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CHROMIUM [ADVANCE RELEASE]

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Chromium

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In 2019, U.S. chromium apparent consumption (including recycling) was 519,000 metric tons (t) on a chromium content basis, a 12% decrease from that in 2018 (table 1). The decrease in apparent industry consumption was primarily in response to a decrease in stainless-steel production as well as decreases in imports and exports in 2019. Because stainless-steel mill products account for a significant amount of chromium in the domestic economy, trade in these products and their contribution has been accounted for in chromium apparent consumption. U.S. chromium apparent consumption in 2019 was 58% of the recorded high in 1965.

Domestic reported consumption of chromium materials decreased by 8% (chromium content) in 2019 compared with that in 2018. Steelmaking was the leading end use for chromium materials and accounted for 96% of consumption in 2019 (table 2). Superalloys and other end uses made up the remaining 4%.

Chromium exports decreased by 26% to 157,000 t in 2019 compared with those in 2018, based on estimated chromium content of chromite ore, chromium chemicals, chromium ferroalloys and metal, and stainless-steel mill products and scrap. Chromium imports decreased by 19% on a chromium content basis to 530,000 t compared with those in 2018, based on U.S. Census Bureau trade data for chromite ore, chromium chemicals, chromium ferroalloys and metal, and stainless-steel mill products and scrap (table 1).

World production of chromite ore in 2019 decreased by 4% to 44.8 million metric tons (Mt) compared with the revised amount in 2018. South Africa was the leading producer of chromite ore in 2019 (table 7). World production of ferrochromium increased by 4% to 14.1 Mt compared with the amount in 2018. China was the leading producer of ferrochromium, with an estimated 43% of global production in 2019 (table 8).

Legislation and Government Programs

Stockpile.—The Defense Logistics Agency Strategic Materials, U.S. Department of Defense, disposed of chromium materials under its fiscal year 2019 (October 1, 2018, through September 30, 2019) Annual Materials Plan (AMP). Maximum disposal limits were based on the 2019 AMP for chromium materials, which were set at 21,300 t of chromium ferroalloys and 181 t of chromium metal (Defense Logistics Agency Strategic Materials, 2018).

At yearend 2019, the quantity of chromium ferroalloys held in the National Defense Stockpile (NDS) decreased by 7% compared with stocks at yearend 2018 (table 2). The quantity of chromium metal was unchanged compared with stocks at the beginning of the year. On a chromium content basis, the quantity of chromium materials in the NDS at yearend 2019 was equivalent to about 10% of U.S. chromium apparent consumption on a chromium content basis in 2019 (tables 1, 2).

Tariffs.—The Office of the U.S. Trade Representative proposed additional duties on products from the European Union (EU) in response to a section 301 investigation into EU subsidies on large civil aircraft (Office of the U.S. Trade Representative, 2019a). High-carbon ferrochromium products with Harmonized Tariff Schedule of the United States (HTS) codes 7202.49.10 and 7202.49.50 were listed in Section 2 of the Annex.

On May 10, the Office of the U.S. Trade Representative modified the tariff rate established under a section 301 investigation on products from China from an additional duty of 10% to 25% (Office of the U.S. Trade Representative, 2019b). Products affected were outlined in subchapter III of chapter 99 of the HTS, and included chromium chemical products with HTS codes 2819.10.00, 2819.90.00, 2833.29.40, 2841.30.00, 2841.50.10, 2841.50.91, 2841.90.45, and 3206.20.00; high-carbon ferrochromium products with HTS codes 7202.41.00, 7202.49.10, and 7202.49.50; ferrosilicon-chromium products with HTS code 7202.50.00; and chromium metal products with HTS code 8112.29.00 (U.S. International Trade Commission, 2019).

Other Programs.—Trivalent chromium [Cr(III)] is required for normal glucose, protein, and fat metabolism, and thus an essential trace element for human health. Hexavalent chromium [Cr(VI)], however, is acutely toxic, chronically toxic, and (or) carcinogenic. The U.S. Environmental Protection Agency (EPA) regulates total chromium emissions into the air under section 112 of the Clean Air Act of 1990 (U.S. Environmental Protection Agency, 2002). The Occupational Safety and Health Administration regulates workplace exposure to Cr(VI). Currently, the permissible exposure limit for Cr(VI) is 5 micrograms per cubic meter of air, calculated as an 8-hour time-weighted average (U.S. Department of Labor, undated).

The EPA also regulates total chromium in drinking water under the National Primary Drinking Water Regulations. The maximum contaminant level for total chromium in drinking water, including Cr(III) and Cr(VI), was established in 1991 at 0.1 milligrams per liter and is undergoing further review as part of an Integrated Risk Information System assessment (U.S. Environmental Protection Agency, undated).

Production and Consumption

Domestic data for chromium materials were developed by the U.S. Geological Survey (USGS) by means of monthly "Chromite Ores and Chromium Products" and "Consolidated Consumers" consumer surveys. Based on the results of these surveys, stainless- and heat-resisting-steel producers were the leading chromium consumers, and high-carbon ferrochromium was the leading chromium-containing material consumed (table 2).

The major marketable chromium-containing materials are chromite ore and foundry sand; chromium chemicals, ferroalloys, and metal; and stainless steel. In 2019, the United States produced chromium chemicals and stainless steel.

Chromium Chemicals.—Chemical grade chromite ore, which has greater than 45% chromium oxide (Cr_2O_3), is typically processed via conversion to sodium dichromate. Sodium dichromate can then be used in other applications as oxidizing agents or in the production of dyes and inorganic chemicals, such as leather tanning liquors, metal plating and finishing solutions, drilling muds, and wood preservatives. In the United States, Elementis Chromium, a subsidiary of Elementis plc (United Kingdom), produced sodium dichromate from chromite ore at Castle Hayne, NC.

Stainless Steel.—Chromium is essential to stainless-steel production by virtue of its oxide-forming properties and to some grades of alloy steel and to nickel-, iron-, and cobalt-based superalloys because of its alloying properties. Chromium is also used to reduce stress corrosion susceptibility and improve toughness in aluminum-magnesium, aluminum-magnesium-silicon, and aluminum-magnesium-zinc alloys.

In 2019, the U.S. stainless-steel industry shipped 2.3 Mt of stainless steel and imported and exported stainless-steel mill products and scrap, making it a leading consumer of chromium materials (American Iron and Steel Institute, 2019). North American Stainless Company (NAS), AK Steel Holding Corp. (AK Steel), Outokumpu Oyj (Finland), and Allegheny Technologies Inc. (ATI), listed in decreasing order of production, were the leading United States stainless-steel producers.

NAS was a subsidiary of Acerinox, S.A., based in Spain, and produced stainless steel in its Ghent, KY, facility. Melt-shop production decreased by 7% to 1.04 Mt in 2019 compared with 1.11 Mt in 2018, which made it the leading producer in the United States (Acerinox S.A., 2019, p. 26; 2020, p. 14).

AK Steel produced stainless steel at manufacturing plants in Butler, PA, and Mansfield, OH. AK Steel reported 5.34 Mt of flat-rolled steel shipments in 2019, which included carbon, electrical, and stainless steel, compared with 5.68 Mt in 2018. Stainless steel accounted for 14% of its flat-rolled steel shipments, or approximately 750,000 t, making AK Steel the second leading stainless-steel producer in the United States. Flat-rolled steel shipments to the automotive market decreased by 6% owing to a continued reduction in North American light vehicle production as well as a 40-day strike at General Motors (AK Steel Holding Corp., 2020, p. 2, 23–24). A decrease in shipments to distributors and converters market also contributed to the decrease in the company's total shipments.

Cleveland-Cliffs Inc. and AK Steel announced a definitive merger agreement in December, which added flat-rolled carbon, stainless, and electrical steel products to Cleveland-Cliffs' capabilities. After completion of the merger, Cleveland-Cliffs' shareholders would own 68% of the combined company and AK Steel shareholders would own 32% (Cleveland-Cliffs Inc., 2019).

Outokumpu Stainless USA, LLC, a subsidiary of Outokumpu Oyj, produced stainless steel at its Calvert, AL, and Richburg, SC, plants. Outokumpu reported that its total global stainless-steel shipments in 2019 were 2.2 Mt, a decrease of 10% compared with shipments in 2018. In 2019, 26% of the stainless-steel shipments (601,000 t) originated in the United States and Mexico combined. This was a decrease of 21% from shipments in 2018. Outokumpu claimed to have 20% of the market share in the United States in 2019, making it the third-leading stainless-steel producer in the United States (Outokumpu Oyj, 2020a, p. 5, 10; 2020b, p. 8).

