

# Mineral Industry Surveys

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## CHROMIUM IN SEPTEMBER 2008

On the basis of gross weight, consumption of chromium ferroalloys and metal in September 2008 decreased by 17% compared with consumption in August 2008; consumption in the third quarter 2008 decreased by 3% compared with consumption in the second quarter 2008 and decreased slightly compared with revised consumption in the third quarter 2007, according to the U.S. Geological Survey.

Included in this Mineral Industry Surveys are U.S. salient chromium statistics, U.S. Government stockpile inventory of chromium materials in September 2008, consumption by end use and consumer stocks of chromium ferroalloys and metal at the end of September 2008, U.S. foreign trade data for selected chromium-containing materials in August 2008, and chromium ferroalloys and metal prices.

TABLE 1  
U.S. SALIENT CHROMIUM STATISTICS<sup>1</sup>

(Metric tons, gross weight)

	2007	2008			
	January-December	July	August	September	January-September <sup>2</sup>
<b>Production:</b>					
Stainless steel production <sup>3</sup>	2,170,000	173,000	153,000	121,000	1,630,000
<b>Components of U.S. supply:</b>					
Stainless steel scrap receipts	953,000	69,900	73,100	70,800	676,000
Stainless steel scrap consumption	1,430,000	108,000	114,000	108,000	1,030,000
<b>Imports for consumption:</b>					
Chromite ore	145,000	2,220	27,800	(4)	115,000 <sup>5</sup>
<b>Ferrochromium:</b>					
More than 4% carbon	384,000	58,900	29,800	(4)	361,000 <sup>5</sup>
More than 3% carbon but not more than 4% carbon	267	--	--	(4)	160 <sup>5</sup>
More than 0.5%, but not more than 3% carbon	7,110	20	--	(4)	1,840 <sup>5</sup>
Not more than 0.5% carbon	31,700	3,090	3,350	(4)	26,400 <sup>5</sup>
Ferrochromium silicon	37,300	3,900	--	(4)	19,200 <sup>5</sup>
Total ferroalloy imports	460,000	65,900	33,200	(4)	408,000 <sup>5</sup>
Chromium metal <sup>6</sup>	11,700	1,270	1,150	(4)	9,560 <sup>5</sup>
Stainless steel	809,000	76,400	65,200	(4)	572,000 <sup>5</sup>
Stainless steel scrap	118,000	10,200	11,300	(4)	109,000 <sup>5</sup>
<b>Distribution of U.S. supply:</b>					
Consumption, industry, chromium ferroalloys and metal	447,000	37,600	37,700	31,400	323,000
<b>Exports:</b>					
Chromite ore	37,600	818	678	(4)	4,690 <sup>5</sup>
<b>Chromium ferroalloys:</b>					
High-carbon ferrochromium	24,700	302	998	(4)	8,930 <sup>5</sup>
Low-carbon ferrochromium	16,200	590	374	(4)	11,500 <sup>5</sup>
Ferrochromium silicon	328	6	100	(4)	210 <sup>5</sup>
Total ferroalloy exports	41,100	899	1,470	(4)	20,700 <sup>5</sup>
Chromium metal	1,210	110	123	(4)	828 <sup>5</sup>
Stainless steel	476,000	54,500	43,600	(4)	351,000 <sup>5</sup>
Stainless steel scrap	882,000	97,300	94,800	(4)	708,000 <sup>5</sup>
<b>Stocks at end of period:</b>					
Consumer, industry, chromium ferroalloys and metal	XX	11,900	11,300	10,300	XX
<b>Government stockpile:</b>					
Chromium ferroalloys	XX	206,000	206,000	206,000	XX
Chromium metal	XX	4,890	4,850	4,820	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>May include revised data that are not broken out by specific month.

<sup>3</sup>Data on stainless steel production reported by American Iron and Steel Institute; monthly, quarterly, and year-to-date production of stainless and heat-resisting raw steel.

<sup>4</sup>Data to be published in a subsequent issue.

<sup>5</sup>January through August data only.

<sup>6</sup>Includes waste and scrap and other.

TABLE 2  
U.S. REPORTED CONSUMPTION AND STOCKS OF CHROMIUM PRODUCTS  
IN 2008<sup>1,2</sup>

(Metric tons, gross weight unless otherwise noted)

	August	September	January- September <sup>3</sup>
<b>Consumption by end use:</b>			
Alloy uses:			
Steel:			
Carbon steel	411	360	2,940
High-strength low-alloy steel	329	308	2,620
Stainless and heat-resisting steel	31,500	25,400	268,000
Full alloy steel	1,790	1,650	13,400
Tool steel	416	416	3,740
Steel end use, not reported by grade	2,140	2,140	21,800
Superalloys	467	462	4,230
Other alloys and uses <sup>4</sup>	701	707	6,350
<b>Total</b>	<b>37,700</b>	<b>31,400</b>	<b>323,000</b>
<b>Total, chromium content</b>	<b>21,800</b>	<b>18,300</b>	<b>188,000</b>
<b>Consumption by material:</b>			
Low-carbon ferrochromium	2,650	2,450	23,500
High-carbon ferrochromium	31,700	25,800	270,000
Ferrochromium silicon	W	W	W
Chromium metal <sup>5</sup>	252	249	2,290
Chromite ore	W	W	W
Chromium-aluminum alloy	W	W	W
Other chromium materials	W	W	W
<b>Total</b>	<b>37,700</b>	<b>31,400</b>	<b>323,000</b>
<b>Total, chromium content</b>	<b>21,800</b>	<b>18,300</b>	<b>188,000</b>
<b>Consumer stocks:</b>			
Low-carbon ferrochromium	1,880	1,920	XX
High-carbon ferrochromium	8,080	7,150	XX
Ferrochromium silicon	1,140	1,090	XX
Chromium metal	113	111	XX
Chromium-aluminum alloy	W	W	XX
Other chromium materials	W	W	XX
<b>Total</b>	<b>11,300</b>	<b>10,300</b>	<b>XX</b>
<b>Total, chromium content</b>	<b>6,490</b>	<b>6,030</b>	<b>XX</b>

