

UNITED STATES TARIFF COMMISSION

MERCURY (QUICKSILVER)

Report to the Congress on Investigation No. 332 - 32 (Supplemental)

Under Section 332 of the Tariff Act of 1930

Made Pursuant to Senate Resolution 206, 87th Congress,

Adopted September 23, 1961



TC Publication 57

**Washington
May 1962**

UNITED STATES TARIFF COMMISSION

BEN DORFMAN, Chairman

JOSEPH E. TALBOT

WALTER R. SCHREIBER

GLENN W. SUTTON

WILLIAM E. DOWLING

J. ALLEN OVERTON, Jr.

DONN N. BENT, Secretary

Address all communications to
UNITED STATES TARIFF COMMISSION
Washington 25, D.C.

C O N T E N T S

	<u>Page</u>
Introduction-----	1
Tariff history-----	2
Description and uses-----	3
Position of the United States in world production, consumption, and trade-----	7
Trend of U.S. supply, demand, and consumption-----	9
World War II period-----	10
Period since World War II-----	11
U.S. Government procurement and assistance programs-----	14
Government procurement for stockpiling and other purposes---	15
Expansion goals of the Korean period-----	15
Procurement for AEC-----	16
Barter program-----	17
Price-support program-----	18
Current stockpile objective and inventory-----	22
Other Government assistance to U.S. producers-----	23
U.S. industry:	
Size of the industry-----	26
Production of secondary mercury-----	26
Production of primary mercury-----	27
Mine production by States-----	28
Number and size of mines-----	29
Methods of producing mercury at mines-----	30
Grade of ore treated-----	32
Ore reserves-----	33
Employment and wages-----	36
Producers' inventories of mercury-----	38
Changes in principal expenses-----	39
U.S. foreign trade:	
Imports-----	40
Duty-free imports-----	41
Dutiable imports-----	41
Ratio of imports to production and to consumption-----	42
Sources-----	44
Importing concerns-----	45
Domestic exports-----	45
Market prices-----	46
New York and London quotations-----	47
Trend-----	48
Selling practices and channels of distribution-----	50
Average value of producers' and importers' sales-----	53
Costs of delivering mercury to U.S. consumers-----	54

(TC29238)

CONTENTS

	<u>Page</u>
The mercury industry in foreign countries-----	56
Relative importance of principal producing countries-----	56
Ore reserves in foreign countries-----	56
Italy-----	58
Spain-----	60
Mexico-----	62
Yugoslavia-----	65
Japan-----	67
Other producing countries-----	68
Appendix A. Senate Resolution 206-----	71
Appendix B. Tables and charts-----	75

TABLES

U.S. Supplies and Consumption

1. Mercury (quicksilver): U.S. production, stocks on Dec. 31, imports for consumption, exports, and consumption, 1954 and 1956-61-----	76
2. Mercury: U.S. consumption, by uses, 5-year averages 1941-50, annual 1954 and 1956-61-----	77

Principal Statistics for U.S. Industry

3a. Primary mercury: Reported statistics for the U.S. industry, 1956-61-----	78
3b. Primary mercury: Reported statistics for the mercury-mining industry in California, 1956-61-----	79
3c. Primary mercury: Reported statistics for a selected group of large mines producing mercury, 1956-61-----	80
4. Primary mercury: U.S. production and number of producing mines, by States, 1936-61-----	81
5. Primary mercury: Number of mines and production in the United States, by size of mine output, 1956-61-----	82
6. Primary mercury: Number of employees engaged in mining and furnacing mercury ores in the United States, in California, and in all other States, by months, January 1956-December 1961-----	83
7. Primary mercury: Number of mines, production, value of shipments, employment, and designated principal expenses in the United States, in California, and in all other States, specified years 1919 to 1958-----	84

CONTENTS

	<u>Page</u>
<u>TABLES--Continued</u>	
<u>U.S. Foreign Trade</u>	
8a. Mercury: U.S. imports for consumption (free and dutiable), by principal sources, 1954-61-----	85
8b. Mercury: U.S. dutiable imports for consumption, by principal sources, 1954-61-----	86
8c. Mercury: U.S. duty-free imports for consumption, by principal sources, 1954-61-----	87
9. Mercury compounds and preparations: U.S. imports for consumption, by principal sources, 1957-61-----	88
10. Mercury: U.S. exports of domestic merchandise, by principal markets, 1954-61-----	89
<u>Foreign Production and Exports</u>	
11. Primary mercury: U.S. and world production, selected years 1877 to 1960-----	90
12. Primary mercury: World production, by countries, 1936-60----	91
13. Primary mercury: World production, by principal producing countries, 5-year averages 1951-60, annual 1956-60-----	92
14. Mercury: World production and exports of producing countries, 1959-----	93
15. Mercury: Imports into principal importing countries, by sources, 1959-----	94
16. Mercury: Exports from Italy, by principal markets, average 1951-55, annual 1956-60-----	95
17. Mercury: Exports from Spain, by principal markets, average 1951-55, annual 1956-60-----	96
18. Mercury: Exports from Mexico, by principal markets, average 1951-55, annual 1956-60-----	97
19. Mercury: Exports from Yugoslavia, by principal markets, average 1951-55, annual 1956-60, and January-June 1961-----	98
<u>Market Prices and Average Values</u>	
20. Mercury: Quantities sold by U.S. producers and importers, average net sales value, and New York price quotations, by months, January 1956-December 1961-----	99
21. Mercury: Average price quotations in New York and London for flasks containing 76 pounds, annual 1948-53, and by months, January 1954-March 1962-----	101
CHARTS	
Chart 1. Mercury: Average grade of ore mined and New York price quotations in the United States, annual averages, 1936-61-----	102
Chart 2. Mercury: New York and London price quotations, by months, 1946-61-----	103

Introduction

This report brings up to date the information in the Commission's report on its investigation of mercury (quicksilver) that was conducted under section 332 of the Tariff Act of 1930, as amended, pursuant to a resolution adopted by the Senate Committee on Finance on March 17, 1958. That report was submitted to the Senate Committee on Finance on December 1, 1958. ^{1/}

This supplemental report has been prepared in response to Senate Resolution 206, 87th Congress, adopted September 23, 1961, which directed the Commission to make a further study and bring up to date its earlier report on mercury with a new report to be submitted to the Congress on or before May 15, 1962. A copy of the Senate resolution is included in appendix A of this report.

In response to the resolution, the Commission on October 5, 1961, instituted an investigation of the mercury industry under section 332 of the Tariff Act of 1930. Public notice of the investigation and of the date of the public hearing was given by posting a copy of the notice at the office of the Commission in Washington, D.C., and at its New York City office, and by publication in the Federal Register (26 F.R. 9610) and in the October 12, 1961, issue of Treasury Decisions.

The public hearing in connection with this investigation was held February 20, 1962, in the Tariff Commission hearing room in Washington, D.C.; all interested parties were given opportunity to appear, to produce evidence, and to be heard.

^{1/} U.S. Tariff Commission, Mercury (Quicksilver): Report on Investigation No. 32 Under Section 332 of the Tariff Act of 1930 Made Pursuant to a Resolution of the Committee on Finance, United States Senate, 1958 (processed).

In addition to the information obtained at the public hearing, the Commission used data from its files, from other official Government sources, and from responses to questionnaires sent by the Commission to both domestic producers and importers. The Commission also obtained, through the U.S. Foreign Service, data on mercury operations in Spain, Italy, Mexico, Yugoslavia, and Japan.

Although the subject matter included in this report is similar to that covered in the previous report, Senate Resolution 206 did not require the assembly of information on domestic costs of production, whereas such information was included in the earlier report.

Tariff History

Mercury metal, or quicksilver, was made dutiable at 25 cents per pound in the Tariff Act of 1922 and is dutiable under paragraph 386 of the Tariff Act of 1930 at the same rate, which is equivalent to \$19 per flask of 76 pounds. No trade-agreement tariff concessions have been granted on mercury metal. Mercury generally moves in commerce in iron or steel flasks. In addition to the duty imposed on mercury metal under paragraph 386, the flask is also currently dutiable at 12-1/2 percent ad valorem under paragraph 328 of the Tariff Act of 1930 (reduced from 25 percent pursuant to the General Agreement on Tariffs and Trade); depending upon the value of the flask, this duty is equivalent to about 15 to 30 cents per flask.

The average ad valorem equivalent of the duty (\$19 per flask) on mercury metal has varied greatly because of the marked changes in the

price of mercury. The ad valorem equivalent of the import duty, based on the foreign value of dutiable imports, averaged 27.9 percent during the prewar years 1937-39. In 1955, when the average foreign value per flask of imported mercury was \$253, the ad valorem equivalent was 7.5 percent. After 1955, as the average foreign value declined steadily to \$180 per flask in 1960 and to \$166 in 1961, the average ad valorem equivalent of the duty increased correspondingly to 10.5 percent in 1960 and to 11.4 percent in 1961.

Mercury ore and concentrates, which do not usually enter into international trade, are on the free list of the Tariff Act of 1930. These imports enter under paragraph 1719, ^{1/} which provides for "Minerals, crude, or not advanced in value or condition by refining or grinding, or by other process of manufacture, not specially provided for." No trade-agreement tariff concessions have been granted on mercury ore.

Description and Uses

Mercury, or quicksilver, is a silver-white metal that is liquid at ordinary temperatures; it solidifies at -38° F. and it boils at 675° F. ^{2/}

^{1/} All imports of unmanufactured mercury into the United States, beginning in 1940, were in the form of metal. Part of the imports in 1938 and 1939 were in the form of mercury ore concentrates (all imported from Mexico); concentrates imported in 1938 contained about 2,400 flasks of mercury, and those imported in 1939 contained about 2,000 flasks.

^{2/} Only two other metals are liquid at or near ordinary room temperatures: The alkali metal cesium melts at 83° F. and the rare metal gallium melts at 85.5° F. Cesium, however, reacts strongly with oxygen and moisture and must be stored in a vacuum or immersed in an inert liquid.

The producers of this metal generally call it quicksilver, whereas consumers generally refer to it as mercury.

Mercury metal is recovered from its principal ore mineral, cinnabar, ^{1/} by heating the ore in a furnace or a retort to a temperature of about 1,080° F., at which point the metal is released from the ore in the form of a mercuric sulfide vapor. The sulfur is removed from the vapor with the use of air, oxygen, or lime and iron, and the mercury vapor is condensed into liquid mercury. The mercury content of the ore mined is small. In consequence, the metal is recovered from the ore more economically at the mines than at distant points.

Mercury as recovered from ore is known as prime virgin mercury. Most of the mercury that enters trade is "prime virgin grade"--99.9 percent pure--sold in cylindrical steel or iron flasks each containing 76 pounds of mercury. ^{2/} Over four-fifths of the mercury consumed in the United States is used as produced at mines without further processing. The remaining one-fifth is further purified to remove undissolved or dissolved impurities. Undissolved foreign matter (such as oil, water, dirt, rust, or scale from flasks) floats and can be removed by filtration. Dissolved impurities (notably metals) are removed by additional distillation or by electrolytic processes; such dissolved impurities render the mercury less fluid and impart other undesirable properties

^{1/} Pure cinnabar contains, by weight, 86.2 percent mercury and 13.8 percent sulfur.

^{2/} This is the type of flask referred to wherever the term "flasks" is used in this report. These flasks are about 5 inches in diameter, about 12 inches high, and weigh, on the average, about 8 pounds. The flasks are used repeatedly and last many years.

to it. Specially purified mercury is sold under various names for special purposes. Among the various commercial grades are those that conform with the specifications of the American Chemical Society, The National Formulary, and the American Dental Association. Specially purified mercury commands substantial price premiums over prime virgin grade. The premium grades are usually packaged in small bottles or jugs (of earthenware, glass, or plastic) holding from 10 pounds of mercury to as little as 4 ounces.

In addition to mercury produced at mines (hereinafter referred to as primary mercury), considerable quantities are obtained by processing mercury-bearing scrap and by reclaiming mercury from mercury boilers and caustic soda or chlorine plants that are withdrawn from service. The latter type of mercury is referred to in this report as secondary mercury.

Mercury has many uses because of the unusual properties of the metal, its vapor, and its compounds. The metal is especially useful because of its liquidity at ordinary room temperatures, its high specific gravity, electrical conductivity, expansibility, and ability to amalgamate with other metals. Mercury vapor has useful thermal and other properties. Many of the mercury compounds are valued for their toxic effect or their catalytic properties.

Mercury metal is used for many industrial and control instruments, such as thermometers, barometers, compensating clock pendulums, gas-pressure and tank gages, flow meters, high-vacuum diffusion pumps, weightometers, gyroscopes, and clutches or seals on small electric motors or other apparatus. Frozen-mercury patterns are used for making

molds for precision casting. Mercury has many applications in electrical apparatus, including mercury switches and fuses; mercury-vapor, arc, sun, and cadmium-mercury lamps; mercury-arc rectifiers and oscillators; mercuric oxide cells and batteries; and the cathodes used in electrolytic processes for the manufacture of chlorine and pure caustic soda from salt. Mercury vapor is used in boilers for electric power generating plants; it is also used for process heating and temperature control, and for sensitizing photographic film. Mercury amalgamates with other metals to form many useful alloys used for dental applications, bearings, solders, and type. Mercury is also used for recovery of gold and silver from ores, although this use has been largely superseded by other processes for treating ores containing these metals. Mercury compounds have a large variety of uses in pharmaceuticals, dental preparations, antiseptics, insecticides, fungicides, wood preservatives, pigments, catalysts, and mercuric fulminate for blasting caps. In recent years, the Atomic Energy Commission (AEC) has received large quantities of mercury for undisclosed purposes.

In some applications, substitutes for mercury can be used; in other applications, processes that require less mercury are available. The use of substitutes and alternate processes is encouraged whenever mercury is in short supply. However, as satisfactory substitutes are not presently available for many of its uses, mercury is regarded by the U.S. Government as an essential material for both civilian and military use. Its essentiality in time of war is indicated by the unusually high levels of consumption reached during World War II and the Korean conflict despite measures restricting its use.

Position of the United States in World Production,
Consumption, and Trade

Mercury ore minerals are sparsely and sporadically distributed throughout the world. Before 1948 the annual world mine output of mercury generally fluctuated widely; it reached a peak of 275,000 flasks in 1941. In the years 1948-58 the total annual production increased steadily from 107,000 flasks to 246,000 flasks (table 11). In 1959 the total mine output of mercury was 224,000 flasks and in 1960, it was 241,000 flasks. Although the United States supplied about 60 percent of world output in 1877 and about 46 percent in 1882, its share of annual world production since 1918 has ranged from a low of 3 percent in 1950 to a high of nearly 26 percent in 1919. The U.S. share of world production of primary mercury rose almost steadily after 1950 until it reached 15 percent in 1958; it was about 14 percent in both 1959 and 1960.

Since World War I the largest producers of primary mercury have been Italy and Spain, but their respective shares of world production have declined in recent years (tables 12 and 13). In 1928, when these two countries organized a selling combine, Mercurio Europeo, their combined output was 121,000 flasks, which was more than 80 percent of the world's production. In 1950, the first year after dissolution of the combine, Italy and Spain produced 105,000 flasks, or 73 percent of the world output. Although production by Italy and Spain rose slightly in the period 1951-60, production by other countries--notably the United States, Mexico, the U.S.S.R., Communist China, Japan, the Philippine Republic, Peru, and Chile--rose sharply (table 12). The combined output of Italy and Spain (108,000 flasks) amounted to only 45 percent of the world output in 1960.

Almost every country in the world consumes some mercury, but no reliable statistics are available on the actual quantities consumed in individual countries other than the United States and Japan. Estimated consumption in many of the important consuming countries, however, can generally be computed from the official statistics on production and exports of the principal producing countries and from the official import data of the principal importing countries (tables 14 and 15).

Consumption of mercury in three of the large producing countries--Spain, Yugoslavia, and Mexico--is negligible; these countries usually export the bulk of their output. Italy consumes one-tenth or more of its own production and exports the remainder. It is believed that the total production of U.S.S.R., Communist China, and Czechoslovakia is consumed domestically or within the Communist bloc countries. The United States, which is the world's largest consumer of mercury, supplies from its domestic mines about 60 percent of its own commercial industrial requirements and relies upon reclaimed mercury and imports for the remainder. During 1957-61, U.S. production of primary mercury averaged 33,700 flasks annually, whereas industrial consumption averaged about 53,500 flasks. Japan, the only other substantial producer of mercury, also consumes more mercury than it produces from its domestic ores.

Principal consuming countries which produce no mercury and depend entirely upon imports to meet their requirements include the United Kingdom, West Germany, France, Denmark, the Netherlands, Sweden, and Canada. These seven countries, together with the United States, imported about 96,000 flasks of mercury in 1959 (the latest period for which such data are available) or about 43 percent of the world output in that year. In

1959, the United States imported 30,100 flasks; the United Kingdom, 25,700; West Germany, 15,700; France, 8,900; Denmark, 8,600; Sweden, 2,600; the Netherlands, 2,200; and Canada, 1,900.

Except in the United Kingdom, practically all of the mercury imported into each of the countries mentioned above is consumed within its borders. The United Kingdom has long been an important trading center. In 1959, reexports of mercury from the United Kingdom amounted to 5,000 flasks.

In the period 1946-57, the U.S. Government was the world's largest single purchaser and storer of mercury; its purchases influenced the world price of this metal to a marked degree. The Government's policy with respect to mercury in the strategic stockpile is to hold it for use in emergencies and to release it only by order of the President. Stocks of mercury acquired by the Government in exchange for surplus agricultural commodities under the barter program have been acquired primarily for use by Government agencies. ^{1/}

Trend of U.S. Supply, Demand, and Consumption

From the inception (about 1850) of mercury production in the United States until a few years before World War I, this country was more than self-sufficient in mercury; in every year until 1911, exports exceeded

^{1/} See section of this report on the barter program.

imports. From 1911 through 1940, U.S. consumption exceeded domestic production in all years except 1931. ^{1/}

World War II period

The outbreak of war in Europe made it essential for the United States to develop new sources of supply, because imports from both Spain and Italy were no longer available. U.S. production rose sharply in 1940-43 in response to wartime demands and substantially higher prices; part of the increased output was stimulated by Government aid to certain small domestic producers. Annual production in 1942-43, amounting to more than 50,000 flasks, exceeded that in any other year since 1882. During the period 1940-44, domestic production was adequate for industrial consumption; however, Government requirements for stockpiling and certain military uses were met by increased imports.

Although the use of mercury in many products was restricted during most of 1940-44, consumption increased from about 27,000 flasks in 1940 to 54,500 flasks in 1943, then declined to about 43,000 flasks in 1944. The chemical industry was the largest user of mercury, consuming 44 percent of the 1942-44 total. About 30 percent of the metal used in the chemical industry was consumed in the manufacture of munitions. About 11 percent of the total consumed during this period was used in electrical

^{1/} Data on mercury consumption in the United States discussed in this report represent apparent consumption for the years preceding 1940 and reported industrial consumption thereafter. Apparent consumption was calculated by adding imports to production and subtracting exports. Reported industrial consumption represents consumption as compiled by the U.S. Bureau of Mines from reports from domestic consumers but does not include mercury acquired by the U.S. Government for its own use; beginning in 1954, the reported data include both primary (mine output) and secondary (reclaimed) mercury.

devices, and 16 percent, in mechanical instruments. The remainder was used by a number of minor consumers and in certain essential military uses for which data were not published.

To provide for expanding military and essential civilian requirements, the U.S. Government undertook the rapid development of new sources of supply in other Western Hemisphere countries, particularly in Mexico and Canada. Imports for the account of the U.S. Government, purchased by the Metals Reserve Company (a U.S. Government agency), increased rapidly, rising to a peak of 48,000 flasks in 1943. With a substantial improvement in the supply situation in 1943 the Government canceled some foreign contracts. In February 1944 the Government withdrew its aid to producers; thereafter, the price of mercury declined sharply. These factors contributed to a decline in domestic production in 1944 to an amount about three-fourths of that in 1943. This decline marked the beginning of a downward trend in production that continued through 1950.

In order to meet a large requirement for a new type of electric dry cells utilizing mercuric oxide, the U.S. Government imported substantial quantities of mercury in 1945. However, the Government contracts for mercuric cells and batteries were canceled at the end of the war, leaving substantial stocks of mercury--amounting to 64,000 flasks--in the hands of the Metals Reserve Company. Despite the end of hostilities in Germany and Japan, industrial consumption of mercury in 1945 reached a record peak of 62,429 flasks.

Period since World War II

A large peacetime market for the new type of cell did not develop in 1946 as expected; total consumption of mercury in that year was

about half that in 1945. Annual consumption during 1946-50, however, which ranged from 31,552 flasks to 49,215 flasks, was considerably larger than the annual average of the prewar period 1929-39 (27,000 flasks). This relatively high peacetime rate was brought about by the increased use of mercury for agricultural purposes, mercury-vapor power plants, pharmaceuticals, and for electrolytic preparation of chlorine and caustic soda.

During the years 1951-61, the demand for mercury increased greatly--the increase having been stimulated primarily by (1) military uses, owing to the Korean conflict; (2) Government stockpiling and other Government uses; and (3) increased requirements for industrial purposes. This increased demand was met, in part, by the expansion of mine output in the United States noted in the preceding section of this report (table 11). Imports, however, supplied a substantial, but declining, share of U.S. consumption in the period 1951-61. In 1951-55, dutiable imports were equivalent to 62 percent of total U.S. consumption of mercury, and in 1956-60 such imports were equivalent to 50 percent of the total. In 1961 they were equivalent to only 22 percent of domestic consumption.

In the 5 years 1946-50, annual U.S. consumption of mercury averaged 40,500 flasks, and in 1951-55, 50,300 flasks. In the 5 years 1957-61, consumption was at an unusually high peacetime rate, averaging 53,500 flasks annually. The principal factors contributing to the increase in consumption for industrial purposes have been the construction and enlargement of chlorine and caustic soda plants, which require large

quantities of mercury to begin operations; increases in the quantity of mercury required in the manufacture of chlorine and caustic soda; and the increased use of mercury for electrical apparatus and paint. During the period 1956-61 the use of mercury for industrial and control instruments, agriculture (insecticides and fungicides), and catalysts declined, but the decline in these uses was more than offset by the increased consumption of mercury for the other purposes mentioned above.

