



2015 Minerals Yearbook

MANGANESE [ADVANCE RELEASE]

MANGANESE

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In 2015, U.S. manganese apparent consumption was estimated to be 707,000 metric tons (t) on a contained-weight basis, a 16% decrease from that in 2014 (table 1). The decrease in apparent consumption was primarily a reflection of the 20% and 31% decreases in ferromanganese and silicomanganese imports, respectively, in 2015 compared with those in 2014 (table 6).

Manganese exports decreased by 8% to 15,700 t (gross weight) compared with those of 2014 (table 5). Manganese imports (gross weight) decreased by 14% to 1.07 million metric tons (Mt) compared with those of 2014 (table 6).

In 2015, the annual average domestic contract price of manganese ore decreased by 21% to \$3.53 per metric ton unit from that in 2014. Average U.S. spot-market prices for high- and medium-carbon ferromanganese decreased by 14% and slightly, respectively, from those in 2014. The average U.S. spot-market price for silicomanganese decreased by 16% from that of 2014. The average domestic spot-market price for manganese metal decreased by 9% from that in 2014 (table 1).

World production of manganese ore in 2015 on a gross-weight basis decreased by 11% compared with the revised amount in 2014. On a contained-weight basis, world production increased by 3%. China and South Africa were the leading producers of manganese ore on a gross-weight basis, but the manganese content of ore from South Africa was almost double that of China (table 7). Combined world production of ferromanganese and silicomanganese decreased by 5% to 17.9 Mt on a gross-weight basis compared with the revised amount in 2014 (table 8). China was the leading producer of these manganese ferroalloys.

Manganese is essential to iron and steel production because of its sulfur-fixing, deoxidizing, and alloying properties. Steelmaking, including its ironmaking component, accounted for most of the domestic manganese consumption, currently in the range of 80% to 90% of U.S. apparent consumption. Among a variety of uses, manganese is a key component of certain widely used aluminum alloys and is used in oxide form in dry cell batteries.

Legislation and Government Programs

Generalized System of Preferences (GSP).—On June 29, 2015, the GSP program was renewed and became effective on July 29, 2015. (The GSP program had expired on July 31, 2013.) GSP-eligible imports that enter the United States from the effective date through December 31, 2017, would be duty free. The renewed program also extended duty reductions retroactively for any GSP-eligible imports that entered between July 31, 2013, and the effective date (U.S. Customs and Border Protection, 2015).

National Defense Stockpile.—The Annual Materials Plan (AMP) for fiscal year 2015 that the Defense Logistics Agency Strategic Materials (DLA Strategic Materials), U.S. Department

of Defense, issued on October 2, 2014, covered the period from October 1, 2014, through September 30, 2015. Under this AMP, the maximum disposal authority for manganese materials was 90,700 t for metallurgical-grade manganese ore and 45,400 t for high-carbon ferromanganese (Defense Logistics Agency Strategic Materials, 2014). The maximum disposal authority under an AMP is the maximum quantity of material that may be disposed of in a given fiscal year as authorized by Congress (table 2).

In 2015, the DLA Strategic Materials disposed of (sold) 45,400 t of high-carbon ferromanganese. The amount of high-carbon ferromanganese and metallurgical-grade manganese ore that was in the National Defense Stockpile at yearend was 280,000 t and 292,000 t, respectively (gross weight) (table 2). The estimated manganese content of this combined material was 283,000 t, which was 10% less than the amount contained at yearend 2014, or 40% of the U.S. manganese apparent consumption in 2015.

Production

Ore and Concentrate.—The only mine production of manganese in the United States consisted of small amounts of manganiferous material (clays or schists) having a manganese content of less than 5%. This material was produced in South Carolina for use in coloring brick.

Chemicals and Ferroalloys.—Production statistics for these materials were withheld to avoid disclosing company proprietary data. Domestic producers of manganese ferroalloys and synthetic dioxide are listed in table 3. After restarting two furnaces in 2014, Felman Production, LLC shut one of them for maintenance at its silicomanganese plant in Letart, WV, in February 2015 (Conway, 2015). Although the maintenance on the furnace was expected to last for 10 weeks, the furnace remained idled throughout the rest of 2015. There are three total silicomanganese furnaces at the Letart plant with a reported production capacity of 105,000 metric tons per year (t/yr) (Felman Production, LLC, 2018).

Consumption and Stocks

In 2015, U.S. manganese apparent consumption was estimated to be 707,000 t on a contained-weight basis (table 1). Metallurgical applications accounted for most domestic manganese consumption, 80% to 90% of which was for steelmaking. Reported domestic consumption of manganese ore decreased by 11% to 451,000 t (gross weight), whereas corresponding yearend stocks decreased slightly to 187,000 t compared with the amounts in 2014 (table 1). Reported consumption (gross weight) of ferromanganese and silicomanganese decreased by 4% and 5%, respectively, from 360,000 t of ferromanganese and 146,000 t of silicomanganese

consumed in 2014 (tables 1, 4). Reported manganese metal consumption in 2015 decreased slightly compared with 20,900 t in 2014.

Reported consumption statistics were derived from U.S. Geological Survey (USGS) voluntary surveys of U.S. operations. Data on domestic consumption of manganese ore, excluding that consumed by the steel industry, are collected by means of the “Manganese Ore and Products” survey. In 2015, eight firms were canvassed that process ore or had processed ore in the past by such methods as grinding and roasting or that use it in the manufacture of dry cell batteries and manganese chemicals, ferroalloys, and metals. Of those eight companies, all used manganese ore in their processes in 2015. The collective consumption of these firms was considered to constitute all the manganese ore consumption in the United States, excluding that consumed directly by the steel industry. Full-year responses on a basis upon which to estimate these data were obtained from all these firms for 2015.

A second survey covered a broad range of metal-consuming companies, such as aluminum, nonferrous-alloy, and steel producers. More than 180 manganese consumers were canvassed on an annual basis. Reported consumption and stocks data in tables 1 and 2 include estimates to account for nonrespondents.

Based on the apparent consumption of ferromanganese, manganese metal, and silicomanganese, on a contained-weight basis, manganese alloy unit consumption in steelmaking was estimated by the USGS to be about 7.7 kilograms per metric ton (kg/t), which was slightly less than the quantity of 7.9 kg/t estimated for 2014 and was predominantly a result of a decrease in ferromanganese and silicomanganese apparent consumption. The decrease in the ferromanganese apparent consumption reflected a decrease in the imports of high-carbon (more than 4% carbon) ferromanganese in 2015 compared with those in 2014 (table 6). The decrease in silicomanganese apparent consumption reflected the decrease in silicomanganese imports in 2015 compared with those in 2014.

Relatively small quantities of manganese were used for alloying with nonferrous metals, chiefly in the aluminum industry as manganese-aluminum briquets that typically contained either 75% or 85% manganese. Manganese plays an important alloying role in aluminum applications to increase corrosion resistance. The leading use of aluminum-manganese alloys is in the manufacture of beverage cans. Other uses include, but are not limited to, aircraft components, automobiles, building products, cooking utensils, and railway and truck carriage bodies (Roskill Information Services Ltd., 2015, p. 224–225).

Comparatively small amounts of manganese were used domestically in animal feed, brick, frits, glass and tile colorants, dry cell batteries, soft ferrites, fertilizers, manganese chemicals (including water treatment), and welding fluxes. These were among the many nonmetallurgical applications of manganese (Roskill Information Services Ltd., 2015, p. 231–254). The source of manganese for these applications was mainly manganese ore.

