UNITED STATES TARIFF COMMISSION

MANGANESE

Report to the Congress on Investigation No. 332-43
Under Section 332 of the Tariff Act of 1930
Made Pursuant to Senate Resolution 206,
87th Congress, Adopted September 23, 1961

TC Publication 68

Washington
August 1962

UNITED STATES TARIFF COMMISSION

Address all communications to

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Washington 25, D.C.

C O N T E N T S

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INTRODUCTION

This report is made pursuant to Senate Resolution 206, 87th Congress, adopted September 23, 1961, which directed the Tariff Commission to conduct an investigation of conditions in the industry producing manganese. A copy of the Senate Resolution appears in appendix A of this report.

The Commission instituted the investigation on October 5, 1961, under the authority of section 332 of the Tariff Act of 1930, as amended (19 U.S.C. 1332), and ordered a public hearing in connection therewith to be held on June 12, 1962. Public notice of the investigation and of the public hearing was given by posting copies of the notice at the Commission's offices in Washington, D.C., and in New York, N.Y., and by publishing notices in the Federal Register (26 F.R. 9610) of October 11, 1961, and in the October 12, 1961 issue of Treasury Decisions.

The public hearing was held as scheduled, in the Tariff Commission's hearing room in Washington, D.C., and all interested parties were given an opportunity to appear, to give evidence, and to be heard.

Information for this report was obtained from the hearing; from the Commission's files; from other Government agencies; from interviews by the Commission's staff with leading U.S. producers, importers, and processors of manganese ore, ferromanganese, and other manganese products; and from responses to questionnaires sent to these producers, importers, and processors.

DESCRIPTION AND USES

Manganese is a metal used primarily in the form of ferroalloys; it is indispensable for making iron and steel--a use that accounts for more than 90 percent of the total consumption of this metal. 1/ The remaining consumption occurs in a large variety of important uses. Manganese is used in dry-cell battery mixes, various chemicals (such as hydroquinone, potassium permanganate, and manganese chloride), the production of aluminum and magnesium, in nonferrous alloys (e.g. in manganese bronzes used in ship propellers), welding-rod coatings, the processing of uranium ore and some zinc concentrates, the production of ferrites (used in electronics), fertilizers, animal feed supplement, and numerous other applications.

The chief function of manganese in steelmaking is to make it possible to hot roll or forge steel without its tearing or cracking. The manganese counteracts the brittle effects produced by sulfur which remains in the steel after the refining process. Within limits, additional amounts of manganese, when present in the steel in the ratio of more than about 10 to 1 of sulfur, increase the strength, toughness, hardness, or hardenability of steel. The effect of manganese upon the properties of steel depends not only upon the amount of sulfur present, but also upon its carbon content and the state of deoxidation of the steel when the manganese is added. Although manganese also serves as

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1/ More than half of the quantity of alloying metals in all forms (such as chromium, nickel, and molybdenum) consumed by the steel industry is comprised of manganese.

a deoxidizer in steelmaking, when present in small amounts, its deoxidizing power is slight and the addition of other materials, such as silicon, is preferred for this purpose.

The manganese content of ordinary carbon steel--the type which accounts for most of the manganese consumed--ranges from 0.25 to 1.65 percent, but is generally less than 1.00 percent. Steels containing more than 1.00 percent manganese (generally 1.65 to 1.90 percent), and with no other alloying element present, are regarded as alloy steels; they possess properties of strength, hardness, or hardenability greater than those found in carbon steel. Steel with a manganese content of 10 to 14 percent, known as Hadfield manganese steel, has qualities of extreme toughness, high strength, and wear resistance. This alloy steel is used in such applications as crushers, power-shovel teeth, well-drill bits, chute linings, railroad switches, safes, and military tanks.

Manganese is used in the production of iron and steel, principally in the form of manganese ferroalloys, which in turn are produced from manganese ores. Substantial quantities of manganese entering into iron and steel production are also derived from manganese in iron ore, from steel furnace slag, and from ferrous scrap. 1/ The manganese used in non-ferrous metallurgy (for processing and alloying) is obtained from the manganese alloys and manganese ores; and manganese ores are used directly in the manufacture of dry-cell batteries, chemicals, and miscellaneous uses.

1/ See appendix B for an estimate of the quantities of manganese in various materials put into process in steelmaking and the quantities of manganese in the slags and metal emanating from iron and steel furnaces.

Manganese ore

Deposits of manganese minerals are widely distributed throughout the world in small quantities, but the few large concentrations of high grade ore are located, for the most part, at considerable distances from the major consuming centers. Because of its high affinity for oxygen, manganese does not occur as a free metal in nature.

Although there are more than 100 manganese minerals, only a few are commonly used. These are mostly oxides, and to a lesser extent, carbonates. Manganese silicates are seldom used because of the generally low manganese content of some of the minerals and the difficulty of processing them. Among the more important oxide minerals are pyrolusite, psilomelane, manganite, hausmannite, and wad (a hydrous mixture of oxides). The most common manganese mineral is pyrolusite (MnO_2) which, when pure, contains 63 percent manganese. A carbonate mineral, rhodochrosite ($MnCO_3$), in some of the ores mined in the United States contains almost 48 percent manganese. 1/ The ores actually produced, of course, contain some waste and their average manganese content is less than that of the pure minerals.

Manganese oxides are often associated with iron oxides, and manganese is a small constituent of almost all iron ores. Some manganese is associated with other metals, such as zinc in the mineral franklinite found in ores mined in New Jersey.

1/ According to the U.S. Bureau of Mines, manganese nodules produced in recent years from rhodochrosite ores in Montana have averaged 57 percent manganese content. The heat process of making the nodules increases the percentage of manganese contained in the nodules to a level above that in the pure mineral.

Manganese ores are generally reported in the official U.S. production and import statistics in two classifications based on their manganese content: Ores containing 10 to 35 percent manganese, and those containing 35 percent or more manganese. Ores containing 10 to 35 percent manganese are referred to as "ferruginous manganese" ores. In the U.S. Bureau of Mines data on U.S. production or shipments, iron ore containing less than 5 percent manganese is segregated from "manganiferous iron ore" containing 5 to 10 percent manganese. 1/

Manganese ores are also classified in the trade, and in the official statistics on consumption, production, and imports, into grades based principally upon their intended use. The three general grades, which are not completely distinct from one another in their chemical or physical characteristics, are designated as metallurgical grade, battery grade, and chemical grade.

Metallurgical grade.--Metallurgical manganese ore accounts for about 95 percent of the manganese ores consumed. It is used principally in making ferromanganese and various other manganese alloys--the forms in which manganese is added to molten steel, and to a smaller extent, to other metals. Metallurgical grade ore should have a high manganese content, and should contain a minimum of such impurities as sulfur, phosphorus, and arsenic. Its manganese-to-iron ratio should be at least 7 to 1. The ore must have suitable physical as well as chemical characteristics. Fine or soft ore requires agglomeration or

1/ The American Iron Ore Association classifies as manganiferous iron ores those which contain 2 percent or more manganese. In pricing iron ore it is customary to add a premium for ores containing more than 5 percent manganese.

sintering before use for making ferroalloys in blast furnaces. To obtain a furnace charge which most closely meets their needs, producers of alloys usually blend manganese ores from different sources. Small quantities of metallurgical-grade ore are also used directly in the production of steel and pig iron without first being converted into alloy.

Battery grade.--Battery-grade ore, which is used in far smaller quantities than metallurgical manganese ore, serves in dry cells as a depolarizing agent. When a dry-cell battery is in operation hydrogen gas collects as a nonconductive film on the carbon electrode. This action (polarization), if uncorrected, impairs the functioning of the cell. The manganese dioxide in the ore serves to depolarize the carbon electrode by oxidizing the hydrogen, thus making possible a continuous flow of electric current within the cell. Battery-grade ore must have a large content of manganese dioxide (generally a minimum of 68 percent); it must contain a minimum of iron and be free of copper, lead, or other materials that would cause dry cells to deteriorate rapidly.

Frequently both battery and metallurgical grades of manganese ore are mined from the same deposits. Ore suitable for dry-cell use may be equally acceptable for the production of ferromanganese, but only ore demonstrated by actual performance to be serviceable in dry cells is considered to be battery grade. Such demonstration consists of making sample batteries from individual lots of ore, and after aging, placing them in service under test conditions. No chemical analysis or simple physical test is known which can assure that a particular lot of ore will make satisfactory dry cells.

Some manganese ores, including those not naturally suited for dry-cells, are beneficiated by special electrolytic or chemical means to produce a high-quality (85 percent or more MnO_2) "synthetic" ore for use in dry cells. This material is more effective than natural ore, but it is also more expensive. For these reasons, synthetic manganese dioxide is usually blended with natural ore when used in batteries.

Chemical grade.--Various qualities of manganese ore are used in the production of chemicals. Manufacturers of manganese chemicals choose the most economical material available consistent with the particular chemical process to be followed. Two grades of manganese ore for chemical use are defined in National Stockpile Specifications. One of these is used in the production of the chemical hydroquinone, and the other in the manufacture of permanganate chemicals.

Chemical- as well as battery-grade ores must have a large content of manganese dioxide. Imports supply the bulk of these two grades of ore; the manganese content of such imports for industrial use during 1957-61 averaged 53 percent, which was equivalent to about 84 percent manganese dioxide.

Manganese metallurgical products

Ferromanganese, other manganese ferroalloys and, to a small extent, manganese metal are used primarily as vehicles for the controlled addition of manganese to molten steel. 1/ The additions are made in the steel furnaces or in the ladles near the end of the steelmaking process.

1/ These products are collectively referred to in this report as manganese metallurgical products.

In this way an average of about 13 or 14 pounds of manganese is normally added in producing a ton of steel.

Ferromanganese.--The alloy ferromanganese--the most common form in which manganese is added to steel--is made in a number of grades, of which the standard (high-carbon) grade is the most important. Standard ferromanganese, produced in both blast furnaces and electric furnaces, contains 74 to 82 percent manganese, and not more than the following: 1.25 percent silicon, 0.35 percent phosphorus, 7.50 percent carbon, and 0.05 percent sulfur. 1/ The balance is principally iron.

Various grades of ferromanganese containing less than 7.50 percent carbon 2/ are used when it is important to limit the amount of carbon entering the steel, as in stainless steels. These grades contain 80 to 85 percent manganese. The lower the carbon content, the higher is the price per pound of the alloy. Medium-carbon ferromanganese contains a maximum of 1.5 percent carbon. A variety of ferromanganese alloys of special analysis, such as low iron, or low phosphorus, are also produced.

Ferromanganese is available in ground, crushed and lump sizes ranging from 80 mesh to 75-pound lumps. Some ferromanganese and other manganese alloys are made in the form of briquets for convenience in adding manganese to steel in small predetermined quantities, such as 2 pounds.

1/ The specifications for particular grades of manganese metallurgical products vary somewhat among the different sources from which the Commission obtained information. Those given in this discussion, believed to be typical, are taken from U.S. Steel Corporation, The Making, Shaping, and Treating of Steel (Seventh Edition, 1957).

2/ Low-carbon ferromanganese is available in grades having a carbon content of: 0.07 percent, 0.10 percent, 0.15 percent, 0.30 percent, 0.50 percent, and 0.75 percent (all maximum).

Silicomanganese.--A typical grade of the alloy silicomanganese contains 65 to 68 percent manganese, 18 to 20 percent silicon, and a maximum of 1.5 percent carbon. Silicomanganese is used in making types of low-carbon steel in which silicon is not objectionable. It is sometimes used in open-hearth furnaces in lieu of ferrosilicon plus ferromanganese, to "block the heat" (retard the oxidizing reactions occurring in the furnace toward the end of the finishing process), because of the shorter holding time required.

Spiegeleisen.--The alloy spiegeleisen contains 16 to 28 percent manganese, not over 6.5 percent carbon, and from 1.0 to 4.5 percent silicon. A grade known as silicospiegel contains: 25 to 30 percent manganese, 2 to 3 percent carbon, and 7 to 8 percent silicon. Spiegeleisen, also called spiegel, was one of the earliest ferroalloying materials developed for use by the steel industry; but it has been largely replaced by ferromanganese.

Manganese metal and miscellaneous alloys.--Manganese metal is used primarily as an additive or alloying element in steel or other metals (as for example, in manganese bronze) when manganese is needed in a concentrated and almost pure form. The metal is too hard and brittle for other uses.

A number of other manganese alloys, of minor commercial importance, are made for alloying purposes. Among these are manganese boron (used for alloying steel, brass, bronze, and other metals) and manganese aluminum.

U.S. CUSTOMS TREATMENT

Manganese ore and metallurgical products are dutiable under paragraphs 301 and 302 of the Tariff Act of 1930. The rates of duty originally provided in the 1930 act, and subsequent changes in the rates made pursuant to concessions granted by the United States in trade agreements, are shown in tables 1 - 4 in appendix C. The following tabulation shows, for the manganese products that have been imported in recent years, the rates of duty originally provided in the Tariff Act of 1930, those in effect on July 1, 1962, and the average ad valorem equivalents of the latter based on the value of imports in 1961:

Tariff paragraph and abbreviated description of item	Tariff Act of 1930		
	Rate originally provided in act	GATT rate in effect July 1, 1962	Average ad valorem equivalent of the July 1, 1962, rate based on imports in 1961
			Percent
Par. 302(a):			
Manganese ore containing 10 percent or more of manganese	1¢ per lb. on Mn content	1/4¢ per lb. on Mn content	6.9
Par. 302(d)(e):			
Ferromanganese containing of carbon--			
Not over 1 percent	1-7/8¢ per lb. on Mn content + 15% ad val.	0.7¢ per lb. on Mn content + 5% ad val.	7.9
Over 1 percent but under 4 percent	1-7/8¢ per lb. on Mn content	15/16¢ per lb. on Mn content	6.8
4 percent or more	1-7/8¢ per lb. on Mn content	5/8¢ per lb. on Mn content	7.7
Par. 302(e):			
Manganese silicon	1-7/8¢ per lb. on Mn content + 15% ad val.	15/16¢ per lb. on Mn content + 7-1/2%	17.5
Manganese metal	1-7/8¢ per lb. on Mn content + 15% ad val.		23.1

The rates of duty currently applicable to manganese ore and to the manganese metallurgical products, classifiable under paragraphs 301 and 302, respectively, under the Tariff Act of 1930, will be continued in the new Tariff Schedules of the United States, the adoption of which is provided for in the Tariff Classification Act of 1962 (Public Law 87-456), approved May 24, 1962. It is anticipated that these Schedules will become effective January 1, 1963. The pertinent item numbers in the schedules are as follows: Manganese ore, 601.27; spiegeleisen, 607.20; ferromanganese, 607.35, 607.36, and 607.37; silicomanganese (referred to as ferrosilicon manganese in the Tariff Schedules and manganese silicon in the Tariff Act of 1930), 607.57; and manganese metal, 632.32.

U.S. GOVERNMENT PURCHASE AND ASSISTANCE PROGRAMS

Purchase and procurement programs for manganese undertaken by the U.S. Government since World War II have greatly affected manganese production and processing activities both within the United States and in some free-world countries from which manganese has been imported. These activities of the Government, especially since 1950, have resulted in greatly increased imports of manganese and in an expanded output by the small domestic manganese-ore industry.

Two significant developments aroused special concern in the early 1950's regarding future U.S. manganese supplies. First, the Soviet Union, which is the world's largest producer of manganese ore, and which had been an important source of U.S. supplies, embargoed shipments to the United States at the end of 1948. Then, with the expansion of U.S. steel production after the

outbreak of the Korean conflict in 1950, shortages which developed in U.S. manganese supplies led to the issuance on April 1, 1951, of an order (MO-2) by the Defense Minerals Administration allocating deliveries of manganese ore to U.S. consumers. Thereafter, the U.S. Government sponsored programs to encourage domestic manganese production and to develop foreign sources of supply in order to (1) meet current and anticipated needs of the nation's steel industry, and (2) build an adequate stockpile for emergency use if foreign sources should be cut off.

Description of programs

Government stockpiling had been authorized by the Strategic and Critical Materials Stock Piling Act (60 Stat. 596) approved July 23, 1946. By 1951, the Government had acquired an inventory of about 2.3 million tons of manganese ore, equal perhaps to 1 year's consumption, but considerably short of stockpile objectives. Meanwhile, additional legislation authorized programs under which large quantities of manganese were ultimately acquired for Government stockpiles. The principal authorizations were (1) the Defense Production Act of 1950 (64 Stat. 798), approved September 8, 1950, which permitted the Government to purchase manganese from domestic and foreign sources and to offer financial assistance in developing domestic and foreign sources of supply, and (2) section 303 of the Agricultural Trade Development and Assistance Act (68 Stat. 459), approved July 10, 1954, which permitted the Government to acquire manganese from foreign sources in exchange for surplus U.S. agricultural commodities (the barter program). Indicative of the high level of manganese procurement under the barter program is the inventory

of 2.8 million tons of manganese ore held separately in the "supplemental" stockpile at the end of 1961. Although negotiations for procurement of manganese by barter have been suspended in recent months (August 1962), some manganese is still being received on the basis of contracts previously made.

Purchase and other assistance programs for domestic ores.--Under authority of the Defense Production Act (DPA) the Government initiated a variety of programs for the acquisition of domestic manganese ore. Beginning in July 1951, the General Services Administration (GSA) opened depots for the purchase of domestically mined manganese ore (at prices designed to encourage production) at Butte and Philipsburg, Montana; at Deming, New Mexico; and at Wenden, Arizona. Quotas were set for the purchase at these depots of a total of 18 million long-ton units 1/ of manganese ore amenable to beneficiation to specifications of the strategic stockpile. Grades of ore acceptable at each depot and prices varied with the type of ore available in the area. The minimum acceptable manganese content was 12 percent at Butte and 15 percent at the other depots. 2/ This program was terminated in 1958 when 18.3 million units (equivalent to about 205,000 short tons of contained manganese) had been purchased at a cost of $34.5 million.

1/ A long-ton unit consists of 22.4 pounds of contained manganese, or 1 percent of the number of pounds in a long ton. Conversion from price per long-ton unit to price per ton is achieved by multiplying the unit price by the percentage of manganese contained in a given grade of ore.

2/ These minimums are well below the specifications for manganese ore acceptable under strategic stockpile specifications, which call for a minimum manganese content of 40 to 46 percent, depending upon the content of other elements.

In July 1952 the GSA announced a "carlot" program for domestic producers in locations remote from Government depots. Under this program the Government purchased, at railhead, manganese ore having a minimum manganese content of 40 percent. The "carlot" program objective was the purchase of 28 million units on the basis of $2.30 per long-ton unit for 48-percent ore, with adjustments according to actual manganese content. When this program was terminated in 1959, the Government had acquired slightly more than 28 million units (equivalent to about 314,000 short tons of contained manganese), at a cost of $71.9 million.

The Government also negotiated special contracts with individual producers under DPA for the acquisition of domestic manganese. One contract provided for the purchase of manganese nodules 1/ from an operation in Nevada, the output of which made Nevada the nation's leading producer of manganese ore in most recent years. Other Government contracts included commitments for the purchase of synthetic ore (manganese dioxide) from material mined in Minnesota.

A variety of other Government programs have been designed to encourage increased domestic production of manganese materials. These programs have provided financial assistance to research organizations and industrial concerns studying the technical and economic feasibility of beneficiating low-grade manganese ores and slags from steel furnaces. In addition, the Bureau of Mines has studied methods for processing low-grade manganese ores, operated pilot plants using new extractive processes, and explored a large number of domestic manganese deposits.

1/ Beneficiated manganese ore agglomerated and sintered.

A program of extending financial assistance for the exploration of domestic manganese deposits was instituted by the Government in 1951 through the Defense Minerals Exploration Administration (DMEA). Funds were advanced by the Government for manganese-ore projects to the extent of 75 percent (reduced in 1958 to 50 percent) of approved exploration costs; such loans were to be repaid from proceeds of production. Borrowers were not obligated to produce from the properties, but any production during the period of exploration was subject to royalty payable to the Government. If the Government certified a discovery or development as one from which future production might result, the obligation to pay royalty was to continue either for 10 years, or until the full amount of the Government's contribution had been repaid. The Office of Minerals Exploration (successor to DMEA) has reported that 28 manganese projects have been terminated, 14 of which were certified as potential sources of production. The Government's outlay in the 28 projects was $855,410, of which $712,632 was spent on the 14 projects that were certified. 1/

Procurement of manganese from foreign sources.--Manganese from foreign sources was acquired for stockpiling by the Government under both the Defense Production Act and the barter program authorized under the Agricultural Trade Development and Assistance Act. Most of such imports have been in the form of manganese ore. The great bulk of the imports for the U.S. Government entered free of duty. During 1951-61,

1/ Manganese exploration accounted for only a small part of the DMEA program, which included about a thousand projects involving two dozen different materials and an outlay by the Government of $23 million.

annual imports of duty-free manganese ore varied (in terms of manganese content) between a low of 71,000 tons in 1958 and a high of 358,000 tons in 1953 (table 16). 1/ Such imports were unusually high in 1953, 1954 (264,000 tons), 1960 (318,000 tons), and 1961 (349,000 tons). These Government imports were reflected in the unusually large amounts by which total imports exceeded U.S. consumption of manganese in those years (chart II). In the last 5 years, 1957-61, the manganese contained in ore imported duty-free for the U.S. Government came principally from Brazil (more than half of the total), Ghana, India, the Union of South Africa, and Morocco.

A part of the manganese imported for the U.S. Government has been in the form of ferromanganese. Duty-free imports of ferromanganese for the Government during 1951-61 ranged (in terms of manganese content) from 3,000 tons in 1952 to 228,000 tons in 1957; they amounted to 91,000 tons in 1961 (table 38). Principal sources of such imports in recent years have been Canada, India, France, Japan, and West Germany (table 41).

The total quantity of manganese contained in manganese ore and ferromanganese imported duty-free for the U.S. Government during 1951-61 amounted to about 2.5 million tons; almost 2 million tons of this total consisted of manganese in ore, and about 500,000 tons of manganese in ferromanganese. By the end of June 1962 the Commodity Credit Corporation had received, under the barter program, a total of 1.9 million tons of

1/ These data do not include undetermined quantities of manganese imported for U.S. Government account on which duty was paid; the quantity of such imports is believed not to have exceeded 5 percent of the total quantity of manganese in ore acquired by the Government from foreign sources in the years reported in table 16.

manganese ore, 685,000 tons of ferromanganese, and 4,000 tons of manganese metal (table 10). It is estimated that the manganese content of the materials acquired under the barter program (all since 1954) constituted more than half of the manganese acquired by the Government from foreign sources during the entire period 1951-61.

At the end of June 1962, about 224,000 tons of manganese ore (having an estimated manganese content of around 111,000 tons) was still to be delivered under unexpired barter agreements; no new barter contracts have been negotiated since March 1962.