In the 6 years 1956-61, mercury used in electrical apparatus accounted for about 23 percent of total consumption; that used in industrial and control instruments and in general laboratory equipment, 20 percent; that consumed in electrolytic preparation of chlorine and caustic soda, 10 percent; that used in agriculture, 8 percent; in paint, 6 percent; and for dental preparations and pharmaceuticals, 8 percent (table 2).

In the 21-year period, 1941-61, mercury produced from domestic mines totaled 558,215 flasks; that recovered from secondary sources, 72,505 flasks; and imports of mercury, 870,607 flasks. Hence, the total available U.S. supply was 1,501,327 flasks. The net change in yearend stocks held by producers, consumers, and dealers in this period was negligible, amounting to a net gain of only 604 flasks. Since actual consumption for commercial use (1,030,142 flasks) plus exports (a possible maximum of 15,838 flasks) during this same period aggregated 1,045,980 flasks, the excess of supply over disappearance (industrial consumption plus exports) over the entire period amounted to more than 455,000 flasks. Some of that excess was diverted to stockpiles ^{1/} (national,

^{1/} See p. 22 for quantities of mercury in stockpiles.

Defense Production Administration, and supplemental); some, to the Atomic Energy Commission; some, to contractors or manufacturers engaged in various types of production for Government account; and some was exported under the lend-lease program.

U.S. Government Procurement and Assistance Programs

At various times since World War II, ^{1/} the U.S. Government has been an important factor in the mercury market, primarily in procurement of this metal from foreign sources. Inasmuch as the metal has been obtained principally for the strategic stockpile and for use by the Atomic Energy Commission (AEC), and since the Government has sought to buy the metal at the best terms obtainable, Government procurement has frequently been on a confidential basis, thereby obscuring the Government's role.

Official foreign-trade statistics of the U.S. Department of Commerce show that very substantial amounts of mercury have been imported free of duty for Government use. Available import statistics, however, do not permit a precise measure of such Government acquisitions, especially on a year-to-year basis. An undetermined part of the dutiable imports is known to have been entered for Government account, beginning in 1953. Import statistics for 1958 and later years are probably more accurate in this regard than those for some prior years, inasmuch as the demand for foreign mercury for confidential uses has tapered off. The Office of

^{1/} For an account of U.S. Government operations in mercury during World War II, see U.S. Tariff Commission report, Mercury, War Changes in Industry Series Rept. No. 4, 1944 (processed).

Defense Mobilization (ODM) ^{1/} reported to Congress semiannually during 1956 and 1957 that the stockpile objectives for mercury had been filled; the AEC reported that since mid-1957 "all purchases for the AEC account have been under the domestic price-support program of ODM established pursuant to the Defense Production Act of 1950." ^{2/} Statistical data on the quantity of mercury procured under that program are presented on pages 21 and 22.

Government procurement for stockpiling and other purposes

After the close of World War II large quantities of mercury were held by the Government as war surplus. These holdings were transferred to the permanent stockpile under the Strategic and Critical Materials Stock Piling Act (60 Stat. 596), approved July 23, 1946. In a public report dated July 23, 1948, the Munitions Board, which administered the stockpile, listed mercury among Group A materials, i.e., those for which only stockpiling can insure adequate supply for a future emergency. ^{3/} Subsequently, various additions were made to the inventory, including a large purchase from Italy in 1949 with counterpart funds under the provisions of the Economic Cooperation Act of 1948 (62 Stat. 137).

Expansion goals of the Korean period.--Following the outbreak of the Korean conflict, the Defense Production Administration (DPA) announced expanded supply objectives for mercury. The goals established by DPA

^{1/} Later the Office of Defense and Civilian Mobilization, then the Office of Civil and Defense Mobilization, and effective Sept. 22, 1961, the Office of Emergency Planning.

^{2/} Letter of May 28, 1958, from R. W. Cook, Acting General Manager, U.S. Atomic Energy Commission, to Hon. Henry Dworshak, U.S. Senate.

^{3/} The National Stockpile: A Nonconfidential Supplement to the Stockpiling Report, July 23, 1948.

under authority of the Defense Production Act of 1950 (64 Stat. 798) and implemented by the Revenue Act of 1950 (64 Stat. 906) were designed to assure adequate supplies of essential materials and products for both military and essential civilian use in a national emergency. Expansion Goal No. 64 for Mercury, dated April 1, 1952, called for an annual supply of 60,500 flasks beginning in 1952, or for about 10,000 flasks more than the U.S. consumption of mercury in 1950. Goal No. 64 was revised upward on October 7, 1952, to 80,000 flasks as the annual supply objective for 1953 and 1954. Domestic production plus imports actually exceeded those goals in 1953, 1954, and 1957.

At the time the goals were announced, DPA anticipated no difficulty in their achievement, and assistance to domestic producers was limited to loans for exploration work. DPA stated in October 1952: ^{1/}

Current estimates of domestic production and imports indicate that supply will be adequate to meet the requirements. Except for exploration loans under the Defense Minerals Exploration Administration Program, no financial assistance under the Defense Production Act is to be provided to expand mercury production.

On April 25, 1957, ODM closed Expansion Goal No. 64 for mercury after the completion of studies that indicated that sufficient capacity existed, or was planned, to meet mobilization requirements known at that time.

Procurement for AEC.--Early in 1953, the Munitions Board stated in its semiannual public stockpile report to Congress that acquisitions of mercury for the stockpile were "no longer of the highest urgency." ^{2/}

^{1/} Expansion Goal No. 64, Revision 1, Mercury, issued Oct. 7, 1952.

^{2/} Stockpile Report to the Congress, Feb. 15, 1953, p. 3.

However, about this time the procurement of imported mercury for AEC was undertaken by the General Services Administration (GSA). The amount needed was large enough to cause market repercussions, if disclosed. To avoid intra-Government competition in making purchases, the GSA acted as sole procurement agency, making purchases under the Federal Property and Administrative Services Act of 1949 (63 Stat. 337).

According to AEC, ^{1/} it had obtained through GSA approximately 64,000 flasks of mercury from foreign sources by June 30, 1957. Between July 1, 1957, and December 31, 1958, the total quantity of mercury purchased by the Government under the mercury purchase regulations ^{2/} --30,165 flasks-- was also acquired by AEC. The balance of AEC mercury requirements were supplied by transfer, with Presidential approval, from the national stockpile. ^{1/}

Barter program.--Under the Commodity Credit Corporation (CCC) Charter Act (Public Law 806, approved June 29, 1948) and under the Agricultural Trade Development and Assistance Act of 1954 (Public Law 480, 83d Cong.) the CCC has frequently implemented procurement by bartering surplus agricultural commodities for foreign mercury on behalf of GSA. By the end of 1956, CCC was able to consign to GSA the following quantities of mercury acquired through barter:

	<u>Flasks</u>
1953-----	26,302
1954-----	52,973
1956-----	10,000

Although both U.S. agencies moved with a minimum of publicity, the price of mercury, which had been relatively stable during 1951-53 at

^{1/} Letter of May 15, 1961, from AEC to John T. Conway, Assistant Executive Director, Joint Committee on Atomic Energy, U.S. Congress.

^{2/} See section of this report on price-support program.

around \$200 per flask (at New York) began a spectacular climb early in 1954 and remained above \$300 from September 1954 to May 1955 (table 21).

On September 11, 1958, officials of the Spanish and United States Governments announced approval of a barter deal for exchanging 18,800 bales of U.S. cotton for 16,000 flasks of Spanish mercury. ^{1/} Although mercury was on the list of materials eligible for acquisition for the supplemental stockpile through barter or exchange from November 14, 1958, to September 16, 1959, no transactions were undertaken. On December 21, 1961, mercury was again included as an item eligible under the barter program. It is understood that the barter and stockpiling manager of the Foreign Agricultural Service of the U.S. Department of Agriculture is presently conducting negotiations to barter agricultural surpluses for mercury.

Acquisitions of materials under the regulations of the barter program (Public Law 480, sec. 303) for the supplemental stockpile do not have to meet the same requirements as do acquisitions under the regulations of other acts relating to stockpiling. Under the barter program, strategic, critical, or other materials are acquired when a determination is made that such articles entail less risk of loss through deterioration or substantially less storage charges than would be incurred for wheat or for other commodities given in exchange.

Price-support program.--The advancing price level in the period March 1954 to May 1955 was a significant deterrent to Government procurement. Some foreign suppliers with which the Government had contracts defaulted; others were reluctant to enter into further commitments. On June 30, 1954,

^{1/} Report from U.S. Embassy, Madrid, 1958.

GSA advised ODM that it was required to procure a minimum of 170,000 flasks as quickly as possible, but market prices then prevailing were considered excessive. 1/

To stimulate the production of mercury in North America while producers were fearful of a collapse of prices and therefore unwilling to risk expanded production, GSA, under the authority of the Defense Production Act of 1950, announced on July 9, 1954, a price-support program. It guaranteed a price of \$225 per flask for 125,000 flasks of domestic mercury (including Alaskan) and 75,000 flasks of Mexican mercury, the latter to be delivered duty paid by the seller. Deliveries were to be made to GSA depots by December 31, 1957. On March 21, 1957, 9 months before the expiration date, ODM announced that it was authorizing GSA to extend the program on a limited basis by permitting the acquisition of 30,000 flasks of domestic mercury and 20,000 of Mexican in the calendar year 1958.

GSA described the price-support program as offering a "long-range guaranteed market at a price consistent with a legitimate profit," and added that--

for the first time the domestic mercury mine operator is assured a firm market for his production at an assured price and is thus set free of the undermining effects of market speculation, manipulation and cartel type business operations. 2/

1/ Memorandum on "Program for Stimulation of Production of Mercury on the North American Continent," enclosed with covering letter of June 30, 1954, from A. J. Walsh, Commissioner, GSA, to Elmer H. Weaver, Assistant Director for Materials, ODM.

2/ Memorandum to the Press, Oct. 6, 1954 (GSA-295).

The support price was set at \$225 a flask--a level which it was believed might reasonably be expected to increase domestic output to 30,000 flasks per annum. In 1953, mine production in the United States had been only 14,337 flasks. GSA advised ODM that--

the year 1945 can be taken as the norm with a production of 30,763 flasks, and an average price of \$134.90 which in present dollars is equivalent to approximately \$224.00. This appears to be a satisfactory figure to adopt as a guaranteed floor price. 1/

To obtain 50,000 flasks per annum (the level achieved in 1942-43), GSA calculated that the required stimulus would be a price from \$310 to \$350; however, the agency characterized such a price as "definitely excessive" and "not to be considered even as a possibility." 1/

At the time the support program was announced, the New York spot price for mercury was about \$50 per flask higher than the \$225 offered by the Government, and no early offers of domestic mercury to the Government were expected. GSA further stated:

It should be considered that at the present market and at prices above \$225.00, both domestic and Mexican production will go on the open market rather than to the Government However, these high prices should not continue long and soon the domestic producers will be selling to the Government. At any rate, the effect of the guaranteed floor price will be to cause new mines to open and current producers to increase production. 1/

As anticipated, domestic producers expanded their production, especially after 1955, but they continued to sell their entire output in the open market until November 1957, when the market price had moved

1/ Memorandum on "Program for Stimulation of Production of Mercury on the North American Continent," enclosed with covering letter of June 30, 1954, from A. J. Walsh, Commissioner, GSA, to Elmer H. Weaver, Assistant Director for Materials, ODM.

down close to the support level of the purchase program. The fact that a floor price was available, if needed, and could be obtained in the event of a price decline, served to encourage domestic production including some operations for which substantial time-consuming development work was necessary before any output could be forthcoming. During the latter part of 1957 and 1958, when the New York market price was slightly above the support price, producers frequently found it more advantageous to sell to the Government at the support price of \$225 per flask delivered at GSA depots in the West, relatively close to the mines, than to sell in the New York market and deliver there at the same or slightly higher prices after absorbing transportation costs.

When both domestic and Mexican producers began to offer part of their output to the U.S. Government at the support price near the end of 1957, problems arose concerning the kind of flasks in which the mercury was to be delivered to the GSA, and that agency revised the specifications for the type of flask permitted ^{1/} and extended the delivery period for offerings under the 1954-57 program until March 31, 1958.

Actual purchases of mercury by GSA amounted to 30,165 flasks; of this amount, 26,891 flasks were of domestic origin and 3,274 flasks came from Mexico. The domestic mercury, acquired under the Government purchase programs at a cost of \$6,066,000, was eventually transferred to the AEC; the Mexican mercury, acquired at a cost of \$749,000, was also transferred to the AEC.

^{1/} Originally, the regulations required mercury to be delivered in "seamless" flasks. Later the regulation was amended to permit deliveries in flasks fabricated of "seamless or welded" tubing.

The Government's maximum obligation to buy mercury under the two purchase programs and the quantities actually purchased are indicated below (in number of flasks):

Program	Maximum obligation to buy	Actual purchases
1954-57 program:		
Domestic Purchase Regulation-----	125,000	9,428
Mexican Purchase Regulation-----	75,000	775
Total-----	200,000	10,203
1958 program:		
Domestic Purchase Regulation-----	30,000	17,463
Mexican Purchase Regulation-----	20,000	2,499
Total-----	50,000	19,962

Current stockpile objective and inventory.--In March 1962 the Office of Emergency Planning (formerly Office of Civil and Defense Mobilization) ^{1/} declassified information on almost all of the strategic materials held in Government stockpiles. Data on holdings of mercury were among those declassified. The information released shows total Government inventories of mercury on December 31, 1961, to have been 147,000 flasks, of which 131,000 flasks were in the strategic stockpile and 16,000 flasks were in the supplemental stockpile. In addition, the data released show that at the end of 1961 the Government's inventory of mercury exceeded the maximum stockpile objective (110,000 flasks) by 37,000 flasks, an amount equivalent to 33.6 percent of the maximum stockpile objective. At the current (March 1962) market price quotation for mercury (\$192 per flask), total stockpile holdings are valued at \$28,224,000; the surplus above the maximum objective is valued at \$7,104,000.

^{1/} Press release, Office of Emergency Planning, Mar. 29, 1962.

Other Government assistance to U.S. producers

Under the authority of the Defense Production Act, the Government has undertaken to stimulate the discovery and development of new deposits of mercury in continental United States and Alaska. Between mid-1951 and mid-1958 the program was administered by the Defense Minerals Exploration Administration (DMEA) and thereafter by the Office of Minerals Exploration (OME). Under the program, the Government shared with producers the costs of exploration and development.

When the program was initiated, the Government covered 75 percent of the allowable exploration and related development costs, but for contracts subsequent to October 17, 1957, the Government's share was limited to 50 percent. Since August 1958, when OME took over the functions of DMEA, the following limitations have been imposed: Applicants must provide evidence that funds cannot be obtained on reasonable terms from commercial sources; interest is to be charged from the date of disbursement of Federal funds to the operator; and Government participation in any one contract may not exceed \$250,000.

During the period that DMEA administered the program, exploration for mercury was carried out under 41 contracts written in the amount of \$2,637,396 with Government participation at 74.15 percent, or \$1,955,774; \$1,250,848 of the Government's funds were actually spent. ^{1/} All but the last three contracts authorized by DMEA provided for 75-percent participation

^{1/} Memorandum prepared by OME and enclosed in letter of Mar. 19, 1962, from Arthur A. Baker, Acting Director, Geological Survey, U.S. Department of the Interior, to the Chairman of the U.S. Tariff Commission.

by the Government. On the basis of the available information, it appears that the funds spent by private individuals for exploration, without Government assistance, far exceeded the amount spent under these contracts.

Thus far, under the OME program, work has been carried out under four mercury contracts, some of which are still in force. The total value of the contracts was \$115,530, with Government participation at 50 percent, or \$57,765. Data are not available as to the amounts of Federal funds actually disbursed.

Operators have not been obliged to produce from the property on which the contracts were authorized, but any production during the progress of the exploration work has been subject to a royalty, payable to Government, ranging from 1-1/2 to 5 percent of the gross proceeds, or value of production. If, upon the completion of the authorized work, the Government considered that there had been a discovery or development from which mercury might be produced, the project was terminated and certified. Upon certification, the obligation to pay royalty on production from the mine continues for a period, usually until 10 years have elapsed from the date of the contract or until the full amount of the Government's contribution is repaid, whichever occurs first. However, if the work under the contract did not result in such a discovery or development, the project was terminated without certification. In this event the funds advanced by the Government were considered as unrecoverable.

By the end of 1961, 40 of the 41 projects under the DMEA program had been terminated; 26 were terminated without certification and 14 terminated

and certified. Approximately \$513,000 had been repaid to the Government in the form of royalties. According to the GSA, the total ultimate net cost of the exploration programs to the United States will probably approach \$535,000. By the end of 1961, losses to the Government had amounted to \$317,000; estimated future losses may aggregate \$218,000.

Although most of the DMEA projects involved only surface drilling or minor rehabilitation of local workings, two of them required major rehabilitation, such as unwatering, restoring caved shafts and workings, and replacing pipe, track, and other production facilities. At each of the two mines, at least 1 year was required for its rehabilitation. More than 40 percent of the total Federal funds disbursed under these two contracts was spent in rehabilitation work. By the end of 1961, only four of the mines involving Government participation under the DMEA program were active.

Data are not available with respect to the extent that these exploration programs added to the overall reserves of mercury. In December 1958 OME estimated that the amount of recoverable mercury in potential ore reserves in certified projects (12 as of that time) was slightly more than 100,000 flasks. Since then, however, the domestic price of mercury has declined and the costs of mining and processing mercury ore have increased, thereby reducing the amounts of potential ore that can be mined at a profit.

During 1955 and 1956 a few mercury producers sought rapid tax amortization privileges under authority of the Defense Production Act of 1950 as implemented by section 124A of the Internal Revenue Code. ^{1/}

^{1/} Revenue Act of 1950, 64 Stat. 906.

On one application, ODM allowed an 80-percent writeoff for tax purposes in 5 years against facilities costing \$789,000. On another, similar privileges were granted on facilities costing \$253,000. A third application involving a \$12,000 facility was denied.

Under section 613 of the Internal Revenue Code of 1954 (68A Stat. 208), domestic mercury mines benefit from a deduction of 23 percent of gross income for depletion allowable in the computation of income for tax purposes. This allowance shall not exceed 50 percent of the taxable income from the property computed without allowance for depletion.

U.S. Industry

Size of the industry

The mercury-mining industry in the United States is small compared with most other mining industries. In 1961 the estimated mine value of the mercury produced amounted to \$5.8 million, compared with \$6.6 million in 1960, \$6.7 million in 1959, and \$8.4 million in 1958. ^{1/}

The total number of employees engaged at mines producing mercury in December 1961 is estimated to have been about 400, about 85 percent of whom were production and related workers. In addition, there were about 75 individuals mining mercury on a partnership or individual basis.

Production of secondary mercury

In addition to the mercury produced from ores at mines, considerable quantities of mercury are obtained by processing mercury-bearing scrap

^{1/} Mine value was estimated by multiplying the number of flasks produced by the average price per flask realized by the domestic producers.

(batteries, sludges, etc.) and by reclaiming mercury when mercury boilers or caustic soda and chlorine plants are withdrawn from service.

Statistics on secondary mercury production have been compiled only since World War II. During 1946-53 the annual output of secondary mercury ranged from 1,385 flasks in 1949 to 4,000 flasks in 1946. Some of the secondary mercury recovered prior to 1954 is not included in available statistics, but all such secondary mercury is included in the data compiled by the U.S. Bureau of Mines beginning in 1954. Secondary mercury recovered in the years 1954-61 ranged from 4,950 flasks in 1959 (14 percent of total mercury production) to 10,300 flasks in 1955 (35 percent of the total). In 1961, mercury recovered from secondary sources amounted to 8,400 flasks, which provided an increase of 3,050 flasks over the 1960 level (table 1). This substantial increase was attributable to the withdrawal from service of a mercury boiler.

Production of primary mercury

U.S. production of primary mercury has fluctuated widely, from a high of 79,917 flasks in 1877 to a low of 4,535 flasks in 1950. In the 6 years immediately prior to 1950, mine output steadily declined as the domestic price (f.o.b. New York) of mercury fell from \$166 per flask in February 1945 to \$70 per flask in June 1950. Although the price of mercury was at a much higher level--ranging between \$183 and \$217 per flask--during 1951-53, the annual domestic production increased to only 14,300 flasks in 1953. Apparently because of the extremely low prices that had prevailed prior to 1951, domestic producers were reluctant to expand operations. Expansion would have required the expenditure of considerable funds to recruit technical and other help, block out ore reserves, and

acquire necessary equipment and supplies. With the institution in mid-1954 of the Government price-support program discussed in a preceding section of this report, mine output increased steadily, and by 1958 reached 38,067 flasks, the largest peacetime production in any year since 1883. Mine output declined to 31,256 flasks in 1959, rose to 33,223 flasks in 1960, and then fell to 31,600 flasks in 1961.

Mine production by States

Mercury ore has been mined in 8 to 10 States, including Alaska. California has always been the largest producer of mercury, accounting for about 60 percent of the total domestic production during 1936-61 (table 4). From 1936 through 1944 Oregon was the second largest producer, but yielded that position to Nevada in 1945. During World War II both Arkansas and Arizona produced substantial quantities, but their production since the war has been small or negligible. Prior to 1956, only small quantities of mercury were recovered from mines in Alaska and in Idaho, but in 1956-61, both Alaska and Idaho were substantial producers, and beginning with 1957, Alaska became the third ranking producer.

During the 6 years 1956-61, when the U.S. production of primary mercury averaged 32,158 flasks, five States accounted for 99 percent of the total. These States, listed in order of magnitude were California (17,060 flasks), 53 percent of the total; Nevada (6,998 flasks), 22 percent; Alaska ^{1/} (4,070 flasks), 13 percent; Idaho (2,146 flasks), 6 percent; and Oregon (1,675 flasks), 5 percent.