W Withheld to avoid disclosing company proprietary data; included in "Total." 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>Includes estimates.

<sup>3</sup>May include revised data that are not broken out by specific month.

<sup>4</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>5</sup>Includes waste and scrap and other.

TABLE 3  
U.S. GOVERNMENT STOCKPILE INVENTORY OF  
CHROMIUM MATERIALS<sup>1,2</sup>

(Metric tons)

Period	Chromium ferroalloys		Chromium metal
	High-carbon ferro-chromium	Low-carbon ferro-chromium	
<b>2007:</b>			
September	113,000	61,000	5,150
October	108,000	60,500	5,090
November	104,000	57,800	5,030
December	99,400	55,400	4,970
<b>2008:</b>			
January	98,200	54,700	4,970
February	95,000	50,800	4,940
March	93,600	48,100	4,940
April	93,600	46,900	4,940
May	93,500	45,800	4,930
June	93,600	45,100	4,930
July	140,000	66,700	4,890
August	140,000	66,700	4,850
September	139,000	66,700	4,820

<sup>1</sup>Data are rounded to no more than three significant digits.

<sup>2</sup>These Government stocks are reported by the Defense National Stockpile Center in Inventory of Stockpile Materials D-1, which reports uncommitted inventory. Uncommitted inventory is that inventory for which there is no sales contract. Committed inventory is that inventory for which there is a sales contract, however, the material has not yet been shipped. For chromium materials, the D-1 report includes chromium materials that (1) meet specifications and are held in excess of goal and (2) do not meet specifications and are held in excess of goal. The D-1 report excludes chromium materials that are committed and awaiting shipment.

Source: Defense National Stockpile Center.

TABLE 4  
U.S. EXPORTS OF CHROMITE ORE, CHROMIUM FERROALLOYS, AND METAL<sup>1</sup>

Period	Chromite ore		Chromium ferroalloys <sup>2</sup>			Chromium metal <sup>3</sup>	
	Gross weight (metric tons)	Value (thousands)	Gross weight (metric tons)	Chromium content (metric tons)	Value (thousands)	Gross weight (metric tons)	Value (thousands)
2007:							
August	874	\$364	1,270	747	\$1,960	123	\$2,690
September	406	231	4,030	2,470	6,760	95	1,670
October	6,340	812	933	568	1,620	74	1,390
November	525	400	1,580	831	2,600	125	3,850
December	534	284	1,440	737	2,680	67	1,170
January-December <sup>4</sup>	37,600	5,560	41,100	25,800	51,200	1,210	23,200
2008:							
January	482	255	2,040	957	4,470	96	1,600
February	657	424	2,210	905	3,650	30	845
March	582	282	2,260	946	3,600	131	1,940
April	778	411	4,680	1,810	6,500	80	1,610
May	369	242	4,370	2,040	10,800	129	2,040
June	325	197	2,740	1,180	6,020	128	2,540
July	818	472	899	323	1,130	110	2,210
August	678	372	1,470	544	2,060	123	2,490
January-August	4,690	2,660	20,700	8,710	38,300	828	15,300

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

<sup>2</sup>Includes low- and high-carbon ferrochromium and ferrochromium silicon.

<sup>3</sup>Includes chromium metal, waste and scrap, and unwrought powders.

<sup>4</sup>May include revised data that are not broken out by specific month.

Source: U.S. Census Bureau.

TABLE 5  
U.S. IMPORTS FOR CONSUMPTION OF CHROMITE ORE, FERROCHROMIUM, AND CHROMIUM METAL<sup>1</sup>

(Metric tons)

