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SILICON

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SILICON

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In 2007, domestic ferrosilicon production increased from that of 2006. At 155,000 metric tons (t) of contained silicon, production was about 6% higher than that of 2006 (table 1). On a gross-weight basis, ferrosilicon production increased by 7% from the 253,000 t produced in 2006 (table 2). Domestic statistics for silicon metal were withheld to avoid disclosing company proprietary data. On the basis of contained silicon, U.S. exports of silicon products increased by 9%, and imports decreased by 4%. The increase in exports was associated with an increase in the "more than 55% silicon" ferrosilicon and "more than 99.99% silicon" silicon metal trade categories (table 5). The decrease in imports was attributable to a decrease in the "55% to 80%, other" ferrosilicon and "other" silicon metal trade categories (table 6). Apparent consumption for ferrosilicon decreased slightly compared with that in 2006. Year-average import prices for the 50% and 75% ferrosilicon grades each increased by 18% and 20%, respectively, and those for silicon metal increased by 42% compared with that in 2006 (table 1).

Silicon is a light chemical element with metallic and nonmetallic characteristics. Silicon is not found free in nature. Silicon combines with oxygen and other elements to form silicates, which comprise more than 25% of the Earth's crust. Silica (SiO_2) as quartz or quartzite is used to produce silicon ferroalloys for the iron and steel industries and silicon metal for the aluminum and chemical industries. Silicon metal that is refined into semiconductor-grade metal for use in making computer chips is crucial to modern technology, but the quantity is less than 5% of total silicon metal demand (Roskill's Letter from Japan, 2000). Silicon metal may also be refined into wafers used to power solar batteries. The U.S. Geological Survey (USGS) does not survey the high-purity silicon industry for production and related data; therefore, the only information that this report contains about these high-purity grades is as it appears in the foreign trade statistics and from published sources.

Production

Silicon Ferroalloys[1] and Metal.—Domestic production data for silicon are derived from monthly and annual voluntary surveys and estimates for nonrespondents by the USGS. The data in table 2 were obtained from all operations listed in table 3 that are canvassed by means of the USGS "Silicon Alloys" survey. In terms of gross weight and compared with that of 2006, domestic ferrosilicon gross production and net shipments increased by 7% and 9%, respectively. Producer stocks of ferrosilicon at the end of 2007 had decreased by 19% compared with those at yearend 2006. Data for ferrosilicon reflected adjustments in inventory and in-plant consumption of ferrosilicon to produce magnesium ferrosilicon and other miscellaneous alloys. Production-related statistics for silicon metal were withheld to avoid disclosing company proprietary data.

Semiconductor- and Solar-Battery-Grade Silicon.—U.S. production of polycrystalline silicon used in both semiconductor and solar cells was reported to be 21,850 t in 2007. Total domestic polycrystalline production by company was as follows: Hemlock Semiconductor Corporation, 11,000 t; MEMC Electronic Materials, 3,800 t; REC Advanced Silicon Materials LLC, 3,400 t; REC Solar Grade Silicon LLC, 2,300 t; and Mitsubishi Materials Group, 1,350 t (Roskill's Letters from Japan, 2008b, p. 8).

Consumption

Silicon Ferroalloys and Metal.—The majority of ferrosilicon (including miscellaneous silicon alloys) was used to produce steel (67%) (table 4). Silicon metal was used mainly to produce chemicals—silanes, silicones, and others—and silica fume (76%). Metallurgical-grade silicon carbide can substitute for ferrosilicon, especially in iron foundries. Data on North American production and U.S. imports of silicon carbide are reported in the Manufactured Abrasives chapter of the 2007 USGS Minerals Yearbook, volume I, Metals and Minerals.

In 2007, apparent consumption decreased slightly to 359,000 t for ferrosilicon and miscellaneous silicon alloys (table 1). Decreases in net imports for consumption contributed to the decline in ferrosilicon apparent consumption. Silicon metal apparent consumption was withheld to avoid disclosing company proprietary data.

The ratio of reported to apparent consumption on a content basis was 39:61 for ferrosilicon, which includes miscellaneous silicon alloys. This ratio was derived based on the typical silicon content of these materials noted in table 4.

