



2020 Minerals Yearbook

CHROMIUM [ADVANCE RELEASE]

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In 2020, U.S. chromium apparent consumption (including recycling) was 465,000 metric tons (t) on a chromium content basis, an 11% decrease from that in 2019 (table 1). The decrease in apparent consumption was primarily the result of a decrease in U.S. supply, which was largely due to decreases in demand related to mitigation measures put in place to limit the spread of the global coronavirus disease 2019 (COVID-19) pandemic. Because stainless-steel mill products contribute a significant amount of chromium to the domestic economy, trade in these products and their contribution has been accounted for in chromium apparent consumption calculations. U.S. chromium apparent consumption in 2020 was 52% of the recorded high in 1965.

Domestic reported consumption of chromium materials decreased by 25% (chromium content) in 2020 compared with that in 2019. Steelmaking was the leading end use for chromium materials and accounted for 95% of consumption in 2020. Superalloys and other end uses made up the remaining 5% (table 2).

Chromium exports decreased by 25% to 111,000 t in 2020 compared with those in 2019, based on estimated chromium content of trade data for chromite ore, chromium chemicals, chromium ferroalloys, chromium metal, and stainless-steel mill products and scrap. Total chromium imports decreased by 14% on a chromium content basis to 457,000 t compared with imports in 2019, also based trade data for chromite ore, chromium chemicals, chromium ferroalloys, chromium metal, and stainless-steel mill products and scrap (table 1).

World production of chromite ore in 2020 decreased by 20% to 37.0 million metric tons (Mt), gross weight, compared with the revised amount in 2019. South Africa was the leading producer of chromite ore, accounting for an estimated 36% of global production (table 7). World production of ferrochromium decreased by 12% to 12.7 Mt compared with the revised amount in 2019. China was the leading producer of ferrochromium, accounting for an estimated 45% of global production (table 8).

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 2020 (October 1, 2019, through September 30, 2020) Annual Materials Plan (AMP). Maximum disposal limits were based on the 2020 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, 2019).

At yearend 2020, the quantity of high-carbon chromium ferroalloys held in the National Defense Stockpile (NDS) decreased by 15% and the quantity of low-carbon chromium ferroalloys decreased by 3% compared with stocks at yearend 2019 (table 2). The quantity of chromium metal decreased slightly compared with stocks at the beginning of the year.

As a result, the quantity of chromium materials in the NDS at yearend 2020 was equivalent to about 10% of U.S. chromium apparent consumption on a chromium content basis in 2020.

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 consumption 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-steel 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 marketplace chromium-containing materials were chromite ore and foundry sand; chromium chemicals, ferroalloys, and metal; and stainless steel. In 2020, the United States produced chromium chemicals and stainless steel.

Chromium Chemicals.—Chemical-grade chromite ore, which has a high chromium content with greater than 45% chromium oxide (Cr₂O₃), 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 Inc., a subsidiary of Elementis plc (United Kingdom), produced sodium dichromate from chromite ore at Castle Hayne, NC (Elementis plc, 2021, p. 18, 80, 179).

The U.S. Court of Appeals for the Third Circuit ruled that the U.S. Government was not responsible for chromium contamination caused during World War I and World War II by a plant now owned by PPG Industries Inc. in Jersey City, NJ. As a

result, PPG Industries was required to take responsibility for the remediation of chromium-contaminated waste that was stored in piles outside the plant or used as fill dirt in construction projects around Jersey City (Bettenhausen, 2020; U.S. Court of Appeals for the Third Circuit, 2020, p. 7, 22–23).

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

In 2020, the U.S. stainless-steel industry produced 2.4 Mt of stainless steel and imported and exported stainless-steel mill products and scrap, making it a leading consumer of chromium materials in the United States (American Iron and Steel Institute, 2020). North American Stainless Company (NAS), Outokumpu Oyj (Finland), Allegheny Technologies Incorporated (ATI), and AK Steel Holding Corporation (now Cleveland-Cliffs Inc.), listed in descending order of production, were the leading U.S. stainless-steel producers.

NAS is a subsidiary of Acerinox, S.A., based in Spain, and produced stainless steel in its Ghent, KY, facility. Melt shop production decreased by 3% to 1.01 Mt in 2020 compared with 1.04 Mt in 2019, which made it the leading producer in the United States accounting for 42% of domestic production (Acerinox, S.A., 2020, p. 14; 2021, p. 22).

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 2020 were 2.1 Mt, a 3% decrease compared with shipments in 2019. In 2020, 27% of the stainless-steel shipments (approximately 570,000 t) were from the United States and Mexico combined. Outokumpu also reported that it possessed 22% of the stainless-steel market share in the United States in 2020, which would make it the second leading stainless-steel producer in the United States (Outokumpu Oyj, 2021, p. 5, 11).

ATI produced stainless steel at facilities located in Brackenridge and Latrobe, PA. ATI sales for nickel-base alloys and specialty alloys, which included stainless steel, decreased by 15% compared with those in 2019 and accounted for 38% of overall sales. The decrease in sales was attributed to declines in demand related to the global COVID-19 pandemic, with an 18% decrease in sales to the aerospace and defense markets and a 20% decrease to energy markets (Allegheny Technologies Inc., 2021, p. F-20, F-24, F-27). In December, ATI announced it would discontinue the production of standard stainless-steel sheet products to focus on more profitable advanced alloy products for the aerospace and defense markets. Production of standard stainless-steel sheet products would cease by midyear 2021 and affect five locations by yearend 2021, including those in Brackenridge, PA; Bridgeville, IL; Louisville, OH; Pico Rivera, CA; and Waterbury, CT (Allegheny Technologies Inc., 2020; Sabatini, 2020).

