The Government of Jamaica retained ownership of 45% of the joint venture. The Jamalco assets included a 1.48-Mt/yr alumina refinery at Clarendon and a 3.7-Mt/yr bauxite mine at Manchester. AWAC, a joint venture among Alcoa Inc. (60%) and Alumina Ltd. (40%), continued as the operator under a 3-year service agreement (Alcoa Inc., 2014a).

In December, United Company RUSAL Plc acquired the 7% share of the West Indies Alumina Co. (Winalco) (Jamaica) owned by the Government of Jamaica, becoming the sole owner of Winalco. Winalco's assets in Jamaica included the Ewarton refinery in St. Catherine, the Kirkvine refinery in Manchester, and bauxite mines at Russel Place and Schwallenburgh. The combined capacity of the refineries was 1.25 Mt/yr, and the combined capacity of the mines was 4 Mt/yr. RUSAL planned to modernize the refineries to increase efficiency, decrease production costs, and improve alumina quality, although a schedule was not disclosed (United Company RUSAL Plc, 2014d). RUSAL also became the sole owner of the 3.2-Mt/yr Timan bauxite mine in Russia in December by purchasing the 20% share controlled by the Republic of Komi (Russia) (United Company RUSAL Plc, 2014c).

BHP Billiton Ltd. (Melbourne, Victoria, Australia) announced that it would spin off its alumina, aluminum, bauxite, coal, lead, manganese, nickel, silver, and zinc assets to create a new company to be called South32 Ltd. that would be headquartered in Perth, Western Australia, Australia. Assets of South32 would include BHP Billiton's 36% share of the 3.5-Mt/yr Alumar alumina refinery in Sao Luis, Brazil, as well as BHP Billiton's 86% share of the 4.6-Mt/yr Worsley alumina refinery and an adjacent bauxite mine in Boddington, Western Australia, Australia. In addition, South32 would receive BHP Billiton's 40% share of the 447,000-metric-ton-per-year (t/yr) Alumar smelter in Brazil, the 715,000-t/yr Hillside smelter in South Africa, and the 565,000-t/yr Mozal smelter in Mozambique. The spinoff was pending shareholder approval, which was expected in May 2015 (BHP Billiton Ltd., 2014a, b).

World Review

Australia.—Alumina and bauxite production declined by 5% and 3%, respectively, compared with that in 2013. The shutdown of one refinery was the main reason for the production decrease, but increased production from new capacity being ramped up at one refinery and higher production rates at two refineries that had temporary weather-related shutdowns in 2013 offset part of the decrease in production. Increased exports of

bauxite also offset part of the decrease in bauxite deliveries to domestic refineries.

Rio Tinto plc (London, United Kingdom) continued to ramp up new capacity at the Yarwun alumina refinery in Queensland, and production increased to 2.7 Mt, a 10% increase from that in 2013. Design and construction issues discovered in 2014 were being corrected and completion of the rampup was expected in the second half of 2015. The refinery capacity had been expanded to 3.4 Mt/yr in 2012 from 1.4 Mt/yr. Production from the 3.85-Mt/yr Queensland alumina refinery in Gladstone, Queensland, was 5% more than that in 2013. In May, Rio Tinto shut down the 3.8-Mt/yr Gove refinery in Northern Territory, citing low alumina prices, high fuel costs, and unfavorable currency exchange rates. The refinery was to remain on care-and-maintenance status. Production continued at the adjacent 6-Mt/yr bauxite mine for sales to third party customers, and mining capacity was to be increased to 8 Mt/yr by yearend 2015. Although alumina production at the Gove refinery was 70% less than that produced in 2013 because of the shutdown, bauxite production decreased by only 19% owing to increased sales for export (Rio Tinto plc, 2013; 2014, p. 4; 2015, p. 4, 17, 19).

Altech Chemicals Ltd. (formerly Australia Minerals and Mining Group Ltd.) announced that it would build a refinery in Johor Bahru, Malaysia, that used its proprietary process to produce high-purity alumina (99.99%) from a high-alumina clay deposit in Western Australia. Altech cited lower costs for construction and operation of the refinery as well as closer proximity to customers and chemicals suppliers as reasons for building the refinery in Malaysia instead of Australia. Altech planned to sell high-purity alumina for use in electronics and other high-tech products. A completion schedule for the 4,000-t/yr refinery was not announced (Altech Chemicals Ltd., 2014).