ATI produced stainless steel at facilities located in Brackenridge and Latrobe, PA. Sales for flat-rolled products, which included specialty alloys and stainless steel, were essentially unchanged compared with 2018 and made up 42% of overall sales (Allegheny Technologies Inc., 2020, p. 17). In 2019, shipments of high-value products, which included specialty alloys, increased slightly to 160,000 t. Shipments of standard products, such as stainless-steel sheet, specialty stainless sheet, and stainless-steel plate, decreased by 10% to 164,000 t (Allegheny Technologies Inc., 2020, p. 27). In April, Allegheny & Tsingshan Stainless, a 50–50 joint venture between ATI and Tsingshan Holding Group Co., Ltd. (China), was denied exemption from section 232 tariffs on imports of stainless-steel slab from Indonesia (Allegheny Technologies Inc., 2019). As a result, all its imported stainless-steel slab from Indonesia into the United States continued to be subject to an additional 25% tariff.

Prices

Chromium materials are not openly traded. Purchase contracts are confidential between buyer and seller; however, trade journals report composite prices based on interviews with buyers and sellers, and the U.S. Department of Commerce (DOC) reports the declared value of U.S. imports and exports. Thus, industry publications and U.S. trade statistics are sources of chromium material prices and values, respectively (table 3).

The mass-weighted annual average import value of chromite ore in 2019 decreased by 11% from that in 2018; the mass-weighted annual average import value of ferrochromium decreased by 17% from that in 2018; and the mass-weighted annual average import value of chromium metal decreased by 8% from that in 2018. Prices and unit values of specific grades of chromite ore, chromium metal, and ferrochromium are reported in tables 1 and (or) 3.

Foreign Trade

Chromium-containing material exports from and imports to the United States included chromite ore; chromium chemicals, ferroalloys, metal, and pigments; and stainless steel (tables 1, 4, 5). Based on foreign trade statistics reported by the U.S. Census Bureau for calendar year 2019, the value of foreign trade of these chromium materials, excluding stainless-steel mill products and scrap, was $25.4 million for exports (11% less than that in 2018) and $780 million for imports (a 29% decrease than that in 2018). A significant amount of chromium exits and enters the U.S. economy via stainless-steel mill products and scrap trade. The value of foreign trade of chromium materials including stainless-steel mill products and scrap was $2.4 billion for exports (16% less than that in 2018) and $3.8 billion for imports (22% less than that in 2018).

World Review

Albania.—AlbChrome, a chromium ore and ferrochromium producer in Albania, announced that it would keep operations shuttered at two ferrochromium furnaces following a period of maintenance. AlbChrome cited reduced demand and an oversupply of ferrochromium as reasons for the extended shutdown (CRU Group, 2019a).

Brazil.—Companhia de Ferro Ligas da Bahia (Ferbasa) owned 95% of chromite deposits operated in Brazil in 2019 (Companhia de Ferro Ligas da Bahia, 2020, p. 7). Ferbasa continued to focus on production improvements including new machinery and equipment and with projects such as the "Hard Lump" project, which treated and processed chromite ore. However, Ferbasa decided to delay using economic gains from the project until 2020 (Companhia de Ferro Ligas da Bahia, 2020, p. 15). In addition, chromite ore and ferrochromium sales volume decreased in 2019 compared with sales in 2018 owing to the decreases in unit value and domestic market demand (Companhia de Ferro Ligas da Bahia, 2020, p. 5, 14).

Canada.—Noront Resources Ltd. announced Sault Ste. Marie (Ontario) as the location for its new ferrochromium production facility (Noront Resources Ltd., 2019a). Noront Resources Ltd. then entered into a 5-year option agreement with Algoma Steel Inc. to lease a brownfield property in Sault Ste. Marie for the construction of the ferrochromium plant, which would process chromite ore from its Ring of Fire deposits. According to the agreement, the lease could be renewed for a period of 99 years (Noront Resources Ltd., 2019b).

Valbruna Canada Ltd., a subsidiary of Acciaierie Valbruna S.p.A. (Italy), acquired ASW Steel Inc. at the end of September. The new company, Valbruna ASW, Inc., took over ASW Steel's production capabilities, including approximately 100,000 metric tons per year (t/yr) of alloy-, carbon-, and stainless-steel products (Acciaierie Valbruna S.p.A., 2019).

China.—Following an investigation into imports of stainless-steel billets and stainless-steel hot-rolled coil from the EU, Indonesia, Japan, and the Republic of Korea, the Ministry of Commerce of the People's Republic of China announced anti-dumping duties that ranged from 18.1% to 103.1%. The highest tariffs were assigned to the Republic of Korea, with one exception for POSCO, which was assessed an anti-dumping duty of 23.1%. The tariffs became effective on July 23 and were set to expire in 5 years (CRU Group, 2019b).

Guangxi Liuzhou Iron and Steel Group Co. began construction on a stainless-steel plant at its subsidiary Liugang Zhongjin Stainless Co. (Guangxi Zhuang Autonomous Region), consisting of a blast furnace, sintering plants, and a rotary kiln electric furnace and a capacity of 300,000 t/yr of high-carbon ferrochrome (Mysteel Global, 2019). Tsingshan Holding Group Co., Ltd. began construction on several stainless-steel processing plants that were planned to be built in an industrial park in Zhouning County (Tsingshan Holding Group Co., Ltd., 2019).

Lanxess Aktiengesellschaft (Lanxess) (Germany) signed an agreement with Brother Enterprises, a leather chemical business based in China, to sell its chromium chemical business. Lanxess began shifting away from its chromium chemical business in prior years to focus solely on its specialty chemicals business. The final transaction was expected to be completed by yearend 2019 but was subject to approval by applicable antitrust officials (Lanxess Aktiengesellschaft, 2019a).

Finland.—Outokumpu Oyj owned and operated the Kemi chromite mine, the only chromite mine in Finland. Outokumpu also produced ferrochromium at its Tornio ferrochromium production facility using chromite extracted from its Kemi chromite mine. In 2019, Outokumpu began an Environmental Impact Assessment to determine if it could build a new slag furnace in Tornio (Backeberg, 2019c; Outokumpu Oyj, 2020a, p. SR17). Outokumpu also continued work on its Deep Mine project, which aimed to extend the depth of the Kemi Mine to 1,000 meters below sea level by 2021 (Outokumpu Oyj, 2020a, p. SR19).

Germany.—A new chromium coating line was approved by thyssenkrupp AG for packing steel at its Andernach plant in Germany operated by subsidiary thyssenkrupp Rasselstein (thyssenkrupp AG, 2019). The coating line was designed to meet new technical requirements for the production of chromium-coated steel as well as to improve health, safety, and environmental compliance in accordance with the EU ban on Cr(VI) compounds used in production processes.

India.—Jindal Stainless Group announced the commissioning of the first phase of its brownfield project for cold-rolled products at its plant in Jajpur, Odisha. The first unit was expected to go into production in January and would have a capacity of 100,000 t/yr. A second 100,000-t/yr unit was planned to begin production later in 2019 (Singh, 2019).

Tsingshan Holding Group Co., Ltd. (China) announced that stainless-steel production at its cold-rolling stainless-steel plant in Mundra would begin in July (Hu, 2019). The plant had a capacity of 600,000 t/yr and was part of a 3-million-metric-ton-per-year (Mt/yr) stainless-steel complex expected to be completed by 2022.

On July 24, Ferro Alloys Corp. Ltd. reported that mining operations had resumed at the Ostapal and Kalarangiatta chromite mines in Odisha. Mining had been suspended since June because of a dispute with a contractor (Equity Bulls, 2019a, b).

Indian Metals and Ferro Alloys Ltd. received approval by the Odisha State government for the construction of a new 96,000-t/yr ferrochromium plant in Kalinganagar. Construction would begin after land had been acquired for the project and all relevant paperwork completed (CRU Group, 2019c).

Kazakhstan.—Transnational Company Kazchrome JSC, a subsidiary of Eurasian Resources Group S.a.r.l. (Luxembourg), reported completion of a new smelting furnace at the Aksu Ferroalloys Plant, thereby achieving the first stage of an extensive renovation project to increase ferrochromium output by 87% by 2024 (Transnational Company Kazchrome JSC, 2019). Three additional furnaces were reported to be scheduled for completion by 2024. Upon completion, ferrochromium production would increase to 503,000 t/yr.

South Africa.—FLSmidth & Co. A/S (Denmark) and Linhleko Projects (Pty) Ltd. (South Africa) signed a cooperative agreement to extract chromite from waste at Sibanye-Stillwater's Rustenburg Platinum Waterval chrome recovery plant in South Africa (Moore, 2019). As part of the collaboration, Sibanye-Stillwater agreed to an outcomes-based

contract with FLSmidth and Linhleko that would improve its revenue through additional chromite sales without requiring additional capital. Mining Phakisa, a Government-run mining initiative in South Africa, facilitated the cooperative partnership between Linhleko and FLSmidth (Moore, 2019).