Consumption of ferrosilicon and silicon metal was estimated by CRU International Ltd. to have increased in 2007 throughout the Western World. In terms of contained silicon, ferrosilicon consumption increased to 2.23 million metric tons (Mt) from 2.09 Mt (revised) in 2006, and silicon metal consumption increased to 1.42 Mt from 1.36 Mt (revised). Areas with the largest year-to-year increase in consumption of ferrosilicon and silicon metal were Asian countries (excluding China, Japan, and North Korea) and Europe. In decreasing order of consumption, Europe, Asian countries (excluding China, Japan, and North Korea), and Japan accounted for 71% of the ferrosilicon consumption in 2007. Also in decreasing order of consumption, the European Union, the United States, and Japan accounted

[1]There are two standard grades of ferrosilicon—50% and 75%. Additional information concerning these grades is found in table 2.

for 74% of the silicon metal consumed in 2007 (CRU Bulk Ferroalloys Monitor, 2008a, b).

Prices

Ferrosilicon and silicon metal prices (excluding those of high-purity silicon) tend to vary in response to changes in demand and supply by the steel, ferrous foundry, chemical, and aluminum industries. Year-average import prices given by Platts Metals Week were 65.6 cents per pound for 75% ferrosilicon and 112.7 cents per pound for silicon metal; these prices were 20% and 42% higher, respectively, than those of 2006. The year-average North American transaction price for 50% ferrosilicon as calculated from Ryan's Notes listings was 74.0 cents per pound, an 18% increase from that of 2006. Prices for both standard grades of ferrosilicon rose because of higher demand—particularly as some steel producers substituted ferrosilicon and high-carbon ferromanganese for silicomanganese because of record-high prices for silicomanganese—and increased costs associated with importing ferrosilicon from China after the Chinese government imposed higher export taxes in mid-2007 (Metal Bulletin Ferro-Alloys Monthly, 2007a; 2008). Higher silicon metal prices in the United States were attributed to supply concerns that arose primarily from power curtailments at Globe Metallurgical's Beverly, OH, plant coupled with increased demand by the chemical sector (Metal Bulletin Ferro-Alloys Monthly, 2007b).

Foreign Trade

Trade volumes discussed are based on gross weight. U.S. ferrosilicon exports increased by 24% to 11,600 t, and their value increased by 36% to $14.1 million from those of 2006. In decreasing order of quantity, Canada and Mexico accounted for 89% of the total 2007 ferrosilicon exports (table 5). Exports of silicon metal increased by 7% to 28,600 t, and their value increased by 47% to $1,870 million from that of 2006. In decreasing order of quantity, Japan, China, and Norway accounted for 66% of silicon metal exports. Shipments of high-purity silicon containing more than 99.99% silicon accounted for 74% of total silicon metal exported and 98% of the total value of combined ferrosilicon and silicon metal exports.

U.S. ferrosilicon imports decreased by 5% to 309,000 t, but the value of those imports increased by 16% to $282 million compared with that in 2006. These imports declined primarily because of a decrease in the "55% to 80% silicon, other" ferrosilicon trade category. Imports of standard 75% ferrosilicon (ferrosilicon category of "55% to 80% silicon, other") accounted for 80% of total ferrosilicon imports by gross weight and value (table 6). China was the leading source of ferrosilicon imports at 51%, followed by Russia at 19%.

Silicon metal imports (149,000 t) were about the same as that in 2006, and increased by 34% in value to $529 million from $394 million. The slight rise in silicon metal imports was primarily attributable to an increase in the "99.00% to 99.99% silicon" trade category. Brazil was the leading source of this import category at 35%, followed by South Africa at 28% and Canada at 16%. Silicon metal in the "99.00% to 99.99% silicon" trade category accounted for 91% of the amount of, and 47% of the value for, respectively, all silicon metal imported in 2007. The quantity of silicon metal imports in this trade category increased by 8% compared with that of 2006.

The estimated U.S. net import reliance for ferrosilicon in 2007 decreased to 57% from 60% in 2006. Silicon metal import reliance was withheld to avoid disclosing company proprietary data.

The general rates of duty that applied to U.S. imports during 2007 were the same as in 2006. These were, on an ad valorem basis, 5.8% for ferrosilicon containing more than 90% silicon; 5.3% or 5.5% for metal containing 99.00% to 99.99% silicon or "other" silicon, respectively; 1.9% for ferrosilicon containing 80% to 90% silicon; 1.5% for standard 75% ferrosilicon; 1.1% for nominal 75% ferrosilicon that contains more than 3% calcium; and free for magnesium ferrosilicon, metal containing more than 99.99% silicon, and other ferrosilicon (U.S. International Trade Commission, 2007).