Government inventories

The national stockpile objectives which had been established to provide sufficient materials for a 5-year emergency were reduced in June 1958 to cover a 3-year emergency. Additional Government procurement under the Defense Production Act and under the barter program has built up Government inventories of manganese until they are considerably in excess of the maximum stockpile objectives. Commodities procured under the Defense Production Act were placed initially in the DPA inventory; acquisitions under the barter program entered the supplemental stockpile. Materials in both these inventories are available for transfer to the strategic stockpile.

Data on quantities of manganese and other strategic materials in Government inventories were released to the public in March 1962 by the Office of Emergency Planning (OEP). The quantity of manganese materials which met stockpile specifications held in various Government inventories at the end of 1961 amounted to nearly 9.6 million tons, which is about

2.6 million tons in excess of maximum stockpile objectives. Total Government inventories of manganese materials, including manganese ores not meeting stockpile specifications, amounted to 12 million tons at the end of 1961. Listed below for the various grades of manganese materials meeting stockpile specifications are the Government's maximum stockpile objectives and the inventories as of December 31, 1961 (in thousands of short dry tons):

Item	Grade			Total
	Metal-lurgical	Battery	Chemical	
Maximum stockpile objectives	6,800	70	83	6,953
Government inventory:				
Strategic stockpile	5,230	166	31	5,427
Defense Production Act inventory	1,324	4	-	1,328
Commodity Credit Corporation and supplemental stockpile	2,562	129	145	2,836
Total	9,116	299	176	9,591
Surplus in inventories over maximum objectives	2,316	229	93	2,638

The quantities of manganese materials meeting stockpile specifications in Government inventories at the end of each year beginning with 1948 are shown in table 7.

The inventory total of 9.1 million tons of metallurgical material, shown above, includes 790 thousand short tons of standard (high-carbon) ferromanganese and 10.7 thousand short tons of manganese metal. However, it does not include 2.4 million short dry tons of ore (owned by the Government) which does not meet stockpile specifications; 624 thousand

tons of this amount are in the strategic stockpile, 1.8 million tons are in the DPA inventory, and almost 3 thousand tons are in the supplemental stockpile.

The 9.1 million tons of metallurgical manganese materials in the U.S. stockpiles at the end of 1961 were equivalent to slightly more than 5 years' consumption at the average annual rate that prevailed during 1956-61. Most of this material was manganese ore, which had to be converted to ferroalloys or manganese metal before it could be used.

By Dec. 31, 1961, the total cost to the Government of acquiring manganese materials had amounted to $670.8 million, of which $540.2 million was for material of stockpile quality, and $130.6 million for ore not meeting stockpile specifications (table 8). At the end of 1961 the market value of the material that did meet specifications was calculated at $507.8 million; no data are available on the market value of the ore that did not meet specifications. For material meeting stockpile specifications the market value of the surplus over maximum objectives at the end of 1961 was $209 million.

Materials in the strategic and supplemental stockpiles may not be disposed of without the approval of Congress, except in time of war or during a national emergency with respect to the common defense, when they may be released by Presidential order. Less stringent regulations control releases of material held in the DPA inventory.

U.S. CONSUMPTION

The United States, the world's largest consumer of manganese, accounted for more than a fourth of the world total consumption during

1957-61. The position of the United States in world consumption is indicated by the fact that it produced 28 percent of the world output of steel during this period, and by the fact that the great bulk of the manganese is consumed in the production of steel. The Soviet Union, which produced 19 percent of the world's steel, was probably the world's second largest consumer of manganese; the other leading consuming countries were West Germany, the United Kingdom, and Japan. 1/

It is estimated that during 1956-61 the U.S. annual consumption--in additive manganese alloys and unalloyed metal, and in manganese ore used for dry cells and chemicals--averaged about 772,000 short tons of manganese content (table 5). 2/ The annual consumption during this period ranged from about 644,000 short tons in 1958, a recession year, to about 887,000 tons in 1956, when a postwar record was attained. In 1961 about 764,000 tons were consumed.

Trend of consumption

The long-term trend of U.S. consumption of manganese has been upward; this trend is not apparent, however, from the data for the past decade. The average annual consumption in 1956-61 (772,000 tons), indicated above, was slightly below that of 781,000 tons in the preceding period, 1951-55,

1/ Data on the production of steel from the American Iron and Steel Institute, Foreign Trade Trends, Iron and Steel (1962 edition).

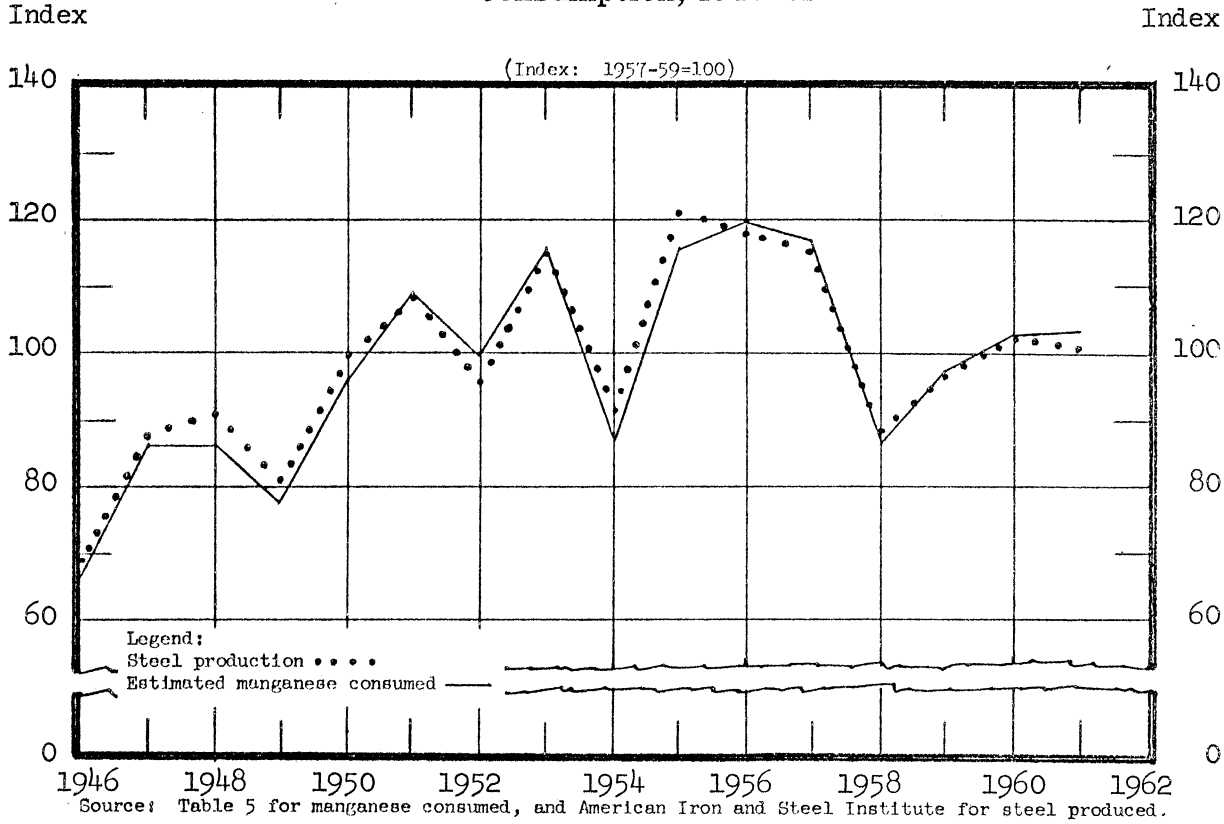
2/ These estimates are based on the gross weight of the various metallurgical products consumed (table 33) and the gross weight of foreign and domestic manganese ore consumed in manufacturing dry-cell batteries and chemicals (table 29) multiplied by the average manganese contents of the respective metallurgical products and ores. Whenever available, data were used on average manganese contents of products consumed (such as the average manganese contents of the various metallurgical products consumed in steelmaking as reported for recent years by the American Iron and Steel Institute). For much of the data for the period before 1956, use was made of average manganese contents of imported products (compiled from official import statistics) and average manganese contents of products shipped by domestic producers (compiled by the U.S. Bureau of Mines).

but it was considerably larger than the average annual consumption during 1946-50 (612,000 tons). The rate of manganese consumption during 1951-55 was high, reflecting the effect of the Korean war, while that during 1956-61 was retarded by the business recession in 1958 and the steel strike in 1959. The annual consumption has increased since 1958; further increases are expected with the growth of the national economy.

The annual consumption of manganese has varied directly with the annual production of steel. This close correlation is indicated by the annual indexes of U.S. steel production and manganese consumption, as shown in chart I.

Chart I

Indexes of U. S. steel production and manganese consumption, 1946-61



Source: Table 5 for manganese consumed, and American Iron and Steel Institute for steel produced.

Manganese ore consumed

Because of processing losses, the manganese content of the ore used in making manganese metallurgical products is larger than the manganese content of such products. Accordingly, U.S. consumption of manganese would appear to be greater at the point of consumption of the manganese ore than at the point of consumption of the manganese metallurgical products. During the 6 years 1956-61, the U.S. annual consumption of manganese ore for metallurgical uses is estimated to have averaged about 835,000 short tons of manganese content 1/, as compared with an average of 727,000 short tons of manganese contained in the metallurgical products. In addition, an average of about 45,000 short tons of manganese was contained in the manganese ore consumed during 1956-61 for batteries and chemicals.

Of the total quantity of manganese ore (containing 35 percent or more manganese) consumed in the United States during 1956-61, 2/ 95.5 percent was consumed in metallurgical uses, 1.5 percent was used in producing dry-cells, and the remaining 3.0 percent was used in the manufacture of chemicals and miscellaneous items (based on data in table 29). The proportion of the total consumed in metallurgical uses

1/ Data on U.S. consumption of manganese ore, by uses, as compiled by the U.S. Bureau of Mines (table 29) are limited to gross weight of the ore consumed, and since 1955, to ore containing 35 percent or more manganese. It is estimated that during 1956-61 about 835,000 tons of manganese contained in ores of this grade were consumed annually in metallurgical uses. However, as indicated in table 5, an average of about 25,000 tons of manganese were contained in lower-grade manganese ore supplied annually by U.S. mines (18,000 tons) and imports (7,000 tons); a part of this quantity was consumed in metallurgical uses and a part of it entered Government and private stockpiles.

2/ An annual average of 1,899,000 short tons (gross weight).

declined from 97.1 percent in 1956 to 93.0 percent in 1961, while the share going to chemicals and miscellaneous uses increased from 1.5 percent in 1956 to 5.3 percent in 1961. The percentage of the total consumed in making dry cells remained almost unchanged during the period.

The share of the total manganese ore consumed that was supplied by U.S. mines has been small. A peak in the utilization of domestic ore was reached in 1943, when 200,000 tons were consumed. This quantity represented about 15 percent of the total consumed in that year. More recently, the share supplied by domestic sources has decreased; it amounted to about 8 percent of average annual consumption in 1946-50, 4 percent in 1951-55, and only 2 percent in 1956-61 (table 29).

Only about 8,500 tons of domestic ore (containing 35 percent or more manganese) were consumed in 1959, possibly because of a diversion of material to Government depots in that final year of a Government purchase program. The consumption of domestic ore amounted to 29,000 tons in 1960, but was only 20,000 tons in 1961, when it represented 1.2 percent of that year's consumption of ore from all sources.

U.S. mines have generally supplied a larger share of the manganese ore consumed in dry cells, chemicals, and miscellaneous uses, than in metallurgical uses. 1/ During 1956-61, domestically produced ore accounted for 10.4 percent of the total quantity consumed in making dry cells and 4.5 percent of that consumed in making chemicals, compared with only 1.7 percent of the total consumed in metallurgical uses. The share of the manganese ore consumed in making dry cells that was supplied by domestic ores increased from 4.7 percent in 1956 to 16.1 percent in 1961.

1/ As reported annually by the U.S. Bureau of Mines (Minerals Yearbook), U.S. industries consumed annually an average of 2,330 short tons of domestically produced manganese ore in the manufacture of chemicals (and miscellaneous items) in the period 1942-61 (table 29).

During the same period the share of the total consumed in chemicals and miscellaneous uses that was supplied by domestic ores varied from less than 1 percent in 1958 and 1959 to 10.5 percent in 1960; it amounted to 6.5 percent of the total in 1961.

Consumption of manganese metallurgical products

Data on U.S. consumption of manganese metallurgical products, by types, are presented for a period of years in table 33, and by types and end uses for 1961 in table 30. 1/ Of the total quantity of manganese metallurgical products consumed in the United States during 1956-61 (averaging, on a gross weight basis, 988,000 tons per year), ferromanganese, mostly standard (high-carbon) grade, accounted for 82.5 percent, silicomanganese for 10.7 percent, spiegeleisen for 4.6 percent, manganese metal for 1.2 percent, and briquets (made up mostly of ferromanganese) for the remaining 1 percent (table 33).

Inasmuch as nearly all of these products are consumed in steelmaking, the year-to-year changes in total consumption are attributable almost entirely to changes in steel production. However, a persistent downward trend is apparent in the consumption of spiegeleisen, which averaged 165,000 tons per year during 1941-45, 97,000 tons during 1946-50, and about 45,000 tons during 1956-61. By contrast, annual consumption of manganese metal, although small compared with that of the other products, has increased sharply in recent years--from an average of less than 2,000 tons per year during 1951-54, to more than 16,000 tons in 1961.

1/ The quantity data, in terms of gross weight, as compiled by the U.S. Bureau of Mines from reports received from individual consumers, are supplemented by estimates of manganese content by the Tariff Commission.

According to data compiled by the U.S. Bureau of Mines, the production of steel ingots and castings in 1961 consumed a total of 911,000 short tons (gross weight) of manganese metallurgical products, of which 75 percent was used in making carbon steel (table 30). As previously noted, the estimated manganese content of these products consumed in all steelmaking in 1961 amounted to about 678,000 short tons, representing about 96.5 percent of the manganese contained in the metallurgical products consumed for all purposes. The remaining 3.5 percent was used principally in the production of gray and malleable iron castings and in nonferrous alloys including welding rods.

The predominant share of the manganese metallurgical products consumed in the United States is made from foreign ores in U.S. plants During 1956-61, annual shipments by U.S. producers of ferromanganese, the principal manganese product, averaged 777,000 short tons, compared with average annual imports of ferromanganese of 166,000 tons (table 34). About 98 percent of the manganese ore consumed in the production of ferromanganese in the United States during this period was of foreign origin (table 31).

Consumption in relation to domestic mine shipments and imports

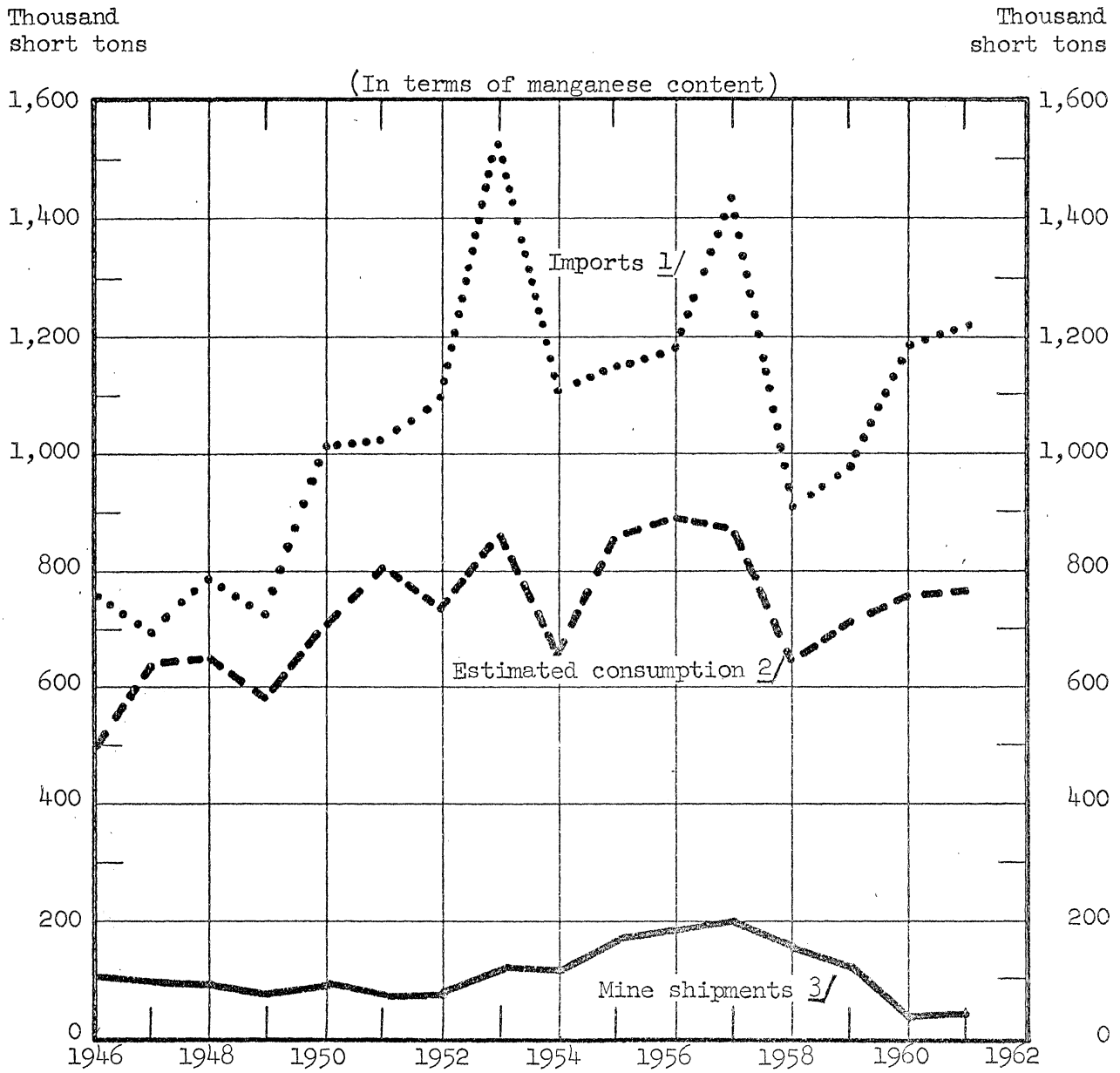
As previously stated, domestic mine production has accounted for only a small part of the manganese consumed in the United States. Imports alone have exceeded U.S. consumption in each postwar year, notwithstanding that a small part of the quantity consumed was supplied by domestic mines. Beginning in 1950, they exceeded consumption by a substantial margin; in the period 1956-61, they did so by about 31 percent.

This persistent excess of imports reflected largely net annual additions to U.S. Government stocks, a large part of which came from foreign sources (table 9).

The quantity of manganese consumed in the United States in relation to the quantities shipped by domestic mines and imported in each postwar year are shown on chart II. All data are in terms of short tons of manganese content (table 5). Exports (not shown on the chart) are very small; they amounted to only about 8,000 tons per year (manganese content) during 1946-61. About half of the exports consisted of manganese ore which is included in the data on mine shipments.

Chart II

Manganese: U.S. consumption, imports, and mine shipments, 1946-61



1/ In ores containing 10 percent or more manganese and in manganese metallurgical products.
2/ In manganese metallurgical products and in manganese ores consumed for other purposes.
3/ In ores (including concentrates or nodules) containing 10 percent or more manganese.

Source: Table 5.

THE U.S. INDUSTRY

Mining and milling

The deposits of manganese ore in the United States are generally of lower grade (that is, they have a lower manganese content) than the deposits in the foreign countries that are the major U.S. suppliers. Moreover, the domestic production and sale of manganese ore have been seriously handicapped by: (1) the underground location of most domestic deposits that are mined, (2) the lack of uniformity among domestic ores, (3) the need for concentrating and upgrading these ores to adapt them to prevailing metallurgical techniques, and (4) the high cost of overland transportation, from mines located largely in the Western States to consuming centers located in the Central and Eastern States.

During the period of the Government's purchase program (1951-59), several hundred manganese mines were active in the United States for varying periods of time. Most of these operations exploited small ore bodies and offered little employment other than to the proprietor-operators. A number of more extensive projects had several dozen employees; only a few large mines provided jobs for more than 100 employees. The Census of Mineral Industries 1/ reported that the products shipped by the "manganese ores industry" were valued at $32.4 million in 1954 and at $39.4 million in 1958. The Government purchase program was in effect in both of these years. The Census reported 367 "establishments" engaged in producing manganese ore in 1954 and 186 in 1958; only 24 of the establishments in 1954 and 22 in

1/ U.S. Bureau of the Census.

1958 each had 20 or more employees. Responses to questionnaires sent by the Tariff Commission to about 300 establishments, which had operated at some time during the last 10 years, disclosed that in 1961 only a half-dozen were still operating; in 1962 only four were active. The company operating one of these establishments, the activities of which in recent years have been confined largely to processing manganese ore already above ground, has advised customers that it intends to discontinue production when these supplies are exhausted.

The few domestic ore producers that marketed their output commercially during 1960 and 1961 differed materially in method of operation and type of products. Several sold ore, concentrate, or nodules to one or more of the following: The steel industry, other consumers of metallurgical ore, and makers of welding rods and chemicals. Others sold their output in the form of battery mix and chemicals.

Production trends.--Manganese ore has been produced at one time or another in about half of the States. Since 1950, Nevada and Montana have usually been the largest U.S. sources of metallurgical-grade ore containing 35 percent or more manganese; they were the only sources in 1961. In 1951-60, Arizona, Arkansas, New Mexico and California were also large shippers, while Virginia and Tennessee shipped smaller quantities (table 12). Much of the domestic production

of ores containing less than 35 percent manganese has occurred in Minnesota and Michigan, where the ore is associated with iron ore. 1/

In the early part of the present century, the annual production of manganese ore in the United States was seldom more than 10,000 tons gross weight; frequently it was as small as 2,000 tons. The output increased considerably after the outbreak of World War I; it exceeded 100,000 tons in 1917 and 300,000 tons in 1918. Thereafter, production dwindled to much lower levels until World War II; 250,000 tons were produced in 1944. After World War II the output again declined, but it increased with the outbreak of the Korean war. Under the stimulus of Government purchase programs which offered substantially higher ore prices than those prevailing in the commercial market, production attained record levels during the 1950's. In the years 1955-58 the average gross weight of U.S. mine shipments of ore containing 10 percent or more manganese exceeded 400,000 tons annually, and the manganese content of this material averaged approximately 177,000 tons. The decrease in output after 1959, following the termination of Government purchases of domestic ore, was more abrupt for ore containing 35 percent or more manganese than for ore containing 10 to 35 percent manganese

1/ The diverse, scattered, and intermittent character of manganese mining in the United States has created difficulties in measuring production. The U.S. Bureau of Mines uses data on shipments as its measure of output, calculating quantities at the point at which material is considered to be in marketable form. At various locations, manganese-containing ores have been mined which have been neither marketable commercially nor salable to the Government under the purchase program. Such accumulations are not deemed to be production until they are converted into salable form by concentrating or by blending with higher-grade material. The above-ground supply of such ores cannot be estimated with any dependable degree of accuracy; however, the quantity involved is not of great significance in the overall national supply.