Brazil.—Alumina production at the Alumar refinery was a record-high 3.64 Mt, 6% higher than that of 2013 and slightly more than its nameplate capacity of 3.6 Mt/yr. The refinery was a joint venture among BHP Billiton (36%), Alcoa (23.4%), Alumina (15.6%), Aluminio Ltd. (15%), and Rio Tinto (10%) (Rio Tinto plc, 2015, p. 17).

The production rate at the 6.3-Mt/yr Alunorte alumina refinery reached 6 Mt/yr in the second quarter of the year. Power failures in May and June 2013 forced a temporary shutdown and the refinery was still ramping up production at the beginning of 2014 (Norsk Hydro ASA, 2013; 2014a, b).

Canada.—Orbite Aluminae Inc. (Montreal, Quebec) was constructing a 1,100-t/yr refinery to produce high-purity (99.99%) alumina from high-alumina clay at Cap-Chat, Quebec. Completion was expected in the third quarter of 2015. In addition to high-purity alumina, Orbite's plant would produce gallium, iron oxide, rare-earth elements, and high-purity silica (Orbite Aluminae Inc., 2014).

China.—China's alumina production was 47.8 Mt, an 8% increase compared with that in 2013 as new capacity ramped up during the year. Alumina imports in 2014 were 5.28 Mt, an increase of 38% compared with those in 2013, and accounted for about 11% of China's consumption. Alumina capacity at yearend 2014 was estimated to be 61 Mt/yr, a slight decline from the 61.4 Mt/yr estimated at yearend 2013. New capacity expansions were limited owing to concerns about bauxite

availability and financing restrictions by the Government and were more than offset by the permanent shutdown of older, less-efficient capacity owing to high operating costs and environmental regulations. Capacity expansions were expected to be limited in future years (China Metal Market—Aluminum and Alumina, 2013b, d; 2014h, i).

Bauxite production increased by 20% compared with that of 2013. Bauxite imports were 36.3 Mt, 49% less than the 71.5 Mt imported in 2013 but only 8% less than the 39.6 Mt imported in 2012. In anticipation of Indonesia's ban on exporting bauxite and other unprocessed minerals, many alumina refineries in China increased bauxite imports in 2013. By the beginning of 2014, refineries in China had secured bauxite supplies from other countries. Imports from Australia increased by 10% compared with those in 2013 and accounted for 43% of bauxite imports to China. Although imports decreased by 82% compared with those in 2013, Indonesia was the second leading supplier of bauxite to China, accounting for 24% of imports in 2014. Imports from India decreased by 4% and accounted for 14% of all bauxite imports. Malaysia, the fourth leading supplier of bauxite, accounted for 9% of imports and supplied 3.26 Mt of bauxite in 2014 compared with 0.2 Mt in 2013. Imports from the Dominican Republic increased by 429% to 1.6 Mt in 2014 compared with that imported in 2013, and accounted for 4% of total bauxite imports (China Metal Market—Aluminum and Alumina, 2013d; 2014i; 2015a, b).

Between 2011 and 2013, 280 Mt of bauxite reserves were discovered in China, mostly in Guangxi, Guizhou, Henan, and Shanxi Provinces. However, spending on exploration for bauxite in the first half of 2014 decreased by 39% compared with that in the first half of 2013. Exploration for new bauxite deposits continued with discoveries being made in Guangxi Zhuang Autonomous Region and Guizhou Province (China Metal Market—Aluminum and Alumina, 2014a, f, h).

Guizhou Province.—In August, Aluminum Corp. of China (Chinalco) 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 and Hangzhou Jinjiang Group Ltd. planned to build a new refinery adjacent to the mine that had been the principal source of bauxite for the Guiyang refinery (China Metal Market—Alumina and Aluminum, 2014d).

Guizhou Huajin Aluminum Co. Ltd., a joint venture between Chinalco and Hangzhou Jinjiang Group Ltd., was building an 800,000-t/yr alumina refinery in Qingzhen. Completion was expected in June 2015. The project would also include an aluminum smelter and a captive powerplant (China Metal Market—Alumina and Aluminum, 2014c).

China Power Investment Corp. was building an 800,000-t/yr alumina refinery in Wuchuan County. Construction started in early 2014 and completion was expected in December 2015 with rampup to begin in 2016. The refinery would be supplied with bauxite from the Dazhuyuan and Wachangping Mines (China Metal Market—Alumina and Aluminum, 2014a).

