



# 2015 Minerals Yearbook

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## CHROMIUM [ADVANCE RELEASE]

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# CHROMIUM

By John F. Papp

Domestic survey data and tables were prepared by Benjamin N. Bryden, statistical assistant, and the world production tables were prepared by Glenn J. Wallace, international data coordinator.

U.S. chromium apparent consumption was estimated to be 445,000 metric tons (t) on a contained-chromium basis in 2015, a 26% decrease from the revised total in 2014 (table 1). The decrease in apparent industry demand was primarily a result of decreased imports offset by decreased exports in 2015 compared with those in 2014. Chromium apparent consumption in 2015 was 50% of the recorded high of 890,000 t in 1965.

Domestic reported consumption of chromium materials (measured in contained weight) decreased by 3% in 2015 compared with that of 2014. Steelmaking was the leading end use for chromium materials, accounting for 96% of consumption in 2015 (table 2).

Chromium exports decreased by 6% to 240,000 t in 2015 compared with those of 2014, based on estimated chromium content of the chromite ore and chromium chemicals, ferroalloys, and metal. Chromium imports decreased by 25% on a content basis to 511,000 t compared with those of 2014, based on U.S. Census Bureau trade data for chromite ore and chromium chemicals, ferroalloys, and metal.

The annual average import value (based on gross quantity) of chromite ore in 2015 decreased by 11% from that in 2014; the annual average import value of ferrochromium increased by 3% from that in 2014; and the annual average import value of chromium metal increased slightly from that in 2014 (tables 1, 3).

World production of chromite ore in 2015 decreased by 9% to 28 million metric tons (Mt) compared with the revised amount in 2014. South Africa was the leading producer of chromite ore (table 8). World production of ferrochromium decreased by 8% to 10.7 Mt compared with the amount in 2014. South Africa was also the leading producer of ferrochromium (table 9).

Chromium is essential to stainless steel production by virtue of its oxide-forming properties; and to some grades of alloy steel and superalloys because of its alloying properties. Among a variety of uses, chromium is a key component of certain widely used aluminum alloys.

## Legislation and Government Programs

**Stockpile.**—The Defense Logistics Agency Strategic Materials (DLA Strategic Materials), U.S. Department of Defense, disposed of chromium materials under its fiscal year 2015 (October 1, 2014, through September 30, 2015) Annual Materials Plan (AMP). The stockpile of chromium ferroalloys decreased by 11.6% and that of chromium metal was unchanged compared with stocks at the beginning of the year. The amount of chromium materials in the National Defense Stockpile (NDS) inventory at yearend 2015 was about 16% of U.S. chromium apparent consumption in 2015. DLA Strategic Materials announced that fiscal year 2016 AMP set maximum disposal goals for chromium materials at 23,319 t of chromium ferroalloys and 181 t of chromium metal (Defense Logistics Agency Strategic Materials, 2015a, b).

**Other Programs.**—Chromium is an essential trace element for human health. Some chromium compounds, however, are acutely toxic, chronically toxic, and (or) carcinogenic. The U.S. Environmental Protection Agency regulates chromium releases into the environment and the Occupational Safety and Health Administration regulates workplace exposure to chromium.

## Production

Domestic data for chromium materials were developed by the USGS by means of the monthly “Chromite Ores and Chromium Products” and “Consolidated Consumers” consumer surveys. Stainless and heat-resisting steel producers are the leading chromium consumers, and high-carbon ferrochromium is the leading chromium-containing material consumed. In 2015, no chromite ore or ferrochromium production was reported in the United States.

The major marketplace chromium-containing materials are chromite ore and foundry sand; chromium chemicals, ferroalloys, and metal; and stainless steel. In 2015, the United States produced chromium chemicals and stainless steel. The United States is a major world producer of chromium chemicals and stainless steel (International Stainless Steel Forum, 2017, p. 8; Roskill Information Services Ltd., 2016, p. 56, 142).

**Chromium Chemicals.**—Elementis Chromium, a subsidiary of Elementis plc (United Kingdom), produced sodium dichromate from chromite ore at Castle Hayne, North Carolina (Elementis plc, undated).

## Consumption

**Stainless Steel.**—The U.S. stainless steel industry produces more than 2 million metric tons per year (Mt/yr) of stainless steel (American Iron and Steel Institute, 2016, p. 71), imports and exports stainless steel mill products and scrap, and is the leading consumer of chromium materials. The leading U.S. stainless steel producers in 2015 were AK Steel Corp. (AK), Allegheny Technologies Inc. (ATI), North American Steel Co. (NAS), and Outokumpu Oyj.

AK produced stainless steel in Butler, PA, and Mansfield, OH, and reported shipments of 795,000 t of stainless and electrical steel in 2015 compared with 787,000 t in 2014 (AK Steel Corp., 2016, p. 11, 17). ATI produced stainless steel at its plants in Brackenridge, Midland, and Latrobe, PA (Allegheny Technologies Inc., 2016, p. F-15). NAS [a subsidiary of Acerinox, S.A. (Spain)] produced stainless steel in Ghent, KY (Acerinox S.A., 2016, p. 159). Outokumpu produced stainless steel at its Calvert, AL, plant. The Calvert plant delivered 509,000 t of stainless steel in 2015, a 6% decrease compared with 541,000 t in 2014 (Outokumpu Oyj, 2016, p. 19).

## 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 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).

## 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 4, 6). Based on foreign trade statistics reported by the U.S. Department of Commerce for 2015, the value of foreign trade of these chromium materials excluding stainless steel mill products and scrap was \$57.3 million for exports (63% less than that of the previous year) and \$740 million for imports (32% less than that of the previous year) (tables 4, 6). A significant amount of chromium exits and enters the U.S. economy via stainless steel mill product and scrap trade. The value of foreign trade of stainless steel mill products and scrap was \$3,350 million for exports (9.3% less than that of the previous year) and \$4,020 million for imports (16% less than that of the previous year) (table 1).

## World Review

**Canada.**—Noront Resources Ltd. purchased the chromite assets of Cliffs Natural Resources Inc. (Cliffs Chromite Ontario Inc. and Cliffs Chromite Far North Inc., both indirect wholly owned subsidiaries) for \$27.5 million (Cliffs Natural Resources Inc., 2015; Noront Resources Ltd., 2015).

**Finland.**—Outokumpu's Kemi Mine, the only operating chromite ore mine in the European Union, started production in 1968 as an open pit, and currently all mining is underground. Ore reserves were 48 Mt and mineral resources were 100 Mt. Ore production in 2014 was 2.4 Mt. Ore was concentrated into upgraded lumpy ore and fine concentrate (1.1 Mt in 2014), which were raw materials for Outokumpu's Ferrochrome Works in Tornio. Gravity concentration was done without any chemicals. The International Chromium Development Association presented their award on safety to Outokumpu's operations at the Kemi Mine for progress in improving contractors' safety. About one-half of the personnel working daily at the Kemi Mine are contractor employees (Outokumpu Oyj, 2015).

**India.**—Tata Steel (Tata Group) planned to construct a new ferrochromium smelter in Gopalpur Industrial Park (a Special Economic Zone) in Ganjam District of Odisha State. The high-carbon ferrochromium plant was to have a production capacity of 55,000 metric tons per year (t/yr) with expansion potential of as much as 245,000 t/yr. Production was expected to start in 2016 (Hindu, The, 2015a, b). Vertically integrated ferrochromium producers (Jindal Stainless, Visa Steel, and Nava Bharat Ventures Limited) in Odisha State experienced chromite ore shortages. The ferrochromium companies appealed to State officials to extend their chromite ore mine leases to 2020 (Business Standard, 2015b).

Balasore Alloys Ltd. acquired the ferrochromium businesses of Jabamayee Ferro Alloys Limited and the Jajpur unit of Rohit Ferro Tech Ltd. (Kalinganagar Industrial Complex). Jabamayee's ferrochromium production capacity was 21,000 t/yr and Rohit's was 200,000 t/yr (Balasore Alloys Ltd., 2015, p. 17, 29, 52). Balasore planned a new ferrochromium plant in Jajpur District of Kalinganagar State. The plant was planned to have a ferrochromium production capacity of 400,000 t/yr. Production was to start by 2020 at 200,000 t/yr of capacity with the remaining 200,000 t/yr of capacity online by 2021 (Business Standard, 2015a).