(table 11). Production of manganiferous iron ore (5 to 10 percent manganese content), which averaged more than 1 million tons per year during 1941-50, declined irregularly to a low of 107,000 tons in 1961 (table 13).

Employment and wages.--Both employment and aggregate wages paid by establishments engaged in mining and milling manganese ore (containing 10 percent or more manganese) have declined sharply from the high levels attained during the 1950's. According to data compiled by the U.S. Bureau of the Census, the number of employees in the industry averaged 2,604 in 1954 and 2,099 in 1958. Wages paid to production and related workers in each of these years amounted to more than $7 million. A more recent canvass of the industry by the Tariff Commission found that the number of employees averaged 322 in 1960 and 222 in 1961. Total wages paid to production and related workers in these years were about $1 million per annum.

The number of employees engaged in producing manganese ore in the United States is much smaller than the number engaged in processing such ore (foreign and domestic) into ferromanganese and other manganese products. Even in years of high mine production, employment in domestic manganese mining and milling was equal to only about half that in plants producing ferromanganese and other manganese products (table 14).

Manganese reserves of the United States.--Manganese resources of the United States have been estimated by U.S. Government agencies twice in the past 10 years with no outstanding variation in the estimates. The U.S. Bureau of Mines made a detailed study of U.S. deposits in 1952,

and the U.S. Geological Survey reported on the nation's manganese reserves in 1956. Both studies listed the country's reserves at approximately 70 million tons of contained manganese, mostly in low-grade deposits (table 28). In contrast with this estimate of the manganese contained in U.S. ore reserves, U.S. commercial imports 1/ of ore in 1951-61 contained nearly 10 million tons of manganese (table 16). The two estimates of U.S. ore reserves are described briefly in the following paragraphs.

The estimate by the Bureau of Mines in 1952 (Mobilization Survey I-5) indicated that U.S. reserves of manganese ore amounted to more than 1 billion tons having a manganese content of approximately 85 million short tons. More than 99 percent of the known reserves were located in 12 major deposits and the balance was distributed among more than 1,000 small showings. About 93 percent of potential U.S. manganese resources identified were in 4 localities: The Cuyuna Range, Minnesota; Aroostook County, Maine; the Artillery Mountains, Arizona; and the Chamberlain Range, South Dakota. It was estimated that the Chamberlain deposits had a manganese content of about 15 percent. The Aroostook County resources were listed as containing 7 percent manganese; those in the Cuyuna Range, 5 percent; and those in the Artillery Mountains, 4 percent. Of the four States mentioned, only Arizona had produced metallurgical ore containing 35 percent or more manganese continuously for a period of years (table 12). Production in Minnesota, as has been indicated, is principally ferruginous manganese ore and manganiferous iron ore

1/ Refers to total imports minus duty-free imports for the U.S. Government.

(with manganese content ranging from 5 to 35 percent). In 1957, the peak year of U.S. manganese production, no output was reported for either South Dakota or Maine.

The U.S. Geological Survey in 1956 estimated total manganese reserves at more than 970 million long tons (equivalent to more than 1 billion short tons) of ore having a manganese content approaching 70 million long tons (78.4 million short tons). The manganese content of the ore was listed as ranging from 22.5 percent for small deposits in the Philipsburg district of Montana, to 9 percent for much larger deposits in Maine and to 5 percent in Minnesota (table 28). Some of the estimates included in the total were made in 1955 and others in 1949. The data were qualified by the comment that many of the deposits entering into the calculations had never been mined, and that a margin of error of approximately 50 percent should be allowed in evaluating the estimates.

Commercial exploitation of U.S. manganese reserves would involve problems of developing economic methods for removing ore from underground deposits, processing complex ores, and gaining their acceptance by domestic ferromanganese producers. By contrast, foreign ore properties in which some domestic alloy producers have extensive financial investments have known reserves sufficient to support production for many years and yield high-grade ore with which the processors are already familiar.

Manganese processing

Nature of the industry.--About two-thirds of the U.S. output of ferromanganese--i.e., the alloying material into which most manganese ore is converted--is made in blast furnaces. These furnaces are operated by two or three large steel companies that produce both for their own use and for sale, and by one independent operator that makes ferromanganese for sale only. The remaining third of the ferromanganese production is made by seven companies that operate electric furnaces in which silicomanganese and other manganese alloys, as well as ferroalloys not containing manganese, are sometimes made. Some of these producers occasionally make spiegeleisen, although in the United States most spiegeleisen is made by a single company, which utilizes manganese-bearing residues of zinc smelting. Since the early 1950's, two U.S. manufacturers have produced manganese metal by the electrolytic process. One of them is also a large producer of ferroalloys and the other is a producer of chemicals. Two chemical concerns plan to produce manganese metal beginning in 1962. An indeterminate number of companies process manganese ore in small quantities for non-metallurgical purposes. Among these are a half dozen concerns which grind, blend, or otherwise process ore for battery mix and for manganese chemicals.

Production trends.--The U.S. production of ferromanganese by operators of both blast and electric furnaces has averaged about 800,000 tons annually since 1951. In 1957 production reached a record high of

about 964,000 tons; in that year, the industry shipped 882,000 tons valued at $210 million (table 34). Shipments in 1961 amounted to 757,000 tons valued at $159 million.

The output of ferromanganese by blast-furnaces was 505,000 tons in 1961, which was lower than the 571,000 tons produced in 1960, and well below the production of 735,000 tons in 1957 (table 31). Production by electric furnaces has been more stable than that from blast furnaces; it amounted to about 228,000 tons in both 1957 and 1961 and reached a high of 272,000 tons in 1960. The greater stability in output by electric furnaces is attributable in part to the fact that such producers are often required to make costly commitments for power which must be paid for whether or not it is utilized; hence the furnaces continue in operation during periods of slack demand and producers' stocks generally rise under such conditions.

Data on the annual production of silicomanganese have been available only since 1957, when the output amounted to 115,000 tons; this level was not exceeded until 1961 when 120,000 tons were produced. The 1957 shipments of 108,000 tons were valued at $28 million; the considerably larger shipments in 1961 (121,000 tons) were valued at $25 million (tables 32 and 34). No data on the production of spiegeleisen and manganese metal are published. Because of the limited number of producers, publication of such data might reveal the individual operations of the respective concerns.

Employment and wages.--Both employment and aggregate wages paid at plants producing ferromanganese and other manganese products were

lower in 1961 than in 1960, according to reports submitted to the Tariff Commission by 25 processors (table 14). These companies reported an average of 4,369 employees (including 3,466 production and related workers) in 1961, compared with an average of 5,287 employees (including 4,194 production and related workers) in 1960. Wages paid by the industry to production and related workers amounted to $18.9 million in 1961 and $22.1 million in 1960. Hourly wages in 1961 averaged $2.68, compared with $2.64 in 1960 and $2.38 in 1957. Total employment and wage payments in 1960 exceeded the levels of 1957, which was a year of high activity in the manganese industry.

U.S. IMPORTS

As previously noted, the United States is primarily dependent on imports, principally in the form of manganese ore, for its supplies of manganese. Inasmuch as U.S. production of ore has been small, the volume of imports in recent years has been determined in large measure by activity in the steel industry and by the rate of U.S. Government acquisitions of manganese for stockpiling. The importance of U.S. Government acquisitions from foreign sources is indicated by the fact that, in the 11 years 1951-61, duty-free imports for the U.S. Government accounted for about one-fifth of the total quantity of manganese contained in all imports of manganese ores and metallurgical products (table 5).

Manganese ore

Of the total quantity of manganese contained in ore imported during 1951-61, exclusive of duty-free imports for Government use, 93.2 percent was contained in metallurgical-grade ore, 4.4 percent was in battery- and chemical-grade ore, and the remaining 2.4 percent was in manganese ore containing less than 35 percent manganese. The manganese content of such imports averaged 46 percent for the metallurgical-grade ore, 54 percent for the battery- and chemical-grade ore, and 23 percent for the lower-grade ore containing 10 to 35 percent manganese.

The following tabulation [1/] shows the manganese content and the foreign value of U.S. imports of manganese ore, by types, in selected postwar periods:

1/ See tables 15, 18, 20, and 23.

Type of manganese ore	Average 1946-50	Average 1951-55	Average 1956-61
	Manganese content (short tons)		
Ore containing 35 percent or more manganese:			
Metallurgical grade	685,597	1,033,711	949,161
Battery and chemical grade	40,872	39,078	53,427
Ore containing 10 to 35 percent manganese	7,253	37,473	7,041
Total	733,722	1,110,262	1,009,629
	Foreign value (1,000 dollars)		
Ore containing 35 percent or more manganese:			
Metallurgical grade	26,443	68,818	73,536
Battery and chemical grade	1,999	3,312	6,162
Ore containing 10 to 35 percent manganese	225	1,648	329
Total	28,667	73,778	80,027

The manganese contained in all imports of manganese ore increased from an annual average of 734,000 tons during 1946-50, to an average of 1.1 million tons during 1951-55; the manganese content of imports averaged one million tons annually during the 6 years 1956-61. The average annual value of imports was higher in each of these successive periods ($28.7 million, $73.8 million, and $80.0 million, respectively), owing to increased unit values. The average annual imports of battery- and chemical-grade ore were considerably higher during the last 6 years than in the preceding years.

Since 1956 the principal U.S. sources of manganese ore imports have been Brazil, India, Ghana, the Union of South Africa, Mexico, Morocco, the Republic of the Congo, and Cuba 1/ (table 17). Battery- and

1/ Imports from Cuba were discontinued after 1960.

chemical-grade ores have come principally from Greece, Ghana, and Morocco (table 25). Before 1949, the Soviet Union was a major source of U.S. imports, but the Soviet Government embargoed shipments to the United States in late 1948.

Large investments of U.S. capital for the development of extensive manganese deposits in Africa and South America foreshadow a diminution in the number of sources from which the United States may be expected to receive manganese supplies in the future. In Brazil, the Bethlehem Steel Co. has invested in a large operation, the development of which was assisted by the U.S. Export-Import Bank. Some of the ore from this mine is consumed in the United States by the Bethlehem concern; some is sold to other processors in the United States and elsewhere; and some has been acquired by the U.S. Government for stockpiling. The United States Steel Corporation has also developed manganese resources in Brazil and is now developing an extensive operation in Gabon (formerly part of French Equatorial Africa). U.S. interests have also been developing other foreign sources of manganese, including some deposits in British Guiana, Ghana, Mexico, Northern Rhodesia, and the Union of South Africa.

Manganese metallurgical products

During the 6 years 1956-61, the annual imports of manganese in metallurgical products averaged 136,900 short tons compared with the aforementioned average of one million tons contained in imports of ore (tables 36 and 16).

In addition to the imports of manganese metallurgical products for commercial use, there have been imports by the U.S. Government in recent

years. In the period 1951-61, duty-free imports for U.S. Government use accounted for 49 percent of the total imports of ferromanganese (table 38). With the stockpile objectives now fully attained, annual imports of manganese metallurgical products may be lower in the near future than they were in the recent past.

The following tabulation (based on table 36) shows the quantity and value of manganese metallurgical products, by kinds, imported into the United States in selected postwar periods:

Manganese product	Average 1946-50	Average 1951-55	Average 1956-61
	Manganese content (short tons)		
Ferromanganese	61,835	68,233	127,382
Silicomanganese	51	969	9,398
Spiegeleisen	440	33	8
Manganese metal	negligible	-	140
All products	62,326	69,235	136,928
	Foreign value (1,000 dollars)		
Ferromanganese	11,480	16,957	27,874
Silicomanganese	9	168	1,815
Spiegeleisen	120	14	3
Manganese metal	negligible	-	65
All products	11,609	17,139	29,757

The annual imports of each kind of manganese product except spiegeleisen averaged higher in each of the last two periods shown than they did in the immediately preceding period. The major part of the imports consisted of ferromanganese. Imports of all metallurgical products combined reached a record high of 263,000 tons in 1957. They dropped

sharply to 58,000 tons in 1958, then increased to 83,000 tons in 1959, to 103,000 tons in 1960, and to 184,000 tons in 1961. The annual average value of imports of all manganese metallurgical products was $11.6 million in 1946-50, $17.1 million in 1951-55, and $29.8 million in 1956-61. In 1961, total imports of these products amounted to 184,000 tons, valued at $37.2 million. Commercial imports of ferromanganese during 1957-61 have come principally from France, Japan, the Union of South Africa, and West Germany (table 40). Imports for Government account in 1957-61 came principally from Canada, India, France, and Japan (table 41). Japan has been virtually the only source of manganese metal (table 43). Manganese-silicon alloys have come from scattered sources; Norway's importance as a U.S. supplier has increased steadily (table 42).

U.S. EXPORTS

It is estimated that the manganese content of U.S. annual exports of manganese ore and manganese products during 1951-61 varied from 4,000 to 9,000 tons; these quantities are small compared with the manganese content of imports of about 1 million tons per year. Manganese metal accounted for more than half of the value of U.S. exports of manganese products in both 1960 and 1961. Exports of manganese metal increased from 218 tons in 1951 to 2,234 tons in 1961. The value of U.S. exports of manganese products in the period 1951-61 averaged $1.8 million per year. The average annual export values for the different categories of materials were as follows: $673,000, for manganese ore, $553,000 for ferromanganese and silicomanganese; $530,000 for manganese metal and scrap; and $17,000 for spiegeleisen (table 44).

Some of the manganese ores exported are comprised of imported manganese ore, principally of battery grade, which was re-exported from the United States after grinding, blending, or other processing. Canada has been the principal market for U.S. manganese exports; small quantities have been exported to numerous other countries.

U.S. COMMERCIAL STOCKS

Manganese ore

U.S. commercial stocks of manganese ore, held principally by ore consumers, have increased substantially since World War II. The gross weight of yearend stocks of ores containing 35 percent or more of manganese (including those in bonded warehouses, but not Government-owned

stocks), averaged 1.3 million short tons annually in the period 1946-50; they increased to an annual average of 1.4 million tons in 1951-55 and to 2.1 million tons in 1956-61 (table 6). Stocks at the end of 1959, 2.7 million tons, were at a record high. Although they declined thereafter--to 2.6 million tons at the end of 1960 and to 2.2 million tons at the end of 1961--they were still much larger than in 1946-50. Almost all of the stocks consisted of imported ore.

Manganese metallurgical products

U.S. commercial stocks of manganese metallurgical products, held by producers and consumers, are considerably smaller, in terms of manganese content, than the commercial stocks of manganese ore.

Yearend stocks of manganese metallurgical products, as in the case of ore, have increased since World War II. The gross weight of yearend stocks held by producers and consumers averaged 239,000 short tons in the period 1946-50, 296,000 tons in 1951-55, and 330,000 tons in 1956-61 (table 35). The stocks were at a record high at the end of 1957 (368,000 tons), dropped to 284,000 tons by the end of 1959, but returned to a higher level at the end of 1961 (350,000 tons). Such stocks consisted largely of ferromanganese, of which producers and consumers each held about half.

The total quantities of manganese stocks (ores and metallurgical products combined) held by the U.S. Government are several times larger than those held by U.S. producers and consumers combined. Data on private and Government stocks at the end of each year beginning with 1948 are summarized in table 9.

MARKETING

Manganese ore

Methods of marketing.--Marketing practices vary considerably among the few domestic producers of manganese ore (including nodules); each producer's product generally differs from that of the others and encounters different market conditions. Most sales are made by direct negotiation between seller and buyer, with the latter generally paying the freight. In 1961, one producer of ore for metallurgical use shipped his entire output in carload lots on a contract basis to a single purchaser. Other producers of manganese ore (including nodules) sold in lots of various sizes depending upon the grade of the material and the use for which it was intended. Long-term contracts are seldom made for the sale or purchase of domestic ore.

Several of the largest U.S. consumers of manganese ore import for their own use from sources in which they have financial interests. These large users sometimes sell part of the imported ore and, to obtain proper blends and to balance inventories, also purchase ore in the open market. Several of the independent importers in the manganese trade have large organizations doing business on a world-wide scale and dealing in a number of ores other than manganese. Some importers have financial interests in foreign mining operations whereas others buy ore on a contract basis only. Importers have aided the Government in procuring ore for stockpiling, and have assisted in the Government's barter program.

Ore consumers and dealers usually desire assurance of a supply of ore adequate for their own needs, or those of their customers, over an extended period of time. Imported ore is therefore ordinarily sold to major consumers or dealers under long-term contracts covering large tonnages. In times of slack activity in the steel industry, ore consumers or dealers are reluctant to make long-term commitments at fixed prices. It is not uncommon for contracts to be written with the stipulation that they may be renegotiated in the event of substantial changes in either the price of manganese ore or the cost of ocean freight. Regardless of price changes, importers in times of slack demand are confronted with the alternative of either curtailing imports or accumulating large inventories, usually at ports of entry.

Transportation costs.--The cost of transporting manganese ore to U.S. consumers is an important factor in marketing both domestic and foreign ores. Inasmuch as manganese ore is a bulk commodity, the most economical means of transporting it is by water--in shipload lots when possible. The few producers of manganese ore in the United States are located in the West and Southwest at considerable distances from the principal consumers, who are located in the East and North Central States. The expense of shipping ore long distances limits the price that can be obtained for domestic ore at the point of shipment. For example, one ore producer in the West reported that the cost (at the end of 1961) of shipping ore from the minehead to consumers in Wisconsin, Illinois, Ohio, and Pennsylvania ranged from $14.50 to $17.70 per ton.

Such freight costs (which were for ore containing 35 percent or more manganese and valued at $65 to $90 per ton at the mine) represented from 13 to 25 percent of the delivered price of the ore. On shipments of lower-grade ore (containing less than 35 percent manganese), freight costs have sometimes amounted to half the delivered price of the ore, even when short hauls were involved.

High transportation costs are also involved in moving imported ore from the mines in the producing countries to consumers in the United States. Internal transportation costs vary among the producing countries according to the proximity of the mines to the loading ports; hauls of 100 miles or more are not uncommon. Importers reported to the Tariff Commission that in 1961 ocean freight charges on manganese ore received at East Coast ports of the United States ranged from $7.15 to $11.34 per short ton from Africa, $6.47 to $7.25 per ton from India, and $2.30 to $4.75 per ton from Brazil. These freight charges applied to various grades of ores delivered to East Coast ports at landed duty-paid costs which ranged from $25.00 to $110.00 per ton for ores from Africa, from $23.00 to $40.00 for ores from India, and from $37.00 to $51.00 for ores from Brazil.

The cost of rail transportation in the United States from ports of entry to points of consumption is also an important factor in the total cost of manganese ore to the consumer. Although such freight costs are small for the small quantities of ore consumed near the ports of entry, they range from $4 to $5 per ton for most ore entered at East and Gulf ports and shipped to the consuming centers in Pennsylvania, New York, and Ohio.

Price quotations.--Market prices are commonly quoted in trade journals for imported manganese ore, but not for domestic ore. Comparison of prices for imported manganese ore over an extended period is difficult because of changes in terms of sale and in the sources and specifications of the ore. In recent years, published price quotations have often been "nominal"--that is, they have merely reflected trade opinion on the state of the market rather than actual prices at which transactions took place.

Price quotations have been published for a number of years for Indian ore having a manganese content of 46 to 48 percent (table 45). In early 1951, such ore was quoted at $0.92 to $0.96 (nominal), c.i.f., U.S. ports, per long-ton unit (22.4 pounds of contained manganese). By August 1951, the quotations had risen from $1.25 to $1.30. Thereafter, they declined over a period of 3 years until they reached a low of $0.70 to $0.75 in the period from September to December 1954. During 1955, owing partly to stronger demand and increased ocean freight rates, prices for the specified ore gradually increased. The upward trend continued through December 1956, when the quotations reached a high of $1.64 to $1.69 per long-ton unit. Contributing to rising prices were the increased ocean freight costs following the closing of the Suez Canal, the imposition of an export tax by India effective September 1, 1956, and a high rate of manganese consumption. In 1958-59, increased supplies of manganese ore from expanding sources of production and a decline in the consumption of manganese by the steel industry

combined to weaken the market, as indicated by a gradual decline in the price quotation which in April 1959 dropped from $0.87 to $0.90 (nominal) per long-ton unit. Since that time the quotation for such ore has remained unchanged.

Since October 1, 1959, price quotations have been published for South African ore containing 46-48 percent manganese, and for Brazilian ore containing 48-50 percent manganese. Since October 1959 the former has been quoted at $0.87 to $0.90 (nominal) per long-ton unit and the latter at $0.91 (nominal) (table 45).

Manganese metallurgical products

Two of the large producers of steel make ferromanganese to meet their requirements; they also sell to other consumers in competition with importers and independent domestic producers. Published price quotations for manganese metallurgical products, as in the case of those for ore, serve to indicate the general level and trend of prices, but they are not necessarily the actual prices negotiated in individual sales. Prices of ferromanganese are quoted f.o.b. seaboard, or at major domestic producing or shipping points. Quotations for standard (high-carbon) ferromanganese containing 74-76 percent manganese increased from about 8.26 cents per pound at the beginning of 1951 to 10.04 cents per pound in the latter part of 1952. 1/ Thereafter, the price increased gradually, with one interruption, to a high of 12.75 cents per pound at the end of 1956 and remained at that level until September 1957. Over the four succeeding years, the price declined, with the quotation falling to a range of 9.5 cents to 11.0 cents per pound in December 1961 (table 46).

1/ Before June 18, 1953, prices were quoted for ferromanganese having a manganese content of 78-82 percent.

Imported standard ferromanganese was separately quoted, in a new listing beginning on August 2, 1962, at $158 per long ton (equivalent to 7.053 cents per pound); this price was considerably below the quotation for comparable domestic alloy. 1/

Since 1956 price quotations have been available for 2 other grades of ferromanganese in addition to those for the standard grade. These other grades are the medium-carbon grade, which contains from 80 to 85 percent manganese and 1.25 to 1.50 percent carbon, and the low-carbon grade, which contains 85 to 90 percent manganese and not more than 0.07 percent carbon. The quoted price of the low-carbon grade is about 3 times that for the standard grade and that for the medium-carbon grade is about double the price for the standard. When standard ferromanganese was quoted in a range of 9.5 to 11.0 cents per pound in December 1961, the medium-carbon grade was quoted at 24 cents, and the low-carbon grade, at 35.1 cents per pound. All three quotations remained unchanged through August 2, 1962.