Henan Province.—Chinalco obtained an underground mining permit to begin operating in the Jiayi area of the Sanmenxia Mine. The 160,000-t/yr underground expansion of the 1.6-Mt/yr

bauxite mine was completed in 2013 and would supply the Zhongzhou alumina refinery. During the first half of the year, Xiangjiang Wanji Aluminum Co. Ltd. ramped up production from the expansion to its alumina refinery in Luoyang that increased capacity of the refinery to 1.4 Mt/yr from 800,000 t/yr (China Metal Market—Alumina and Aluminum, 2014c).

Nei Mongol Autonomous Region.—Beijing Xinheng Group Co. Ltd. continued to ramp up its 500,000-t/yr refinery in Erdos that was commissioned in the fourth quarter of 2013. The refinery was being expanded to 1 Mt/yr, but a completion schedule was not available (China Metal Market—Alumina and Aluminum, 2014e). In October, Mengxi Ordos Aluminum Co. Ltd. commissioned a 400,000-t/yr refinery designed to recover alumina from coal fly ash (China Metal Market—Alumina and Aluminum, 2014g).

Shanxi Province.—In October, Shanxi Fusheng Aluminum Co. Ltd. (a joint venture among Jinjiang Group Ltd. and Henan Zhengzhou Coal Corp.) commissioned an alumina refinery in Pinglu County with a capacity of 800,000 t/yr (China Metal Market—Alumina and Aluminum, 2013c; 2014g).

Shanxi Tongde Aluminum Co. Ltd., a joint venture among Shanxi Datong Coal Group Co. Ltd., Shanxi Huayu Group Ltd., and Orient Patron Ltd., was building a 1.4-Mt/yr alumina refinery in Xinzhou, Baode County. A 2-Mt/yr bauxite mine was also being constructed adjacent to the refinery, with completion expected by yearend. An aluminum smelter and captive powerplant were also planned as part of the project (China Metal Market—Alumina and Aluminum, 2013a; 2014b).

Yunnan Province.—In July, Yunnan Aluminum Co. Ltd. started constructing an expansion of its alumina refinery in Wenshan. The project would increase capacity to 1.4 Mt/yr from 800,000 t/yr. The refinery used bauxite from two nearby mines and a third mine was under construction; the three mines would have a combined capacity of 3 Mt/yr. Construction schedules for the refinery expansion and the new mine were not available (China Metal Market—Alumina and Aluminum, 2014d).

Guinea.—Continued strong demand from third party customers was cited for record production of 15.8 Mt of bauxite at the Sangaredi Mine, slightly more than that produced in 2013. 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, 2015, p. 4, 17). Increased third party sales were also cited for bauxite production at RUSAL's Kindia Mine, increasing slightly to 3.38 Mt compared with that produced in 2013 (United Company RUSAL Plc, 2015c).

In July, RUSAL started construction of the Dian-Dian Mine, which would have a capacity of 3 Mt/yr. The bauxite mine would be completed in 2016 (Smart, 2014b). Alufer Mining Ltd. completed a feasibility study for the Bel Air project to develop a 4.8-Mt/yr bauxite mine. Construction was scheduled to start in 2015 and production would start in 2016. Expansion of the mine to 10.3 Mt/yr was planned (Blamey, 2014a).

Guyana.—Bauxite production by Bauxite Company of Guyana Inc. (BCGI) (RUSAL 90%, Government of Guyana 10%) decreased by 9% compared with that in 2013. RUSAL completed the first stage of the Kurubuka-22 Mine by yearend, and production was expected to begin in 2015. The Kurubuka-22 Mine would increase BCGI's total capacity to

2.3 Mt/yr from 1.7 Mt/yr (United Company RUSAL Plc, 2015a, p. 16; 2015b, c).

India.—Production of alumina and bauxite increased by 25% and 7%, respectively, owing to the restart of one alumina refinery, expansion of two other refineries, and expansion of a bauxite mine. National Aluminum Co. Ltd. of India (Bhubaneswar) completed expansion of the Panchpatmali Mine to 6.83 Mt/yr from 6.3 Mt/yr during the second quarter of the year and completed expansion of the alumina refinery in Damanjodi, Odisha State, to 2.28 Mt/yr from 2.1 Mt/yr (National Aluminium Co. Ltd., 2014).

At yearend, production at the 1.5-Mt/yr Utkal alumina refinery reached full capacity. Hindalco Industries Ltd. (Mumbai) commissioned the new refinery in October 2013. Hindalco suspended bauxite production at six mines in Jharkhand State in September, citing expired mining leases. Inventory and production from other mines were sufficient to supply Hindalco's refineries at Muri and Renukoot without disrupting production (Hindalco Industries Ltd., 2013, p. 4; Lim, 2014a; Phang, 2015).

