

# Mercury

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Mercury production was reported from three mines, two in Nevada and one in California. Increased production in 1979 was due primarily to higher prices, which prevailed throughout the year. Secondary production also increased in 1979. Part of the total supply was from sales by the General Services Administration (GSA).

An overall decline in consumption was led by reduced demand for mercury use in catalysts, paints, dental equipment, and for general laboratory purposes. Increased use was reported by chlorine and caustic soda manufacturers. Producer, consumer, and dealer stocks fell sharply. The average monthly price rose through the first half of 1979 but then fell off through August before beginning a rise that continued through the end of the year. The average annual flask price in New York was \$281.10.<sup>2</sup>

Imports for consumption decreased by 39% from the 1978 level, to 26,448 flasks; but imports nonetheless accounted for over 50% of U.S. mercury consumption in 1979. Japan, Italy, Spain, Canada, and Mainland China were the principal sources of imported mercury.

Producers in Italy, Spain, and the U.S.S.R. reportedly continued to restrict sales of mercury during most of 1979; and Italian, Yugoslavian, and Mexican producers continued to sharply curtail or completely shut down mercury mining operations. Canadian mining operations, suspended in 1975 because of low prices, did not reopen in 1979. An international association of mercury producers that was formed in 1975, reportedly met intermittently during 1979. The group continued to advocate

price stabilization by curtailing production, withholding supplies from the market, restricting sales to dealers, and closely controlling sales agents.

**Legislation and Government Programs.**—GSA offered 1,000 flasks of mercury for sale each month during 1979 and sold 11,300 flasks. GSA obtained the mercury from other Government agencies. At year-end, the strategic stockpile contained 194,290 flasks, which was 140,286 flasks more than the 54,004 flask goal.

In order to obtain public comment, the Environmental Protection Agency (EPA) published in 1978 its proposed plan for implementing the Toxic Substances Control Act which was passed in 1976.<sup>3</sup> Although mercury was not included in the initial list of toxic substances, the metal was being evaluated by EPA to determine if there is a need for its regulation. Mercury lost in past years during chlorine manufacturing continues to find its way into rivers adjacent to former production plant sites.<sup>4</sup> The mercury content found in fish in these waters greatly exceeded guidelines that have been established for edible foods by the U.S. Food and Drug Administration. These guidelines resulted in the bans on fishing for food purposes in these areas several years ago.

Information on the production, geology, and ore reserves of mercury deposits in Oregon was developed for inclusion in the Bureau of Mines Minerals Availability System.<sup>5</sup> A report on the mercury deposits of Turkey was published.<sup>6</sup> The study details the mineralogy, geology, size, and grade of deposits and includes a brief history of Turkey's productive mines.

Table 1.—Salient mercury statistics

	1975	1976	1977	1978	1979
United States:					
Producing mines -----	13	7	5	2	3
Production ----- flasks -----	7,366	23,133	28,244	24,163	29,519
Value ----- thousands -----	\$1,165	\$2,306	\$3,833	\$3,705	\$8,299
Exports ----- flasks -----	339	501	852	NA	NA
Reexports ----- do -----	155	12	101	NA	NA
Imports:					
For consumption ----- do -----	43,865	44,415	28,750	43,148	26,448
General ----- do -----	44,472	43,964	28,750	43,964	28,819
Stocks, Dec. 31 ----- do -----	25,549	31,734	34,178	38,749	27,582
Consumption ----- do -----	50,838	64,870	61,259	48,766	45,442
Price: New York, average per flask -----	\$158.12	\$121.35	\$135.71	\$153.32	\$281.10
World:					
Production ----- flasks -----	252,329	<sup>r</sup> 243,274	<sup>r</sup> 199,539	183,579	192,845
Price: London, average per flask -----	\$130.11	\$91.97	\$140.70	\$181.57	\$291.73

NA Not available. <sup>r</sup>Revised.

## DOMESTIC PRODUCTION

Three mines reported production; the Carlin gold mine and the McDermitt mercury mine, both in Nevada, and the Knoxville mine in California. The increased output of primary mercury was accounted for mainly by the McDermitt mine. Most small mercury mines in the United States remained closed despite the higher prices in 1979. The average grade of all ore processed in 1979, including ore processed at concentrators, increased from 7.2 pounds of mercury per ton in 1978 to 7.5 pounds per ton in 1979.

Production of secondary mercury amounted to 4,287 flasks, which was 20% above that of 1978. Most of the increase in secondary production was attributed to higher mercury prices, which made it more economical to extract mercury metal from lower-grade scrap material. Major sources of secondary mercury were industrial and control instruments, batteries, sludges, and dental amalgams.

