## SILICON

(Data in thousand metric tons of silicon content, unless otherwise noted)

<u>Domestic Production and Use</u>: Estimated value of silicon metal and alloys (excluding semiconductor-grade silicon) produced in the United States in 1996 was about \$700 million. Ferrosilicon was produced by five companies in six plants, while production of silicon metal was distributed between five companies in eight plants. Most of the ferrosilicon and silicon metal plants were east of the Mississippi River or in the Pacific Northwest. Most ferrosilicon was consumed in the ferrous foundry and steel industries, predominantly in the eastern one-half of the United States. The main consumers of silicon metal were aluminum producers and the chemical industry.

Salient Statistics—United States:	<u> 1992</u>	<u> 1993</u>	<u> 1994</u>	<u> 1995</u>	<u>1996</u> <sup>e</sup>
Production	370	367	390	396	414
Imports for consumption	193	212	255	250	226
Exports	38	31	32	47	44
Consumption, apparent	532	557	616	609	597
Price, <sup>1</sup> average, cents per pound Si:					
Ferrosilicon, 50% Si	36.9	40.8	43.9	57.9	64.0
Ferrosilicon, 75% Si	35.4	40.6	40.8	58.1	63.0
Silicon metal	60.0	66.4	64.1	69.5	90.9
Stocks, producer, yearend	57	48	45	35	34
Employment, plant, e number	2,300	NA	NA	NA	NA
Net import reliance <sup>2</sup> as a percent					
of apparent consumption	30	34	37	35	31

**Recycling**: Insignificant.

Import Sources (1992-95): Norway, 21%; Brazil, 18%; Russia, 13%; Canada, 12%; and other, 36%.

<u>'ariff</u> : Item Number		Most favored nation (MFN) 12/31/96	Non-MFN <sup>3</sup> 12/31/96	
Ferrosilicon, 55%-80% Si:				
More than 3% Ca	7202.21.1000	1.1% ad val.	11.5% ad val.	
Other	7202.21.5000	1.5% ad val.	11.5% ad val.	
Ferrosilicon, 80%-90% Si	7202.21.7500	1.9% ad val.	9% ad val.	
Ferrosilicon, more than 90% Si	7202.21.9000	5.8% ad val.	40% ad val.	
Ferrosilicon, other:				
Ferrosilicon, more than 2% Mg	7202.29.0010	Free	4.4¢/kg Si.	
Ferrosilicon, other	7202.29.0050	Free	4.4¢/kg Si.	
Silicon, more than 99.99% Si	2804.61.0000	2.2% ad val.	25% ad val.	
Silicon, 99.00%-99.99% Si	2804.69.1000	5.3% ad val.	21% ad val.	
Silicon, other	2804.69.5000	7.6% ad val.	45% ad val.	

Depletion Allowance: Quartzite, 14% (Domestic and Foreign); gravel, 5% (Domestic and Foreign).

**Government Stockpile:** Information on silicon carbide in the National Defense Stockpile is discussed in the "Manufactured Abrasives" chapter.

**Events, Trends, and Issues:** Overall consumption for silicon increased slightly compared with that of the previous year. Demand for silicon ferroalloys closely follows overall iron and steel production, whereas demand for silicon metal largely reflects the health of the aluminum and chemical industries. Consumption of ferrosilicon and miscellaneous silicon alloys was about 365,000 tons, while consumption of silicon metal was about 232,000 tons.

In late November, the "dealer import" price for 50%-grade ferrosilicon was \$0.63 to \$0.65 per pound, and the import price for 75%-grade ferrosilicon was \$0.585 to \$0.605 per pound. The import price for silicon metal started the year at \$0.75 to \$0.77 per pound, rose to \$0.93 to \$0.98 by mid-June, then fell to \$0.85 to \$0.89 in late November. Silicon metal prices continued to be influenced by strong demand and antidumping duties imposed in the United States.

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For the first one-half year, total gross ferrosilicon imports increased by more than 10%. Norway and Iceland continued as the leading suppliers, with about 60% of both total quantity and value. For the same period, silicon metal imports decreased by more than 20%, with Russia providing about 40% of total imports.

In early September, the U.S. Department of Commerce (DOC) announced in the Federal Register final results of its administrative review of the antidumping duty order on silicon metal from Brazil. DOC's review of Brazil covered four manufacturers/exporters. As a result of its review, DOC determined that margins of 16.81% and 31.6% existed for two of the concerns, respectively, for the period July 1, 1992, through June 30, 1993.

It is estimated that in 1997 domestic production of silicon-containing ferroalloys and metal will be more than 400,000 tons, and U.S. apparent consumption will be about 600,000 tons.

## **World Production, Reserves, and Reserve Base:**

vona i roddollon, reserves, and	Production		Reserves and reserve base <sup>4</sup>
	<u> 1995</u>	<u>1996</u>	
United States	396	414	The reserves and reserve
Australia	30	30	base in most major
Brazil	270	270	producing countries are ample
Canada	60	60	in relation to demand.
China	715	720	Quantitative estimates are
Egypt	30	30	not available.
France	130	130	
Germany	15	15	
Iceland	45	45	
India	55	60	
Kazakstan	230	230	
Norway	375	375	
Poland	35	35	
Romania	15	15	
Russia	270	270	
South Africa	90	90	
Spain	25	25	
Sweden	15	15	
Ukraine	195	195	
Venezuela	25	25	
Other countries	<u>90</u>	<u>100</u>	
World total (rounded)	3,100	3,100	

<u>World Resources</u>: The world and domestic resources for making silicon metal and alloys are abundant, and, in most producing countries, adequate to supply world requirements for many decades.

<u>Substitutes</u>: Various metals and alloys, such as aluminum and silicomanganese, can be substituted for ferrosilicon in some applications. Germanium and gallium arsenide are the principal substitutes for silicon in semiconductor and infrared applications.

<sup>&</sup>lt;sup>e</sup>Estimated. NA Not available.

<sup>&</sup>lt;sup>1</sup>Based on U.S. dealer import price.

<sup>&</sup>lt;sup>2</sup>Defined as imports - exports + adjustments for Government and industry stock changes.

 $<sup>^{3}</sup>$ See Appendix B.

<sup>&</sup>lt;sup>4</sup>See Appendix C for definitions.