The 1-Mt/yr Lanjigarh alumina refinery ramped up to full capacity during the first quarter of 2014. Vedanta Resources plc 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. In 2014, the refinery processed bauxite supplied from other parts of India and imported bauxite. Vedanta canceled plans to expand capacity of the refinery to 5 Mt/yr, citing issues with obtaining permits to construct the proposed expansion and to mine bauxite from nearby deposits (Phang, 2014c; Vedanta Resources plc, 2014).

Anrak Aluminium Ltd. (Visakhapatnam) delayed the startup of its 1.5-Mt/yr alumina refinery in Rachapalle, Andhra Pradesh State, citing a lack of bauxite. Anrak was seeking a permit for a 1.5-Mt/yr bauxite mine in Andhra Pradesh State to supply the refinery that was completed in the fourth quarter of 2013 (Ananthalakshmi and Dash, 2014; Bayya, 2014).

Indonesia.—Bauxite production in Indonesia decreased by 95% compared with the amount produced in 2013 as mines that had exported bauxite closed after a ban on exporting bauxite and other unprocessed mineral ores took effect on January 12. The export ban was part of the 2009 Mining Law and was intended to increase economic development in the country through investment in mineral processing facilities. Although several companies have invested in alumina refineries in Indonesia, the refineries had yet to come onstream by yearend 2014 (Smart, 2014a; Yee, 2014).

PT Indonesia Chemical Alumina, a joint venture among PT Indonesia Aneka Tambang Ltd. (Antam) (80%) and Japan-based Showa Denko K.K. (20%) continued trial runs of the 300,000-t/yr Tayan refinery, which was commissioned in October 2013. Commercial production of chemical-grade alumina was delayed until the first quarter of 2015. The refinery used bauxite from a nearby deposit in West Kalimantan (PT Aneka Tambang Tbk, 2015).

Construction of an alumina refinery in Ketapang, West Kalimantan, continued and was expected to be completed in August 2015 with rampup to full capacity of 1 Mt/yr in 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%) (China Metal Market—Alumina and Aluminum, 2014c; Mok, 2013; Rizki and Suroyo, 2014).

Antam planned to build a 1.2-Mt/yr alumina refinery in Mempawah, West Kalimantan. Construction of the refinery was expected to begin in early 2015 and be completed in 2017. The refinery would supply PT Indonesia Asahan Aluminium Ltd.'s (Inalum) aluminum smelter in Asahan, North Sumatra, which Inalum planned to expand to 650,000 t/yr from 250,000 t/yr (Gunawan, 2014; Mok, 2013).

Ireland.—In July, RUSAL completed a modernization project at the 1.99-Mt/yr Aughinish alumina refinery. The project converted the boilers and steam generators to use natural gas instead of heavy fuel oil in order to reduce costs and decrease emissions of carbon dioxide, particulates, nitrogen oxides, and sulfur oxides (United Company RUSAL Plc, 2014a, b).

Malaysia.—Bauxite production in Malaysia increased to 3.26 Mt in 2014 from 209,000 t in 2013 as existing mines increased production and new mines were opened to supply alumina refineries in China after Indonesia implemented an export ban on unprocessed mineral ores including bauxite. In April, Tanah Makmur Ltd. opened the Ladang Bukit Goh Mine in Kuantan State. Capacity of the mine was 900,000 t/yr and bauxite reserves of the deposit were reported to be 1.4 Mt. Although Malaysia increased bauxite production dramatically in response to Indonesia's export ban, there were concerns about Malaysia's ability to continue producing at the current levels because of limited reserves (Phang, 2014b).

Romania.—Alumina production declined by 7% compared with that in 2013. During the first quarter of the year, the 600,000-t/yr alumina refinery in Tulcea completed a modernization project (Blamey, 2014b; Vimetco N.V., 2015, p. 5).

Russia.—The first stage of a new shaft at the Cheryomukhovskaya-Glubokaya section of the North Urals Mine was completed. The expansion project would enable mining from the deposit to continue when reserves in the Krasnaya Shapochka pit are exhausted in 2015. Production from the mine was 11% more than that in 2013, when production was suspended for part of the year during expansion work (United Company RUSAL Plc, 2015a, c).