Indian Metals & Ferro Alloys Ltd. (IMFA), India's leading merchant producer, operated two ferrochromium plants in Odisha State, one at Choudwar and one at Therubali. IMFA ferrochromium production capacity was 275,000 t/yr. IMFA also operated captive chromite ore mines and electrical power plants (Indian Metals & Ferro Alloys Ltd., undated).

Visa Steel operated a 180,000-t/yr ferrochromium plant comprising four submerged arc furnaces and a 75-megawatt captive powerplant. Of those four furnaces at the ferrochromium plant at Kalinganagar Industrial Complex, Odisha, two were operated under a joint-venture agreement between Bao Steel (China) and Visa Steel called Visa Bao Ltd. and two were operated for Visa. An additional two furnaces have yet to be commissioned. Visa Steel also operated a 200,000-t/yr chromite ore beneficiation plant at Golagaon (Visa Steel, 2015, p. 9, 12, 14–15, 53–54).

**Russia.**—Tikhvin ferrochromium plant, owned by Yildirim Group (Turkey), experienced a fire in November that was expected to keep the plant closed until mid-2016. Tikhvin, located near Saint Petersburg, had a ferrochromium production capacity of 120,000 t/yr (Watanabe, 2015).

**South Africa.**—International Ferro Metals (SA) (Pty) Limited (IFMSA) entered Business Rescue, a South African statutory means of enabling a financially distressed company to continue in business. IFMSA operated the IFL Group's Lesedi Mine and ferrochrome smelting operations. IFMSA attributed its financial distress to a significant decline in global commodity markets generally, the declining price of ferrochromium, a slowdown of stainless steel production that resulted from the slowdown of China's economy, and increased ferrochromium production in China. In addition, IFMSA was affected by increased labor costs, electrical power supply costs (since 2007, heavy industry electrical power costs have increased by 374%), and electrical power supply interruptions. Tata Steel KwaZulu-Natal also entered Business Rescue (Moorcroft, 2015). Additionally, ASA Metals (Pty) Ltd., a joint venture between Eastern Asia Metals Investment Co. Ltd. (China) and the Limpopo Economic Development Enterprise (South Africa), operated the captive Dilokong Chrome Mine and a charge chrome production facility near Burgersfort that experienced financial distress for similar reasons and was anticipated to enter Business Rescue [ASA Metals (Pty) Ltd., 2016].

Hernic Ferrochrome (Pty) Ltd., the world's fourth largest integrated ferrochrome producer, based in the North West Province, entered into an agreement with Jubilee Platinum Plc wherein Jubilee was to process platinum-containing surface chromite ore tailings generated and stockpiled by Hernic.

Jubilee planned to produce chromite and platinum-group-metals concentrates from the tailings (Jubilee Platinum Plc, 2015).

Assore Ltd. purchased African Rainbow Minerals Ltd.'s indirect 50% interest in Dwarsrivier Chrome Mine, subject to Government approval (African Rainbow Minerals Ltd., 2015; Assore Ltd., 2015).

Sylvania Resources Ltd. recovered platinum from chromite tailings at many locations in both the eastern and western limbs of the Bushveld Igneous Complex. Sylvania's exploration at the Grasvally Chrome Operation found high-grade chromite ore. Sylvania anticipated selling the chromite resources (Sylvania Resources Ltd., 2015).

Bauba Platinum Ltd. mined chromite ore for ASA Metals via its Bauba Chrome-Ore Operation at its Moeijelyk Farm. Owing to adverse economic conditions in the chromite ore sector, Bauba put the Moeijelyk Mine on care-and-maintenance status until conditions improve (Bauba Platinum Ltd., 2016).

Glencore-Merafe chrome venture operations comprise several chromite ore mines, pelletizing and sintering plants, and ferrochromium smelters in the eastern and western limbs of the Bushveld Igneous Complex. Phase II of the Lion ferrochrome plant reached its full production potential making Glencore-Merafe's ferrochromium production capacity 2.34 Mt/yr from 6 plants operating 22 furnaces (Merafe Resources, 2016, p. 3, 6, 9, 13, 16–18, 21, 23–25, 50).

**Turkey.**—Yildirim Group operated chromite ore mines in Kazakhstan (Voskhod Chrome) and Turkey (Yildirim Holdings) and ferrochromium smelters in Russia (Tikhvin Ferroalloy), Sweden (Vargon Alloys), and Turkey (Eti Krom) (Davies, 2015a, p. 7; 2015b, p. 7). Yildirim cut back chromite ore production in Elazig, Fethiye, Hatay, Kayseri, and Konya owing to price decline and limited demand (Blamey, 2015, p. 8).

**Zimbabwe.**—Zimasco (Pvt.) Ltd., Afrochine Smelting (Pvt.) Ltd., and Xin Yu Mining produced ferrochromium while five other operations—Oliken Ferro-Alloys (Pvt.) Ltd., MonaChrome, ZimAlloys, Maranatha Ferrochrome (Pvt.) Ltd., and Wel Mine—were closed. Xin Yu Mining, a Chinese-owned chromite ore mining and smelting company, closed in March but reopened in May after laying off 100 workers (New Zimbabwe Media Ltd., 2015; Source, The, 2015). MK Trading GmbH took over MonaChrome in January (Musoko, 2015). Afrochine, a subsidiary of Tsingshang Iron and Steel Group of China, produced ferrochromium at its Selous plant. Afrochine had the capacity to consume 15,000 metric tons per month (t/mo) of chromite ore; however, it was able to get only 2,000 to 3,000 t/mo from small-scale chromite ore producers (Herald, The, 2015). To encourage the expansion of chromite ore mining, the Government of Zimbabwe lifted its ban on chromite ore exports; however, Zimasco and ZimAlloys controlled about 80% of the chromite ore claims along the Great Dyke, so there was little resource available for further exploitation (Financial Gazette, 2015). The water, electrical power, and train transportation infrastructure of Zimbabwe was challenged. Water shortage caused electrical power generation to be reduced or suspended (Zenda, 2015; Zimbabwe Independent, 2015). National Railways of Zimbabwe's (NRZ's) wagon fleet was depleted owing to lack of maintenance, leaving NRZ without a commercially viable bulk minerals hauling capacity.

## Outlook

Domestic and global consumption of chromium was 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 2.6 Mt (gross quantity of stainless steel) in 2015, down 1.8% from that of 2014. Details of the outlook for the steel industry are discussed in the Outlook section of the Iron and Steel chapter of the 2015 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/slab equivalent) in 2015, compared with that in 2014, decreased by 0.33% to 41.5 Mt.

Domestic reported consumption of chromium ferroalloys and metal in 2015 decreased by 3.5% compared with that of 2014, suggesting that chromium ferroalloys and metal consumption will be less in 2016 than it was in 2015. The trend of production from 2011 through 2015 suggests the global chromite ore production in 2016 will be about 33 Mt and ferrochromium production will be about 13 Mt.

Chromium metal is used primarily by the superalloy industry, followed by the aluminum and steel industries. The outlook for the aluminum industry is discussed in the Outlook section of the Aluminum chapter of the 2015 USGS Minerals Yearbook, volume I, Metals and Minerals.