	2007	2008		
	January- December	July	August	January- August <sup>2</sup>
<b>Chromite ore:</b>				
Not more than 40%:				
Gross weight	52	--	--	--
Chromic oxide content	19	--	--	--
More than 40% but less than 46% chromic oxide:				
Gross weight	26,400	462	3,180	11,000
Chromic oxide content	12,100	210	1,290	5,020
46% or more chromic oxide:				
Gross weight	119,000	1,760	24,600	104,000
Chromic oxide content	55,600	811	11,300	49,900
<b>Total, all grades:</b>				
Gross weight	145,000	2,220	27,800	115,000
Chromic oxide content	67,800	1,020	12,600	55,000
<b>Ferrochromium:</b>				
Low-carbon: <sup>3</sup>				
Not more than 0.5%:				
Gross weight	31,700	3,090	3,350	26,400
Chromium content	21,000	2,180	2,290	18,100
More than 0.5% but not more than 3%:				
Gross weight	7,110	20	--	1,840
Chromium content	4,020	11	--	1,160
<b>Total, low-carbon:</b>				
Gross weight	38,800	3,110	3,350	28,200
Chromium content	25,100	2,190	2,290	19,200
Medium-carbon: <sup>4</sup>				
Gross weight	267	--	--	160
Chromium content	144	--	--	90
High-carbon: <sup>5</sup>				
Gross weight	384,000	58,900	29,800	361,000
Chromium content	217,000	34,300	15,700	205,000
<b>Total, all grades:</b>				
Gross weight	423,000	62,000	33,200	389,000
Chromium content	242,000	36,500	18,000	224,000
<b>Chromium metal:</b>				
Unwrought powders	822	121	91	672
Waste and scrap	357	28	57	439
Other than waste and scrap and unwrought powders	10,500	1,120	1,010	8,450
<b>Total, all grades:</b>	<b>11,700</b>	<b>1,270</b>	<b>1,150</b>	<b>9,560</b>

-- Zero.

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

<sup>2</sup>May include revised data that are not broken out by specific month.

<sup>3</sup>Ferrochromium containing not more than 3% carbon.

<sup>4</sup>Ferrochromium containing more than 3% carbon but not more than 4% carbon.

<sup>5</sup>Ferrochromium containing more than 4% carbon.

Source: U.S. Census Bureau.

TABLE 6  
U.S. IMPORTS FOR CONSUMPTION OF FERROCHROMIUM IN 2008,  
BY GRADE AND BY COUNTRY<sup>1</sup>

Grade and country	August			January-August <sup>2</sup>		
	Gross weight (metric tons)	Chromium content (metric tons)	Value <sup>3</sup> (thousands)	Gross weight (metric tons)	Chromium content (metric tons)	Value <sup>3</sup> (thousands)
<b>High-carbon ferrochromium:<sup>4</sup></b>						
Brazil	--	--	--	2,000	1,040	\$3,820
China	--	--	--	632	400	1,730
India	6,550	4,060	\$16,000	51,500	31,800	90,900
Italy	--	--	--	159	100	260
Kazakhstan	97	67	349	74,000	51,200	227,000
Mexico	19	13	63	38	28	123
Russia	--	--	--	25,500	16,500	66,900
South Africa	20,800	10,200	36,000	182,000	89,000	249,000
Sweden	--	--	--	529	326	882
Zimbabwe	2,370	1,400	7,140	24,300	14,200	62,200
Total	29,800	15,700	59,600	361,000	205,000	703,000
<b>Medium-carbon ferrochromium,<sup>5</sup> Russia</b>						
	--	--	--	160	90	152
<b>Low-carbon ferrochromium:<sup>6</sup></b>						
<b>More than 0.5% but not more than 3%:</b>						
China	--	--	--	340	212	1,200
Russia	--	--	--	1,080	726	3,690
South Africa	--	--	--	420	227	666
Total	--	--	--	1,840	1,160	5,560
<b>Not more than 0.5% carbon:</b>						
Brazil	--	--	--	37	25	116
China	530	360	3,050	3,180	2,060	15,600
Germany	554	376	3,850	3,750	2,580	18,600
Japan	40	28	180	2,500	1,550	6,480
Kazakhstan	46	31	170	421	280	971
Russia	2,180	1,500	14,600	16,000	11,200	88,600
South Africa	--	--	--	283	174	437
Sweden	--	--	--	241	165	1,080
Total	3,350	2,290	21,800	26,400	18,100	132,000
<b>All grades:</b>						
Brazil	--	--	--	2,030	1,070	3,940
China	530	360	3,050	4,150	2,670	18,500
Germany	554	376	3,850	3,750	2,580	18,600
India	6,550	4,060	16,000	51,500	31,800	90,900
Italy	--	--	--	159	100	260
Japan	40	28	180	2,500	1,550	6,480
Kazakhstan	143	98	519	74,400	51,500	228,000
Mexico	19	13	63	38	28	123
Russia	2,180	1,500	14,600	42,700	28,600	159,000
South Africa	20,800	10,200	36,000	183,000	89,400	250,000
Sweden	--	--	--	770	491	1,960
Zimbabwe	2,370	1,400	7,140	24,300	14,200	62,200
Total	33,200	18,000	81,400	389,000	224,000	840,000

-- Zero.

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

<sup>2</sup>May include revised data that are not broken out by specific month.

<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.

<sup>4</sup>Ferrochromium containing more than 4% carbon.

<sup>5</sup>Ferrochromium containing more than 3% carbon but not more than 4% carbon.

<sup>6</sup>Ferrochromium containing not more than 3% carbon.

Source: U.S. Census Bureau.