Prices for silicomanganese are quoted in cents per pound in carload lots, f.o.b. shipping point. Since November 1952 prices have been published for three grades, all containing between 65 and 68 percent of manganese. Price differences between the grades reflect variations in the silicon and carbon contents, the higher prices being for the grades high in silicon and low in carbon. Current quotations (August 1962), which range from 10.1 to 10.6 cents per pound, are lower than those in any year as far back as 1950, and are 3.2 or 3.3 cents a pound less than the high prices quoted in October 1956 (table 47).

1/ E & MJ Metal and Mineral Markets, August 2, 1962.

Prices for spiegeleisen are quoted per gross (long) ton, in carload lots, f.o.b. Palmerton, Pa., a major producing point. The quotations are for three grades, depending on manganese content. Since January 11, 1962, quotations have been $99.50 per ton for the highest grade (21-23 percent manganese). This quotation is about $10 per ton lower than that which prevailed in 1957-59 (table 48).

Prices for manganese metal are quoted in cents per pound, f.o.b. shipping point, with freight allowed east of the Mississippi River. The quotations apply to electrolytic metal containing 99.98 percent manganese. Quotations for manganese metal in ton lots are usually 2 or 2.5 cents per pound higher than those for carload lots. The current quotation (August 1962), which has been in effect since May 3, 1962, is 31.25 to 33.75 cents per pound in carload lots. This price is lower than the 34 cents per pound which prevailed during 1957-60, but is substantially higher than the price (28 cents) quoted in 1951-52 (table 49).

WORLD PRODUCTION AND RESOURCES OF MANGANESE ORE

Trend

World production of manganese ore in 1961 was several times larger than the average annual output during World War II. Between 1949 and 1953 the expansion in world output was especially large, with the output increasing from about 5 million to 12 million tons annually. Additional increases in succeeding years raised the world total to a high of about 15 million tons in both 1960 and 1961. These tonnages are on a gross weight basis for ore containing at least 30 percent manganese (table 27), although most of the major sources supply ore with a manganese content of 40 percent or higher (table 26).

Principal producing areas

Manganese ore is mined in numerous countries. Europe accounts for almost half the world output; its position in this regard reflects largely production in the Soviet Union, which for years has been the world's leading producer. In 1961 Africa replaced Asia as the second largest producing continent. The Union of South Africa has become the leading producing country in Africa; it had an output of 1.6 million tons in 1961, which was more than twice that in 1956. Production in Ghana, which has been a major source of U.S. imports of both metallurgical and battery ore, was 432,000 tons in 1961, compared with more than 700,000 tons in 1956.

In Asia, where in recent years production of manganese ore has averaged about 3 million tons a year, India was for many years the largest producer; more recently, India's output has declined, having

fallen from nearly 2 million tons in 1956 to an average of about 1.3 million tons in the years 1959-61. The production in Communist China, estimated at 1.4 million tons in 1960, made that country the leading Asian producer in that year, but China's output in 1961 dropped to an estimated 1.1 million tons. Production in South America, which was about 1.4 million tons in 1961, is accounted for principally by production in Brazil (1.1 million tons in 1961) plus the production of British Guiana, a relatively new source. North America has not contributed to the general increase in world production of manganese ore; its annual output has decreased in 5 successive years, from 785,000 tons in 1956 to 248,000 tons in 1961.

The relative positions of the leading world producers of manganese ore during the period 1956-61 were as follows:

Year	Position in world production				
	First	Second	Third	Fourth	Fifth
1956	Soviet Un.	India	So. Afr.	Ghana	China
1957	Soviet Un.	India	Brazil	So. Afr.	China
1958	Soviet Un.	India	Brazil	China	So. Afr.
1959	Soviet Un.	India	Brazil	China	So. Afr.
1960	Soviet Un.	China	So. Afr.	India	Brazil
1961	Soviet Un.	So. Afr.	India	(Brazil & China)	Morocco

World reserves

Deposits of manganese are widely scattered throughout the world, not only in some 40 countries in which they are currently being mined, but also in a number of others. Some of the undeveloped deposits are little known. Many others, though known, are either inaccessible, or of low grade, or composed of minerals requiring complex recovery processes.

In 1952 1/ the U.S. Bureau of Mines estimated total world reserves of high-grade manganese ore at about one billion tons, including ore suitable for direct shipment and ore from which high-grade concentrate could be produced by beneficiation; more than half of these reserves were in the Soviet Union. In addition, the Bureau estimated that more than a billion tons of manganiferous ores containing less than 10 percent manganese had been located (some of these ores are mined primarily for their iron content).

Such estimates of world manganese reserves have limited significance. New deposits are being discovered and known deposits reappraised as they are developed. Still others are nearing exhaustion. The manganese ore reserves in the Soviet Union, and to a lesser extent those in China, are large but they are not likely soon to become a source of supply for U.S. consumers. Since 1950, there has been a trend in foreign countries toward production from large, rich, newly discovered deposits of manganese ore amenable to mining by economical mass-production techniques. As a result of this trend ore consumers are relying increasingly on fewer but larger ore sources despite the remote location of the mines. The following summary identifies the ore deposits from which the United States may expect to receive the bulk of its manganese ore supply.

Illustrative of a large new source of manganese is the mine being developed in Gabon by the U.S. Steel Corporation, which holds a 49 percent interest in the project. Ore shipments from the mine are scheduled to

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1/ Mobilization Survey, II-5.

commence in 1962. This deposit, containing at least 200 million tons of high-grade ore did not enter into the estimates of world reserves 10 years ago. The Gabon deposit has been described as being 15 feet thick, and having only a thin cover of soil, permitting surface mining. The manganese content of the ore as mined can be raised to about 50 percent by simple washing. Potential annual shipments are reported at 500,000 tons of ore. Facilities include a 180-mile railway and a 45-mile cableway. This project was financed in part by a $35 million loan from the International Bank for Reconstruction and Development (World Bank). The Gabon development, although unusually large, accounts for only part of the recent expansion of manganese mining in Africa. Several other sources are being mined; one in the Union of South Africa has been described as being expandable to the size of the Gabon project.

Steel-producing interests in the United States have been active in developing manganese resources in other areas. Reference has already been made to the Bethlehem project in Brazil. Its ore reserves (in the Amapa district) are estimated at 20 million tons, having a manganese content of 45 to 49 percent. Production there started about 7 years ago and reached an annual level of more than 800,000 tons. The ore has been shipped principally to the United States, although a portion of it is available for other markets. Elsewhere in Brazil, in the State of Matto Grosso, reserves have been estimated at around 40 million tons of ore containing 45 percent manganese. The U.S. Steel Corporation has arranged to participate in the exploitation of this deposit. The Autlan mine, located in Southwestern Mexico, is the nearest major producer from which manganese

ore can be shipped to the United States by rail. This mine, in which a U.S. steel company has an interest, is producing monthly 10,000 to 12,000 tons of ore which is averaging about 46 percent manganese.

Although the foregoing examples are representative of new projects having special interest to the U.S. steel industry, other large-size foreign deposits are sources of important quantities of high quality ore. Among these is the Imini mine in Morocco, which in 1961 produced 600,000 tons of ore, including more than 100,000 tons of a chemical ore exported to manufacturers in the United States and elsewhere. For many years, battery ore shipped to the United States was mined principally in a single mine in Ghana, in which the Union Carbide Co., a producer of dry-cell batteries and manganese alloys, has a large interest. This company is now developing a source of metallurgical ore in British Guiana. This project will involve an investment of $12 million.

India, for many years one of the world's major producers of manganese ore, has large manganese deposits which are still being explored and developed. In recent years production in India has supplied the country's growing ferroalloys and steel industries, as well as enabled the country to export more than 1 million tons of ore per year.

Other manganese resources

Other possible sources of manganese are low-grade manganese ore deposits, slags from steelmaking furnaces, and manganese nodules found on ocean bottoms. The exploitation of such sources would require the development of techniques of recovery that would permit them to compete with manganese mined from large deposits of high-grade ore.

APPENDIX A

SENATE RESOLUTION 206

87TH CONGRESS
1ST SESSION

S. RES. 206

[Report No. 1103]

IN THE SENATE OF THE UNITED STATES

SEPTEMBER 11, 1961

Mr. DIRKSEN (for himself, Mr. MANSFIELD, Mr. COOPER, Mr. MORTON, Mr. ALLOTT, and Mr. DWORSHAK) submitted the following resolution; which was referred to the Committee on Finance

SEPTEMBER 21, 1961

Reported by Mr. BYRD of Virginia, with amendments

SEPTEMBER 23, 1961

Considered, amended, and agreed to; preamble agreed to

RESOLUTION

Whereas, pursuant to a resolution of the Senate Committee on Finance, dated August 14, 1954, the United States Tariff Commission made an investigation under section 332 of the Tariff Act of 1930, of the domestic fluorspar industry and submitted a report of the results thereof to the said committee on June 6, 1955, and the Senate of the United States subsequently on August 21, 1959, by S. Res. 163, directed the United States Tariff Commission to bring up to date said report and to submit its findings not later than February 21, 1960; and

Whereas, pursuant to a resolution of the United States Senate adopted August 21, 1959, the United States Tariff Commission was directed to make a supplemental investigation of conditions in the lead and zinc industry and to bring up to date its report on lead and zinc which had previously been made on April 19, 1954; and

Whereas, pursuant to a resolution of the Senate Committee on Finance, dated March 17, 1958, the United States Tariff Commission made an investigation under section 332 of the Tariff Act of 1930, of the domestic mercury (quicksilver) industry and submitted a report of the results thereof to the said committee on December 1, 1958; and

Whereas the industries producing manganese, cobalt, and beryllium are becoming more and more distressed and such distress could have an effect on our national security: Now, therefore, be it

Resolved, That the United States Tariff Commission is hereby directed, pursuant to section 332 of the Tariff Act of 1930, to make further studies and bring up to date the reports on lead, zinc, mercury, and fluorspar and to report to the Congress on or before May 15, 1962, and to conduct investigations of conditions in the industries producing manganese, cobalt, and beryllium and report to Congress not later than August 31, 1962.

The supplemental reports and new reports shall include a summary of the facts obtained in the investigation, including a description of the domestic industry, domestic production, foreign production, imports, consumption, channels and methods of distribution, United States exports, and other factors affecting the competition between domestic and imported products. In the course of the investigations, the Commission shall hold hearings, giving adequate oppor-

tunity to interested parties to appear and be heard, except that in the case of lead, zinc, mercury, and fluorspar where reports are being brought up to date, the matter of further hearings shall be left to the discretion of the Tariff Commission.

APPENDIX B

SOURCES OF MANGANESE IN STEELMAKING

Manganese ferroalloys and to a small extent manganese metal (both produced from ore containing 10 percent or more manganese) supply a principal part of the manganese used in steelmaking. The following tabulation for 1960 shows the estimated manganese content of the various manganese-containing materials that entered into U.S. furnaces making iron and steel and the contained manganese in the various products [1] from these furnaces:

Item	Estimated manganese content	Percent of total
	Short tons	
Input of materials:		
Iron ore	503,000	24.8
Manganiferous iron ore	79,400	3.9
Slag from steelmaking furnaces	457,000	22.5
Home scrap (from own iron and steel works)	191,600	9.5
Purchased scrap	92,300	4.6
Ferroalloys	704,400	34.7
Total	2,027,700	100.0
Output of materials and products:		
Blast-furnace slag (lost)	308,000	15.2
Slag from steel furnaces:		
Recycled to blast furnaces	457,000	22.5
Sent to slag dumps	633,000	31.2
Home scrap	191,700	9.5
Shipped steel	438,000	21.6
Total	2,027,700	100.0

The tabulation indicates that about a third of the manganese put into process in these furnaces was contained in ferroalloys and a little

1/ Adapted from data supplied to the Tariff Commission by the Union Carbide Metals Company.

more than a fourth of the total manganese was contained in iron ore. Although the average manganese content of the iron ore consumed is very small, 1/ it supplies a substantial share of the manganese because of the large quantity of iron ore consumed. Somewhat more than a fifth of the manganese put into process was contained in slag from steel furnaces, and the remainder (about 14 percent) was contained in ferrous scrap.

On the output side of the process (that is, in the materials flowing out of the furnaces) about 15 percent of the manganese was carried out in blast-furnace slags and lost. 2/ About 54 percent of the manganese was carried out in slag from steelmaking furnaces and ladles, of which about two-fifths was recycled to blast furnaces. Most of it, however, was sent to slag dumps. 3/ Only about 32 percent of the manganese put into process (including that in recycled slag) was in the steel that came out of the furnaces. More than two-thirds of this amount entered into finished steel (various mill products) as shipped; the remainder, as home scrap, was put back into steel furnaces.

1/ A little more than 0.5 percent of gross weight.

2/ The manganese content of these slags, 0.5 to 1.0 percent, is too low for recovery.

3/ The accumulated slags from open-hearth furnaces and ladles sent to slag dumps average 5 to 9 percent manganese and represent a large potential source of manganese awaiting development of economic methods of recovery.

APPENDIX C

STATISTICAL TABLES

TABLES

Import duties on manganese ore, alloys and metal

Summaries of U.S. manganese supplies

Employment in producing and processing manganese ore

Imports of manganese ore

World production of manganese and U.S. reserves

Consumption of manganese ore by uses

U.S. supplies of manganese metallurgical products

Imports of manganese metallurgical products

Imports of manganese metallurgical products--Continued

Manganese exports

Price quotations for manganese ores and metallurgical products

Table 1.--Manganese ore and concentrates: U.S. rates of duty under par. 302(a), Tariff Act of 1930, from June 18, 1930, to August 31, 1962

(Rate in cents per pound on metallic manganese content)

Tariff description	Rate	Effective date and trade agreement or other basis for change
Par. 302(a):		
Manganese ore (including ferruginous manganese ore) or concentrates, and manganiferous iron ore, all the foregoing containing in excess of 10 per centum of metallic manganese.	1¢ 1/	June 18, 1930 (Tariff Act of 1930).
	1/2¢	Jan. 1, 1936; Brazil.
	1/4¢ 2/	Jan. 1, 1948; GATT.

1/ Rate established in Tariff Act of 1930 and currently applicable to the products of Communist-dominated nations or areas designated by the President pursuant to sec. 5 of the Trade Agreements Extension Act of 1951 (including Cuba, Public Law 87-456). Prior to May 24, 1962, manganese ore and concentrates of Cuban origin were free of duty pursuant to a concession granted by the United States to Cuba in the GATT. However, as of Feb. 7, 1962, the importation into the United States of all goods of Cuban origin and all goods imported from or through Cuba has been prohibited (Presidential Proclamation 3447, 27 F.R. 1085).

2/ Currently applicable to the products of all countries except the Philippines and Communist-dominated nations or areas. Also current base rate for computing preferential rate for "Philippine articles."

Table 2.--Ferromanganese: U.S. rates of duty under pars. 302(d) and (e), Tariff Act of 1930, from June 18, 1930, to August 31, 1962

Tariff description	Rate	Effective date and trade agreement or other basis for change
	Cents per pound on the manganese content plus percent ad valorem	
Par. 302(d)(e):		
Ferromanganese (containing 30 percent or more of manganese) containing of carbon--		
Not over 1 percent	1-7/8¢ + 15% 1/	June 18, 1930 (Tariff Act of 1930).
	15/16¢ + 10%	July 11, 1948; GATT.
	15/16¢ + 7-1/2%	Aug. 2, 1951; GATT.
	0.9¢ + 7%	June 30, 1956; GATT.
	0.85¢ + 6-1/2%	June 30, 1957; GATT.
	0.8¢ + 6%	June 30, 1958; GATT.
	0.7¢ + 5% 2/	July 1, 1962; GATT.
	Cents per pound on the metallic manganese content	
Over 1 percent but under 4 percent.	1-7/8¢ 1/	June 18, 1930 (Tariff Act of 1930).
	15/16¢ 3/	July 11, 1948; GATT.
4 percent or more	1-7/8¢ 1/	June 18, 1930 (Tariff Act of 1930).
	1¢ 4/	Jan. 1, 1936; Canada.
	11/16¢	July 11, 1948; GATT.
	5/8¢ 3/	June 6, 1951; GATT.

1/ Rate established in Tariff Act of 1930 and currently applicable to the products of Communist-dominated nations or areas designated by the President pursuant to sec. 5 of the Trade Agreements Extension Act of 1951 (including Cuba, Public Law 87-456).

2/ This rate reflects the first stage of a 2-stage GATT concession; the second stage will become effective on July 1, 1963 when the rate will be reduced to 0.6 cents per pound plus 4-1/2 percent ad valorem.

3/ Currently applicable to the products of all countries except the Philippines and Communist-dominated nations or areas. Also current base rate for computing preferential rate for "Philippine articles."

4/ Trade agreements with Canada effective Jan. 1, 1936, and Jan. 1, 1939. The rate specified in the agreements was 3/8 cents per pound of metallic manganese content plus 1-1/4 times the duty on manganese ore. Since the rate on ore was 1/2 cent per pound of metallic manganese content (as fixed by the 1936 trade agreement with Brazil), the rate on this ferromanganese was equivalent to 1 cent per pound of metallic manganese content.

Table 3.--Spiegeleisen (containing less than 30 percent of manganese): U.S. rates of duty under pars. 301 and 302(e), Tariff Act of 1930, from June 18, 1930, to August 31, 1962

Tariff description	Rate	Effective date and trade agreement or other basis for change
Par. 301:		
Spiegeleisen containing over 1 percent of carbon.	75¢ per long ton.	June 18, 1930 (Tariff Act of 1930).
	75¢ per long ton.	Jan. 1, 1939; bound, Canada.
	75¢ per long ton. 1/	Jan. 1, 1948; bound, GATT.
Par. 302(e):		
Spiegeleisen containing not over 1 percent of carbon.	1-7/8¢ per lb. on manganese content and 15% ad val. 2/	June 18, 1930 (Tariff Act of 1930).
	15/16¢ per lb. on manganese content and 7-1/2% ad val. 3/	June 6, 1951; GATT.

1/ Currently applicable to the products of all countries except the Philippines.

2/ Rate established in Tariff Act of 1930 and currently applicable to the products of Communist-dominated nations or areas designated by the President pursuant to sec. 5 of the Trade Agreements Extension Act of 1951 (including Cuba, Public Law 87-456).

3/ Currently applicable to the products of all countries except the Philippines and Communist-dominated nations or areas. Also current base rate for computing preferential rate for "Philippine articles."

Table 4.--Manganese silicon, manganese boron, and manganese metal: U.S. rates of duty under par. 302(e), Tariff Act of 1930, from June 18, 1930, to August 31, 1962

(Rate in cents per pound on manganese content plus percent ad valorem)

Tariff description	Rate	Effective date and trade agreement or other basis for change
Par. 302(e):		
Manganese silicon:		
Containing not more than 45 percent of manganese.	1-7/8¢ + 15% 1/	June 18, 1930 (Tariff Act of 1930).
	15/16¢ + 7-1/2% 2/	June 6, 1951; GATT.
Containing more than 45 percent of manganese.	1-7/8¢ + 15% 1/	June 18, 1930 (Tariff Act of 1930).
	1¢ + 10%	July 11, 1948; GATT.
	15/16¢ + 7-1/2% 2/	June 6, 1951; GATT.
Manganese boron	1-7/8¢ + 15% 1/	June 18, 1930 (Tariff Act of 1930).
	15/16¢ + 7-1/2% 2/	June 6, 1951; GATT.
Manganese metal	1-7/8¢ + 15% 3/	June 18, 1930 (Tariff Act of 1930).

1/ Rate established in Tariff Act of 1930 and currently applicable to the products of Communist-dominated nations or areas designated by the President pursuant to sec. 5 of the Trade Agreements Extension Act of 1951 (including Cuba, Public Law 87-456).

2/ Currently applicable to the products of all countries except the Philippines and Communist-dominated nations or areas. Also current base rate for computing preferential rate for "Philippine articles."

3/ Currently applicable to the products of all countries except the Philippines.

Table 5.--Manganese: U.S. shipments, imports, exports, and consumption, 5-year averages 1941-60, annual 1956-61

Item	Average 1941-45	Average 1946-50	Average 1951-55	Average 1956-60	1956	1957	1958	1959	1960	1961
	Quantity of contained manganese (short tons)									
Shipments: 1/ Manganese contained in ore--										
10 to 35 percent manganese content 2/	48,745	15,082	19,332	18,319	16,908	29,639	11,075	21,033	12,940	14,731
35 percent or more manganese content	98,097	76,842	89,602	124,322	164,649	170,099	148,746	99,064	39,051	21,323
Total	146,842	91,924	108,934	142,641	181,557	199,738	159,821	120,097	51,991	36,054
Imports: 3/										
Manganese contained in ore--										
10 to 35 percent manganese content	1,072	7,253	37,473	8,055	33,545	1,818	1,575	2,421	915	1,974
35 percent or more manganese content	717,396	726,469	1,072,789	996,934	1,008,073	1,169,448	837,107	887,680	1,082,362	1,030,859
Manganese contained in metallurgical products 4/	10,552	62,326	69,235	127,471	130,357	262,930	58,429	82,759	102,883	184,210
Total	729,020	796,048	1,179,497	1,132,460	1,171,975	1,434,196	897,111	972,860	1,186,160	1,217,043
Total, excluding duty-free imports for U.S. Government account 5/	566,136	701,781	977,091	925,931	1,048,863	1,060,996	814,536	880,286	824,976	776,408
Exports (estimated content of ore and metallurgical products)	7,496	13,559	5,257	5,664	5,366	8,878	4,055	4,499	5,524	6,163
Consumption (estimated):										
Manganese content of ore consumed for dry-cell batteries and chemicals	31,416	34,685	34,829	41,958	35,984	41,006	41,945	42,796	48,058	62,040
Manganese content of metallurgical products consumed	607,122	577,714	745,889	732,065	851,354	823,093	602,394	674,607	708,879	702,227
Total	638,538	612,399	780,718	774,023	887,338	864,099	644,339	717,403	756,937	764,267

1/ Shipments include concentrate and nodules (without duplication) in marketable form.
2/ Ferruginous manganese ore.
3/ Imports for consumption.
4/ Includes ferromanganese, silicomanganese, spiegeleisen, and manganese metal.
5/ Includes undetermined quantities for U.S. Government account on which duty was paid.

Source: Shipments and imports compiled from official statistics of the U.S. Bureau of Mines and the U.S. Department of Commerce; manganese content of exports and consumption estimated by the U.S. Tariff Commission.