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TABLE 1  
SALIENT CHROMIUM STATISTICS<sup>1</sup>

	2011	2012	2013	2014	2015	
Components of U.S. supply, contained chromium:						
Domestic mines	metric tons	--	--	--	--	
Secondary <sup>2</sup>	do.	147,000	146,000	150,000	157,000	161,000
Imports:						
Chromite ore	do.	70,300	89,200 <sup>r</sup>	55,000 <sup>r</sup>	58,100 <sup>r</sup>	56,000
Chromium chemicals	do.	4,270 <sup>r</sup>	5,990 <sup>r</sup>	5,870 <sup>r</sup>	5,910 <sup>r</sup>	6,090
Chromium ferroalloys	do.	311,000	306,000 <sup>r</sup>	280,000 <sup>r</sup>	359,000 <sup>r</sup>	228,000
Chromium metal	do.	13,600	15,300	13,700	17,500 <sup>r</sup>	12,800
Stainless steel mill products and scrap <sup>2</sup>	do.	203,000 <sup>r</sup>	220,000 <sup>r</sup>	203,000 <sup>r</sup>	242,000 <sup>r</sup>	208,000
Stocks, January 1:						
Government	do.	115,000	111,000	107,000	96,500	81,200
Industry <sup>3</sup>	do.	7,300	7,770	7,580	7,750	8,320
Total	do.	872,000 <sup>r</sup>	901,000 <sup>r</sup>	821,000 <sup>r</sup>	944,000 <sup>r</sup>	762,000
Distribution of U.S. supply, contained chromium:						
Exports:						
Chromite ore <sup>4</sup>	do.	1,930	6,930	2,700 <sup>r</sup>	2,090	3,090
Chromium chemicals	do.	20,500 <sup>r</sup>	17,300 <sup>r</sup>	16,800	11,000 <sup>r</sup>	3,560
Chromium ferroalloys and metal	do.	3,030 <sup>r</sup>	3,090 <sup>r</sup>	3,360	2,950	1,330
Stainless steel mill products and scrap	do.	214,000 <sup>r</sup>	216,000 <sup>r</sup>	217,000 <sup>r</sup>	236,000 <sup>r</sup>	228,000
Stocks, December 31:						
Government	do.	111,000	107,000	96,500	81,200	72,300
Industry <sup>3</sup>	do.	7,770	7,580	7,750	8,320 <sup>r</sup>	8,060
Total	do.	358,000 <sup>r</sup>	358,000 <sup>r</sup>	344,000 <sup>r</sup>	357,000 <sup>r</sup>	320,000
Consumption						
Apparent, contained chromium	do.	514,000 <sup>r</sup>	543,000 <sup>r</sup>	477,000 <sup>r</sup>	603,000 <sup>r</sup>	445,000
Reported:						
Chromite ore and concentrates, gross quantity	do.	W	W	W	W	W
Chromium ferroalloys: <sup>5</sup>						
Gross quantity	do.	429,000	435,000	435,000	449,000	432,000
Contained chromium	do.	248,000	251,000	248,000	257,000	248,000
Chromium metal, gross quantity	do.	4,490	4,470	4,270	4,190	4,170
Stocks, December 31, gross quantity:						
Government:						
Chromium ferroalloys	do.	150,000	144,000	129,000	108,000	95,700
Chromium metal	do.	4,230	4,090	4,090	3,960	3,960
Industry, consumer:						
Chromium ferroalloys <sup>6</sup>	do.	12,600	12,500	13,000	13,900	13,400
Chromium metal	do.	186	169	159	157 <sup>r</sup>	160
Other	do.	239	211	194	185 <sup>r</sup>	189
Prices, average annual:						
Chromite ore <sup>7</sup>	dollars per metric ton	216	168	162	182	173
Ferrochromium, chromium content <sup>8</sup>	dollars per pound	1.15	1.08	1.00	1.07	1.06
Aluminothermic chromium metal, gross quantity <sup>9</sup>	do.	6.56	5.87	4.57	4.49	4.38
Value of trade:						
Exports	thousands	\$150,000 <sup>r</sup>	\$159,000 <sup>r</sup>	\$152,000	\$224,000 <sup>r</sup>	\$83,700
Imports	do.	\$1,130,000 <sup>r</sup>	\$1,100,000 <sup>r</sup>	\$871,000 <sup>r</sup>	\$1,090,000 <sup>r</sup>	\$745,000
Net imports <sup>10</sup>	do.	-\$983,000 <sup>r</sup>	-\$941,000 <sup>r</sup>	-\$719,000 <sup>r</sup>	-\$869,000 <sup>r</sup>	-\$662,000
Stainless steel:						
World production, contained chromium <sup>11</sup>	metric tons	5,710,000 <sup>r</sup>	5,870,000 <sup>r</sup>	6,550,000 <sup>r</sup>	7,090,000 <sup>r</sup>	7,150,000
U.S. production:						
Gross quantity <sup>12</sup>	do.	2,070,000	1,980,000	2,030,000	2,390,000	2,350,000
Contained chromium <sup>13</sup>	do.	353,000	343,000	354,000	420,000	412,000
Average grade, dimensionless <sup>14</sup>		0.1703	0.1733	0.1744	0.1759	0.1758
Shipments, gross quantity <sup>15</sup>	metric tons	1,890,000	1,900,000	2,220,000	2,270,000 <sup>r</sup>	2,230,000
Exports, gross quantity	do.	612,000 <sup>r</sup>	650,000 <sup>r</sup>	633,000 <sup>r</sup>	838,000 <sup>r</sup>	828,000
Imports, gross quantity	do.	1,030,000 <sup>r</sup>	1,140,000 <sup>r</sup>	965,000 <sup>r</sup>	1,100,000 <sup>r</sup>	1,030,000
Scrap, gross quantity:						
Receipts	do.	866,000	858,000	882,000	921,000	947,000
Consumption	do.	1,300,000	1,300,000	1,300,000	1,320,000	1,450,000

See footnotes at end of table.

TABLE 1—Continued  
SALIENT CHROMIUM STATISTICS<sup>1</sup>

	2011	2012	2013	2014	2015	
Stainless steel—Continued:						
Scrap, gross quantity—Continued:						
Exports	do.	646,000 <sup>r</sup>	624,000	644,000	548,000	514,000
Imports	do.	169,000	156,000 <sup>r</sup>	226,000	329,000	192,000
Value of trade:						
Exports	thousands	\$2,670,000 <sup>r</sup>	\$2,570,000 <sup>r</sup>	\$2,500,000 <sup>r</sup>	\$3,020,000 <sup>r</sup>	\$2,710,000
Imports	do.	\$4,580,000 <sup>r</sup>	\$4,600,000 <sup>r</sup>	\$3,670,000 <sup>r</sup>	\$4,370,000 <sup>r</sup>	\$3,860,000
Scrap exports	do.	\$955,000 <sup>r</sup>	\$804,000	\$742,000 <sup>r</sup>	\$674,000	\$638,000
Scrap imports	do.	\$295,000	\$236,000	\$211,000	\$426,000 <sup>r</sup>	\$165,000
Net imports <sup>16</sup>	do.	-\$1,250,000 <sup>r</sup>	-\$1,460,000 <sup>r</sup>	-\$632,000 <sup>r</sup>	-\$1,100,000 <sup>r</sup>	-\$675,000

<sup>1</sup>Revised. do. Ditto. W Withheld to avoid disclosing company proprietary data. -- Zero.

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

<sup>2</sup>Calculated assuming chromium content of stainless steel and stainless steel scrap to average 17% chromium.

<sup>3</sup>Includes consumer stocks of chromium ferroalloys and metal and other chromium-containing materials.

<sup>4</sup>Calculated assuming chromite ore to average 44% Cr<sub>2</sub>O<sub>3</sub>, which is 68.42% chromium.

<sup>5</sup>Chromium ferroalloys, chromite ore, and other chromium-containing materials excluding chromium metal.

<sup>6</sup>Consumer stocks of high- and low-carbon ferrochromium and ferrochromium-silicon.

<sup>7</sup>Time-weighted average price of South African chromite ore that contains 44% Cr<sub>2</sub>O<sub>3</sub> free on board (f.o.b.) South Africa as reported in CRU Prices Incorporating Ryan's Notes.

<sup>8</sup>Time-weighted average U.S. price of imported high-carbon chromium that contains 49% to 51% chromium as reported in CRU Prices Notes.

<sup>9</sup>Time-weighted average U.S. price of imported aluminothermic chromium metal as reported by CRU Prices Incorporating Ryan's Notes.

<sup>10</sup>Negative data indicate that imports are greater than exports.

<sup>11</sup>Production estimated from publically available sources. Chromium content estimated at 17%.

<sup>12</sup>Source: American Iron and Steel Institute annual report of stainless and heat-resisting raw steel production and shipments.

<sup>13</sup>Estimated mass-weighted average of the mean chromium content of stainless steel production by grade.

<sup>14</sup>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.

<sup>15</sup>Source: American Iron and Steel Institute annual report of stainless and heat-resisting raw steel shipments.

