



2015 Minerals Yearbook

MERCURY [ADVANCE RELEASE]

MERCURY

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In 2015, mercury was produced in the United States as a byproduct of processing gold-silver ores, mainly in Nevada, and may have been produced as a byproduct of processing other metal ores. Secondary mercury was recovered from end-of-service automobile convenience switches, dental amalgam, electronic waste, fluorescent lamps and compact fluorescent lamps (CFLs), laboratory and medical measuring devices, mercury-contaminated waste, and thermostats. About 25,800 kilograms (kg) of mercury was imported in 2015, 48% less than in 2014 (table 2).

The global use of mercury continued to decline in 2015 owing to environmental and health concerns. Unable to sell it to an oversupplied domestic market and precluded from exporting it, mining and recycling companies placed additional byproduct mercury into permanent storage. However, the use of mercury in the CFL industry and in small-scale gold mining operations continued to be substantial despite steps having been taken to reduce consumption in both industries.

Legislation and Government Programs

The U.S. Environmental Protection Agency announced that the proposed amalgam separator rule will be delayed until the summer of 2016. The proposed rule would have set the amalgam separator standards for dental offices and was to be issued in September 2015. The reason for the delay was that the agency needed more time to address the regulatory burden the rule would create (Palmer, 2015).

Production

Mercury was last produced as a principal product in the United States in 1992 when the McDermitt Mine in northern Nevada closed. Since then, mercury has been recovered chiefly as a byproduct of processing gold-silver ores, mainly in Nevada. Since 1998, data on the amount of primary and secondary mercury produced in the United States have not been available.

Mercury was reclaimed from end-of-service automobile convenience switches, dental amalgam, electronic waste, fluorescent lamps and CFLs, laboratory and medical measuring devices, mercury contaminated waste, and thermostats. Reclaimed mercury was either sold to domestic customers or placed in permanent storage.

Consumption

Based on industry trends and data in trade literature, domestic consumption of mercury was estimated to be less than 45,000 kg in 2015. Consumption continued to decrease as mercury was eliminated from more consumer and industrial products. Some of the domestic uses were in batteries, dental amalgam, lighting, measuring devices, switches and

relays, and thermostats (Interstate Mercury Education and Reduction Clearinghouse, 2015).

Based on 2010 estimates, the U.S. chlorine-caustic soda (chloralkali) industry probably accounted for 2% to 7% of U.S. mercury consumption. Mercury is used as a cathode in chloralkali production; however, most of the mercury is recycled internally and only a small quantity of additional or make-up mercury is required. The chloralkali industry continued to shift away from using mercury cell technology with only two mercury cell plants remaining in the United States in 2015, one in Ohio and one in West Virginia.

Prices

The domestic price of mercury, as quoted in Platts Metals Week, averaged \$1,850 per flask in 2015, unchanged since 2011 (table 1). The quoted price range for mercury also remained unchanged at \$1,750 to \$1,950 per flask. One flask of mercury weighs 34.5 kg, and 1 metric ton (t) of mercury is the equivalent to approximately 29 flasks.

Foreign Trade

Beginning on January 1, 2013, U.S. exports of elemental mercury were banned, except when the following criteria are met: there are no alternatives to mercury use for a specified application, mercury is not available from other sources in the destination country, the destination country supports the export ban exemption, the exported mercury will be used at a specific facility, and the mercury will be handled in a manner to protect human health and the environment. In 2013, a small quantity of mercury was exported to South Africa under this exemption; in 2014, there were no mercury exports; and in 2015, 30 kg of mercury was exported to Mexico.

In 2015, mercury imports were 25,800 kg valued at \$602,000 compared with 49,500 kg valued at \$1,280,000 in 2014 (table 2). Canada (32%), France (27%), Switzerland (23%), and Germany (17%) were the leading sources of mercury imported into the United States in 2015 (table 2).

In 2015, 21,500 kg of amalgam valued at \$45.6 million was imported into the United States, which is the same quantity as in 2014 but with a lower value owing to a decrease in values of alloyed precious and base metals. Amalgam is defined as mercury alloyed with one or more metals but amalgam imports may include mercury-containing chlorine-caustic soda waste. Principal amalgam source countries were Germany (47%), South Africa (13%), the United Kingdom (11%), Argentina (6%), and Italy (6%) (table 3). In 2015, 99,300 kg of amalgam valued at \$375 million was exported from the United States, 8% less than in 2014. Principal destinations for these exports were Canada (32%), Mexico

and the United Kingdom (10% each), the Netherlands (9%), and India (7%) (table 3).