TABLE 7  
U.S. IMPORTS FOR CONSUMPTION OF CHROMIUM METAL IN 2008,  
BY GRADE AND BY COUNTRY<sup>1</sup>

Grade and country	August		January-August <sup>2</sup>	
	Gross weight (metric tons)	Value <sup>3</sup> (thousands)	Gross weight (metric tons)	Value <sup>3</sup> (thousands)
<b>Unwrought powders:</b>				
China	43	\$344	204	\$1,420
France	--	--	30	90
Germany	--	--	5	77
Japan	--	--	19	800
Netherlands	--	--	20	173
Russia	17	95	251	1,690
United Kingdom	31	493	142	2,050
Total	91	932	672	6,300
<b>Waste and scrap:</b>				
China	--	--	59	542
Germany	--	--	(4)	10
Japan	6	75	25	397
Malaysia	--	--	23	190
Mexico	41	140	311	1,170
Singapore	7	186	18	308
Taiwan	2	39	2	39
Total	57	441	439	2,650
<b>Other than waste and scrap and unwrought powders:</b>				
China	263	2,460	1,630	14,300
France	438	6,410	2,300	27,500
Germany	25	341	144	3,000
India	--	--	126	170
Italy	--	--	1	20
Japan	1	16	15	216
Russia	203	1,890	2,350	23,300
United Kingdom	76	1,120	1,880	20,600
Total	1,010	12,200	8,450	89,200
<b>All grades:</b>				
China	306	2,800	1,890	16,300
France	438	6,410	2,330	27,600
Germany	25	341	148	3,090
India	--	--	126	170
Italy	--	--	1	20
Japan	6	91	59	1,410
Malaysia	--	--	23	190
Mexico	41	140	311	1,170
Netherlands	--	--	20	173
Russia	220	1,990	2,600	25,000
Singapore	7	186	18	308
Taiwan	2	39	2	39
United Kingdom	107	1,610	2,030	22,700
Total	1,150	13,600	9,560	98,100

-- Zero.

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

<sup>2</sup>May include revised data that are not broken out by specific month.

<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.

<sup>4</sup>Less than ½ unit.

Source: U.S. Census Bureau.

TABLE 8  
U.S. STAINLESS STEEL TRADE, BY PRODUCT, IN 2008<sup>1</sup>

Stainless steel product	August		January-August	
	Gross weight (metric tons)	Value <sup>2</sup> (thousands)	Gross weight (metric tons)	Value <sup>2</sup> (thousands)
<b>Exports:</b>				
Ingot	2,370	\$15,400	19,600	\$97,900
Flat-rolled (width > 600 mm)	23,100	72,800	196,000	677,000
Flat-rolled (width < 600 mm)	8,090	42,700	64,700	384,000
Bars and rods in irregular coils	840	3,990	5,980	32,700
Other bars and rods	4,400	33,200	28,800	206,000
Wire	951	7,610	5,870	46,800
Tubes, pipes, hollow profiles	3,770	32,500	30,000	255,000
Total	43,600	208,000	351,000	1,700,000
Stainless steel scrap	94,800	137,000	708,000	893,000
Grand total	138,000	346,000	1,060,000	2,590,000
<b>Imports:</b>				
Ingot	10,400	48,800	86,600	394,000
Flat-rolled (width > 600 mm)	27,700	111,000	265,000	1,050,000
Flat-rolled (width < 600 mm)	4,350	21,500	33,000	168,000
Bars and rods in irregular coils	1,850	9,150	19,300	93,100
Other bars and rods	8,380	49,500	70,100	417,000
Wire	3,840	24,200	27,300	174,000
Tubes, pipes, hollow profiles	8,660	85,300	71,000	644,000
Total	65,200	349,000	572,000	2,940,000
Stainless steel scrap	11,300	11,200	109,000	185,000
Grand total	76,500	361,000	680,000	3,120,000

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

<sup>2</sup>Export value is free alongside ship. Import value is Customs import value, which 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.

Source: U.S. Census Bureau.

TABLE 9  
CHROMITE ORE PRICES AVERAGE MONTHLY AND ANNUAL PRICES

(Dollars per metric ton, gross weight unless otherwise noted)