Saudi Arabia.—Alcoa and Saudi Arabian Mining Co. (Ma'aden) completed their joint-venture alumina refinery at Ras Al Khair and started production in December. Rampup was expected to be complete in late 2015 or early 2016. The 1.8-Mt/yr refinery used bauxite from a 4-Mt/yr mine at Al Ba'itha that was also completed during the year. Alumina from the refinery would supply an adjacent 740,000-t/yr smelter that was completed in 2013. Ma'aden owned 74.9% of the joint venture, and Alcoa owned 25.1% (Alcoa Inc., 2014b; Lim, 2015).

Sierra Leone.—Bauxite production increased by 88% in 2014 compared with the amount produced in 2013. Vimetco N.V. cited equipment upgrades for the increased production (Blamey, 2014b; Vimetco N.V., 2015, p. 15).

Venezuela.—Alumina production from Corporación Venezolana de Guayana's Bauxilum refinery in Ciudad Guayana

was 36% less in 2014 than in 2013. One of the two production lines of its 2-Mt/yr refinery remained idle owing to lack of financing for replacement parts to repair deteriorating equipment and owing to shortages of bauxite. Bauxite production from the 5.8-Mt/yr Los Pijiguaos Mine was 31% less than that in 2013 (Soules, 2014).

Vietnam.—State-owned Vietnam National Coal and Mineral Industries Group continued to ramp up production at the alumina refinery in Tan Rai, Lam Dong Province. The 600,000-t/yr refinery was producing at about 90% of its capacity during the fourth quarter of the year and was expected to be at full capacity early in 2015. The Go Dau River port in Dong Nai Province was being upgraded to enable shipments as large as 30,000 t, double the current limit of 15,000 t. The project would be completed in August 2015 (Lim, 2014c).

Outlook

Consumption of bauxite and alumina is expected to closely follow the trend of aluminum production. Aluminum prices, which were generally stable during the first half of 2014 and increased during the second half of 2014, decreased throughout 2015. World demand for aluminum in 2015 is expected to only increase slightly from that in 2014 because the rate of economic expansion in China was slower than in prior years and aluminum consumption in Europe continued 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, which can obtain higher purity levels than can be obtained using bauxite.

Indonesia's restrictions of exports of mineral resources is expected to continue to effect the flow of bauxite and the construction of new alumina refineries. The ability of alumina refineries in China to obtain bauxite and alumina from other sources calls into question the effectiveness of the export ban. Although Malaysia increased bauxite production significantly to supply demand in China, the ability for Malaysia to continue production at the current level is uncertain because of limited reserves. The policy of China's Government that encouraged 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 that fewer expansions of alumina refineries in China are expected. Lower alumina prices, however, cast doubt on the economic feasibility of new alumina refineries in Indonesia. Chinese refineries are

expected to continue to source more bauxite from Australia and countries in West Africa. Access barriers to bauxite deposits in India, which currently restrain the startup of new alumina refineries, are expected to be resolved in the long run, but the history of slow mine permitting is expected to deter expansion projects in India.

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TABLE 1
 SALIENT BAUXITE STATISTICS¹

(Thousand metric tons)

| | 2010 | 2011 | 2012 | 2013 | 2014 |
|--------------------------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| United States: | | | | | |
| Exports, as shipped: | | | | | |
| Crude and dried | 21 | 22 | 11 | 4 | 3 |
| Calcined | 19 | 31 | 18 | 10 | 7 |
| Imports for consumption, as shipped: | | | | | |
| Crude and dried | 8,120 | 9,540 | 10,300 | 9,830 | 10,800 |
| Calcined | 690 | 353 | 406 | 582 ^r | 601 |
| Consumption, dry equivalent | 8,180 | 8,820 | 9,560 | 10,200 | 9,780 |
| World, production | 240,000 ^r | 260,000 ^r | 259,000 ^r | 282,000 ^r | 245,000 ^e |

^eEstimated. ^rRevised.