Afarak Group Plc (Afarak) (Finland) announced its decision to idle two submerged arc furnaces at its Mogale smelter in South Africa. According to Afarak, irregular energy availability and the high cost of energy negatively affected ferroalloy production and smelter performance. Decreasing ferrochromium prices added to Afarak's decision to idle the furnaces. Afarak indicated that it would continue to operate its plasma furnace for plasma charge chrome, with production of approximately 64,800 t/yr, and the converter for medium-carbon ferrochromium, with production of approximately 11,000 t/yr (Afarak Group Plc, 2019b). Mining operations at its chromite-bearing Mecklenburg and Zeerust Chrome Mines were also temporarily halted in response to market conditions, whereas the Stellite Mine was partially shut down (Afarak Group Plc, 2019a, p. 31).

Jubilee Metals Group Plc (Jubilee) (United Kingdom) announced the acquisition of rights to the earnings from platinum-group-metal (PGM) tailings produced at the Hernic Project in South Africa from Hernic Ferrochrome Pty Ltd. The agreement included 1.70 Mt of unprocessed tailings at the Hernic operations, 630,000 t of previously processed tailings at Hernic, and rights to an additional 1 Mt of PGM-rich material at Jubilee's Windsor Chrome operations that were previously held by Hernic Ferrochrome. As a result, operations at the Hernic Project shifted from a joint-venture processing partnership between Jubilee and Hernic Ferrochrome to 100% ownership of surface tailings and recovery operations by Jubilee. In addition, Jubilee renamed the Hernic operations to Inyoni (Jubilee Metals Group Plc, 2019a). Jubilee also reported its first delivery of chromite concentrate from its Dilokong Chrome Mine fine chrome project, which was completed and commissioned in 2018 (Jubilee Metals Group Plc, 2019b, p. 3).

Bauba Platinum Ltd. (Johannesburg) announced that the wash plant at its Moeijelijk Mine in Limpopo Province had achieved full production of 420,000 t/yr. The wash plant was commissioned and began production in November 2018, enabling run-of-mine chromite ore to be processed into concentrates for subsequent use in chemical, foundry, and metallurgical markets in China (Bauba Platinum Ltd., 2018, 2019).

Eastern Platinum Ltd. (Canada) and its subsidiary Barplats Mine (Pty) Ltd. (Brits), together known as Eastplats, produced 598,034 t of chromite concentrate with an average grade of 38.6% from its chromite retreatment project, known as the "Chrome Circuit," that was commissioned in 2018 (Eastern Platinum Ltd., 2020, p. 8). The chromite-processing unit was developed to remine and process tailings at the Crocodile River Mine near Rustenburg (Eastern Platinum Ltd., 2018).

Lanxess Aktiengesellschaft (Germany) signed an agreement with Clover Alloys (SA) Proprietary Limited (Clover Alloys), a supplier of chromite fine ores in South Africa, to sell its 74% stake in its Rustenburg chromite mine (Lanxess Aktiengesellschaft, 2019b). The remaining 26% stake would be retained by Dirlem (RF) (Pty) Ltd., and the sale was expected to be completed by yearend 2020. The chromite ore from the Rustenburg Mine was used by Lanxess as a raw material in the chemical industry, but with the pending sale of its chromium chemical business to Brother Enterprises (China), the mine was deemed no longer necessary for its portfolio (Lanxess Aktiengesellschaft, 2019a, b).

Following the sale of its chromium chemical business to Brother Enterprises, production of sodium dichromate and chromic acid at the Newcastle plant would be taken over by Brother Enterprises, but the Merebank plant would manufacture chromium tanning salts on a contract basis with Brother Enterprises until 2024 (Lanxess Aktiengesellschaft, 2019a).

Vietnam.—Mintal Group Co., Ltd. (China), a joint venture between China Minmetals Corporation (China) and Goldman Sachs (New York, NY), signed a Memorandum of Understanding (MOU) to construct a ferrochromium and stainless-steel plant in Vietnam (Backeberg, 2019b). The plant would be built in the Nghi Son Economic Zone of Thanh Hoa Province with a planned capacity of 1.5 Mt/yr. About 20% of the plant's ore feed would be sourced from Vietnam's chromite ores.

Zimbabwe.—Jinan Corporation (China), which operates ferrochromium smelters in Gweru, planned to commission a sixth furnace that would produce low-carbon ferrochromium (Backeberg, 2019a). Funding for four additional furnaces was also approved by the Government of the People's Republic of China for expansion at Jinan's Zimbabwe operations.

Zimbabwe Mining and Smelting Company agreed to form a joint venture with Afrochine Smelting (Pvt) Ltd. to build four chromium smelters in Mberengwa (Kadzere, 2019). The furnaces would be part of a larger smelting complex with a combined capacity of 140,000 t/yr. Commissioning of the first furnace was scheduled for 2021 (Kadzere, 2019).

African Chrome Fields (Pty) Ltd. halted alluvial chromite ore operations in March. The stoppage occurred in response to restructuring efforts geared toward improving efficiency and profitability. The restructuring also addressed economic and financial conditions in Zimbabwe that could affect operations (Roskill Information Services Ltd., 2019).

Tsingshan Holding Group Co., Ltd. (China) signed a MOU with the Government of Zimbabwe to construct a steel plant in Mvuma with a capacity of 2 Mt/yr. This MOU expanded one signed in 2018 for the production of 550,000 t/yr of ferrochromium that would be used for consumption in the Mvuma plant. The first phase of production at the Mvuma plant would include 1 Mt/yr of carbon steel and the second phase would add an additional 1 Mt/yr of stainless steel (CRU Group, 2019d, p. 5).

Outlook

Domestic and global consumption of chromium is expected to follow closely the trend in stainless-steel production. U.S. stainless-steel production was estimated by the American Iron and Steel Institute to be 2.9 Mt (gross quantity of stainless steel) in 2019, an 8% decrease from that in 2018 (American Iron and Steel Institute, 2018, 2019). Details of the outlook for the steel industry are discussed in the "Outlook" section of the Iron and Steel chapter of the 2019 USGS Minerals Yearbook, volume I, Metals and Minerals. According to the International

Stainless Steel Forum, world stainless and heat resisting steel melt shop production (ingot or slab equivalent) increased by 3% to 52.2 Mt in 2019 compared with that in 2018 (International Stainless Steel Forum, 2019, p. 7).

References Cited

Acciaierie Valbruna S.p.A., 2019, Acquisition of ASW Steel, Inc.: Vicenza, Italy, Acciaierie Valbruna S.p.A. news, September 30. (Accessed December 9, 2019, at http://www.valbruna-stainless-steel.com/events-and-news/news/acquisizione-di-asw-steel-inc-1.)

Acerinox S.A., 2019, Annual report 2018: Madrid, Spain, Acerinox S.A., March 18, 238 p. (Accessed April 30, 2019, at https://www.acerinox.com/export/sites/acerinox/.content/galerias/galeria-descargas/junta-general/Informe-Anual-2018.pdf.)

Acerinox S.A., 2020, Annual accounts of the consolidated group: Madrid, Spain, Acerinox S.A., February 27, 238 p. (Accessed June 19, 2020, at https://www.acerinox.com/export/sites/acerinox/.content/galerias/galeria-descargas/informacion-eco-financiera/memoria-e-informe-anual/Informe-Anual-2019.pdf.)

Afarak Group Plc, 2019a, Afarak annual report 2019: Helsinki, Finland, Afarak Group Plc, March 31, 167 p. (Accessed June 22, 2020, at http://www.afarak.com/site_media/media/cms_page_media/97/AFARAK%20ANNUAL%20REPORT%202019.pdf.)

Afarak Group Plc, 2019b, Production guidance & operational update on ferro-alloy segment: Helsinki, Finland, Afarak Group Plc press release, June 12. (Accessed August 9, 2019, at http://otp.investis.com/clients/fi/afarak/omx/omx-story.aspx?cid=175&newsid=68267&culture=en-US.)

AK Steel Holding Corp., 2020, Form 10–K—2019: West Chester, OH, AK Steel Holding Corp., February 18, 99 p. (Accessed June 29, 2020, via https://www.sec.gov/.)

Allegheny Technologies Inc., 2019, A&T Stainless joint venture tariff exclusion request denied: Pittsburgh, PA, Allegheny Technologies Inc. press release, April 24. (Accessed April 26, 2019, at https://ir.atimetals.com/news-and-events/news-releases/2019/04-24-2019-220802974.)

Allegheny Technologies Inc., 2020, Form 10–K—2019: Pittsburgh, PA, Allegheny Technologies Inc., February 25, 104 p. (Accessed June 30, 2020, via https://sec.gov/edgar/searchedgar/companysearch.html.)

American Iron and Steel Institute, 2018, AIS 16S Report—Shipments by market classification (4th quarter): Washington, DC, American Iron and Steel Institute. (Accessed February 10, 2020, via http://www.steel.org/.)

American Iron and Steel Institute, 2019, AIS 16S Report—Shipments by market classification (4th quarter): Washington, DC, American Iron and Steel Institute. (Accessed February 10, 2020, via http://www.steel.org/.)