Month	Turkey <sup>1</sup>			South Africa <sup>2</sup>								
	1	2	3	1	2	3	4	5	6	7		
2007:												
September	363 - 363	393 - 393	NA - NA	225 - 240	235 - 250	265 - 270	285 - 295	345 - 345	220 - 240	NA - NA		
October	390 - 390	420 - 420	NA - NA	258 - 269	258 - 269	300 - 300	320 - 320	410 - 410	220 - 240	NA - NA		
November	403 - 403	435 - 435	NA - NA	263 - 275	263 - 275	330 - 340	340 - 340	430 - 430	210 - 230	NA - NA		
December	425 - 425	450 - 450	NA - NA	268 - 278	268 - 278	270 - 350	300 - 350	455 - 455	240 - 290	NA - NA		
Yearly avg.	360 - 360	382 - 382	NA - NA	238 - 249	238 - 250	224 - 240	248 - 267	292 - 306	163 - 191	NA - NA		
2008:												
January	420 - 420	440 - 440	200 - 300	268 - 278	268 - 278	340 - 340	350 - 370	450 - 480	270 - 290	NA - NA		
February	450 - 450	470 - 470	200 - 300	298 - 308	298 - 308	360 - 370	380 - 400	460 - 480	270 - 290	NA - NA		
March	509 - 509	529 - 529	200 - 300	393 - 403	393 - 403	360 - 370	380 - 400	460 - 480	270 - 290	NA - NA		
April	588 - 588	618 - 618	200 - 300	440 - 450	440 - 450	360 - 370	380 - 400	460 - 480	270 - 290	NA - NA		
May	600 - 600	635 - 635	200 - 300	450 - 460	450 - 460	390 - 415	420 - 435	550 - 580	300 - 350	NA - NA		
June	600 - 600	635 - 635	200 - 300	393 - 413	410 - 430	450 - 480	480 - 510	550 - 580	420 - 420	NA - NA		
July	575 - 600	610 - 635	500 - 500	330 - 340	370 - 400	550 - 580	580 - 570	650 - 680	520 - 520	NA - NA		
August	550 - 600	585 - 635	500 - 500	330 - 340	370 - 400	510 - 540	540 - 570	710 - 740	500 - 500	330 - 370		
September	475 - 544	540 - 609	500 - 500	315 - 328	368 - 388	490 - 510	520 - 540	750 - 800	295 - 330	330 - 370		
South Africa												
Month	8	9	Kazakhstan <sup>3</sup>	Philippines <sup>4</sup>	Sand <sup>5</sup>							
2007:												
September	NA - NA	NA - NA	NA - NA	125 - 140	170 - 175							
October	NA - NA	NA - NA	NA - NA	125 - 140	170 - 175							
November	NA - NA	NA - NA	NA - NA	125 - 140	170 - 175							
December	NA - NA	NA - NA	NA - NA	125 - 140	170 - 175							
Yearly avg.	NA - NA	NA - NA	NA - NA	125 - 140	170 - 175							
2008:												
January	NA - NA	NA - NA	200 - 300	125 - 140	170 - 175							
February	NA - NA	NA - NA	200 - 300	125 - 140	170 - 175							
March	NA - NA	NA - NA	200 - 300	125 - 140	170 - 175							
April	NA - NA	NA - NA	200 - 300	125 - 140	170 - 175							
May	NA - NA	NA - NA	200 - 300	125 - 140	170 - 175							
June	NA - NA	NA - NA	200 - 300	125 - 140	170 - 175							
July	NA - NA	NA - NA	500 - 500	125 - 140	400 - 400							
August	360 - 390	330 - 350	500 - 500	125 - 140	400 - 400							
September	360 - 390	330 - 350	500 - 500	125 - 140	400 - 400							

NA Not available.

<sup>1</sup>Source for Turkey 1 price is Ryan's Notes. Turkey 1 is called 38-40% Cr<sub>2</sub>O<sub>3</sub> before 07/07/06 and 40-42% cfr China on and after 07/07/06 by Ryan's Notes. Source for Turkey 2 price is Ryan's Notes. Turkey 2 is called 44% Cr<sub>2</sub>O<sub>3</sub> cfr China by Ryan's Notes. Source for Turkey 3 price is Industrial Minerals. Turkey 3 is called 40-42% 2.5:1 (scale pro rata) by Industrial Minerals.

<sup>2</sup>Source for South Africa 1 price is Ryan's Notes. South Africa 1 is called 39% Cr<sub>2</sub>O<sub>3</sub> free on board (f.o.b.) South Africa by Ryan's Notes. Source for South Africa 2 price is Ryan's Notes. South Africa 2 is called 44% chrome concentrate f.o.b. South Africa by Ryan's Notes. Source for South Africa 3 price is Industrial Minerals. South Africa 3 is called chemical grade, 46% Cr<sub>2</sub>O<sub>3</sub>, wet bulk, f.o.b. by Industrial Minerals. Source for South Africa 4 price is Industrial Minerals. South Africa 4 is called foundry grade, 46% Cr<sub>2</sub>O<sub>3</sub>, wet bulk, f.o.b. by Industrial Minerals. Source for South Africa 5 price is Industrial Minerals. South Africa 5 is called refractory grade, 46% Cr<sub>2</sub>O<sub>3</sub>, wet bulk, f.o.b. by Industrial Minerals. Source for South Africa 6 price is Industrial Minerals. South Africa 6 is called Northwest, metallurgical grade, friable lumpy, basis 40% Cr<sub>2</sub>O<sub>3</sub>, f.o.b. by Industrial Minerals. Source for South Africa 7 price is Metal Bulletin. South Africa 7 is called friable lumpy basis 35-40% chrome ore; cost, insurance and freight (c.i.f.) main Chinese ports by Metal Bulletin. Source for South Africa 8 price is Metal Bulletin. South Africa 8 is called LG6 metallurgical grade basis 42% chrome ore; cost, c.i.f. main Chinese ports by Metal Bulletin. Source for South Africa 9 price is Metal Bulletin. South Africa 9 is called UG2 metallurgical grade basis 40% chrome ore; cost, c.i.f. main Chinese ports by Metal Bulletin.

<sup>3</sup>Source for Kazakhstan price is Industrial Minerals. Kazakhstan is called 40-41% min. by Industrial Minerals.

<sup>4</sup>Source for Philippines price is Industrial Minerals. Philippines is called refractory grade, f.o.b. by Industrial Minerals.

<sup>5</sup>Source for Sand price is Industrial Minerals. Sand is called molding grade, 98% < 30 mesh, del. UK reported in British pounds by Industrial Minerals.