In March, ArcelorMittal S.A. (Luxembourg) announced that it would idle blast furnace #4 at its Indiana Harbor steel mill in Chicago, IL, citing the temporary shutdown of the auto industry in response to mitigation efforts to limit the spread of the global COVID-19 pandemic (Pete, 2020). In September, Cleveland-Cliffs Inc. announced that it entered into a definitive agreement with ArcelorMittal S.A. to purchase ArcelorMittal USA LLC operations and affiliated subsidiaries, the sale of which was completed on December 9, 2020. Six U.S. steelmaking facilities were part of the agreement, including stainless-steel plants at Burns Harbor and Indiana Harbor, IN (Cleveland-Cliffs Inc., 2020; Decena, 2020a).

Cleveland-Cliffs Inc. also completed the acquisition of AK Steel on March 13, 2020. AK Steel produced stainless steel at manufacturing plants in Butler, PA, and Mansfield, OH, in 2020, and Cleveland-Cliffs kept operations at those plants active after the acquisition (Cleveland-Cliffs Inc., 2021, p. 4, 7). Stainless and electrical steel accounted for 16% of Cleveland-Cliffs' total product line (Cleveland-Cliffs Inc., 2021, p. 48).

United States Steel Corp. idled blast furnace A (BF-A) at its Granite City Works plant in Illinois and shut down its No. 4 blast furnace at its Gary Works plant in Indiana for repairs in March (Decena, 2020b). In July, United States Steel Corp. announced that it would keep the No. 4 blast furnace at Gary Works in Indiana and the BF-A furnace in Illinois idled for the rest of 2020, citing weak market demand (Forster, 2020). Combined annual capacity for the idled furnaces was 2.9 million metric tons per year (Mt/yr).

Universal Stainless and Alloy Products, Inc. announced that plants were idled for 3 to 4 weeks during the second half of 2020 in response to decreased demand from the aerospace and oil and gas markets related to the global COVID-19 pandemic. Rolling shutdowns were also implemented at various sites to cut costs (CRU Group, 2020f).

AMG Advanced Metallurgical Group N.V. (Netherlands) announced that it would begin manufacturing chrome metal products in 2021 through its subsidiary AMG Chrome US LLC at a plant in New Castle, PA. The facility was previously owned by International Specialty Alloys (AMG Advanced Metallurgical Group N.V., 2020).

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).

In 2020, the annual average import unit value (gross weight) of chromite ore decreased by 28% from that in 2019; the annual average import unit value of ferrochromium decreased by 11% from that in 2019; and the annual average import unit value of chromium metal decreased by 24% from that in 2019. 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 4, 5). Based on foreign trade statistics reported by the DOC for calendar year 2020, the value of foreign trade of these chromium materials, excluding stainless-steel mill products and scrap, was \$19.6 million for exports (23% less than that in 2019) and \$545 million for imports (a 30% less than that in 2019). 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 \$1.9 billion for exports (21% less than that in 2019) and \$3.1 billion for imports (19% less than that in 2019).

World Review

Stainless-steel companies began idling or shutting down plants across the world in response to the spread of the COVID-19 pandemic and ensuing unstable market conditions. In Europe, Aperam S.A. announced that it would halt stainless-steel production at its facilities in Belgium and France beginning in May (CRU Group, 2020b).

China.—Hubei Zhenhua Chemical Co., Ltd. announced the acquisition of Chongqing Minfeng Chemical Co., Ltd., a chromium chemical producer in Chongqing. Once approved by the China Securities Regulatory Commission, Hubei Zhenhua Chemical Co., Ltd. would become the largest chromium chemical production company in the country, accounting for 65% of China's total output (Nils Backeberg, Manager, Steel Alloys, Roskill Information Services Ltd., written commun., December 10, 2020; Tong and Backeberg, 2020).

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 the chromite ore extracted from its Kemi chromite mine. In 2020, Outokumpu reported that total stainless-steel deliveries were 2.1 Mt, with a reported production capacity of 3.2 Mt/yr. Outokumpu also continued work on its Deep Mine project to extend the depth of the Kemi Mine to 1,000 meters below sea level. The expansion project was expected to be completed by the end of 2022 (Outokumpu Oyj, 2021, p. 5, 7, 11).

India.—Vedanta Ltd. (India) acquired Ferro Alloys Corp. Ltd. (FACOR) (India) in January 2020 following regulatory approval. The acquisition included control over management and 100% capital of FACOR (Vedanta Ltd., 2020). FACOR owned a ferrochromium plant with a production capacity of 72,000 metric tons per year (t/yr) and two chromite ore mines in Odisha State.

In June, Tata Steel Mining Limited, a subsidiary of Tata Steel Ltd., completed the requirements for the mining leases of the Kamarda, Saruabil, and Sukinda chromite mines in the Sukinda deposit. The leases, which were granted for 50 years, were auctioned by the State government of Odisha following the expiration of commercial leases in late March 2020. Tata Steel finished all preliminary steps to obtain the leases, including initial payments and completion of a mine development and

production agreement, before receiving word that it was the successful bidder (Asian News International, 2020; Prameya News7, 2020; Tata Steel Ltd., 2020). In September, Tata Steel began chromite mining operations at the Sukinda Chromite Mine (Pancholi, 2020). In November, Tata Steel reported operations had begun at the Saruabil and Kamarda chromite mines in the Jaipur district of Odisha (Divekar, 2020).

The board of directors at Jindal Stainless (Hisar) Ltd. approved the merger with Jindal Stainless Ltd. in December. The combined company, operating as Jindal Stainless Ltd., would have a stainless-steel production capacity of 1.9 Mt/yr. The final merger was expected to be completed by March 2022 following approval by shareholders, creditors, and relevant regulatory authorities (CRU Group, 2020e).