In California, Nevada, and Alaska, mine output was substantially higher in 1961 than in 1956, whereas in Oregon and Idaho, mine output

^{1/} Alaska became a State on Jan. 3, 1959.

was considerably lower in 1961. At the end of 1961 practically all of the mines in the latter two States had been closed, owing to the decline in mercury prices.

Number and size of mines

Most of the U.S. output of mercury has always come from a few of the larger mines, usually fewer than 20. However, when prices are high, substantial quantities are produced from many small mines or workings. Many of the small producers operate "prospects" or recover mercury ore from old abandoned mine workings or from old mine dumps; these are often worked by only one or a few individuals.

In the period 1936-45 the number of mines in operation ranged from 68 (in 1945) to 197 (in 1941), but some 15 to 34 mines, each producing 100 flasks or more per year, accounted for 85-97 percent of the total mine production in that period (table 4). In the period 1946-61, the number of active mines ranged from 16 in 1950 to 147 in 1956; 7 to 23 mines, each producing 100 flasks or more, accounted for 95 percent or more of the total output during most of the years in this period.

In 1956, when 147 mines were in operation, 21 mines, with an output of 100 or more flasks each, produced 94 percent of total domestic mine output, and 14 of these 21 mines, with an output of 500 or more flasks each, produced 89 percent of the total. In 1961, 75 mines were in operation; 18 mines in the 100-or-more-flask category accounted for 98 percent of the total mine output, and 8 mines in the 500-or-more-flask category accounted for 92 percent of the total (table 5).

The above figures relating to the number of mines in operation during 1961 are not indicative of the status of the mercury mines on

December 31 of that year. The total number of mines currently (April 1962) in operation is unknown but is believed to be substantially smaller than the number in operation in 1961. Many of the operators of small mines ceased operations in 1961, according to their responses to the Commission's questionnaires. Four mines, which produced more than 1,000 flasks of mercury each in 1958 and accounted for 28 percent of the total mine output of mercury in 1958 and for 12 percent in 1961, also discontinued operation in 1961. One of these mines was reopened late in 1961, however, under a leasing arrangement, but according to testimony at the public hearing the outlook for its continued operation is "far from promising."

Methods of producing mercury at mines

Most of the mercury produced in the United States is recovered by furnacing or by retorting either newly mined ore or the ore reclaimed from old surface dumps. In recent years, some mercury has also been recovered by processing the ground underlying old furnaces at mines where a considerable amount of leakage of free mercury occurred when the ore was originally processed. According to the data submitted to the Tariff Commission by domestic producers, mercury recovered from treating newly mined ore accounted for 98 percent or more of their total output during the period from 1956 through 1961.

Mercury-bearing minerals may occur either near the surface or at considerable depths below the surface. Consequently, both surface and underground mining methods are used to mine ore. In recent years the great bulk of the total mercury produced has come from underground mines.

In most of the underground mines the mercury deposits occur in highly fractured rock ("heavy ground"), so that most of the mine interiors require substantial support--usually heavy timbers--when ore or waste material is being removed during the course of mining. Generally, the underground workings are not large enough to permit extensive mechanization. Few mercury mines exceed 2,000 feet in depth. The New Almaden mine (with a depth of 2,450 feet) and the New Idria (with a depth exceeding 1,450 feet) are the deepest mines worked thus far in the United States; ^{1/} a few others have been worked to depths of 1,000 feet or more.

Except for crushing and screening, mercury ore requires very little preparation before treatment for extraction of the mercury metal. At least one mine--which is currently inactive--uses the flotation method of concentrating the ore. At some small operations in the United States and at a large mine in Alaska, waste rock is removed from the ore by hand-sorting.

Since the metallurgy involved in extracting mercury from its ores is comparatively simple, and since transportation costs for moving the low-grade ore are high relative to the value of the ore, virtually every mine has its own extraction facilities. Mercury is recovered from ore either in furnaces or in retorts. Most of the larger mines employ furnaces to release the metal from the ore. In the United States, ores are treated chiefly in mechanical furnaces of the rotary-kiln or multiple-hearth types. More than 90 percent of the mercury produced at mines in

^{1/} Neither of these California mines is currently operating at these levels; many of the underground workings at these mines caved in when the mines were shut down in prior periods and are no longer economically accessible.

recent years is recovered from ores by furnaces; the balance is processed in retorts. Furnaces, which are more continuous in operation and more costly than retorts, are generally employed at operations having a large volume of material to be treated. Small operators usually recover the mercury at their mines by means of simple retorts, some of which are homemade units.

Grade of ore treated

The grade or richness of mercury ore mined is indicated by the pounds of mercury metal produced per ton of ore furnaced or retorted. Generally, the average grade of ore furnaced or retorted has varied inversely with market prices of mercury; the average is low when prices are high, and high when prices are low. Variances in the grade of ore are achieved by selective mining in response to the prevailing level of prices. In 1955, when the New York monthly price quotations averaged \$290 per flask, the ore treated averaged 6.4 pounds of mercury per ton. Prices declined almost without interruption thereafter and the grade of ore treated (as computed by the U.S. Bureau of Mines) increased; it averaged pounds per ton in 1956, 8.4 pounds in 1957, 8.6 pounds in 1958 and 1959, and 9.7 pounds in 1960 (chart 1). Data for 1961 are not yet available from the U.S. Bureau of Mines, but it is probable that the ore treated in 1961 yielded on the average 10.5 pounds, or more, of mercury per ton. ^{1/}

In recent years the average grade of ore treated at individual mines has varied widely, ranging from a low of less than 3 pounds of mercury per

^{1/} In 1961 the grade of ore treated, as computed from reports to the Commission, averaged 10.4 pounds of mercury per ton.

ton at some opencut mines to a high in excess of 50 pounds per ton at some operations--principally at one- or two-man operations--where only the richest ore in the vein was mined. Data reported to the Tariff Commission by 10 of the larger concerns show that the grade of ore treated increased from an average of 7.9 pounds per ton in 1956 to 10.6 pounds per ton in 1961 (table 3c). The mercury produced from the crude ore mined by these 10 reporting concerns accounted for 73 percent of the U.S. total mine output in 1956, 77 percent in 1957, 84 percent in 1958, 86 percent in 1959, 91 percent in 1960, and 92 percent in 1961. In 1957, when the grade of ore for 8 of these mines averaged 8.6 pounds per ton, the average grade of ore at 2 of the 8 mines was less than 3 pounds per ton; at 3 mines the grade was between 6 and 10 pounds per ton; and at the remaining 3 mines the grade of ore was in excess of 10 pounds per ton. By the end of 1961, 4 of the 5 mines referred to in the preceding sentence as having an average grade of ore of less than 10 pounds had ceased operation; ¹/₄ of the remaining 4 mines, 1 was mining ore with an average grade of slightly more than 10 pounds per ton, and the others were mining ore of a grade in excess of 20 pounds per ton. For 1 of the concerns included in the last group, the average number of pounds of mercury per ton of ore tripled between 1956 and 1961.

Ore reserves

According to the U.S. Geological Survey, "the term 'mineral reserves' [or ore reserves] refers only to the material that in some degree has

¹/₄ At one of these mines, operation was resumed in the latter part of the year by a group of miners who, it is understood, will mine only pockets of high-grade ore.

been inventoried in terms of commercial enterprise. It is material that can be mined, processed, and marketed without financial loss under the economic and technologic conditions prevailing at the time [that a reserve estimate is] made." ^{1/} Accordingly, as costs and market prices fluctuate, so also does the reserve tonnage of a particular ore. At all times there is present, in virtually all ore deposits, material of a quality that cannot be mined, processed, and marketed under prevailing conditions of cost and price without financial loss.

Under conditions prevailing in early 1962, U.S. reserves of mercury were estimated by Edgar Bailey of the U.S. Geological Survey at 76,000 flasks. ^{2/} In light of the definition of the term "reserves" contained in the preceding paragraph, the estimate presumes that, under the costs of operation prevailing in early 1962, U.S. mines can produce and market, without financial loss, only 76,000 flasks of mercury at \$190 per flask, the New York quotation for December 1961 and January 1962. Instead of being based on a single standard cutoff grade of ore, this estimate takes full account of the potential recovery of the various grades of ore at different sites, depending upon the method of mining, the kind of deposit, and the location of the individual mines.

On the bases of the costs of production and the technologic conditions prevailing at the beginning of 1962 and a market price in New York of \$250 per flask, U.S. reserves of mercury were estimated at 228,500 flasks, an amount 152,500 flasks larger than the estimate based on the

^{1/} President's Materials Policy Commission Report, Resources for Freedom (H. Doc. 527, 82d. Cong., 2d. sess.), vol. 2, The Outlook for Key Commodities, 1952, p. 136.

^{2/} Letter of Mar. 19, 1962, from Arthur A. Baker, Acting Director, Geological Survey, U.S. Department of the Interior, to the Chairman of the U.S. Tariff Commission.

actual price quotation (\$190) for January 1962. The price of \$250 per flask was approximately the New York quotation for August 1957 when the U.S. Geological Survey estimated that mercury reserves under the economic and technologic conditions prevailing at that time amounted to 315,300 flasks. ^{1/}

The foregoing estimates made by the U.S. Geological Survey of mercury reserves under the economic and technologic conditions prevailing in early 1962, based on prices of \$190 and of \$250 per flask, are shown, by States, as follows (in number of flasks):

State	\$190 per flask			\$250 per flask		
	Measured: and indicated ^{1/}	Inferred ^{2/}	Total	Measured: and indicated ^{1/}	Inferred ^{2/}	Total
Alaska-----	7,000	5,000	12,000	15,000	10,000	25,000
Arizona-----	-	-	-	1,000	2,000	3,000
Arkansas-----	-	-	-	-	1,000	1,000
California-----	31,000	21,000	52,000	79,000	70,000	149,000
Idaho-----	-	-	-	15,000	5,000	20,000
Nevada-----	8,000	2,000	10,000	13,000	4,000	17,000
Oregon-----	-	2,000	2,000	2,500	5,000	7,500
Texas-----	-	-	-	1,000	4,000	5,000
Utah and Washington---	-	-	-	-	1,000	1,000
Total-----	46,000	30,000	76,000	126,500	102,000	228,500

^{1/} Measured ore is ore for which tonnage is computed from dimensions revealed in outcrops, trenches, workings, and drill holes and for which the grade is computed from the results of detailed sampling. Indicated ore is ore for which tonnage and grade are computed partly from specific measurements, samples, or production data and partly from projection for a reasonable distance on geologic evidence.

^{2/} Inferred ore is ore for which quantitative estimates are based largely on broad knowledge of the geologic character of the deposit and for which there are few, if any, samples or measurements.

The mercury ore deposits in the United States are generally small, irregular, and scattered, and their exploration and development are costly. Owing to both the geologic characteristics and fluctuations in market prices, the domestic industry does not develop ore reserves long in advance of mining. The periodic estimates of mercury ore reserves, therefore, are scarcely more than approximations and are subject to continuous change resulting from mining operations, the discovery of new deposits, and the development of additional reserves at known deposits and from economic factors affecting market prices and the cost of production.

In the past, mercury ore reserves have been increased primarily by extension of known workings. In fact, most of the known reserves are located at the larger mines now in operation. High prices and programs such as the Government price-support program stimulate production and lead to discovery of new reserves. On the other hand, low prices not only force some mines out of business, but also curtail or even halt exploration and associated development work at locations able to continue mine operations. Declining prices, therefore, not only retard the rate of discovery of new reserves, but also cause some of the reserves in closed underground mines either to be lost entirely or to be unsalable without heavy expenditures to reopen the mines.

Employment and wages

According to the U.S. Census of Mineral Industries, the average number of persons engaged in producing primary mercury in the United States (excluding Alaska) declined from 1,127 persons in 1929, to 753 in 1939, and to 578 in 1954 (table 7). In 1958, the latest year for which Census figures are available, the average number of persons employed

was 730. In that year, at operations where salaries and wages were paid, 569 employees were engaged in production, development, or related work, and 83 were employed in other capacities (as executives, clerks, engineers, and so forth). In addition, there were 78 proprietors or firm members in the industry, 62 of whom were performing manual labor.

Employment and wage data compiled from reports submitted to the Commission for the period January 1956 through December 1961 are shown in tables 3a, 3b, 3c, and 6.

From these data, which represent from 87 to 97 percent of the total annual production of mercury during 1956-61, it is estimated that an average of about 700 persons were engaged in mercury-mining operations in the continental United States and Alaska in 1956, about 770 were so engaged in 1957, 780 in 1958, 740 in 1959, 640 in 1960, and 580 in 1961. These estimates include working proprietors, but do not include an undetermined number of persons engaged at nonproducing operations (operations that involve maintenance, exploration, or development work but no production).

The number of production, development, and related workers of the reporting concerns increased from an average of 438 in 1956 to 511 in 1957, declined to 445 in 1958, increased to 457 in 1959, and then declined to 380 in 1961 (table 6). The highest number of production and related workers was reported for August 1957, when an average of 585 persons were employed; the lowest number was reported for December 1961, when 316 were employed.

About 60 percent of the production, development, and related workers in the 6-year period 1956-61 were employed at mines located in California, and 20 percent were employed at operations in Nevada.

Wages reported paid by reporting mines to production, development, and related workers averaged \$2.12 per man-hour in 1956, \$2.34 in 1957, \$2.29 in 1958, \$2.48 in 1959, \$2.64 in 1960, and \$2.69 in 1961. The increase between 1956 and 1961 in average hourly wages paid to such workers was 27 percent.

Average hourly wages paid to production, development, and related workers in California were \$2.07 in 1956, \$2.14 in 1957, \$2.15 in 1958, \$2.25 in 1959, \$2.39 in 1960, and \$2.48 in 1961. Average hourly payments to such workers in Nevada, the second largest producing State, were somewhat higher than those paid in California.

The reported total man-hours worked by production, development, and related workers increased from slightly more than 1 million in 1956 to 1.2 million in 1957. Man-hours worked declined to about 1 million in 1958, 1959, and 1960, and to 841,000 in 1961. The number of man-hours required to produce a flask of mercury declined from an average of 49 in 1956 to slightly less than 28 in 1961. The reduction in man-hour requirements to recover a flask of mercury, however, reflects primarily the aforementioned increase in the grade of ore mined and treated and the curtailment of exploration and development work, rather than any marked improvement in technology.

Producers' inventories of mercury

At the beginning of 1956, inventories held by the domestic producers reporting to the Tariff Commission--whether at the mines or at other

locations in the United States--amounted to 908 flasks; at the end of that year they held 1,116 flasks. By the end of 1957, however, their stocks reached a record high of 5,649 flasks (table 3a). Part of the 1957 yearend stocks were earmarked for the U.S. Government under the price-support program; shipment to the Government had been delayed because of difficulties in obtaining flasks meeting Government specifications. Substantial shipments of mercury to the Government were made during 1958, and by the end of that year inventories of mercury held at mines and other locations by the producers had declined to 1,370 flasks. Stocks increased to 2,182 flasks at the end of 1959 and to 3,282 flasks in 1960. By the end of 1961, stocks held by the reporting domestic producers amounted to 2,283 flasks.

Changes in principal expenses

In this investigation the Commission was not required to obtain information on costs of production; in the previous investigation such costs were obtained for 1956 and 1957. ^{1/} In both investigations, however, mercury producers reported the principal expenses of the type collected in the Census of Mineral Industries. These expenses for mining and processing, as well as for exploration and development, include salaries and wages paid to employees, cost of supplies and materials, fuels, purchased electric energy and contract work. Other types of expenses incurred--but not included with these principal expenses--are depreciation, depletion, royalties, machinery and other capital expenditures, and taxes.

^{1/} For a discussion of costs of production in 1956-57, see the Commission's 1958 report on mercury, pp. 38-42.

Principal expenses as reported to the Commission increased from \$4.5 million in 1956 to \$5.4 million in 1957 and then declined to \$4.2 million in 1958 (table 3a). In 1959 and again in 1960, principal expenses were \$4.6 million, and in 1961 they declined to slightly less than \$4 million.

Comparison of the above expenses with the amounts of mercury actually produced indicates that the average cost (measured in terms of principal expenses only) of producing a flask of mercury has declined somewhat since 1956. Much of the lower cost, however, was achieved as a result of the discontinuance of marginal mining operations and the cessation of exploration and development. Moreover, yearly changes in the average cost of production are misleading, since the amounts spent on exploration and development work constitute a principal expense. Such amounts are generally reported for the year in which they were actually spent, and they vary widely from mine to mine as well as from year to year.

U.S. Foreign Trade

Imports

In only 3 years (1925, 1926, and 1933) during the period between World War I and World War II did imports exceed 20,000 flasks per year. During World War II (1941-45), imports for consumption averaged 36,600 flasks annually and ranged from 7,700 flasks in 1941 to 68,600 flasks in 1945. Imports were less than 14,000 flasks in 1946 and in 1947, but averaged much larger in the years of the following decade. They averaged 56,900 flasks annually during 1948-57 and ranged from as much as 103,100

flasks in 1949 to as little as 20,400 flasks in 1955. In the period 1958-61, annual imports of mercury declined from 30,200 flasks in 1958 to 12,300 flasks in 1961 (table 8a). Over the same period there was an increase in imports of mercury compounds and preparations, principally mercuric oxide, iodide, and carbonate (table 9). ^{1/}

Duty-free imports.---Duty-free imports for U.S. Government account first became important during World War II (1941-45), when a total of 125,100 flasks (averaging about 25,000 flasks per year) was imported free of duty. Some of this mercury was reexported, the largest recipient being the U.S.S.R., which acquired 22,300 flasks in the period 1942-43. Duty-free imports in the period 1949-52 averaged 32,400 flasks per year and consisted primarily of Government purchases for the strategic stockpile. Duty-free imports from 1953 through 1957 averaged 20,200 flasks per year; they were destined partly for the strategic stockpile and partly for other Government uses, including use by the AEC. In the period 1958-61, duty-free imports declined substantially; they amounted to 11,200 flasks in 1958, and only 14 flasks in 1960 and 24 flasks in 1961. The available data on duty-free imports (table 8c) do not include, for the years before 1958, an indeterminate quantity of imported mercury metal that was also acquired by the Government.

Dutiable imports.---Dutiable U.S. imports have consisted almost entirely of mercury imported for consumption by private industry. Dutiable imports did not exceed 3,500 flasks in any year from 1938 through 1944.

^{1/} On the assumption that mercury constitutes at least 90 percent of the weight of mercury compounds and preparations, imports thereof were equivalent to about 1,354 flasks of mercury in 1960, and 1,074 flasks in 1961.

In 1945, however, imports of dutiable mercury amounted to 50,700 flasks. After dropping sharply to 13,900 flasks in 1946 and to 9,900 flasks in 1947, such imports rose to 56,100 flasks in 1950 during the Korean crisis. In the period 1951-56, annual dutiable imports again fluctuated considerably, ranging from 18,500 flasks in 1954 to 46,900 in 1953; in the following 5 years, 1957-61, dutiable imports dropped from 26,900 flasks in 1957 to 12,300 flasks in 1961 (table 8b).

During the 1957-61 period, New York price quotations for mercury declined from an average of \$247 per flask in 1957 to \$198 per flask in 1961. Reflecting both declining imports and declining prices thereof, the foreign value of U.S. dutiable imports dropped from \$5.9 million in 1957 to \$2.0 million in 1961, a decrease of 66 percent. The average foreign value per flask of dutiable mercury imported decreased almost steadily from \$219 per flask in 1957 to \$166 in 1961.

Ratio of imports to production and to consumption.--During the period 1928-35, domestic production exceeded imports in every year except 1933; during the whole of this period, imports were equivalent to about a third of domestic consumption. In 1936 and 1937, imports exceeded domestic production, being equal to a little more than half of consumption. During the 3 years 1938-40, imports fell off sharply; they supplied an average of 15 percent of consumption during that period. During the war period, 1941-45, most of the imports entered duty-free for the account of the Government. Meanwhile, industrial consumption in the United States was restricted. Little of the imported mercury was consumed; some went into Government stockpiles, and some was exported to the

allies. For these reasons, the ratio of imports to consumption during the war period has little significance.

In the 10-year period 1948-57, U.S. imports of mercury (dutiable and duty-free) exceeded domestic production (mine output plus production of secondary mercury) in each year except 1955. In 1958-60, such annual imports were equal to one-half to four-fifths of total annual production; in 1961, imports were equal to only 31 percent of domestic production.

In the 9-year period 1948-56, U.S. dutiable imports of mercury exceeded U.S. mine output in each year except 1954, when the two were about equal. Beginning in 1957, annual mine output was greater than annual dutiable imports. The ratio of dutiable imports to mine output declined from 78 percent in 1957 to 39 percent in 1961. Dutiable imports were equivalent to about 70 percent of domestic consumption during 1948-56, to 36 to 51 percent of annual consumption in 1957-60, and to only 22 percent in 1961.

The ratio of total U.S. imports to total domestic production, as well as the ratios of dutiable imports to total production, to mine output, and to domestic consumption, varied widely from year to year in the period 1948-61, as indicated in the following tabulation (in percent):

Year	Ratio of total imports to total production 1/	Ratio of dutiable imports to--		
		Total pro- duction 1/	Mine output	Domestic consumption
1948-----	193	193	222	69
1949-----	912	203	232	58
1950-----	858	858	1,237	114
1951-----	515	403	513	66
1952-----	478	219	262	77
1953-----	486	273	327	90
1954-----	264	75	100	43
1955-----	70	69	107	36
1956-----	158	147	183	82
1957-----	104	66	78	51
1958-----	69	44	50	36
1959-----	83	67	77	44
1960-----	51	50	59	38
1961-----	31	31	39	22

1/ Includes mine output and production of secondary mercury.

Sources.--Spain, Italy, and Mexico have usually been the principal sources of both dutiable and duty-free imports of mercury. During World War II, however, practically all the imports came from the Western Hemisphere, the leading suppliers being Mexico, Canada, and Chile. Large-scale imports from Spain were resumed in 1945, and from Italy, in 1946. In most years since 1946, Spain has been the primary supplier of U.S. imports, but in 1949, 1951, 1953, and 1956, Italy was the leading source. In the period 1957-61, Spain supplied about 60 percent of total U.S. imports, while Mexico supplied about 17 percent and Italy 15 percent.