Prices

The average annual domestic manganese prices for all manganese materials decreased in 2015 from those in 2014.

Manganese Ore.—The USGS estimated that the annual U.S. average contract price of metallurgical-grade ore containing 46% to 48% manganese was \$3.53 per metric ton unit. This was a 21% decrease compared with \$4.49 per metric ton unit in 2014, which followed the 28% decrease in the average annual manganese export value between Australian producers and Chinese consumers in 2015 from that in 2014 (Australian Bureau of Resources and Energy Economics, unpub. data, December 5, 2016). The Australian export unit value was used as a surrogate for the discontinued use of an annual international benchmark price for manganese ore in 2015. Historically, the international benchmark price represented the annual average contract price negotiated between producers in Australia and consumers in Japan. The only spot-market prices reported for manganese ore were for deliveries to China. In 2015, the average spot-market price for metallurgical-grade ore containing 46% manganese, based on weekly averages of China’s cost, insurance, and freight transaction prices as reported by CRU Ryan’s Notes, was \$3.22 per metric ton unit, down from \$4.72 per metric ton unit in 2014. This price decrease was attributable to a 2.3% decrease in ferroalloy production by China (table 8), which required less manganese ore to be imported during 2015 compared with that imported in 2014, 15.8 Mt and 16.2 Mt, respectively (TEX Report, The, 2016a). [A metric ton unit is 1 t of ore containing 1% or 10 kilograms of manganese. The price of 1 t of ore (gross weight) is obtained by multiplying the price per metric ton unit by the manganese content of the ore; for example, multiplying by 46 when the manganese content is 46%.] The ore market consisted of a number of submarkets because of differences in ore-quality requirements by end use—ferroalloy production, blast furnace ironmaking, and manufacture of manganese chemicals.

Manganese Ferroalloys and Metal.—Prices for manganese ferroalloys tend to vary in response to changes in demand by the steel and ferrous foundry industries, whereas prices for manganese metal predominantly follow changes in demand by the aluminum industry. Manganese ferroalloy prices are also influenced by changes in the product mix of the world’s suppliers because various manganese ferroalloys are largely interchangeable with each other.

Annual average import prices for manganese ferroalloys are given by Platts Metals Week. These prices are based on free market spot prices per unit of measurement, duty-paid in a U.S. warehouse. Annual average import prices were \$915.36 per gross (long) ton for high-carbon ferromanganese, 93.49 cents per pound for medium-carbon ferromanganese, and 49.60 cents per pound for silicomanganese (table 1). These prices were 14%, slightly, and 16% lower, respectively, than those in 2014. The decreases in these average manganese ferroalloys prices reflected the 11% decrease in domestic steel production (Fenton, 2017). The annual average price for manganese metal is based on weekly averages of North American transaction prices published by CRU Ryan’s Notes for bulk shipments of manganese metal, free on board producing point or Chicago, IL, or Pittsburgh, PA, warehouse. The annual average North American transaction price for manganese metal was 115.10 cents per pound, which was 9% less than that of 2014. The decrease in manganese metal prices reflected the 7% and

14% decreases in domestic primary and secondary aluminum production, respectively (Bray, 2017).

Foreign Trade

Excluding the negligible amount of manganiferous materials extracted in South Carolina to color bricks and in the absence of recycling specifically for manganese, U.S. net import reliance, as a percentage of apparent consumption, was 100% for manganese, the same as it had for the past 30 years. The ensuing comparisons of foreign trade data were made on the basis of gross weight.

In 2015, U.S. exports of manganese dioxide, manganese ore, ferromanganese, and silicomanganese decreased, whereas exports of manganese metal increased compared with exports of these materials in 2014 (table 5). The biggest year-to-year change in exports, on a quantity basis, was that of silicomanganese, which was 2,100 t less than those in 2014. The leading countries that accounted for United States silicomanganese exports were Canada (47%), Mexico (13%), and India (2%).

In 2015, U.S. imports of ferromanganese, potassium permanganate, manganese dioxide, manganese metal, and silicomanganese decreased compared with those of 2014, whereas imports of manganese ore (all grades) increased (table 6). The most significant year-to-year change, on a quantity basis, was for silicomanganese imports, which were 144,000 t less than those in 2014. The decrease in silicomanganese imports was especially notable for Georgia (62,500 t less than in 2014).

World Industry Structure

World manganese ore production was estimated by the USGS to be 51.8 Mt (gross weight) and 17.0 Mt (contained manganese) in 2015, 11% and 3% more, respectively, than the revised amounts in 2014 (table 7). Manganese ore was produced chiefly in 13 countries; these accounted for 97% of world production. On a contained-weight basis, the leading producer countries of manganese ore were South Africa (35%), Australia (17%), China (12%), Gabon (11%), and Brazil (7%).

Total world manganese ferroalloy production, excluding the United States, was estimated by the USGS to be 17.9 Mt (gross weight) in 2015, 5% less than the revised amount in 2014 (table 8). On a gross-weight basis, the leading producer of manganese ferroalloys was China (58%); followed by India (12%); South Africa and Ukraine (4% each); and Japan, the Republic of Korea, and Norway (3% each).

The International Manganese Institute (IMnI) estimated that world apparent consumption of manganese ferroalloys (gross weight) decreased by 11% to about 17.1 Mt in 2015 compared with 19.3 Mt (revised) in 2014. Of the 17.1 Mt in 2015, 11.7 Mt was silicomanganese, 3.9 Mt was high-carbon ferromanganese, and 1.5 Mt was refined (medium- and low-carbon) ferromanganese. World manganese ferroalloys consumption was slightly more than IMnI's estimate of 16.8 Mt of world manganese ferroalloys production in 2015. The IMnI estimated world manganese ore apparent consumption in 2015 to be about 15.0 Mt (contained weight), which was about 7% less than the estimate of 16.2 Mt in 2014 (Aloys d'Harambure, market research manager, International Manganese Institute, unpub. data, June 20, 2017).

World Review

New manganese materials projects around the world scheduled for completion from 2015 through 2019 are listed in table 9. In 2015, additional production capacities were under development follows: 377,000 metric tons per year (t/yr) of manganese ore, 265,000 t/yr manganese alloys, and 120,000 t/yr of electrolytic manganese metal (EMM). Additional manganese mine capacity was added in Mexico (227,000 t/yr) and Namibia (150,000 t/yr). A 200,000-t/yr high-carbon ferromanganese plant expansion (China) and new 65,000-t/yr silicomanganese plant (Gabon) became operational. Most of the planned increase in EMM capacity in 2015 was in China (100,000 t/yr) and Gabon (20,000 t/yr); the Gabon EMM plant was only the second such plant to be presently located outside of China.

Australia.—Manganese ore production (gross weight) in Australia decreased slightly in 2015 from that in 2014. This was a result of decreased production at Consolidated Minerals Ltd.'s Woodie Woodie Mine (1.28 Mt in 2015 from 1.70 Mt in 2014) and OM Holdings Ltd.'s Bootu Creek Mine (0.76 Mt in 2015 from 0.89 Mt in 2014) (Consolidated Minerals Ltd., 2016, p. 7; OM Holdings Ltd., 2017, p. 18).

Brazil.—Manganese ferroalloys production (gross weight) was down slightly in 2015 from that in 2014. Ferroalloy producers in the State of Minas Gerais continued to struggle because of an energy crisis coupled with Brazil's deepest economic recession since the 1930s (Evans, 2016). Vale S.A. (2015, p. 35), the largest manganese ferroalloys producer in Brazil, reported that it had temporarily suspended operations at its 74,000-t/yr Barbacena and 65,000-t/yr Ouro Preto ferroalloys plants in the State of Minas Gerais in January 2015 and February 2014, respectively, owing to market conditions.