Indian Metals and Ferro Alloys Ltd. (IMFA) cited chromite ore production decreases were caused by lockdowns related to the global COVID-19 pandemic as well as a change in mine ownership after mine leases were auctioned by the State government of Odisha. Although IMFA received approval for the construction of a new 96,000-t/yr ferrochromium plant in Kalinganagar by the Odisha State government in November 2019, construction was delayed in 2020. No further plans were made for the project in 2020, but IMFA was committed to expanding capacity at existing facilities and mines (CRU Group, 2019; Indian Metals and Ferro Alloys Ltd., 2021, p. 3, 10).

South Africa.—Chromite mines and ferrochromium producers in South Africa were also affected by COVID-19 pandemic-related lockdowns, which began on March 26 and were set to stay in effect for 21 days. As a result, Afarak Group Company announced that it would put its furnaces at the Mogale ferroalloy plant and underground chromite mining operations at the Stellite and Mecklenburg Mines on care-and-maintenance status (CRU Group, 2020a). Jubilee Metals Group Plc (Jubilee Metals) also announced that it would idle operations in South Africa to comply with the pandemic-related lockdowns (Jubilee Metals Group Plc, 2020c).

Mines in South Africa were given permission to resume operations up to 50% of capacity in mid-April despite the 21-day lockdown that began on March 26 to help prevent the spread of the COVID-19 pandemic in South Africa. The change in restrictions was made in response to the potential instability of deep mines if left unmonitored, such as chromite mines that are located almost 4 kilometers below ground. However, operations were required to screen employees for COVID-19 symptoms and provide quarantine facilities as well as travel arrangements when necessary (CRU Group, 2020d). As a result, Jubilee Metals announced that it would resume operations in late April according to the revised lockdown guidelines at its Inyoni Surface PGM and Chrome Operation (Jubilee Metals Group Plc, 2020d). Jubilee Metals also announced that operations at its Windsor platinum-group-metal (PGM) and chromite mine restarted in May following the 21-day lockdown. Full production was expected to take place rapidly (Haill, 2020).

During the same period, ArcelorMittal South Africa Ltd., a subsidiary of Luxembourg-based ArcelorMittal S.A. that produces steel products like stainless steel, announced force majeure to customers and suppliers, also in response to the 21-day COVID-19 pandemic-related lockdown that began in

March (Mir, 2020). In May, the Mogale ferrochromium smelter owned by Afarak Group Plc (Finland) was placed in business rescue status owing to the effect of the global COVID-19 pandemic on the economy. Afarak expected operations to continue during the business rescue process and planned to resume production by mid-May (CRU Group, 2020c).

Glencore-Merafe Chrome Venture, a joint venture between Glencore plc (Switzerland) and Merafe Resources Ltd. (South Africa), resumed operations in May at its Lion ferrochromium smelter and Eastern Chrome Mine in South Africa following the 21-day COVID-19 pandemic-related lockdown. However, the Boshhoek, Lydenberg, Rustenburg, and Wonderkop ferrochromium smelters as well as the Kroondal chromite mine were not set to restart owing to market conditions that were present prior to the COVID-19 pandemic-related lockdown and remained under care-and-maintenance status (Merafe Resources Ltd., 2020).

In May, Jubilee Metals also announced a deal to move its fine chromite plant from the Dilokong Chrome Mine (DCM), a joint venture between Jubilee Metals, Sinosteel (China), and Samancor Chrome Holdings Pty. Ltd. (South Africa), to its Inyoni or Windsor chromite processing facilities. The agreement terminated the DCM joint venture fine chromite operations but kept the rights for Jubilee to process DCM tailings to recover PGMs. However, Jubilee Metals indicated there were no immediate plans to restart mining at the DCM (Jubilee Metals Group Plc, 2020b).

In August, Jubilee Metals entered into a 3-year third-party chromite ore offtake agreement with an undisclosed company at its Windsor chromite beneficiation plant in South Africa. Under the agreement, the plant would produce 40,000 metric tons per month (t/mo) of chromite concentrate and included the rights to all tailings, including those containing PGMs. Jubilee Metals also entered a joint venture agreement with a private company in South Africa to increase chromium-processing capability by an additional 35,000 t/mo at the Windsor 8 plant (Jubilee Metals Group Plc, 2020a).

The Cabinet of South Africa approved an export tax on chromite ore in October as part of an effort to support the domestic ferrochromium industry. The details of the export tax were not provided in the Cabinet statement. The Cabinet also proposed energy-efficient technologies for ferrochromium smelters and the use of cogeneration and self-generation power capabilities to manage potential power outages (Department of Government Communication and Information System, 2020).

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 2020, an 8% decrease from that in 2019 (American Iron and Steel Institute, 2019, 2020). Details of the outlook for the steel industry are discussed in the “Outlook” section of the Iron and Steel chapter of the 2020 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) decreased by 3% to 50.9 Mt in 2020 compared with that in 2019 (International Stainless Steel Forum, 2021, p. 7).

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TABLE 1
SALIENT CHROMIUM STATISTICS¹