The decline since 1954 in U.S. imports of mercury from Italy is in part attributable to the so-called manufacturing tax of 32,000 lire (equivalent to about \$51.20) per flask, which was imposed in November 1954.

At that time the average value of mercury, f.o.b. Italian port, exceeded \$200 per flask. As world market prices for mercury declined, the tax became increasingly burdensome and discouraged Italy's exports to the United States. ^{1/} The tax was suspended in February 1959 and abolished in December 1961.

Importing concerns.--The Commission sent questionnaires to U.S. concerns that were known to have imported mercury in the period 1958-61; 32 responded. ^{2/} Some of the respondents act as distributors of imported mercury; others merely import for their own use. Some buy and sell both domestic and imported mercury; others not only trade in domestic and foreign mercury but also use some in their own manufacturing operations. Only 8 of the 32 concerns imported mercury in 10 or more of the 48 months in the period 1958-61. Among those 8 concerns, 3 imported mercury during 20 or more months. Of the 24 responding firms that imported mercury during 10 or fewer months during the period 1958-61, 5 imported only during 1 month, another 5 only during 2 months, and 9 others during 3 to 5 months.

Domestic exports

U.S. exports of domestic mercury metal are small; most individual shipments contain only a few pounds each. As shown in table 10, there is wide variation in the average unit values of the exports reported in a particular year to the principal markets. Accordingly, the official

^{1/} See section of this report relating to the mercury industry in Italy.

^{2/} The total quantity of mercury imported by these 32 concerns represented practically all of the mercury imports reported by the U.S. Department of Commerce for 1958-61.

export statistics are believed to include, in addition to mercury metal (primary, redistilled, or triple-distilled), some compounds and preparations of mercury, as well as mercury-bearing raw materials such as furnace soot and scrap.

Domestic exports averaged about 30,500 pounds,^{1/} valued at \$85,000, annually during 1958-61, compared with an annual average of 82,500 pounds, valued at \$276,000, during 1954-57. The principal destinations of U.S. exports during 1958-61 were Canada, South American countries, Saudi Arabia, the Philippine Republic, and Japan.

Market Prices

Mercury prices are quoted in several daily and weekly publications. The quotation most widely used in the trade for determining the price at which mercury is actively traded is that shown in E & MJ Metal and Mineral Markets, issued each Thursday by the publishers of the monthly Engineering and Mining Journal. The most widely used foreign price quotation for mercury (the London quotation) is reported semiweekly in Metal Bulletin, published in London.

Both the New York and London price quotations are based on spot transactions, f.o.b. New York or London, for prime virgin mercury 99.9 percent pure; they do not take into account the quantities sold at various prices. The New York quotations are obtained from a weekly canvass of principal sellers and buyers; insofar as practicable, the

^{1/} Owing to the diversity of products covered by the export statistics, the conversion of pounds to flasks (of 76-pounds each), as shown in tables 1 and 10, is not meaningful.

editors seek to quote prices reflecting actual transactions. The weekly New York price quotation is given as a range; the lower price usually reflects sales in large quantities and the higher price, sales in small lots. The monthly New York quotations, as shown in table 21 and chart 2, are averages of the lower figure of the 4 or 5 weekly price quotations; the annual quotations are computed from the 12 monthly averages.

New York and London quotations

The New York price quotations for mercury generally move with the London price quotations; the major exceptions occur during periods of war or internal disorders when markets are isolated and supplies are interrupted or are threatened. The disparity between the monthly average quotations at New York and those at London in the years 1954-61 indicates that for most of the period the New York price was \$10 to \$20 higher than the London price (table 21). The following tabulation shows the frequency (expressed in number of months) of specified price differentials between the New York and London markets during the 8-year period 1954-61:

<u>Differential</u>	<u>Number of months</u>
New York price exceeded London price	
by--	
\$20 or more-----	24
\$10 to \$20-----	57
0 to \$9-----	11
London price exceeded New York price---	4

The largest price differentials prevailed in periods of rapid and wide fluctuations in prices, such as 1954-55. At such times traders do not always take advantage of the large price differentials because of risks of sharp adverse price changes that might occur while shipments are in transit. However, when market conditions are stable in both

New York and London, the New York price should tend to stabilize at a level about \$21 above the price in London, since the U.S. import duty is \$19 per flask and the transportation cost from Europe to the United States is about \$2 per flask. In 9 months of 1956, the New York price was \$21 to \$27 higher than the London price. In that year large quantities of dutiable imports (44,300 flasks) entered the United States. Beginning in 1957 and through 1961, as world prices continued downward, the differential between the New York and London prices became narrower. In only 11 months of the 5-year period 1957-61 did the New York price exceed the London price by \$21 or more per flask; in 4 months the New York price differential ranged between \$18 and \$20; in 33 months it was between \$12 and \$17; and in 12 months it was \$11 or less per flask. At no time during 1957-61 did the London price exceed the New York price. Although prices declined in both the London and New York markets in this period, the New York market was less attractive to foreign exporters of mercury than the London market--a major factor in the decrease of dutiable imports into the United States. Dutiable imports decreased from 26,900 flasks in 1957 to 12,300 flasks in 1961.

Trend

Market prices of mercury over the years have fluctuated widely and often rapidly. Such fluctuation is attributable primarily to the erratic changes in demand for mercury arising not only from war or threat of war, but also from sudden changes in industrial demand as, for example, when large amounts of mercury are required in the installation of plants for producing chlorine and caustic soda (see section on U.S. supply, demand, and consumption). In such times of exceptional demand three factors

cause prices of mercury to rise to high levels: (1) For many of its uses mercury is virtually indispensable, (2) for many products the cost of mercury--even when its price is high--constitutes only a small part of the total cost, and (3) mine production of mercury does not respond quickly to sudden increases in consumption.

With the decline in the demand for mercury near the end of World War II, ^{1/} the price of mercury in the United States declined to \$101 per flask by July 1944. The anticipation of large Government requirements for mercury dry cells caused the price to rise sharply, advancing to \$166 per flask in February 1945. Upon the cancellation of Government contracts for the mercury dry cells and the arrival of 50,000 flasks of mercury from Spain in the period April-September 1945, the price declined and, by September 1945 the New York quotation was \$96 per flask. Thereafter, the quoted price declined almost without interruption through June 1950 to \$70 a flask, its lowest level since September 1935.

After the outbreak of the Korean conflict, the quoted price of mercury rose sharply, increasing from \$70 per flask in June 1950 to \$215 in February 1951. ^{2/} During the next 3 years through March 1954, the New York price quotations ranged between \$183 and \$217 per flask. Thereafter, the price increased rapidly to \$325 per flask in October 1954, reflecting a shortage of world supplies brought about by heavy purchases not only by the U.S. Government but also by France, Germany,

^{1/} For a discussion of trend of prices in earlier years, see the Commission's 1958 report on mercury, pp. 56-58.

^{2/} From the end of January 1951 until Aug. 10, 1951, mercury was subject to the General Ceiling Price Regulation.

and the United Kingdom. These three countries together imported almost twice as much mercury from Spain and Italy in 1954 as in 1953. The New York price of mercury exceeded \$300 through May 1955, and then declined to \$225 per flask, the Government purchase price, by December 1957. During 1958, the last year in which the Government's purchase program had a stabilizing effect on the domestic price, New York quotations for mercury ranged between \$220 and \$238. In January and February 1959 the price of mercury was \$218 per flask, but with the increase in U.S. demand in the second quarter of that year the price advanced to \$245 a flask in May. Thereafter, the domestic price declined almost without interruption until August 1961. In that month and the following month, the quoted price averaged \$188 per flask, the lowest average monthly quotation since February 1954. Since September 1961, the quoted price has advanced slightly, to \$192 per flask in March 1962.

Selling Practices and Channels of Distribution

In 1957 and in 1961 more than 90 percent of total sales by importers were made directly to consumers. In 1957 most of the sales by domestic producers were made directly to consumers, but in 1961, sales to consumers accounted for about 40 percent of their total. An additional 45 percent of the domestic producers' 1961 sales were made to concerns that import and sell mercury. Some of these dealers also consume mercury. Substantial quantities of domestic mercury, especially from small producers, were sold either through brokers (who sell for a commission) or through dealers (who buy and sell on their own account).

Most of the brokers or dealers are located in San Francisco and New York City, but some are located in Chicago, Los Angeles, and Detroit. On sales through brokers, domestic producers usually paid a selling commission amounting to 1 percent of the delivered value. Some brokers, however, charged 2 percent. One firm is the sole U.S. representative of the Italian mercury producers, and one importer is the sole sales agent for Spanish mercury. Several U.S. importers sell mercury entered from Mexico and Yugoslavia.

Yearend stocks held by consumers and dealers are generally large compared with yearend stocks held by producers of primary mercury (table 1). ^{1/} The importers also generally follow a policy of tight inventory control. Most importers order mercury from their foreign suppliers on the basis of firm orders placed by U.S. consumers and generally carry stocks only to meet spot orders for small quantities. As reported to the Commission, in 1957, yearend stocks of foreign mercury held by importers were equivalent to about 4 percent of their sales, and in 1961, to about 10 percent of their sales.

Separate data on stocks of mercury held by dealers are not available. Combined stocks held by consumers and dealers at the end of 1957 were equivalent to 41 percent of total domestic consumption in that year; at the end of 1961 they were equivalent to 26 percent of 1961 consumption (table 1).

Most domestic mercury is sold c.i.f. New York or delivered to consumers. On sales directly to consumers, the cost of transportation to

^{1/} See the earlier section of this report on producers' inventories of mercury.

consumers is paid by the producers and is included in the selling price. Payment for mercury is usually made on delivery to the purchaser. Foreign mercury is sold chiefly c.i.f. New York port or f.o.b. importer's warehouse, but some is sold delivered to consumers' plants.

The New York price quotations, as already stated, are used as the basis for bargaining between sellers and buyers; the actual prices at which sales are made are agreed upon after considering the apparent direction in which price quotations are moving, the volume of mercury involved in the transactions, and the current demand for mercury. Producers and importers have reported to the Commission that the delivered prices on their sales of mercury to the east coast States were generally less, by varying amounts, than the New York price quotations at the time of sale. The bulk of the sales consist of mercury of prime virgin grade. Mercury that does not come up to the specification for this grade is sold at a discount, and that which has been processed to attain a higher degree of purity is sold at a premium. Long-term contracts for delivery of mercury over a period of months generally provide that the prices of the individual shipments be based on the New York price quotation for the week preceding the date of shipment.

Beginning in November 1957 and continuing through 1958, a large part of the domestic mercury produced in the United States was sold to the GSA for \$225 per flask, rather than to industrial consumers at prevailing market prices. The freight and selling expenses on sales to the Government, delivered to GSA depots (principally in San Francisco or Spokane), were substantially less than those on sales to industrial consumers.

Domestic producers found it more profitable to sell to GSA when the New York market price was less than about \$232 to \$233 per flask. In late July 1958, when the New York market price rose above this level, sales to industrial consumers on the eastern seaboard were resumed. The Government purchase program thus had the effect of establishing a floor not only for returns per flask to domestic producers but also for the New York market price. This brake on the decline in New York market prices was eliminated with the termination of the Government purchase program at the end of 1958.

Average value of producers' and importers' sales

The Commission obtained from domestic producers and from importers data on the quantities of mercury sold and the net value received (f.o.b. producer's plant and importer's shipping point in the United States) for the period January 1956 through December 1961.^{1/}

The average net value of sales of mercury by domestic producers, f.o.b. plants, was \$248 per flask in 1956, \$234 in 1957, \$220 in 1958, \$214 in 1959, \$198 in 1960, and \$182 in 1961. As indicated in table 20, the average New York price quotation exceeded the average net sales value of domestic producers by \$12 to \$13 per flask in 1956, 1957, 1959, and 1960. This differential increased to \$16 in 1961. Differences among individual producers in the average net values of sales, f.o.b. plants, reflect primarily the differences in the costs of delivery to consumers.

^{1/} The data obtained cover sales by domestic producers that accounted for 77 to 99 percent of annual domestic production during 1956-61, and sales by importers that accounted for 58 to 98 percent of annual dutiable imports in the same period.

The average net value of sales of mercury by importers, f.o.b. dock or shipping point in the United States, was \$257 per flask in 1956, \$246 in 1957, \$226 in 1958, \$223 in 1959, \$208 in 1960, and \$196 in 1961. On the basis of information obtained by the Commission, the average net unit value of importers' sales of mercury exceeded the average net unit value of domestic producers' sales in each of the years 1956-61. This differential ranged in the period 1956-61 from \$6 per flask in 1958 to \$14 per flask in 1961. In the period 1956-61 the annual average net unit value of importers' sales of mercury was \$1 to \$4 per flask less than the corresponding annual average New York price quotation.

Costs of delivering mercury to U.S. consumers

At the time the Commission's 1958 report on mercury was prepared, the average cost of shipping mercury from U.S. mines to the principal consuming area was about twice the cost of shipping mercury from principal suppliers in Europe to the same area. Virtually all the domestic mercury mines are located either west of the Rocky Mountains or in Alaska, whereas the bulk of the domestic consumption of mercury is in the area east of the Mississippi River. For California producers the cost of trucking to San Francisco and shipping by water to New York was about \$5.50 per flask in 1957; for producers in Oregon and Nevada the cost of shipping to New York by truck was about \$8 per flask; and for the producer in Alaska the cost of shipping to New York was higher still. Data obtained by the Commission from seven major domestic producers indicate that the cost of transportation from mines to all customers (including the GSA) averaged \$5.87 per flask in 1956 and \$5.04 per flask in 1957. This decline in average

costs of transportation is attributable not to a decline in freight rates, but primarily to the fact that a larger proportion of the sales of mercury in 1957 than in 1956 was delivered to the GSA at points nearer to the mines than are most of the industrial consumers.

Data on delivery costs comparable to those above are not available for later years. The following information, however, was reported to the Commission for 1961. The cost of delivering mercury from Alaskan mines to Seattle was nearly \$7 per flask, and the cost of delivering mercury from mines in California, Nevada, and Arizona to San Francisco, Calif., ranged from 30 cents per flask to \$2.50. Transportation and other charges from the same mines to midwest consumers varied from \$3.17 per flask to \$5.31, while charges for delivery to New York and other east coast consumers were \$5.61 to \$10 per flask.

Transportation and other costs (excluding duty) incident to the delivery of Spanish and Italian mercury to U.S. ports of entry, as reported by importers, averaged \$2.23 per flask in 1956, \$2.44 per flask in 1957, \$1.68 in 1958, and \$1.49 in 1961. The average cost of delivering Mexican mercury to U.S. ports of entry was \$2.63 in 1956, \$1.72 in 1958, and \$3.08 in 1961.

The average cost of wharfage and other handling incident to delivery of foreign mercury from U.S. ports of entry to points from which shipments are made to importers' customers was less than 52 cents per flask for imports from Spain and Italy in 1956-57 and less than 45 cents in 1958-61; similar costs were less than 88 cents per flask for imports from Mexico in 1956 and ranged from 39 cents to \$1.04 during 1958-61.

The Mercury Industry in Foreign Countries

In order to comply as fully as possible with the resolution of the U.S. Senate to bring up to date the Commission's 1958 report on mercury, the Commission endeavored to obtain--through the U.S. Foreign Service-- production, consumption, trade, employment, and other data relating to the mercury industry in Spain, Italy, Mexico, Yugoslavia, and Japan. Either because the information was not readily available or because it was regarded as confidential, the various embassies did not supply all of the information requested on the listed topics. The material that follows is a summary of pertinent information that the Commission obtained from the Foreign Service and other sources.

Relative importance of principal producing countries

World production of primary mercury averaged 164,600 flasks annually in 1951-55. In 1956-60 the annual world output ranged from 218,000 flasks in 1956 to 246,000 flasks in 1958; it amounted to 241,000 flasks in 1960 (table 13). Italy, Spain, the United States, and Mexico were the principal free-world producing countries. In 1956-60 these four countries accounted for about 70 percent of total world output, while the U.S.S.R. and Communist China combined were estimated to have produced nearly 20 percent of the total. Yugoslavia and Japan have been important, but smaller, producers.

Ore reserves in foreign countries

According to the U.S. Geological Survey, ^{1/} reserves in countries other than the United States of all classes of mercury ore minable under economic conditions existing in 1962 are estimated at 3,120,000 flasks.

^{1/} Letter of Mar. 19, 1962, from Arthur A. Baker, Acting Director, Geological Survey, U.S. Department of the Interior, to the Chairman of the U.S. Tariff Commission.

The current estimate of ore reserves is considerably less than that made in 1957, owing partly to the decrease in price and the increase in mining costs. Moreover, new data on the grade of ore being mined in the U.S.S.R. cast doubt on the estimate of the large reserves previously published for that country.

Estimates of reserves in foreign countries of mercury ore minable under the economic conditions prevailing in 1957 and under those prevailing in 1962 are as follows (in thousands of flasks of 76 pounds each):

Country	1957			1962		
	Measured and indicated ^{1/}	Inferred ^{2/}	Total	Measured and indicated ^{1/}	Inferred ^{2/}	Total
Canada-----	150	150	300	-	-	-
Mexico-----	30	100	130	25	100	125
South America---	4	10	14	10	10	20
Spain----- ^{3/}	100	1,000	1,100	500	500	1,000
Italy-----	500	1,000	1,500	200	500	700
Yugoslavia-----	150	300	450	100	300	400
Czechoslovakia--	10	-	10	5	-	5
U.S.S.R.----- ^{4/}	850	500	1,350	150	150	300
Japan-----	30	50	80	30	30	60
Communist China-	-	500	500	-	400	400
Turkey-----	-	50	50	-	40	40
Philippine Republic-----	45	45	90	35	35	70
Total-----	1,875	3,710	5,585	1,055	2,065	3,120

^{1/} Measured ore is ore for which tonnage is computed from dimensions revealed in outcrops, trenches, workings, and drill holes and for which the grade is computed from the results of detailed sampling. Indicated ore is ore for which the tonnage and grade are computed partly from specific measurements, samples, or production data and partly from projection for a reasonable distance on geologic evidence.

^{2/} Inferred ore is ore for which quantitative estimates are based largely on broad knowledge of the geologic character of the deposit and for which there are few, if any, samples or measurements.

^{3/} Data are inadequate; reserves known to owners may be much larger.

^{4/} Based on U.S.S.R. estimate, which (according to the Geological Survey) appears high considering the amount of exploration that had been done at the time the estimate was made.

Italy

Italy is usually the world's largest producer of mercury; it accounted for about one-third of world production in 1951-55 and for about one-fourth in 1956-60 (table 13). Two large mining companies, the Monte Amiata and the Stabilimento Minerario del Siele, each operate three large mines. The Monte Amiata company operates the Abbadia S. Salvatore and the Morone mines in the Province of Siena, and the Selvena mine in the Province of Grosseto. The Siele company operates the Carpine Solforate and the Abetina mines located in Siena and the Cerreto Piano mine in Grosseto. These six mines are believed to have accounted for more than 90 percent of Italy's production in the period 1958-61. Istituto Ricostruzione Industriale, the state-owned industrial holding company, owns 32.7 percent of the stock of the Monte Amiata company. Stabilimento Minerario del Siele is entirely privately owned.

Italy's output of mercury in the period 1951-55 averaged about 53,800 flasks annually. During 1956-58, mercury prices in the international markets declined; Italy's production, nevertheless, was 62,300 flasks in 1956, 63,200 flasks in 1957, and 58,700 flasks in 1958. This high-level output was obtained by working a greater proportion of low-yield veins in order to keep the workers employed and in anticipation of higher prices, which have not as yet materialized.

As prices moved downward in 1957 and 1958, producers in Italy, reluctant to sell, accumulated large stocks. An important factor contributing to such accumulation during 1958 was the anticipation of the removal of the production tax of 32,000 lire (\$51.20) per flask, which had been

imposed in 1954 ^{1/} when the average value of mercury, f.o.b. Italian ports, exceeded \$200 per flask. This tax was suspended in February 1959 and abolished in December 1961.

As prices continued downward and as producers' stocks were reduced through sales, Italy's production of mercury in 1959 dropped to 45,800 flasks, the lowest output in any year during the 1950's. In 1960-61 several mines closed their less efficient sections in order to reduce average unit costs and enable them to meet competition in export markets. Italy's output of mercury metal was about 55,500 flasks in 1960 and 55,400 flasks in 1961.

Production, exports, estimated domestic sales, and apparent variation in yearend stocks, 1958-61, were as follows (in flasks):

Year	Production	Exports	Estimated domestic sales	Apparent variation in yearend stocks
1958-----	58,712	11,498	7,000	+40,214
1959-----	45,833	35,142	11,000	-309
1960-----	55,492	52,887	16,000	-13,395
1961-----	55,439	27,821	13,500	+14,118

The average mercury content of the ore processed in Italy is lower than that obtained in Spain, but higher than that of the other major producing countries. In 1960 and 1961 the mercury content of the Italian ore averaged about 0.68 percent (13.6 pounds per short ton).

Data on producers' stocks and consumption of mercury in Italy are not available. In 1956-57, consumption was estimated by Italian producers as approximately 10 percent of production. However, because of the expanded

^{1/} Decree Law No. 1608, Nov. 24, 1954. The tax was payable when the mercury was shipped from the plant.

industrial activity in Italy since 1958 and the resultant increase in the domestic sales, domestic consumption of mercury has doubtless increased and may now account for a greater proportion of Italian production.

Exports of mercury from Italy averaged 41,256 flasks annually during 1951-55 and accounted for 77 percent of total Italian production. The unit value of exports in that period averaged \$197 per flask (table 16). During 1956-61 annual exports fluctuated greatly from 75,000 flasks in 1956, with an average value of \$235 per flask, to 11,500 flasks in 1958, with a value of \$217 per flask. Exports amounted to 52,900 flasks in 1960 and 27,800 flasks in 1961. In 1960 the average value per flask was \$190.

For many years the United States was the predominant market for Italian mercury. In 1956, 24,200 flasks, or one-third of Italy's total exports, went to the United States. Since then, annual exports to the United States have been substantially smaller. In the 4-year period 1957-60, the United States took only 11 percent of Italy's exports of mercury. In 1960, 45 percent of the exports from Italy went to Germany, 20 percent to the United Kingdom, and only 6 percent to the United States.