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

TABLE 2
SALIENT ALUMINA STATISTICS¹

(Thousand metric tons)

| | 2010 | 2011 | 2012 | 2013 | 2014 |
|--------------------------------------|---------------------|---------------------|---------------------|----------------------|----------------------|
| United States: | | | | | |
| Production: | | | | | |
| Calcined alumina | 3,420 | 3,740 | 3,960 | 4,310 | 4,180 |
| Other alumina ² | 483 | 543 | 645 | 575 | 580 |
| Total: | | | | | |
| As produced or shipped ³ | 3,900 | 4,280 | 4,610 | 4,890 | 4,760 |
| Calcined equivalent | 3,470 | 3,790 | 4,370 | 4,390 | 4,390 |
| Shipments: | | | | | |
| Calcined alumina | 3,410 | 3,730 | 3,990 | 4,320 | 4,180 |
| Other alumina ² | 485 | 551 | 641 ^r | 572 | 580 |
| Total: | | | | | |
| As produced or shipped ³ | 3,900 | 4,280 | 4,630 | 4,890 | 4,760 |
| Calcined equivalent | 3,470 | 3,790 | 4,400 | 4,400 | 4,390 |
| Stocks, yearend ^{4,5} | 381 | 961 | 363 | 280 | 277 |
| Imports for consumption ⁵ | 1,720 | 2,160 | 1,900 | 2,050 | 1,630 |
| Exports ⁵ | 1,520 | 1,660 | 1,720 | 2,250 ^r | 2,130 |
| Consumption, apparent ^{5,6} | 3,540 | 3,710 | 5,170 | 4,280 ^r | 3,900 |
| World, production ⁵ | 86,000 ^r | 92,500 ^r | 97,700 ^r | 104,000 ^r | 108,000 ^e |

^eEstimated. ^rRevised.

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

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

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

⁴Excludes consumers 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 | 2013 | 2014 |
|--|-------|-------|
| Alcoa Inc., Point Comfort, TX | 2,300 | 2,300 |
| Noranda Alumina LLC, Gramercy, LA | 1,200 | 1,200 |
| Almatis Inc., Burnside, LA ³ | 500 | 500 |
| Sherwin Alumina Co., Corpus Christi, TX ⁴ | 1,600 | 1,600 |
| Total | 5,600 | 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 | 2013 | 2014 |
|--------------------|--------|-------|
| Alumina | 9,810 | 9,530 |
| Other ² | 369 | 247 |
| Total | 10,200 | 9,780 |

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 | 2013 | | 2014 | |
|-------------------------------|---|--|---|--|
| | 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 | 35.23 | 49.53 | 32.67 | 45.75 |
| Guinea | 30.85 | 44.40 | 30.44 | 43.49 |
| Jamaica ⁴ | 21.56 | 31.17 | 21.07 | 29.78 |
| Weighted average ⁵ | 27.46 | 39.29 | 26.72 | 37.79 |

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.

⁴Based on quantity reported by the Jamaica Bauxite Institute.

⁵Weighted average of major suppliers.

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

(Dollars per metric ton)

| | 2013 | 2014 |
|-----------|------|------|
| January | 409 | 350 |
| February | 393 | 382 |
| March | 403 | 370 |
| April | 607 | 374 |
| May | 384 | 399 |
| June | 382 | 508 |
| July | 375 | 422 |
| August | 409 | 360 |
| September | 379 | 487 |
| October | 436 | 353 |
| November | 361 | 380 |
| December | 430 | 521 |
| Average | 414 | 409 |

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 PRICES¹

(Dollars per metric ton)

| Material | 2013 | 2014 |
|------------------------------------|---------|---------|
| China: | | |
| Guizhou Province, round kiln, lump | 400–430 | 375–385 |
| Shanxi Province, round kiln, lump | 400–435 | 375–385 |
| 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 | 2013 | 2014 |
|----------------------|--------------|---------------|
| Exports: | | |
| Canada | 4 | 2 |
| Other | (2) | 1 |
| Total | 4 | 3 |
| Imports: | | |
| Brazil | 2,480 | 3,030 |
| Guinea | 2,510 | 2,590 |
| Jamaica ³ | 4,710 | 4,810 |
| Other | 126 | 329 |
| Total | 9,830 | 10,800 |