		2016	2017	2018	2019	2020
Components of U.S. supply, chromium content:						
Secondary ²	metric tons	152,000 ^r	152,000 ^r	139,000 ^r	135,000 ^r	116,000
Imports:						
Chromite ore	do.	64,600	61,300	92,600	92,500	83,200
Chromium chemicals	do.	3,490	3,950	3,810	3,680	4,560
Chromium ferroalloys	do.	266,000	319,000	320,000	254,000	202,000
Chromium metal	do.	13,800	14,500	15,500	14,400	11,600
Stainless-steel mill products and scrap ²	do.	201,000	235,000	219,000	165,000	155,000
Stocks, January 1:						
Government	do.	72,300	66,800	58,700	54,700	51,000
Industry ³	do.	7,240	8,500	6,060	5,060	4,970
Total	do.	779,000 ^r	861,000 ^r	855,000 ^r	725,000 ^r	629,000
Distribution of U.S. supply, chromium content:						
Exports:						
Chromite ore ⁴	do.	1,330	5,250	2,960	1,400	1,470
Chromium chemicals	do.	48	631	629	183 ^r	76
Chromium ferroalloys and metal	do.	1,320	1,580	1,910	1,370	1,270
Stainless-steel mill products and scrap ²	do.	251,000	248,000	206,000	146,000 ^r	109,000
Stocks, December 31:						
Government	do.	66,800	58,700	54,700	51,000	46,300
Industry ³	do.	8,500	6,060	5,060	4,970	5,720
Total	do.	329,000	320,000	271,000	205,000 ^r	164,000
Consumption:						
Apparent, chromium content ⁵	do.	451,000 ^r	541,000 ^r	583,000 ^r	520,000 ^r	465,000
Reported:						
Chromite ore and concentrates, gross weight	do.	W	W	W	W	W
Chromium ferroalloys: ⁶						
Gross weight	do.	390,000	506,000	508,000	465,000	345,000
Chromium content	do.	225,000	285,000	245,000 ^r	267,000	199,000
Chromium metal, gross weight	do.	3,390	4,580	4,630	4,860	4,580
Stocks, December 31, gross weight:						
Government:						
Chromium ferroalloys	do.	88,100	76,800	71,200	66,100	59,600
Chromium metal	do.	3,900	3,860	3,850	3,850	3,750
Industry, consumer:						
Chromium ferroalloys ⁷	do.	11,600	7,070	5,180	4,900	4,770
Chromium metal	do.	111	287	270	282	273
Other	do.	4,290	4,280	4,280	4,270 ^r	4,280
Price, average annual:						
Chromite ore, gross weight ⁸	dollars per metric ton	204	280	209	174	154
Ferrocromium, chromium content ⁹	dollars per pound	0.95 ^r	1.45 ^r	1.37 ^r	1.00 ^r	0.90
Aluminothermic chromium metal, gross weight ¹⁰	do.	3.75	3.94	5.53	4.13	3.22
Value of trade:						
Imports	thousands	\$667,000	\$1,040,000	\$1,100,000	\$779,000	\$545,000
Exports	do.	\$25,600	\$33,300	\$28,600	\$25,400	\$19,600
Net imports ¹¹	do.	\$641,000 ^r	\$1,010,000 ^r	\$1,080,000 ^r	\$753,000 ^r	\$526,000
Stainless steel:						
World production, chromium content ¹²	metric tons	7,780,000 ^r	8,170,000	8,620,000 ^r	8,880,000 ^r	8,650,000
United States:						
Production:						
Gross weight ¹³	do.	2,480,000	2,750,000	2,810,000	2,590,000	2,090,000
Chromium content ¹⁴	do.	436,000	480,000	495,000	455,000	366,000
Average grade, dimensionless ¹⁵		0.1755	0.1744	0.1762	0.1755	0.1749
Shipments, gross weight ¹³	metric tons	2,360,000	2,500,000	2,490,000	2,280,000	2,010,000
Imports, gross weight	do.	917,000	1,100,000	959,000	767,000	694,000
Exports, gross weight	do.	821,000	974,000	668,000	436,000	325,000

See footnotes at end of table.

TABLE 1—Continued
SALIENT CHROMIUM STATISTICS¹

		2016	2017	2018	2019	2020
Stainless steel:—Continued						
Scrap, gross weight:						
Receipts	metric tons	891,000 ^r	892,000 ^r	818,000 ^r	797,000 ^r	682,000
Consumption	do.	1,340,000 ^r	1,330,000 ^r	1,230,000 ^r	1,230,000 ^r	1,040,000
Imports	do.	263,000	282,000	331,000	204,000	219,000
Exports	do.	654,000	486,000	545,000	422,000 ^r	314,000
Value of trade:						
Imports	thousands	\$3,070,000	\$3,730,000	\$3,440,000	\$2,830,000	\$2,320,000
Scrap imports	do.	\$182,000	\$280,000	\$345,000	\$183,000	\$197,000
Exports	do.	\$2,350,000	\$2,860,000	\$2,470,000	\$1,990,000	\$1,570,000
Scrap exports	do.	\$442,000	\$424,000	\$319,000	\$345,000 ^r	\$276,000
Net imports ^{11, 16}	do.	\$452,000 ^r	\$727,000 ^r	\$994,000 ^r	\$677,000 ^r	\$670,000

^rRevised. do. Ditto. W Withheld to avoid disclosing company proprietary data.

¹Table includes data available through July 29, 2021. Data are rounded to no more than three significant digits; may not add to totals shown.

²Calculated assuming chromium content of stainless steel and stainless-steel scrap to average 17% chromium.

³Includes consumer stocks of chromium ferroalloys and metal and other chromium-containing materials.

⁴Calculated based on the chromium content of imported chromite ore, typically between 46% and 63% chromium oxide (Cr₂O₃).

⁵Apparent consumption calculated as total U.S. distribution minus total U.S. supply.

⁶Chromium ferroalloys, chromite ore, and other chromium-containing materials excluding chromium metal.

⁷Consumer stocks of high- and low-carbon ferrochromium and ferrosilicon-chromium.

⁸Time-weighted average price of South African chromite ore that contains 44% Cr₂O₃ free on board (f.o.b.) as reported by CRU Group.

⁹Time-weighted average U.S. price of imported high-carbon chromium that contains 62% to 70% chromium as reported by CRU Group.

¹⁰Time-weighted average U.S. price of imported aluminothermic chromium metal as reported by CRU Group.

¹¹Defined as imports minus exports.

¹²Production estimated from publicly available sources. Chromium content estimated at 17%.

¹³Source: American Iron and Steel Institute annual report of stainless and heat-resisting raw steel production and shipments.

¹⁴Estimated mass-weighted average of the mean chromium content of stainless-steel production by grade.

¹⁵Ratio 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.

¹⁶Includes stainless steel and stainless-steel scrap.