In January 1958 the Italian mercury producers formed a consortium, or joint office for marketing mercury. This organization acts as an agent for all Italian producers and handles all export sales. Currently there are no export taxes levied on mercury from Italy.

Spain

Production of mercury in Spain during the 5 years 1951-55 averaged 41,300 flasks annually and accounted for one-fourth of world production during that period. In 1956-60 production ranged between 48,300

flasks in 1956 and 55,400 flasks in 1958; the average for the period was 52,600 flasks, which represented 22.5 percent of world output (table 13).

In 1951-55 an average of 42,400 flasks was exported annually from Spain (table 17). In 1956-60, annual exports fluctuated from 40,700 flasks in 1956 to 52,600 flasks in 1960, the greatest annual quantity exported during the last decade. The United States, the United Kingdom, France, and Germany were the principal markets. These countries combined took 81 percent of the total exports from Spain in 1951-55 and 72 percent in 1960. The value per flask of exports to all countries averaged \$187 in 1960.

Mercury production and sales in Spain are controlled by the "Consejo de Administración de las Minas de Almadén y Arrayanes," an organization owned and operated by the Spanish Government through its Ministry of Finance. Production of the Government-owned Almadén mines, which comprises the bulk of the output in Spain, is adjusted to meet domestic and foreign requirements. Because of the extraordinary richness of the mercury ore deposits, the Government can sell at very low prices. In 1958 four large groups of mines were in operation; in 1959 there were three groups, and in 1960, four. Included in these groups were mines owned by a few small private concerns that sell their output to the Government organization.

In 1958-60 the quantity of the ore mined in Spain and the mercury content of the ore processed were as follows:

Year	Mercury ore mined	Mercury content of ore processed	
		Percent	Equivalent pounds per short ton
	Metric tons		
1958	69,208	2.5	50
1959	68,899	3.6	72
1960	52,161	3.2	64

The labor force engaged in mining and processing mercury in Spain remained stable at about 2,300 workers during the period 1956-60. The workers receive a guaranteed minimum annual wage and the management keeps them employed throughout the year. Short work days (6-hour shifts) and other precautions against mercury poisoning date from 1780. In addition, the workers receive many special privileges and unusual fringe benefits. In 1960 the average number of workers employed in mining mercury ore and recovering mercury metal was 2,316; 1,577 miners worked a total of 1,398,000 man-hours underground, and 647 worked 817,000 man-hours on the surface. In addition, 92 technicians and administrative personnel were employed.

Mexico

Mercury has been produced and used in Mexico since the 16th century; it was formerly used principally as an amalgamating agent in the extraction of silver and gold from ores; at present it is produced almost entirely for export. The output is very responsive to changes in market prices inasmuch as a large part of the Mexican mercury is produced by numerous small operators who can alternate mercury production with farming or other occupations. With the sharp drop in world prices of mercury after World War II, Mexican production declined until it reached 3,757 flasks in 1950, compared with a high of 32,400 flasks in 1942. For some years after 1950, Mexican production increased steadily, reaching a postwar high of 30,000

flasks in 1955, when mercury prices were at their peak. By 1956, production dropped to 19,500 flasks, but in 1957 and 1958, even though the market prices of mercury had declined, production increased to 21,100 flasks and 22,600 flasks, respectively, principally because the U.S. Government, through its purchase program, guaranteed Mexican producers a market for their mercury at a minimum price of \$225 per flask, delivered duty-paid.^{1/} However, production declined to 16,400 flasks in 1959 and to 20,100 flasks in 1960.^{2/}

In the years 1951-60, Mexico ranked from third to sixth place among the world producers of mercury and accounted for an average of 8.7 percent of world output (table 13).

Unlike the industries in Spain and Italy, the industry in Mexico is widely dispersed. Few mines produce more than 500 flasks per year, and more than half (estimated between 50 and 70 percent) of the Mexican production comes from a large number of small operations. The hundreds of small self-employed operators, known as gambusinos, are principally farmers or laborers who work their small deposits intermittently, depending on such factors as the price of mercury, alternative employment opportunities, and the season for planting or harvesting. The gambusinos are scattered throughout Mexico; individually they produce small quantities of mercury by using crude "pipe retorts." They are unorganized and do not keep accurate records. They usually sell or barter their production to

^{1/} See section on U.S. Government procurement and assistance programs.

^{2/} Production figures are those derived by the Mexican Government from payments of production taxes by the larger companies and therefore somewhat understate total output.

middlemen or traveling agents who collect the impure metal and deliver it to a central point for redistilling. In addition to the small-scale independent operators, about 850 workers are directly employed in the Mexican mercury industry and depend entirely upon it for their livelihood.

Mercury deposits are located in more than 15 Mexican States. The most outstanding are the Ocampo deposits in Coahuila; Hacienda Grunidos and San Felipe in Zacatecas; Cuencamé mine in Durango; the Fatima and Wadley mines in San Luis Potosí; and the San Juan Unión, Huahuaxtla, Tlapehuala, and Huitzuco de Hidalgo mines in Guerrero. United States interests are active in several mercury-mining enterprises.

Most of the major deposits consist of the common mercury ore, cinnabar; one deposit, however, consists of a complex cinnabar ore that must be treated by flotation, and another, of a complex ore containing recoverable antimony. Although retorts are the chief means of recovering the metal from the ore, some furnaces are also in use. The furnaces vary greatly in type, capacity, and efficiency. The mines now being worked yield ores that vary from 0.3 to 3.0 percent mercury (6 to 60 pounds of metal per short ton of ore); metal recovered from the ores in 1961, however, averaged about 0.6 percent (12 pounds per ton).

The mining industry in Mexico contributes heavily in taxes to the Mexican Government; such levies include production taxes, export taxes, and export surtaxes. The basic production tax is an ad valorem levy based on the New York price of mercury; the export tax, including the surtax, consists of a specific rate and an ad valorem rate based on an official valuation established by the Mexican Government. Production and export taxes on mercury metal in 1961 were equivalent to approximately \$15.85 per flask.

Since 1941 the United States has been the principal export market for Mexican mercury, except in 1960 (table 18). ^{1/} From 1950 through 1956, exports to the United States were 75 percent of total shipments; in 1957 and 1959, about 50 percent; in 1958, 63 percent; and in 1960, 26 percent. Shipments to Japan, the United Kingdom, and (West) Germany have increased during the last 5 years. In 1960 Japan took 56 percent of total shipments. During 1951-60 the average unit value per flask of mercury exported to all countries ranged from \$119 in 1953 to \$225 in 1955; in 1960 the unit value averaged \$163 per flask.

Mexico usually ranks third as a U.S. supplier of mercury; it ranked first in 1955 and was surpassed only by Spain in 1958 and 1961.

Consumption of domestic mercury in Mexico is negligible. Very small quantities of specially refined mercury are imported from the United States for making thermometers, and also some compounds are imported for use in making dental amalgams and pharmaceutical preparations.

Yugoslavia

During 1951-55, the annual production of mercury in Yugoslavia averaged 14,500 flasks and accounted for 8.8 percent of world production; during 1956-60 the output averaged 13,000 flasks and accounted for 5.6 percent of total production (table 13). Most of the output comes from the Idria mine in Slovenia. Total Yugoslav production in 1960 was 14,000 flasks, and the average metal content of the ore processed was

^{1/} In all but 2 years since 1950, official figures on exports of Mexican mercury have exceeded reported figures on production. It is probable that the export data more accurately reflect actual production than do the production statistics.

estimated to be between 0.30 and 0.46 percent (6.0 and 9.2 pounds per short ton). During the first 11 months of 1961, 14,400 flasks of mercury was produced.

Exports of mercury metal from Yugoslavia averaged about 13,000 flasks annually during the 5-year period 1951-55. They declined from 13,200 flasks in 1955 to 8,600 flasks in 1956 and to 4,100 flasks in 1958. By 1960, exports had risen to 6,850 flasks, and during the first 6 months of 1961 they were 3,800 flasks (table 19). ^{1/} Part of the decline in Yugoslavia's exports of mercury metal during the last 5 years was offset by increasing exports of mercury chloride and mercury oxide. ^{2/}

West Germany, the United States, Switzerland, Austria, and France are usually the principal markets for Yugoslavia's exports of mercury. During 1956-59 these five countries accounted for about 90 percent of the total. In 1960, however, their combined share represented only 42 percent, while the U.S.S.R. accounted for 47 percent. During the first 6 months of 1961 there were no exports of mercury to West Germany, Switzerland, or the U.S.S.R.; exports to the United States, Austria, and France represented 56 percent of the total exports, and shipments to Poland and Czechoslovakia, 32 percent.

^{1/} The value figures for exports of mercury are available in the Yugoslav statistics, and the official rates of currency exchange are also available. However, the Commission's staff was unable to learn the rate applied to the exports of mercury.

^{2/} The mercury metal content of exports of mercury chloride and mercury oxide increased almost steadily from an equivalent of 661 flasks in 1955 to that of 5,447 flasks in 1960.

Japan

Production of mercury metal in Japan comes from three principal sources: Domestic ore, imported mercury-bearing raw materials, and from scrap metal containing mercury.

Japan's output of mercury from domestic ore averaged 5,300 flasks annually during 1951-55 and increased only slightly to an average of 5,600 flasks annually in 1956-60 (table 13). Since 1956, increasing quantities of mercury-bearing raw materials have been imported and reprocessed or redistilled in Japan in order to meet that country's increased requirements. In 1959, more than 10,000 flasks was produced from this source, an amount about 1.6 times the output of primary mercury from domestic ores; in 1960 the output of mercury from imported materials was 27,800 flasks, or nearly five times the output from domestic ores. ^{1/}

Japan's annual output of secondary mercury from scrap metal also exceeds its annual output of primary mercury from domestic ore. For the 4 years 1957-60, secondary mercury production averaged 6,885 flasks annually; for the first 9 months of 1961, such output was 6,721 flasks.

Total Japanese production increased from 19,200 flasks in 1957 to 40,500 flasks in 1960; in the first 9 months of 1961, total output was 28,000 flasks.

Consumption of mercury in Japan was about 35,000 flasks in 1957, declined to 24,400 flasks in 1958, and amounted to 37,300 flasks in 1960; in the first 9 months of 1961, 28,400 flasks were consumed. The mercury is consumed principally in the installation of caustic soda plants, in catalysts, and in producing inorganic and agricultural chemicals.

^{1/} Detailed information relating to the description and the source of these imported mercury-bearing raw materials is not currently available to the Tariff Commission.

To meet the domestic requirements for mercury, Japan is usually dependent upon imports to supplement domestic production. Japan's imports of mercury metal in recent years have varied widely from more than 13,000 flasks in both 1956 and 1957 to 11 flasks in 1960; in the first 9 months of 1961, imports were 5,000 flasks. In 1956 Italy was the principal supplier, but in 1957-60 Mexico supplied the bulk of the imports. There are virtually no exports of mercury from Japan.

The Japanese Government provides no assistance for the mercury industry.

Other producing countries

Cinnabar deposits were discovered in the Philippine Republic in 1953. Production of mercury began there in 1955 and averaged more than 3,000 flasks annually in 1956-60. The entire output comes from one producer--the Palawan Quicksilver Mines, Inc.; based on the ore treated in 1958-59, the mercury content was slightly more than 4 pounds per short ton. The bulk of the production is exported to Japan under long-term contracts.

Production of mercury in China dates back to ancient times. No official statistics are available, but production in Communist China is estimated by the U.S. Bureau of Mines to have averaged about 7,000 flasks annually during 1951-55 and about 19,000 flasks during 1956-60. Output in 1959 and 1960 is estimated at 23,000 flasks annually. Statistics of the leading free-world importing countries show no imports from Communist China in 1959. ^{1/}

^{1/} Under the Foreign Assets Control Regulations of the U.S. Treasury Department, U.S. imports from Communist China are currently prohibited.

In the U.S.S.R., production of mercury has been increasing to meet rising internal requirements and, according to estimates by the U.S. Bureau of Mines, rose from about 11,600 flasks in 1951 to 22,000 flasks in 1956; beginning in 1957, estimated annual output has been about 25,000 flasks. No recent U.S.S.R. official trade statistics are available. However, United Kingdom statistics ^{1/} report total exports from the U.S.S.R. as 5,539 flasks in 1955; 9,316 flasks in 1956; 8,447 flasks in 1957; 10,380 flasks in 1958; and 10,300 flasks in 1959. The destinations of the exports are not given, but presumably they went to Communist bloc countries. The official statistics of Yugoslavia show that 3,200 flasks of mercury were exported from that country to the U.S.S.R. in 1960.

Production of mercury in both Chile and Peru has increased greatly during the last decade. In 1951-55, the average annual output of Chile was 230 flasks and that of Peru was less than 100 flasks. Production in Chile rose to 3,340 flasks in 1958 and then declined to 2,900 flasks in 1960. Production in Peru increased steadily from 300 flasks in 1956 to 3,000 flasks in 1960. During the last decade the output of mercury in Turkey averaged about 1,100 flasks annually. Annual production in Czechoslovakia is estimated at about 725 flasks. Tunisia, Algeria, and Austria each produce less than 200 flasks annually. In Tunisia, Chile, and Czechoslovakia, mercury is obtained as a byproduct in the production of other metals.

^{1/} United Kingdom, Overseas Geological Surveys, Mineral Resources Division, Statistical Summary of the Mineral Industry; World Production, Exports and Imports, 1954-1959, 1961.

During World War II, substantial quantities of mercury were produced in Canada, Venezuela, South Africa, and Germany. There has been small or sporadic production in France, Hungary, Portugal, Sweden, Honduras, Bolivia, and Australia. Deposits of cinnabar have been discovered, but not developed, in several widely scattered countries, including Southern Rhodesia, Pakistan, Albania, Argentina, Brazil, and Ecuador.

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

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

9 The supplemental reports and new reports shall include
10 a summary of the facts obtained in the investigation, in-
11 cluding a description of the domestic industry, domestic
12 production, foreign production, imports, consumption, chan-
13 nels and methods of distribution, United States exports, and
14 other factors affecting the competition between domestic
15 and imported products. In the course of the investigations,
16 the Commission shall hold hearings, giving adequate oppor-

1 tunity to interested parties to appear and be heard, except
2 that in the case of lead, zinc, mercury, and fluorspar where
3 reports are being brought up to date, the matter of further
4 hearings shall be left to the discretion of the Tariff Commis-
5 sion.

Appendix B

Tables and Charts

Table 1.--Mercury (quicksilver): U.S. production, stocks on Dec. 31, imports for consumption, exports, and consumption, 1954 and 1956-61

Item	1954	1956	1957	1958	1959	1960	1961
Quantity (flasks containing 76 pounds)							
Production, total-----	24,643	30,027	40,425	43,467	36,206	38,573	40,000
Mine output-----	18,543	24,177	34,625	38,067	31,256	33,223	31,600
Secondary-----	6,100	5,850	5,800	5,400	4,950	5,350	8,400
Stocks, total on Dec. 31-----	22,486	22,310	25,388	11,274	13,580	19,761	15,304
Producers'-----	186	1,210	3,588	674	1,880	2,561	604
Consumers' ^{1/} -----	22,300	21,100	21,800	10,600	11,700	17,200	14,700
Imports for consumption, total-----	64,957	47,316	42,005	30,196	30,141	^{2/} 19,488	^{2/} 12,313
Dutiable-----	18,469	44,262	26,876	19,039	24,136	^{2/} 19,474	^{2/} 12,289
Free-----	46,488	3,054	15,129	11,157	6,005	^{2/} 14	^{2/} 24
Exports ^{3/} -----	890	1,080	1,919	320	640	^{2/} 357	^{2/} 285
Consumption-----	42,796	54,143	52,889	52,617	54,895	51,167	^{2/} 56,000
Percent							
Ratio of dutiable imports to--							
Domestic production-----	74.9	147.4	66.5	43.8	66.7	50.5	30.7
Consumption-----	43.2	81.8	50.8	36.2	44.0	38.1	21.9
Ratio of exports to domestic production-----	3.6	3.6	4.7	.7	1.8	.9	.7
Value (1,000 dollars)							
Production, total ^{4/} -----	6,516	7,805	9,984	9,957	8,236	8,130	7,904
Mine output ^{4/} -----	4,903	6,284	8,552	8,720	7,110	7,002	6,244
Secondary ^{4/} -----	1,613	1,521	1,432	1,237	1,126	1,128	1,660
Imports for consumption, total ^{5/} -----	10,784	11,010	9,333	5,922	5,992	^{2/} 3,510	^{2/} 2,048
Dutiable ^{5/} -----	3,718	10,281	5,879	3,680	4,782	^{2/} 3,507	^{2/} 2,044
Free ^{5/} -----	7,066	729	3,454	2,242	1,210	^{2/} 3	^{2/} 4
Exports-----	183	284	484	95	92	^{2/} 83	^{2/} 71
Average value per flask							
Production, total ^{6/} -----	\$264.39	\$259.92	\$246.98	\$229.06	\$227.48	\$210.76	\$197.60
Imports for consumption, total ^{5/} -----	166.01	232.69	222.18	196.12	198.80	^{2/} 180.09	^{2/} 166.32
Dutiable ^{5/} -----	201.28	232.29	218.72	193.28	198.15	^{2/} 180.07	^{2/} 166.30
Free ^{5/} -----	152.00	238.70	228.33	200.91	201.42	^{2/} 192.43	^{2/} 180.00
Exports-----	206.12	263.46	252.18	297.15	144.11	^{2/} 232.08	^{2/} 248.19
New York price-----	264.39	259.92	246.98	229.06	227.48	210.76	197.60
London price ^{7/} -----	255.33	238.68	232.36	214.98	208.61	197.86	181.87

^{1/} Includes stocks held by dealers.

^{2/} Preliminary.

^{3/} Data are not strictly comparable with those shown for other items, since they include mercury-bearing raw materials such as partly refined furnace soot and mercury scrap, as well as unknown quantities of mercury compounds and preparations.

^{4/} Value calculated at average New York price.

^{5/} Represents foreign value.

^{6/} Represents average New York price.

^{7/} London prices in terms of pounds sterling were converted to U.S. dollars by using average rates of exchange recorded by Federal Reserve Board.

Source: Production, stocks, and consumption, compiled from official statistics of the U.S. Bureau of Mines; imports and exports, compiled from official statistics of the U.S. Department of Commerce; New York prices, from E & MJ Metal and Mineral Markets, and London prices, from Mining Journal (London).

Table 2.--Mercury: U.S. consumption, ^{1/} by uses, 5-year averages 1941-50, annual 1954 and 1961

Use	Average 1941-45	Average 1946-50	1954	1956	1957	1958	1959	1960	1961
	Quantity (in flasks containing 76 pounds)								
Total-----	2/ 50,866	40,492	42,796	54,143	52,889	52,617	54,895	51,167	2/ 56,000
Pharmaceuticals-----	11,603	3,993	1,846	1,600	1,751	1,430	1,717	1,729	2,519
Electrical apparatus, total-----	3/	8,370	14,081	13,462	13,420	12,736	12,358	11,978	11,965
Virgin mercury-----	4/ 8,810	7,299	10,833	9,704	9,151	9,335	8,905	9,268	9,441
Redistilled mercury-----	4/	1,071	3,248	3,698	4,269	3,401	3,453	2,710	2,524
Fulminate for munitions and blasting caps-----	2/ 4,373	417	106	11	-	-	-	-	-
Catalysts-----	3,625	3,383	594	871	859	816	965	1,018	567
Industrial and control instruments, total-----	3/	8,395	9,176	10,287	9,812	10,117	10,176	10,880	8,128
Virgin mercury-----	4/ 3,572	5,211	5,185	6,114	6,028	6,054	6,164	6,525	4,072
Redistilled mercury-----	4/	3,184	3,991	4,173	3,784	4,063	4,012	4,355	4,056
Agriculture (for insecticides and fungicides)-----	2,457	4,994	7,651	9,930	6,337	6,270	3,202	2,974	2,403
Paint: Antifouling and mildew-proofing-----	1,740	1,513	1,512	511	568	749	6/ 3,514	6/ 4,221	6/ 5,922
Paper and pulp manufacture-----	1/	1/	1/	1/	1/	1/	4,360	3,481	2,536
Dental preparations, total-----	3/	2,026	2,337	2,181	2,147	2,686	2,761	2,654	2,798
Virgin mercury-----	4/ 668	1,067	1,409	1,328	1,371	1,741	1,828	1,783	1,957
Redistilled mercury-----	4/	959	928	853	776	945	933	871	811
Electrolytic preparation of chlorine and caustic soda-----	590	823	2,137	3,351	4,025	4,547	5,828	6,211	6,195
General laboratory-----	286	407	1,129	984	894	968	1,110	1,302	1,309
Amalgamation-----	133	147	203	239	244	248	265	255	282
Other, total 8/-----	11,842	6,024	3,024	10,716	12,832	12,050	8,639	4,464	7,427
Virgin mercury-----	5,833	5,037	1,910	9,957	11,958	11,011	7,706	2,722	5,804
Redistilled mercury-----	2/ 6,009	987	1,114	759	874	1,039	933	1,742	1,623
	Percent of total								
Total-----	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Pharmaceuticals-----	23.0	9.9	4.3	3.0	3.3	2.7	3.1	3.4	4.8
Electrical apparatus, total-----	3/	20.7	32.9	24.9	25.4	24.2	22.5	23.4	23.0
Virgin mercury-----	4/ 17.3	18.0	25.3	18.1	17.3	17.7	16.2	18.1	18.1
Redistilled mercury-----	4/	2.7	7.6	6.8	8.1	6.5	6.3	5.3	4.9
Fulminate for munitions and blasting caps-----	5/ 8.6	1.0	.2	10/	-	-	-	-	-
Catalysts-----	7.1	8.4	1.4	1.6	1.6	1.6	1.8	2.0	1.1
Industrial and control instruments, total-----	3/	20.7	21.4	19.0	18.6	19.2	18.5	21.3	15.6
Virgin mercury-----	4/ 7.0	12.9	12.1	11.3	11.4	11.5	11.2	12.8	7.8
Redistilled mercury-----	4/	7.8	9.3	7.7	7.2	7.7	7.3	8.5	7.8
Agriculture (for insecticides and fungicides)-----	4.8	12.3	17.9	18.3	12.0	11.9	5.8	5.8	4.6
Paint: Antifouling and mildew-proofing-----	1/ 3.4	1/ 3.7	1/ 1.2	1/ .9	1/ 1.1	1/ 1.4	6/ 6.4	6/ 8.3	6/ 11.4
Paper and pulp manufacture-----	1/	1/	1/	1/	1/	1/	8.0	6.8	4.9
Dental preparations, total-----	3/	5.0	5.5	4.0	4.1	5.1	5.0	5.2	5.4
Virgin mercury-----	4/ 1.3	2.6	3.3	2.5	2.6	3.3	3.3	3.5	3.8
Redistilled mercury-----	4/	2.4	2.2	1.5	1.5	1.8	1.7	1.7	1.6
Electrolytic preparation of chlorine and caustic soda-----	1.0	2.0	5.0	6.2	7.6	8.6	10.6	12.1	11.9
General laboratory-----	.6	1.0	2.6	1.8	1.7	1.8	2.0	2.5	2.5
Amalgamation-----	.3	.4	.5	.4	.5	.5	.5	.5	.5
Other, total 8/-----	23.3	14.9	7.1	19.9	24.1	23.0	15.8	8.7	14.3
Virgin mercury-----	11.5	12.4	4.5	18.5	22.5	21.0	14.1	5.3	11.2
Redistilled mercury-----	2/ 11.8	2.5	2.6	1.4	1.6	2.0	1.7	3.4	3.1

^{1/} Includes all industrial consumption of mercury except the mercury used by the Atomic Energy Commission in atomic energy facilities and in other applications and the mercury consumed by private companies working on contracts for the Atomic Energy Commission. The data in this table include the consumption of secondary mercury by industrial users beginning in 1954.