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:
2013—6.16 million metric tons (Mt) and 2014—7.32 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 | 2013 | | | | 2014 | | | |
|-----------------|------------------|--------------------|------------------------|--------------------|------------------|--------------------|-------------|--------------------|
| | Refractory grade | | Other grade | | Refractory grade | | Other grade | |
| | Quantity | Value ² | Quantity | Value ² | Quantity | Value ² | Quantity | Value ² |
| Exports: | | | | | | | | |
| Canada | 7 | 618 | -- | -- | 5 | 517 | -- | -- |
| Mexico | 1 | 263 | -- | -- | 1 | 230 | 1 | 556 |
| Other | 2 | 484 | (3) | 46 | 1 | 395 | (3) | 40 |
| Total | 10 | 1,370 | (3) | 46 | 7 | 1,140 | 1 | 596 |
| Imports: | | | | | | | | |
| Australia | -- | -- | 128 | 4,360 | -- | -- | 178 | 5,740 |
| Brazil | 8 | 5,930 | 89 | 4,110 | -- | -- | 45 | 2,300 |
| China | 65 | 29,100 | 13 | 5,040 | 78 | 30,700 | 15 | 6,510 |
| Greece | -- | -- | 51 ^r | 3,110 | -- | -- | 24 | 1,360 |
| Guyana | 57 | 23,700 | 169 | 8,610 | 29 | 11,700 | 203 | 11,300 |
| Other | (3) | 37 | 2 | 930 | 28 | 1,310 | 1 | 655 |
| Total | 130 | 58,700 | 452^r | 26,200 | 135 | 43,800 | 466 | 27,900 |

^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 | 2013 | | 2014 | |
|----------------------|--------------------------|----------------------------|--------------|--------------------|
| | Quantity | Value ² | Quantity | Value ² |
| Exports: | | | | |
| Canada | 792 ^r | 267,000 ^r | 607 | 212,000 |
| Egypt | 391 | 117,000 | 400 | 129,000 |
| Georgia | 156 | 46,600 | 86 | 27,800 |
| Iceland | 292 ^r | 89,500 | 273 | 86,000 |
| Mexico | 79 ^r | 53,400 ^r | 102 | 62,400 |
| Netherlands | 5 ^r | 15,600 ^r | 82 | 52,200 |
| Norway | 223 | 58,400 | 357 | 96,700 |
| Russia | 215 | 66,300 | 87 | 30,700 |
| Other | 95 ^r | 241,000 ^r | 137 | 265,000 |
| Total | 2,250^r | 955,000^r | 2,130 | 961,000 |
| Imports: | | | | |
| Australia | 760 | 230,000 | 617 | 184,000 |
| Brazil | 241 | 71,300 | 216 | 67,000 |
| Canada | 52 | 37,100 | 75 | 41,500 |
| France | 19 | 38,000 | 19 | 36,500 |
| Germany | 35 | 94,300 | 29 | 87,100 |
| Jamaica ³ | 168 | 63,200 | 11 | 4,100 |
| Suriname | 724 | 219,000 | 536 | 161,000 |
| Other | 51 ^r | 89,100 ^r | 130 | 146,000 |
| Total | 2,050 | 842,000 | 1,630 | 727,000 |

^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 | 2010 | 2011 | 2012 | 2013 | 2014 ^e |
|------------------------|----------------------|----------------------|----------------------|----------------------|---------------------|
| Australia | 68,414 | 69,976 | 76,282 | 81,109 | 78,633 ³ |
| Bosnia and Herzegovina | 844 | 708 | 800 ^r | 800 | 800 |
| Brazil | 32,028 | 33,625 | 34,956 ^r | 32,481 | 34,800 |
| China ^e | 44,000 | 45,000 | 47,000 | 46,000 | 55,000 |
| Dominican Republic | 9 | -- | 11 | 770 | 1,596 ³ |
| Fiji | -- | 50 | 300 | 460 | 376 |
| Ghana ⁴ | 595 | 408 | 753 | 827 | 837 |
| Greece | 1,902 | 2,300 ^r | 1,816 ^r | 1,849 ^r | 1,900 |
| Guinea ⁵ | 15,900 ^r | 15,696 ^r | 16,041 | 16,887 ^r | 17,258 ³ |
| Guyana ⁵ | 1,083 | 1,818 | 2,210 ^r | 1,649 ^r | 1,600 |
| Hungary | 307 | 278 | 255 ^r | 95 ^r | 100 |
| India | 14,124 ^r | 12,723 ^r | 13,600 ^r | 15,360 | 16,500 |
| Indonesia ^e | 27,400 | 40,600 | 31,400 | 55,700 | 2,600 |
| Iran | 681 | 818 | 898 ^r | 820 | 700 |
| Jamaica ^{5,6} | 8,540 | 10,189 | 9,339 | 9,435 | 9,677 ³ |
| Kazakhstan | 5,310 | 5,495 | 5,170 | 5,192 ^r | 5,200 |
| Malaysia | 124 | 188 | 122 | 209 ^r | 3,258 ³ |
| Montenegro | 61 | 50 | -- | -- | -- |
| Mozambique | 9 | 10 | 8 | 13 | 10 |
| Pakistan | 10 | 10 ^e | 30 ^r | 29 ^r | 30 |
| Russia | 5,690 | 5,943 | 5,166 | 5,322 | 5,589 ³ |
| Saudi Arabia | -- | -- | -- | -- | 879 ³ |
| Sierra Leone | 1,089 | 1,300 | 776 | 616 | 1,161 ³ |
| Suriname | 3,104 | 3,236 | 3,400 | 3,000 ^r | 3,000 |
| Tanzania ^c | 39 ^r | 30 ^{r,3} | 58 ^{r,3} | 50 ^{r,3} | 50 |
| Turkey | 1,311 | 1,025 | 541 | 550 | 700 |
| United States | W | W | W | W | W |
| Venezuela | 3,126 ^r | 2,455 | 2,286 | 2,160 | 1,500 |
| Vietnam ^e | 80 | 100 | 100 | 482 ^{r,3} | 1,090 ³ |
| Total | 236,000 ^r | 254,000 ^r | 253,000 ^r | 282,000 ^r | 245,000 |