TABLE 2
U.S. REPORTED CONSUMPTION AND STOCKS OF CHROMIUM PRODUCTS¹

(Metric tons unless otherwise specified)

	2019		2020		Change ²	
	Gross weight	Chromium content	Gross weight	Chromium content	Quantity	Percent
Consumption by end use:						
Steel:						
Carbon steel	3,790	2,430	3,670	2,380	-51	-2
High-strength low-alloy steel	2,020	1,320	1,950	1,290	-36	-3
Stainless and heat-resisting steel	409,000	233,000	289,000	165,000	-67,600	-29
Fully alloy steel	11,400	6,990	11,300	6,970	-21	(3)
Unspecified steel ⁴	31,300	18,000	31,200	18,000	-85	(3)
Superalloys	6,260	5,040	6,090	4,960	-80	-2
Other alloys and uses ⁵	6,860	4,640	6,800	4,750	114	2
Total	470,000	271,000	350,000	204,000	-67,800	-25
Consumption by material:						
Low-carbon ferrochromium	28,200	19,400	26,200	18,000	-1,440	-7
High-carbon ferrochromium	417,000	238,000	302,000	172,000	-65,600	-28
Ferrochromium silicon	(6)	(6)	(6)	(6)	(6)	(6)
Chromium metal	4,860	4,360	4,580	4,280	-77	-2
Chromium-aluminum alloy	405	287	374	272	-15	-5
Other chromium materials	19,800	9,670	17,300	9,020	-645	-7
Total	470,000	271,000	350,000	204,000	-67,800	-25
Consumer stocks:						
Low-carbon ferrochromium	1,080	741	1,090	749	8	1
High-carbon ferrochromium	3,520	2,010	3,360	1,920	-89	-4
Ferrochromium silicon	(6)	(6)	(6)	(6)	(6)	(6)
Chromium metal	282	253	273	255	2	1
Chromium-aluminum alloy	(6)	(6)	(6)	(6)	(6)	(6)
Other chromium materials	4,570	1,970	4,600	2,800	825	42
Total	9,450	4,970	9,320	5,720	746	15
National Defense Stockpile stocks:⁷						
Chromium ferroalloys:⁸						
High-carbon ferrochromium	38,700	27,600	33,000	23,500	-4,110	-15
Low-carbon ferrochromium	27,400	19,500	26,600	19,000	-517	-3
Chromium metal ⁹	3,850	3,850	3,750	3,750	-93	-2

¹Table includes data available through July 29, 2021. Data are rounded to no more than three significant digits; may not add to totals shown.

²Change based on chromium content of unrounded data of current year compared with that of previous year.

³Less than ½ unit.

⁴Includes electrical, tool, and unspecified steel end uses.

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

⁶Withheld to avoid disclosing company proprietary data; included in "Other chromium materials."

⁷Data are based on the "Total Uncommitted Inventory" of stockpile material D-1 report by the Defense Logistics Agency Strategic Materials.

⁸Chromium content estimated using 71.4% chromium.

⁹Chromium content estimated using 100% chromium.

TABLE 3
VALUE OF IMPORTS AND U.S. PRICE QUOTATIONS FOR CHROMIUM MATERIALS¹

Material	2019		2020		
	Gross weight	Chromium content	Gross weight	Chromium content	
Value: ²					
Chromite ore:					
Not more than 40% chromium oxide Cr ₂ O ₃	dollars per metric ton	291	786	177	701
More than 40% but less than 46% Cr ₂ O ₃	do.	225	518	205	470
46% or more Cr ₂ O ₃	do.	249	405	176	196
Average	do.	248	408	179	217
Ferrochromium:					
Not more than 0.5% carbon	do.	2,770	3,980	2,290	3,400
More than 0.5% but not more than 3% carbon	do.	2,200	3,460	2,050	3,050
More than 3% but not more than 4% carbon	do.	1,010	1,520	986	1,800
Average (not more than 4% carbon)	do.	2,700	3,900	2,260	3,370
More than 4% carbon	do.	993	1,820	889	1,640
Average (all grades)	do.	1,180	2,090	1,050	1,880
Chromium metal ³	do.	10,400	XX	7,930	XX
Price: ⁴					
Chromite ore, South Africa:					
38% to 40% Cr ₂ O ₃	do.	159	595	144	542
44% Cr ₂ O ₃	do.	174	577	154	512
42% UG2	do.	155	540	138	482
High-carbon ferrochromium:					
47% to 55% chromium	cents per pound	XX	135	XX	(5)
62% to 70% chromium	do.	XX	100	XX	90
Low-carbon ferrochromium:					
0.05% carbon	do.	XX	216	XX	207
0.10% carbon	do.	XX	187	XX	168
0.15% carbon	do.	XX	183	XX	167
Chromium metal, imported, aluminothermic	do.	413	XX	322	XX

do. Ditto. XX Not applicable.

¹Table includes data available through July 29, 2021. Data are rounded to no more than three significant digits; may not add to totals shown.

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

³Average for all grades.

⁴Source: CRU Group.

⁵CRU Group discontinued prices for 47% to 55% chromium in March 2019.