Antidumping Duty Administrative Reviews.—Final antidumping duty rates assessed in 2007 on imports of manganese materials to the United States are summarized in table 7. Results of appeals of import antidumping duty reviews made in 2007 are found in table 8.

World Industry Structure

Data on annual world production of ferrosilicon and silicon metal by country during 2003 through 2007 are provided in the Ferroalloys chapter of the 2007 USGS Minerals Yearbook, volume I, Metals and Minerals. World production of ferrosilicon was estimated to have been 6.76 Mt in 2007 compared with 6.48 Mt (revised) in 2006. The major ferrosilicon producers in 2007 were, in decreasing order, China, Russia, Norway, and the United States; they accounted for 81% of total production as listed in table 1.

World production of silicon metal, excluding that from China and the United States, was estimated to have been 641,000 t in 2007 compared with 628,000 t (revised) in 2006. Firm data on China's production of silicon metal are lacking, although one source reported it to be about 800,000 t in 2007 (Roskill's Letters from Japan, 2008a). The country's 2007 net exports were about 610,000 t as calculated from United Nations commodity trade statistics. China was thus by far the leading producer of silicon metal in the world in 2007. Other major producers of silicon metal in 2007 were, excluding the United States and in decreasing order, Brazil, France, Norway, Russia, and South Africa; they accounted for 80% of world production reported in table 1.

New ferrosilicon and silicon metal projects scheduled for completion around the world from 2007 through 2012 are listed in table 9.

World Review

European Union.—On January 15, the Council of the European Union extended its 49% antidumping duty on Chinese silicon metal imports to those shipped from the Republic of Korea during the period of April 1, 2005, to March 31, 2006.

The Council found that silicon metal imports from the Republic of Korea were actually Chinese in origin, and had been transshipped via the country to avoid paying the 49% Chinese duty (Official Journal of the European Union, 2007b).

In March, the European Court of First Instance annulled the 22.7% antidumping duty on imports of silicon metal from Russian producer SUAL Group (SUAL-Kremny-Ural Ltd. and ZAO Kremny) that was imposed by the Council of the European Union in December 2003 (Official Journal of the European Union, 2007c).

In August, the Commission of the European Communities imposed provisional antidumping duties on ferrosilicon imported during the period of October 1, 2005, to September 30, 2006, from China, Egypt, Kazakhstan, Macedonia, and Russia. The duties were as follows: China, 35.5%, except for Erdos Xijin Kuangye Co. Ltd. (2.8%) and Lanzhou Good Land Ferroalloy Factory Co. (33.7%); Kazakhstan, 33.9%; Russia, 25.5%, except for Bratsk Ferroalloy Plant (18.8%) and Chelyabinsk Electrometallurgical Integrated Plant (22.8%); Egypt, 20.4%, except for Egyptian Chemical Industries KIMA (18%); and Macedonia, 5.4% (Official Journal of the European Union, 2007a).

China.—China's exports of ferrosilicon rose 16% from that of 2006 to an alltime high of 1.543 Mt (TEX Report, 2008b). China exported 698,274 t of silicon metal in 2007, an increase of 13.7% from 614,020 t in 2006 (TEX Report, 2008a).

The Central Government of China raised the duty on ferrosilicon exports twice—to 15% from 10% effective June 1, and then to 25% effective January 1, 2008 (TEX Report, 2007; 2008d). The Central Government of China also placed a duty on silicon metal exports for the first time effective January 1, 2008, at 10% (TEX Report, 2008c). With these duties, the Chinese Government aimed to reduce exports of these materials from the country so more material would be available for the domestic market.

Germany.—Dutch specialty metal producer AMG Advance Metallurgical Group N.V. acquired majority ownership (79.52%) in German silicon metal producer Graphit Kropfmuhl AG (AMG Advanced Metallurgical Group N.V., 2008). Graphit produced silicon metal through its RW silicium GmbH division.

Macedonia.—Silmak restarted ferrosilicon production in February after having to declare force majeure on November 13, 2006, because of national power restrictions (Ryan's Notes, 2007a). The production rate as of May was 4,000 metric tons per month (Metal-Pages, 2007). The plant has a production capacity of 65,000 t/yr (Roskill Information Services Ltd., 2007, p. 74).