Table 2.—Mercury produced in the United States

Year and State	Pro- ducing mines	Flasks	Value <sup>1</sup> (thou- sands)
1978			
California and Nevada -	2	24,163	\$3,705
1979			
California and Nevada -	3	29,519	8,299

<sup>1</sup>Value calculated at average New York price.Table 3.—Mercury ore treated and mercury produced in the United States<sup>1</sup>

Year	Ore treated (short tons)	Mercury produced	
		Flasks	Pounds per ton of ore
1975 -----	76,772	6,905	6.8
1976 -----	185,103	23,042	9.5
1977 -----	216,577	28,244	9.9
1978 -----	256,197	24,144	7.2
1979 -----	241,684	29,499	7.5

<sup>1</sup>Excludes mercury produced from old surface ores, dumps, and placers, and as a byproduct.

Table 4.—Production of secondary mercury in the United States

Year	(Flasks)		
	Industrial production	GSA releases	Total
1975 -----	7,538	500	8,038
1976 -----	2,843	520	3,363
1977 -----	5,566	1,000	6,566
1978 -----	3,560	5,702	9,262
1979 -----	4,287	11,300	15,587

## CONSUMPTION AND USES

In 1978, the Bureau of Mines used the Standard Industrial Classification code for reporting consumption data and developed detailed data not previously available on electrical and instrument uses.

Of the mercury consumed in 1979, 82% was primary mercury, 15% was redistilled mercury, and the remainder was secondary mercury. Primary mercury was used

throughout the whole range of mercury applications, and redistilled mercury was used primarily in electrical apparatus, industrial and control instruments, and dental preparations. Secondary mercury was used mainly in industrial and control instruments, chemicals, electrical apparatus, and catalysts.

Table 5.—Mercury consumed in the United States, by use

(Flasks)

Use	1975	1976	1977	1978	1979
Agriculture <sup>1</sup>	600	607	584	W	W
Amalgamation	7	11	W	W	W
Catalysts	838	1,264	1,545	W	548
Dental preparations	2,340	1,990	1,230	512	793
Electrical apparatus	16,971	27,498	29,180	( <sup>2</sup> )	( <sup>2</sup> )
Electrolytic preparation of chlorine and caustic soda	15,222	16,054	10,744	11,166	12,180
General laboratory use	335	595	406	420	410
Industrial and control instruments	4,598	5,067	5,221	( <sup>2</sup> )	( <sup>2</sup> )
Paint: Mildew proofing	6,928	7,845	8,365	8,956	9,979
Pharmaceuticals	445	60	W	W	W
Other <sup>3</sup>	1,750	2,909	2,589	( <sup>2</sup> )	( <sup>2</sup> )
Total known uses	50,034	63,900	59,864	48,766	45,442
Total unknown uses	804	970	1,395	--	--
Grand total	50,838	64,870	61,259	48,766	45,442

W Withheld to avoid disclosing company proprietary data; included in "Other."

<sup>1</sup>Includes fungicides and bactericides for industrial purposes.

<sup>2</sup>Due to format change, see table 6 for 1978 and 1979 data.

<sup>3</sup>Includes mercury used for installation and expansion of chlorine and caustic soda plants.

Table 6.—Mercury consumed in the United States in 1978-79

(Flasks)

Use	Primary	Redistilled	Secondary	Total
1978				
Chemicals and allied products:				
Chlorine and caustic preparation	11,166	--	W	11,166
Pigments	W	W	W	W
Catalysts	W	W	W	W
Laboratory uses	153	259	8	420
Plastic materials and synthetic (processing and resins)	W	W	--	W
Pharmaceuticals	W	W	--	W
Paint	8,956	W	--	8,956
Agricultural chemicals	W	W	--	W
Chemicals and allied products, n.e.c.	W	W	--	W
Electrical and electronic instruments:				
Electrical lighting	422	487	--	909
Wiring devices and switches	2,020	1,158	--	3,178
Batteries	11,691	2,134	--	13,825
Other electrical and electronic equipment	41	W	--	41
Instruments and related products:				
Measuring and control devices	957	2,532	W	3,489
Dental equipment and supplies	W	512	W	512
Other instruments and related products	W	W	W	W
Other identified end uses:				
Refining lubricating oils	W	--	--	W
Other	W	--	--	W
Other	3,901	1,482	887	6,270
<b>Total known uses</b>	<b>39,307</b>	<b>8,564</b>	<b>895</b>	<b>48,766</b>
1979				
Chemicals and allied products:				
Chlorine and caustic preparation	12,180	--	W	12,180
Pigments	W	--	W	W
Catalysts	548	W	W	548
Laboratory uses	122	277	11	410
Plastic materials and synthetic (processing and resins)	W	W	--	W
Pharmaceuticals	W	W	--	W
Paint	9,979	W	--	9,979
Agricultural chemicals	W	W	--	W
Chemicals and allied products, n.e.c.	W	W	W	W
Electrical and electronic instruments:				
Electrical lighting	W	511	--	511
Wiring devices and switches	2,147	1,066	--	3,213
Batteries	7,988	W	W	7,988
Other electrical and electronic equipment	W	W	--	W
Instruments and related products:				
Measuring and control devices	751	2,852	W	3,603
Dental equipment and supplies	W	793	W	793
Other instruments and related products	W	W	--	W
Other identified end uses:				
Refining lubricating oils	--	--	--	--
Other	--	--	--	--
Other	3,361	1,453	1,403	6,217
<b>Total known uses</b>	<b>37,076</b>	<b>6,952</b>	<b>1,414</b>	<b>45,442</b>