TABLE 10  
HIGH-CARBON FERROCHROMIUM AVERAGE MONTHLY AND ANNUAL PRICES

(Cents per pound, contained chromium)

Month	United States <sup>1</sup>														
	1		2		3		4		5						
2007:															
September	101.25	-	107.50	130.25	-	135.25	107.50	-	116.25	126.75	-	131.00	120	-	130
October	116.25	-	125.00	142.25	-	146.25	113.75	-	120.00	137.00	-	142.75	130	-	140
November	137.90	-	142.50	162.00	-	166.10	121.25	-	132.50	155.00	-	163.75	137	-	143
December	143.00	-	148.00	168.25	-	174.13	140.00	-	155.00	162.75	-	170.50	150	-	165
Yearly avg.	101.99	-	107.70	117.56	-	121.62	97.14	-	105.55	113.31	-	118.57	104	-	112
2008:															
January	147.18	-	149.19	172.50	-	175.75	145.00	-	157.50	165.00	-	170.50	150	-	165
February	161.60	-	166.56	192.40	-	196.80	173.00	-	184.00	188.80	-	195.60	174	-	183
March	192.50	-	198.75	223.75	-	232.50	201.25	-	207.50	207.50	-	215.00	215	-	221
April	204.00	-	208.25	240.00	-	245.00	205.00	-	215.00	225.00	-	236.25	241	-	246
May	204.80	-	209.95	241.00	-	247.00	205.00	-	215.00	224.60	-	240.00	246	-	251
June	205.00	-	211.44	240.75	-	248.25	205.00	-	215.00	211.25	-	225.00	245	-	250
July	202.00	-	207.00	238.00	-	243.00	205.00	-	210.00	196.25	-	216.25	237	-	243
August	195.05	-	197.63	222.50	-	226.75	190.00	-	205.00	185.00	-	205.00	228	-	235
September	178.44	-	183.81	208.75	-	216.25	176.25	-	186.25	169.00	-	181.25	218	-	225

See footnotes at end of table.

TABLE 10—Continued  
HIGH-CARBON FERROCHROMIUM AVERAGE MONTHLY AND ANNUAL PRICES

(Cents per pound, contained chromium)

Month	Europe <sup>2</sup>				Japan <sup>3</sup>		Hong Kong <sup>4</sup>	China <sup>5</sup>														
	1	2	3	4	1	2																
2007:																						
September	102	-	104	135	-	140	99	-	101	131	-	146	93.75	-	98.75	108	100	-	146	8,500	-	8,800
October	102	-	104	135	-	140	99	-	101	140	-	150	95.00	-	100.00	108	100	-	150	8,825	-	9,200
November	102	-	104	135	-	140	100	-	106	156	-	165	112.00	-	118.00	108	100	-	165	9,120	-	9,420
December	102	-	104	150	-	160	107	-	114	170	-	191	120.00	-	130.00	108	100	-	191	9,250	-	9,738
Yearly avg.	90	-	92	114	-	119	92	-	92	116	-	126	94.77	-	99.48	96	87	-	94	8,304	-	8,578
2008:																						
January	102	-	104	150	-	160	192	-	210	245	-	325	230.00	-	240.00	200	100	-	110	58	-	62
February	137	-	145	196	-	214	192	-	210	243	-	310	230.00	-	240.00	200	100	-	110	60	-	63
March	178	-	188	233	-	258	205	-	220	230	-	275	190.00	-	210.00	210	100	-	110	71	-	75
April	190	-	200	250	-	280	205	-	220	220	-	260	184.00	-	204.00	213	100	-	110	94	-	102
May	190	-	200	250	-	280	205	-	220	220	-	254	172.50	-	185.00	213	100	-	110	103	-	107
June	190	-	200	250	-	280	189	-	206	199	-	230	145.00	-	150.00	197	100	-	110	94	-	101
July	195	-	205	250	-	280	205	-	220	230	-	275	190.00	-	210.00	210	100	-	110	86	-	93
August	195	-	205	246	-	274	205	-	220	220	-	260	184.00	-	204.00	213	100	-	110	87	-	93
September	195	-	205	230	-	250	205	-	220	220	-	254	172.50	-	185.00	213	100	-	110	84	-	90

<sup>1</sup>Source for United States 1 price is Platts Metals Week; United States 1 is called United States charge 50%-55% chromium, imported, by Platts Metals Week.

Source for United States 2 price is Platts Metals Week; United States 2 is called United States 60%-65% chromium, imported, by Platts Metals Week. Source for United States 3 price is Ryan's Notes; United States 3 is called 50%-52% chromium, imported, North American transaction by Ryan's Notes. Source for United States 4 price is Ryan's Notes; United States 4 is called 60%-65% chromium, imported, North American transaction by Ryan's Notes. Source for United States 5 price is Metal Bulletin; United States 5 is called 6%-8% carbon, basis 60%-65% chromium, max. 2% silicon, by Metal Bulletin.

<sup>2</sup>Source for Europe 1 price is Platts Metals Week; Europe 1 is called high-carbon 52% chromium, by Platts Metals Week. Source for Europe 2 price is Platts Metals Week; Europe 2 is called high-carbon 62% chromium, by Platts Metals Week. Source for Europe 3 price is Metal Bulletin; Europe 3 is called lumpy chromium charge, basis 52% chromium, quarterly by Metal Bulletin. Source for Europe 4 price is Metal Bulletin; Europe 4 is called 6%-8% carbon, basis 60% chromium, max. 1.5% silicon, by Metal Bulletin.