^{2/} This total is larger than the sum of the items listed because it includes an estimated quantity for unreported consumption. Percentages shown below are based on the total of the individual items.

^{3/} Not available.

^{4/} Included under "Other"; separate data relating to the quantity of redistilled mercury used in electrical apparatus, industrial and control instruments, and dental preparations are not available.

^{5/} Includes an average of 1,806 flasks used for munitions other than fulminate.

^{6/} Includes 2,521 flasks of mildew-proofing paint in 1959, 2,861 flasks in 1960, and 5,017 flasks in 1961. Data for this use were not available prior to 1959.

^{7/} Included in "Agriculture."

^{8/} Includes mercury for new chlorine-and-caustic-soda plant installations using mercury cells and mercury needed to replace mercury-boiler leakages. Mercury reported actually consumed in the electrolytic production of chlorine and caustic soda is shown separately in this table.

^{9/} Includes total quantity of redistilled mercury consumed.

^{10/} Less than 0.05 percent.

Source: Compiled from official statistics of the U.S. Bureau of Mines; for the years 1946-61, the quantities of redistilled mercury consumed in electrical apparatus, industrial and control instruments, dental preparations and other uses were computed by the U.S. Tariff Commission using figures published by the Bureau of Mines on percentages of total redistilled mercury consumed for these uses.

Table 3a.--Primary mercury: Reported statistics for the U.S. industry, 1956-61 ^{1/}

Item	1956	1957	1958	1959	1960	1961
Number of active mines covered-----	43	48	23	29	34	36
Number of furnaces covered-----	16	16	22	23	26	25
Number of retorts covered-----	31	37	32	37	38	42
Production:						
Ore mined, total-----short tons--	220,333	269,467	232,169	236,772	239,961	222,548
Ore treated, total-----do-----	230,403	315,289	277,908	275,074	242,493	220,954
From ore mined-----do-----	205,023	276,959	232,455	234,073	239,672	220,808
From old surface ore, dumps, etc-----do-----	25,380	38,330	45,453	41,001	2,821	146
Mercury metal recoverable per ton of ore treated-----pounds--	6.9	7.5	9.0	7.8	10.0	10.4
From crude ore mined and treated-----do-----	7.7	8.4	10.6	9.0	10.0	10.4
From old surface ore, dumps, etc., and treated-----do-----	.6	1.2	1.0	.7	6.3	19.8
Mercury metal produced, total flasks containing 76 pounds--	21,064	31,318	33,076	28,157	31,811	30,372
From crude ore mined flasks containing 76 pounds--	20,859	30,699	32,479	27,798	31,578	30,334
From old surface ore, dumps, etc. flasks containing 76 pounds--	205	619	597	359	233	38
Inventories, total ^{2/} flasks containing 76 pounds--	1,116	5,649	1,370	2,182	3,282	2,283
Sales:						
Number of flasks sold flasks containing 76 pounds--	20,854	26,784	37,157	27,462	30,389	31,404
Value of flasks sold (f.o.b. mine)-----	\$5,177,053	\$6,270,440	\$8,176,594	\$5,887,803	\$6,020,525	\$5,722,446
Average unit value per flask sold-----	\$248.25	\$234.11	\$220.06	\$214.40	\$198.12	\$182.22
Employment:						
Number of persons engaged, total-----	604	699	561	578	572	523
Production, development, and related workers, average-----	438	511	445	457	439	380
All other employees, average-----	62	67	54	54	58	56
Proprietors and firm members-----	104	121	62	67	75	87
Proprietors and firm members performing production, development, and related work-----	87	102	50	53	62	73
Man-hours worked by production, develop- ment, and related workers, total-----	1,023,132	1,199,471	1,006,530	1,024,519	985,813	840,544
Man-hours worked per flask of mercury produced-----	48.6	38.3	30.4	36.4	31.0	27.7
Average hourly wages of production, development, and related workers ^{3/} -----	\$2.12	\$2.34	\$2.29	\$2.48	\$2.64	\$2.69
Principal expenses designated below, total-----	\$4,513,084	\$5,436,487	\$4,228,234	\$4,593,186	\$4,593,168	\$3,965,724
Salaries and wages, total-----	2,586,046	3,234,229	2,654,680	2,914,356	3,005,627	2,635,580
Wages of production, development, and related workers-----	2,167,709	2,809,878	2,302,052	2,538,070	2,606,321	2,264,542
Salaries of all other employees-----	418,337	424,351	352,628	376,286	399,306	371,038
Cost of supplies, materials, fuels, purchased electric energy, and contract work, total-----	1,927,038	2,202,258	1,573,554	1,678,830	1,587,541	1,330,144
Supplies and materials-----	1,033,846	1,280,100	1,053,956	1,087,013	1,023,347	809,078
Fuels-----	410,942	547,014	406,269	459,593	438,548	374,451
Purchased electric energy-----	75,787	83,710	72,073	82,594	104,013	126,083
Contract work-----	406,463	291,434	41,256	49,630	21,633	20,532

^{1/} Represents data covering mines that were engaged during any part of the period 1956-61 in producing mercury ores and/or mercury. The mines included produced 87.1 percent of all primary mercury recovered in 1956 (as reported by the U.S. Bureau of Mines), 90.4 percent of the total production in 1957, 86.9 percent in 1958, 90.1 percent in 1959, 95.7 percent in 1960, and 96.1 percent in 1961.

^{2/} Represents inventories of mercury as of Dec. 31 for the years shown.

^{3/} Data do not include all the fringe benefits paid.

Source: Compiled from data submitted to the U.S. Tariff Commission by domestic mercury mining companies.

Table 3b.--Primary mercury: Reported statistics for the mercury-mining industry in California, 1956-61 ^{1/}

Item	1956	1957	1958	1959	1960	1961
Number of active mines covered-----	30	31	15	16	18	21
Number of furnaces covered-----	8	9	6	7	10	10
Number of retorts covered-----	26	27	28	28	26	29
Production:						
Ore mined, total-----short tons--	75,953	103,890	110,569	111,069	121,186	108,446
Ore treated, total-----do-----	101,670	147,168	142,564	152,057	123,939	106,901
From ore mined-----do-----	76,290	109,536	110,563	111,056	121,173	106,775
From old surface ore, dumps, etc-----do-----	25,380	37,632	32,001	41,001	2,766	126
Mercury metal recoverable per ton of ore treated-----pounds--	6.0	7.8	10.6	7.9	11.2	12.7
From crude ore mined and treated-----do-----	7.8	10.0	13.5	10.5	11.3	12.7
From old surface ore, dumps, etc., and treated-----do-----	.6	1.2	.7	.7	6.0	19.9
Mercury metal produced, total						
flasks containing 76 pounds--	8,074	15,035	19,929	15,713	18,267	17,830
From crude ore mined						
flasks containing 76 pounds--	7,869	14,421	19,633	15,354	18,048	17,797
From old surface ore, dumps, etc. flasks containing 76 pounds--	205	614	296	359	219	33
Inventories, total ^{2/}						
flasks containing 76 pounds--	220	1,028	638	701	649	861
Sales:						
Number of flasks sold						
flasks containing 76 pounds--	7,920	14,226	19,634	15,768	17,996	17,649
Value of flasks sold (f.o.b. mine)-----	\$1,971,296	\$3,335,458	\$4,541,587	\$3,373,762	\$3,584,246	\$3,235,925
Average unit value per flask sold-----	\$248.90	\$234.46	\$231.31	\$213.96	\$199.17	\$183.35
Employment:						
Number of persons engaged, total-----	355	430	372	368	361	332
Production, development, and related workers, average-----	233	288	284	280	270	234
All other employees, average-----	37	43	38	37	39	37
Proprietors and firm members-----	85	99	50	51	52	61
Proprietors and firm members performing production, development, and related work-----	75	87	43	42	44	54
Man-hours worked by production, development, and related workers, total-----	498,103	634,288	647,122	648,177	634,494	534,936
Man-hours worked per flask of mercury produced-----	61.7	42.2	32.5	41.3	34.7	30.0
Average hourly wages of production, development, and related workers ^{3/} -----	\$2.07	\$2.14	\$2.15	\$2.25	\$2.39	\$2.48
Principal expenses designated below,						
total-----	\$2,221,835	\$2,617,784	\$2,425,832	\$2,575,265	\$2,577,350	\$2,248,978
Salaries and wages, total-----	1,232,497	1,569,942	1,626,473	1,718,004	1,783,441	1,572,628
Wages of production, development, and related workers-----	1,033,119	1,359,389	1,389,049	1,460,242	1,518,876	1,324,592
Salaries of all other employees-----	199,378	210,553	237,424	257,762	264,565	248,036
Cost of supplies, materials, fuels, purchased electric energy, and contract work, total-----	989,338	1,047,842	799,359	857,261	793,909	676,350
Supplies and materials-----	468,206	582,828	551,307	583,809	535,464	431,601
Fuels-----	169,632	224,445	142,722	148,958	147,417	144,327
Purchased electric energy-----	56,357	65,460	64,074	74,864	95,970	91,143
Contract work-----	295,143	175,109	41,256	49,630	15,058	9,279

^{1/} Represents data covering mines that were engaged during any part of the period 1956-61 in producing mercury ores and/or mercury. The mines included produced 89.5 percent of all primary mercury recovered in 1956 in California (as reported by the U.S. Bureau of Mines), 91.1 percent of the total production in California in 1957, 89.1 percent in 1958, 91.9 percent in 1959, 97.4 percent in 1960, and 95.9 percent in 1961.

^{2/} Represents inventories of mercury as of Dec. 31 for the years shown.

^{3/} Data do not include all the fringe benefits paid.

Source: Compiled from data submitted to the U.S. Tariff Commission by domestic mercury mining companies.

Table 3c.--Primary mercury: Reported statistics for a selected group of large mines producing mercury, 1956-61 ^{1/}

Item	1956	1957	1958	1959	1960	1961
Number of active mines covered-----	9	10	10	9	10	10
Number of furnaces covered-----	9	10	10	9	10	10
Number of retorts covered-----	10	10	20	17	16	17
Production:						
Ore mined, total-----short tons--	178,861	224,492	228,243	216,976	225,676	211,055
Ore treated, total-----do-----	191,389	265,635	273,838	258,228	227,227	209,257
From ore mined-----do-----	168,389	235,635	228,306	217,228	225,527	209,257
From old surface ore, dumps, etc-----do-----	23,000	30,000	45,452	41,000	1,700	-
Mercury metal recoverable per ton of ore treated-----pounds--	7.0	7.8	9.0	8.0	10.2	10.6
From crude ore mined and treated-----do-----	7.9	8.7	10.7	9.4	10.2	10.6
From old surface ore, dumps, etc., and treated-----do-----	.5	1.2	1.0	.6	6.0	-
Mercury metal produced, total flasks containing 76 pounds--	17,712	27,312	32,588	27,135	30,443	29,098
From crude ore mined flasks containing 76 pounds--	17,567	26,826	32,009	26,792	30,309	29,085
From old surface ore, dumps, etc. flasks containing 76 pounds--	145	486	579	343	134	13
Inventories, total ^{2/} flasks containing 76 pounds--	1,018	5,333	1,355	2,102	3,083	2,145
Sales:						
Number of flasks sold flasks containing 76 pounds--	17,574	22,997	36,681	26,502	29,140	30,071
Value of flasks sold (f.o.b. mine)-----	\$4,364,988	\$5,361,139	\$8,077,544	\$5,686,531	\$5,778,016	\$5,479,135
Average unit value per flask sold-----	\$248.38	\$233.12	\$220.21	\$214.57	\$198.28	\$182.21
Employment:						
Number of persons engaged, total-----	437	525	513	507	486	438
Production, development, and related workers, average-----	349	423	426	425	407	359
All other employees, average-----	53	58	53	52	52	49
Proprietors and firm members performing production, development, and related work-----	35	44	34	30	27	30
Man-hours worked by production, development, and related workers, total-----	839,180	1,011,901	956,591	951,368	921,320	795,509
Man-hours worked per flask of mercury produced-----	47.4	37.0	29.4	35.1	30.3	27.3
Average hourly wages of production, development, and related workers ^{3/} -----	\$2.15	\$2.38	\$2.30	\$2.48	\$2.66	\$2.72
Principal expenses designated below, total-----	\$3,645,431	\$4,546,747	\$4,034,284	\$4,255,832	\$4,299,183	\$3,769,849
Salaries and wages, total-----	2,155,513	2,787,927	2,549,154	2,722,501	2,831,933	2,516,943
Wages of production, development, and related workers-----	1,802,660	2,413,775	2,199,494	2,359,115	2,455,346	2,168,020
Salaries of all other employees-----	352,853	374,152	349,660	363,386	376,587	348,923
Cost of supplies, materials, fuels, purchased electric energy, and contract work, total-----	1,489,918	1,758,820	1,485,130	1,533,331	1,467,250	1,252,906
Supplies and materials-----	799,563	1,078,179	988,554	992,599	943,449	767,749
Fuels-----	333,552	455,396	383,397	419,427	404,641	344,978
Purchased electric energy-----	51,184	61,514	71,923	80,894	98,838	120,851
Contract work-----	305,619	163,731	41,256	40,411	20,322	19,328

^{1/} Represents data covering concerns that produced 500 flasks or more of mercury in any year during 1956-61. In some years, production at some of the mines included was less than 500 flasks but such production and related data are included. The combined output of these mines accounted for 73 percent of the total mine output as reported by the U.S. Bureau of Mines in 1956, for 79 percent in 1957, 86 percent in 1958, 87 percent in 1959, and 92 percent in 1960 and in 1961.

^{2/} Represents inventories as of Dec. 31 for the years shown.

^{3/} Does not include all fringe benefits paid.

Source: Compiled from data submitted to the U.S. Tariff Commission by domestic mercury mining companies.

Table 5.--Primary mercury: Number of mines and production in the United States, by size of mine output, 1956-61

Year and size of mine output ^{1/}	Number of mines	Quantity	
		Number of flasks produced ^{1/}	Percent of total
<u>1956</u>			
500 or more flasks-----	14	21,514	89.0
100 to 499 flasks-----	7	1,205	5.0
Less than 100 flasks-----	126	1,458	6.0
Total-----	147	24,177	100.0
<u>1957</u>			
500 or more flasks-----	13	31,199	90.1
100 to 499 flasks-----	10	2,212	6.4
Less than 100 flasks-----	97	1,214	3.5
Total-----	120	34,625	100.0
<u>1958</u>			
500 or more flasks-----	10	33,951	89.2
100 to 499 flasks-----	13	3,147	8.3
Less than 100 flasks-----	78	969	2.5
Total-----	101	38,067	100.0
<u>1959</u>			
500 or more flasks-----	10	28,120	90.0
100 to 499 flasks-----	9	2,436	7.8
Less than 100 flasks-----	52	700	2.2
Total-----	71	31,256	100.0
<u>1960</u>			
500 or more flasks-----	8	29,960	90.2
100 to 499 flasks-----	12	2,669	8.0
Less than 100 flasks-----	55	594	1.8
Total-----	75	33,223	100.0
<u>1961</u>			
500 or more flasks-----	8	29,019	91.8
100 to 499 flasks-----	10	1,888	6.0
Less than 100 flasks-----	57	693	2.2
Total-----	75	31,600	100.0

^{1/} Flasks containing 76 pounds each.

Source: Official statistics of the U.S. Bureau of Mines.

Table 6.--Primary mercury: Number of employees engaged in mining and furnacing mercury ores in the United States, in California, and in all other States, by month, January 1956-December 1961 1/

Year and month	Production, development, and related workers			All other employees			Total, all employees		
	Calif- ornia	All other States	Total	Calif- ornia	All other States	Total	Calif- ornia	All other States	Total
1956:									
January	268	180	448	34	22	56	302	202	504
February	247	183	430	34	22	56	281	205	486
March	241	182	423	35	22	57	276	204	480
April	224	185	409	35	22	57	259	207	466
May	237	196	433	34	24	58	271	220	491
June	247	226	473	36	29	65	283	255	538
July	244	244	488	39	29	68	283	273	556
August	237	224	461	38	28	66	275	252	527
September	228	233	461	41	27	68	269	260	529
October	202	215	417	40	27	67	242	242	484
November	214	191	405	41	25	66	255	216	471
December	200	206	406	39	25	64	239	231	470
1956 average	233	205	438	37	25	62	270	230	500
1957:									
January	220	210	430	48	25	73	276	235	511
February	233	195	428	41	25	66	274	220	494
March	246	222	468	41	24	65	287	246	533
April	261	231	492	41	24	65	302	255	557
May	302	224	526	44	25	69	346	249	595
June	317	248	565	47	26	73	364	274	638
July	312	257	569	47	25	72	359	282	641
August	324	261	585	52	25	77	376	286	662
September	331	242	573	43	23	66	374	265	639
October	307	200	507	41	22	63	348	222	570
November	305	198	503	39	21	60	344	219	563
December	287	187	474	39	23	62	326	210	536
1957 average	280	223	511	43	24	67	331	247	578
1958:									
January	271	146	417	36	15	51	307	161	468
February	274	143	417	35	15	50	309	158	467
March	276	148	424	39	14	53	315	162	477
April	276	154	430	39	14	53	315	168	483
May	284	160	444	39	14	53	323	174	497
June	277	164	441	41	17	58	318	181	499
July	287	169	456	39	17	56	326	186	512
August	300	180	480	36	17	53	336	197	533
September	290	166	456	38	17	55	336	183	519
October	291	165	456	39	17	56	330	182	512
November	293	166	459	37	17	54	330	183	513
December	282	174	456	38	17	55	320	191	511
1958 average	284	161	445	38	16	54	322	177	499
1959:									
January	275	154	429	34	16	50	309	170	479
February	271	150	421	36	16	52	307	166	473
March	270	157	427	37	16	53	307	173	480
April	270	172	442	36	16	52	306	188	494
May	268	173	441	36	17	53	304	190	494
June	294	182	476	37	15	52	331	197	528
July	280	180	468	41	16	57	321	204	525
August	290	188	478	43	16	59	333	204	537
September	285	192	477	39	17	56	324	209	533
October	286	203	489	39	17	56	325	220	545
November	288	192	480	38	17	55	326	209	535
December	278	179	457	33	16	49	311	195	506
1959 average	280	177	457	37	17	54	317	194	511
1960:									
January	268	172	440	36	16	52	304	188	492
February	274	168	442	40	16	56	314	184	498
March	251	166	417	38	16	54	289	182	471
April	257	163	420	38	18	56	295	181	476
May	273	169	442	36	19	55	309	188	497
June	268	169	437	38	19	57	306	188	494
July	272	175	447	40	21	61	312	196	508
August	283	169	452	43	20	63	326	189	515
September	273	164	437	42	21	63	315	185	500
October	297	172	469	41	19	60	328	191	519
November	269	169	438	40	20	60	309	189	498
December	264	170	434	40	19	59	304	189	493
1960 average	270	169	439	39	19	58	309	188	497
1961:									
January	269	171	440	38	21	59	307	192	499
February	254	170	424	38	21	59	292	191	483
March	253	162	415	39	20	59	292	182	474
April	254	151	405	38	22	60	292	173	465
May	241	146	387	36	21	57	277	167	444
June	246	150	396	36	21	57	282	171	453
July	247	148	395	39	21	60	286	169	455
August	232	136	368	38	18	56	270	154	424
September	215	138	353	37	18	55	252	156	408
October	202	130	332	34	19	53	236	149	385
November	198	125	323	33	16	49	231	141	372
December	198	118	316	33	21	54	231	139	370
1961 average	234	146	380	37	19	56	271	165	436

1/ Based on data reported to the U.S. Tariff Commission covering mines and furnaces (including retorts) that accounted for 87.1 percent of the total primary mercury produced (as reported to the U.S. Bureau of Mines) in 1956, for 90.4 percent of the total produced in 1957, 86.9 percent in 1958, 90.1 percent in 1959, 95.7 percent in 1960, and 96.1 percent in 1961. In addition, there were 104 proprietors and firm members engaged at operations producing mercury in 1956, 121 in 1957, 62 in 1958, 67 in 1959, 75 in 1960, and 87 in 1961.

Source: Compiled from data submitted to the U.S. Tariff Commission by domestic mercury mining companies.