Table 6.--Manganese ore containing 35 percent or more manganese: U.S. shipments, imports, and consumption, by grades; U.S. exports; and U.S. industrial stocks of domestic and foreign ores; 5-year averages 1941-60, annual 1956-61

(Gross weight in short tons)

Type of ore	Average 1941-45	Average 1946-50	Average 1951-55	Average 1956-60	1956	1957	1958	1959	1960	1961
U.S. shipments:										
Metallurgical	172,476	122,702	160,627	265,379	341,291	364,227	327,309	223,164	70,905	39,246
Battery	9,603	10,364	13,623	4,136	3,444	2,107	1/	6,011	9,116	6,832
Miscellaneous	655	324	11	5	-	-	-	24	-	10
Total	182,734	133,390	174,261	269,520	344,735	366,334	327,309	229,199	80,021	46,088
Imports for consumption:										
Metallurgical	1,433,345	1,454,147	2,278,964	2,050,131	2,143,031	2,447,998	1,749,096	1,767,455	2,143,073	2,012,860
Battery and chemical	53,888	74,712	71,349	94,215	81,065	95,905	49,599	110,610	133,897	139,024
Total	1,487,233	1,528,859	2,350,313	2,144,346	2,224,096	2,543,903	1,798,695	1,878,065	2,276,970	2,151,884
Consumption:										
Metallurgical	1,434,752	1,357,528	1,885,992	1,856,642	2,198,613	2,285,802	1,420,327	1,525,214	1,853,254	1,598,034
Batteries (dry cells)	44,457	43,549	38,187	29,004	32,363	30,102	26,604	28,734	27,215	28,301
Chemicals 2/	15,842	19,861	25,382	49,373	33,183	45,556	50,643	51,559	65,920	91,470
Total	1,495,051	1,420,938	1,949,561	1,935,019	2,264,159	2,361,460	1,497,574	1,605,507	1,946,389	1,717,805
Exports 3/	4,797	8,892	7,413	5,425	6,133	5,270	4,883	5,702	5,139	7,528
Stocks (year end): 4/										
Domestic ore	23,320	67,368	14,748	2,725	8,021	913	1,144	1,221	2,325	1,145
Foreign ore	1,128,703	1,218,410	1,420,708	2,024,359	1,266,035	1,545,759	2,040,251	2,684,541	2,585,211	2,219,362
Total	1,152,023	1,285,778	1,435,456	2,027,084	1,274,056	1,546,672	2,041,395	2,685,762	2,587,536	2,220,507

1/ Battery ore included with metallurgical.
2/ Includes miscellaneous uses after 1955.
3/ Data subsequent to 1947 include ore containing 10 percent or more manganese.
4/ Excludes Government stocks.

Source: Compiled from official statistics of the U.S. Bureau of Mines and the U.S. Department of Commerce.

Table 7.--Manganese ore: U.S. Government inventories, 1/ by grades, at end of year, 1948-61

(1,000 short dry tons)

Stocks on Dec. 31	Metallurgical grade 2/	Battery grade		Chemical grade		Total
		Natural	Synthetic dioxide	Type A 3/	Type B 4/	
1948	1,818	18	-	-	-	1,836
1949	1,870	40	-	-	-	1,910
1950	2,254	52	-	9		2,315
1951	2,504	61	-	11		2,576
1952	2,672	83	-	19		2,774
1953	4,149	105	-	27		4,281
1954	5,095	132	-	1	27	5,255
1955	5,563	142	3	26	2	5,736
1956	6,224	147	10	29	2	6,412
1957	6,415	144	19	29	2	6,609
1958	7,711	172	25	32	2	7,942
1959	7,274	179	25	29	43	7,550
1960	8,125	179	25	56	31	8,416
1961	5/ 9,116	274	25	103	73	9,591

1/ U.S. Government stocks in the National Stockpile, Defense Production Act inventory; and the Commodity Credit Corporation and Supplemental Stockpiles.

2/ Represents principally metallurgical-grade ore but also includes upgraded products into which part of the Government ore stocks were converted; at the end of 1961 these products consisted of 790 thousand short tons of standard (high-carbon) ferromanganese and 10.7 thousand short tons of electrolytic manganese metal.

3/ High dioxide manganese ore with a predominance of the mineral pyrolusite; this type of ore is used as an oxidizing agent in the manufacture of hydroquinone by continuous process.

4/ High dioxide ore (psilomelane) suitable for the production of permanganates and other chemicals.

5/ Does not include 2,427 thousand short dry tons of manganese ore in Government inventories on December 31, 1961, which had been acquired at a cost of $130,587,900, but which does not meet stockpile specifications.

Source: Office of Emergency Planning, Executive Office of the President.

Table 8.--Manganese ore: U.S. Government inventories by grades, acquisition cost, and market value as of December 31, 1961 1/

Grade or type of ore	Quantity	Acquisition cost	Market value
	1,000 short dry tons	Million dollars	Million dollars
Material meeting stockpile specifications:			
Metallurgical	2/ 9,116	487.5	449.7
Battery:			
Natural	274	34.6	31.2
Synthetic	25	5.6	15.5
Chemical:			
Type A 3/	103	7.3	6.6
Type B 4/	73	5.2	4.8
Total	9,591	540.2	507.8
Not meeting stockpile specifications	2,427	130.6	5/
Total	12,018	670.8	5/

1/ U.S. Government stocks in the National Stockpile, Defense Production Act inventory, and the Commodity Credit Corporation and Supplemental Stockpiles.

2/ Includes upgraded forms consisting of 790,000 tons of standard (high carbon) ferromanganese and 10,700 short tons of manganese metal.

3/ High dioxide manganese ore with a predominance of the mineral pyrolusite; this type of ore is used as an oxidizing agent in the manufacture of hydroquinone by a continuous process.

4/ High dioxide ore (psilomelane) suitable for the production of permanganates and other chemicals.

5/ Not available.

Source: Office of Emergency Planning, Executive Office of the President.

Table 9.--Manganese ore and metallurgical products: Private and Government stocks in the United States, end of years 1948-61

(In thousand short tons, gross weight)

End of year	Private stocks			U.S. Government stocks	Total, all stocks
	Industrial stocks of ores containing 35 percent or more manganese	Producers' and consumers' stocks of manganese metallurgical products	Total		
1948	965	1/ 225	1,190	1,836	3,026
1949	1,570	1/ 252	1,822	1,910	3,732
1950	1,331	1/ 240	1,571	2,315	3,886
1951	734	1/ 238	972	2,576	3,548
1952	1,811	2/ 275	2,086	2,774	4,860
1953	1,692	2/ 285	1,977	4,281	6,258
1954	1,579	2/ 327	1,906	5,255	7,161
1955	1,362	2/ 276	1,638	5,736	7,374
1956	1,274	2/ 286	1,560	6,412	7,972
1957	1,547	2/ 368	1,915	6,609	8,524
1958	2,041	2/ 355	2,396	7,942	10,338
1959	2,686	284	2,970	7,550	10,520
1960	2,588	341	2,929	8,416	11,345
1961	2,221	350	2,571	3/ 9,591	3/ 12,162

1/ Represents consumers' stocks only.

2/ Excludes producers' stocks of spiegeleisen.

3/ Excludes 2,427 thousand short tons, gross weight, of metallurgical grade manganese ore in U.S. Government inventories, acquired at a cost of $130.6 million, that do not meet stockpile specifications.

Source: Tables 6, 7, and 35.

Table 10.--Manganese ore and metallurgical products: Quantities received by the Commodity Credit Corporation under the barter program, by fiscal years 1955-62 (July 1, 1954 through June 30, 1962) 1/

(In short tons)

Fiscal year ending June 30--	Manganese ore			Ferromanganese	Manganese metal
	Metallurgical grade	Battery grade	Chemical grade		
1955	-	-	-	654	-
1956	-	2,949	-	195,840	-
1957	-	2,756	-	149,466	773
1958	-	35,874	-	88,351	3,267
1959	116,413	8,911	-	21,816	-
1960	328,549	29,280	22,801	7,109	-
1961	742,906	20,057	53,220	151,501	-
1962	404,597	49,158	86,673	70,177	-
Total	1,592,465	148,985	162,694	684,914	4,040
Undelivered portions of current contracts	156,654	36,486	30,846	-	-

1/ Currently (August 1962) held in Government inventories of the Commodity Credit Corporation and the Supplemental Stockpile.

Source: Commodity Credit Corporation, U.S. Department of Agriculture.

Table 11.--Manganese ore: U.S. shipments, by grades, 5-year averages 1941-60, annual 1951-61

Period	Gross weight (short tons)	Manganese content		Value (1,000 dollars)	Average value per short ton (gross weight)
		Quantity (short tons)	Percent		
	10 to 35 percent manganese (natural)				
Average:					
1941-45	332,796	48,745	14.6	1,403	$4.22
1946-50	102,672	15,082	14.7	561	5.46
1951-55	141,874	19,332	13.6	1/	1/
1956-60	146,815	18,319	12.5	1/	1/
Annual:					
1951	106,203	12,783	12.0	532	5.01
1952	106,307	14,426	13.6	667	6.27
1953	272,738	36,003	13.2	1,900	6.97
1954	61,827	12,411	20.1	1/	1/
1955	162,293	21,039	13.0	1/	1/
1956	140,871	16,908	12.0	1/	1/
1957	250,102	29,639	11.8	1/	1/
1958	87,751	11,075	12.6	1/	1/
1959	164,234	21,033	12.8	1/	1/
1960	91,118	12,940	14.2	1/	1/
1961	117,646	14,731	12.5	1/	1/
	35 percent or more manganese (natural)				
Average:					
1941-45	182,734	98,097	53.7	6,561	$35.90
1946-50	133,390	76,842	57.6	4,962	37.20
1951-55	174,261	89,602	51.4	12,721	73.00
1956-60	269,520	124,322	46.1	20,649	76.61
Annual:					
1951	105,007	59,162	56.3	6,045	57.57
1952	115,379	62,463	54.1	8,252	71.52
1953	157,536	82,735	52.5	12,480	79.22
1954	206,128	98,347	47.7	15,176	73.62
1955	287,255	145,301	50.6	21,651	75.37
1956	344,735	164,649	47.8	26,990	78.29
1957	366,334	170,099	46.4	29,363	80.15
1958	327,309	148,746	45.4	23,637	72.22
1959	229,199	99,064	43.2	17,904	78.12
1960	80,021	39,051	48.8	5,352	66.88
1961	46,088	21,323	46.3	3,264	70.82

1/ Not available.

Source: Compiled from official statistics of the U.S. Bureau of Mines.

Table 12.--Metallurgical manganese ore: 1/ U.S. shipments by States, 5-year averages 1941-60, annual 1956-61

(Gross weight in short tons)

State	Average 1941-45	Average 1946-50	Average 1951-55	Average 1956-60	1956	1957	1958	1959	1960	1961
Alabama	21	27	-	-	-	-	-	-	-	-
Arizona	3,865	164	2/	50,720	42,008	79,505	62,279	68,183	1,626	-
Arkansas	5,648	1,246	9,912	18,542	29,485	23,261	22,221	17,742	-	-
California	11,305	63	1,568	10,520	6,595	9,009	17,644	19,354	-	-
Colorado	282	-	-	321	-	175	210	1,218	-	-
Georgia	2,888	-	2/	3/	3/	3/	3/	1,547	-	-
Montana	118,461	119,830	84,845	46,475	77,573	66,191	4/53,123	15,569	19,920	10,673
Nevada	8,452	226	5/ 44,415	96,614	121,017	129,046	127,322	56,611	49,076	28,573
New Mexico	1,069	669	795	20,773	22,011	25,459	28,866	27,528	-	-
Oregon	55	-	9	-	-	-	-	-	-	-
South Carolina	351	16	-	-	-	-	-	-	-	-
Tennessee	1,912	77	6,094	8,913	17,821	12,938	5,935	7,586	283	-
Texas	-	-	11	-	-	-	-	-	-	-
Utah	227	24	19	539	-	142	1,043	1,511	-	-
Virginia	10,329	75	12,959	9,449	20,231	12,655	8,128	6,232	-	-
Washington	6,434	285	2/	17	-	-	-	83	-	-
Undistributed 6/	1,177	-	2/	2,496	4,550	5,846	538	-	-	-
Total	172,476	122,702	160,627	265,379	341,291	364,227	327,309	223,164	70,905	39,246

1/ Containing 35 percent or more manganese (natural).
2/ Included with Nevada.
3/ Included in "Undistributed."
4/ Includes battery ore.
5/ Includes shipments from some other States.
6/ Includes shipments from Idaho, Missouri, North Carolina, Oklahoma, Pennsylvania, South Dakota, West Virginia, and Wyoming in the period 1941-45; from Missouri and Minnesota in the period 1951-55; from Minnesota in 1956; from Minnesota, Missouri, Oklahoma, and West Virginia in 1957; and from Missouri in 1958.

Source: Compiled from official statistics of the U.S. Bureau of Mines.

Table 13.--Manganiferous iron ore: 1/ U.S. shipments, 5-year averages 1941-60, annual 1951-61

Period	Gross weight	Manganese content	
		Quantity	Percent
	Short tons	Short tons	
Average:			
1941-45	1,253,923	93,221	7.4
1946-50	1,067,747	64,978	6.1
1951-55	846,594	48,971	5.8
1956-60	492,272	31,183	6.3
Annual:			
1951	1,117,761	64,676	5.8
1952	902,711	52,009	5.8
1953	966,652	55,918	5.8
1954	496,505	28,075	5.7
1955	749,343	44,175	5.9
1956	539,780	35,492	6.6
1957	615,025	37,926	6.2
1958	432,850	25,993	6.0
1959	306,366	19,671	6.4
1960	567,337	36,833	6.5
1961	107,358	9,060	8.4

1/ Containing 5 to 10 percent manganese (natural).

Source: Compiled from official statistics of the U.S. Bureau of Mines.

Table 14.--Employment and wages in the production of manganese ore and in processing manganese ore into ferromanganese and other products in the United States, in specified years 1954-61

Year	Average number of all employees	Production and related workers			
		Average number	Manhours	Wages paid	
				Total	Average per manhour
	At mines and mills producing ore containing 10 percent or more manganese (natural)				
1954	1/ 2,604	2/ 2,266	4,293,000	$7,643,000	$1.78
1958	1/ 2,099	2/ 1,792	3,475,000	7,244,000	2.08
1960	322	279	429,052	1,113,525	2.60
1961	222	208	351,366	980,923	2.79
	At plants producing ferromanganese and other manganese products 3/				
1957	5,170	4,229	8,425,609	20,026,427	2.38
1960	5,287	4,194	8,374,393	22,105,800	2.64
1961	4,369	3,466	7,027,810	18,859,685	2.68

1/ Excludes 458 proprietors and firm members in 1954 and 209 in 1958.
2/ Excludes proprietors and firm members performing manual labor, 386 in 1954 and 128 in 1958.
3/ Of the total sales value of products in 1961, ferroalloys, manganese metal, and other metallurgical products accounted for 93 percent; the remainder was comprised of battery mix, chemical mix, welding flux, and chemical compounds.

Source: Data for mines and mills for 1954 and 1958 from the Census of Mineral Industries; all other data compiled from reports of individual concerns to the U.S. Tariff Commission.

Table 15.--Manganese ore containing 10 percent or more manganese: U.S. imports for consumption, 5-year averages 1941-60, annual 1951-61

Period	Gross weight	Manganese content		Foreign value	Average value per short ton (gross weight)
		Quantity	Percent		
	Short tons	Short tons		1,000 dollars	
Average:					
1941-45	1,490,924	718,468	48.2	24,421	$16.38
1946-50	1,554,869	733,722	47.2	28,667	18.44
1951-55	2,509,195	1,110,262	44.2	73,778	29.40
1956-60	2,180,583	1,004,989	46.1	80,346	36.85
Annual:					
1951	2,078,442	929,052	44.7	46,598	22.42
1952	2,359,180	1,042,328	44.2	67,753	28.72
1953	3,301,833	1,435,681	43.5	105,673	32.00
1954	2,355,338	1,054,179	44.8	77,030	32.70
1955	2,451,173	1,090,070	44.5	71,835	29.31
1956	2,383,835	1,041,618	43.7	71,229	29.88
1957	2,549,768	1,171,266	45.9	96,970	38.03
1958	1,803,732	838,682	46.5	76,364	42.34
1959	1,885,920	890,101	47.2	74,810	39.67
1960 1/	2,279,658	1,083,277	47.5	82,357	36.13
1961 1/	2,158,044	1,032,833	47.9	78,430	36.34

1/ Preliminary.

Source: Compiled from official statistics of the U.S. Department of Commerce.

Table 16.--Manganese ore containing 10 percent or more manganese: U.S. imports for consumption, 1951-61

Item and year	Gross weight	Manganese content		Foreign value	Percent of total value	Average value per short ton (gross weight)
		Quantity	Percent			
	Short tons	Short tons		1,000 dollars		
Total, excluding duty-free imports for U.S. Government:						
1951	1,854,958	833,284	44.9	40,427	86.8	$21.79
1952	2,164,958	953,309	44.0	61,108	90.2	28.23
1953	2,493,834	1,077,354	43.2	78,582	74.4	31.51
1954	1,772,497	790,212	44.6	57,206	74.3	32.27
1955	2,219,984	979,639	44.1	64,089	89.2	28.87
1956	2,236,950	969,598	43.3	65,222	91.6	29.16
1957	2,250,143	1,025,721	45.6	83,469	86.1	37.09
1958	1,654,403	767,269	46.4	70,302	92.1	42.49
1959	1,718,066	807,808	47.0	68,316	91.3	39.76
1960 1/	1,628,341	765,555	47.0	59,870	72.7	36.77
1961 1/	1,452,240	683,536	47.1	49,212	62.7	33.89
Duty-free for U.S. Government:						
1951	223,484	95,768	42.9	6,171	13.2	27.61
1952	194,222	89,019	45.8	6,645	9.8	34.21
1953	807,999	358,327	44.3	27,091	25.6	33.53
1954	582,841	263,967	45.3	19,824	25.7	34.01
1955	231,189	110,431	47.8	7,746	10.8	33.51
1956	146,885	72,020	49.0	6,007	8.4	40.90
1957	299,625	145,545	48.6	13,501	13.9	45.06
1958	149,329	71,413	47.8	6,062	7.9	40.59
1959	167,854	82,293	49.0	6,494	8.7	38.69
1960 1/	651,317	317,722	48.8	22,487	27.3	34.53
1961 1/	705,804	349,297	49.5	29,218	37.3	41.40
Total imports for consumption:						
1951	2,078,442	929,052	44.7	46,598	100.0	22.42
1952	2,359,180	1,042,328	44.2	67,753	100.0	28.72
1953	3,301,833	1,435,681	43.5	105,673	100.0	32.00
1954	2,355,338	1,054,179	44.8	77,030	100.0	32.70
1955	2,451,173	1,090,070	44.5	71,835	100.0	29.31
1956	2,383,835	1,041,618	43.7	71,229	100.0	29.88
1957	2,549,768	1,171,266	45.9	96,970	100.0	38.03
1958	1,803,732	838,682	46.5	76,364	100.0	42.34
1959	1,885,920	890,101	47.2	74,810	100.0	39.67
1960 1/	2,279,658	1,083,277	47.5	82,357	100.0	36.13
1961 1/	2,158,044	1,032,833	47.9	78,430	100.0	36.34

1/ Preliminary.

Source: Compiled from official statistics of the U.S. Department of Commerce.

Table 17.--Manganese ore containing 10 percent or more manganese: U.S. imports for consumption, by countries, 1957-61

Country	Quantity--short tons gross weight					Quantity--short tons manganese content				
	1957	1958	1959	1960 1/	1961 1/	1957	1958	1959	1960 1/	1961 1/
Brazil	600,409	426,051	472,249	682,183	798,581	281,495	201,717	224,597	323,468	390,035
Ghana	219,782	192,947	269,851	341,043	271,463	107,772	94,576	131,468	173,363	133,953
India	678,470	513,565	419,415	475,178	257,800	307,633	234,411	195,694	216,880	120,689
Morocco	70,015	23,977	74,229	76,332	108,287	34,551	11,483	39,348	40,854	57,876
Union of South Africa	224,988	207,611	172,493	226,288	219,475	97,028	93,272	75,292	101,105	93,718
Mexico	223,513	160,549	183,639	203,349	184,766	99,768	73,481	83,116	93,263	83,145
Congo Republic and Ruanda-Urundi	137,043	69,723	93,973	141,221	160,943	68,452	34,910	46,584	69,610	77,416
Greece	5,565	5,715	10,195	6,755	57,818	2,670	2,757	4,857	3,255	27,917
Egypt	1,640	4,778	3,274	9,956	21,480	754	2,214	1,725	5,221	10,752
Angola	34,843	43,779	32,827	24,237	18,397	16,829	21,775	16,370	12,091	9,291
Rhodesia and Nyasaland Federation	25,359	10,022	31,396	22,122	12,526	12,015	4,720	15,030	10,861	6,344
Chile	28,092	18,584	28,871	22,559	12,786	12,342	8,360	12,968	10,092	5,745
Philippine Republic	7,584	9,610	18,937	14,063	7,700	3,557	4,667	9,236	6,662	3,649
Cuba	159,393	71,896	50,068	17,644	-	65,402	30,224	22,532	9,073	-
All other	133,072	44,925	24,503	16,728	26,022	60,998	20,115	11,284	7,479	12,303
Total	2,549,768	1,803,732	1,885,920	2,279,658	2,158,044	1,171,266	838,682	890,101	1,083,277	1,032,833

	Foreign value (1,000 dollars)					Average value per short ton, gross weight				
	1957	1958	1959	1960 1/	1961 1/	1957	1958	1959	1960 1/	1961 1/
Brazil	25,777	20,588	19,252	24,383	29,243	$42.93	$48.32	$40.77	$35.74	$36.62
Ghana	9,953	10,702	14,044	15,786	13,075	45.29	55.47	52.04	46.29	48.16
India	21,407	18,255	14,036	14,357	7,765	31.55	35.55	33.47	30.21	30.12
Morocco	3,687	1,385	4,915	4,191	5,955	52.66	57.76	66.21	54.90	54.99
Union of South Africa	6,351	7,038	5,306	6,696	5,511	28.23	33.90	30.76	29.59	25.11
Mexico	8,181	6,902	6,621	6,790	5,296	36.60	42.99	36.05	33.39	28.66
Congo Republic and Ruanda-Urundi	6,013	3,449	3,726	4,940	5,050	43.88	49.47	39.65	34.98	31.38
Greece	253	268	560	413	3,109	45.46	46.89	54.93	61.14	53.77
Egypt	88	175	107	409	806	53.66	36.63	32.68	41.08	37.52
Angola	1,654	1,690	1,252	910	722	47.47	38.60	38.14	37.55	39.25
Rhodesia and Nyasaland Federation	1,052	381	1,168	878	437	41.48	38.02	37.20	39.69	34.89
Chile	1,295	845	1,063	813	348	46.10	45.47	36.82	36.04	27.22
Philippine Republic	340	434	584	434	248	44.83	45.16	30.84	30.86	32.21
Cuba	5,670	2,357	1,337	689	-	35.57	32.78	26.70	39.05	-
All other	5,249	1,895	839	668	865	39.44	42.18	34.24	39.93	33.24
Total or average	96,970	76,364	74,810	82,357	78,430	38.03	42.34	39.67	36.13	36.34

1/ Preliminary.