China.—China was the world's leading producer of electrolytic manganese dioxide (EMD), EMM, manganese ferroalloys, and manganese ore (gross weight). Most of these materials were consumed domestically, although China imported an additional 15.8 Mt of manganese ore in 2015, which was slightly less than the 16.2 Mt imported in 2014. The manganese ore imported in 2015 was 21% more than the USGS-estimated Chinese production and would equate to 31% of the USGS-estimated total world production (gross weight). The leading sources of China's manganese ore imports were South Africa (6.42 Mt), Australia (4.30 Mt), Gabon (1.89 Mt), Brazil (1.52 Mt), and Malaysia (0.58 Mt) (TEX Report, The, 2016a). Most of the imported manganese ore was blended with lower grade domestic manganese ore to produce manganese ferroalloys and metal.

In 2015, China's total ferromanganese production decreased slightly to 2.6 Mt from that in 2014. This was in response to the 2.3% decrease in the country's crude steel production in 2015 to about 804 Mt from 823 Mt in 2014 (World Steel Association, 2016). China is the world's leading producer of crude steel.

China produced 1.01 Mt of EMM in 2015, which was 21% less than the 1.28 Mt produced in 2014. This was the lowest level since 2007, when EMM production was 1.02 Mt, and 32% less than the alltime high of 1.48 Mt in 2011. In 2015, there were 54 EMM plants in operation in China, down from 78 in 2014. Of these active plants, China's EMM production capacity in 2015 was estimated to be 1.76 million metric tons per year (Mt/yr), or 97% of the world total (the only other countries that

produced manganese metal electrolytically in 2015 was Gabon and South Africa); this was down from the capacity of 1.95 Mt/yr in 2014. China exported about 316,000 t of EMM in 2015, a decrease of 5% from that in 2014 (Tan, 2016, p. 10, 12, 14).

In 2015, China produced 239,676 t of EMD, which was a 4% increase from that of 2014. This equated to 83% of the country's annual production capacity (287,400 t), which was held by 12 producers. China's share of the active world EMD production capacity in 2015 (434,900 t) was 66%, followed by the United States with 16%. Other countries with EMD capacity included Colombia, Greece, India, Japan, and Spain. China's EMD exports increased to about 45,100 t in 2015 from about 40,000 t in 2014. Most of China's 2015 EMD exports went to other countries in Asia to produce alkaline and zinc-carbon batteries—Indonesia (22.88%), Singapore (16.92%), India (14.19%), the Republic of Korea (6.68%), Burma (4.64%), Thailand (4.53%), Malaysia (4.29%), Vietnam (4.26%), and Japan (2.4%) (Li, 2016, p. 6, 19, 22).

Gabon.—Eramet SA was the leading producer of manganese ore in Gabon, accounting for about 94% of the country's total manganese ore produced (gross weight) in 2015. The 9% increase in total manganese ore production (gross weight) for Gabon in 2015 from that in 2014 was mainly attributable to Eramet's 11% increase in production to 3.868 Mt (Eramet SA, 2016, p. 7). Eramet also ramped up production in 2015 at its new Moanda Metallurgical Complex, which consists of a 65,000-t/yr silicomanganese plant and a 20,000-t/yr EMM plant (Eramet SA, 2015).

India.—In 2015, India's manganese ore production (gross weight) decreased by 4% compared with that in 2014 (table 7). In addition, India imported 2.3 Mt of manganese ore and exported 250,000 t during 2015 (United Nations Statistics Division, 2018). Total manganese alloys production decreased by 7% (table 8). This led to an increase in manganese ore inventory by yearend 2015 (Aloys d'Harambure, market research manager, International Manganese Institute, unpub. data, June 20, 2017). In addition, India exported significant quantities of ferromanganese and silicomanganese—748,617 t and 918,847 t, respectively, in India's fiscal year 2015 (April 1, 2014, through March 31, 2015) (Indian Bureau of Mines, 2017, p. 6–19, 6–20). The TEX Report (2016b) reported that India's exports of silicomanganese reached 773,821 t in calendar year 2015, down from 900,604 t in 2014. About 44% of these exports went to the following four countries: Japan (120,899 t), Italy (106,130 t), Taiwan (68,059 t), and Turkey (49,261 t).

South Africa.—Manganese ore production (gross weight) in South Africa increased by 14% (1.9 Mt) in 2015 from that in 2014 (table 7). However, total manganese ferroalloys production in 2015 decreased by 28% compared with that of 2014, owing mainly to decreased ferromanganese production, which decreased by 34% to 512,000 t in 2015 from 772,000 t in 2014 (table 8). Because of falling prices, two of the leading manganese ferroalloys producers in the country temporarily curtailed ferromanganese production. In May, Samancor Manganese Joint Venture (South32 Ltd., 60%, and Anglo American plc, 40%) temporarily shut down three of the four high-carbon ferromanganese furnaces at its Metalloys plant.

These furnaces remained idled through yearend (South32 Ltd., 2016). Macmillan (2015) reported that Assmang Proprietary Ltd. (African Rainbow Minerals Ltd., 50%, and Assore Ltd., 50%) had also temporarily decreased ferromanganese production, at its Cato Ridge Works (three of six furnaces) and Machadadorp Works (all four furnaces) plants.

South Africa's state-run port and rail utility, Transnet SOC Ltd continued work on its manganese export expansion project, which would bring the manganese bulk rail line from the manganese-rich Northern Cape region to Port Ngqura in the Eastern Cape. Transnet reported that this rail system would be expanded to 16 Mt/yr in conjunction with the development of a new manganese export terminal at Port Ngqura. This expansion would almost quadruple the amount of manganese ore that the country could transport via rail. The rail and port system was expected to reach maximum capacity by 2019 (Transnet SOC Ltd, 2015, p. 110).

Ukraine.—Ukraine's total manganese ferroalloy production in 2015 decreased by 17% compared with that of 2014 primarily because of less silicomanganese production. The decrease in manganese ferroalloys production resulted from reduced crude steel production by the Republic of Korea, Russia, Turkey, and Ukraine. The World Steel Association (2016) reported crude steel production in these countries decreased in 2015 from that in 2014 as follows: Ukraine (by 15.6%, or 4.2 Mt), Turkey (by 7.4%, or 2.5 Mt), the Republic of Korea (by 2.6%, or 1.8 Mt), and Russia (by 0.5%, or 347,000 t). Most of Ukraine's silicomanganese production is exported each year—in 2015, the country exported about 549,100 t out of 698,400 t produced. Of that amount, 57% was exported to the Republic of Korea, Russia, and Turkey. In 2014, silicomanganese exports from Ukraine were 684,505 t (TEX Report, The, 2016c).

Outlook

Domestic and global consumption of manganese is expected to closely follow the trend in steel production, for which the annual rate of growth has been typically in the range of 1% to 2% in the United States. Although rates of growth for some nonmetallurgical components of manganese consumption, especially batteries, may be higher than for steel production, this situation should have only a minor effect on overall manganese demand. U.S. crude steel production decreased slightly in 2016 to 78.6 Mt from 78.8 Mt in 2015. World steel production in 2016 increased slightly to 1.63 billion metric tons (Gt) from 1.62 Gt in 2015 (World Steel Association, 2017).

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TABLE 1
SALIENT MANGANESE STATISTICS¹

(Thousand metric tons, gross weight, unless otherwise specified)

	2011	2012	2013	2014	2015	
United States:						
Manganese ore (20% or more Mn):						
Production	--	--	--	--	--	
Exports	1	2	1	1	1	
Imports for consumption	552	506	549	387 ^r	441	
Consumption ²	532	538	523	508	451	
Stocks, December 31, consumers ²	250	203	217	189	187	
Ferromanganese:						
Production	W	W	W	W	W	
Exports	5	5	2	6 ^r	5	
Imports for consumption	348	401	331	365 ^r	292	
Consumption	303	382	368	360	344	
Stocks, December 31, consumers and producers	25	31	27	23	21	
Silicomanganese:						
Production	W	W	W	W	W	
Exports	8	6	6	3	1	
Imports for consumption	348	348	329	448	303	
Consumption	106	150	152	146	138	
Stocks, December 31, consumers and producers	22	19	6	10	21	
Consumption, apparent, manganese content ³	699	843	794	838	707	
Price, average:						
Ferromanganese, high-carbon ⁴	dollars per gross ton	1,310.57	1,230.72	1,053.83	1,062.24 ^r	915.36
Ferromanganese, medium-carbon ⁴	cents per pound	108.43	91.30	86.87	94.39	93.49
Manganese metal ⁵	do.	181.79	149.71	130.50	126.97	115.10
Manganese ore price, c.i.f. ⁶	dollars per metric ton unit	6.67	4.97	4.61	4.49	3.53
Silicomanganese ⁴	cents per pound	59.70	63.25	52.11	58.72	49.60
World, production of manganese ore		45,700 ^r	46,400 ^r	54,600 ^r	58,000 ^r	51,800

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

¹Data are rounded to no more than three significant digits, except prices.

²Exclusive of iron and steel plants.

³Based on estimates of average content for all significant components except imports, for which content is reported.

⁴Platts Metals Week, dealer import prices based on annual or monthly averages.

⁵CRU Ryan's Notes North American transaction prices based on weekly averages.

⁶Cost, insurance, and freight, U.S. ports. Estimated by the U.S. Geological Survey.

TABLE 2
U.S. GOVERNMENT NATIONAL DEFENSE STOCKPILE MANGANESE STATISTICS IN 2015^{1,2}

(Metric tons, gross weight)

Material	Inventory, yearend		Annual Materials Plan ³	Sales		Inventory changes ⁴	
	Fiscal year ³	Calendar year		Fiscal year ³	Calendar year	Fiscal year ³	Calendar year
Metallurgical ore	292,000	292,000	90,700	--	--	--	--
High-carbon ferromanganese	286,000	280,000	45,400	47,500 ⁵	45,400	-43,200	-42,300
Total	578,000	572,000	136,000	47,500	45,400	-43,200	-42,300

-- Zero.

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

²Includes stockpile- and nonstockpile-grade materials.

³Twelve-month period ending September 30, 2015.

⁴From previous year.

⁵The amount of high-carbon ferromanganese sales shown for fiscal year 2015 (FY15) was the result of negotiated, long-term contract awards; this was the total amount removed from the stockpile during FY15.

Source: Defense Logistics Agency Strategic Materials.

TABLE 3
DOMESTIC PRODUCERS OF PRINCIPAL MANGANESE PRODUCTS IN 2015

Company	Plant location	Products ¹			Type of process
		FeMn	SiMn	MnO ₂	
Energizer Holdings, Inc., Eveready Battery Co.	Marietta, OH			X	Electrolytic.
Erachem Comilog, Inc.	Baltimore, MD			X	Chemical.
Do.	New Johnsonville, TN			X	Electrolytic.
Eramet Marietta, Inc.	Marietta, OH	X	X		Electric furnace.
Felman Production, LLC	Letart, WV		X		Do.
Tronox Inc.	Henderson, NV			X	Electrolytic.

Do. Ditto.

¹FeMn, ferromanganese; SiMn, silicomanganese; MnO₂, synthetic manganese dioxide.

TABLE 4
U.S. CONSUMPTION, BY END USE, AND INDUSTRY STOCKS OF MANGANESE FERROALLOYS AND METAL IN 2015¹

(Metric tons, gross weight)

End use	Ferromanganese			Silicomanganese	Manganese metal
	High carbon	Medium and low carbon	Total		
Steel:					
Carbon	114,000	107,000	221,000	87,000	8,140
High-strength, low-alloy	36,100	12,600	48,600	12,500	--
Stainless and heat-resisting	7,140	2,680	9,830	15,600	884
Full alloy	27,300	19,600	46,900	18,000	54
Unspecified ²	5,710	4,190	9,900	1,660	1,700
Total	190,000	146,000	336,000	135,000	10,800
Cast irons	6,490	396	6,890	230	W
Superalloys	W	W	W	--	84
Alloys (excluding alloy steels)	371	139	510	2,590	9,710 ³
Miscellaneous and unspecified	W	--	W	W	W
Grand total	197,000	147,000	344,000	138,000⁴	20,600
Total manganese content⁵	158,000	124,000	281,000	90,800	20,600
Stocks, December 31, consumers and producers	8,140	12,900	21,100	20,800	1,100 ⁶

W Withheld to avoid disclosing company proprietary data; included with "Alloys (excluding alloy steels)." -- Zero.

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

²Includes electrical and tool steel.

³Approximately 89% of this combined total was for consumption in aluminum alloys.

⁴Internal evaluation indicates that silicomanganese consumption is considerably understated.

⁵Estimated based on the following typical manganese content: high-carbon ferromanganese (80%); medium- and low-carbon ferromanganese (84%); silicomanganese (66%); and manganese metal (100%).

⁶Consumer stocks only.

TABLE 5
U.S. EXPORTS OF MANGANESE ORE, FERROALLOYS, METAL, AND MANGANESE DIOXIDE, BY COUNTRY¹

Country ²	2014		2015	
	Quantity, gross weight (metric tons)	Value, f.a.s. ³ (thousands)	Quantity, gross weight (metric tons)	Value, f.a.s. ³ (thousands)
Ore and concentrates with 20% or more manganese:				
Canada	436	\$873	58	\$49
Netherlands	282	1,200	241	949
Poland	35	42	15	10
United Kingdom	20	17	231	189
Other (4 countries)	85 ^r	127 ^r	155	351
Total	858	2,250	700	1,550
Ferromanganese, all grades:				
Canada	4,830 ^r	7,020 ^r	4,630	5,050
Equatorial Guinea	43	116	9	20
Mexico	114	211	29	60
Other (14 countries)	546 ^r	1,230 ^r	478	496
Total	5,530 ^r	8,580 ^r	5,140	5,630
Silicomanganese:				
Canada	2,030	2,510	570	707
India	828	599	20	18
Mexico	76	153	155	229
Other (3 countries)	391	555	478	388
Total	3,320	3,820	1,220	1,340
Metal, including alloys and waste and scrap:				
China	76	1,060	172	499
Germany	101	417	51	217
Japan	84	291	188	654
Malaysia	2,290	1,340	4,090	2,000
Mexico	285	1,000	184	657
Vietnam	322	394	58	12
Other (22 countries)	451 ^r	2,840 ^r	649	3,620
Total	3,610 ^r	7,350 ^r	5,390	7,660
Manganese dioxide:				
Canada	1,720	1,600	1,100	1,090
Estonia	468	2,450	438	2,290
Mexico	316	476	167	218
Netherlands	343	1,250	176	907
Poland	140	589	106	188
United Kingdom	372	541	300	482
Other (31 countries)	449 ^r	962 ^r	987	2,770
Total	3,800 ^r	7,870	3,270	7,940

^rRevised.

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

²Countries listed are the leading importers of these manganese materials from the United States based on the 2-year average.

³Free alongside ship.

Source: U.S. Census Bureau.

TABLE 6
U.S. IMPORTS FOR CONSUMPTION OF MANGANESE ORE, FERROALLOYS, METAL, AND SELECTED CHEMICALS, BY COUNTRY¹

Country	2014			2015		
	Quantity		Value, customs (thousands)	Quantity		Value, customs (thousands)
	Gross weight (metric tons)	Mn content (metric tons)		Gross weight (metric tons)	Mn content (metric tons)	
Ore and concentrates with 20% or more manganese:						
All grades: ²						
Australia	35,700	17,500	\$11,500	33,600	16,700	\$9,230
Belgium	2,890	1,440	173	--	--	--
Brazil	3,170	1,690	1,390	8,530	2,210	2,350
Gabon	292,000 ^r	143,000 ^r	62,500 ^r	331,000	171,000	72,100
Mexico	9,420	3,440	2,010	4,510	2,100	1,230
Morocco	1,850	954	305	193	128	204
South Africa	41,600	17,200	7,070	63,400	23,800	7,310
Other (6 countries)	39 ^r	30 ^r	44 ^r	176	111	111
Total	387,000 ^r	186,000 ^r	84,900 ^r	441,000	216,000	92,500
More than 20% but less than 47% manganese:						
China	11	5	6	--	--	--
Gabon	40,500 ^r	14,600 ^r	4,310 ^r	--	--	--
Mexico	9,420	3,440	2,010	1,510	694	357
Morocco	115	44	55	--	--	--
South Africa	40,000	16,100	5,650	61,600	22,900	6,650
Total	90,100 ^r	34,100 ^r	12,000 ^r	63,100	23,600	7,010
47% or more manganese:						
Australia	35,700	17,500	11,500	33,600	16,700	9,230
Belgium	2,890	1,440	173	--	--	--
Brazil	3,170	1,690	1,390	8,530	2,210	2,350
China	8	7	2	8	4	8
Gabon	251,000	129,000	58,200	331,000	171,000	72,100
Mexico	--	--	--	3,000	1,410	870
Morocco	1,730	910	250	193	128	204
South Africa	1,600	1,180	1,420	1,780	878	657
Other (5 countries)	20 ^r	18 ^r	35 ^r	168	107	111
Total	296,000	152,000	72,900	378,000	193,000	85,500
Ferromanganese:						
All grades: ³						
Australia	46,900 ^r	34,900 ^r	40,500 ^r	38,800	29,200	36,600
China	7,250	6,690	16,400	12,500	11,500	26,200
Korea, Republic of	26,000	21,500	40,700	47,800	38,400	73,800
Norway	34,200	27,800	49,600	38,300	31,000	54,300
South Africa	233,000 ^r	179,000 ^r	231,000 ^r	125,000	94,600	124,000
Ukraine	3,320	2,540	3,280	18,300	13,900	14,900
Other (14 countries)	13,600 ^r	10,200 ^r	16,000 ^r	11,500	8,850	13,200
Total	365,000 ^r	283,000 ^r	398,000 ^r	292,000	228,000	343,000
1% or less carbon:						
China	7,070	6,550	16,000	12,400	11,400	25,900
Korea, Republic of	6,470	5,770	13,400	11,300	9,700	21,800
Norway	20,100	16,300	30,900	25,100	20,300	37,600
South Africa	2,560	2,420	6,040	492	462	1,120
Other (6 countries)	162 ^r	94 ^r	278 ^r	1,630	1,340	2,460
Total	36,400	31,100	66,500	50,900	43,300	88,900
More than 1% but not more than 2% carbon:						
Australia	--	--	--	4,020	3,180	5,820
China	180	137	440	120	92	262
Korea, Republic of	19,000	15,400	26,800	29,900	23,800	47,000
Norway	14,100	11,500	18,800	9,340	7,610	12,600
South Africa	25,700	20,500	35,000	17,500	13,900	27,900
Other (4 countries)	2,730	2,100	5,040	4,320	3,390	6,460
Total	61,800	49,600	86,000	65,100	52,000	100,000
More than 2% but not more than 4% carbon:						
China	1	(4)	3	16	13	36
Norway	--	--	--	73	59	125
South Africa	--	--	--	464	363	1,230

See footnotes at end of table.

TABLE 6—Continued

U.S. IMPORTS FOR CONSUMPTION OF MANGANESE ORE, FERROALLOYS, METAL, AND SELECTED CHEMICALS, BY COUNTRY¹

Country	2014			2015		
	Quantity		Value, customs (thousands)	Quantity		Value, customs (thousands)
	Gross weight (metric tons)	Mn content (metric tons)		Gross weight (metric tons)	Mn content (metric tons)	
Ferromanganese:—Continued						
More than 2% but not more than 4% carbon:—Continued						
Other (3 countries)	1 ^r	1 ^r	2 ^r	55	43	79
Total	2 ^r	1 ^r	5 ^r	608	479	1,470
More than 4% carbon:						
Australia	46,900 ^r	34,900 ^r	40,500 ^r	34,800	26,000	30,800
France	5,660	4,300	4,950	49	37	41
Korea, Republic of	519	395	548	6,590	4,880	4,920
Norway	4	3	6	3,830	3,030	3,990
South Africa	205,000 ^r	156,000 ^r	190,000 ^r	106,000	79,800	94,200
Ukraine	3,320	2,540	3,280	18,300	13,900	14,900
Other (9 countries)	5,000 ^r	3,750 ^r	5,690 ^r	5,410	4,080	4,160
Total	266,000	202,000 ^r	245,000 ^r	175,000	132,000	153,000
Silicomanganese:³						
Australia	70,800	47,200	76,900	63,500	45,000	57,700
Georgia	147,000 ^r	103,000 ^r	162,000 ^r	85,000	61,200	85,000
Mexico	36,900	24,000	38,000	24,900	16,200	24,000
Norway	37,800	24,000	51,300	18,200	11,200	24,300
South Africa	126,000	83,000	135,000	84,600	55,000	85,900
Spain	2,240	1,460	2,620	13,900	9,050	13,400
Other (12 countries)	26,100 ^r	17,100 ^r	29,700 ^r	13,300	7,970	13,300
Total	448,000 ^r	300,000 ^r	496,000 ^r	303,000	206,000	304,000
Metal:²						
Unwrought:⁵						
China	21,700 ^r	XX	47,400 ^r	17,200	XX	36,200
Japan	520	XX	1,770	446	XX	1,450
South Africa	12,600	XX	34,700 ^r	9,900	XX	25,500
Other (14 countries)	612 ^r	XX	1,720 ^r	1,660	XX	3,940
Total	35,400 ^r	XX	85,600 ^r	29,200	XX	67,100
Other manganese, wrought:						
Germany	89	XX	1,190	188	XX	2,020
Korea, Republic of	2,020	XX	4,960	515	XX	1,170
Other (12 countries)	57 ^r	XX	273 ^r	220	XX	1,140
Total	2,160	XX	6,430	923	XX	4,330
Waste and scrap:						
Canada	1,430	XX	811	548	XX	144
Germany	(4)	XX	3	--	XX	--
Total	1,430	XX	814	548	XX	144
Manganese dioxide:²						
Japan	5,930	XX	13,700	5,850	XX	13,500
South Africa	6,150 ^r	XX	13,400 ^r	--	XX	--
Turkey	866	XX	423	243	XX	413
Other (16 countries)	1,100	XX	1,060	724	XX	1,200
Total	14,000 ^r	XX	28,700 ^r	6,820	XX	15,100
Potassium permanganate:²						
India	1,590	XX	4,490	898	XX	2,340
Other (4 countries)	23	XX	40	9	XX	23
Total	1,610	XX	4,530	908	XX	2,370

^rRevised. XX Not applicable. -- Zero.¹Data are rounded to no more than three significant digits; may not add to totals shown.²Countries listed exported more than 300 metric tons (gross weight) to the United States based on the 2-year average.³Countries listed exported more than 5,000 metric tons (gross weight) of total ferromanganese to the United States based on the 2-year average.⁴Less than ½ unit.⁵Imports of unwrought metal include flake, powder, and other.

Source: U.S. Census Bureau; data adjusted by the U.S. Geological Survey.

TABLE 7
MANGANESE ORE: WORLD PRODUCTION, BY COUNTRY^{1,2}

(Thousand metric tons)

Country ³	Mn content (percent) ^{c,4}	2011	2012	2013	2014	2015
Australia: ^{5,6}						
Gross weight		6,963	7,172	7,447 ^r	7,670 ^r	7,500
Mn content	37–53	2,860	2,950	2,970 ^r	3,068 ^r	2,883
Brazil: ⁶						
Gross weight		2,738	2,796	2,833	2,723 ^r	2,816
Mn content	33–51	1,139	1,164	1,180	1,094 ^r	1,226
Burma: ⁷						
Gross weight		586	286	394	241 ^r	70
Mn content	40	234	115	158 ^r	96 ^r	28
China: ^{7,8}						
Gross weight		14,000 ^e	14,500 ^e	17,547 ^r	19,671 ^r	13,024
Mn content	20–30	2,800 ^e	2,900 ^e	2,808 ^r	3,147 ^r	2,084
Gabon: ⁷						
Gross weight		4,070	3,637	3,997 ^r	3,787 ^r	4,112
Mn content	45–53	1,858	1,650	1,871 ^r	300 ^r	1,929
Georgia, concentrate: ^e						
Gross weight		400	380	380	334	334
Mn content	29–30	116	110	110	97	97
Ghana: ⁶						
Gross weight		1,689	1,467	1,812	1,496 ^r	1,478
Mn content ^e	28–34	484	414	510	418	416
India: ⁶						
Gross weight		2,105 ^r	1,916 ^r	3,112 ^r	2,200 ^r	2,117
Mn content	10–54	895	689 ^r	1,118 ^r	791 ^r	810
Kazakhstan, concentrate: ⁶						
Gross weight		1,096	1,071	1,121	1,092 ^r	615
Mn content ^e	35–36	390	390	404	390 ^r	222
Malaysia: ⁶						
Gross weight		598	1,100	1,125	835 ^r	480
Mn content	32–45	233	429	439	326 ^r	187
Mexico: ^{6,9}						
Gross weight		468	515	580 ^r	652 ^r	600
Mn content	36–37	171	188	212	235 ^r	217
South Africa: ^{6,10}						
Gross weight		8,652	8,943	10,958 ^r	14,051 ^r	15,952
Mn content ^e	30–48+	3,400	3,600	4,300	5,300 ^r	5,900
Ukraine, concentrate:						
Gross weight		972	1,234	1,525	1,526 ^r	1,203
Mn content ^e	30–35	330	396	515	519 ^r	410
Other: ^{e,11}						
Gross weight		1,410 ^r	1,340 ^r	1,670 ^r	1,670 ^r	1,470
Mn content	XX	497	491 ^r	638 ^r	644 ^r	582
Total:						
Gross weight		45,700 ^r	46,400 ^r	54,600 ^r	58,000 ^r	51,800
Mn content	XX	15,400	15,500 ^r	17,200 ^r	16,400 ^r	17,000

^eEstimated. ^rRevised. XX Not applicable.

¹Totals and estimated data are rounded to no more than three significant digits; may not add to totals shown.

²Includes data available through May 31, 2018. Data pertain to concentrates or comparable shipping product, except that in a few instances the best data available appear to be for crude ore, possibly after some upgrading.

³In addition to the countries listed, Cuba, Greece, Pakistan, Panama, and Peru may have produced manganese ore and (or) manganiferous ore, but available information was inadequate to make reliable estimates of output.

⁴May be average content of each year's production rather than for content of typical products.

⁵Metallurgical ore.

⁶Reported by country or producer(s).

⁷Reported by the International Manganese Institute.

⁸Includes manganiferous ore.

⁹Mostly oxide nodules; may include smaller quantities of direct-shipping carbonate and oxide ores for metallurgical and battery operations, and sinter.

TABLE 7—Continued
MANGANESE ORE: WORLD PRODUCTION, BY COUNTRY^{1,2}

(Thousand metric tons)

¹⁰Calculated metal content includes allowance for assumed moisture content. Includes ore and sinter.

¹¹Includes Bulgaria, Côte d'Ivoire, Egypt, Hungary, Indonesia, Iran, Morocco, Namibia, Nigeria, Oman, Philippines, Romania, Russia (concentrate), Sudan, Thailand, Turkey, Vietnam, and Zambia.

TABLE 8
FERROMANGANESE AND SILICOMANGANESE: WORLD PRODUCTION, BY COUNTRY^{1,2}

(Metric tons, gross weight)

Country ³	2011	2012	2013	2014	2015
Argentina, electric furnace, silicomanganese	11,000 ^e	11,000 ^e	13,000 ^{r,4}	10,000 ^{r,4}	8,000 ⁴
Australia, electric furnace: ⁴					
Ferromanganese	180,200 ^r	130,900 ^r	146,900 ^r	165,300 ^r	153,100
Silicomanganese	94,700 ^r	50,800	110,100	119,400	130,700
Total	274,900 ^r	181,700 ^r	257,000 ^r	284,700 ^r	284,000
Bahrain, electric furnace: ⁴					
Ferromanganese	35,300	5,300 ^r	-- ^r	-- ^r	--
Silicomanganese	3,000	6,000 ^r	20,000 ^r	17,000 ^r	15,000 ^e
Total	38,300	11,300 ^r	20,000 ^r	17,000 ^r	15,000 ^e
Brazil, electric furnace:					
Ferromanganese ^e	82,000	94,000	93,000	96,000 ^r	99,000
Silicomanganese ^e	214,000	213,000	218,000	218,000 ^r	209,000
Total ⁵	296,000	307,000	311,000	314,000 ^r	308,000
China: ⁵					
Blast furnace, ferromanganese	350,000	300,000	453,000 ^r	457,000 ^r	446,000
Electric furnace:					
Ferromanganese	2,600,000	3,020,000	3,150,000 ^r	2,170,000 ^r	2,120,000
Silicomanganese	6,700,000	7,400,000	7,920,000 ^r	7,990,000 ^r	7,810,000
Total, blast and electric furnaces	9,650,000	10,700,000	11,500,000 ^r	10,600,000 ^r	10,400,000
Egypt, electric furnace, ferromanganese ^e	30,000	30,000	30,000	12,000 ^r	12,000
France, electric furnace: ⁴					
Ferromanganese	130,000 ^r	101,000	104,000	116,000 ^r	146,000
Silicomanganese	63,000 ^r	69,000 ^r	92,000 ^r	108,000 ^r	98,000
Total	193,000 ^r	170,000 ^r	196,000 ^r	224,000 ^r	244,000
Gabon, electric furnace, silicomanganese ^e	--	--	--	4,000	20,000
Georgia, electric furnace: ⁵					
Ferromanganese	195 ⁶	--	--	--	--
Silicomanganese	242,746	261,075	253,361 ^r	256,677	217,300
Total	242,941	261,075	253,361 ^r	256,677	217,300
India, electric furnace: ⁴					
Ferromanganese	436,100 ^r	419,200 ^r	455,400 ^r	533,300 ^r	476,300
Silicomanganese	1,433,600	1,693,100 ^r	1,917,000 ^r	1,786,000 ^r	1,691,300
Total	1,869,700 ^r	2,112,300 ^r	2,372,400 ^r	2,319,300 ^r	2,168,000
Indonesia, electric furnace: ⁵					
Ferromanganese	12,000	12,000 ^r	12,000	12,000 ^r	12,000
Silicomanganese	8,000	8,000 ^r	8,000	8,000 ^r	8,000
Total	20,000	20,000 ^r	20,000	20,000 ^r	20,000
Italy, electric furnace: ⁴					
Ferromanganese	18,000	12,000 ^r	6,000 ^r	-- ^r	--
Silicomanganese	25,000 ^r	24,000 ^r	--	--	--
Total	43,000 ^r	36,000 ^r	6,000 ^r	-- ^r	--
Japan, electric furnace:					
Ferromanganese	456,798 ⁴	436,171 ⁴	460,936 ⁵	463,345 ⁵	465,952 ⁵
Silicomanganese	49,798 ⁴	52,287 ⁴	24,741 ⁵	26,500 ^{r,5}	22,700 ⁵
Total	506,596 ⁴	488,458 ⁴	485,677 ⁵	489,845 ^{r,5}	488,652 ⁵
Kazakhstan, electric furnace, silicomanganese ⁵	232,039	251,530	203,986	200,379 ^r	164,189
Korea, Republic of, electric furnace: ⁵					
Ferromanganese	355,047	364,800	330,000 ^r	306,000	300,000
Silicomanganese	195,650	184,700	216,000 ^r	240,000	200,000
Total	550,697	549,500	546,000 ^r	546,000	500,000
Macedonia, electric furnace, silicomanganese ⁴	50,756	14,179	--	--	--
Mexico, electric furnace: ⁴					
Ferromanganese	73,684	62,000 ^r	60,675 ^r	67,507 ^r	67,914
Silicomanganese	139,044	161,300 ^r	157,855 ^r	164,852 ^r	139,361
Total	212,728	223,300 ^r	218,530 ^r	232,359 ^r	207,275

See footnotes at end of table.

TABLE 8—Continued
 FERROMANGANESE AND SILICOMANGANESE: WORLD PRODUCTION, BY COUNTRY^{1,2}

(Metric tons, gross weight)

Country ³	2011	2012	2013	2014	2015
Norway, electric furnace: ⁴					
Ferromanganese	337,900	325,900	306,700	295,400 ^r	309,200
Silicomanganese	266,000	271,400	301,400	314,300	309,900
Total	603,900	597,300	608,100	609,700 ^r	619,100
Poland: ⁵					
Blast furnace, ferromanganese	800	800	820 ^r	549 ^r	460
Electric furnace, silicomanganese	400	100 ^r	100 ^r	32 ^r	--
Total	1,200	900 ^r	920 ^r	581 ^r	460
Romania, electric furnace, silicomanganese ⁶	31,000	17,000	--	--	--
Russia: ⁵					
Blast furnace, ferromanganese	148,100	160,800	181,400	178,600 ^r	192,600
Electric furnace, silicomanganese	149,850	164,350	169,190	179,100 ^r	172,800
Total	297,950	325,150	350,590	357,700 ^r	365,400
Saudi Arabia, electric furnace: ⁴					
Ferromanganese	-- ^r	-- ^r	-- ^r	-- ^r	--
Silicomanganese	96,000	80,000	96,000 ^r	60,000 ^r	63,000
Total	96,000 ^r	80,000 ^r	96,000 ^r	60,000 ^r	63,000
Slovakia, electric furnace: ⁵					
Ferromanganese	18,180	12,862	2,119	20,554 ^r	25,376
Silicomanganese	25,023	50,089	26,794	29,643	27,036
Total	43,203	62,951	28,913	50,197 ^r	52,412
South Africa, electric furnace: ⁴					
Ferromanganese	534,900	590,000 ^r	681,000 ^r	772,000 ^r	512,000
Silicomanganese	313,600	148,800	133,600	228,100	210,200
Total	848,500	738,800 ^r	814,600 ^r	1,000,100 ^r	722,200
Spain, electric furnace: ⁴					
Ferromanganese	92,500 ^r	79,800 ^r	107,200 ^r	133,200 ^r	126,200
Silicomanganese	142,000 ^r	148,000 ^r	136,000 ^r	129,000 ^r	134,000
Total	234,500 ^r	227,800 ^r	243,200 ^r	262,200 ^r	260,000
Ukraine, electric furnace: ⁵					
Ferromanganese	180,500	163,921	88,626	103,000	87,740
Silicomanganese	843,500	823,131	724,892	840,900	698,400
Total	1,024,000	987,052	813,518	943,900	786,140
United States, electric furnace:					
Ferromanganese	W	W	W	W	W
Silicomanganese	W	W	W	W	W
Total	W	W	W	W	W
Venezuela, electric furnace: ⁴					
Ferromanganese	12,000	9,000	9,000	8,000	8,000
Silicomanganese	24,000	58,000 ^r	63,000 ^r	39,000 ^r	35,000
Total	36,000	67,000 ^r	72,000 ^r	47,000 ^r	43,000
Grand total, excluding United States	17,400,000	18,500,000 ^r	19,500,000 ^r	18,900,000 ^r	17,900,000
Of which:					
Blast furnace, ferromanganese	499,000	462,000	635,000 ^r	636,000 ^r	639,000
Electric furnace, excluding United States:					
Ferromanganese	5,590,000 ^r	5,870,000 ^r	6,040,000 ^r	5,270,000 ^r	4,920,000
Silicomanganese	11,400,000	12,200,000 ^r	12,800,000 ^r	13,000,000 ^r	12,400,000

²Estimated. ¹Revised. W Withheld to avoid disclosing company proprietary data; not included in "Grand total." -- Zero.

¹Grand totals, U.S. data, and estimated data are rounded to no more than three significant digits; may not add to totals shown.

²Includes data available through May 30, 2018.

³Ferromanganese may have been produced in Iran, but available information was inadequate to make reliable estimates of output.

⁴Reported by the International Manganese Institute.

⁵Reported figure by country or producer(s).

⁶Net exports.