Norway.—In January, Fesil ASA restarted one of two furnaces that had been shut down since October 2005 at its Rana Metall ferrosilicon plant. As a result, the company operated both furnaces during the year, producing 53,659 t of ferrosilicon in 2007 compared with 44,411 t in 2006. Fesil also restarted the last of four furnaces at its Holla Metall silicon metal plant in May; however, a transformer malfunction at another furnace resulted in a 6-month loss of production at Holla. Silicon metal production decreased by 2% to 40,782 t in 2007 compared with that in 2006 (Fesil ASA, 2007, 2008).

Starting in August, Finnfjord Smelteverk ASA produced ferrosilicon at full capacity [110,000 t/yr] (Ryan's Notes, 2007b).

Russia.—United Company RUSAL was formed in March upon the merger of Russian aluminum producers RUSAL and SUAL, with a 12% investment by Glencore International AG (Switzerland) (United Company RUSAL, 2007). SUAL Group owned two silicon metal plants—one operated by Irkutsk Silicon (ZAO Kremny) in the Irkutsk region and the other run by Ural Silicon (SUAL-Kremny-Ural Ltd.) in the Sverdlovsk region.

Outlook

Consumption of ferrosilicon follows trends in the iron and steel industries, for which the combined annual growth rates (CAGRs) have been typically in the range of 1% to 2% in the United States. Details of the outlook for the steel industry are discussed in the Outlook section of the Iron and Steel chapter of the 2007 USGS Minerals Yearbook, volume I, Metals and Minerals. According to the World Steel Association (formerly the International Iron and Steel Institute), raw steel production was about the same in the United States while increasing about 8% globally from that in 2006 (World Steel Association, 2009).

World apparent consumption of finished steel products increased by 6.6% to 1.202 billion metric tons in 2007 from that in 2006. This increase was primarily attributed to steel consumption in Asia, particularly in China. Asia accounted for 56% of steel consumed worldwide in 2007, up by 10% to 670.6 Mt from that in 2006. China alone consumed about 408 Mt, a 9% increase from that of 2006. Steel consumption in 2007 was also up in all other regions of the world except North America (-9.1%); Brazil, China, India, and Russia accounted for about 43% of the total. Global steel apparent consumption was projected to increase by 6.7% and 6.3% in 2008 and 2009, respectively. Brazil, China, India, and Russia were expected to lead this growth with a combined increase in steel consumption of 11.1% and 10.3% in 2008 and 2009, respectively. Steel consumption in North America was forecast to increase by about 2% to 144.2 Mt in 2008 compared with that in 2007, and by 1% between 2008 and 2009 (International Iron and Steel Institute, 2008).

Demand for silicon metal comes primarily from the aluminum and chemical industries. The American Chemistry Council reported U.S. chemical production was nearly unchanged (up 0.7%) in the first 9 months of 2007 compared with that in 2006, but down slightly (-1.5%) in the first 10 months of 2008 compared with 2007 (American Chemistry Council, 2007, 2009). Consumption of silicon by the U.S. aluminum castings industry was expected to mirror the 7% (2.1 Mt) increase in aluminum casting shipments forecast for 2008, rise by 8% from 2007 to 2009, and increase 2.5% annually to 2.5 Mt by 2017 (Kirgin, 2008).

World production of polycrystalline silicon can be used as a rough indicator of high-purity silicon consumption. Compared with that of 2006, world production of polycrystalline silicon was forecast to increase by 14% to 38,600 t in 2007, by 61% to 54,500 t in 2008, by 109% to 70,400 t in 2009, by 176% to 93,200 t in 2010, and by about 229% to 111,100 t in 2011. About 43% of polycrystalline global output in 2007 was for the semiconductor industry (Roskill's Letters from Japan, 2008b).

Demand for silica fume, a byproduct from furnaces making silicon metal or ferrosilicon with a silicon content of at least 75%, comes from the cement and concrete industries, where it is used as a pozzolan in certain blended cements and as a binder in high-strength cements and concrete. Silica fume thus served a niche market in which consumption was steady in 2006 and 2007, unlike the case of more general application grades of cement and concrete (U.S. Geological Survey, unpub. data, 2007).