<sup>16</sup>Includes stainless steel and stainless steel scrap.

TABLE 2  
U.S. REPORTED CONSUMPTION AND STOCKS OF CHROMIUM PRODUCTS<sup>1</sup>

(Metric tons)

	2014		2015		Change <sup>2</sup>	
	Gross quantity	Chromium content	Gross quantity	Chromium content	Quantity	Percent
Consumption by end use:						
Steel:						
Carbon steel	5,050	3,240	4,620	2,990	-426	-8
High-strength low-alloy steel	2,050	1,340	2,000	1,310	-43	-2
Stainless and heat-resisting steel	389,000	221,000	378,000	216,000	-10,500	-3
Fully alloy steel	19,500	11,800	13,300	8,200	-6,210	-32
Unspecified steel <sup>3</sup>	25,200	14,900	24,700	14,600	-447	-2
Superalloys	7,320	5,160	7,280	5,150	-41	-1
Other alloys and uses <sup>4</sup>	5,280 <sup>r</sup>	3,740 <sup>r</sup>	5,440	3,830	163	3
Total	453,000	261,000	436,000	252,000	-17,500	-4
Consumption by material:						
Low-carbon ferrochromium	28,100	18,600	26,100	17,200	-2,060	-7
High-carbon ferrochromium	391,000	226,000	375,000	218,000	-16,000	-4
Ferrochromium silicon	W	W	W	W	W	W
Chromium metal	4,190	4,190	4,170	4,170	-23	-1
Chromium-aluminum alloy	414 <sup>r</sup>	296 <sup>r</sup>	427	387	13	3
Other chromium materials	29,700	11,600	30,200	11,900	547	2
Total	453,000	261,000	436,000	252,000	-17,500	-7
Consumer stocks:						
Low-carbon ferrochromium	1,790 <sup>r</sup>	1,180	1,740	1,150	-42	-2
High-carbon ferrochromium	11,300	6,540	10,900	6,330	-426	-4
Ferrochromium silicon	W	W	W	W	W	W
Chromium metal	157 <sup>r</sup>	157 <sup>r</sup>	160	160	3	2
Chromium-aluminum alloy	W	W	W	W	W	W
Other chromium materials	1,030 <sup>r</sup>	435 <sup>r</sup>	945	416	-86	-8
Total	14,300	8,320 <sup>r</sup>	13,700	8,060	-551	-12
National Defense Stockpile stocks: <sup>5</sup>						
Chromium ferroalloys: <sup>6</sup>						
High-carbon ferrochromium	73,500	52,500	63,000	45,000	-10,500	-14
Low-carbon ferrochromium	34,600	24,700	32,600	23,300	-1,990	-6
Chromium metal <sup>7</sup>	3,960	3,960	3,960	3,960	--	--

<sup>1</sup>Revised. W Withheld to avoid disclosing company proprietary data; included in "Other chromium materials." -- Zero.

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

<sup>3</sup>Change based on gross quantity of unrounded data of current year compared with that of previous year.

<sup>4</sup>Includes electrical, tool, and unspecified steel end uses.

<sup>5</sup>Includes cast irons, welding and alloy hard-facing rods and materials, wear- and corrosion-resistant alloys, and aluminum, copper, magnetic, nickel, and other alloys.

<sup>6</sup>Data are based on the "Total Uncommitted Inventory" of stockpile material D-1 report by the Defense Logistics Agency Strategic Materials.

<sup>7</sup>Chromium content estimated using 71.4% chromium.

<sup>8</sup>Chromium content estimated using 100% chromium.



TABLE 3  
VALUE OF IMPORTS AND U.S. PRICE QUOTATIONS FOR CHROMIUM MATERIALS<sup>1</sup>

Material	2014		2015		
	Contained chromium	Gross quantity	Contained chromium	Gross quantity	
Value: <sup>2</sup>					
Chromite ore:					
Not more than 40% chromic oxide	dollars per metric ton	2,910	442	XX	XX
More than 40% but less than 46% chromic oxide	do.	634	198	600	179
46% or more chromic oxide	do.	729 <sup>r</sup>	260	484	230
Average	do.	705 <sup>r</sup>	243	506	217
Ferrochromium:					
Not more than 0.5% carbon	do.	4,550 <sup>r</sup>	3,100 <sup>r</sup>	4,310	2,920
More than 0.5% but not more than 3% carbon	do.	3,730	2,580	3,630	2,440
More than 3% but not more than 4% carbon	do.	2,090	1,010	1,660	843
Average (not more than 4% carbon)	do.	4,240 <sup>r</sup>	2,860 <sup>r</sup>	4,160	2,790
More than 4% carbon	do.	1,970 <sup>r</sup>	1,070 <sup>r</sup>	1,880	1,020
Average (all grades)	do.	2,210	1,230 <sup>r</sup>	2,250	1,260
Chromium metal <sup>3</sup>	do.	XX	11,000	XX	11,200
Price: <sup>4</sup>					
Chromite ore:					
Turkey:					
40% to 42% Cr <sub>2</sub> O <sub>3</sub>	do.	987 <sup>r,5</sup>	277	(6)	(6)
46% to 48% Cr <sub>2</sub> O <sub>3</sub>	do.	891 <sup>5</sup>	286	(6)	(6)
South Africa:					
38% to 40% Cr <sub>2</sub> O <sub>3</sub>	do.	686 <sup>r,5</sup>	183 <sup>r</sup>	552	166
44% Cr <sub>2</sub> O <sub>3</sub>	do.	605 <sup>5</sup>	182	574	173
42% UG2	do.	558 <sup>5</sup>	168 <sup>r</sup>	499	150
High-carbon ferrochromium:					
49% to 51% chromium	cents per pound	(6)	XX	(6)	XX
47% to 55% chromium	do.	107	XX	106	XX
60% to 65% chromium	do.	(6)	XX	(6)	XX
60% to 70% chromium	do.	114	XX	108	XX
Low-carbon ferrochromium:					
0.05% carbon	do.	227	XX	228	XX
0.10% carbon	do.	208	XX	210	XX
0.15% carbon	do.	201	XX	208	XX
Chromium metal, imported, aluminothermic	do.	XX	449	XX	438

<sup>r</sup>Revised. do. Ditto. XX Not applicable.

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

<sup>2</sup>Mass-weighted average based on customs value and quantity of imported material, as reported by the U.S. Census Bureau.

<sup>3</sup>Average for all grades.

<sup>4</sup>Source: CRU Prices Incorporating Ryan's Notes.

<sup>5</sup>Based on average Cr<sub>2</sub>O<sub>3</sub> content.

<sup>6</sup>Discontinued.

