

MERCURY

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As has been the case for more than a decade, no domestic mine recovered mercury as its primary product. The United States remained dependent on recycled material and imports to meet its mercury requirements. Several companies were engaged in mercury recovery and refining. It was estimated that chlorine and caustic soda production remained the largest end use for mercury.

Legislation and Government Programs

The U.S. Geological Survey (USGS) in 2001 was directly involved in a broad range of national and international studies related to mercury and its distribution and mobility in the environment. Activities included data collection, long-term assessments, ecosystem analyses, predictive modeling, and process research on the occurrence, distribution, recycling, and fate of mercury. Much of this work was conducted in partnership with other Federal and State agencies.

Using a nationwide database developed over the past 25 years, the USGS published a fact sheet on the abundance, distribution, and mode of occurrence of mercury in U.S. coal (Tewalt and others, 2001). Using data from more than 7,000 coal samples, the authors found that the mercury content of in-ground coal within the conterminous United States ranged from 0.07 to 0.24 parts per million (ppm), and averaged 0.17 ppm. The highest mercury content was found in coals in the northern Appalachian region.

The USGS issued a report describing an analytical method using cold vapor-atomic fluorescence spectrometry (CV-AFS) for determination of organic and inorganic mercury in filtered and unfiltered natural water (Garbarino and Damrau, 2001). Prior to development of this new method, the mercury content of natural water was determined by the cold vapor-atomic absorption spectrometric method. CV-AFS was developed to eliminate the use of acid dichromate preservative and to provide capability to measure ambient mercury concentrations in natural water at the nanograms-per-liter level. According to the authors, regulations governing shipping and disposal had made the use of acid dichromate too costly for preserving mercury samples.

Production

For more than a decade, no domestic mine has produced mercury as its primary product. However, owing in part to regulations controlling mercury discharges and emissions, some domestic mines and plants recovered small amounts of mercury as a byproduct of other metals. Typically these operations were located in States, such as Arizona and Nevada, that historically had produced large amounts of mercury. Secondary sources accounted for nearly all the mercury

produced in the United States. Mercury-bearing items such as spent batteries, mercury vapor and fluorescent lamps, switches, dental amalgams, measuring devices, control instruments, and laboratory and electrolytic refining wastes were processed using high-temperature retorting to recover any contained mercury. Among the largest producers of refined mercury were the following companies: Bethlehem Apparatus Co. Inc., Hellertown, PA; D.F. Goldsmith Chemical and Metal Corp., Evanston, IL; and Mercury Waste Solutions, Inc., Mankato, MN.

Consumption

The USGS estimated that the electrolytic production of chlorine and caustic soda and electrical applications were the largest uses for mercury in the United States, accounting for approximately 30% and 40% of domestic consumption, respectively. Consumption of mercury by the chloralkali industry has been declining in recent years. Only in dental applications, where it is the most cost-effective and longest lasting dental cavity-filler, has the quantity of mercury consumed remained steady.

World Review

During the past 10 years, annual world mercury production has averaged about 2,000 metric tons, nearly all of which was produced at mines where mercury has been the primary product. Most countries do not report their mercury production, and world production values have a high degree of uncertainty. In 2001, about 10 countries produced mercury, with Kyrgyzstan and Spain the dominant producing nations. In some countries, a few base-metal operations recover small quantities of mercury to meet environmental standards and avoid environmental releases of the metal.

The United Nations Environmental Programme began a global assessment of mercury and its compounds in 2001. Government agencies in the United States (including the USGS) and abroad are participating in the study. The study is scheduled for completion in 2003.

Outlook

Ever stricter environmental regulations and the development of new technology are expected to be the primary factors affecting mercury supply and demand in the near future. Environmental standards and technological advances likely will work in tandem to reduce the demand for mercury in commercial products. