

## MANGANESE

(Data in thousand metric tons, gross weight, unless otherwise specified)

**Domestic Production and Use:** Manganese ore containing 35% or more manganese was not produced domestically in 1996. Manganese ore was consumed mainly by about 15 firms with plants principally in the Eastern and Midwestern United States. The majority of ore consumption was related to steel production, directly in pig iron manufacture and indirectly through upgrading ore to ferroalloys and metal. Ore was used otherwise for such nonmetallurgical purposes as producing dry cell batteries, as an ingredient in plant fertilizers and animal feed, and as a colorant for brick. Leading identifiable end uses of manganese were construction, machinery, and transportation, which were estimated to be 23%, 14%, and 12%, respectively, of total manganese demand. Most of the rest went to a variety of other iron and steel applications. Value of domestic consumption was estimated from foreign trade data as about \$500 million.

<b>Salient Statistics—United States:</b> <sup>1</sup>	<b>1992</b>	<b>1993</b>	<b>1994</b>	<b>1995</b>	<b>1996<sup>e</sup></b>
Production, mine <sup>2</sup>	—	—	—	—	—
Imports for consumption:					
Manganese ore	247	232	331	394	430
Ferromanganese	304	347	336	310	350
Silicomanganese <sup>3</sup>	257	316	273	305	310
Exports:					
Manganese ore	13	16	15	15	32
Ferromanganese	13	18	11	11	9
Shipments from Government stockpile excesses: <sup>4</sup>					
Manganese ore	425	254	134	115	140
Ferromanganese	(128)	(1)	9	18	—
Consumption, reported: <sup>5</sup>					
Manganese ore	438	389	449	486	470
Ferromanganese	339	341	347	348	350
Consumption, apparent, manganese <sup>6</sup>	596	696	694	676	716
Price, average value, 46% to 48% Mn metallurgical ore, dollars per mtu cont. Mn, c.i.f. U.S. ports	3.25	2.60	2.40	2.40	2.55
Stocks, producer and consumer, yearend:					
Manganese ore	276	302	269	309	310
Ferromanganese	28	30	36	33	38
Net import reliance <sup>7</sup> as a percent of apparent consumption	100	100	100	100	100

**Recycling:** Scrap recovery specifically for manganese was negligible, but a significant amount was recycled through processing operations as a minor component of ferrous and nonferrous scrap and steel slag.

**Import Sources (1992-95):** Manganese ore: Gabon, 58%; Australia, 18%; Mexico, 10%; Brazil, 8%; and other, 6%. Ferromanganese: South Africa, 37%; France, 26%; Brazil, 10%; Mexico, 7%; and other, 20%. Manganese contained in all manganese imports: South Africa, 27%; Gabon, 15%; Australia, 12%; France, 12%; and other, 34%.

<b>Tariff: Item</b>	<b>Number</b>	<b>Most favored nation (MFN) 12/31/96</b>	<b>Non-MFN<sup>8</sup> 12/31/96</b>
Ore and concentrate	2602.00.0040/60	Free	2.2¢/kg of contained Mn.
Manganese dioxide	2820.10.0000	4.7% ad val.	25% ad val.
High-carbon ferromanganese	7202.11.5000	1.5% ad val.	10.5% ad val.
Silicomanganese	7202.30.0000	3.9% ad val.	23% ad val.
Metal, unwrought	8111.00.4500	14% ad val.	20% ad val.

**Depletion Allowance:** 22% (Domestic), 14% (Foreign).

**Government Stockpile:** Committed inventories and disposals tabulated may include nonstockpile-grade material. The Defense Logistics Agency (DLA), U.S. Department of Defense, listed additional uncommitted inventories of nonstockpile-grade materials, as follows: 16,400 tons of natural battery ore, 81 tons of chemical ore, and 392,000 tons of metallurgical ore. DLA's Fiscal Year 1996 and 1997 Annual Materials Plans that specified maximum sales quantities included all forms of manganese in Government inventories.

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### Stockpile Status—9-30-96

Material	Uncommitted inventory	Committed inventory	Authorized for disposal	Disposals Jan.-Sept. 96
Battery: Natural ore	115	2	115	2
Synthetic dioxide	3	—	3	—
Chemical ore	149	—	149	—
Metallurgical ore	763	166	763	16
Ferromanganese:				
High-carbon	968	—	760	—
Medium-carbon	18	—	—	—
Silicomanganese	0.2	—	—	—
Electrolytic metal	10	0.02	10	2

**Events, Trends, and Issues:** A slight further advance in raw steel production sustained domestic manganese demand. Price developments varied for the principal forms of manganese used. The price of ore rose moderately, the first instance of an increase since 1989. Prices declined for imported high-carbon ferromanganese and silicomanganese; the price for the latter fell by one-third by September. The world scene was marked by the activity of Japanese firms forming international joint ventures for production of refined ferromanganese and electrolytic manganese dioxide. The manganese industries of Georgia and Ukraine were in various stages of transition to privatization. Manganese is an essential element for people, animals, and plants, but it can be harmful in excessive amounts. Thus, manganese can be an industrial poison, but generally is not a hazard.

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

	Mine production		Reserves <sup>9</sup>	Reserve base <sup>9</sup>
	<u>1995</u>	<u>1996<sup>e</sup></u>		
United States	—	—	—	—
Australia	1,070	950	30,000	80,000
Brazil	<sup>e</sup> 905	900	21,000	56,000
China	<sup>e</sup> 1,000	1,000	40,000	100,000
Gabon	<sup>e</sup> 895	830	45,000	150,000
Georgia	<sup>e</sup> 150	30	7,000	49,000
India	<sup>e</sup> 627	630	24,000	36,000
Mexico	<sup>e</sup> 174	165	4,000	9,000
South Africa	<sup>e</sup> 1,350	1,400	370,000	4,000,000
Ukraine	<sup>e</sup> 1,100	1,100	135,000	520,000
Other countries	<sup>e</sup> 309	350	Small	Small
World total (rounded)	<sup>e</sup> 7,580	7,400	680,000	5,000,000

**World Resources:** Land-based resources are large but irregularly distributed; those of the United States are very low grade and have potentially high extraction costs. South Africa and the former Soviet Union (FSU) account for more than 80% of the world's identified resources; South Africa accounts for more than 80% of the total exclusive of China and the FSU.

**Substitutes:** There is no satisfactory substitute for manganese in its major applications.

<sup>e</sup>Estimated.

<sup>1</sup>Manganese content typically ranges from 35% to 54% for manganese ore and from 74% to 95% for ferromanganese.

<sup>2</sup>Excludes insignificant quantities of low-grade manganese ore.

<sup>3</sup>For silicomanganese, imports more nearly represent amount consumed than does reported consumption; internal evaluation indicates that reported consumption of silicomanganese is considerably understated.

<sup>4</sup>Net quantity including effect of stockpile upgrading program. Data in parentheses denote increases in inventory.

<sup>5</sup>Total manganese consumption cannot be approximated from consumption of manganese ore and ferromanganese because of the use of ore in making manganese ferroalloys and metal.

<sup>6</sup>Thousand metric tons, manganese content. Based on estimates of average content for all significant components except imports, for which content is reported.

<sup>7</sup>Defined as imports - exports + adjustments for Government and industry stock changes.

<sup>8</sup>See Appendix B.

<sup>9</sup>Thousand metric tons, manganese content. See Appendix C for definitions.