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TABLE 1

SALIENT SILICON STATISTICS[1]

(Contained silicon, unless otherwise noted)

		2003	2004	2005	2006	2007
United States production:						
Ferrosilicon	thousand metric tons	116	128	125	146	155
Silicon metal	do.	137	147	145	W	W
Exports:						
Ferrosilicon	do.	6	6	8	5	7
Silicon metal	do.	20	18	23	27	28
Imports for consumption:						
Ferrosilicon	do.	189	173	197	223	208
Silicon metal	do.	126	165	152	146	147
Apparent consumption:						
Ferrosilicon	do.	304	297	317	363	359
Silicon metal	do.	240	291	275	W	W
Price, average:						
Ferrosilicon, 50% Si[2]	cents per pound	47.70	58.16	55.00	62.93	73.96
Ferrosilicon, 75% Si[3]	do.	45.30	55.35	48.03	54.87	65.62
Silicon metal[4]	do.	61.30	81.92	76.18	79.29	112.69
World production, gross weight:						
Ferrosilicon	thousand metric tons	4,950 r	5,670 r	5,800 r	6,480 r	6,760
Silicon metal[5]		703 r	760 r	811 r	628 r, 6	641 6

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

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

[2]Ryan's Notes North American transaction prices based on weekly averages.

[3]Platts Metals Week mean import prices based on monthly averages.

[4]Platts Metals Week dealer import prices based on monthly averages.

[5]Excluding China.

[6]Excluding the United States.

TABLE 2

PRODUCTION, SHIPMENTS, AND STOCKS OF SILICON ALLOYS AND METAL IN THE UNITED STATES[1, 2]

(Metric tons)

	Silicon content (percent)		2006 producers' stocks, December 31	2007		
Material	Rang	Typical	(gross weight)	Gross production[3] (gross weight)	Net shipments (gross weight)	Producers' stocks, December 31 (gross weight)
Ferrosilicon[4]	25-65 5	48	14,000	180,000	129,000	11,300
Do.	56-95	76	12,100	90,600	93,000	11,000
Silicon metal, excluding semiconductor grades	96-99	98	W	W	W	W

Do. Ditto. W Withheld to avoid disclosing company proprietary data.

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

[2]Data for silvery pig iron (less than 25% silicon) withheld to avoid disclosing company proprietary data.

[3]Ferrosilicon production includes material consumed in the production of miscellaneous silicon alloys.

[4]Includes miscellaneous silicon alloys, which were listed separately prior to 1999.

[5]25% to 55% for ferrosilicon; 32% to 65% for miscellaneous silicon alloys.

TABLE 3
PRINCIPAL PRODUCERS OF SILICON ALLOYS AND/OR SILICON METAL IN THE UNITED STATES IN 2007

Producer	Plant location	Product
CC Metals and Alloys, Inc.	Calvert City, KY	Ferrosilicon.
Globe Metallurgical, Inc.	Alloy, WV	Ferrosilicon and silicon metal.
Do.	Beverly, OH	Do.
Do.	Selma, AL	Silicon metal.
Oxbow Carbon and Minerals LLC	Bridgeport, AL	Ferrosilicon.
Simcala, Inc.	Mt. Meigs, AL	Silicon metal.

Do. Ditto.

TABLE 4
REPORTED CONSUMPTION, BY END USE, AND STOCKS OF SILICON FERROALLOYS AND METAL IN THE UNITED STATES IN 2007[1, 2]

(Metric tons, gross weight)

End use	Silvery pig iron[3]	Ferrosilicon, 50%[4]	Ferrosilicon, 75%[5]	Silicon metal[6]	Miscellaneous silicon alloys[7]	Silicon carbide[8]
Steel:						
Carbon and high-strength, low-alloy	--	(9)	32,100	1,010	1,250	(9)
Stainless and heat-resisting	--	689	46,700	294	(9)	(9)
Full alloy	--	6,070	8,670	218	(9)	--
Electric and tool	--	--	(9)	--	(9)	(9)
Unspecified	--	28,200	31,900	(10)	719	7,330
Total	--	34,900	119,000	1,530	1,960	7,330
Cast irons	4,960	33,600	30,100	(10)	12,100	26,100
Superalloys	--	(11)	(10)	(10)	--	--
Alloys, excluding superalloys and alloy steel	(11)	(11)	(10)	53,700 [12]	--	--
Miscellaneous and unspecified	--	--	1,410	177,000 [13]	(11)	(11)
Grand total	4,960	68,500	151,000	232,000	14,100	33,400
Consumers' stocks, December 31	346	2,960	9,230	2,460	808	1,920

-- Zero.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Includes U.S. Geological Survey estimates.

[3]Typically 18% silicon content but ranges between 5% to 24% silicon content.

[4]Typically 48% silicon content but ranges between 25% to 55% silicon content; includes briquets.

[5]Typically 76% silicon content but ranges between 56% to 95% silicon content; includes briquets.