TABLE 4
U.S. EXPORTS OF CHROMIUM MATERIALS, BY TYPE¹

Schedule B code	Type	2019		2020		Principal destinations in 2020 (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 weight	2,300	\$1,940	1,780	\$1,040	Canada (1,200, \$591); Mexico (585, \$454).
8112.21.0000	Chromium metal, gross weight: Unwrought chromium powders	262	5,350	215	5,330	Netherlands (56, \$1,530); Malaysia (35, \$1,020); Germany (24, \$690); United Kingdom (19, \$354); Switzerland (16, \$266).
8112.22.0000	Chromium metal waste and scrap	21	332	30	235	United Kingdom (28, \$209); Canada (2, \$22).
8112.29.0000	Chromium metal other than unwrought powders and waste and scrap	148	7,460	134	4,410	Japan (34, \$1,320); United Kingdom (17, \$402); Taiwan (12, \$149); Spain (12, \$58); Singapore (9, \$85).
	Total chromium metal	431	13,100	379	9,970	
	Chromium ferroalloys:					
7202.41.0000	High-carbon ferrochromium: ² Gross weight	1,300	1,870	949	1,310	Mexico (454, \$702); Canada (393, \$498); Peru (81, \$75); Republic of Korea (12, \$25); Pakistan (6, \$5).
7202.49.0000	Chromium content Low-carbon ferrochromium: ³ Gross weight	679	XX	574	XX	
	Chromium content	437	911	393	718	Canada (227, \$414); Mexico (100, \$215); Argentina (34, \$46); India (19, \$25); Germany (10, \$14).
7202.50.0000	Ferrochromium-silicon: Gross weight	254	XX	236	XX	
	Chromium content	22	26	238	249	Canada (all).
	Chromium content	8	XX	83	XX	
	Total chromium ferroalloys:					
	Gross weight	1,760	2,810	1,580	2,280	
	Chromium content	942	XX	893	XX	
	Chemicals, gross weight:					
2833.29.4000	Chromium sulfates	5	31	7	34	China (5, \$22); Republic of Korea (1, \$5); Colombia (1, \$4).
	Salts of oxometallic or peroxometallic acids:					
2841.90.4500	Zinc and lead chromate	9	624	9	507	South Africa (4, \$450); Colombia (3, \$13); Mexico (2, \$36).
2841.50.1000	Potassium dichromate	584	1,910	205	386	Honduras (59, \$54); Mexico (40, \$144); India (38, \$35); Taiwan (25, \$85); China (22, \$20).
2841.50.9100	Other	184	1,450	192	1,800	Canada (72, \$219); Taiwan (26, \$163); Japan (26, \$122); South Africa (14, \$459); Australia (10, \$97).
	Total salts	782 ^r	4,010 ^r	413	2,720	
3206.20.0000	Pigments and preparations, gross weight	443 ^r	3,330 ^r	377	2,930	Mexico (161, \$1,100); Canada (62, \$313); China (44, \$523); El Salvador (21, \$199); Guatemala (16, \$92).

^rRevised. XX Not applicable.¹Table includes data available through July 8, 2021. Data are rounded to no more than three significant digits; may not add to totals shown.²More than 4% carbon.³Not more than 4% carbon.

Source: U.S. Census Bureau.

TABLE 5
U.S. IMPORTS FOR CONSUMPTION OF CHROMIUM MATERIALS, BY TYPE¹

HTS ³ code	Type	2019		2020		Sources in 2020 (Quantity in metric tons, value in thousands)
		Quantity (metric tons)	Value ² (thousands)	Quantity (metric tons)	Value ² (thousands)	
Chromite ore:						
2610.00.0020	Not more than 40% chromium oxide (Cr ₂ O ₃): Gross weight	973	\$283	3,600	\$637	South Africa (1,850, \$307); Germany (1,290, \$175); Brazil (423, \$142); Spain (28, \$13).
Cr ₂ O ₃ content						
2610.00.0040	More than 40%, but less than 46% Cr ₂ O ₃ : Gross weight	4,170	936	11,000	2,250	South Africa (10,800, \$2,200); Italy (152, \$39); Netherlands (18, \$9).
Cr ₂ O ₃ content						
2610.00.0060	46% or more Cr ₂ O ₃ : Gross weight	147,000	36,600	86,300	15,200	South Africa (86,300, \$15,100); United Kingdom (39, \$36); Belgium (11, \$23).
Cr ₂ O ₃ content						
Total chromite ore:						
Gross weight		152,000	37,800	101,000	18,100	
Cr ₂ O ₃ content		92,500	XX	83,200	XX	
Chromium ferroalloys:						
Ferrosilicon:						
7202.49.5090	Not more than 0.5% carbon: Gross weight	44,300	123,000	37,400	85,600	Russia (19,600, \$40,100); Kazakhstan (7,580, \$19,000); Germany (3,970, \$12,700); Brazil (2,730, \$3,930); Belgium (1,220, \$3,610).
Chromium content						
7202.49.5010	More than 0.5%, but less than 3% carbon: Gross weight	30,900	XX	25,200	XX	
Chromium content						
7202.49.1000	More than 3%, but less than 4% carbon: Gross weight	2,090	4,610	3,360	6,890	Kazakhstan (2,020, \$4,530); Brazil (1,020, \$1,700); India (200, \$372); Russia (120, \$284).
Chromium content						
7202.41.0000	More than 4% carbon: Gross weight	1,330	XX	2,260	XX	
Chromium content						
7202.50.0000	Ferrosilicon-chromium: Gross weight	1,210	1,220	212	210	Turkey (126, \$68); Russia (76, \$119); United Kingdom (10, \$23).
Chromium content						
7202.50.0000	More than 4% carbon: Gross weight	802	XX	116	XX	
Chromium content						
7202.41.0000	More than 4% carbon: Gross weight	393,000	390,000	310,000	276,000	South Africa (193,000, \$162,000); Kazakhstan (52,900, \$59,700); Russia (26,900, \$24,500); Zimbabwe (15,400, \$9,740); India (6,640, \$5,450).
Chromium content						
7202.50.0000	Ferrosilicon-chromium: Gross weight	215,000	XX	169,000	XX	
Chromium content						
7202.50.0000	Ferrosilicon-chromium: Gross weight	17,600	27,300	15,800	20,800	Kazakhstan (15,400, \$20,400); Brazil (324, \$384).
Chromium content						
Total chromium ferroalloys:						
Gross weight		458,000	546,000	367,000	389,000	
Chromium content		254,000	XX	202,000	XX	

See footnotes at end of table.