Source: Compiled from official statistics of the U.S. Department of Commerce.

Table 18.--Manganese ore containing 10 to 35 percent manganese: U.S. imports for consumption, 5-year averages 1941-60, annual 1951-61

Period	Gross weight	Manganese content		Foreign value	Average value per short ton (gross weight)
		Quantity	Percent		
	Short tons	Short tons		1,000 dollars	
Average:					
1941-45	3,691	1,072	29.0	45	$12.19
1946-50	26,010	7,253	27.9	225	8.65
1951-55	158,880	37,473	23.6	1,648	10.37
1956-60	36,237	8,055	22.2	373	10.29
Annual:					
1951	175,261	46,649	26.6	1,626	9.28
1952	154,349	40,666	26.3	1,876	12.15
1953	185,233	41,979	22.7	2,124	11.47
1954	108,096	22,766	21.1	1,076	9.95
1955	171,462	35,301	20.6	1,538	8.97
1956	159,739	33,545	21.0	1,423	8.91
1957	5,865	1,818	31.0	126	21.48
1958	5,037	1,575	31.3	107	21.24
1959	7,855	2,421	30.8	162	20.62
1960 1/	2,688	915	34.0	49	18.23
1961 1/	6,160	1,974	32.0	107	17.37

1/ Preliminary.

Source: Compiled from official statistics of the U.S. Department of Commerce.

Table 19.--Manganese ore containing 35 percent or more manganese: U.S. imports for consumption, 5-year averages 1941-60, annual 1951-61

Period	Gross weight	Manganese content		Foreign value	Average value per short ton (gross weight)
		Quantity	Percent		
	Short tons	Short tons		1,000 dollars	
Average:					
1941-45	1,487,233	717,396	48.2	24,376	$16.39
1946-50	1,528,859	726,469	47.5	28,442	18.60
1951-55	2,350,313	1,072,789	45.6	72,130	30.69
1956-60	2,144,346	996,934	46.5	79,973	37.29
Annual:					
1951	1,903,181	882,403	46.4	44,972	23.63
1952	2,204,831	1,001,662	45.4	65,877	29.88
1953	3,116,600	1,393,702	44.7	103,549	33.22
1954	2,247,242	1,031,413	45.9	75,954	33.80
1955	2,279,711	1,054,769	46.3	70,297	30.84
1956	2,224,096	1,008,073	45.3	69,806	31.39
1957	2,543,903	1,169,448	46.0	96,844	38.07
1958	1,798,695	837,107	46.5	76,257	42.40
1959	1,878,065	887,680	47.3	74,648	39.75
1960 1/	2,276,970	1,082,362	47.5	82,308	36.15
1961 1/	2,151,884	1,030,859	47.9	78,323	36.40

1/ Preliminary.

Source: Compiled from official statistics of the U.S. Department of Commerce.

Table 20.--Manganese ore, metallurgical grade, 35 percent or more manganese content: U.S. imports for consumption, 5-year averages 1941-60, annual 1951-61

Period	Gross weight	Manganese content		Foreign value	Average value per short ton (gross weight)
		Quantity	Percent		
	Short tons	Short tons		1,000 dollars	
Average:					
1941-45	1,433,345	689,335	48.1	23,319	$16.27
1946-50	1,454,147	685,597	47.1	26,443	18.18
1951-55	2,278,964	1,033,711	45.4	68,818	30.20
1956-60	2,050,131	946,793	46.2	74,067	36.13
Annual:					
1951	1,837,496	846,877	46.1	42,525	23.14
1952	2,136,370	964,380	45.1	63,002	29.49
1953	3,029,529	1,346,282	44.4	99,247	32.76
1954	2,195,354	1,002,885	45.7	73,181	33.33
1955	2,196,072	1,088,533	49.6	66,134	30.11
1956	2,143,031	963,964	45.0	65,552	30.59
1957	2,447,998	1,117,595	45.7	90,731	37.06
1958	1,749,096	810,273	46.3	72,135	41.24
1959	1,767,455	828,738	46.9	66,867	37.83
1960 1/	2,143,073	1,013,394	47.3	75,050	35.02
1961 1/	2,012,860	961,001	47.7	70,879	35.21

1/ Preliminary.

Source: Compiled from official statistics of the U.S. Department of Commerce.

Table 21.--Manganese ore, metallurgical grade, 35 percent or more manganese content: U.S. imports for consumption, 1951-61

Item and year	Gross weight	Manganese content		Foreign value	Percent of total value
		Quantity	Percent		
	Short tons	Short tons		1,000 dollars	
Total, excluding duty-free imports for U.S. Government:					
1951	1,614,328	750,886	46.5	36,375	85.5
1952	1,942,278	875,404	45.1	56,360	89.5
1953	2,221,530	987,955	44.5	72,156	72.7
1954	1,613,765	739,587	45.8	53,426	73.0
1955	1,965,103	898,218	45.7	58,397	88.3
1956	2,002,303	894,956	44.7	59,790	91.2
1957	2,151,427	973,546	45.3	77,374	85.3
1958	1,602,455	740,215	46.2	66,252	91.8
1959	1,638,036	766,883	46.8	62,995	94.2
1960 1/	1,534,095	717,350	46.8	54,632	72.8
1961 1/	1,393,064	654,115	47.0	46,168	65.1
Duty-free for U.S. Government:					
1951	223,168	95,591	42.8	6,150	14.5
1952	194,092	88,976	45.8	6,642	10.5
1953	807,999	358,327	44.3	27,091	27.3
1954	581,589	263,298	45.3	19,755	27.0
1955	230,969	110,315	47.8	7,737	11.7
1956	140,728	69,008	49.0	5,762	8.8
1957	296,571	144,049	48.6	13,357	14.7
1958	146,641	70,058	47.8	5,883	8.2
1959	129,419	61,855	47.8	3,872	5.8
1960 1/	608,978	296,044	48.6	20,418	27.2
1961 1/	619,796	306,886	49.5	24,711	34.9
Total imports for consumption:					
1951	1,837,496	846,477	46.1	42,525	100.0
1952	2,136,370	964,380	45.1	63,002	100.0
1953	3,029,529	1,346,282	44.4	99,247	100.0
1954	2,195,354	1,002,885	45.7	73,181	100.0
1955	2,196,072	1,008,533	45.9	66,134	100.0
1956	2,143,031	963,964	45.0	65,552	100.0
1957	2,447,998	1,117,595	45.7	90,731	100.0
1958	1,749,096	810,273	46.3	72,135	100.0
1959	1,767,455	828,738	46.9	66,867	100.0
1960 1/	2,143,073	1,013,394	47.3	75,050	100.0
1961 1/	2,012,860	961,001	47.7	70,879	100.0

1/ Preliminary.

Source: Compiled from official statistics of the U.S. Department of Commerce.

Table 22.--Manganese ore, metallurgical grade, 35 percent or more manganese content: U.S. imports for consumption, by countries, 1957-61

Country	Quantity (short tons, gross weight)					Quantity (short tons, manganese content)				
	1957	1958	1959	1960 1/	1961 1/	1957	1958	1959	1960 1/	1961 1/
Brazil	600,409	426,495	472,249	682,183	798,581	281,495	201,717	224,597	323,468	390,035
Ghana	171,052	162,748	238,267	302,918	235,195	81,610	78,007	114,256	153,459	115,763
India	678,470	513,565	417,253	456,746	254,700	307,633	234,411	194,634	207,792	119,108
Union of South Africa	224,988	207,611	169,376	220,873	219,475	97,028	93,272	73,764	98,435	93,718
Mexico	217,648	155,838	176,190	200,660	181,161	97,950	72,009	80,822	92,348	81,988
Republic of the Congo	132,455	68,459	88,206	136,899	155,296	65,912	34,253	43,592	67,535	74,479
Morocco	42,572	14,096	13,145	28,203	77,311	19,703	6,216	6,829	15,385	41,823
Angola	32,661	43,779	32,827	22,076	13,919	15,674	21,775	16,370	11,053	7,006
Rhodesia and Nyasaland Federation	25,358	10,022	31,396	19,884	12,526	12,015	4,520	15,030	9,639	6,344
Chile	28,092	18,584	28,871	21,799	12,886	12,342	8,360	12,968	9,715	5,745
Cuba	151,811	64,574	43,470	10,236	-	61,480	26,369	19,173	5,282	-
All other	142,482	63,325	56,205	40,596	51,810	64,753	29,364	26,704	19,283	24,992
Total	2,447,998	1,749,096	1,767,455	2,143,073	2,012,860	1,117,595	810,273	828,739	1,013,394	961,001

	Foreign value (1,000 dollars)					Average value (per short ton, gross weight)				
	1957	1958	1959	1960 1/	1961 1/	1957	1958	1959	1960 1/	1961 1/
Brazil	25,777	20,588	19,252	24,383	29,243	$42.93	$48.27	$40.77	$35.74	$36.62
Ghana	6,882	7,751	11,086	13,447	10,940	40.23	47.63	46.53	44.39	46.51
India	21,407	18,255	13,962	13,793	7,672	31.55	35.55	33.46	30.20	30.12
Union of South Africa	6,351	7,038	5,190	6,470	5,511	28.23	33.90	30.64	29.29	25.11
Mexico	8,055	6,804	6,466	6,741	5,233	37.01	43.66	36.70	33.59	28.89
Republic of the Congo	5,687	3,385	3,495	4,781	4,837	42.94	49.45	39.62	34.92	31.15
Morocco	1,825	675	815	1,266	4,280	42.87	47.89	62.00	44.89	55.36
Angola	1,540	1,690	1,252	848	566	47.15	38.60	38.14	38.41	40.66
Rhodesia and Nyasaland Federation	1,052	381	1,168	759	437	41.49	38.02	37.20	38.17	34.89
Chile	1,295	845	1,063	782	348	46.10	45.47	36.82	35.87	27.01
Cuba	5,326	2,004	1,055	274	-	35.08	31.03	24.27	26.77	-
All other	5,534	2,719	2,063	1,506	1,812	38.84	42.94	36.70	37.10	34.97
Total or average	90,731	72,135	66,867	75,050	70,879	37.06	41.24	37.83	35.02	35.21

1/ Preliminary.

Source: Compiled from official statistics of the U.S. Department of Commerce.

Table 23.--Manganese ore, battery and chemical grade, 35 percent or more manganese content: U.S. imports for consumption, 5-year averages 1941-60, annual 1951-61

Period	Gross weight	Manganese content		Foreign value	Average value per short ton (gross weight)
		Quantity	Percent		
	Short tons	Short tons		1,000 dollars	
Average:					
1941-45	53,888	28,061	52.1	1,057	$19.61
1946-50	74,712	40,872	54.7	1,999	26.76
1951-55	71,349	39,078	54.8	3,312	46.42
1956-60	94,215	50,141	53.2	5,906	62.69
Annual:					
1951	65,685	35,926	54.7	2,447	37.25
1952	68,461	37,282	54.5	2,875	41.99
1953	87,071	47,420	54.5	4,302	49.41
1954	51,888	28,528	55.0	2,773	53.44
1955	83,639	46,236	55.3	4,163	49.77
1956	81,065	44,109	54.4	4,254	52.48
1957	95,905	51,853	54.1	6,113	63.74
1958	49,599	26,834	54.1	4,122	83.11
1959	110,610	58,942	53.3	7,781	70.35
1960 1/	133,897	68,968	51.5	7,258	54.21
1961 1/	139,024	69,858	50.2	7,444	53.54

1/ Preliminary.

Source: Compiled from official statistics of the U.S. Department of Commerce.

Table 24.--Manganese ore, battery and chemical grade, 35 percent or more manganese content: U.S. imports for consumption, 1951-61

Item and year	Gross weight	Manganese content		Foreign value	Percent of total value
		Quantity	Percent		
	Short tons	Short tons		1,000 dollars	
Total, excluding duty-free imports for U.S. Government:					
1951	65,369	35,749	54.7	2,426	99.1
1952	68,461	37,282	54.5	2,875	100.0
1953	87,071	47,420	54.5	4,302	100.0
1954	50,636	27,859	55.0	2,704	97.5
1955	83,419	46,120	55.3	4,154	99.8
1956	74,908	41,097	54.9	4,009	94.2
1957	92,851	50,357	54.2	5,969	97.6
1958	46,911	25,479	54.3	3,943	95.7
1959	72,175	38,504	53.3	5,159	66.3
1960 1/	91,558	47,290	51.6	5,189	71.5
1961 1/	53,016	27,447	51.8	2,937	39.5
Duty-free for U.S. Government:					
1951	316	177	56.0	21	0.9
1952	-	-	-	-	-
1953	-	-	-	-	-
1954	1,252	669	53.4	69	2.5
1955	220	116	52.7	9	.2
1956	6,157	3,012	48.9	245	5.8
1957	3,054	1,496	49.0	144	2.4
1958	2,688	1,355	50.4	179	4.3
1959	38,435	20,438	53.2	2,622	33.7
1960 1/	42,339	21,678	51.2	2,069	28.5
1961 1/	86,008	42,411	49.3	4,507	60.5
Total imports for consumption:					
1951	65,685	35,926	54.7	2,447	100.0
1952	68,461	37,282	54.5	2,875	100.0
1953	87,071	47,420	54.5	4,302	100.0
1954	51,888	28,528	55.0	2,773	100.0
1955	83,639	46,236	55.3	4,163	100.0
1956	81,065	44,109	54.4	4,254	100.0
1957	95,905	51,853	54.1	6,113	100.0
1958	49,599	26,834	54.1	4,122	100.0
1959	110,610	58,942	53.3	7,781	100.0
1960 1/	133,897	68,968	51.5	7,258	100.0
1961 1/	139,024	69,858	50.2	7,444	100.0

1/ Preliminary.

Source: Compiled from official statistics of the U.S. Department of Commerce.

Table 25.--Manganese ore, battery and chemical grade, 35 percent or more manganese content: U.S. imports for consumption, by countries, 1957-61

Country	1957	1958	1959	1960 1/	1961 1/
	Quantity--short tons, gross weight				
Greece	3,059	-	-	6,755	57,818
Ghana	44,000	30,199	31,178	38,125	33,713
Morocco	27,443	9,881	61,084	48,129	30,972
All other	21,403	9,519	18,348	40,888	16,521
Total	95,905	49,599	110,610	133,897	139,024
	Quantity--short tons, manganese content				
Greece	1,496	-	-	3,255	27,917
Ghana	23,947	16,568	17,086	19,904	17,374
Morocco	14,848	5,267	32,519	25,469	16,053
All other	11,562	4,999	9,337	20,340	8,514
Total	51,353	26,834	58,942	68,968	69,858
	Foreign value (1,000 dollars)				
Greece	144	-	-	413	3,109
Ghana	2,896	2,951	2,950	2,339	2,089
Morocco	1,863	710	4,100	2,925	1,675
All other	1,210	461	731	1,581	571
Total	6,113	4,122	7,781	7,258	7,444
	Average value per short ton, gross weight				
Greece	$47.07	-	-	$61.14	$53.77
Ghana	65.82	$97.72	$94.62	61.35	61.96
Morocco	67.89	71.86	67.12	60.77	54.08
All other	56.53	48.43	39.84	38.67	34.56
Average	63.74	83.11	70.35	54.21	53.54

1/ Preliminary.

Source: Compiled from official statistics of the U.S. Department of Commerce.

Table 26 --Manganese ore containing 35 percent or more manganese: Average manganese content of U.S. imports by grades and by countries, 1957-61

(Average percent, manganese content)

Country	1957	1958	1959	1960 1/	1961 1/
	Metallurgical grade				
Brazil	46.9	47.3	47.6	47.4	48.8
Ghana	47.7	47.9	48.0	50.7	49.2
India	45.3	45.6	46.6	45.5	46.8
Union of South Africa	43.1	44.9	43.6	44.6	42.7
Mexico	45.0	46.2	45.9	46.0	45.3
Congo Republic and Ruanda Urundi	49.8	50.0	49.4	49.3	48.0
Morocco	46.3	44.1	52.0	54.6	54.1
Angola	48.0	49.7	49.9	50.1	50.3
Rhodesia and Nyasaland Federation	47.4	45.1	47.9	48.5	50.6
Chile	43.9	45.0	44.9	44.6	44.6
Cuba	40.5	40.8	44.1	51.6	-
All other	45.4	46.4	47.5	47.5	48.2
Total	45.7	46.3	46.9	47.3	47.7
	Battery and chemical grade				
Greece	48.9	-	-	48.2	48.3
Ghana	54.4	54.9	54.8	52.2	51.5
Morocco	54.1	53.3	53.2	52.9	51.8
All other	54.0	52.5	50.9	49.7	51.5
Total	54.1	54.1	53.3	51.5	50.2

1/ Preliminary.

Source: Compiled from official statistics of the U.S. Department of Commerce.

Table 27.--Manganese ore: World production, by specified countries, 5-year averages 1941-60, annual 1956-61

(Quantities in thousands of short tons)

Country	Manganese content	Average 1941-45	Average 1946-50	Average 1951-55	Average 1956-60	1956	1957	1958	1959	1960	1961
	Percent										
North America:											
Cuba	36-50+	280	78	261	116	269	161	75	59	18	46
Mexico	30+	55	44	178	186	171	220	187	182	171	156
United States	35+	183	133	174	269	345	366	327	229	80	46
Other	-	1/	-	-	3	-	2	5	-	-	-
Total		518	255	613	574	785	749	594	470	269	248
South America:											
Brazil	38-50	311	205	234	867	343	1,012	972	1,139	1,101	1,100
British Guiana	40-42	-	-	-	27	-	-	-	-	137	216
Chile	40-50	63	28	50	53	52	60	42	43	51	39
Other	30-40+	2	3	11	32	31	61	27	26	27	24
Total		376	236	295	979	426	1,133	1,043	1,208	1,316	1,379
Europe:											
U.S.S.R	-	1,748	2,000	4,959	5,901	5,443	5,675	5,915	6,080	6,473	6,500
Greece	35+	1/	-	20	44	9	18	22	39	39	39
Other	30-35+	165	248	430	538	534	668	558	534	458	473
Total		1,913	2,248	5,409	6,483	5,986	6,361	6,495	6,653	6,970	7,012
Asia:											
China	-	8	2/	188	953	580	770	935	1,100	1,380	1,100
India	35+	609	618	1,714	1,557	1,946	1,853	1,407	1,309	1,303	1,338
Japan	32-40	282	81	210	340	314	318	326	384	357	327
Philippine Republic	35-51	2/	19	19	24	5	33	25	38	19	21
Other	30-50	36	36	237	227	419	290	163	174	176	172
Total		935	754	2,368	3,101	3,264	3,264	2,856	3,005	3,235	2,958
Africa:											
Angola	38-48	1	7	51	31	30	24	38	39	26	23
Congo	48+	18	16	278	399	363	405	373	426	412	344
Ghana	48	643	770	750	639	712	714	574	578	600	432
Ivory Coast	46+	-	-	-	14	-	-	-	-	68	110
Morocco	35-50	48	202	451	502	463	543	452	519	533	630
Rhodesia	30+	2	-	11	53	42	41	52	60	66	59
South-West Africa	45+	-	1	31	72	57	90	103	49	67	50
Union of South Africa	40+	282	495	827	975	768	788	934	1,069	1,316	1,563
Other	36-58	5	-	4	64	13	18	70	90	47	40
Total		999	1,491	2,403	2,749	2,448	2,623	2,596	2,830	3,135	3,251
Oceania, including											
Australia	45-58	8	10	45	100	92	125	87	115	81	85
World total		4,801	5,000	11,133	13,986	13,001	14,255	13,671	14,281	15,006	14,933

1/ Less than 500 tons.
2/ Included in total.

Source: Compiled from official statistics of the U.S. Bureau of Mines.

Table 28.--Manganese reserves of the United States

District	Raw material	Manganese content	
		Average percent	Quantity
	Long tons		Long tons
Cuyuna Range, Minn	450,000,000	5	22,500,000
Aroostook County, Maine	280,000,000	9	25,200,000
Chamberlain, S. D	69,000,000	15.5	10,700,000
Artillery Peak, Ariz	156,000,000	4	6,240,000
Butte, Mont	4,460,000	14	624,000
Three Kids, Nev	4,460,000	10	446,000
Pioche, Nev	3,570,000	10	357,000
Philipsburg, Mont	710,000	22.5	160,000
Leadville, Colo	3,570,000	15	536,000
Other deposits	-	-	3,000,000
Total	971,770,000		69,763,000

Source: Compiled by U.S. Geological Survey; published in the minutes of the 20th International Geological Congress, Mexico City, 1956 ("Symposium Sobre Yacimientos de Manganeso").