Table 7.--Primary mercury: Number of mines, production, value of shipments, employment, and designated principal expenses in the United States, in California, and in all other States, specified years 1919 to 1958

Area and year	Mines	Mercury metal produced	Value of shipments	Number of persons engaged				
				Total	Production, development and related workers	All other employees	Proprietors and firm members	
							Total	Performing manual labor
Number	Flasks of 76 pounds each	1,000 dollars						
United States, total:								
1958-----	79	33,812	8,607	730	569	83	78	62
1954-----	87	17,487	4,519	578	372	81	125	110
1939-----	69	18,222	1,830	753	621	81	51	41
1929-----	40	23,769	2,820	1,127	1,029	88	10	2/
1919-----	26	2/	1,803	846	748	71	27	11
California:								
1958-----	41	21,334	4,981	2/	2/	2/	2/	2/
1954-----	42	11,260	2,987	354	230	65	59	50
1939-----	30	10,897	1,088	396	342	29	25	21
1929-----	18	10,036	1,178	481	446	28	7	2/
1919-----	17	2/	1,217	543	485	35	23	9
Other States: 3/								
1958-----	38	12,478	3,626	2/	2/	2/	2/	2/
1954-----	45	6,227	1,532	224	142	16	66	60
1939-----	31	7,325	742	325	260	45	20	16
1929-----	22	13,733	1,642	646	583	60	3	2/
1919-----	9	2/	586	303	263	36	4	2
Designated principal expenses								
Mines	Wages paid : production, development and related workers	Salaries paid all other employees	Supplies and minerals received for milling 4/	Fuel	Purchased electric energy	Contract work		
Number	1,000 dollars	1,000 dollars	1,000 dollars	1,000 dollars	1,000 dollars	1,000 dollars		
United States, total:								
1958-----	79	2,627	485	1,462	387	102	55	
1954-----	87	1,607	365	1,160	204	61	28	
1939-----	69	752	164	229	139	33	4	
1929-----	40	1,383	220	464	230	69	15	
1919-----	26	828	221	404	127	29	8	
California:								
1958-----	41	1,491	2/	2/	2/	2/	2/	
1954-----	42	1,001	252	869	103	47	5	
1939-----	30	465	71	158	77	27	-	
1929-----	18	657	73	288	86	42	10	
1919-----	17	621	97	271	80	29	7	
Other States: 3/								
1958-----	38	1,136	2/	2/	2/	2/	2/	
1954-----	45	606	113	291	101	14	23	
1939-----	31	272	84	65	61	6	3	
1929-----	22	726	147	176	144	27	5	
1919-----	9	207	124	133	47	-	1	

1/ Includes the value of minerals shipped for treatment at plants within the industry, as well as the value of the mercury recovered from such ores. This duplication, however, amounts to less than 1 percent of the total value of shipments.

2/ Not available.

3/ Oregon and Nevada for all years and, in addition, for 1954, Idaho, Arizona, and Washington; for 1939, Arkansas, Texas, Idaho, Arizona, and a central office in Washington; for 1929, Texas, Arizona, and Washington; and for 1919, Texas.

4/ The cost of minerals received for processing (milling, furnacing, or retorting), if any, is excluded for 1939 and 1929. No such receipts were reported for 1919.

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

Note.--Nonproducing operations are included for 1958 and 1954 and for the United States (totals only) for 1939. Data for such operations are excluded for 1919, 1929, and 1939 (except in the U.S. totals).

Table 8a.--Mercury: U.S. imports for consumption (free and dutiable),
by principal sources, 1954-61

Year	Spain	Italy	Mexico	Yugoslavia	Chile	Peru	All other	Total
	Quantity (flasks containing 76 pounds)							
1954	29,884	22,180	8,887	3,891	-	-	115	64,957
1955	5,458	629	10,250	3,807	-	95	115	20,354
1956	15,713	16,811	11,536	2,349	25	372	510	47,316
1957	25,276	8,056	5,280	568	-	244	2,581	42,005
1958	18,494	1,133	8,250	220	514	345	1,240	30,196
1959	17,111	6,146	3,516	954	813	589	1,012	30,141
1960 2/	12,464	3,421	2,419	900	139	49	96	19,488
1961 2/	6,544	2,073	3,010	355	82	-	249	12,313
	Foreign value (1,000 dollars)							
1954	4,875	3,394	1,730	754	-	-	31	10,784
1955	1,302	178	2,546	1,059	-	26	38	5,149
1956	3,667	3,934	2,618	579	6	89	117	11,010
1957	5,677	1,869	1,023	132	-	52	1/ 580	9,333
1958	3,729	220	1,506	46	102	61	258	5,922
1959	3,400	1,256	645	198	164	112	217	5,992
1960 2/	2,278	627	382	170	26	8	19	3,510
1961 2/	1,118	365	444	62	15	-	44	2,048
	Average foreign value per flask							
1954	\$163	\$153	\$195	\$194	-	-	\$272	\$166
1955	239	284	248	278	-	\$276	319	253
1956	233	234	227	247	\$233	239	230	233
1957	225	232	194	233	-	215	1/ 224	222
1958	202	195	183	209	199	176	208	196
1959	199	204	184	208	202	189	214	199
1960 2/	183	183	158	189	189	167	192	180
1961 2/	171	176	148	175	186	-	174	166

1/ Includes 2,000 flasks, valued at 454 thousand dollars, with a unit value of \$227 from the United Kingdom.

2/ Preliminary.

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

Table 8b.---Mercury: U.S. dutiable imports for consumption, by principal sources, 1954-61

Year	Spain	Italy	Mexico	Yugoslavia	Chile	Peru	All other	Total
Quantity (flasks containing 76 pounds)								
1954	1,143	4,845	8,887	3,491	-	-	103	18,469
1955	5,458	629	10,250	3,807	-	95	83	20,322
1956	15,713	13,809	11,536	2,349	25	372	458	44,262
1957	16,162	4,053	5,280	568	-	244	569	26,876
1958	7,657	859	8,250	220	514	345	1,194	19,039
1959	11,111	6,146	3,516	954	813	589	1,007	24,136
1960 1/	12,464	3,421	2,419	900	139	49	82	19,474
1961 1/	6,544	2,073	3,010	355	82	-	225	12,289
Foreign value (1,000 dollars)								
1954	335	934	1,730	691	-	-	28	3,718
1955	1,302	178	2,546	1,059	-	26	30	5,141
1956	3,667	3,217	2,618	579	6	89	105	10,281
1957	3,634	914	1,023	132	-	52	124	5,879
1958	1,552	162	1,506	46	102	61	251	3,680
1959	2,192	1,256	645	198	164	112	215	4,782
1960 1/	2,278	627	382	170	26	8	16	3,507
1961 1/	1,118	365	444	62	15	-	40	2,044
Average foreign value per flask								
1954	\$293	\$193	\$195	\$198	-	-	\$283	\$201
1955	239	264	248	278	-	\$276	343	253
1956	233	233	227	247	\$233	239	230	232
1957	225	226	194	233	-	215	215	219
1958	203	190	183	209	199	176	210	193
1959	197	204	184	208	202	189	214	198
1960 1/	183	183	158	189	189	167	192	180
1961 1/	171	176	148	175	186	-	173	166

1/ Preliminary.

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

Table 8c.--Mercury: U.S. duty-free imports for consumption, by principal sources, 1954-61

Year	Spain	Italy	Mexico	Yugoslavia	Chile	Peru	All other	Total
	Quantity (flasks containing 76 pounds)							
1954	28,741	17,335	-	400	-	-	12	46,488
1955	-	-	-	-	-	-	32	32
1956	-	3,002	-	-	-	-	52	3,054
1957	9,114	4,003	-	-	-	1/2,012	46	15,129
1958	10,837	274	-	-	-	-	5	11,157
1959	6,000	-	-	-	-	-	14	6,005
1960 2/	-	-	-	-	-	-	14	14
1961 2/	-	-	-	-	-	-	24	24
	Foreign value (1,000 dollars)							
1954	4,540	2,460	-	63	-	-	3	7,066
1955	-	-	-	-	-	-	8	8
1956	-	717	-	-	-	-	12	729
1957	2,043	955	-	-	-	1/456	7	3,454
1958	2,177	58	-	-	-	-	2	2,242
1959	1,208	-	-	-	-	-	3	1,210
1960 2/	-	-	-	-	-	-	4	4
1961 2/	-	-	-	-	-	-	4	4
	Average foreign value per flask							
1954	\$158	\$142	-	\$159	-	-	\$176	\$152
1955	-	-	-	-	-	-	256	256
1956	-	239	-	-	-	-	228	239
1957	224	239	-	-	-	1/227	143	228
1958	201	210	-	-	-	-	222	201
1959	201	-	-	-	-	-	192	201
1960 2/	-	-	-	-	-	-	180	192
1961 2/	-	-	-	-	-	-	180	180

1/ Includes 2,000 flasks, valued at 454 thousand dollars, with a unit value of \$227, from the United Kingdom.

2/ Preliminary.

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

Table 9.--Mercury compounds and preparations: U.S. imports for consumption, by principal sources, 1957-61

Country	1957	1958	1959	1960 ^{1/}	1961 ^{1/}
Quantity (pounds)					
Spain-----	551	1,689	4,205	16,309	54,894
Yugoslavia-----	1,551	2,800	26,187	89,707	26,327
United Kingdom-----	4,269	3,484	9,468	5,856	9,478
Sweden-----	-	-	441	2,116	-
Canada-----	12,300	210	-	317	-
Israel-----	-	2	1	-	1
France-----	-	500	-	-	-
Italy-----	220	-	-	-	-
Total ^{2/} -----	18,891	8,685	40,302	114,305	90,700
Foreign value					
Spain-----	\$1,725	\$4,069	\$11,189	\$40,798	\$133,335
Yugoslavia-----	4,876	7,960	69,196	222,093	62,450
United Kingdom-----	16,524	12,428	33,445	20,905	31,736
Sweden-----	-	-	3,572	17,136	-
Canada-----	43,028	294	-	842	-
Israel-----	-	300	291	300	300
France-----	-	1,773	-	-	-
Italy-----	916	-	-	-	-
Total -----	67,069	26,824	117,693	302,074	227,821
Unit value (per pound)					
Spain-----	\$3.13	\$2.41	\$2.66	\$2.50	\$2.43
Yugoslavia-----	3.14	2.84	2.64	2.48	2.37
United Kingdom-----	3.87	3.57	3.53	3.57	3.35
Sweden-----	-	-	8.10	8.10	-
Canada-----	3.50	1.40	-	2.66	-
Israel-----	-	150.00	291.00	300.00	300.00
France-----	-	3.55	-	-	-
Italy-----	4.16	-	-	-	-
Average-----	3.55	3.09	2.92	2.64	2.51

^{1/} Preliminary.

^{2/} Estimated mercury content in terms of flasks containing 76 pounds each; 1957--224 flasks; 1958--103 flasks; 1959--477 flasks; 1960--1,354 flasks; and 1961--1,074 flasks.

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

Note.--Imports during 1950-56 averaged 35,289 pounds annually (equivalent to 418 flasks of 76 pounds each of metallic mercury), ranging from a peak of 82,908 pounds in 1951 to a low of 20,298 pounds in 1955.

Table 10.--Mercury: U.S. exports of domestic merchandise, 1/ by principal markets, 1954-61

Year	Canada		Colombia		Korean Republic		Saudi Arabia		Cuba		Venezuela		Brazil		Philippine Republic		Peru		Japan		All other		Total	
	Quantity (1,000 pounds)																							
1954	8	2/																						68
1955	8		4																					34
1956	8		4																					82
1957	8		4																					146
1958	3		2																					24
1959	29		5																					49
1960 <u>3/</u>	7		3																					27
1961 <u>3/</u>	5		1																					22
	Value (1,000 dollars)																							
1954	14	2																						183
1955	35	22																						155
1956	24	15																						284
1957	26	10																						484
1958	11	7																						95
1959	23	20																						92
1960 <u>3/</u>	23	11																						83
1961 <u>3/</u>	13	6																						71
	Unit value (per pound) <u>5/</u>																							
1954	\$1.88	\$4.46																						\$2.99
1955	4.37	5.55																						4.74
1956	3.12	4.14																						3.47
1957	3.42	5.13																						3.32
1958	3.47	4.77																						3.91
1959	.78	3.76																						1.90
1960 <u>3/</u>	2.90	3.75																						3.05
1961 <u>3/</u>	2.77	6.23																						3.27

1/ Includes unknown quantities of mercury-bearing substances such as soot and scrap mercury, as well as some mercury preparations and compounds.
2/ Less than 500 pounds.
3/ Preliminary.
4/ Less than \$500.
5/ Calculated from the unrounded figures.

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

Table 11.--Primary mercury: U.S. and world production, selected years 1877 to 1960

Year	United States	World	Ratio of U.S. to world production
	Flasks 1/	Flasks 1/	Percent
1877-----	79,917	135,000	59.2
1882-----	53,079	116,200	45.7
1921-----	6,256	62,742	10.0
1928-----	17,870	149,083	12.0
1933-----	9,669	59,828	16.2
1936-----	16,569	123,878	13.4
1937-----	16,508	133,136	12.4
1938-----	17,991	150,000	12.0
1939-----	18,633	145,000	12.8
1940-----	37,777	215,000	17.6
1941-----	44,921	275,000	16.3
1942-----	50,846	265,000	19.2
1943-----	51,929	236,000	22.0
1944-----	37,688	163,000	23.1
1945-----	30,763	131,000	23.5
1946-----	25,348	154,000	16.5
1947-----	23,244	168,000	13.8
1948-----	14,388	107,000	13.4
1949-----	9,930	121,000	8.2
1950-----	4,535	143,000	3.2
1951-----	7,293	147,000	5.0
1952-----	12,547	151,000	8.3
1953-----	14,337	160,000	9.0
1954-----	18,543	180,000	10.3
1955-----	18,955	185,000	10.2
1956-----	24,177	218,000	11.1
1957-----	34,625	239,000	14.5
1958-----	38,067	246,000	15.5
1959-----	31,256	224,000	14.0
1960-----	33,223	241,000	13.8

1/ Containing 76 pounds each.

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

Table 13.--Primary mercury: World production, by principal producing countries, 5-year averages 1951-60, annual 1956-60

Country	Average		1956		1957		1958		1959		1960 ^{1/}	
	1951-55	1956-60	1956	1957	1957	1958	1958	1959	1959	1960	1960	1960
	Quantity (flasks containing 76 pounds)											
United States	14,335	32,270	24,177	34,625	38,067	31,256	33,223					
Italy	53,816	57,117	62,309	63,237	58,712	45,833	55,492					
Spain	41,304	52,594	48,269	54,750	55,382	51,680	52,887					
Mexico	14,615	19,937	19,529	21,068	22,556	16,420	20,114					
Yugoslavia	14,516	13,048	13,228	12,328	12,270	13,344	14,069					
Japan ^{1/}	5,318	5,592	5,352	4,859	5,720	6,228	5,802					
U.S.S.R. ^{2/}	12,020	24,400	22,000	25,000	25,000	25,000	25,000					
China ^{2/}	6,900	19,400	17,000	17,000	17,000	23,000	23,000					
All other	1,776	9,242	6,136	6,133	11,293	11,239	11,413					
Total	164,600	233,600	218,000	239,000	246,000	224,000	241,000					
	Percent of total											
United States	8.7	13.8	11.1	14.5	15.5	13.9	13.8					
Italy	32.7	24.5	28.6	26.5	23.9	20.5	23.0					
Spain	25.1	22.5	22.1	22.9	22.5	23.1	22.0					
Mexico	8.9	8.5	9.0	8.8	9.2	7.3	8.3					
Yugoslavia	8.8	5.6	6.1	5.2	5.0	5.9	5.8					
Japan ^{1/}	3.2	2.4	2.4	2.0	2.3	2.8	2.4					
U.S.S.R. ^{2/}	7.3	10.4	10.1	10.5	10.2	11.2	10.4					
China ^{2/}	4.2	8.3	7.8	7.1	6.9	10.3	9.5					
All other	1.1	4.0	2.8	2.5	4.5	5.0	4.8					
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0					

^{1/} Revised.
^{2/} Estimated.

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

Table 14.--Mercury: World production and exports of producing countries, 1959

(Quantities in flasks of 76 pounds)

Country	Production (quantity)	Exports	
		Quantity	Percent of pro- duction
Italy-----	45,833	35,142	76.7
Spain-----	51,680	43,019	83.2
United States-----	31,256	640	2.0
Mexico-----	16,420	20,888	127.2
U.S.S.R-----	<u>1/</u> 25,000	10,298	<u>1/</u> 41.2
Yugoslavia-----	13,344	5,003	37.5
Japan-----	<u>2/</u> 6,228	151	<u>3/</u> 2.4
China-----	<u>1/</u> 23,000	<u>3/</u>	<u>3/</u>
Philippine Republic-----	3,520	4,585	130.3
Czechoslovakia-----	<u>1/</u> 725	<u>3/</u>	<u>3/</u>
Chile-----	2,007	2,309	115.0
Turkey-----	<u>4/</u> 1,321	1,321	100.0
Peru-----	2,526	2,714	107.4
Colombia-----	95	26	27.4
Rumania-----	387	<u>3/</u>	<u>3/</u>
Tunisia-----	198	<u>3/</u>	<u>3/</u>
Total-----	<u>2/</u> <u>5/</u> 224,000	<u>3/</u>	<u>3/</u>

1/ Estimate. 2/ Revised figure.3/ Not available.4/ Exports.5/ Data do not add to total because of rounding.

Source: Production data from the Bureau of Mines; export data compiled from official statistics of the several countries.

Table 15--Mercury: Imports into principal importing countries, by sources, 1959

(In flasks of 76 pounds)

Importing country	Total imports	Source					
		Italy	Spain	Mexico	Yugoslavia	Other producing countries	Non-producing countries
United States--	30,141	6,146	17,111	3,516	954	1,913	501
United Kingdom-----	25,737	10,875	7,109	2,740	-	1,790	3,223
West Germany----	15,717	4,688	6,576	1,738	1,758	337	620
France-----	8,856	2,263	4,705	545	1,105	-	238
Brazil-----	765	-	624	-	-	128	13
India-----	1,773	469	470	-	51	-	783
Canada-----	1,858	-	500	146	-	892	320
Netherlands----	2,175	1,160	435	58	-	174	348
Sweden-----	2,553	348	1,770	-	29	-	406
Finland-----	1,980	1,102	638	-	-	-	240
Belgium-----	1,065	99	302	119	-	148	397
Switzerland----	1,284	560	329	251	110	-	34
Denmark-----	8,624	8,430	-	105	-	-	89
Australia-----	1,001	237	293	164	-	75	232
Total of listed countries--	103,529	36,377	40,862	9,382	4,052	5,457	7,399

Source: Compiled from official statistics of the importing countries.

Table 16.--Mercury: Exports from Italy, by principal markets, average 1951-55, annual 1956-60

Country	Average 1951-55	1956	1957	1958	1959	1960 ^{1/}
Quantity (flasks containing 76 pounds)						
West Germany-----	6,435	9,796	5,925	988	6,489	23,946
France-----	2,910	6,846	4,363	1,391	2,152	4,453
United States-----	19,220	24,244	4,153	951	5,970	3,333
Brazil-----	143	-	4,053	400	8	482
United Kingdom-----	7,056	13,736	3,252	2,912	10,628	10,658
Japan-----	170	6,353	2,682	-	-	-
Austria-----	214	630	1,012	110	83	-
Czechoslovakia-----	635	1,850	814	792	120	400
India-----	481	2,260	489	3	240	1,047
Poland-----	1,613	2,042	821	1,501	1,021	2,602
Canada-----	175	1,126	100	600	-	351
Sweden-----	99	809	80	-	30	438
Belgium-Luxembourg-----	208	691	265	100	150	249
Switzerland-----	144	340	80	50	560	690
Netherlands-----	491	316	100	1,139	1,601	183
Union of South Africa---	80	300	150	-	295	1,120
Finland-----	269	232	-	-	1,101	-
Australia-----	99	216	198	138	540	322
All other countries-----	814	3,216	251	423	4,154	2,613
Total-----	41,256	75,003	28,788	11,498	35,142	52,887
Average value per flask ^{2/}						
West Germany-----	\$248	\$237	\$238	\$207	\$199	\$189
France-----	225	237	238	226	209	188
United States-----	170	230	230	202	205	185
Brazil-----	266	-	244	222	221	198
United Kingdom-----	200	228	236	213	200	193
Japan-----	266	242	240	-	-	-
Austria-----	258	238	224	177	203	-
Czechoslovakia-----	239	243	236	236	200	193
India-----	55	234	237	223	221	197
Poland-----	198	252	243	239	207	190
Canada-----	209	240	234	202	-	197
Sweden-----	266	240	235	-	202	191
Belgium-Luxembourg-----	237	246	248	225	206	195
Switzerland-----	228	233	231	219	216	192
Netherlands-----	219	236	239	205	205	189
Union of South Africa---	193	233	240	-	202	192
Finland-----	213	248	-	-	201	-
Australia-----	227	236	248	224	200	197
All other countries-----	245	245	254	224	195	183
Average-----	197	235	238	217	202	190

^{1/} Preliminary.^{2/} Lire converted to dollars at the following rates of exchange (in lire per U.S. dollar): 1951-57, 625; 1958, 624; and 1959-60, 620.6.

Source: Compiled from the official trade statistics of Italy.