TABLE 5—Continued
U.S. IMPORTS FOR CONSUMPTION OF CHROMIUM MATERIALS, BY TYPE¹

HTS ³ code	Type	2019		2020		Sources in 2020 (Quantity in metric tons, value in thousands)
		Quantity (metric tons)	Value ² (thousands)	Quantity (metric tons)	Value ² (thousands)	
	Chromium metal, gross weight:					
8112.21.0000	Unwrought chromium powders	11,500	124,000	9,730	79,400	Russia (3,550, \$22,900); France (2,190, \$18,500); United Kingdom (2,190, \$22,300); China (1,120, \$10,700); Germany (373, \$2,900).
8112.22.0000	Waste and scrap	221	1,910	168	953	United Kingdom (114, \$718); Canada (22, \$67); Japan (20, \$119); France (11, \$34); Taiwan (1, \$14).
8112.29.0000	Other than waste and scrap	2,680	24,500	1,740	11,900	Russia (1,360, \$7,760); United Kingdom (210, \$2,230); China (85, \$809); Spain (38, \$194); Germany (31, \$527).
	Total chromium metal	14,400	150,000	11,600	92,300	
	Chemicals, gross weight:					
	Chromium oxides and hydroxides:					
2819.10.0000	Chromium trioxides	2,170	6,980	1,970	5,660	Kazakhstan (1,320, \$3,430); India (378, \$941); China (156, \$713); South Africa (49, \$148); France (18, \$100).
2819.90.0000	Other	3,120	13,000	4,620	14,500	Germany (1,800, \$8,030); Italy (1,530, \$1,590); China (828, \$3,800); Canada (346, \$393); Spain (43, \$208).
	Total oxides	5,280	20,000	6,590	20,100	
2833.29.4000	Sulfates of chromium	460	475	389	338	Turkey (235, \$224); India (139, \$88); Germany (15, \$25).
	Salts of oxometallic or peroxometallic acids:					
2841.90.4500	Chromates of lead and zinc	32	178	36	511	Italy (36, \$503).
2841.30.0000	Sodium dichromate	458	536	323	412	South Africa (all).
	Other chromates and dichromates;					
	peroxochromates:					
2841.50.1000	Potassium dichromate	21	71	4	27	India (2, \$17); Colombia (1, \$7); Kazakhstan (1, \$3).
2841.50.9100	Other	1,400 ^r	4,690 ^r	1,420	4,970	Austria (1,330, \$4,640); France (49, \$208); Colombia (23, \$85); Italy (10, \$26).
	Total salts	1,910 ^r	5,480 ^r	1,780	5,920	
2849.90.2000	Chromium carbide	142	2,850 ^r	154	3,110	China (81, \$1,110); Canada (31, \$962); Israel (20, \$651); United Kingdom (18, \$249); Germany (3, \$90).
	Total chromium chemicals	7,800 ^r	28,800 ^r	8,910	29,500	
	Pigments and preparations based on chromium,					
	gross weight:					
3206.20.0010	Chrome yellow	342	1,730	443	2,310	Canada (304, \$1,340); Mexico (121, \$859); Germany (7, \$72); India (7, \$21); Venezuela (2, \$7).
3206.20.0020	Molybdenum orange	234	1,350	138	1,270	Canada (137, \$1,260).
3206.20.0030	Zinc yellow	56	163	75	223	China (49, \$154); Austria (22, \$57); Mexico (5, \$12).
3206.20.0050	Other	1,840	12,700	1,620	12,200	Mexico (1,350, \$10,700); Netherlands (115, \$463); France (49, \$151); Spain (43, \$544); Japan (41, \$215).
	Total pigments	2,470	15,900	2,280	16,000	

^rRevised. XX Not applicable.¹Table includes data available through July 8, 2021. Data are rounded to no more than three significant digits; may not add to totals shown.²Customs 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.³Harmonized Tariff Schedule of the United States.

Source: U.S. Census Bureau.

TABLE 6
WORLD PRODUCTION CAPACITY (CHROMITE ORE, FERROCHROMIUM, CHROMIUM METAL,
CHROMIUM CHEMICALS, AND STAINLESS STEEL) AND CONSUMPTION FOR SELECTED COUNTRIES¹

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

Country or locality	Production capacity in 2020					Chromium consumption ²		
	Ore ³	Ferro-chromium ³	Metal	Chemicals	Stainless steel ⁴	2018	2019	2020
Afghanistan	7	--	--	--	--	1	-- ^r	--
Albania	1,300	100	--	--	--	200	250 ^r	180
Argentina	--	--	--	--	--	3	4	3
Australia	--	--	--	--	--	9	4	5
Austria	--	--	--	--	15	29	31	22
Belgium	--	--	--	--	290	180	140 ^r	110
Brazil	800	290	--	--	70	140	140 ^r	65
Canada	--	--	--	--	--	24	22	19
China	110	11,000	46	213	5,200	5,700	6,600	6,200
Finland	2,700	530	--	--	240	530	570	520
France	--	--	12	--	55	43	30	25
Germany	--	36	1	2	80	190	130	100
India	4,400	2,000	--	40	680	840 ^r	850	440
Indonesia	--	600	--	--	500	500	530	580
Iran	400	40	--	1	--	-- ^r	1 ^r	42
Italy	--	--	2	2	250	-- ^r	-- ^r	--
Japan	--	20	1	2	550	500 ^r	420 ^r	320
Kazakhstan	7,100	1,900	--	31	--	1,300	1,200	1,300
Korea, Republic of	--	--	--	--	410	340	310	260
Madagascar	320	--	--	--	--	--	--	18
Mexico	--	--	--	--	--	15	9 ^r	5
Oman	1,400	130	--	--	--	86 ^r	190 ^r	110
Pakistan	190	--	--	1	--	-- ^r	-- ^r	--
Papua New Guinea	150	--	--	--	--	28	36 ^r	31
Philippines	50	--	--	--	--	-- ^r	-- ^r	--
Poland	--	--	--	2	--	10	6 ^r	5
Russia	1,200	440	20	35	20	320	280	110
South Africa	19,000	4,200	--	18	100	-- ^r	-- ^r	--
Spain	--	2	2	1	170	110 ^r	100 ^r	73
Sudan	100	--	--	--	--	8	6 ^r	3
Sweden	--	160	--	--	110	5	13 ^r	10
Taiwan	--	--	--	--	230	160	91 ^r	76
Turkey	12,000	190	--	45	--	2,900	2,300 ^r	2,200
Ukraine	--	--	--	--	14	13	14	14
United Arab Emirates	200	--	--	--	--	58	42 ^r	19
United Kingdom	--	--	8	1	53	28	19	15
United States	--	--	--	42	480	430	330	280
Vietnam	3	--	--	--	--	1	1	--
Zimbabwe	1,600	310	--	--	--	110	130	16
Total	53,000	21,900	92	436	9,520	XX	XX	XX