^eEstimated. ^rRevised. W Withheld. -- Zero.

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

²Includes data available through August 18, 2015.

³Reported figure.

⁴Estimate based on Ghana's bauxite exports to the world in 2012 and on the release of the Half-Year Performance of the Mining Industry report by the Chamber of Mines, which indicated an 82% increase in bauxite production.

⁵Dry bauxite equivalent of crude ore.

⁶Bauxite 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 | 2010 | 2011 | 2012 | 2013 | 2014 ^e |
|------------------------|---------------------|---------------------|---------------------|----------------------|---------------------|
| Australia | 19,956 | 19,399 | 21,357 | 21,528 | 20,475 ⁴ |
| Azerbaijan | -- | 6 | 102 ^r | -- | -- |
| Bosnia and Herzegovina | 269 | 262 | 202 | 200 ^e | 200 |
| Brazil | 9,433 | 10,182 | 10,321 | 10,200 ^e | 10,600 |
| Canada | 1,301 | 1,363 | 1,397 | 1,439 | 1,444 ⁴ |
| China ^e | 29,000 | 34,100 | 37,700 | 44,400 ^r | 47,774 ⁴ |
| France | 481 | 524 | 540 ^e | 540 | 600 |
| Germany | 1,485 | 1,405 | 1,364 | 1,360 | 1,400 |
| Greece | 725 | 810 ^r | 784 ^r | 812 ^r | 800 |
| Guinea | 597 | 574 | 150 ^e | -- | -- ⁴ |
| Hungary | 214 | 250 | 170 | 200 ^e | 200 |
| India | 3,640 | 3,880 | 4,347 | 4,040 | 5,060 ⁴ |
| Indonesia | -- | -- | -- | -- | 240 |
| Iran ^e | 610 ^r | 645 ^r | 675 ^r | 600 ^r | 710 ⁴ |
| Ireland | 1,850 | 1,927 | 1,926 | 1,935 | 1,951 ⁴ |
| Jamaica | 1,591 | 1,960 | 1,758 | 1,855 | 1,851 ⁴ |
| Japan ^{e,5} | 300 | 280 | 250 | 250 | 250 |
| Kazakhstan | 1,639 | 1,670 | 1,510 | 1,590 ^r | 1,600 |
| Romania | 450 | 520 | 414 | 391 | 363 ⁴ |
| Russia | 2,930 | 2,825 | 2,719 | 2,659 | 2,572 ⁴ |
| Saudi Arabia | -- | -- | -- | -- | 100 |
| Slovakia | 163 | 163 | 161 | 163 | 160 |
| Spain ^e | 1,500 | 1,500 | 1,500 | 1,400 | 1,400 |
| Suriname | 1,486 | 1,421 | 1,500 ^e | 1,300 | 1,300 |
| Turkey ^e | 160 | 210 | 220 | 230 | 230 |
| Ukraine | 1,534 | 1,601 | 1,429 | 1,494 | 1,455 ⁴ |
| United States | 3,470 | 3,790 | 4,370 | 4,390 | 4,390 |
| Venezuela | 1,244 | 1,266 | 808 | 1,020 ^r | 650 |
| Vietnam | -- | -- | -- | 214 ^r | 485 ⁴ |
| Total | 86,000 ^r | 92,500 ^r | 97,700 ^r | 104,000 ^r | 108,000 |

^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.

²Totals, 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 August 18, 2015.

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).