Backeberg, Nils, 2019a, Chromium—Jinan Corporation expanding operations in Zimbabwe: London, United Kingdom, Roskill Information Services Ltd., August 30. (Accessed September 3, 2019, at https://roskill.com/news/chromium-jinan-corporation-expanding-operations-in-zimbabwe/.)

Backeberg, Nils, 2019b, Chromium—Mintal signs MoU for construction of charge chrome plant in Vietnam: London, United Kingdom, Roskill Information Services Ltd., August 30. (Accessed September 3, 2019, at https://roskill.com/news/chromium-mintal-signs-mou-for-construction-of-charge-chrome-plant-in-vietnam/.)

Backeberg, Nils, 2019c, Chromium—Outokumpu considers new slag furnace in Tornio: London, United Kingdom, Roskill Information Services Ltd., August 30. (Accessed July 1, 2020, at https://roskill.com/news/chromium-outokumpu-considers-new-slag-furnace-in-tornio/.)

Bauba Platinum Ltd., 2018, Voluntary announcement—offtake agreement: Fourways, South Africa, Bauba Platinum Ltd. news release, August 8. (Accessed August 5, 2019, at http://www.baubaplatinum.co.za/wp-content/uploads/2018/08/bauba-voluntary-offtake-20180808.pdf.)

Bauba Platinum Ltd., 2019, New Moeijelijk chrome was plant commissioned: Johannesburg, South Africa, Bauba Platinum Ltd. news release, March 8. (Accessed June 22, 2020, at https://www.baubaresources.co.za/wp-content/uploads/2019/03/030-Bauba-Platinum-media-release-BAUBA-NEW-MOEIJELIJK-CHROME-WASH-PLANT-COMMISSIONED08032019.pdf.)

Cleveland-Cliffs Inc., 2019, Cleveland-Cliffs to acquire AK Steel: Cleveland and West Chester, OH, Cleveland-Cliffs Inc. press release, December 3. (Accessed February 3, 2020, at http://s1.q4cdn.com/345331386/files/doc_news/Cleveland-Cliffs-to-Acquire-AK-Steel-2019.pdf.)

Companhia de Ferro Ligas da Bahia, 2020, Management report 2019: Salvador, Brazil, Companhia de Ferro Ligas da Bahia, March 3, 39 p. (Accessed June 30, 2020, at http://www.ferbasa.com.br/conteudo_en.asp?idioma=1&conta=44&tipo=55691.)

CRU Group, 2019a, Chrome monitor—Albchrome to lengthen repair outage: London, United Kingdom, CRU Group, September 9. (Accessed September 23, 2019, via http://www.crugroup.com/.)

CRU Group, 2019b, Chrome monitor—China places duties on stainless from four trading partners: London, United Kingdom, CRU Group, July 23. (Accessed August 19, 2019, via http://www.crugroup.com/.)

CRU Group, 2019c, Chrome monitor—Ferroalloy plant given green light in India: London, United Kingdom, CRU Group, November 19. (Accessed November 20, 2019, via http://www.crugroup.com/.)

CRU Group, 2019d, Chrome price weekly—Tsingshan extends Zimbabwean plans: London, United Kingdom, CRU Group, April 26. (Accessed April 26, 2019, via www.crugroup.com.)

Defense Logistics Agency Strategic Materials, 2018, Annual Materials Plan for FY 2019: Fort Belvoir, VA, Defense National Stockpile Center news release DLA–SM–19–3151, October 3. (Accessed June 29, 2020, at https://www.dla.mil/Portals/104/Documents/Strategic%20Materials/Announcements/3151%20FY19%20AMP.pdf?ver=2018-10-03-091746-287.)

Eastern Platinum Ltd., 2018, Eastern Platinum first chrome concentrate: Vancouver, British Columbia, Canada, Eastern Platinum Ltd. press release, December 18. (Accessed September 14, 2020, at https://eastplats.com/first-chrome-concentrate/.)

Eastern Platinum Ltd., 2020, Annual information form for the year ended December 31, 2019: Vancouver, British Columbia, Canada, Eastern Platinum Ltd., March 26, 97 p. (Accessed September 14, 2020, at https://eastplats.com/wp-content/uploads/2020/04/EPL-AIF-2019-Q4-FINAL.pdf.)

Equity Bulls, 2019a, Ferro Alloys Corporation Ltd announces disruption of mining work: Chennai, India, Equity Bulls Stock Report, June 6. (Accessed September 23, 2019, at https://www.equitybulls.com/admin/news2006/news_det.asp?id=251904.)

Equity Bulls, 2019b, Ferro Alloys Corporation Ltd announces resumption of mining operations: Chennai, India, Equity Bulls Stock Report, July 25. (Accessed September 23, 2019, at https://www.equitybulls.com/admin/news2006/news_det.asp?id=253889.)

Hu, Tracy, 2019, Tsingshan to start production at India stainless steel plant in July: New York, NY, S&P Global Market Intelligence, June 20. (Accessed June 20, 2019, via https://www.spglobal.com/marketintelligence/en/.)

International Stainless Steel Forum, 2019, Stainless steel in figures: Brussels, Belgium, International Stainless Steel Forum, 22 p. (Accessed July 7, 2020, at https://www.worldstainless.org/Files/issf/non-image-files/PDF/ISSF_Stainless_Steel_in_Figures_2020_English_public_version.pdf.)

Jubilee Metals Group Plc, 2019a, Acquisition at Hernic—Transforming operations: London, United Kingdom, Jubilee Metals Group Plc press release, October 24. (Accessed December 9, 2019, at https://jubileemetalsgroup.com/investors/rns/acquisition-at-hernic-transforming-operations/.)

Jubilee Metals Group Plc, 2019b, Unaudited interim results for the six months ended 31 December 2018: London, United Kingdom, Jubilee Metals Group Plc regulatory annoucement, March 28. (Accessed August 5, 2019, at http://jubileemetalsgroup.com/investors/rns/unaudited-interim-results/.)

Kadzere, Martin, 2019, Zim chrome giants in joint venture: The Herald [Harare, Zimbabwe], September 13. (Accessed July 1, 2020, at https://www.herald.co.zw/zim-chrome-giants-in-joint-venture/.)

Lanxess Aktiengesellschaft, 2019a, Lanxess to sell its chrome chemicals business to Brother Enterprises: Cologne, Germany, Lanxess Aktiengesellschaft press release, August 12. (Accessed July 1, 2020, at https://lanxess.com/en/Media/Press-Releases/2019/08/LANXESS-to-sell-its-chrome-chemicals-business-to-Brother-Enterprises.)

Lanxess Aktiengesellschaft, 2019b, Lanxess to sell its stake in chrome ore mine in South Africa to Clover Alloys: Cologne, Germany, Lanxess Aktiengesellschaft press release, November 18. (Accessed January 7, 2020, at https://lanxess.com/en/Media/Press-Releases/2019/11/LANXESS-to-sell-its-stake-in-chrome-ore-mine-in-South-Africa-to-Clover-Alloys.)

Moore, Paul, 2019, FLSmidth teams up with Linhleko to extract chromite from waste for Sibanye-Stillwater: Berkhamsted, United Kingdom, International Mining, February 21. (Accessed April 24, 2019, at https://im-mining.com/2019/02/21/flsmidth-teams-linhleko-extract-chromite-waste-sibanye-stillwater/.)