Table 17.--Mercury: Exports from Spain, by principal markets, average
1951-55, annual 1956-60

Country	Average 1951-55	1956	1957	1958	1959	1960
Quantity (flasks containing 76 pounds)						
United States-----	18,808	16,586	17,258	20,206	14,018	12,322
United Kingdom-----	7,461	3,859	6,482	10,283	6,755	8,191
France-----	5,088	3,991	5,140	6,525	5,130	6,609
Germany-----	2,928	2,434	4,450	3,237	5,119	10,909
Netherlands-----	929	1,964	3,749	1,026	997	3,046
Brazil-----	550	2,352	1,836	1,058	859	753
Finland-----	260	317	1,340	100	655	580
Sweden-----	915	2,599	1,256	583	1,884	1,001
Japan-----	1,008	1,787	1,178	-	-	-
Belgium-Luxembourg-----	57	195	856	305	300	549
Canada-----	300	601	651	220	851	1,251
Switzerland-----	2,731	153	618	1,186	530	1,511
India-----	-	1,689	550	3,824	1,365	378
Portugal-----	313	96	341	253	138	170
Norway-----	267	145	300	60	118	55
Austria-----	24	-	181	60	1,356	505
Venezuela-----	-	1,287	-	10	83	-
Denmark-----	28	450	-	1,151	-	-
Australia-----	347	220	-	-	-	268
All other countries-----	391	10	311	643	2,861	4,520
Total-----	42,405	40,735	46,497	50,730	43,019	52,618
Average value per flask 1/						
United States-----	\$169	\$237	\$226	\$206	\$203	\$184
United Kingdom-----	195	239	231	204	200	187
France-----	228	247	242	209	204	189
Germany-----	212	223	226	153	196	184
Netherlands-----	216	235	232	218	206	186
Brazil-----	245	305	298	217	214	202
Finland-----	302	242	267	224	219	198
Sweden-----	198	243	236	214	194	185
Japan-----	217	244	236	-	-	-
Belgium-Luxembourg-----	225	243	227	218	208	185
Canada-----	249	239	262	221	201	191
Switzerland-----	193	238	239	221	216	184
India-----	-	247	235	217	204	196
Portugal-----	220	336	234	223	219	189
Norway-----	201	240	238	224	217	196
Austria-----	245	-	239	226	214	185
Venezuela-----	-	243	-	224	229	-
Denmark-----	189	241	-	207	-	-
Australia-----	194	245	-	-	-	187
All other countries-----	195	237	232	228	208	195
Average-----	191	243	235	205	203	187

1/ For 1951-59, gold pesetas converted to dollars at the rate of 3.061 per U.S. dollar; for 1960, pesetas converted to dollars at the rate of 60 per U.S. dollar.

Source: Compiled from the official trade statistics of Spain.

Table 18--Mercury: Exports from Mexico, by principal markets,
average 1951-55, annual 1956-60

Country	Average 1951-55	1956	1957	1958	1959	1960
Quantity (flasks containing 76 pounds)						
United States-----	11,300	17,821	10,637	16,606	10,488	5,790
Japan-----	552	1,626	5,340	1,149	6,062	12,603
United Kingdom-----	2,015	1,388	2,973	3,974	2,327	3,212
Germany-----	174	711	1,108	2,979	1,135	347
Canada-----	476	977	889	816	27	239
Argentina-----	-	271	-	-	45	-
France-----	130	109	-	541	450	109
Netherlands-----	259	11	-	-	-	162
Belgium-Luxembourg-----	130	-	-	-	-	-
All other countries-----	217	163	18	95	354	180
Total-----	15,253	23,077	20,965	26,160	20,888	22,642
Average value per flask ^{1/}						
United States-----	\$160	\$200	\$188	\$150	\$170	\$150
Japan-----	194	208	139	155	181	167
United Kingdom-----	216	225	219	192	176	172
Germany-----	190	212	215	194	183	171
Canada-----	208	212	221	189	203	179
Argentina-----	-	243	-	-	166	-
France-----	154	226	-	204	195	164
Netherlands-----	164	209	-	-	-	164
Belgium-Luxembourg-----	185	-	-	-	-	-
All other countries-----	159	190	229	212	192	178
Average-----	171	204	183	164	175	163

^{1/} Pesos converted to dollars at the following rates of exchange (in pesos per U.S. dollar): 1951, 8.65; 1952-53, 8.60; 1954-60, 12.49.

Source: Compiled from the official trade statistics of Mexico.

Table 19.--Mercury: Exports from Yugoslavia, by principal markets, average 1951-55, annual 1956-60, and January-June 1961

(In flasks containing 76 pounds)

Country	Average 1951-55	1956	1957	1958	1959	1960	January-June 1961
West Germany----	2,021	816	2,742	2,374	1,470	400	-
United States----	6,002	1,821	1,201	-	550	1,150	1,000
Switzerland-----	1,495	2,405	1,010	400	210	20	-
Austria-----	413	1,829	953	513	1,047	1,015	863
France-----	752	612	410	707	1,006	305	250
Japan-----	-	100	350	-	-	-	-
United Kingdom--	1,153	474	125	50	450	300	300
Sweden-----	241	165	60	70	60	30	100
Netherlands-----	412	379	-	-	-	-	-
Belgium-----	412	-	-	-	-	-	-
All other countries-----	72	-	5	-	210	<u>1/</u> 3,634	<u>2/</u> 1,283
Total-----	12,973	8,601	6,856	4,114	5,003	6,854	3,796

1/ Includes 3,208 flasks exported to the U.S.S.R.

2/ Includes 900 flasks exported to Poland and 300 flasks exported to Czechoslovakia.

Source: Compiled from the official trade statistics of Yugoslavia.

Table 20.--Mercury: Quantities sold by U.S. producers and importers, average net sales value, and New York price quotations, by months, January 1956-December 1961

(In flasks containing 76 pounds)

Year and month	Quantity sold by--			Average net sales value received by--		New York price quotation ^{3/}
	Domestic producers	Importers ^{1/}	Producers and importers	Domestic producers ^{2/}	Importers ^{1/}	
	Number of flasks	Number of flasks	Number of flasks	Per flask	Per flask	
1956:						
January-----	1,112	3,980	5,092	\$256	\$262	\$273
February-----	1,413	1,241	2,654	261	265	268
March-----	1,248	3,200	4,448	250	263	259
April-----	1,744	3,055	4,799	250	252	267
May-----	1,658	904	2,562	255	261	265
June-----	1,877	2,270	4,147	249	256	258
July-----	1,892	1,774	3,666	246	257	255
August-----	1,980	4,319	6,299	247	258	255
September-----	1,608	2,944	4,552	245	251	255
October-----	2,492	2,024	4,516	244	255	255
November-----	1,534	2,613	4,147	243	249	255
December-----	2,296	1,442	3,738	244	262	255
Total or average----	20,854	29,766	50,620	248	257	260
1957:						
January-----	1,701	1,552	3,253	245	243	255
February-----	1,257	3,775	5,032	243	249	255
March-----	1,327	1,664	2,991	245	250	255
April-----	2,047	1,683	3,730	244	250	255
May-----	2,175	1,426	3,601	242	248	255
June-----	2,397	2,007	4,404	244	251	255
July-----	2,480	965	3,445	241	253	254
August-----	2,299	1,537	3,836	237	250	251
September-----	1,892	731	2,623	220	249	245
October-----	3,636	1,050	4,686	220	239	232
November-----	1,797	1,822	3,619	220	238	227
December-----	3,776	1,467	5,243	222	227	225
Total or average----	26,784	19,679	46,463	234	246	247
1958:						
January-----	3,258	1,935	5,193	218	222	221
February-----	3,244	818	4,062	219	222	222
March-----	3,960	1,607	5,567	219	223	232
April-----	2,354	905	3,259	217	229	231
May-----	3,381	759	4,140	220	228	229
June-----	3,619	1,016	4,635	220	227	228
July-----	2,547	911	3,458	223	231	230
August-----	2,195	1,253	3,448	223	228	238
September-----	2,396	1,689	4,085	223	229	238
October-----	3,221	1,470	4,691	220	228	233
November-----	2,656	1,006	3,662	221	230	227
December-----	4,273	825	5,098	220	224	220
Total or average----	4/ 37,157	14,194	4/ 51,351	220	226	229

See footnotes at end of table.

Table 20.--Mercury: Quantities sold by U.S. producers and importers, average net sales value, and New York price quotations, by months, January 1956-December 1961--Continued

(In flasks containing 76 pounds)

Year and month	Quantity sold by--			Average net sales value received by--		New York price quotation ^{3/}
	Domestic producers	Importers ^{1/}	Producers and importers	Domestic producers ^{2/}	Importers ^{1/}	
	Number of flasks	Number of flasks	Number of flasks	Per flask	Per flask	
1959:						
January-----	2,307	761	3,068	\$209	\$218	\$218
February-----	2,638	564	3,202	207	220	218
March-----	2,118	436	2,554	213	249	225
April-----	2,261	512	2,773	225	226	241
May-----	2,208	4,315	6,523	232	225	245
June-----	2,457	390	2,847	224	227	240
July-----	2,140	1,734	3,874	218	223	236
August-----	2,060	270	2,330	215	233	229
September-----	1,696	416	2,112	213	230	224
October-----	2,659	1,639	4,298	211	220	223
November-----	2,012	758	2,770	204	219	217
December-----	2,891	2,159	5,050	205	214	214
Total or average---	^{4/} 27,462	13,954	^{4/} 41,416	214	223	227
1960:						
January-----	2,633	387	3,020	201	211	211
February-----	2,340	874	3,214	200	210	212
March-----	2,444	804	3,248	200	211	214
April-----	2,296	1,155	3,451	201	209	213
May-----	2,319	1,103	3,422	200	206	212
June-----	2,972	1,060	4,032	198	208	211
July-----	2,152	1,048	3,200	198	208	210
August-----	2,048	857	2,905	195	210	209
September-----	2,564	2,182	4,746	195	207	209
October-----	2,458	1,603	4,061	196	206	209
November-----	2,971	2,489	5,460	197	207	209
December-----	3,179	1,560	4,739	196	207	209
Total or average---	^{4/} 30,389	16,092	^{4/} 46,481	198	208	211
1961:						
January-----	2,187	596	2,783	194	207	209
February-----	2,011	584	2,595	193	209	208
March-----	2,000	1,578	3,578	191	204	206
April-----	2,381	607	2,988	190	204	206
May-----	2,039	486	2,525	188	208	203
June-----	3,629	548	4,177	182	205	200
July-----	1,768	214	1,982	179	204	195
August-----	3,678	160	3,838	176	205	188
September-----	3,766	540	4,306	175	200	188
October-----	2,816	3,062	5,878	176	188	189
November-----	2,445	402	2,847	177	191	189
December-----	2,679	2,152	4,831	179	194	190
Total or average---	^{4/} 31,404	12,064	^{4/} 43,468	182	196	198

^{1/} Number of flasks sold on which duty was paid, and average net sales value f.o.b. shipping point (usually dock or warehouse). The number of flasks sold includes a very small quantity of domestic mercury, but does not include any mercury sold to the U.S. Government. Importers reporting sales by months, included in this table, accounted for 67 percent of U.S. dutiable imports in 1956, 73 percent in 1957, 75 percent in 1958, 58 percent in 1959, 83 percent in 1960, and 98 percent in 1961.

^{2/} Average net sales value f.o.b. mine, including sales to the U.S. Government in 1957 and 1958. Producers reporting sales included in this table accounted for 86 percent of U.S. mine production in 1956, 77 percent in 1957, 98 percent in 1958, 88 percent in 1959, 92 percent in 1960, and 99.4 percent in 1961.

^{3/} Not weighted by quantities sold at various prices.

^{4/} Includes sales of some concerns that were unable to furnish data by months.

Source: Reports submitted to the U.S. Tariff Commission by individual producers and importers; New York prices as reported in the E & MJ Metal and Mineral Markets.

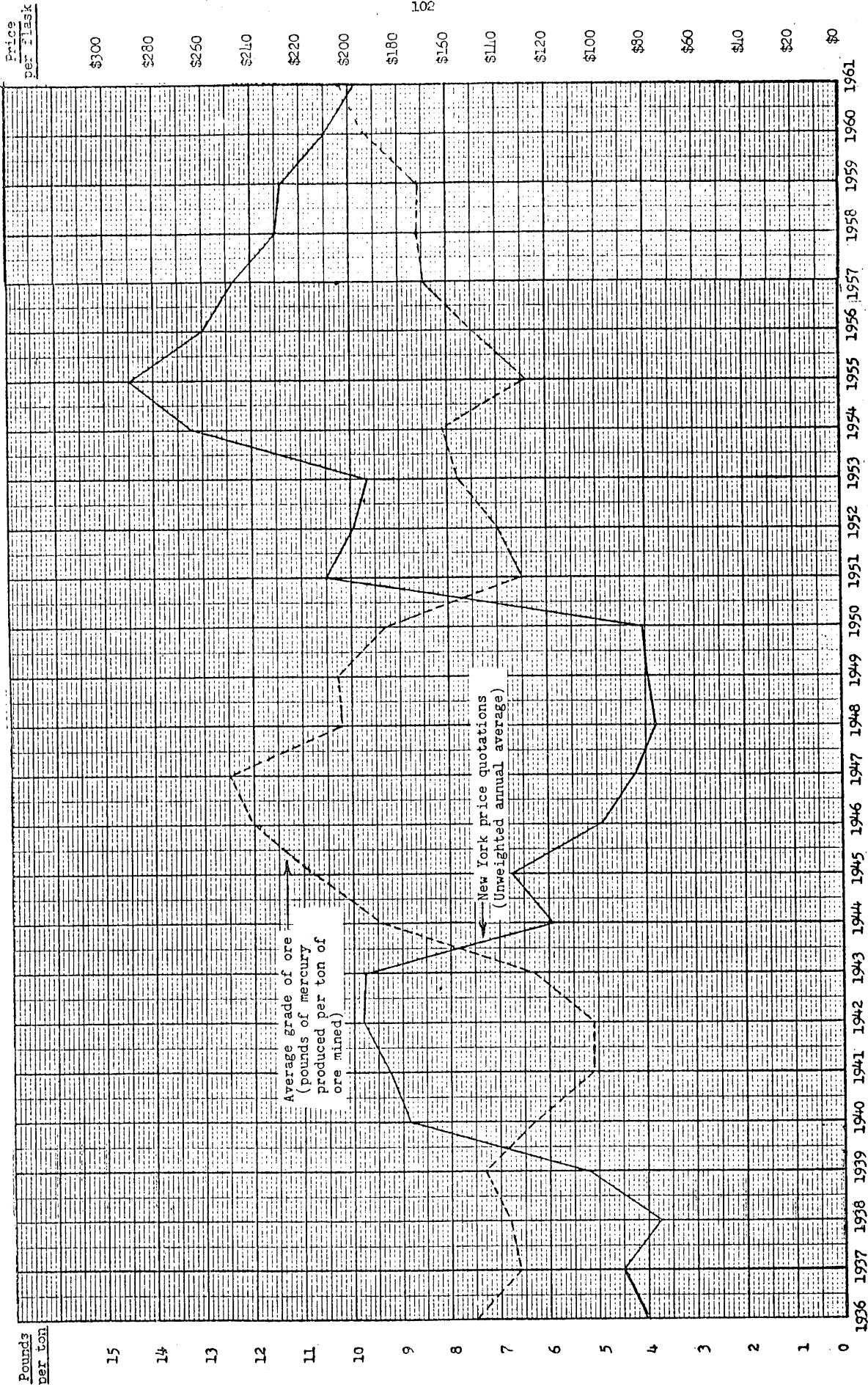
Table 21.--Mercury: Average price quotations in New York and London for flasks containing 76 pounds, annual 1948-53, and by months, January 1954-March 1962

Year and month	New York	London	Excess or deficiency (-), New York over London	Year and month	New York	London	Excess or deficiency (-), New York over London
1948-----	\$76	\$62	\$14	1958:			
1949-----	79	73	6	January-----	\$221	\$200	\$21
1950-----	81	62	19	February-----	222	211	11
1951-----	210	203	7	March-----	232	218	14
1952-----	199	195	4	April-----	231	218	13
1953-----	193	192	1	May-----	229	215	14
				June-----	228	215	13
1954:				July-----	230	217	13
January-----	187	175	12	August-----	238	222	16
February-----	188	180	8	September-----	238	221	17
March-----	200	193	7	October-----	233	220	13
April-----	220	223	-3	November-----	227	216	11
May-----	249	245	4	December-----	220	207	13
June-----	275	259	16				
July-----	287	280	7	1959:			
August-----	290	281	9	January-----	218	208	10
September-----	311	290	21	February-----	218	208	10
October-----	325	304	21	March-----	225	210	15
November-----	320	308	12	April-----	241	221	20
December-----	320	307	13	May-----	245	218	27
				June-----	240	216	24
1955:				July-----	236	211	25
January-----	322	305	17	August-----	229	203	26
February-----	322	305	17	September-----	224	201	23
March-----	322	305	17	October-----	223	202	21
April-----	316	304	12	November-----	217	202	15
May-----	303	302	1	December-----	214	201	13
June-----	283	301	-18				
July-----	265	301	-36	1960:			
August-----	254	281	-27	January-----	211	201	10
September-----	263	259	4	February-----	212	200	12
October-----	276	259	17	March-----	214	199	15
November-----	279	254	25	April-----	213	199	14
December-----	279	201	78	May-----	212	199	13
				June-----	211	198	13
1956:				July-----	210	197	13
January-----	273	248	25	August-----	209	197	12
February-----	268	245	23	September-----	209	195	14
March-----	259	243	16	October-----	209	197	12
April-----	267	240	27	November-----	209	198	11
May-----	265	241	24	December-----	209	196	13
June-----	258	243	15				
July-----	255	238	17	1961:			
August-----	255	234	21	January-----	209	194	15
September-----	255	232	23	February-----	208	193	15
October-----	255	233	22	March-----	206	193	13
November-----	255	234	21	April-----	206	190	16
December-----	255	234	21	May-----	203	187	16
				June-----	200	186	14
1957:				July-----	195	183	12
January-----	255	237	18	August-----	188	177	11
February-----	255	237	18	September-----	188	175	13
March-----	255	238	17	October-----	189	172	17
April-----	255	240	15	November-----	189	167	22
May-----	255	248	7	December-----	190	166	24
June-----	255	254	1				
July-----	254	249	5	1962:			
August-----	251	240	11	January-----	190	1/	1/
September-----	245	238	7	February-----	192	1/	1/
October-----	232	213	19	March-----	192	1/	1/
November-----	227	197	30				
December-----	225	194	31				

1/ Not available.

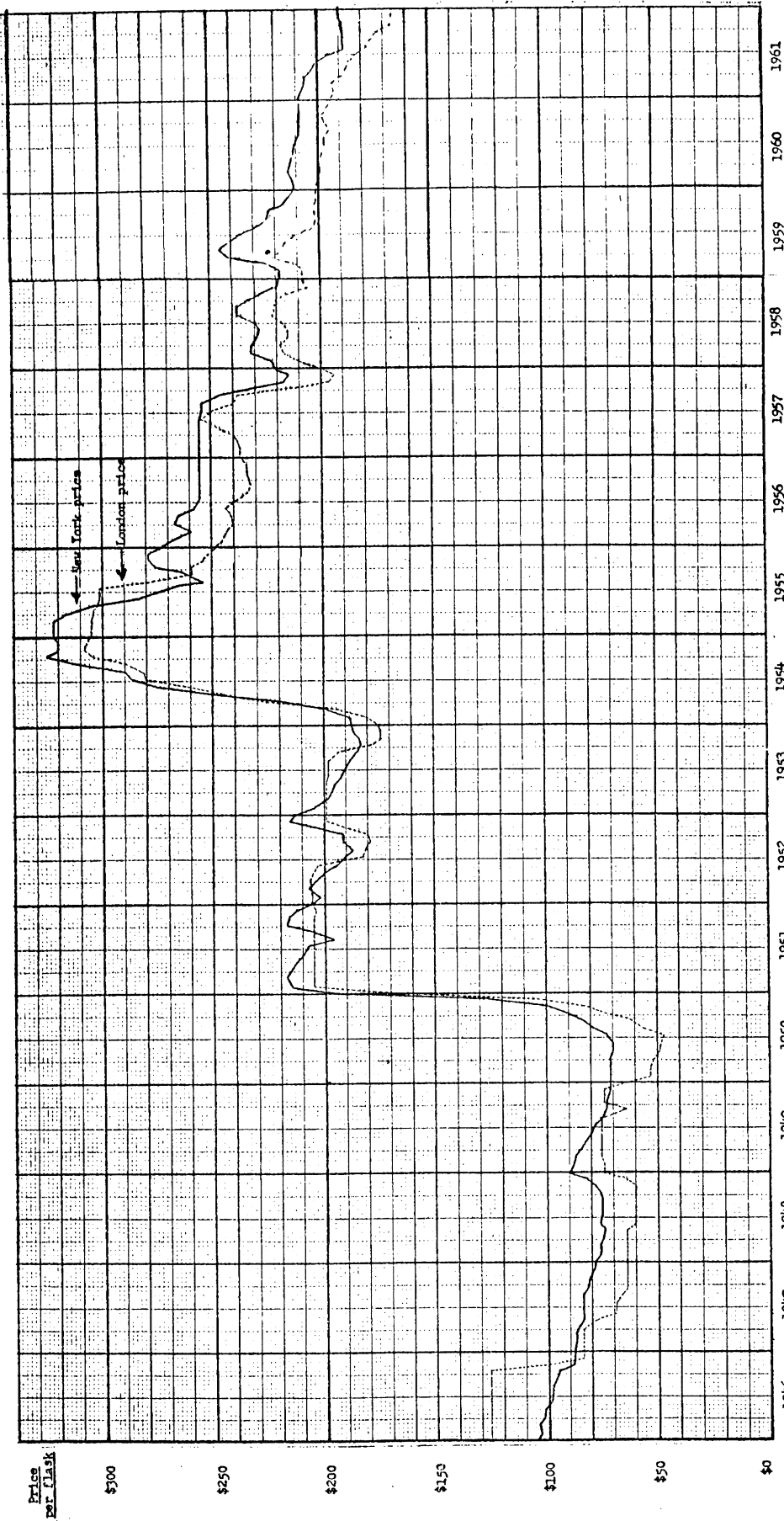
Source: New York prices, E & MJ Metal and Mineral Markets; London prices, Mining Journal (London).

Chart 1.--Mercury: Average Grade of Ore Mined and New York Price Quotations in the United States, Annual Averages, 1936-61



Source: New York price quotations, from E. & M.J. Metal and Mineral Markets; data for average grade of ore, from official statistics of the U.S. Bureau of Mines.

Chart 2.--Mercury: New York and London Price Quotations, by Months, 1946-61



Source: New York price quotations, from the E & M Metal and Mineral Markets; London prices, from the Mining Journal.