TABLE 4  
U.S. EXPORTS OF CHROMIUM MATERIALS, BY TYPE<sup>1</sup>

HTS <sup>2</sup> code	Type	2014		2015		Principal destinations in 2015 (Quantity in metric tons, value in thousands)
		Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)	
2610.00.0000	Chromite ore and concentrates, gross quantity	6,060	\$4,150	7,210	\$5,680	Taiwan (4,200, \$3,640); Canada (1,310, \$592); Mexico (931, \$751); China (285, \$159); Argentina (188, \$67); Thailand (127, \$197); United Kingdom (94, \$129); Ecuador (40, \$59); Republic of Korea (21, \$80); Germany (5, \$3); India (1, \$3).
Chromium metal, gross quantity:						
8112.21.0000	Unwrought chromium powders	354	8,560	555	7,900	Taiwan (136, \$1,460); Republic of Korea (103, \$624); Japan (82, \$1,370); Thailand (55, \$335); Germany (29, \$1,330); Brazil (24, \$262); India (23, \$207); Switzerland (21, \$312); Mexico (19, \$373); United Kingdom (17, \$320); Canada (12, \$213); Singapore (11, \$413); China (7, \$169); Chile (3, \$136); Malaysia (3, \$81); Peru (2, \$26); Saudi Arabia (2, \$102); Colombia (2, \$21); France (1, \$35); United Arab Emirates (1, \$28); Argentina (1, \$19); Algeria (1, \$17).
8112.22.0000	Chromium metal waste and scrap	35	527	35	551	United Kingdom (11, \$201); Japan (11, \$75); China (6, \$106); Canada (3, \$27); Mexico (2, \$42); Germany (1, \$44); Belgium (1, \$23); Republic of Korea (1, \$15).
8112.29.0000	Chromium metal other than unwrought powders and waste and scrap	265 <sup>r</sup>	8,750 <sup>r</sup>	210	7,200	Taiwan (70, \$2,080); Japan (20, \$772); France (20, \$410); Mexico (20, \$558); Ireland (9, \$260); Brazil (8, \$221); Israel (8, \$134); Canada (6, \$118); Republic of Korea (5, \$460); United Kingdom (5, \$139); China (4, \$409); United Arab Emirates (4, \$314); Germany (4, \$218); Hong Kong (4, \$112); Spain (3, \$58); Singapore (2, \$175); Malaysia (2, \$140); Madagascar (2, \$73); Hungary (2, \$65); Turkmenistan (2, \$13); India (1, \$77); Italy (1, \$67); Czech Republic (1, \$63); Netherlands (1, \$20); Costa Rica (1, \$16); Georgia (1, \$16); Chile (1, \$12); Sweden (1, \$12); Australia (1, \$11); Barbados (1, \$7).
Total chromium metal		655 <sup>r</sup>	17,800 <sup>r</sup>	801	15,700	
Chromium ferroalloys:						
7202.41.0000	High-carbon ferrochromium: <sup>3</sup>					
	Gross quantity	3,850	6,250	723	1,020	Canada (478, \$695); Mexico (115, \$127); Brazil (51, \$105); Republic of Korea (28, \$25); Czech Republic (21, \$19); Peru (14, \$33); Japan (5, \$4); Ecuador (4, \$4); Australia (4, \$3); Colombia (3, \$3).
	Contained chromium	1,940	XX	354	XX	
7202.49.0000	Low-carbon ferrochromium: <sup>4</sup>					
	Gross quantity	839	1,770	279	717	Canada (126, \$372); Mexico (65, \$221); Argentina (51, \$69); Vietnam (20, \$28); Colombia (17, \$27).
	Contained chromium	339	XX	154	XX	
7202.50.0000	Ferrochromium-silicon:					
	Gross quantity	36	43	73	85	Canada (61, \$72); Germany (12, \$13).
	Contained chromium	13	XX	26	XX	
Total chromium ferroalloys:						
	Gross quantity	4,730	8,060	1,080	1,820	
	Contained chromium	2,290	XX	533	XX	

See footnotes at end of table.

TABLE 4—Continued  
U.S. EXPORTS OF CHROMIUM MATERIALS, BY TYPE<sup>1</sup>

HTS <sup>2</sup> code	Type	2014		2015		Principal destinations in 2015 (Quantity in metric tons, value in thousands)
		Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)	
Chemicals, gross quantity:						
Chromium oxides:						
2819.10.0000	Chromium trioxide	15,500	67,400 <sup>r</sup>	--	--	
2819.90.0000	Other	4,280 <sup>r</sup>	24,100 <sup>r</sup>	5,200	26,500	United Kingdom (1,390, \$5,270); Belgium (889, \$3,030); Spain (670, \$2,340); Brazil (415, \$1,720); Romania (342, \$872); Canada (243, \$1,730); Japan (186, \$1,150); Germany (184, \$1,860); China (138, \$3,890); Republic of Korea (114, \$588); Australia (98, \$560); Italy (97, \$432); Mexico (95, \$494); Taiwan (87, \$708); Paraguay (73, \$283); France (50, \$423); Saudi Arabia (38, \$249); Thailand (22, \$180); Indonesia (15, \$103); Chile (10, \$52); Malaysia (9, \$38); Trinidad and Tobago (6, \$56); Venezuela (5, \$84); Argentina (4, \$20); Netherlands (3, \$47); India (3, \$37); Guatemala (3, \$33); Poland (3, \$19); Israel (3, \$16); South Africa (2, \$82); Singapore (2, \$39); Guyana (2, \$23); United Arab Emirates (2, \$21).
Total chromium oxides		19,800	91,400 <sup>r</sup>	5,200	26,500	
2833.29.4000	Chromium sulfates	207	1,100	238	1,230	Mexico (135, \$725); Republic of Korea (58, \$288); Taiwan (24, \$121); Singapore (8, \$41); Malaysia (5, \$26); Hong Kong (3, \$16); Indonesia (3, \$14); Costa Rica (1, \$3).
Salts of oxometallic or peroxometallic acids:						
2841.90.4500	Zinc and lead chromate	12	490	24	713	China (8, \$39); Mexico (7, \$134); South Africa (4, \$508); Trinidad and Tobago (3, \$11); Republic of Korea (1, \$21).
2841.30.0000	Sodium dichromate	13,500	24,400	--	--	
2841.50.1000	Potassium dichromate	56	147	178	411	Mexico (97, \$144); Taiwan (29, \$98); Saudi Arabia (18, \$76); Malaysia (17, \$71); Japan (10, \$9); Netherlands (7, \$7); United Kingdom (1, \$6).
2841.50.9100	Other	235	2,140	203	1,640	Canada (94, \$491); Taiwan (27, \$120); Germany (23, \$148); South Africa (15, \$361); Mexico (15, \$120); Trinidad and Tobago (8, \$51); Jamaica (7, \$43); Japan (3, \$23); Republic of Korea (2, \$97); France (2, \$33); United Kingdom (2, \$27); El Salvador (2, \$10); Australia (1, \$16).
Total salts		13,800	27,200	405	2,760	
3206.20.0000	Pigments and preparations, gross quantity	432 <sup>r</sup>	3,180 <sup>r</sup>	521	3,640	Mexico (330, \$1,120); Canada (111, \$773); Antigua and Barbuda (17, \$59); China (6, \$229); Aruba (6, \$10); Colombia (4, \$208); Switzerland (3, \$560); Thailand (3, \$62); Ecuador (3, \$48); El Salvador (3, \$40); Suriname (3, \$39); Guatemala (3, \$17); Trinidad and Tobago (3, \$6); Haiti (3, \$3); Belgium (2, \$111); Singapore (2, \$90); Republic of Korea (2, \$22); Costa Rica (2, \$20); Germany (2, \$19); South Africa (2, \$14); Curacao (2, \$6); Japan (1, \$30); Indonesia (1, \$19); Chile (1, \$12); Ireland (1, \$11); Jamaica (1, \$6); Malaysia (1, \$3); St. Lucia (1, \$3).

See footnotes at end of table.

TABLE 4—Continued  
U.S. EXPORTS OF CHROMIUM MATERIALS, BY TYPE<sup>1</sup>

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<sup>1</sup>Revised. XX Not applicable. -- Zero.

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

<sup>2</sup>Harmonized Tariff Schedule of the United States.

<sup>3</sup>More than 4% carbon.

<sup>4</sup>Not more than 4% carbon.

Source: U.S. Census Bureau.