Mysteel Global, 2019, China's Liugang building first stainless plant in Guangxi: Shanghai, China, Mysteel Global Top News, January 16. (Accessed September 14, 2020, at https://www.mysteel.net/article/5004342-0601/Chinas-Liugang-building-first-stainless-plant-in-Guangxi.html.)
Noront Resources Ltd., 2019a, Noront selects Sault Ste. Marie site for ferrochrome production facility: Toronto, Ontario, Canada, Noront Resources Ltd. press release, May 7. (Accessed May 8, 2019, at http://norontresources.com/noront-selects-sault-ste-marie-site-for-ferrochrome-production-facility/.)
Noront Resources Ltd., 2019b, Two of Ontario's largest industrial and engineering firms partner with Noront to advance Ring of Fire development: Sault Ste. Marie, Ontario, Canada, Noront Resources Ltd. press release, September 20. (Accessed September 27, 2019, at http://norontresources.com/two-of-ontarios-largest-industrial-and-engineering-firms-partner-with-noront-to-advance-ring-of-fire-development-4/.)
Office of the U.S. Trade Representative, 2019a, Initiation of investigation; notice of hearing and request for public comments—Enforcement of U.S. WTO rights in large civil aircraft dispute: Federal Register, v. 84, no. 71, April 12, p. 15028–15036. (Accessed July 14, 2020, at https://www.govinfo.gov/content/pkg/FR-2019-04-12/pdf/2019-07267.pdf.)
Office of the U.S. Trade Representative, 2019b, Notice of modification of Section 301 action—China's acts, policies, and practices related to technology transfer, intellectual property, and innovation: Federal Register, v. 84, no. 90, May 9, p. 20459–20460. (Accessed July 9, 2019, at https://www.federalregister.gov/documents/2019/05/09/2019-09681/notice-of-modification-of-section-301-action-chinas-acts-policies-and-practices-related-to.)
Outokumpu Oyj, 2020a, Annual report 2019: Helsinki, Finland, Outokumpu Oyj, February 24, 140 p. (Accessed June 29, 2020, via https://www.outokumpu.com/en/investors/materials.)
Outokumpu Oyj, 2020b, Outokumpu financial statements release 2019: Helsinki, Finland, Outokumpu Oyj, February 5, 24 p. (Accessed June 29, 2020, via https://www.outokumpu.com/en/investors/materials.)
Roskill Information Services Ltd., 2019, Chromium—Slower ramp-up of Zimbabwe ore production in H1 2019: London, United Kingdom, Roskill Information Services Ltd. news release, July 1. (Accessed July 1, 2020, at https://roskill.com/news/chromium-slower-ramp-up-of-zimbabwean-ore-production-in-h1-2019/.)
Singh, Ratan, 2019, Jindal Stainless to commission cold rolled steel unit in Odisha: Gurgaon, India, Steel Guru, January 7. (Accessed October 8, 2020, at https://steelguru.com/steel/jindal-stainless-to-commission-cold-rolled-steel-unit-in-odisha-/530645#tag.)
thyssenkrupp AG, 2019, Strong signals for site and region—thyssenkrupp invests in new state-of-the-art coating line at Andernach site: Essen, Germany, thyssenkrupp AG press release, July 2. (Accessed September 9, 2019, at https://www.thyssenkrupp.com/en/newsroom/press-releases/strong-signal-for-site-and-region--thyssenkrupp-invests-in-new-state-of-the-art-coating-line-at-andernach-site-13825.html.)
Transnational Company Kazchrome JSC, 2019, New smelting furnace commences production at Aksu Ferroalloys Plant: Aktobe, Kazakhstan, Transnational Company Kazchrome JSC press release, August 2. (Accessed October 18, 2019, at https://www.kazchrome.com/en/media/news/new_smelting_furnace_commences_production_at_aksu_ferroalloy_plant/.)
Tsingshan Holding Group Co., Ltd., 2019, The first batch of project plants at the Stainless Steel Deep Processing Industrial Park in Zhouning County started building: Wenzhou, China, Tsingshan Holding Group Co., Ltd. news release, December 4. (Accessed October 8, 2020, at https://www.tssgroup.com.cn/en/the-first-batch-of-project-plants-at-the-stainless-steel-deep-processing-industrial-park-in-zhouning-county-started-building/.)
U.S. Department of Labor, [undated], Chromium (VI)—Standard number 1910.1026: Occupational Safety and Health Administration, U.S. Department of Labor. (Accessed June 20, 2019, at https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=13096.)
U.S. Environmental Protection Agency, 2002, National emission standards for hazardous air pollutants for source categories: general provisions; and requirements for control technology determinations for major sources in accordance with Clean Air Act sections, Section 112(g) and 112(j): Federal Register, v. 67, no. 66, April 5, p. 16582—16611. (Accessed March 6, 2019, at https://www3.epa.gov/ttn/atw/112j/fr05ap02.pdf.)
U.S. Environmental Protection Agency, [undated], Chromium in drinking water: U.S. Environmental Protection Agency. (Accessed June 20, 2019, at https://www.epa.gov/dwstandardsregulations/chromium-drinking-water.)
U.S. International Trade Commission, 2019, Harmonized Tariff Schedule of the United States (2019) revision 9: Washington, DC, chapter 99, 391 p. (Accessed July 19, 2019, via https://hts.usitc.gov/current.)

GENERAL SOURCES OF INFORMATION

U.S. Geological Survey Publications

Chromium. Ch. in Mineral Commodity Summaries, annual.
Chromium. Ch. in United States Mineral Resources, Professional Paper 820, 1973.
Chromium. International Strategic Minerals Inventory Summary Report, Circular 930–B, 1984.
Chromium. Mineral Industry Surveys, monthly.

Other

Chromite. Ch. in Industrial Minerals and Rocks (7th ed.), Society for Mining, Metallurgy, and Exploration, Inc., 2006.
Chromium. Ch. in Mineral Facts and Problems, U.S. Bureau of Mines Bulletin 675, 1985.
International Chromium Development Association.
Strategic and Critical Materials Report to the Congress. U.S. Department of Defense, multiple years.

TABLE 1
SALIENT CHROMIUM STATISTICS[1]

		2015	2016	2017	2018	2019
Components of U.S. supply, chromium content:						
Secondary[2]	metric tons	159,000	156,000	156,000	143,000	142,000
Imports:						
Chromite ore	do.	81,900	64,600	61,300	92,600	92,500
Chromium chemicals	do.	6,180	3,490	3,950	3,810	3,680
Chromium ferroalloys	do.	228,000	266,000	319,000	320,000	254,000
Chromium metal	do.	12,800	13,800	14,500	15,500	14,400
Stainless-steel mill products and scrap[2]	do.	208,000	201,000	235,000	219,000 r	165,000
Stocks, January 1:						
Government	do.	81,200	72,300	66,800	58,700	54,700
Industry[3]	do.	8,320	7,240 r	8,500 r	6,060 r	5,060
Total	do.	785,000	784,000 r	866,000 r	859,000 r	732,000
Distribution of U.S. supply, chromium content:						
Exports:						
Chromite ore[4]	do.	4,510	1,330 r	5,250	2,960	1,400
Chromium chemicals	do.	3,670	48	631	629 r	184
Chromium ferroalloys and metal	do.	1,330	1,320	1,580	1,910	1,370
Stainless-steel mill products and scrap[2]	do.	228,000	251,000	248,000	206,000 r	154,000
Stocks, December 31:						
Government	do.	72,300	66,800	58,700	54,700	51,000
Industry[3]	do.	7,240 r	8,500 r	6,060 r	5,060 r	4,970
Total	do.	317,000 r	329,000 r	320,000 r	271,000 r	213,000
Consumption:						
Apparent, chromium content[5]	do.	468,000 r	455,000 r	545,000 r	587,000 r	519,000
Reported:						
Chromite ore and concentrates, gross weight	do.	W	W	W	W	W
Chromium ferroalloys:[6]						
Gross weight	do.	402,000 r	390,000 r	506,000 r	508,000 r	465,000
Chromium content	do.	233,000 r	225,000 r	285,000 r	290,000 r	267,000
Chromium metal, gross weight	do.	4,420 r	3,390 r	4,580 r	4,630 r	4,860
Stocks, December 31, gross weight:						
Government:						
Chromium ferroalloys	do.	95,700	88,100	76,800	71,200	66,100
Chromium metal	do.	3,960	3,900	3,860	3,850	3,850
Industry, consumer:						
Chromium ferroalloys[7]	do.	11,900 r	11,600 r	7,070 r	5,180 r	4,900
Chromium metal	do.	126 r	111 r	287 r	270 r	282
Other	do.	177 r	4,290 r	4,280 r	4,280 r	4,260
Prices, average annual:						
Chromite ore, gross weight[8]	dollars per metric ton	173	204	280	209	174
Ferrochromium, chromium content[9]	dollars per pound	1.06	0.92	1.34	1.35	1.35
Aluminothermic chromium metal, gross weight[10]	do.	4.38	3.75	3.94	5.53	4.13
Value of trade:						
Exports	thousands	$58,900	$25,600	$33,300 r	$28,600 r	$25,400
Imports	do.	$740,000 r	$667,000 r	$1,040,000	$1,100,000	$779,000
Net imports[11]	do.	-$681,000 r	-$641,000 r	-$1,010,000	-$1,080,000	-$753,000
Stainless steel:						
World production, chromium content[12]	metric tons	8,880,000 r	8,620,000 r	8,170,000 r	7,780,000 r	7,060,000
U.S. production:						
Gross weight[13]	do.	2,350,000	2,480,000	2,750,000	2,810,000	2,590,000
Chromium content[14]	do.	413,000 r	436,000 r	480,000	495,000	455,000
Average grade, dimensionless[15]		0.1759 r	0.1755	0.1744	0.1762	0.1755
Shipments, gross weight[16]	metric tons	2,230,000	2,360,000	2,500,000	2,490,000	2,280,000
Exports, gross weight	do.	828,000	821,000	974,000	668,000	436,000
Imports, gross weight	do.	1,030,000	917,000	1,100,000	959,000 r	767,000
Scrap, gross weight:						
Receipts	do.	934,000	918,000	917,000	842,000	810,000
Consumption	do.	1,380,000	1,380,000	1,370,000	1,270,000	1,240,000
Exports	do.	514,000	654,000	486,000	545,000 r	469,000
Imports	do.	192,000	263,000	282,000	331,000	204,000

See footnotes at end of table.