TABLE 9
MANGANESE MATERIALS: PROJECTS SCHEDULED FOR COMPLETION, BY YEAR, BY YEAREND 2015–19^{1, 2, 3}

(Metric tons, gross weight, unless otherwise specified)

Projected year of first production	Country (Region, State, or Province)	Project and company	Project type	Incremental annual production capacity	Total annual production capacity	Manganese product ⁴
2015	China (Shanxi)	Shanxi Ferroalloys Plant Shanxi Dongfang Resource Development Co. Ltd.	Ferroalloys plant expansion	200,000	500,000	HC FeMn.
2015	China (Yunnan)	Tycoon EMM Plant Tycoon Group	New EMM plant	XX	100,000	EMM.
2015	Gabon (Haut Ogooue)	Moanda Metallurgical Complex Compagnie Miniere de l'Ogooué (Comilog) S.A.	New ferroalloys plant	XX	65,000	SiMn.
2015	Gabon (Moyen Ogooue)	do.	New EMM plant	XX	20,000	EMM.
2015 ^r	Mexico (Hidalgo)	Tajo Naopa Manganese Mine Minera Autlán Sociedad Anónima Bursátil de Capital Variable (SAB de CV)	Mine expansion	227,000 ^{r, c}	460,000 ^{r, c}	Mn ore.
2015	Namibia (Otjozondjupa)	Otjozonda Manganese Mine Shaw River Manganese Ltd.	do.	150,000 ^c	250,000 ^c	Do.
2016	Australia (Northern Territory)	Groote Eylandt Mining Company (Pty) Ltd. South32 Ltd. ⁵ (60%) and Anglo American Corp. (40%)	Mine expansion via tailings reining and beneficiation	500,000	5,300,000	Do.
2016	China (Inner Mongolia)	Minmetals Hunan Inner Mongolia Ferroalloys Plant Minmetals (Hunan) Ferroalloys Co. Ltd.	New EMM plant	60,000	300,000	SiMn.
2016	China (Ningxia)	Ningxia Tianyuan EMM Plant Ningxia Tianyuan Manganese Co. Ltd.	New EMM plant	XX	300,000	EMM.
2016	India (Maharashtra)	Chandrapur Ferroalloys Plant Steel Authority of India Ltd. (SAIL)	Ferroalloys plant expansion	100,000 ^r	200,000 ^r	FeMn, SiMn.
2016	Malaysia (Sarawak)	Pertama ferroalloys plant ⁶ Pertama Ferroalloy SDN BHD	New ferroalloys plant	XX	50,000 ^r	MC FeMn, LC FeMn.
				XX	110,000 ^r	SiMn.
2016 ^r	Do.	Sakura ferroalloys plant ⁷ Sakura Ferroalloy SDN BHD	do.	XX	107,000 ^r	FeMn.
2016	South Africa (Gauteng)	Mogale Alloys Plant ⁸ Mogale Alloys (Pty) Ltd.	Ferroalloys plant conversion	48,000	29,000 ^c	SiMn.
2016	South Africa (Northern Cape)	Wessels Mine South32 Ltd. ⁵ (44.4%), American Corp. (29.6%), Ntsimbintle (9%), and others (17%)	Mine expansion	500,000	1,500,000	Mn ore.
2017	Azerbaijan (Sumgayit)	Sumgayit ferroalloys plant ⁹ Baku Non-Ferrous Metals and Ferroalloys Co. and DEMORA	New ferroalloys plant	XX	36,000	SiMn.
2017 ^c	Côte d'Ivoire (Goh-Djiboua)	Lauzoua Mine China National Geological and Mining Corp. and Société du Développement Minier de Côte d'Ivoire (Sodemi)	Mine expansion	170,000 ^r	500,000 ^r	Mn ore.
2017	Gabon (Moyen Ogooue)	Nouvelle Gabon Manganese Mine Nouvelle Gabon Manganese Mining SA	New mine	XX	364,000 ^r	Do.
2017 ^c	India (Odisha)	Joda ferroalloys plant ¹⁰ Tata Steel Ltd.	Ferroalloys plant expansion	XX	60,000	SiMn.

See footnotes at end of table.

TABLE 9—Continued
MANGANESE MATERIALS: PROJECTS SCHEDULED FOR COMPLETION, BY YEAR, BY YEAREND 2015–19^{1,2,3}

(Metric tons, gross weight, unless otherwise specified)

Projected year of first production	Country (Region, State, or Province)	Project and company	Project type	Incremental annual production capacity	Total annual production capacity	Manganese product ⁴
2017	Indonesia (East Nusa Tenggara)	Gulf Mangan Ferroalloys Plant ¹¹ PT Gulf Mangan Grup	New ferroalloys plant	XX	31,640 ^r	HC FeMn.
2017 ^r	Malaysia (Sarawak)	OM Materials Sarawak ferroalloys plant ¹² OM Materials (Sarawak) Sdn Bhd	New ferroalloys and sinter plant	XX	300,000	Mn ore (sinter).
2017 ^r	Do.	Sakura ferroalloys plant ⁷ Sakura Ferroalloy SDN BHD	do.	24,000	70,000 ^r	HC FeMn, SiMn.
2018 ^{r,c}	India (Madhya Pradesh)	Balaghat Mines MOIL Ltd. ¹³	Mine expansion	350,000	800,000	Mn ore.
2018	India (Maharashtra)	Munsar Mine MOIL Ltd. ¹³	do.	50,000	100,000	Do.
2019	Russia (Kemerovo)	Usinskoe Manganese Mine CJSC CHEK-Su.VK	New mine	XX	400,000	Do.
2019	Russia (Kemerovo)	do.	New EMM plant	XX	80,000	EMM.
2019 ^{r,c}	Togo (Savanes)	Nayega Manganese Mine Ferrex Manganese Ltd.	New mine	XX	250,000	Mn ore.

^cEstimated. ^rRevised. Do., do. Ditto. XX Not applicable.

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

²Projects in feasibility or later stages of development in 2015–16. Actual startup dates may be postponed, owing to economic or other factors. Additional projects might produce manganese materials by 2018, but not enough information was available to include them.

³Includes projects having the following minimum tonnage capacities: 20,000 metric tons per year (t/yr) of manganese alloys or manganese ore and 10,000 t/yr of electrolytic manganese dioxide or electrolytic manganese metal.

⁴EMM Electrolytic manganese metal. FeMn Ferromanganese. HC FeMn High-carbon ferromanganese. LC FeMn Low-carbon ferromanganese. MC FeMn Medium-carbon ferromanganese. Mn Manganese. SiMn Silicomanganese.

⁵South32 Ltd. was created in 2015 from the spinoff of manganese and other operations from BHP Billiton Ltd.

⁶The Pertama ferroalloys plant will also have the capacity to produce 110,000 t/yr of ferrosilicon by 2018. At 60%, Asia Minerals Ltd. (AML) has the majority interest in the plant.

⁷The Sakura ferroalloys plant is the joint venture of Assmang Ltd. (South Africa) (54.36%), Sumitomo Corp. (Japan) (26.6%), and China Steel Corp. (Taiwan) (19%).

⁸One of two silicomanganese furnaces at the Mogale ferroalloys plant will be converted to ferrochromium production by 2016.

⁹The Sumgayit ferroalloys plant will also have a ferrosilicon production capacity of 20,000 t/yr.

¹⁰The Joda ferroalloys plant will also expand its ferromanganese production capacity by 9,600 t/yr to 60,000 t/yr and add a new 50,000-t/yr manganese sinter plant.

¹¹On August 8, 2016, Gulf Manganese Corp. Ltd. purchased two existing FeMn furnaces from Transalloys (pty) Ltd. in South Africa to transport to Indonesia for use in the Gulf Mangan Ferroalloys Plant.

¹²The OM Materials Sarawak ferroalloys plant will also have a ferrosilicon production capacity of 308,000 t/yr. OM Holdings Ltd. is the majority owner in the plant at 80%.

¹³MOIL Ltd. operates 10 mines, of which 6 are located in the Nagpur and Bhandara Districts of Maharashtra and 4 are located in the Balaghat District of Madhya Pradesh.

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