TABLE 5  
U.S. IMPORTS FOR CONSUMPTION OF FERROCHROMIUM, BY COUNTRY<sup>1</sup>

Country	Not more than 0.5% carbon (HTS <sup>2</sup> code 7202.49.5090)			More than 0.5% carbon, but not more than 3% carbon (HTS <sup>2</sup> code 7202.49.5010)			More than 3% carbon, but not more than 4% carbon (HTS <sup>2</sup> code 7202.49.1000)			More than 4% carbon (HTS <sup>2</sup> code 7202.41.0000)			Total all grades		
	Gross quantity (metric tons)	Cr content (metric tons)	Value (thousands)	Gross quantity (metric tons)	Cr content (metric tons)	Value (thousands)	Gross quantity (metric tons)	Cr content (metric tons)	Value (thousands)	Gross quantity (metric tons)	Cr content (metric tons)	Value (thousands)	Gross quantity (metric tons)	Cr content (metric tons)	Value (thousands)
	2014:														
Albania	--	--	--	--	--	--	--	--	--	1,730	1,150	\$2,590	1,730	1,150	\$2,590
Belgium	--	--	--	--	--	--	28	15	\$15	--	--	--	28	15	15
Brazil	714	442	\$1,720	162	99	\$393	--	--	--	3,040	1,550	2,600	3,920	2,100	4,720
China	541 <sup>r</sup>	337 <sup>r</sup>	1,450 <sup>r</sup>	--	--	--	9	6	22	--	--	--	551 <sup>r</sup>	343 <sup>r</sup>	1,470 <sup>r</sup>
Colombia	--	--	--	--	--	--	--	--	--	21	14	34	21	14	34
Finland	--	--	--	--	--	--	--	--	--	100	53	99	100	53	99
Germany	8,530	5,980	32,900	--	--	--	--	--	--	299	208	500	8,830	6,190	33,400
India	185 <sup>r</sup>	121 <sup>r</sup>	1,010 <sup>r</sup>	--	--	--	--	--	--	11,000	6,850	13,100	11,200	6,970 <sup>r</sup>	14,100 <sup>r</sup>
Japan	2,170	1,510	8,660	--	--	--	--	--	--	--	--	--	2,170	1,510	8,660
Kazakhstan	270 <sup>r</sup>	191 <sup>r</sup>	675 <sup>r</sup>	6,140	4,280	15,400	--	--	--	91,300 <sup>r</sup>	63,200 <sup>r</sup>	128,000 <sup>r</sup>	97,700 <sup>r</sup>	67,700 <sup>r</sup>	144,000 <sup>r</sup>
Latvia	--	--	--	--	--	--	--	--	--	440	307	770	440	307	770
Mexico	70 <sup>r</sup>	46 <sup>r</sup>	398 <sup>r</sup>	--	--	--	--	--	--	--	--	--	70 <sup>r</sup>	46 <sup>r</sup>	398 <sup>r</sup>
Oman	--	--	--	--	--	--	--	--	--	1,190	640	1,200	1,190	640	1,200
Poland	--	--	--	41	23	75	--	--	--	--	--	--	41	23	75
Russia	24,000	16,400	67,600	8,150	5,630	21,600	--	--	--	15,200 <sup>r</sup>	9,940 <sup>r</sup>	20,500 <sup>r</sup>	47,400	32,000	110,000
South Africa	1,560	870	3,700	--	--	--	3,000	1,450	3,030	387,000	191,000	364,000	391,000	194,000	371,000
Sweden	1	1	3	--	--	--	--	--	--	6,700	4,420	11,400	6,700	4,420	11,400
Turkey	657	461	2,150	--	--	--	--	--	--	27,100	17,700	39,100	27,800	18,200	41,300
Zimbabwe	--	--	--	--	--	--	--	--	--	34,500	18,700	36,700	34,500	18,700	36,700
<b>Total</b>	<b>38,700<sup>r</sup></b>	<b>26,400<sup>r</sup></b>	<b>120,000<sup>r</sup></b>	<b>14,500</b>	<b>10,000</b>	<b>37,400</b>	<b>3,040</b>	<b>1,470</b>	<b>3,060</b>	<b>579,000<sup>r</sup></b>	<b>316,000<sup>r</sup></b>	<b>621,000<sup>r</sup></b>	<b>636,000<sup>r</sup></b>	<b>354,000<sup>r</sup></b>	<b>782,000<sup>r</sup></b>
2015:															
Albania	--	--	--	--	--	--	--	--	--	3,210	2,200	4,580	3,210	2,200	4,580
Belgium	220	153	715	--	--	--	--	--	--	--	--	--	220	153	715
Brazil	2,900	1,790	5,790	162	98	395	--	--	--	1,070	592	1,130	4,130	2,480	7,320
China	4,930	2,990	10,900	279	170	617	--	--	--	63	39	97	5,270	3,200	11,600
Finland	--	--	--	--	--	--	--	--	--	4,530	2,470	4,260	4,530	2,470	4,260
Germany	5,800	4,070	21,500	--	--	--	--	--	--	--	--	--	5,800	4,070	21,500
India	70	28	194	--	--	--	--	--	--	17,700	10,900	19,600	17,800	10,900	19,800
Japan	2,960	2,020	12,000	--	--	--	--	--	--	--	--	--	2,960	2,020	12,000
Kazakhstan	638	455	1,640	1,220	870	2,990	--	--	--	33,400	21,100	46,300	35,200	22,400	50,900
Mexico	39	24	194	--	--	--	--	--	--	80	55	156	118	80	349
Oman	--	--	--	--	--	--	--	--	--	3,000	1,610	2,740	3,000	1,610	2,740
Poland	--	--	--	120	73	237	--	--	--	--	--	--	120	73	237
Russia	29,300	20,300	84,300	1,620	1,140	4,360	--	--	--	24,000	16,100	35,300	54,900	37,500	124,000
South Africa	708	430	1,730	472	257	824	2,590	1,320	2,180	203,000	102,000	180,000	207,000	104,000	184,000
Sweden	--	--	--	--	--	--	--	--	--	349	234	509	349	234,000	509,000
Turkey	747	518	2,270	81	57	225	--	--	--	16,700	10,500	21,500	17,600	11,100	24,000
Zimbabwe	--	--	--	--	--	--	--	--	--	40,000	21,900	40,000	40,000	21,900	40,000
<b>Total</b>	<b>48,300</b>	<b>32,800</b>	<b>141,000</b>	<b>3,960</b>	<b>2,660</b>	<b>9,650</b>	<b>2,590</b>	<b>1,320</b>	<b>2,180</b>	<b>348,000</b>	<b>189,000</b>	<b>356,000</b>	<b>402,000</b>	<b>460,000</b>	<b>1,020,000</b>

See footnotes at end of table.

TABLE 5—Continued  
U.S. IMPORTS FOR CONSUMPTION OF FERROCHROMIUM, BY COUNTRY<sup>1</sup>

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<sup>1</sup>Revised. -- Zero.

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

<sup>2</sup>Harmonized Tariff Schedule of the United States.

Source: U.S. Census Bureau.

TABLE 6  
U.S. IMPORTS FOR CONSUMPTION OF CHROMIUM MATERIALS, BY TYPE<sup>1</sup>

HTS <sup>2</sup> code	Type	2014		2015		Sources in 2015 (Quantity in metric tons, value in thousands)
		Quantity (metric tons)	Value <sup>3</sup> (thousands)	Quantity (metric tons)	Value <sup>3</sup> (thousands)	
Chromite ore:						
2610.00.0020	Not more than 40% Cr <sub>2</sub> O <sub>3</sub> :					
	Gross quantity	27	\$12	--	--	
	Cr <sub>2</sub> O <sub>3</sub> content	6	XX	--	XX	
2610.00.0040	More than 40%, but less than 46% Cr <sub>2</sub> O <sub>3</sub> :					
	Gross quantity	45,900	9,090	34,600	6,210	South Africa (34,500, \$6,200); Brazil (95, \$14).
	Cr <sub>2</sub> O <sub>3</sub> content	21,000	XX	15,100	XX	
2610.00.0060	46% or more Cr <sub>2</sub> O <sub>3</sub> :					
	Gross quantity	122,000 <sup>r</sup>	31,900 <sup>r</sup>	96,100	22,100	South Africa (96,100, \$22,100); Belgium (12, \$27); Russia (5, \$4);
	Cr <sub>2</sub> O <sub>3</sub> content	63,900 <sup>r</sup>	XX	66,700	XX	Canada (1, \$3).
Total chromite ore:						
	Gross quantity	168,000 <sup>r</sup>	41,000 <sup>r</sup>	131,000	28,300	
	Cr <sub>2</sub> O <sub>3</sub> content	84,900 <sup>r</sup>	XX	81,800	XX	
Chromium ferroalloys:						
Ferrochromium:						
7202.49.5090	Not more than 0.5% carbon:					
	Gross quantity	38,700 <sup>r</sup>	120,000 <sup>r</sup>	48,300	141,000	Russia (29,300, \$84,300); Germany (5,800, \$21,500); China (4,930,
	Cr content	26,400 <sup>r</sup>	XX	32,800	XX	\$10,900); Japan (2,960, \$12,000); Brazil (2,900, \$5,790); Turkey
						(747, \$2,270); South Africa (708, \$1,730); Kazakhstan (638,
						\$1,640); Belgium (220, \$715); India (70, \$194); Mexico (39,
						\$194).
7202.49.5010	More than 0.5%, but less than 3% carbon:					
	Gross quantity	14,500	37,400	3,960	9,650	Russia (1,620, \$4,360); Kazakhstan (1,220, \$2,990); South Africa
	Cr content	10,000	XX	2,660	XX	(472, \$824); China (279, \$617); Brazil (162, \$395); Poland (120,
						\$237); Turkey (81, \$225).
7202.49.1000	More than 3%, but less than 4% carbon:					
	Gross quantity	3,040	3,060	2,590	2,180	South Africa (all).
	Cr content	1,470	XX	1,320	XX	
7202.41.0000	More than 4% carbon:					
	Gross quantity	579,000 <sup>r</sup>	621,000 <sup>r</sup>	348,000	356,000	South Africa (203,000, \$180,000); Zimbabwe (40,000, \$40,000);
	Cr content	316,000 <sup>r</sup>	XX	189,000	XX	Kazakhstan (33,400, \$46,300); Russia (24,000, \$35,300); India
						(17,700, \$19,600); Turkey (16,700, \$21,500); Finland (4,530,
						\$4,260); Albania (3,210, \$4,580); Oman (3,000, \$2,740); Brazil
						(1,070, \$1,130); Sweden (349, \$509); Mexico (80, \$156); China
						(63, \$97).
7202.50.0000	Ferrochromium-silicon:					
	Gross quantity	14,600 <sup>r</sup>	21,100 <sup>r</sup>	5,810	8,020	Kazakhstan (5,660, \$7,840); Russia (140, \$181); United Kingdom (15,
	Cr content	5,430 <sup>r</sup>	XX	2,240	XX	\$4.)
Total chromium ferroalloys:						
	Gross quantity	650,000 <sup>r</sup>	803,000 <sup>r</sup>	408,000	517,000	
	Cr content	359,000 <sup>r</sup>	XX	228,000	XX	