[6]Typically 98% silicon content but ranges between 96% to 99% silicon content.

[7]Typically 48% silicon content. Primarily magnesium-ferrosilicon but also includes other silicon alloys.

[8]Typically 64% silicon content but ranges between 63% to 70% silicon content. Does not include silicon carbide for abrasive or refractory uses.

[9]Included with "Steel: Unspecified," to avoid disclosing company proprietary data.

[10]Included with "Miscellaneous and unspecified," to avoid disclosing company proprietary data.

[11]Included with "Cast irons," to avoid disclosing company proprietary data.

[12]Primarily aluminum alloys.

[13]Primarily silicones, fumed silica, and other chemicals.

TABLE 5
U.S. EXPORTS OF FERROSILICON AND SILICON METAL, BY GRADE AND COUNTRY, IN 2007[1]

Country	Gross weight (metric tons)	Contained weight (metric tons)	Value
Ferrosilicon:			
More than 55% silicon:			
Canada	6,320	3,790	$7,360,000
Colombia	58	40	85,000
Costa Rica	1	1	3,840
Italy	16	10	30,200
Malaysia	55	43	87,500
Mexico	1,280	779	1,590,000
Netherlands	106	63	106,000
Spain	16	10	20,300
Taiwan	472	283	519,000
Thailand	16	10	16,100
United Kingdom	12	11	33,900
Total	8,360	5,040	9,850,000
Other ferrosilicon:			
Belgium	17	8	19,600
Canada	2,030	1,010	2,570,000
Colombia	97	45	137,000
Dominican Republic	18	9	48,200
Germany	34	7	30,900
Indonesia	27	13	41,200
Italy	50	27	90,700
Mexico	727	365	934,000
Netherlands	185	15	298,000
Spain	16	8	23,800
Other	51	25	84,700
Total	3,250	1,530	4,280,000
Grand total ferrosilicon	11,600	6,580	14,100,000
Metal:			
More than 99.99% silicon:			
Canada	183	183	12,600,000
China	2,890	2,890	345,000,000
Germany	2,470	2,470	184,000,000
Japan	9,070	9,070	805,000,000
Korea, Republic of	1,240	1,240	108,000,000
Malaysia	146	146	25,300,000
Norway	3,450	3,450	195,000,000
Taiwan	987	987	93,400,000
Ukraine	162	162	12,200,000
United Kingdom	108	108	15,800,000
Other	384	384	49,900,000
Total	21,100	21,100 [2]	1,850,000,000
99.00%-99.99% silicon:			
Brazil	678	672	1,720,000
China	1,130	1,120	3,330,000
Germany	92	91	175,000
Italy	18	18	25,000
Japan	17	17	24,500
Mexico	18	18	28,900
Singapore	64	64	90,800
Spain	43	43	128,000
Switzerland	21	21	30,300

See footnotes at end of table.

TABLE 5—Continued
U.S. EXPORTS OF FERROSILICON AND SILICON METAL, BY GRADE
AND COUNTRY, IN 2007[1]

Country	Gross weight (metric tons)	Contained weight (metric tons)	Value
Metal—Continued:			
99.00%-99.99% silicon—Continued:			
Taiwan	16	16	$22,900
Other	72	71	113,000
Total	2,170	2,160	5,680,000
Other silicon:			
Canada	598	581	623,000
China	850	824	2,860,000
France	117	114	155,000
Germany	211	202	1,790,000
Hong Kong	54	52	73,200
Japan	1,500	1,450	5,600,000
Korea, Republic of	847	822	1,120,000
Mexico	82	80	230,000
Netherlands	755	733	3,890,000
Taiwan	143	138	806,000
Other	205	199	503,000
Total	5,360	5,200	17,600,000
Grand total silicon metal	28,600	28,400	1,870,000,000

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Contained weight estimated from gross weight.

Source: U.S. Census Bureau.