<sup>3</sup>Source for Japan 1 price is Platts Metals Week; Japan 1 is called 50%-55% chromium, spot, cost insurance freight (c.i.f.), by Platts Metals Week. Source for Japan 2 price is Platts Metals Week; Japan 2 is called 50%-55% chromium, regular, c.i.f., by Platts Metals Week.

<sup>4</sup>Source for Hong Kong price is Platts Metals Week; Hong Kong is called high-carbon 60% chromium, by Platts Metals Week.

<sup>5</sup>Source for China price is Metal Bulletin; China is called 6%-8% carbon, basis 60% chromium, delivered duty paid China RMB/tonne (metric ton) in 2007, by Metal Bulletin. As a result of conversion of price reported in Yuan to U.S. dollars in 2008, variations result from changes in price and exchange rate. The University of British Columbia, Sauter School of Business, Pacific Exchange Rate Service at URL <http://fx.sauder.ubc.ca/data.html> is the source of Yuan/U.S. dollar exchange rates.

TABLE 11  
LOW-CARBON FERROCHROMIUM AVERAGE MONTHLY AND ANNUAL PRICES

(Dollars per pound, contained chromium, unless otherwise noted)

Month	United States <sup>1</sup>				
	1	2	3	4	5
2007:					
September	1.76 - 1.83	1.57 - 1.62	1.55 - 1.61	1.71 - 1.78	1.55 - 1.61
October	1.93 - 1.98	1.78 - 1.82	1.74 - 1.80	1.89 - 1.94	1.81 - 1.87
November	2.18 - 2.23	2.06 - 2.10	2.05 - 2.09	2.22 - 2.29	2.07 - 2.13
December	2.65 - 2.80	2.37 - 2.48	2.36 - 2.47	2.68 - 2.75	2.32 - 2.37
Yearly avg.	1.72 - 1.78	1.54 - 1.59	1.53 - 1.58	1.69 - 1.75	1.52 - 1.56
2008:					
January	3.15 - 3.38	2.68 - 2.75	2.67 - 2.74	3.03 - 3.11	2.69 - 2.79
February	3.54 - 3.64	3.25 - 3.38	3.14 - 3.26	3.54 - 3.67	3.34 - 3.44
March	4.45 - 4.59	4.26 - 4.41	4.16 - 4.25	4.16 - 4.40	4.26 - 4.39
April	5.00 - 5.18	4.89 - 4.96	4.88 - 4.95	5.16 - 5.29	4.95 - 5.06
May	5.45 - 5.56	5.16 - 5.26	5.09 - 5.19	5.40 - 5.45	5.18 - 5.27
June	5.54 - 5.59	5.13 - 5.28	5.12 - 5.27	5.40 - 5.45	4.99 - 5.18
July	5.45 - 5.50	4.99 - 5.06	4.98 - 5.05	5.21 - 5.30	4.85 - 5.00
August	5.27 - 5.32	4.89 - 4.94	4.90 - 4.96	5.15 - 5.25	4.63 - 4.80
September	5.13 - 5.20	4.79 - 4.86	4.78 - 4.85	5.00 - 5.08	4.50 - 4.63

See footnotes at end of table.

TABLE 11—Continued  
LOW-CARBON FERROCHROMIUM AVERAGE MONTHLY AND ANNUAL PRICES

(Dollars per pound, contained chromium, unless otherwise noted)

Month	United States <sup>1</sup>				Europe <sup>2</sup>		
	6	7	8	9	1	2	3
2007:							
September	1.50 - 1.56	1.70 - 1.90	1.45 - 1.60	1.30 - 1.40	1.60 - 1.70	1.71 - 1.81	1.68 - 1.78
October	1.68 - 1.75	1.85 - 1.95	1.60 - 1.70	1.60 - 1.65	1.68 - 1.80	1.80 - 1.88	1.78 - 1.85
November	1.91 - 1.98	1.86 - 1.95	1.61 - 1.70	1.61 - 1.66	1.98 - 2.10	2.09 - 2.27	2.12 - 2.26
December	2.01 - 2.08	1.94 - 2.04	1.72 - 1.82	1.64 - 1.71	2.10 - 2.22	2.18 - 2.38	2.22 - 2.42
Yearly avg.	1.47 - 1.51	1.58 - 1.69	1.40 - 1.49	1.29 - 1.36	1.50 - 1.61	1.57 - 1.66	1.59 - 1.68
2008:							
January	2.54 - 2.64	2.25 - 2.41	2.15 - 2.30	1.75 - 1.90	2.65 - 2.80	2.63 - 2.89	2.66 - 2.90
February	3.18 - 3.28	3.07 - 3.17	2.77 - 2.87	2.53 - 2.63	3.16 - 3.26	3.17 - 3.49	3.22 - 3.55
March	4.08 - 4.18	4.42 - 4.49	4.31 - 4.36	4.23 - 4.30	4.44 - 4.61	3.95 - 4.73	4.00 - 4.78
April	4.66 - 4.79	4.90 - 5.00	4.80 - 4.90	4.73 - 4.83	4.85 - 5.05	3.95 - 5.50	4.00 - 5.55
May	5.03 - 5.13	5.05 - 5.15	5.00 - 5.10	4.93 - 5.03	4.85 - 5.05	3.85 - 4.10	4.75 - 5.55
June	5.00 - 5.08	5.52 - 5.61	5.16 - 5.23	5.10 - 5.16	4.85 - 5.05	4.15 - 4.40	5.30 - 5.43
July	4.78 - 4.84	5.44 - 5.52	5.01 - 5.10	4.98 - 5.07	5.00 - 5.20	5.05 - 5.20	5.10 - 5.32
August	4.70 - 4.75	5.28 - 5.36	4.91 - 5.00	4.89 - 4.97	5.00 - 5.20	4.85 - 5.12	4.85 - 5.15
September	4.33 - 4.40	5.08 - 5.15	4.81 - 4.88	4.79 - 4.84	5.00 - 5.20	4.73 - 5.05	4.78 - 5.08