See footnotes at end of table.

TABLE 6—Continued  
U.S. IMPORTS FOR CONSUMPTION OF CHROMIUM MATERIALS, BY TYPE<sup>1</sup>

HTS <sup>2</sup> code	Type	2014		2015		Sources in 2015 (Quantity in metric tons, value in thousands)
		Quantity (metric tons)	Value <sup>3</sup> (thousands)	Quantity (metric tons)	Value <sup>3</sup> (thousands)	
Chromium metal, gross quantity:						
8112.21.0000	Unwrought chromium powders	5,550 <sup>r</sup>	61,100 <sup>r</sup>	4,820	53,600	United Kingdom (2,040, \$22,500); China (1,980, \$21,300); France (477, \$6,370); Russia (233, \$1,900); Japan (61, \$942); India (19, \$210); Austria (9, \$132); Germany (6, \$215); Taiwan (2, \$59).
8112.22.0000	Waste and scrap	98	1,180	153	1,430	Japan (63, \$686); Canada (24, \$140); United Kingdom (16, \$171); Germany (14, \$76); Mexico (10, \$67); China (7, \$104); France (7, \$37); Taiwan (5, \$115); Brazil (3, \$10); Singapore (1, \$23); Austria (1, \$4).
8112.29.0000	Other than waste and scrap	11,800	130,000	7,870	89,300	Russia (2,990, \$25,600); France (2,190, \$26,100); China (2,060, \$18,500); Germany (225, \$2,070); Canada (179, \$13,800); United Kingdom (91, \$1,340); Spain (82, \$631); Netherlands (50, \$729); Japan (3, \$165); Malaysia (2, \$86); Taiwan (2, \$42); New Zealand (1, \$41).
Total chromium metal		17,500 <sup>r</sup>	192,000	12,800	144,000	
Chemicals, gross quantity:						
Chromium oxides and hydroxides:						
2819.10.0000	Chromium trioxides	7,540 <sup>r</sup>	24,300	8,490	24,900	Turkey (6,260, \$16,900); Kazakhstan (989, \$2,720); China (843, \$3,700); Germany (187, \$769); South Africa (97, \$295); India (36, \$97); Spain (32, \$168); Colombia (28, \$209); Russia (12, \$38); Canada (6, \$28); Japan (1, \$8).
2819.90.0000	Other	2,600	11,500	2,310	10,200	Germany (960, \$5,840); China (674, \$3,340); Canada (638, \$713); Colombia (15, \$120); Spain (13, \$74); India (12, \$74); Netherlands (1, \$23); Republic of Korea (1, \$14).
Total oxides		10,100 <sup>r</sup>	35,800	10,800	35,100	
2833.29.4000	Sulfates of chromium	303	321	500	452	Turkey (378, \$365); China (103, \$62); Uruguay (19, \$18).
Salts of oxometallic or peroxometallic acids:						
2841.90.4500	Chromates of lead and zinc	112	744	128	2,220	Japan (108, \$2,170); China (20, \$52).
2841.30.0000	Sodium dichromate	70	159	39	62	South Africa (19, \$33); Turkey (18, \$26); Argentina (3, \$2).
Other chromates and dichromates; peroxochromates:						
2841.50.1000	Potassium dichromate	7	53	7	30	Colombia (all).
2841.50.9100	Other	848	3,040	832	2,820	Austria (692, \$2,380); Colombia (45, \$101); France (42, \$155); Republic of Korea (36, \$112); Australia (15, \$46); China (2, \$14).
Total salts		1,040	3,990	1,010	5,130	
2849.90.2000	Chromium carbide	238	5,040	109	2,550	China (56, \$915); Canada (35, \$994); United Kingdom (9, \$117); Germany (7, \$394); Austria (2, \$118).
Total chromium chemicals		11,700	45,100 <sup>r</sup>	12,400	43,300	

See footnotes at end of table.



TABLE 6—Continued  
 U.S. IMPORTS FOR CONSUMPTION OF CHROMIUM MATERIALS, BY TYPE<sup>1</sup>

HTS <sup>2</sup> code	Type	2014		2015		Sources in 2015 (Quantity in metric tons, value in thousands)
		Quantity (metric tons)	Value <sup>3</sup> (thousands)	Quantity (metric tons)	Value <sup>3</sup> (thousands)	
	Pigments and preparations based on chromium, gross quantity:					
3206.20.0010	Chrome yellow	534	3,520	626	3,140	Canada (492, \$2,660); Colombia (113, \$382); India (10, \$28); China (6, \$42); Mexico (3, \$12); Spain (1, \$8).
3206.20.0020	Molybdenum orange	431	3,010	609	2,580	Canada (416, \$1,700); Colombia (118, \$579); China (44, \$215); India (19, \$37); Mexico (12, \$48).
3206.20.0030	Zinc yellow	25	92	40	137	China (36, \$119); Mexico (4, \$18).
3206.20.0050	Other	261	1,930	289	1,790	France (128, \$484); China (37, \$513); Germany (30, \$290); India (30, \$179); Canada (30, \$90); Poland (19, \$115); Japan (11, \$83); Republic of Korea (2, \$3); Mexico (1, \$10); United Kingdom (1, \$7).
	Total pigments	1,250	8,560	1,560	7,640	

<sup>1</sup>Revised. XX Not applicable. -- Zero.

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

<sup>2</sup>Harmonized Tariff Schedule of the United States.

<sup>3</sup>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.