TABLE 6
U.S. IMPORTS FOR CONSUMPTION OF FERROSILICON AND SILICON METAL, BY GRADE AND COUNTRY, IN 2007[1]

Country	Gross weight (metric tons)	Contained weight (metric tons)	Value
Ferrosilicon:			
55%-80% silicon, more than 3% Ca:			
Argentina	76	46	$118,000
Brazil	152	92	200,000
Canada	68	41	36,800
China	6,340	4,710	5,720,000
France	1,230	762	1,950,000
Germany	20	12	32,700
Sweden	4	2	11,300
Total	7,890	5,670	8,070,000
55%-80% silicon, other:			
Brazil	4,250	3,220	4,210,000
Canada	13,000	9,680	16,300,000
China	126,000	93,000	111,000,000
France	2,000	1,390	3,850,000
Germany	496	374	2,430,000
Iceland	503	375	494,000
India	162	117	229,000
Norway	2,140	1,580	3,090,000
Russia	57,400	43,000	57,500,000
Venezuela	43,100	32,400	36,600,000
Other	222	134	788,000
Total	249,000	185,000	236,000,000
80%-90% silicon, Germany	34	25 [2]	184,000
Over 90% silicon, China	3,000	2,750	2,390,000
Magnesium ferrosilicon:			
Argentina	1,580	662	3,020,000
Brazil	1,800	818	1,580,000
Canada	11,000	5,100	11,300,000
China	1,510	692	1,500,000
France	155	72	208,000
Germany	79	35	144,000
Japan	214	82	475,000
Netherlands	54	25	52,700
Norway	1,970	910	1,880,000
Russia	1,400	630	672,000
Other	87	52	128,000
Total	19,800	9,080	21,000,000
Other ferrosilicon:			
Brazil	11	5	24,800
Canada	8,290	2,080	7,450,000
China	21,000	2,780	6,170,000
France	122	57	121,000
Russia	241	117	208,000
Total	29,700	5,040	14,000,000
Grand total ferrosilicon	309,000	208,000	282,000,000

See footnotes at end of table.

TABLE 6—Continued
U.S. IMPORTS FOR CONSUMPTION OF FERROSILICON AND SILICON METAL,
BY GRADE AND COUNTRY, IN 2007[1]

Country	Gross weight (metric tons)	Contained weight (metric tons)	Value
Metal:			
More than 99.99% silicon:			
Canada	62	62	$2,070,000
China	95	95	6,710,000
Germany	1,300	1,300	134,000,000
Italy	267	267	23,500,000
Japan	554	554	76,000,000
Korea, Republic of	34	34	7,680,000
Poland	13	13	605,000
Taiwan	20	20	1,520,000
Turkey	13	13	28,900
United Kingdom	21	21	1,610,000
Other	29	29	4,160,000
Total	2,410	2,410 [3]	258,000,000
99.00%-99.99% silicon:			
Australia	13,900	13,800	24,400,000
Brazil	47,000	46,700	84,700,000
Canada	21,300	21,100	39,100,000
China	363	359 [2]	681,000
France	893	885	2,110,000
Germany	464	114 [2]	661,000
Norway	9,350	9,270	24,000,000
Philippines	916	876 [2]	1,440,000
South Africa, Republic of	38,000	37,700	65,900,000
Spain	2,650	2,630	5,630,000
Other	406	386	728,000
Total	135,000	134,000	249,000,000
Other silicon:			
Brazil	2,880	2,830	5,680,000
Canada	5,950	5,830	10,700,000
France	95	94	224,000
Germany	411	(4) [2]	451,000
Japan	84	2	102,000
Norway	633	583	1,330,000
Philippines	596	584	910,000
South Africa, Republic of	40	39	77,600
Sweden	277	73	460,000
United Kingdom	465	457	825,000
Other	37	33	221,000
Total	11,500	10,500	21,000,000
Grand total silicon metal	149,000	147,000	529,000,000

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]All or part of these data have been referred to the U.S. Census Bureau for verification.

[3]Contained weight estimated from gross weight.

[4]Less than ½ unit.

Source: U.S. Census Bureau.

TABLE 7

SILICON MATERIALS: FINAL ANTIDUMPING DUTY RATES ASSESSED IN 2007[1]

(Listed in order of date assessed)

Date	Imported material	Country of origin	Period of investigation	Producer and duty rate
March 14	Silicon metal	Brazil	7/1/99 – 6/30/00	Rima Industrial S/A (0.35%)[2]
October 16	Do.	China	6/1/05 – 5/31/06	All imports (139.49%), except those from: Jiangxi Gangyuan Silicon Industry Co. Ltd. (50.62%) Shanghai Jinneng International Trade Company Ltd. (7.93%)

Do. Ditto.

[1]Antidumping duties are assessed by the International Trade Administration (ITA) of the U.S. Department of Commerce.

[2]As noted in the Court of International Trade Slip Opinion 07–79.

Source: Federal Register notices, unless otherwise noted.