TABLE 1—Continued
SALIENT CHROMIUM STATISTICS[1]

		2015	2016	2017	2018	2019
Stainless steel:—Continued						
Value of trade:						
Exports	thousands	$2,710,000	$2,350,000	$2,860,000	$2,470,000	$1,990,000
Imports	do.	$3,850,000	$3,070,000	$3,730,000	$3,440,000 r	$2,830,000
Scrap exports	do.	$639,000	$442,000	$424,000	$319,000 r	$348,000
Scrap imports	do.	$165,000	$182,000	$280,000	$345,000	$183,000
Net imports[11, 17]	do.	-$672,000	-$452,000	-$727,000 r	-$993,000 r	-$673,000

rRevised. do. Ditto. W Withheld to avoid disclosing company proprietary data.
[1]Table includes data available through August 13, 2020. Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Calculated assuming chromium content of stainless steel and stainless steel scrap to average 17% chromium.
[3]Includes consumer stocks of chromium ferroalloys and metal and other chromium-containing materials.
[4]Calculated based on the chromium content of imported chromite ore, typically between 46% and 63% chromic oxide (Cr_2O_3).
[5]Apparent consumption calculated as total U.S. distribution minus total U.S. supply.
[6]Chromium ferroalloys, chromite ore, and other chromium-containing materials excluding chromium metal.
[7]Consumer stocks of high- and low-carbon ferrochromium and ferrosilicon-chromium.
[8]Time-weighted average price of South African chromite ore that contains 44% Cr_2O_3 free on board (f.o.b.) as reported by CRU Group.
[9]Time-weighted average U.S. price of imported high-carbon chromium that contains 47% to 55% chromium as reported by CRU Group.
[10]Time-weighted average U.S. price of imported aluminothermic chromium metal as reported by CRU Group.
[11]Negative data indicate that imports are greater than exports.
[12]Production estimated from publicly available sources. Chromium content estimated to be 17%.
[13]Source: American Iron and Steel Institute annual report of stainless and heat-resisting raw steel production and shipments.
[14]Estimated mass-weighted average of the mean chromium content of stainless-steel production by grade.
[15]Ratio of estimated mass-weighted average chromium content of stainless-steel production by grade to production. Uncertainty is approximately ±0.01, owing to the range of chromium chemical specification limits by stainless-steel grade.
[16]Source: American Iron and Steel Institute annual report of stainless and heat-resisting raw steel shipments.
[17]Includes stainless steel and stainless-steel scrap.

TABLE 2
U.S. REPORTED CONSUMPTION AND STOCKS OF CHROMIUM PRODUCTS[1]

(Metric tons)

	2018		2019		Change[2]	
	Gross weight	Chromium content	Gross weight	Chromium content	Quantity	Percent
Consumption by end use:						
Steel:						
Carbon steel	5,590 r	3,430 r	3,790	2,430	-1,800	-32
High-strength low-alloy steel	2,030 r	1,320 r	2,020	1,320	-5	(3)
Stainless and heat-resisting steel	448,000 r	255,000 r	409,000	233,000	-39,300	-9
Fully alloy steel	11,400	6,980 r	11,400	6,990	1	(3)
Unspecified steel[4]	32,600 r	18,700 r	31,300	18,000	-1,240	-4
Superalloys	6,540 r	5,240 r	6,260	5,040	-278	-4
Other alloys and uses[5]	6,220 r	4,330 r	6,860	4,640	643	10
Total	512,000 r	295,000 r	470,000	271,000	-42,000	-8
Consumption by material:						
Low-carbon ferrochromium	27,800 r	19,000 r	28,200	19,400	459	2
High-carbon ferrochromium	458,000 r	260,000 r	417,000	238,000	-40,700	-9
Ferrochromium silicon	(6)	(6)	(6)	(6)	(6)	(6)
Chromium metal	4,630 r	4,330 r	4,860	4,360	227	5
Chromium-aluminum alloy	438 r	312 r	405	287	-33	-8
Other chromium materials	21,700 r	10,800 r	19,800	9,670	-1,910	-9
Total	512,000 r	295,000 r	470,000	271,000	-42,000	-8
Consumer stocks:						
Low-carbon ferrochromium	1,040 r	709 r	1,080	741	41	4
High-carbon ferrochromium	3,800 r	2,160 r	3,520	2,010	-280	-7
Ferrochromium silicon	(6)	(6)	(6)	(6)	(6)	(6)
Chromium metal	270 r	252 r	282	253	12	4
Chromium-aluminum alloy	(6)	(6)	(6)	(6)	(6)	(6)
Other chromium materials	4,630 r	1,940 r	4,570	1,970	-62	-1
Total	9,740 r	5,060 r	9,450	4,970	-289	-3
National Defense Stockpile stocks:[7]						
Chromium ferroalloys:[8]						
High-carbon ferrochromium	43,800	31,300	38,700	27,600	-5,080	-12
Low-carbon ferrochromium	27,400	19,500	27,400	19,500	(3)	(3)
Chromium metal[9]	3,850	3,850	3,850	3,850	(3)	(3)

rRevised.
[1]Table includes data available through August 13, 2020. Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Change based on gross weight of unrounded data of current year compared with that of previous year.
[3]Less than ½ unit.
[4]Includes electrical, tool, and unspecified steel end uses.
[5]Includes cast irons, welding and alloy hard-facing rods and materials, wear- and corrosion-resistant alloys, and aluminum, copper, magnetic, nickel, and other alloys.
[6]Withheld to avoid disclosing company proprietary data; included in "Other chromium materials."
[7]Data are based on the "Total Uncommitted Inventory" of stockpile material D–1 report by the Defense Logistics Agency Strategic Materials.
[8]Chromium content estimated using 71.4% chromium.
[9]Chromium content estimated using 100% chromium.

TABLE 3
VALUE OF IMPORTS AND U.S. PRICE QUOTATIONS FOR CHROMIUM MATERIALS[1]

Material		2018		2019	
		Chromium content	Gross weight	Chromium content	Gross weight
Value:[2]					
Chromite ore:					
Not more than 40% chromic oxide (Cr_2O_3)	dollars per metric ton	1,400	524	786	291
More than 40% but less than 46% Cr_2O_3	do.	867	390	518	225
46% or more Cr_2O_3	do.	569	269	405	249
Average	do.	592	279	408	248
Ferrochromium:					
Not more than 0.5% carbon	do.	4,500 r	3,140 r	3,980	2,770
More than 0.5% but not more than 3% carbon	do.	3,730 r	2,330	3,460	2,200
More than 3% but not more than 4% carbon	do.	2,090 r	1,090 r	1,520	1,010
Average (not more than 4% carbon)	do.	4,220 r	2,840 r	3,900	2,700
More than 4% carbon	do.	2,280 r	1,240 r	1,820	993
Average (all grades)	do.	2,550 r	1,430 r	2,090	1,180
Chromium metal[3]	do.	XX	11,300	XX	10,400
Price:[4]					
Chromite ore, South Africa:					
38% to 40% Cr_2O_3	do.	657	175	595	159
44% Cr_2O_3	do.	694	209	577	174
42% UG2	do.	664	191	540	155
High-carbon ferrochromium:					
47% to 55% chromium	cents per pound	135	XX	135	XX
60% to 70% chromium	do.	137	XX	100	XX
Low-carbon ferrochromium:					
0.05% carbon	do.	239	XX	216	XX
0.10% carbon	do.	220	XX	187	XX
0.15% carbon	do.	212	XX	183	XX
Chromium metal, imported, aluminothermic	do.	XX	553	XX	413

rRevised. do. Ditto. XX Not applicable.
[1]Table includes data available through August 13, 2020. Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Mass-weighted average based on customs value and quantity of imported material, as reported by the U.S. Census Bureau.
[3]Average for all grades.
[4]Source: CRU Group.