TABLE 7  
ESTIMATED WORLD PRODUCTION CAPACITY (CHROMITE ORE, FERROCHROMIUM, CHROMIUM METAL,  
CHROMIUM CHEMICALS, AND STAINLESS STEEL) AND CONSUMPTION FOR SELECTED COUNTRIES<sup>1</sup>

(Thousand metric tons of contained chromium)

Country	Production capacity in 2015					Chromium consumption <sup>2</sup>		
	Ore	Ferro-chromium	Metal	Chemicals	Stainless steel	2013	2014	2015
Afghanistan	2	--	--	--	--	1	2	2
Albania	204	28	--	--	--	163	209	148
Argentina	--	--	--	13	--	21	24	17
Australia	--	--	--	--	--	-4	5	7
Austria	--	--	--	--	12	24	25	19
Belgium	--	--	--	--	252	162	137	151
Brazil	208	157	--	--	73	151	229	180
Canada	--	--	--	--	--	14	15	17
China	60	2,420	15	56	3,650	4,760	4,110	4,760
Finland	312	239	--	--	220	139	166	81
France	--	--	12	--	55	52	55	51
Germany	--	12	1	--	256	140	85	91
India	1,300	552	(3)	11	486	592	692	817
Iran	126	10	--	2	--	-53	-36	1
Italy	--	--	--	--	289	214	184	177
Japan	--	14	1	7	559	404	466	405
Kazakhstan	1,650	879	--	30	--	1,000	1,110	1,130
Korea, Republic of	--	--	--	--	372	290	269	299
Kosovo	4	--	--	--	--	3	4	2
Madagascar	69	--	--	--	--	27	30	71
Mexico	--	--	--	10	--	7	8	6
Oman	237	35	--	--	--	243	231	216
Pakistan	45	--	--	2	--	42	26	31
Papua New Guinea	29	--	--	--	--	28	30	12
Philippines	14	--	--	--	--	-26	2	-4
Poland	--	--	--	6	--	14	16	6
Russia	199	311	16	31	30	351	349	323
South Africa	4,230	1,930	--	18	90	-29	126	-514
Spain	--	--	--	--	163	88	113	109
Sudan	19	--	--	--	--	10	18	15
Sweden	--	57	--	--	104	19	17	15
Taiwan	--	--	--	--	215	157	144	143
Turkey	1,250	84	--	28	--	589	788	680
Ukraine	--	--	--	--	33	15	12	11
United Arab Emirates	6	--	--	--	--	5	6	5
United Kingdom	--	--	8	--	56	20	26	15
United States	--	--	--	31	438	308	424	272
Vietnam	8	--	--	--	--	8	1	4
Zimbabwe	180	151	--	--	--	109	126	139
Total	10,100	6,880	53	246	7,350	XX	XX	XX

XX Not applicable. -- Zero.

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

<sup>2</sup>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 in January 2017. Assume that the average grade of chromite ore is 45% Cr<sub>2</sub>O<sub>3</sub>; ferrochromium, 57% Cr; and chromium metal, 100% Cr.

<sup>3</sup>Less than ½ unit.

TABLE 8  
CHROMITE: WORLD PRODUCTION, BY COUNTRY<sup>1,2</sup>

(Metric tons, gross weight)

Country	2011	2012	2013	2014	2015 <sup>c</sup>
Afghanistan	6,205 <sup>r</sup>	5,727 <sup>r</sup>	3,309	6,369	6,400
Albania	161,000 <sup>r</sup>	185,040 <sup>r</sup>	208,511 <sup>r</sup>	277,300 <sup>r</sup>	259,000
Australia	219,484 <sup>r</sup>	460,189 <sup>r</sup>	312,959 <sup>r</sup>	32,907 <sup>r</sup>	--
Brazil	493,632 <sup>r</sup>	425,159 <sup>r</sup>	429,745 <sup>r</sup>	555,959 <sup>r</sup>	500,000
China <sup>c</sup>	211,000 <sup>r</sup>	123,000 <sup>r</sup>	105,000 <sup>r</sup>	24,000 <sup>r</sup>	20,000
Finland	692,527	425,217	981,752	1,034,750	750,000
Greece	1,295 <sup>r</sup>	1,309 <sup>r</sup>	-- <sup>r</sup>	-- <sup>r</sup>	--
India	4,325,699 <sup>r</sup>	2,923,435 <sup>r</sup>	2,833,895 <sup>r</sup>	2,852,854 <sup>r</sup>	3,000,000
Indonesia	12,000	10,000	19,000	7,000	120,000
Iran	417,554 <sup>r</sup>	411,566	344,169	350,000 <sup>r</sup>	400,000
Kazakhstan	5,059,000 <sup>r</sup>	5,233,000 <sup>r</sup>	5,255,100 <sup>r</sup>	5,410,400 <sup>r</sup>	5,490,000
Kosovo	--	2,000	8,950	12,700	8,000
Madagascar	66,700	111,500	88,000	97,250 <sup>r</sup>	198,000
Oman	634,334 <sup>r</sup>	603,225 <sup>r</sup>	787,645	751,200	700,000
Pakistan	148,000	129,756 <sup>r</sup>	136,443 <sup>r</sup>	83,507 <sup>r</sup>	100,000
Papua New Guinea	--	8,250	92,000	96,750	40,000
Philippines	25,483	36,628	26,164 <sup>r</sup>	47,056	15,500
Russia, marketable	662,000	552,000	360,000	360,000 <sup>r</sup>	400,000
South Africa	10,824,000 <sup>r</sup>	11,310,000 <sup>r</sup>	13,563,000 <sup>r</sup>	14,037,722 <sup>r</sup>	12,000,000
Sudan	64,130 <sup>r</sup>	18,300 <sup>r</sup>	30,870	60,000 <sup>r</sup>	40,000
Turkey	2,281,981 <sup>r</sup>	3,295,398 <sup>r</sup>	4,140,655 <sup>r</sup>	4,100,000 <sup>r</sup>	3,500,000
United Arab Emirates	11,652 <sup>r</sup>	17,208 <sup>r</sup>	15,750 <sup>r</sup>	19,822 <sup>r</sup>	10,000
Vietnam	25,200 <sup>r</sup>	1,900 <sup>r</sup>	24,990 <sup>r</sup>	3,400 <sup>r</sup>	10,000
Zimbabwe	599,079	408,475	355,142 <sup>r</sup>	408,422 <sup>r</sup>	400,000
Total	26,900,000 <sup>r</sup>	26,700,000 <sup>r</sup>	30,100,000 <sup>r</sup>	30,600,000 <sup>r</sup>	28,000,000

<sup>c</sup>Estimated. <sup>r</sup>Revised. -- Zero.

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

<sup>2</sup>Includes data available through May 18, 2017.

TABLE 9  
FERROCHROMIUM: WORLD PRODUCTION, BY COUNTRY<sup>1,2</sup>

(Metric tons, gross weight)

Country	2011	2012	2013	2014	2015 <sup>c</sup>
Albania	28,694	24,018	24,692	34,897	38,000
Brazil	145,122	165,532	189,088	285,340 <sup>r</sup>	200,000
China	3,272,200 <sup>r</sup>	2,709,000 <sup>r</sup>	3,041,900 <sup>r</sup>	3,928,700 <sup>r</sup>	3,000,000
Finland	231,405 <sup>r</sup>	228,744 <sup>r</sup>	433,677 <sup>r</sup>	441,292 <sup>r</sup>	457,000
Germany	18,500	17,800	17,800 <sup>r</sup>	17,800 <sup>r</sup>	18,000
India	1,003,598 <sup>r</sup>	943,000 <sup>r</sup>	944,000 <sup>r</sup>	944,000 <sup>r</sup>	944,000
Iran	-- <sup>r</sup>	-- <sup>r</sup>	-- <sup>r</sup>	-- <sup>r</sup>	--
Japan	17,217	19,392	21,671 <sup>r</sup>	22,000 <sup>r</sup>	20,000
Kazakhstan	1,289,917	1,305,343 <sup>r</sup>	1,336,632 <sup>r</sup>	1,351,896 <sup>r</sup>	1,410,000
Oman	--	--	20,625 <sup>r</sup>	44,063 <sup>r</sup>	63,800
Russia	501,700 <sup>r</sup>	447,600 <sup>r</sup>	480,000 <sup>r</sup>	480,000 <sup>r</sup>	500,000
South Africa	3,425,911	3,063,257	3,219,162 <sup>r</sup>	3,719,010 <sup>r</sup>	3,700,000
Sweden	81,500	39,852 <sup>r</sup>	49,000	67,000	90,500
Turkey	75,950 <sup>r</sup>	69,550 <sup>r</sup>	132,603 <sup>r</sup>	86,025 <sup>r</sup>	82,600
Zimbabwe	195,750 <sup>r</sup>	154,565 <sup>r</sup>	129,554 <sup>r</sup>	235,256 <sup>r</sup>	191,000
Total	10,300,000 <sup>r</sup>	9,190,000 <sup>r</sup>	10,000,000 <sup>r</sup>	11,700,000	10,700,000

<sup>c</sup>Estimated. <sup>r</sup>Revised. -- Zero.

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

<sup>2</sup>Includes data available through May 18, 2017.