<sup>1</sup>Source for United States 1 price is Platts Metals Week; United States 1 is called United States low-carbon, 0.05% carbon, imported, by Platts Metals Week.

Source for United States 2 price is Platts Metals Week; United States 2 is called United States low-carbon, 0.10% carbon, imported, by Platts Metals Week.

Source for United States 3 price is Platts Metals Week; United States 3 is called United States low-carbon, 0.15% carbon, imported, by Platts Metals Week.

Source for United States 4 price is Ryan's Notes; United States 4 is called 0.05% carbon, imported, North American transaction by Ryan's Notes. Source for

United States 5 price is Ryan's Notes; United States 5 is called 0.1% carbon, imported, North American transaction by Ryan's Notes. Source for United States

6 price is Ryan's Notes; United States 6 is called 0.15% carbon, imported, North American transaction by Ryan's Notes. Source for United States 7 price is

Metal Bulletin; United States 7 is called United States free market, low carbon, duty paid free on board (f.o.b.) Pittsburgh, 0.05% carbon, 65% min.

chromium by Metal Bulletin. Source for United States 8 price is Metal Bulletin; United States 8 is called United States free market, low-carbon, duty paid

f.o.b. Pittsburgh, 0.10% carbon, 62% min. chromium by Metal Bulletin. Source for United States 9 price is Metal Bulletin; United States 9 is called United

States free market, low-carbon, duty paid f.o.b. Pittsburgh, 0.15% carbon, 60% min. chromium by Metal Bulletin.

<sup>2</sup>Source for Europe 1 price is Platts Metals Week; Europe 1 is called 0.1% carbon, by Platts Metals Week. Source for Europe 2 price is Metal Bulletin;

Europe 2 is called 0.1% carbon, average 68%-70% chromium, by Metal Bulletin. Source for Europe 3 price is Metal Bulletin; Europe 3 is called European

low-carbon, in warehouse, 0.06% carbon max., 65% chromium, by Metal Bulletin.

TABLE 12  
FERROCHROMIUM SILICON AND CHROMIUM METAL AVERAGE MONTHLY AND ANNUAL PRICES

(Dollars per pound, gross weight, unless otherwise noted)

Month	Ferro-chromium silicon <sup>2</sup>	United States, aluminothermic <sup>3</sup>		Chromium metal			
				Europe, aluminothermic <sup>1</sup>		1	2
2007:							
September	0.7810	3.65	- 3.70	3.44	- 3.61	4.65	- 4.83
October	0.8213	3.65	- 3.70	3.45	- 3.59	4.65	- 4.83
November	0.9120	3.83	- 3.94	3.49	- 3.61	4.65	- 4.83
December	0.9473	4.59	- 4.71	3.86	- 4.02	4.65	- 4.83
Yearly avg.	0.7197	3.62	- 3.70	3.34	- 3.48	4.56	- 4.83
2008:							
January	0.9703	4.65	- 4.75	4.38	- 4.54	4.65	- 4.83
February	1.0896	4.68	- 4.75	4.51	- 4.68	4.65	- 4.83
March	1.2125	4.90	- 5.00	4.51	- 4.65	4.65	- 4.83
April	1.3075	5.05	- 5.13	4.74	- 5.03	4.65	- 4.83
May	1.4040	5.17	- 5.25	4.97	- 5.21	4.65	- 4.83
June	1.4518	5.53	- 5.71	5.36	- 5.53	4.65	- 4.83
July	1.3813	5.75	- 5.90	5.95	- 6.13	4.65	- 4.83
August	1.2912	5.75	- 5.90	6.11	- 6.32	4.65	- 4.83
September	1.1735	5.75	- 5.90	6.00	- 6.23	4.65	- 4.83

<sup>1</sup>Source for Europe aluminothermic 1 price is Metal Bulletin; Europe aluminothermic 1 is called aluminothermic, min. 99% metal by Metal Bulletin; price converted from dollars per metric ton to dollars per pound. Source for Europe aluminothermic 2 price is Metal Bulletin; Europe aluminothermic 2 is called western un-degassed AT, min. 99.4% metal by Metal Bulletin; price converted from dollars per kilogram to dollars per pound.

<sup>2</sup>Source for ferrochromium silicon price is Ryan's Notes; ferrochromium silicon is called North American transaction by Ryan's Notes.

<sup>3</sup>Source for United States aluminothermic price is Ryan's Notes; United States aluminothermic is called aluminothermic imported chrome metal by Ryan's Notes.