TABLE 4
U.S. EXPORTS OF CHROMIUM MATERIALS, BY TYPE[1]

Schedule B code	Type	2018 Quantity (metric tons)	2018 Value (thousands)	2019 Quantity (metric tons)	2019 Value (thousands)	Principal destinations in 2019 (quantity in metric tons, value in thousands)
2610.00.0000	Chromite ore and concentrates, gross weight	6,280	$3,810	2,300	$1,940	Canada (1,330, $1,150); Mexico (790, $640); Netherlands (118, $108); United Kingdom (40, $25); Russia (28, $16).
	Chromium metal, gross weight:					
8112.21.0000	Unwrought chromium powders	285	4,990	262	5,350	Netherlands (44, $830); Canada (37, $457); United Kingdom (34, $585); Germany (28, $800); Japan (27, $285).
8112.22.0000	Chromium metal waste and scrap	91	807	21	332	China (15, $213); Netherlands (5, $91); Canada (1, $16).
8112.29.0000	Chromium metal other than unwrought powders and waste and scrap	138	6,500	148	7,460	Japan (51, $3,380); United Kingdom (20, $618); Mexico (15, $492); Taiwan (9, $332); Ireland (8, $263).
	Total chromium metal	514	12,300	431	13,100	
	Chromium ferroalloys:					
7202.41.0000	High-carbon ferrochromium:[2]					
	Gross weight	731	832	1,300	1,870	Canada (953, $1,492); Czechia (150, $132); Mexico (120, $164); United Kingdom (51, $45); Italy (16, $14).
	Chromium content	365	XX	679	XX	
7202.49.0000	Low-carbon ferrochromium:[3]					
	Gross weight	1,740	2,670	437	911	Mexico (258, $616); Canada (91, $177); India (64, $86); Argentina (18, $24); Colombia (6, $8).
	Chromium content	1,010	XX	254	XX	
7202.50.0000	Ferrochromium-silicon:					
	Gross weight	60	82	22	26	Canada (18, $22); India (4, $4).
	Chromium content	21	XX	8	XX	
	Total chromium ferroalloys:					
	Gross weight	2,530	3,590	1,760	2,810	
	Chromium content	1,400	XX	942	XX	
	Chemicals, gross weight:					
2833.29.4000	Chromium sulfates	48	335 r	5	31	Colombia (2, $12); Republic of Korea (1, $6); Hong Kong (1, $5); China (1, $4).
	Salts of oxometallic or peroxometallic acids:					
2841.90.4500	Zinc and lead chromate	31	394	9	624	Mexico (5, $97); South Africa (4, $520).
2841.50.1000	Potassium dichromate	2,120	2,090	584	1,910	Honduras (277, $252); Nigeria (99, $766); Mexico (98, $324); Germany (39, $285); Taiwan (28, $100).
2841.50.9100	Other	236 r	1,970 r	184	1,450	Canada (104, $496); Jamaica (12, $73); Australia (11, $66); Japan (9, $52); Taiwan (9, $47).
	Total salts	2,450 r	4,810 r	789	4,060	
3206.20.0000	Pigments and preparations, gross weight	491 r	4,140 r	464	3,440	Mexico (184, $893); Canada (146, $1,080); Germany (27, $308); China (26, $242); Republic of Korea (18, $282).

rRevised. XX Not applicable.
[1]Table includes data available through July 30, 2020. Data are rounded to no more than three significant digits; may not add to totals shown.
[2]More than 4% carbon.
[3]Not more than 4% carbon.

Source: U.S. Census Bureau.

TABLE 5
U.S. IMPORTS FOR CONSUMPTION OF CHROMIUM MATERIALS, BY TYPE[1]

HTS[2] code	Type	2018 Quantity (metric tons)	2018 Value[3] (thousands)	2019 Quantity (metric tons)	2019 Value[3] (thousands)	Sources in 2019 (quantity in metric tons, value in thousands)
	Chromite ore:					
2610.00.0020	Not more than 40% chromic acid (Cr_2O_3):					
	Gross weight	462	$242	973	$283	Brazil (494, $131); South Africa (479, $152).
	Cr_2O_3 content	173	XX	360	XX	
2610.00.0040	More than 40%, but less than 46% Cr_2O_3:					
	Gross weight	14,600	5,710	4,170	936	South Africa (4,100, $904); Netherlands (28, $14); Germany (24, $11); Spain (12, $8).
	Cr_2O_3 content	6,590	XX	1,810	XX	
2610.00.0060	46% or more Cr_2O_3:					
	Gross weight	181,000	48,800	147,000	36,600	South Africa (147,000, $36,500); Belgium (46, $35); China (1, $6).
	Cr_2O_3 content	85,800	XX	90,400	XX	
	Total chromite ore:					
	Gross weight	197,000	54,800	152,000	37,800	
	Cr_2O_3 content	92,600	XX	92,500	XX	
	Chromium ferroalloys:					
	Ferrochromium:					
7202.49.5090	Not more than 0.5% carbon:					
	Gross weight	53,100	167,000	44,300	123,000	Russia (16,300, $39,600); Kazakhstan (13,800, $38,500); Germany (6,870, $22,900); Turkey (3,660, $10,100); Japan (1,830, $7,430).
	Chromium content	37,100	XX	30,900	XX	
7202.49.5010	More than 0.5%, but less than 3% carbon:					
	Gross weight	4,130	9,610	2,090	4,610	Brazil (810, $1,690); Kazakhstan (806, $2,060); South Africa (423, $718); Russia (54, $141).
	Chromium content	2,570	XX	1,330	XX	
7202.49.1000	More than 3%, but less than 4% carbon:					
	Gross weight	8,020 r	8,730 r	1,210	1,220	Kazakhstan (1,040, $1,140); Turkey (114, $61); South Africa (54, $20).
	Chromium content	4,190 r	XX	802	XX	
7202.41.0000	More than 4% carbon:					
	Gross weight	495,000	613,000	393,000	390,000	South Africa (257,000, $224,000); Kazakhstan (50,700, $71,500); India (26,900, $28,000); Zimbabwe (21,500, $19,800); Russia (14,000, $17,300).
	Chromium content	269,000	XX	215,000	XX	
7202.50.0000	Ferrosilicon-chromium:					
	Gross weight	18,000	31,300	17,600	27,300	Kazakhstan (17,400, $27,100); Brazil (165, $233).
	Chromium content	6,380	XX	6,360	XX	
	Total chromium ferroalloys:					
	Gross weight	578,000 r	830,000 r	458,000	546,000	
	Chromium content	320,000	XX	254,000	XX	

See footnotes at end of table.

TABLE 5—Continued
U.S. IMPORTS FOR CONSUMPTION OF CHROMIUM MATERIALS, BY TYPE[1]

HTS[2] code	Type	2018 Quantity (metric tons)	2018 Value[3] (thousands)	2019 Quantity (metric tons)	2019 Value[3] (thousands)	Sources in 2019 (quantity in metric tons, value in thousands)
	Chromium metal, gross weight:					
8112.21.0000	Unwrought chromium powders	7,920	100,000	11,500	124,000	United Kingdom (3,480, $43,000); Russia (3,070, $26,700); France (2,580, $27,000); China (1,870, $21,300); Germany (420, $4,450).
8112.22.0000	Waste and scrap	177	1,690	221	1,910	United Kingdom (125, $940); Japan (35, $293); Canada (31, $128); Taiwan (15, $313); Germany (9, $71).
8112.29.0000	Other than waste and scrap	7,440	74,500	2,680	24,500	Russia (2,060, $16,900); France (365, $4,650); United Kingdom (98, $1,040); Spain (93, $584); China (31, $337).
	Total chromium metal	15,500	176,000	14,400	150,000	
	Chemicals, gross weight:					
	Chromium oxides and hydroxides:					
2819.10.0000	Chromium trioxides	2,760	9,880	2,170	6,980	Kazakhstan (1,440, $3,840); China (454, $2,170); India (86, $225); Germany (85, $360); South Africa (81, $230).
2819.90.0000	Other	2,780	13,900	3,120	13,000	Germany (1,410, $7,550); China (824, $4,320); Canada (487, $548); Italy (349, $426); Venezuela (39, $109).
	Total oxides	5,540	23,800	5,280	20,000	
2833.29.4000	Sulfates of chromium	378	398	460	475	Turkey (345, $326); Germany (77, $108); India (34, $31); United Kingdom (4, $10).
	Salts of oxometallic or peroxometallic acids:					
2841.90.4500	Chromates of lead and zinc	140	379	32	178	Italy (32, $174); Switzerland ((4), $3).
2841.30.0000	Sodium dichromate	475	610	458	536	South Africa (442, $516); Turkey (16, $20).
	Other chromates and dichromates; peroxochromates:					
2841.50.1000	Potassium dichromate	121	257	21	71	France (16, $31); Colombia (4, $20); India (1, $10).
2841.50.9100	Other	1,940	6,320	1,370	4,540	Austria (1,260, $4,110); France (66, $251); Colombia (21, $88); Italy (8, $22); China (6, $51).
	Total salts	2,670	7,570	1,880	5,330	
2849.90.2000	Chromium carbide	109 r	2,800 r	142	2,880	China (64, $975); United Kingdom (36, $554); Canada (32, $963); Israel (6, $245); Germany (2, $82).
	Total chromium chemicals	8,700	34,500 r	7,760	28,700	
	Pigments and preparations based on chromium, gross weight:					
3206.20.0010	Chrome yellow	564	3,880	342	1,730	Canada (297, $1,360); Mexico (25, $229); Colombia (13, $59); India (6, $55); China (1, $3).
3206.20.0020	Molybdenum orange	683	2,630	234	1,350	Canada (131, $1,130); India (99, $193); Colombia (4, $20).
3206.20.0030	Zinc yellow	41	126	56	163	China (33, $105); Austria (16, $41); Mexico (5, $12); France (3, $5).
3206.20.0050	Other	417	2,110	1,840	12,700	Mexico (1,500, $11,000); Netherlands (98, $402); India (77, $301); Japan (43, $197); France (42, $156).
	Total pigments	1,700 r	8,740	2,470	15,900	

rRevised. XX Not applicable.
[1]Table includes data available through July 30, 2020. Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Harmonized Tariff Schedule of the United States.
[3]Customs import value generally represents a value in the foreign country and, therefore, excludes U.S. import duties, freight, insurance, and other charges incurred in bringing the merchandise into the United States.
[4]Less than ½ unit.