World Review

In 2015, world mercury mine production was estimated to be 3,270 t (table 4). China (2,800 t) was the world's leading producer of mercury, and Mexico was a leading exporter of mercury, most of which was produced in Mexico. World mercury production estimates have a high degree of uncertainty because most companies and countries do not report principal mine, byproduct mine, or recycling data for mercury. Quantities may appear erratic from year to year because production may not be reported until shipped and stockpiling may take place prior to shipment (table 4).

In January 2013, representatives of 50 countries signed the terms of the Minamata convention, a global treaty that addresses releases of mercury into the environment. The convention, once ratified, will require participating countries to develop strategies to reduce and, if possible, eliminate the use of mercury. Among the convention's conditions are the cessation of mercury trade and the manufacture of many mercury-containing products by 2020, reduction of mercury emissions by industrial plants, and plans for safe storage of waste mercury (United Nations Environment Programme, 2013). In November 2013, the United States became the first country to ratify the convention; by yearend 2015, 128 countries had signed and 22 additional countries had ratified the convention (Minamata Convention on Mercury, 2016).

The number of chloralkali plants that used mercury cell technology decreased worldwide to 44 plants in 2014 from 45 plants in 2013. Mercury emissions from chloralkali plants decreased to 5.6 metric tons per year (t/yr) in 2014 from 5.8 t/yr in 2013 (Euro Chlor, 2015, p. 25). Data for 2015 were not available.

Outlook

Global mercury use is expected to continue to decline as more countries enact restrictions and (or) bans on the use and trade of mercury. If the Minamata Convention is ratified by more of the 128 signatories, global mercury trade and use are expected to be further reduced, most significantly in countries where mercury is used for artisanal gold mining. As a result of reduced consumption and restrictions on sales and trade, mining and recycling companies are expected to place increasing quantities of byproduct mercury into permanent storage. Use of mercury in CFL and other fluorescent lighting may decrease owing to lower unit loading and increases in the sales of alternative light-emitting diode (LED) lighting. Mercury use in electronics and measuring devices is also expected to further decrease. Gallium alloys may provide nontoxic substitutes for mercury in a wide variety of applications that include electrical switches, liquid mirror telescopes, pumps, and sensors. Gallium can be alloyed with a variety of metals, including cesium, gold, lead, silver, and tin. Galinstan®, an alloy of gallium, indium, and tin, is liquid at room temperatures and, owing to the low toxicity of its component metals, is used as a replacement for mercury in thermometers and is being investigated for use in switches and various measuring devices. Because it has higher reflectivity and

lower density than mercury, Galinstan® also is being considered as a replacement for mercury in liquid mirror telescopes for astronomy. Mercury-containing dental amalgam continues to decline in use, replaced by ceramic material with a more natural appearance. Closure of mercury cell chloralkali production facilities worldwide, owing to pressure from international environmental and health organizations, is expected to further reduce consumption and result in the release of large quantities of mercury for disposal, recycling, or storage.

Recycled mercury recovered from mercury cell chloralkali plants and commercial products and byproduct mercury recovered from domestic and foreign precious metals operations are expected to be more than adequate to meet domestic needs.

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TABLE 1
SALIENT MERCURY STATISTICS¹

(Kilograms unless otherwise specified)

	2011	2012	2013	2014	2015
United States:					
Imports for consumption	110,000	249,000	37,700	49,500	25,800
Exports	129,000 ^r	27,600 ^r	90 ^r	--	30
Price, average, free market ² dollars per flask	1,850	1,850	1,850	1,850	1,850
World, mine production metric tons	1,960 ^r	1,820 ^r	2,320 ^r	2,750 ^r	3,270

^rRevised. -- Zero.

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

²Source: Platts Metals Week.

Note: Industrial secondary production, stockpile, and consumption data are not available.