Table 29.--Manganese ore: 1/ Consumption of domestic and foreign ore in the United States for metallurgical uses, manufacture of dry cells, and production of chemicals; 5-year averages 1941-60, annual 1951-61

Period	Metallurgical uses 2/			Dry cells			Chemicals 3/			All uses			Estimated manganese content
	Domestic	Foreign	Total	Domestic	Foreign	Total	Domestic	Foreign	Total	Domestic	Foreign	Total	
	Gross weight (short tons)												Short tons
Average:													
1941-45	110,753	1,323,999	1,434,752	10,828	33,629	44,457	4/ 188	15,654	15,842	121,769	1,373,282	1,495,051	727,734
1946-50	110,645	1,246,883	1,357,528	5,617	37,932	43,549	3,966	15,895	19,861	120,228	1,300,710	1,420,938	685,699
1951-55	75,446	1,810,546	1,885,992	3,485	34,702	38,187	2,156	23,226	25,382	81,087	1,868,474	1,949,561	898,725
1956-60	35,662	1,820,980	1,856,642	2,690	26,314	29,004	1,849	47,523	49,372	40,201	1,894,817	1,935,018	893,572
Annual:													
1951	123,454	1,697,762	1,821,216	3,191	40,936	44,127	4,733	22,533	27,266	131,378	1,761,231	1,892,609	898,016
1952	89,255	1,658,628	1,747,883	4,720	35,177	39,897	5,251	16,158	21,409	99,226	1,709,963	1,809,189	829,740
1953	84,538	2,042,882	2,127,420	4,995	36,552	41,547	478	26,297	26,775	90,011	2,105,731	2,195,742	990,699
1954	35,424	1,651,838	1,687,262	2,893	28,142	31,035	292	22,059	22,351	38,609	1,702,039	1,740,648	802,801
1955	44,558	2,001,622	2,046,180	1,628	32,705	34,333	27	29,083	29,110	46,213	2,063,410	2,109,623	972,371
1956	67,324	2,131,289	2,198,613	1,510	30,853	32,363	731	32,452	33,183	69,565	2,194,594	2,264,159	1,020,851
1957	46,134	2,239,668	2,285,802	1,400	28,702	30,102	1,014	44,542	45,556	48,548	2,312,912	2,361,460	1,076,982
1958	42,943	1,377,384	1,420,327	2,157	24,447	26,604	164	50,479	50,643	45,264	1,452,310	1,497,574	697,835
1959	4,063	1,521,151	1,525,214	4,097	24,637	28,734	388	51,171	51,559	8,548	1,596,959	1,605,507	756,450
1960	17,844	1,835,410	1,853,254	4,285	22,930	27,215	6,951	58,969	65,920	29,080	1,917,309	1,946,389	915,738
1961	9,446	1,588,588	1,598,034	4,567	23,734	28,301	5,991	85,479	91,470	20,004	1,697,801	1,717,805	813,049
	Percent of domestic and foreign ores												
Average:													
1941-45	7.7	92.3	100.0	24.4	75.6	100.0	4/ 1.2	98.8	100.0	8.1	91.9	100.0	100.0
1946-50	8.2	91.8	100.0	12.9	87.1	100.0	20.0	80.0	100.0	8.5	91.5	100.0	100.0
1951-55	4.0	96.0	100.0	9.1	90.9	100.0	8.5	91.5	100.0	4.2	95.8	100.0	100.0
1956-60	1.9	98.1	100.0	9.3	90.7	100.0	3.7	96.3	100.0	2.1	97.9	100.0	100.0
Annual:													
1951	6.8	93.2	100.0	7.2	92.8	100.0	17.4	82.6	100.0	6.9	93.1	100.0	100.0
1952	5.1	94.9	100.0	11.8	88.2	100.0	24.5	75.5	100.0	5.5	94.5	100.0	100.0
1953	4.0	96.0	100.0	12.0	88.0	100.0	1.8	98.2	100.0	4.1	95.9	100.0	100.0
1954	2.1	97.9	100.0	9.3	90.7	100.0	1.3	98.7	100.0	2.2	97.8	100.0	100.0
1955	2.2	97.8	100.0	4.7	95.3	100.0	.1	99.9	100.0	2.2	97.8	100.0	100.0
1956	3.1	96.9	100.0	4.7	95.3	100.0	2.2	97.8	100.0	3.1	96.9	100.0	100.0
1957	2.0	98.0	100.0	4.7	95.3	100.0	2.2	97.8	100.0	2.1	97.9	100.0	100.0
1958	3.0	97.0	100.0	8.1	91.9	100.0	.3	99.7	100.0	3.0	97.0	100.0	100.0
1959	.3	99.7	100.0	14.3	85.7	100.0	.8	99.2	100.0	.5	99.5	100.0	100.0
1960	1.0	99.0	100.0	15.7	84.3	100.0	10.5	89.5	100.0	1.5	98.5	100.0	100.0
1961	.6	99.4	100.0	16.1	83.9	100.0	6.5	93.5	100.0	1.2	98.8	100.0	100.0

1/ Limited to ore containing 35 percent or more manganese (natural) after 1955.
2/ Includes ore used in production of manganese alloys and metal, steel ingots and castings, and pig iron.
3/ Includes miscellaneous uses after 1955.
4/ Average for 1942-45.

Source: Compiled from official statistics of the U.S. Bureau of Mines; manganese content estimated by U.S. Tariff Commission.

Table 30--Manganese ferroalloys and manganese metal: U.S. consumption by end uses, 1961

(In short tons)

End use	Ferro-manganese	Silico-manganese	Spiegel-eisen	Manganese metal	Manganese briquets	Total
Steel ingots and castings:						
Carbon steel	620,993	69,815	16,973	4,324	117	712,222
Stainless steel	3,118	4,148	14	7,561	-	14,841
Other 1/	140,814	33,263	9,123	1,037	18	184,255
Total, gross weight	764,925	107,226	26,110	12,922	135	911,318
Total, manganese content 2/	588,992	69,804	6,110	12,676	3/ 104	677,686
Percent of gross weight 2/	77.0	65.1	23.4	98.1	3/ 77.0	74.4
Gray and malleable iron castings	5,014	3,561	10,666	1	7,326	26,568
Nonferrous alloys (including welding rods)	7,811	727	83	3,265	2	11,888
All other uses	253	323	-	98	13	687
Total, all uses, gross weight	778,003	111,837	36,859	16,286	7,476	950,461
Total, all uses, estimated manganese content 4/	599,000	72,800	8,600	16,000	5,800	702,200
Percent of total 4/	85.3	10.4	1.2	2.3	.8	100.0

1/ Other alloy steel, principally, and steel mill rolls.

2/ Estimated by multiplying gross weight by average percent of manganese content, the latter as reported by the American Iron and Steel Institute in Annual Statistical Report 1961.

3/ Estimated.

4/ Estimated by multiplying gross weight by average percent of manganese in manganese ferroalloys and manganese metal consumed in steelmaking.

Source: Compiled from official statistics of the U.S. Bureau of Mines, except as noted.

Table 31.--Ferromanganese: U.S. production in blast and electric furnaces, and domestic and foreign manganese ore 1/ consumed therein, 5-year averages 1941-60, annual 1951-61

(Gross weight in short tons)

Period	Ferromanganese produced			Manganese ore 1/ consumed			
	In blast furnaces	In electric furnaces	Total	Domestic	Foreign	Total	Per ton of ferro-manganese produced
Average:							
1941-45	2/	2/	653,384	95,572	1,182,733	1,278,305	2.0
1946-50	2/	2/	610,248	97,874	1,106,708	1,204,582	2.0
1951-55	2/	2/	809,242	69,620	1,589,497	1,659,117	2.1
1956-60	3/ 534,950	3/ 233,219	799,137	32,792	1,679,463	1,712,255	2.1
Annual:							
1951	2/	2/	791,260	110,607	1,416,813	1,527,420	1.9
1952	2/	2/	758,721	83,614	1,364,618	1,448,232	1.9
1953	2/	2/	907,533	75,594	1,829,382	1,904,976	2.1
1954	2/	2/	718,721	31,351	1,412,030	1,443,381	2.0
1955	2/	2/	869,977	4/ 46,936	4/ 1,924,643	4/ 1,971,579	4/ 2.3
1956	2/	2/	923,012	63,561	2,025,678	2,089,239	2.3
1957	735,493	228,321	963,814	36,692	2,066,693	2,103,385	2.2
1958	430,790	205,946	636,736	42,061	1,228,769	1,270,830	2.0
1959	402,698	226,609	629,307	3,829	1,275,138	1,278,967	2.0
1960	570,817	272,001	842,818	17,819	4/ 1,801,038	4/ 1,818,857	4/ 2.2
1961	504,744	228,069	732,813	5/ 9,446	1,577,519	5/ 1,586,965	5/ 2.2

1/ Containing 35 percent or more manganese.
2/ Separate data not available.
3/ Average for 1957-60.
4/ Includes ore used in producing silicomanganese.
5/ Includes ore used in producing silicomanganese and manganese metal.

Source: Compiled from official statistics of the U.S. Bureau of Mines.

Table 32.--Ferromanganese and silicomanganese: U.S. production, by gross weight and average manganese content, 1954-61

Year	Ferromanganese		Silicomanganese	
	Gross weight	Manganese content	Gross weight	Manganese content
	Short tons	Percent	Short tons	Percent
1954	718,721	75.0	1/	1/
1955	869,977	77.0	1/	1/
1956	923,012	76.9	1/	1/
1957	963,814	77.2	114,566	66.1
1958	636,736	77.7	80,977	65.7
1959	629,307	77.3	106,340	65.4
1960	842,818	77.7	101,330	65.5
1961	732,813	77.3	120,238	65.8

1/ Not available.

Source: Compiled from official statistics of the U.S. Bureau of Mines.

Table 33.--Manganese metallurgical products: U.S. consumption by types, 5-year averages, 1941-60, annual 1951-61

(Short tons)

Period	Ferromanganese			Silico-manganese	Spiegel-eisen	Manganese metal	Briquets	Total	
	High carbon	Medium and low carbon	Total					Gross weight	Estimated manganese content
Average:									
1941-45	1/	1/	671,232	55,487	165,494	1/	2/ 4,415	3/ 895,745	3/ 607,122
1946-50	612,872	32,477	645,349	68,701	97,446	1/	8,605	3/ 820,101	3/ 577,714
1951-55	785,892	66,794	852,686	98,234	68,949	2,146	16,274	1,038,289	745,889
1956-60	757,783	64,677	822,460	104,736	46,513	11,282	10,760	995,751	732,065
Annual:									
1951	823,132	60,709	883,841	92,770	80,556	1,585	18,742	1,077,494	766,635
1952	735,578	61,248	796,826	92,659	69,029	1,512	16,627	976,653	703,513
1953	856,938	74,463	931,401	113,500	73,512	1,197	17,324	1,136,934	820,081
1954	659,788	57,122	716,910	80,259	52,082	1,939	14,983	866,173	615,363
1955	854,025	80,426	934,451	111,983	69,564	4,497	13,694	1,134,189	823,854
1956	870,101	75,109	945,210	125,821	62,398	9,346	15,050	1,157,825	851,354
1957	867,549	68,176	935,725	113,699	53,615	9,254	11,162	1,123,455	823,093
1958	622,389	52,106	674,495	86,886	37,029	9,243	10,589	818,242	602,394
1959	695,339	61,101	756,440	98,639	41,393	12,836	8,691	917,999	674,607
1960	733,536	66,894	800,430	98,634	38,128	15,733	8,306	961,231	708,879
1961	714,650	63,353	778,003	111,837	36,859	16,286	7,476	950,461	702,227

1/ Not available.
2/ Average for 1942-45.
3/ Does not include manganese metal.

Source: Compiled from official statistics of the U.S. Bureau of Mines; manganese content estimated by the U.S. Tariff Commission.

Table 34.--Manganese alloys: Shipments by U.S. producers and U.S. imports for consumption, 5-year averages 1941-60, annual 1956-61

Item	Average 1941-45	Average 1946-50	Average 1951-55	Average 1956-60	1956	1957	1958	1959	1960	1961
	Gross weight (short tons)									
Shipments by U.S. producers:										
Ferromanganese	665,341	611,850	805,649	781,524	925,450	882,066	608,099	709,996	782,009	757,345
Silicomanganese	1/	1/	1/	2/ 100,434	1/	107,946	82,013	107,396	104,380	121,229
Spiegeleisen	830,575	93,502	3/ 71,181	1/	1/	1/	1/	1/	1/	1/
U.S. imports for consumption:										
Ferromanganese	12,765	77,324	86,454	154,499	160,203	338,079	63,932	90,062	4/ 120,222	4/ 221,909
Silicomanganese	1/	1/	1/	1/	1/	1/	1/	1/	1/	1/
Spiegeleisen 5/	3,376	2,138	166	47	234	-	-	-	-	-
	Value (1,000 dollars) 6/									
Shipments by U.S. producers:										
Ferromanganese	83,180	86,793	150,705	180,057	209,412	210,004	145,647	169,360	165,862	159,050
Silicomanganese	1/	1/	1/	2/ 25,101	1/	27,853	20,638	27,930	23,983	25,238
Spiegeleisen	26,512	4,177	3/ 5,081	1/	1/	1/	1/	1/	1/	1/
U.S. imports for consumption:										
Ferromanganese	1,224	11,480	16,957	26,571	28,500	60,236	11,046	14,067	4/ 19,008	4/ 34,385
Silicomanganese	2	9	168	1,673	1,386	1,141	1,656	2,296	4/ 1,886	4/ 2,525
Spiegeleisen 5/	149	116	13	4	18	-	-	-	-	-
	Average value (per short ton) 6/									
Shipments by U.S. producers:										
Ferromanganese	$125.02	$141.85	$187.06	$230.39	$226.28	$238.08	$239.51	$238.54	$212.10	210.01
Silicomanganese	1/	1/	1/	2/ 249.93	1/	258.03	251.64	260.07	229.77	208.18
Spiegeleisen	31.92	44.67	3/ 71.38	1/	1/	1/	1/	1/	1/	1/
U.S. imports for consumption:										
Ferromanganese	95.89	148.47	196.14	171.98	177.90	178.17	172.78	156.19	4/ 158.11	4/ 154.95
Silicomanganese	1/	1/	1/	1/	1/	1/	1/	1/	1/	1/
Spiegeleisen 5/	44.14	54.26	78.31	85.11	76.92	-	-	-	-	-

1/ Not available.
2/ 4-year average.
3/ 3-year average.
4/ Preliminary.
5/ Containing more than 1 percent carbon.
6/ Value of imports is foreign value.

Source: Shipments from official statistics of the U.S. Bureau of Mines; imports from official statistics of the U.S. Department of Commerce.

Table 35.--Manganese metallurgical products: Stocks held by U.S. producers and consumers 1/ at end of year, 5-year averages 1941-60, annual 1951-61

(Gross weight in short tons)

Stocks on Dec. 31	Producers' stocks			Consumers' stocks								Total 2/ producers' and consumers' stocks
				Ferromanganese								
	Ferromanganese, silicomanganese, and manganese metal	Spiegeleisen	Total	High carbon	Medium and low carbon	Total	Silicomanganese	Spiegeleisen	Manganese metal	Briquets	Total	
Average:												
1941-45	3/	3/	3/	4/	4/	199,709	11,666	70,044	3/	5/ 2,115	283,534	283,534
1946-50	3/	3/	3/	4/	4/	173,052	14,051	48,849	3/	2,646	238,598	238,598
1951-55	5/ 78,177	3/	3/	4/	4/	157,303	15,436	40,021	406	4,390	217,556	295,733
1956-60	138,596	3/	3/	123,471	12,513	135,984	16,452	22,297	1,761	2,374	178,868	317,464
Annual:												
1951	3/	3/	3/	4/	4/	178,938	12,734	39,725	388	6,141	237,926	237,926
1952	79,629	3/	3/	4/	4/	142,831	15,736	32,299	155	4,460	195,481	275,110
1953	71,113	3/	3/	4/	4/	137,356	13,894	58,088	250	3,917	213,505	284,618
1954	97,864	3/	3/	4/	4/	175,347	13,689	36,036	409	3,972	229,453	327,317
1955	64,101	3/	3/	4/	4/	152,044	21,127	33,957	829	3,459	211,416	275,517
1956	72,996	3/	3/	135,601	18,925	154,526	22,815	29,395	2,450	3,774	212,960	285,956
1957	148,117	3/	3/	154,668	11,780	166,448	18,866	29,697	1,829	2,912	219,752	367,869
1958	183,559	3/	3/	113,241	10,435	123,676	15,315	28,567	1,313	2,220	171,091	354,650
1959	115,505	22,348	137,853	102,019	12,117	114,136	14,212	14,153	1,851	1,651	146,003	283,856
1960	172,801	23,984	196,785	111,824	9,311	121,135	11,053	9,672	1,362	1,314	144,536	341,321
1961	146,528	31,471	177,999	140,241	7,657	147,898	13,372	7,784	1,580	982	171,616	349,615

1/ Includes stocks in bonded warehouses; excludes U.S. Government stocks.
2/ Total of available data.
3/ Not available.
4/ Separate data not available.
5/ 4-year average.

Source: Compiled from official statistics of the U.S. Bureau of Mines.

Table 36.--Manganese metallurgical products: Manganese content of U.S. imports for consumption, by kinds, 5-year averages 1941-60, annual 1951-61

Period	Ferromanganese		Silicomanganese		Spiegeleisen				Manganese metal		Total, all products	
					Not over 1 percent carbon content		Over 1 percent carbon content					
	Manganese content	Foreign value	Manganese content	Foreign value	Manganese content	Foreign value	Manganese content 1/	Foreign value	Manganese content	Foreign value	Manganese content	Foreign value
	Short tons	1,000 dollars	Short tons	1,000 dollars	Short tons	1,000 dollars	Short tons	1,000 dollars	Short tons	1,000 dollars	Short tons	1,000 dollars
Average:												
1941-45	9,864	1,224	1	2	2/ 12	2/ 3	675	149	3/	3/	10,552	1,378
1946-50	61,835	11,480	51	9	2/ 12	2/ 4	428	116	3/	3/	62,326	11,609
1951-55	68,233	16,957	969	168	4/	1	33	13	-	-	69,235	17,139
1956-60	118,824	26,571	8,583	1,673	-	-	9	4	55	26	127,471	28,274
Annual:												
1951	94,945	20,046	106	28	4/	5/	-	-	-	-	95,051	20,074
1952	51,029	14,759	50	21	-	-	9	4	-	-	51,088	14,784
1953	98,207	27,181	158	34	4/	5/	157	63	-	-	98,522	27,278
1954	44,744	10,903	1,581	280	-	-	-	-	-	-	46,325	11,183
1955	52,237	11,898	2,950	478	-	-	-	-	-	-	55,187	12,376
1956	123,953	28,500	6,357	1,386	-	-	47	18	-	-	130,357	29,904
1957	257,821	60,236	5,109	1,141	-	-	-	-	-	-	262,930	61,377
1958	49,521	11,046	8,908	1,656	-	-	-	-	-	-	58,429	12,702
1959	70,232	14,067	12,495	2,296	-	-	-	-	32	14	82,759	16,377
1960 6/	92,594	19,008	10,046	1,886	-	-	-	-	243	113	102,883	21,007
1961 6/	170,174	34,385	13,471	2,525	-	-	-	-	565	262	184,210	37,172

1/ Estimated (20 percent of gross tonnage of imports).
2/ Includes manganese metal and manganese boron.
3/ Included with spiegeleisen, not over 1 percent carbon.
4/ Less than 1/2 short ton.
5/ Less than $500.
6/ Preliminary.

Source: Compiled from official statistics of the U.S. Department of Commerce.

Table 37 --Ferromanganese, 30 percent or more manganese content: U.S. imports for consumption, by grades, 5-year averages 1941-60, annual 1951-61

Period	Containing not over 1 percent carbon			Containing over 1 percent and less than 4 percent carbon			Containing not less than 4 percent carbon			Total		
	Gross weight	Manganese content	Foreign value	Gross weight	Manganese content	Foreign value	Gross weight	Manganese content	Foreign value	Gross weight	Manganese content	Foreign value
	Short tons	Short tons	1,000 dollars	Short tons	Short tons	1,000 dollars	Short tons	Short tons	1,000 dollars	Short tons	Short tons	1,000 dollars
Average:												
1941-45	3	2	1/	-	-	-	12,762	9,862	1,224	12,765	9,864	1,224
1946-50	85	69	25	14,553	12,005	3,134	62,686	49,761	8,321	77,324	61,835	11,480
1951-55	3,861	2,927	709	19,293	15,845	5,472	63,300	49,461	10,776	86,454	68,233	16,957
1956-60	418	329	151	15,509	12,558	3,570	138,572	105,937	22,850	154,499	118,824	26,571
Annual:												
1951	235	196	75	18,924	15,618	4,427	100,605	79,131	15,544	119,764	94,945	20,046
1952	-	-	-	23,535	18,890	6,906	40,560	32,139	7,853	64,095	51,029	14,759
1953	18,805	14,195	3,356	27,718	23,011	9,039	79,995	61,001	14,786	126,518	98,207	27,181
1954	138	129	56	9,096	7,594	2,511	47,538	37,021	8,336	56,772	44,744	10,903
1955	128	113	57	17,191	14,113	4,478	47,802	38,011	7,363	65,121	52,237	11,898
1956	166	123	61	19,051	15,622	4,846	140,986	108,208	23,593	160,203	123,953	28,500
1957	767	676	405	15,237	12,268	3,971	322,075	244,877	55,860	338,079	257,821	60,236
1958	76	64	28	8,878	7,180	2,122	54,978	42,277	8,896	63,932	49,521	11,046
1959	805	562	140	23,744	19,121	4,635	65,513	50,549	9,292	90,062	70,232	14,067
1960 2/	277	218	122	10,635	8,601	2,278	109,310	83,775	16,608	120,222	92,594	19,008
1961 2/	524	462	222	7,813	6,396	1,756	213,572	163,316	32,407	221,909	170,174	34,385

1/ Less than $500.
2/ Preliminary.

Source: Compiled from official statistics of the U.S. Department of Commerce.

Table 38.--Ferromanganese, 30 percent or more manganese content: U.S. imports for consumption, 1951-61

Item and year	Gross weight	Manganese content		Foreign value	Percent of total value	Average value per short ton (gross weight)
		Quantity	Percent			
	Short tons	Short tons		1,000 dollars		
Total, excluding duty-free imports for U.S. Government:						
1951	106,954	84,999	79.5	18,341	91.5	$171.48
1952	60,208	48,018	79.8	14,177	96.1	235.47
1953	38,194	31,720	83.0	11,522	42.4	301.67
1954	36,674	29,671	80.9	7,349	67.4	200.39
1955	65,121	52,237	80.2	11,898	100.0	182.71
1956	92,654	72,861	78.6	17,466	61.3	188.51
1957	37,613	30,166	80.2	8,939	14.8	237.66
1958	49,092	38,359	78.1	8,044	72.8	163.86
1959	77,005	59,951	77.9	12,001	85.3	155.85
1960 1/	62,515	49,132	78.6	9,093	47.8	145.45
1961 1/	101,385	78,836	77.8	13,627	39.6	134.41
Duty-free for U.S. Government:						
1951	12,810	9,946	77.6	1,705	8.5	133.10
1952	3,887	3,011	77.5	582	3.9	149.73
1953	88,324	66,487	75.3	15,659	57.6	177.29
1954	20,098	15,073	75.0	3,554	32.6	176.83
1955	-	-	-	-	-	-
1956	67,549	51,092	75.6	11,034	38.7	163.35
1957	300,466	227,655	75.8	51,297	85.2	170.72
1958	14,840	11,162	75.2	3,002	27.2	202.29
1959	13,057	10,281	78.7	2,066	14.7	158.23
1960 1/	57,707	43,462	75.3	9,915	52.2	171.82
1961 1/	120,524	91,338	75.8	20,758	60.4	172.23
Total imports for consumption:						
1951	119,764	94,945	79.3	20,046	100.0	167.38
1952	64,095	51,029	79.6	14,759	100.0	230.27
1953	126,518	98,207	77.6	27,181	100.0	214.84
1954	56,772	44,744	78.8	10,903	100.0	192.05
1955	65,121	52,237	80.2	11,898	100.0	182.71
1956	160,203	123,953	77.4	28,500	100.0	177.90
1957	338,079	257,821	76.3	60,236	100.0	178.17
1958	63,932	49,521	77.5	11,046	100.0	172.78
1959	90,062	70,232	78.0	14,067	100.0	156.19
1960 1/	120,222	92,594	77.0	19,008	100.0	158.11
1961 1/	221,909	170,174	76.7	34,385	100.0	154.95

1/ Preliminary.

Source: Compiled from official statistics of the U.S. Department of Commerce.