Source: U.S. Census Bureau.

TABLE 6
WORLD PRODUCTION CAPACITY (CHROMITE ORE, FERROCHROMIUM, CHROMIUM METAL, CHROMIUM CHEMICALS, AND STAINLESS STEEL) AND CONSUMPTION FOR SELECTED COUNTRIES OR LOCALITIES[1]

(Thousand metric tons, chromium content, unless otherwise specified)

	Production capacity in 2019					Chromium consumption[2, 3]		
Country or locality	Ore[4]	Ferrochromium[4]	Metal	Chemicals	Stainless steel[5]	2017	2018	2019
Afghanistan	7	--	--	--	--	1	1	1
Albania	1,200	69	--	--	--	82 r	200 r	200
Argentina	--	--	--	--	--	10	3	4
Australia	--	--	--	--	--	7	9	4
Austria	--	--	--	--	15	31	29	31
Belgium	--	--	--	--	280	150 r	180	130
Brazil	800	240	--	--	73	120 r	140 r	149
Canada	--	--	--	--	--	28	24	22
China	110	11,000	46	213	4,900	5,800	5,700	6,600
Finland	2,700	530	--	--	240	500	530	570
France	--	--	12	--	55	41	43 r	30
Germany	--	36	1	3	150	180 r	190 r	130
India	4,500	2,000	--	52	680	650	850 r	850
Iran	400	40	--	1	--	-22 r	-71 r	25
Italy	--	--	--	7	250	-3	-1 r	-1
Japan	--	20	1	6	550	450	490 r	410
Kazakhstan	7,000	1,800	--	30	--	1,100 r	1,300	1,200
Korea, Republic of	--	--	--	--	410	330 r	340	310
Kosovo	--	--	--	--	--	10	8	8
Madagascar	320	--	--	--	--	--	-- r	--
Mexico	--	--	--	--	--	13	15	14
Oman	1,400	130	--	--	--	53 r	25 r	210
Pakistan	190	--	--	1	--	-100	-45 r	-53
Papua New Guinea	110	--	--	--	--	24	28 r	28
Philippines	50	--	--	--	--	-12	-3	-4
Poland	--	--	--	4	--	15	10 r	5
Russia	1,200	430	19	52	15	250 r	320	280
South Africa	18,000	4,200	--	18	100	-510	-440 r	-1,600
Spain	--	--	--	2	170	120	120	110
Sudan	100	--	--	--	--	10 r	8 r	9
Sweden	--	160	--	--	110	-3	5	12
Taiwan	--	--	--	--	230	180	160	90
Turkey	12,000	190	--	65	--	2,000	2,900 r	2,700
Ukraine	--	--	--	--	14	16	13	14
United Arab Emirates	200	--	--	--	--	18 r	58 r	49
United Kingdom	--	--	8	1	53	29 r	28 r	19
United States	--	--	--	42	480	440	430 r	330
Vietnam	1	--	--	--	--	--	1 r	1
Zimbabwe	1,800	310	--	--	--	150 r	110 r	130
Total	52,100	21,200	87	497	8,780	XX	XX	XX

rRevised. XX Not applicable. -- Zero.

[1]Table includes data available through December 7, 2020. Data are rounded to no more than three significant digits; may not add to totals shown.

[2]In chromium content. Estimated based on U.S. Geological Survey reported chromite ore production and trade statistics for chromite ore, chromium metal, and ferrochromium as reported by Global Trade Atlas and U.N. Comtrade in July 2020. Assume that the average grade of chromite ore is 45% chromic oxide; ferrochromium, 57% chromium; and chromium metal, 100% chromium.

[3]Negative values indicate exports were greater than imports and production.

[4]Reported in gross weight.

[5]Chromium content of stainless steel was calculated assuming the average grade is 17% chromium.

TABLE 7
CHROMITE: WORLD PRODUCTION, BY COUNTRY OR LOCALITY[1, 2]

(Metric tons, gross weight)

Country or locality	2015	2016	2017	2018	2019
Afghanistan	5,700	4,500 r, e	4,500 r, e	4,500 r, e	4,500 e
Albania, marketable	646,139	726,671	808,016 r	1,142,719 r	1,100,000 e
Brazil, ore and concentrate	526,744	426,337 r	450,000 r, e	450,000 r, e	450,000 e
China	23,000 e	88,200 r	71,300 r	23,000 r, e	57,000 e
Finland, ore	1,951,779	2,105,338	1,954,282	2,211,284	2,415,287
India	2,665,904	3,329,372	3,478,276	4,075,560 r	4,138,817
Iran, concentrate	391,618 r	342,332	292,209 r	119,456 r	200,000 e
Kazakhstan, ore[3]	5,382,800	5,542,900	6,313,300	6,688,800	6,700,000 e
Madagascar	148,198	107,735	208,100 r	109,200 r	76,126
Oman[4]	442,600	450,800	631,600 r	687,700 r	690,000 e
Pakistan	100,155	81,250	88,781	111,586 r	160,000 e
Papua New Guinea	100,000 r	53,000 r	78,000 r	92,139 r	90,000 e
Philippines	15,502	25,745	20,849	45,011	31,743
Russia	471,000	448,000	496,000 r	511,000 r	510,000 e
South Africa:					
44% to 48% chromic oxide (Cr_2O_3)	2,127,466	1,935,394	2,009,644	1,100,727	1,442,529
Less than 44% Cr_2O_3	13,528,195	12,772,124	14,538,073	16,516,372	14,952,555
Total	15,655,661	14,707,518	16,547,717	17,617,099	16,395,084
Sudan	60,000 e	15,000	32,000	27,000	30,000 e
Turkey, 34% to 43% Cr_2O_3	8,301,218	6,066,022	7,849,500	10,757,199 r	10,000,000 e
United Arab Emirates	3,869	17,863	57,800	190,146	159,000
Vietnam[5]	--	--	750	--	--
Zimbabwe	267,000 r	735,822 r	1,673,996 r	1,756,126 r	1,550,064
Grand total	37,200,000 r	35,300,000 r	41,100,000 r	46,600,000 r	44,800,000 e

eEstimated. rRevised. -- Zero.

[1]Table includes data available through December 7, 2020. All data are reported unless otherwise noted. Grand totals and estimated data are rounded to no more than three significant digits; may not add to totals shown.

[2]Figures for all countries or localities represent marketable output.

[3]Reported in gross weight by the Statistical Committee of the Ministry of National Economy of the Republic of Kazakhstan.

[4]Reported in gross weight by the Central Bank of Oman since 2014.

[5]Reported in gross weight by World Bureau of Metal Statistics in World Metal Statistics Yearbook.

TABLE 8
FERROCHROMIUM: WORLD PRODUCTION, BY COUNTRY OR LOCALITY[1]

(Metric tons, gross weight)

Country or locality[2]	2015	2016	2017	2018	2019
Albania	43,669	44,551	59,199 r	68,998 r	69,000 e
Brazil[3]	173,467	150,240	171,531	175,061	136,780
China	3,940,000	4,230,000	4,940,000	5,280,000 r	6,030,000
Finland	457,063	469,141	416,285	492,774	505,000
Germany[e]	17,000 r	17,000 r	17,000 r	17,000 r	17,000
India	944,000	944,000	944,000	944,000	930,000
Japan[e]	16,000 r	16,000 r	16,000	15,000 r	13,000
Kazakhstan	1,414,476	1,525,221	1,640,300	1,700,000 r, e	1,800,000 e
Oman	63,750	90,063	79,563	70,000 r	85,125
Russia	363,286	268,439	434,452 r	332,261 r	384,089
South Africa	3,684,598	3,596,000	3,700,000 r, e	3,900,000 e	3,600,000 e
Sweden	90,480	81,900	92,390	101,370 r	118,198
Turkey	82,650	75,000	83,894	91,799 r	81,743
Zimbabwe	115,586	78,200	142,800	365,000 r	308,593
Total	11,400,000	11,600,000	12,700,000 r	13,600,000 r	14,100,000

eEstimated. rRevised.

[1]Table includes data available through August 5, 2020. All data are reported unless otherwise noted. Totals and estimated data are rounded to no more than three significant digits; may not add to totals shown.

[2]In addition to the countries and (or) localities listed, Indonesia and Iran may have produced ferrochromium, but available information was inadequate to make reliable estimates of output.

[3]Includes ferrosilicon-chromium.