TABLE 2
U.S. IMPORTS AND EXPORTS OF MERCURY, BY COUNTRY¹

Country	2014		2015	
	Quantity, gross weight (kilograms)	Value (thousands)	Quantity, gross weight (kilograms)	Value (thousands)
Imports:				
Canada	4,070	\$90	8,310	\$136
France	--	--	7,050	47
Germany	38,000	1,120	4,320	145
India	--	--	200	11
Netherlands	7,430	75	--	--
Switzerland	--	--	5,970	262
Total	49,500	1,280	25,800	602
Exports, Mexico	--	--	30	3

-- Zero.

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

Source: U.S. Census Bureau.

TABLE 3
 U.S. IMPORTS AND EXPORTS OF AMALGAMS¹ OF PRECIOUS METALS,
 WHETHER OR NOT CHEMICALLY DEFINED, BY COUNTRY²

Country	2014		2015	
	Quantity, gross weight (kilograms)	Value (thousands)	Quantity, gross weight (kilograms)	Value (thousands)
Imports:				
Argentina	1,140	\$12,300	1,280	\$11,200
Canada	209	207	153	290
Colombia	101	16	1,080	130
Germany	9,360	7,540 ^r	10,100	7,890
Italy	1,610	14,100	1,270	187
Japan	1,900	10,100	333	366
Mexico	1,940	3,550	830	1,090
Russia	3	12	--	--
South Africa	617	3,970 ^r	2,790	20,200
United Kingdom	3,330	2,690 ^r	2,450	2,530
Other	1,950	1,660	1,270	1,720
Total	21,500	56,100 ^r	21,500	45,600
Exports:				
Australia	148	2,600	91	1,810
Austria	15	7	15	10
Belgium	1,020	1,230	423	857
Brazil	207	2,400	523	5,730
Canada	42,700	116,000	32,000	75,600
China	7,650	12,800	4,480	5,330
France	425	591	481	574
Germany	2,650	6,840	611	1,770
Hong Kong	203	128	2,180	280
India	6,490	33,300	7,060	34,900
Japan	1,200	6,740	1,180	3,590
Korea, Republic of	6,750	29,300	6,770	14,300
Mexico	9,730	180,000	10,400	173,000
Netherlands	8,140	18,800	8,630	15,600
Peru	2	9	83	31
Saudi Arabia	312	4,420	317	4,670
Singapore	1,840	2,280	2,460	2,280
Taiwan	1,660	13,500	2,100	12,600
Thailand	2,950	20,200	1,020	5,780
United Kingdom	4,360	11,000	9,730	14,900
Venezuela	5	80	--	--
Other	9,930	10,800 ^r	8,770	2,080
Total	108,000	474,000	99,300	375,000

^rRevised. -- Zero.

¹An alloy of mercury with one or more other metals.

²Data are rounded to no more than three significant digits; may not add to totals shown.

Source: U.S. Census Bureau.

TABLE 4
MERCURY: WORLD MINE PRODUCTION, BY COUNTRY^{1,2}

(Metric tons)

Country ³	2011	2012	2013	2014	2015
Argentina	31 ^r	37 ^r	28 ^r	25 ^r	25 ^e
Chile ⁴	89	49	19	10 ^e	10 ^e
China	1,493 ^r	1,347 ^r	1,822 ^r	2,259 ^r	2,800
Kyrgyzstan	113 ^r	75 ^r	71 ^r	46 ^r	40 ^e
Mexico ^{e,5}	120	235	266 ^r	301 ^r	300
Morocco ^e	9	8	8	8	5
Norway ^e	25	25	25	25	20
Peru, exports ⁴	53	17	45	40 ^e	35 ^e
Russia	NA ^r	NA ^r	NA ^r	NA ^r	NA
Tajikistan ^e	30 ^r	30 ^r	32 ^r	34 ^r	30
United States ⁴	NA	NA	NA	NA	NA
Total	1,960 ^r	1,820 ^r	2,320 ^r	2,750 ^r	3,270

^eEstimated. ^rRevised. NA Not available.

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

²Includes data available through May 13, 2016.

³In addition to the countries listed, Canada and Spain are thought to produce byproduct mercury, but information on production is inadequate to make reliable estimates of output levels.

⁴Byproduct mercury.

⁵Beginning in 2011, data for Mexico were based on net exports.