Table 39.--Ferromanganese, 30 percent or more manganese content: U.S. imports for consumption, by countries, 1957-61

Country	1957	1958	1959	1960 1/	1961 1/
	Gross weight (short tons)				
India	-	648	5,547	37,105	96,958
France	89,955	16,237	22,289	23,187	40,858
Union of South Africa	-	-	-	11,320	27,206
Japan	55,783	35,502	22,578	30,017	15,747
West Germany	43,247	-	4,711	804	21,645
Canada	124,473	198	127	711	217
Norway	11,405	55	16,136	2,879	2,221
All other	13,216	11,292	18,674	14,199	17,057
Total	338,079	63,932	90,062	120,222	221,909
	Manganese content (short tons)				
India	-	483	4,143	27,849	73,058
France	67,722	12,394	17,199	18,042	31,390
Union of South Africa	-	-	-	8,854	21,508
Japan	42,734	27,604	17,870	23,328	12,462
West Germany	32,900	-	3,594	634	16,792
Canada	94,873	153	101	614	166
Norway	9,466	44	12,779	2,232	1,710
All other	10,126	8,843	14,546	11,041	13,088
Total	257,821	49,521	70,232	92,594	170,174
	Foreign value (1,000 dollars)				
India	-	115	721	6,374	17,291
France	15,529	3,136	3,246	2,772	5,745
Union of South Africa	-	-	-	1,408	3,126
Japan	9,639	6,057	4,317	5,523	3,105
West Germany	7,478	-	619	196	2,561
Canada	22,545	46	41	297	36
Norway	2,529	10	2,627	433	245
All other	2,516	1,682	2,496	2,005	2,276
Total	60,236	11,046	14,067	19,008	34,385
	Average value (per short ton, gross weight)				
India	-	$177.47	$129.98	$171.78	$178.33
France	$172.63	193.14	145.63	119.55	140.61
Union of South Africa	-	-	-	124.38	114.90
Japan	172.79	170.61	191.20	184.00	197.18
West Germany	172.91	-	131.39	243.78	118.32
Canada	181.12	232.32	322.83	417.72	165.90
Norway	221.74	181.82	162.80	150.40	110.31
All other	190.38	148.96	133.66	141.21	133.43
Average	178.17	172.78	156.19	158.11	154.95

1/ Preliminary.

Source: Compiled from official statistics of the U.S. Department of Commerce.

Table 40.--Ferromanganese, 30 percent or more manganese content: U.S. imports for consumption other than for U.S. Government account, by countries, 1957-61

Country	1957	1958	1959	1960 1/	1961 1/
	Gross weight (short tons)				
France	3,428	5,777	22,117	23,187	30,771
Union of South Africa	-	-	-	11,320	27,206
Japan	17,488	31,991	22,578	12,132	9,414
West Germany	548	-	4,711	804	10,880
India	-	648	5,547	4,320	6,980
Yugoslavia	3,212	4,402	5,997	4,998	8,234
Norway	7,184	55	3,251	638	2,221
All other	5,753	6,219	12,804	5,116	5,679
Total	37,613	49,092	77,005	62,515	101,385
	Manganese content (short tons)				
France	2,689	4,549	17,066	18,042	23,654
Union of South Africa	-	-	-	8,854	21,508
Japan	13,915	24,947	17,870	9,825	7,691
West Germany	488	-	3,594	634	8,215
India	-	483	4,143	3,214	5,215
Yugoslavia	2,450	3,524	4,726	3,950	6,432
Norway	6,204	43	2,631	518	1,710
All other	4,420	4,813	9,921	4,095	4,411
Total	30,166	38,359	59,951	49,132	78,836
	Foreign value (1,000 dollars)				
France	749	992	3,225	2,772	3,871
Union of South Africa	-	-	-	1,408	3,126
Japan	4,281	5,391	4,317	2,458	1,977
West Germany	323	-	619	196	1,386
India	-	115	721	521	1,234
Yugoslavia	657	738	877	628	1,005
Norway	1,828	10	582	97	245
All other	1,101	798	1,660	1,013	783
Total	8,939	8,044	12,001	9,093	13,627
	Average value (per short ton, gross weight)				
France	$218.49	$171.72	$145.82	$119.55	$125.80
Union of South Africa	-	-	-	124.38	114.90
Japan	244.80	168.52	191.20	202.60	210.01
West Germany	589.42	-	131.39	243.78	127.39
India	-	177.47	129.98	120.60	176.79
Yugoslavia	204.55	167.65	146.24	125.65	122.05
Norway	254.45	181.82	179.02	152.04	110.31
All other	191.38	128.32	129.65	198.01	137.88
Average	237.66	163.86	155.85	145.45	134.41

1/ Preliminary.

Source: Compiled from official statistics of the U.S. Department of Commerce.

Table 41.--Ferromanganese, 30 percent or more manganese content: U.S. imports for consumption for U.S. Government account, by countries, 1957-61

Country	1957	1958	1959	1960 1/	1961 1/
	Gross weight (short tons)				
India	-	-	-	32,785	89,978
France	86,527	10,460	172	-	10,087
West Germany	42,699	-	-	-	10,765
Japan	38,295	3,511	-	17,885	6,333
Norway	4,221	-	12,885	2,241	-
Canada	124,340	-	-	-	-
All other	4,384	869	-	4,796	3,361
Total	300,466	14,840	13,057	57,707	120,524
	Manganese content (short tons)				
India	-	-	-	24,635	67,843
France	65,033	7,845	133	-	7,736
West Germany	32,412	-	-	-	8,577
Japan	28,819	2,657	-	13,503	4,771
Norway	3,262	-	10,148	1,714	-
Canada	94,768	-	-	-	-
All other	3,361	660	-	3,610	2,411
Total	227,655	11,162	10,281	43,462	91,338
	Foreign value (1,000 dollars)				
India	-	-	-	5,854	16,057
France	14,780	2,144	21	-	1,874
West Germany	7,155	-	-	-	1,175
Japan	5,358	666	-	3,065	1,128
Norway	701	-	2,045	336	-
Canada	22,509	-	-	-	-
All other	794	192	-	660	524
Total	51,297	3,002	2,066	9,915	20,758
	Average value (per short ton, gross weight)				
India	-	-	-	$178.56	$178.45
France	$170.81	$204.97	$122.09	-	185.78
West Germany	167.57	-	-	-	109.15
Japan	139.91	189.69	-	171.37	178.11
Norway	166.07	-	158.71	149.93	-
Canada	181.03	-	-	-	-
All other	181.11	220.94	-	137.61	155.91
Average	170.72	202.29	158.23	171.82	172.23

1/ Preliminary.

Source: Compiled from official statistics of the U.S. Department of Commerce.

Table 42 --Manganese silicon (including silicon manganese): U.S. imports for consumption, by countries, 1957-61

Country	1957	1958	1959	1960 1/	1961 1/
	Quantity (short tons, manganese content)				
Norway	74	298	1,634	3,197	4,684
Belgium and Luxembourg	-	-	223	1,086	3,754
Spain	-	-	-	618	2,210
Yugoslavia	556	-	325	598	1,678
Japan	3,861	8,561	7,170	2,141	366
Chile	618	-	1,160	825	154
All other	-	49	1,983	1,581	625
Total	5,109	8,908	12,495	10,046	13,471
	Foreign value (1,000 dollars)				
Norway	18	54	294	586	828
Belgium and Luxembourg	-	-	46	209	721
Spain	-	-	-	119	431
Yugoslavia	124	-	67	118	314
Japan	847	1,590	1,294	397	75
Chile	152	-	207	148	29
All other	-	12	388	309	127
Total	1,141	1,656	2,296	1,886	2,525
	Average value (per short ton, manganese content)				
Norway	$243.24	$181.21	$179.93	$183.30	$176.77
Belgium and Luxembourg	-	-	206.28	192.45	192.06
Spain	-	-	-	192.56	195.02
Yugoslavia	223.02	-	206.15	197.32	187.13
Japan	219.37	185.73	180.47	185.43	204.92
Chile	245.95	-	178.45	179.39	188.31
All other	-	244.90	195.66	195.45	203.20
Average	223.33	185.90	183.75	187.74	187.44

1/ Preliminary.

Source: Compiled from official statistics of the U.S. Department of Commerce.

Table 43 --Manganese metal: U.S. imports for consumption, by countries, 1959-61

Country	1959	1960 1/	1961 1/
	Quantity (short tons)		
Japan	32	243	564
West Germany	-	-	1
United Kingdom	-	2/	-
Total	32	243	565
	Foreign value		
Japan	$14,416	$113,046	$260,954
West Germany	-	-	1,506
United Kingdom	-	230	-
Total	14,416	113,276	262,460
	Average value (per short ton)		
Japan	$450.50	$465.21	$462.68
West Germany	-	-	3/
United Kingdom	-	3/	-
Average	450.50	466.16	464.53

1/ Preliminary.
2/ Less than 1/2 short ton.
3/ Imports too small to yield significant average unit value.

Source: Compiled from official statistics of the U.S. Department of Commerce.

Table 44.--Manganese: U.S. exports of manganese ores and concentrates, ferromanganese, spiegeleisen, and manganese metal, alloys and scrap, 5-year averages 1941-60, annual 1951-61

Year or period	Manganese ores and concentrates 1/		Ferromanganese (including silico-manganese)		Spiegeleisen		Manganese metal (including alloys and scrap)		Total, all products	
	Quantity (gross weight)	Value	Quantity (gross weight)	Value	Quantity (gross weight)	Value	Quantity (gross weight)	Value	Estimated manganese content	Value
	Short tons	1,000 dollars	Short tons	1,000 dollars	Short tons	1,000 dollars	Short tons	1,000 dollars	Short tons	1,000 dollars
Average:										
1941-45 2/	4,797	315	3/ 5,736	3/ 769	4/	4/	395	269	7,496	1,353
1946-50	8,892	624	10,004	1,537	1,646	62	263	129	13,559	2,352
1951-55	7,413	545	1,344	466	27	2	329	215	5,257	1,228
1956-60	5,425	725	2,549	721	278	27	1,145	686	5,664	2,159
Annual:										
1951	8,030	466	633	207	85	4	218	141	5,236	818
1952	9,749	505	1,453	475	52	4	175	125	6,575	1,109
1953	6,894	552	1,112	389	-	-	356	246	4,823	1,187
1954	6,112	592	1,732	615	-	-	442	312	4,649	1,519
1955	6,279	612	1,789	643	-	-	456	252	5,004	1,507
1956	6,133	664	2,248	682	-	-	716	473	5,366	1,819
1957	5,270	725	7,395	1,867	29	3	733	402	8,878	2,997
1958	4,883	700	1,406	464	834	79	586	300	4,055	1,543
1959	5,702	819	947	388	380	38	1,261	752	4,499	1,997
1960 5/	5,139	719	751	202	148	15	2,431	1,501	5,524	2,437
1961 5/	7,528	1,054	469	146	525	47	2,234	1,327	6,163	2,574

1/ Data for 1948 and subsequent years include ores and concentrates containing 10 percent or more manganese; prior data include ores containing 35 percent or more manganese.
2/ Data for 1941 incomplete.
3/ Includes spiegeleisen.
4/ Included with ferromanganese.
5/ Preliminary.

Source: Gross weight and value of exports compiled from official statistics of the U.S. Department of Commerce; manganese content estimated by the U.S. Tariff Commission.

Table 45.--Manganese ore: Price quotations 1/ and effective dates of changes, Jan. 1, 1951-Aug. 2, 1962

(Per long ton unit 2/)

Effective date of change	Indian, 46-48 percent manganese c.i.f. U.S. ports	West African and other, long-term contracts, c.i.f. U.S. ports (nominal)
1951:		
Jan. 1	$0.92-$0.96 (nominal)	3/
Mar. 15	1.02- 1.06	3/
Mar. 29	1.05- 1.10	3/
June 7	1.10- 1.15 (nominal)	3/
June 28	1.10-	3/
July 12	1.11- 1.16	3/
July 26	1.18- 1.22	3/
Aug. 2	1.22- 1.26	3/
Aug. 9	1.20- 1.26	3/
Aug 16	1.22- 1.28	3/
Aug. 23	1.25- 1.30	3/
Oct. 11	1.20- 1.25	3/
1952:		
Mar. 6	1.22- 1.27	3/
Apr. 24	1.20- 1.24	3/
May 1	1.22- 1.26	3/
June 19	1.22- 1.24	3/
Aug. 14	1.20- 1.22	3/
1953:		
Jan. 8	1.18- 1.22	$0.90-$0.93
Jan. 22	1.18- 1.21	.90- .93
Aug. 13	1.15- 1.18	.90- .93
Sept. 17	1.14- 1.16	.90- .93
Sept. 24	1.14- 1.16 (nominal)	.90- .93
Oct. 22	1.12- 1.14 (nominal)	.90- .93
Nov. 5	1.08- 1.10 (nominal)	.90- .93
Nov. 26	1.08- 1.10 (nominal)	.90
1954:		
Feb. 4	1.02- 1.04 (nominal)	.85- .90
Apr. 22	1.00- 1.02 (nominal)	.85- .90
May 13	.98- 1.00 (nominal)	.85- .90
June 24	.98- 1.00 (nominal)	.85- .88
Aug. 26	.90- .92 (nominal)	.80- .85
Sept. 2	.88- .90 (nominal)	.80- .85
Sept. 9	.85- .90 (nominal)	.80- .85
Sept. 16	.75- .80 (nominal)	.72- .75
Sept. 23	.70- .75 (nominal)	.65- .70
Dec. 2	.74- .77 (nominal)	.70- .73
Dec. 9	.75- .80	.70- .75
Dec. 23	.78- .80	.75- .78
1955:		
Jan. 6	.80- .82	.80- .82
Jan. 27	.84- .86	.82- .84
Mar. 3	.85- .87	.84- .86
Apr. 21	.86- .88	.85- .86
Apr. 28	.86- .88	.86- .88
May 5	.87- .89	.87- .89
May 19	.88- .90	.88- .90
June 23	.90- .92	.88- .90
June 30	.91- .93	.89- .90
July 14	.92- .94	.89- .90
July 28	.94- .96	.92- .94
Aug. 4	.96- .98	.94- .96
Sept. 1	.98- 1.00	.94- .96
Nov. 17	1.03- 1.05	.94- .96
Nov. 24	1.05- 1.07	.94- .96
Dec. 1	1.09- 1.11	.94- .96
Dec. 8	1.09- 1.15	.94- .96
Dec. 15	1.12- 1.17	.94- .96
1956:		
Jan. 12	1.15- 1.20	.94- .96
Jan. 19	1.16- 1.20	3/

See footnotes at end of table.

Table 45.--Manganese ore: Price quotations 1/ and effective dates of changes, Jan. 1, 1951-Aug. 2, 1962--Continued

(Per long ton unit 2/)

Effective date of change	Indian, 46-48 percent manganese, c.i.f. U.S. ports	West African and other, long-term contracts, c.i.f. U.S. ports (nominal)
1956--Continued		
Feb. 23	$1.18-$1.20 (nominal)	3/
Mar. 22	1.20- 1.25 (nominal)	3/
Mar. 29	1.25- 1.30	3/
Apr. 19	1.27- 1.30	3/
June 7	1.27- 1.33	3/
June 21	1.30- 1.35	3/
July 12	1.32- 1.37	3/
Aug. 2	1.34- 1.40	3/
Aug. 30	1.39- 1.45	3/
Sept. 13	1.43- 1.48	3/
Sept. 20	1.45- 1.50	3/
Oct. 18	1.48- 1.50	3/
Oct. 25	1.54- 1.55	3/
Dec. 6	1.64- 1.69	3/
1957:		
Mar. 21	1.64- 1.67	3/
Apr. 4	1.60- 1.65	3/
Apr. 11	1.58- 1.63	3/
May 2	1.53- 1.57	3/
May 23	1.51- 1.55	3/
May 30	1.49- 1.53	3/
June 6	1.48- 1.52	3/
June 20	1.45- 1.49	3/
July 4	1.45- 1.47	3/
Aug. 1	1.43- 1.45	3/
Aug. 29	1.40- 1.43	3/
Nov. 7	1.39- 1.42	3/
Nov. 21	1.36- 1.39 (nominal)	3/
1958:		
Jan. 23	1.33- 1.36 (nominal)	3/
May 1	1.25- 1.30 (nominal)	3/
May 8	1.23- 1.25 (nominal)	3/
May 22	1.20- 1.23 (nominal)	3/
May 29	1.17- 1.20 (nominal)	3/
June 5	1.10- 1.15 (nominal)	3/
July 31	1.05- 1.10 (nominal)	3/
Nov. 27	.915- .965 (nominal)	3/
1959:		
Apr. 16 (through Aug. 2, 1962)	4/ .87- .90 (nominal)	5/

1/ Import duty extra.

2/ A long-ton unit is equivalent to 22.4 pounds of contained manganese.

3/ Not quoted.

4/ Current quotations are for ore containing 10 percent iron, 0.15 percent phosphorus, and 13 percent of aluminum plus silicon.

5/ Since Oct. 1, 1959, South African ore containing 46-48 percent manganese, 9 percent iron, 0.05 percent phosphorus, and 13 percent of aluminum plus silicon has been quoted at $0.87-$0.90 (nominal) per long ton unit. Brazilian ore containing 48-50 percent manganese, 5 percent iron, 0.1 percent phosphorus, 0.2 percent arsenic, and 7 percent of aluminum plus silicon has been quoted at $0.91 (nominal) per long ton unit, also since that date.

Source: Compiled from quotations published in E & MJ Metal and Mineral Markets.

Table 46.--Ferromanganese: Price quotations and effective dates of changes, Jan. 1, 1951-Aug. 2, 1962

(In cents per pound) 1/

Effective date of change	Standard containing 74%-76% manganese	Medium carbon containing 80%-85% manganese, 1-1/4%-1-1/2% carbon	Low carbon containing 85%-90% manganese, maximum 0.07% carbon
1951:			
Jan. 1	2/ 8.26	3/	3/
1952:			
Aug. 8	2/ 10.04	3/	3/
1953:			
June 18	10.00	3/	3/
1954:			
Sept. 1	9.50	3/	3/
1955:			
Dec. 15	10.25	3/	3/
1956:			
Jan. 5	10.25	22.35	30.95
Mar. 14	10.75	22.85	31.95
Sept. 20	10.75-11.75	22.85-24.15	31.95-33.75
Oct. 25	11.75	24.15	33.75
Dec. 20	11.75-12.75	24.15-25.50	33.75-35.10
1957:			
Jan. 24	12.75	25.50	35.10
Sept. 19	12.25	25.50	35.10
1960:			
Jan. 19	11.00	25.50	35.10
Jan. 28	11.00	24.00	35.10
1961:			
Dec. 14 (through Aug. 2, 1962)	4/ 9.50-11.00	24.00	35.10

1/ All quotations are f.o.b. seaboard, major domestic producing point, or shipping point.

2/ Quotations prior to June 18, 1953 were for ferromanganese containing 78 to 82 percent manganese.

3/ Not quoted.

4/ On August 2, 1962, a quotation was listed for imported standard ferromanganese at $158 per long ton (equivalent to 7.05 cents per pound), delivered at Pittsburgh, Pa.

Source: Compiled from quotations published in E & MJ Metal and Mineral Markets.

Table 47.--Silicomanganese: Price quotations and effective dates of changes, Jan. 1, 1951-Aug. 2, 1962

(In cents per pound, carload lots) 1/

Effective date of change	Containing 65%-68% manganese		
	Maximum 1½% carbon, 18%-20% silicon	Maximum 2% carbon, 15%-17½% silicon	Maximum 3% carbon, 12%-14½% silicon
1951:			
Jan. 1	9.9	2/	2/
1952:			
Nov. 13	11.4	11.2	10.9
1954:			
Apr. 1	11.0	10.8	10.6
1955:			
Sept. 15	11.2	11.0	10.8
Dec. 15	11.5	11.3	11.1
1956:			
Jan. 5	11.5	11.3	11.1
Mar. 14	11.5-12.0	11.3-11.8	11.1-11.6
Apr. 5	12.0	11.8	11.6
Sept. 20	12.95	12.75	12.55
Oct. 2	13.8	13.6	13.4
1957:			
Mar. 19	12.8	12.6	12.4
1960:			
Jan. 28	11.6	11.3	11.1
1961:			
Dec. 21	11.0-11.6	10.7-11.3	10.5-11.1
1962:			
Mar. 8 (through Aug. 2, 1962)	3/ 10.6	4/ 10.3	5/ 10.1

1/ Since Oct. 1, 1955, quotations have been f.o.b. shipping point; prior to that date, quotations were f.o.b. shipping point but with freight allowance.
2/ Not quoted.
3/ 18.5 percent to 21 percent silicon content.
4/ 16 percent to 18 percent silicon content.
5/ 12.5 percent to 16 percent silicon content.

Source: Compiled from quotations published in E & MJ Metal and Mineral Markets.

Table 48.--Spiegeleisen: Price quotations and effective dates of changes, Jan. 1, 1951-Aug. 2, 1962

(Per gross ton, carload lots, f.o.b. Palmerton, Pa.)

Effective date of change	3% maximum silicon		
	16%-19% manganese	19%-21% manganese	21%-23% manganese
1951:			
Jan. 1	1/	2/ $75.00	1/
1952:			
Aug. 12	1/	2/ 85.00	1/
1953:			
May 19	$84.00	2/ 86.00	2/ $88.50
1955:			
Oct. 12	86.00	2/ 88.00	2/ 90.50
Dec. 22	89.50	2/ 91.50	2/ 94.00
1956:			
Jan. 5	89.50	91.50	94.00
Mar. 22	92.00	94.00	96.50
Aug. 8	94.00	96.00	98.50
Oct. 2	97.50	99.50	102.00
1957:			
Jan. 7	100.50	102.50	105.00
1960:			
Jan. 22	98.00-100.50	100.00-102.50	102.50-105.00
1961:			
June 8	96.00-99.00	98.00-101.00	100.50-103.50
1962:			
Jan. 11 (through Aug. 2, 1962)	91.00	93.00	95.50

1/ Not quoted.
2/ Maximum silicon content not specified.

Source: Compiled from quotations published in E & MJ Metal and Mineral Markets.

Table 49.--Manganese metal: Price quotations and effective dates of changes, Jan. 1, 1951-Aug. 2, 1962

(In cents per pound, f.o.b. shipping point) 1/

Effective date of change	Electrolytic, 99.98 percent manganese	
	Carload lots	Ton lots
1951:		
Jan. 1	28	2/
1952:		
Aug. 8	30	32
1953:		
Aug. 14	31.5	33.5
1954:		
Mar. 4	30	32
1956:		
Mar. 14	31.5	33.5
Sept. 14	33	35
1957:		
Apr. 1	34	36
1960:		
July 28	33.75	36.25
1962:		
May 3 (through Aug. 2, 1962)	31.25-33.75	33.75-36.25

1/ Freight allowed east of the Mississippi.
2/ Not quoted.

Source: Compiled from quotations published in E & MJ Metal and Mineral Markets.