W Withheld to avoid disclosing company proprietary data.

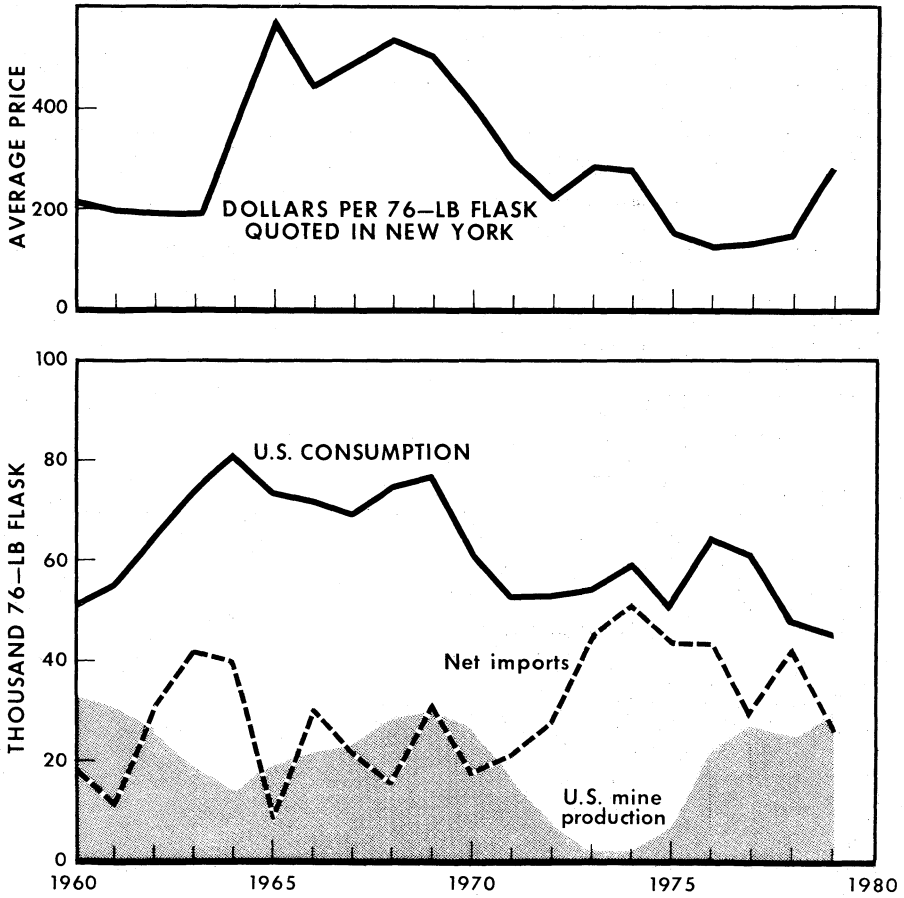


Figure 1.—Trends in production, consumption, and price of mercury.

Table 7.—Stocks of mercury, December 31  
(Flasks)

Year	Producer	Consumer and dealer	Total
1975	4,858	20,691	25,549
1976	9,494	22,240	31,734
1977	11,275	22,903	34,178
1978	16,600	22,149	38,749
1979	9,181	18,401	27,582

## PRICES

The price of primary mercury followed a rising trend during most of 1979, and the yearend price was well above the price at the beginning of the year. Average monthly prices rose steadily in the first half of the year but fell off somewhat before beginning a gradual rise in September that continued through the rest of the year. At yearend 1979, the New York price of mercury was \$365 to \$375 per flask compared with \$175 to \$185 per flask in January. The average annual price in New York was \$281.10 in 1979 compared with \$153.32 per flask in 1978. The London price showed a similar upward pattern during 1979. At the beginning of 1979 the London price per flask was \$173 to \$183 compared with \$370 to \$380 at yearend. The monthly London price per flask averaged \$291.73 in 1979, compared with a \$131.57 average price per flask in 1978. Higher prices in 1979 were attributed to the reluctance of producers in Italy, Spain, and the U.S.S.R. to sell in the international market and to the decline in out-

put by producers in Mexico, Yugoslavia, Italy, and other countries.

Table 8.—Average monthly prices of mercury at New York and London

	1978		1979	
	New York <sup>1</sup>	London <sup>2</sup>	New York <sup>1</sup>	London <sup>2</sup>
January --	\$147.81	\$131.21	\$186.14	\$196.00
February --	157.33	130.50	200.00	218.49
March ----	147.00	130.10	218.91	241.50
April ----	148.50	132.50	255.48	262.29
May ----	150.00	131.25	296.59	301.86
June ----	148.91	124.83	334.76	343.89
July ----	156.55	127.71	299.05	301.00
August ----	156.48	128.00	289.13	301.63
September	150.60	127.29	303.95	310.76
October --	150.00	126.17	315.00	324.46
November --	155.10	137.38	328.58	333.34
December --	171.55	151.86	355.00	365.63
Average	153.32	131.57	281.10	291.73

<sup>1</sup>Metals Week, New York.

<sup>2</sup>Metal Bulletin, London; reported in terms of U.S. dollars.

## FOREIGN TRADE

Statistical data on exports and reexports of mercury are not separately recorded, but they are estimated to have totaled 1,000 flasks valued at \$281,000 in 1979. Compared with that of 1978, imports for consumption decreased 39% in quantity and 66% in value, to 26,448 flasks valued at \$5.2 million. The average unit value for the year was \$196.88 per flask compared with \$125.68 per flask in 1978.

Mainland China, which became a significant exporter of mercury to the United States in 1976, recorded a six-fold increase in shipments from 575 flasks valued at \$50,000 in 1977 to 3,329 flasks valued at \$398,000 in 1978. In 1979, however, China recorded a 65% decline from the previous year's shipments, to 1,400 flasks valued at

\$183,000. Yugoslavia, a major source of imported mercury in past years, did not export mercury to the United States in 1978 and 1979. Japan, after several years of no exports to the United States, sent 4,428 flasks valued at \$442,000 in 1978 and 7,960 flasks valued at \$1,755,000 in 1979.

The U.S. rate of duty on mercury metal imports during 1979 was 12.5 cents per pound (or \$9.50 per flask). The duty on waste and scrap mercury was suspended until June 30, 1981. These duty rates applied to imports from countries designated by the U.S. Government as "Most Favored Nation" (MFN). The statutory rate of 25 cents per pound (or \$19 per flask) applied to other countries.

Table 9—U.S. imports for consumption<sup>1</sup> of mercury, by country

Country	1977		1978		1979	
	Flasks	Value (thousands)	Flasks	Value (thousands)	Flasks	Value (thousands)
Algeria	8,806	\$1,148	8,751	\$1,248	100	\$34
Australia	469	33	—	—	—	—
Canada	1,708	211	895	130	3,943	783
China, Mainland	575	50	3,329	398	—	—
Dominican Republic	—	—	200	26	611	129
Finland	6	1	—	—	—	—
France	( <sup>2</sup> )	1	73	10	470	127
Germany, Federal Republic of	—	—	—	—	—	—
Italy	671	71	5,913	757	4,429	675
Japan	—	—	4,428	442	7,960	1,755
Mexico	4,668	486	813	70	403	60
Netherlands	—	—	369	59	25	4
Spain	8,790	894	13,923	1,723	8,507	1,640
Sweden	7	25	—	—	—	—
Turkey	—	—	2,999	377	—	—
Yugoslavia	3,050	343	—	—	—	—
Total	28,750	3,263	41,693	5,240	26,448	5,207

<sup>1</sup>General Imports: 1977—general imports and imports for consumption were the same; 1978—42,874 (\$5,386,767), China, Mainland 4,010 flasks (\$481,095), and Spain 14,423 (\$1,786,774); 1979—28,818 (\$5,659,206), China, Mainland 1,400 (\$182,674), Italy 5,369 (\$926,522), Japan 8,611 (\$1,919,543), and Spain 8,356 (\$1,621,083).

<sup>2</sup>Less than 1/2 unit.