^rRevised. XX Not applicable. -- Zero.

¹Table includes data available through July 29, 2021. Data are rounded to no more than three significant digits; may not add to totals shown.

²In 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 IHS Markit and U.N. Comtrade in July 2020 assuming that the average grade of chromite ore is 45% chromium oxide (Cr₂O₃); ferrochromium, 57% chromium; and chromium metal, 100% chromium.

³Reported in gross weight.

⁴Chromium 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	2016	2017	2018	2019	2020
Afghanistan ^e	4,300 ^r	4,500	4,500	1,300 ^r	1,000
Albania, marketable	726,671	808,016	1,142,719	1,288,315 ^r	913,400
Brazil, ore and concentrate	426,337	450,000 ^e	450,000 ^e	450,000 ^e	400,000 ^e
China	88,200	71,300	71,100 ^r	84,400 ^r	95,000 ^e
Finland, ore	2,105,338	1,954,282	2,211,284	2,415,287	2,293,330
India	3,329,372	3,478,276	4,075,560	4,138,817	2,500,000 ^e
Iran, concentrate	419,859 ^r	292,209	119,456	122,083 ^r	135,049
Kazakhstan, ore ³	5,542,900	6,313,300	6,688,800	7,018,900 ^r	7,000,000 ^e
Madagascar	107,735	208,100	109,200	76,126	60,000 ^e
Oman	582,042 ^r	452,721 ^r	884,876 ^r	607,749 ^r	367,375
Pakistan	81,250	88,781	111,586	120,698 ^r	100,000 ^e
Papua New Guinea	53,000 ^e	78,000 ^e	92,139	115,573 ^r	100,000 ^e
Philippines	25,745	20,849	45,011	31,743	35,112
Russia	448,000	496,000	511,000	510,000 ^e	500,000 ^e
South Africa:					
44% to 48% chromium oxide (Cr ₂ O ₃)	1,935,394	2,009,644	1,132,581 ^r	1,428,471 ^r	1,162,954
Less than 44% Cr ₂ O ₃	12,772,124	16,670,582 ^r	17,850,463 ^r	17,655,502 ^r	12,080,277
Total	14,707,518	18,680,226 ^r	18,983,044 ^r	19,083,973 ^r	13,243,231
Sudan	15,000	32,000	27,000	20,000 ^{r,e}	10,000 ^e
Turkey, 34% to 43% Cr ₂ O ₃	6,066,022	7,849,500	10,757,199	8,666,114 ^r	8,000,000 ^e
United Arab Emirates	17,863	57,797 ^r	190,146	136,100 ^r	62,413
Vietnam	--	750	--	--	--
Zimbabwe	735,822	1,673,996	1,756,126	1,550,064	1,196,837
Grand total	35,500,000 ^r	43,000,000 ^r	48,200,000 ^r	46,400,000 ^r	37,000,000

^eEstimated. ^rRevised. -- Zero.

¹Table includes data available through June 15, 2021. All data are reported unless otherwise noted; totals may include estimated data. Grand totals, totals, and estimated data are rounded to no more than three significant digits; may not add to totals shown.

²All data represent marketable output.

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

TABLE 8
FERROCHROMIUM: WORLD PRODUCTION, BY COUNTRY OR LOCALITY¹

(Metric tons, gross weight)

Country or locality ²	2016	2017	2018	2019	2020
Albania	44,551	51,033 ^r	92,850 ^r	66,402 ^r	60,000 ^e
Brazil ³	150,240	171,531	175,061	136,780	254,346
China	4,230,000	4,940,000	5,280,000	6,030,000	5,700,000 ^e
Finland	469,141	416,285	492,774	505,000	498,000
Germany ^e	17,000	17,000	16,500 ^r	16,500 ^r	16,000
India	944,000	944,000	944,000	930,000	780,000 ^e
Indonesia	--	80,000	190,000	190,000	190,000 ^e
Japan ^e	16,000	16,000	15,000	13,000	9,900
Kazakhstan	1,525,221	1,640,300	1,740,000 ^{r,e}	1,858,130 ^r	1,800,000 ^e
Oman	90,063	79,563	70,000	70,940 ^r	15,500
Russia	268,439	434,452	332,261	384,089	320,000 ^e
South Africa	3,596,000	3,700,000 ^e	3,900,000 ^e	3,600,000 ^e	2,700,000 ^e
Sweden	81,900	92,390	101,370	118,198	87,000
Turkey	75,000	83,894	91,799	81,743	94,200
Zimbabwe	78,200	142,800	365,000	311,500 ^r	134,000
Total	11,600,000	12,800,000 ^r	13,800,000 ^r	14,300,000 ^r	12,700,000

^eEstimated. ^rRevised. -- Zero.

¹Table includes data available through August 10, 2021. All data are reported unless otherwise noted; totals may include estimated data. Totals and estimated data are rounded to no more than three significant digits; may not add to totals shown.

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

³Includes ferrosilicon-chromium.