TABLE 8
SILICON MATERIALS: APPEALS OF IMPORT ANTIDUMPING DUTY ADMINISTRATIVE REVIEWS IN 2007, BY DECISION DATE

Imported material	Country of origin	Period of investigation	U.S. court	Decision	Decision date	Source
Silicon metal	Brazil	7/1/00 – 6/30/01	CIT[1]	Stayed action on the appeal of ITA's[2] decision in December 2002 to revoke silicon producer Rima Industrial S/A's antidumping duty order pending the outcome of Elkem Metals Co. v. United States, Consol. Court No. 02-0232.	May 3	CIT[1] Consol. Court No. 03–00200, Slip Opinion 07–63.
Do.	do.	7/1/99 – 6/30/00	CIT[1]	Affirmed the ITA's[2] final remand results issued on March 14 regarding the antidumping duty rate of 0.35% on silicon producder. Rima Industrial S/A. The court case was dismissed.	May 18	Elkem Metals Co. v. United Consol. Court No. 02–0232, CIT[1] Slip Opinion 07-79.
Do.	do.	5-year review[3]	CIT[1]	Upheld the ITA[2] and ITC[4] decisions of December 2006 to revoke the antidumping duty order on silicon metal imports from Brazil. The court case was dismissed.	October 31	Globe Metallurgical Inc. v. United States, Court No. 07–00022, Slip Opinion 07–158.

Do., do. Ditto.

[1]Court of International Trade (CIT).

[2]International Trade Adminisstration (ITA).

[3]Conducted on existing antidumping duty order(s) by the ITA and the ITC.

[4]U.S. International Trade Commission (ITC).

TABLE 9

SILICON MATERIALS: PROJECTS SCHEDULED FOR COMPLETION, BY YEAR, THROUGH 2012[1, 2, 3]

(Metric tons, gross weight, unless otherwise specified)

Projected year of first production	Country	Project and company	Project type	Incremental annual production capacity	Total annual production capacity	Silicon product[4]
2007	China	Qinghai Wutong Plant Qinghai Wutong (Group) Industry Co., Ltd.	New ferroalloys plant	NA	200,000	FeSi.
2007	France	FerroPem Laudun Plant Groupo Ferroatlantica S.L.	Furnace conversion—FeSi to Si	25,000 16,800	-- 30,800	do. Si.
2007	Ukraine	Stakhanov Ferroalloy Plant JSC[5] Do.	Furnace conversion—FeSi to SiMn	200,000	50,000 e 150,000 e	FeSi. SiMn.
2008	China	ERDOS Qipanjing Plant ERDOS Group	Ferroalloys plant	220,000 e	550,000	FeSi.
2008	Iceland	Icelandic Alloys Elkem A.S.	New ferroalloys and finishing plant	NA	60,000	FeSi-Mg.
2008	Kazakhstan	Ekibastuz Silicon Plant Silicium Kazakhstan	New smelter	NA	26,000	Si.
2008	Norway	Elkem Salten Plant Elkem A.S.	Ferroalloys plant	20,000	45,000	do.
2009	Brazil	Ferbasa Plant Cia de Ferro Ligas de Bahia (Ferbasa)	do.	18,000	81,000	FeSi.
2009	Russia	Yurga Plant JSC[5] Kuznetsk Ferroalloys	do.	18,000	68,000	do.
2012	China	Ferroatlantica Sichuan Silicon Plant Groupo Ferroatlantica S.L.	New smelter	50,000	50,000	Si.
2012	Zambia	Kafue Ferroalloys Plant Universal Mining and Chemical Industries Ltd. (Umcil)	New ferroalloys plant[6]	NA	80,000	FeSi.

[e]Estimated. Do., do. Ditto. NA Not available. -- Zero.

[1]Estimated data are rounded to no more than three significant digits.

[2]Excludes silicon metal containing more than 99.99% silicon.

[3]Projects in feasibility or later stages of development in 2007. Actual startup dates may be postponed, owing to economic or other factors. Additional projects might produce silicon materials by 2012, but not enough information was available to include them.

[4]FeSi Ferrosilicon. FeSi-Mg Ferrosilicon-magnesium. Si Si metal (containing 99.99% or less Si). SiMn Silicomanganese.

[5]JSC joint-stock company.

[6]Plant may produce ferromanganese, ferronickel, or ferrosilicon, or all three.

Sources: Company annual reports, presentations, and press releases; unpublished personal communications; and trade publications.