## WORLD REVIEW

Decreasing world demand, large inventories throughout much of the world, and low prices caused many large producers to remain closed and others to operate at reduced levels during 1978 and 1979. The international association of mercury producers, generally referred to as "Assimer", met periodically to review the mercury market situation. There were reports that the organization planned to try to bolster prices and to provide for more orderly marketing procedures.

**Canada.**—Canadian mining operations, which were suspended because of low prices in 1975, did not reopen in 1978 or 1979. Exports of mercury from stocks continued in these 2 years.

**China, Mainland.**—Sales in international markets were reduced in both years because of low price and weak demand.

**Dominican Republic.**—Mercury occurs in the gold-silver ore of the Pueblo Viejo gold mine on the island of Hispaniola and is recovered by treating the doré precipitate from the mine's cyanide plant in a 12-tube

retort.

**Italy.**—Mining operations, which were suspended in 1977 as Societa Mercurifera Monte Amiata reorganized its mining activities, continued to be suspended in 1979. Sales of mercury reportedly were reduced because of low prices.

**Spain.**—Minas de Almaden Arrayanes, the largest producer, continued to sell at a reduced level because of low prices. Also, the company set base prices for its mercury that were good only for 48 hours and limited these prices to no more than 1 month ahead.

**U.S.S.R.**—Because of low prices, Soviet suppliers reportedly continued to be inactive in the international market in 1978 and 1979.

**Yugoslavia.**—Production of mercury was not reported in 1978 and 1979, and, if any did occur it is believed to have been very small. Yugoslavia's Idria mine, the country's principal producer, was closed early in 1977 due to low prices and declining grade of ore.

Table 10.—Mercury: World production, by country

(Flasks)

Country	1976	1977	1978 <sup>P</sup>	1979 <sup>e</sup>
Algeria	<sup>r</sup> 30,915	<sup>r</sup> 30,429	30,603	30,000
Australia	4	1	<sup>e</sup> 2	2
Chile	13	20	—	—
China, Mainland	26,000	20,000	20,000	20,000
Czechoslovakia	<sup>r</sup> 6,200	<sup>r</sup> 5,950	6,370	6,300
Dominican Republic	—	495	500	500
Finland	383	630	1,145	1,200
Germany, Federal Republic of	3,191	2,872	2,437	2,500
Italy	22,278	406	87	—
Mexico	15,026	9,660	2,205	2,000
Spain	<sup>r</sup> 42,729	35,013	31,039	35,000
Turkey	<sup>r</sup> 4,899	4,686	5,020	5,000
U.S.S.R. <sup>e</sup>	56,000	58,000	60,000	61,000
United States	23,133	28,244	24,189	29,343
Yugoslavia	12,503	3,133	—	—
Total	<sup>r</sup> 243,274	<sup>r</sup> 199,539	183,597	192,845

<sup>e</sup>Estimate. <sup>P</sup>Preliminary. <sup>r</sup>Revised.

## TECHNOLOGY

A method was developed to remove mercury from gases driven off sulfide ores during metallurgical operations.<sup>7</sup> Sulfur dioxide contained in gases developed during metallurgical operations is generally used to produce sulfuric acid, and the mercury in the sulfur dioxide tends to concentrate in the acid if not removed.

Development of a new mercury vapor arc lamp for use as a household light bulb continued by industry.<sup>8</sup> It was estimated that the new bulbs will last 5,000 hours, compared with 1,000 hours for ordinary incandescent bulbs, and that they will use

only one-third as much electricity.

<sup>1</sup>Physical scientist, Section of Nonferrous Metals.<sup>2</sup>Flask as used throughout this chapter refers to the 76-pound flask.<sup>3</sup>Environmental Protection Agency. Toxic Substances. Federal Register, v. 43, No. 208, Oct. 26, 1978, pp. 50140-50147.<sup>4</sup>Chemical Week. Mercury and DDT Plague Rivers in Two States. V. 123, No. 25, Dec. 20, 1978, pp. 18-19.<sup>5</sup>Brooks, H. C. Mercury Deposits of Oregon, Final Report to U.S. Bureau of Mines. October 1973, 44 pp.<sup>6</sup>Yildiz, M., and E. H. Bailey. Mercury Deposits of Turkey. U.S. Geol. Survey Bull. 1456, 1978, 80 pp.<sup>7</sup>Kuivala, A., and J. Poijarvi. Sulphuric Acid Washing Removes Mercury From Roaster Gases. Eng. and Min. J., v. 179, No. 10, October 1978, pp. 81-84.<sup>8</sup>Business Week. From GE a \$10 Bulb That Saves Money. June 25, 1979, pp. 35-36.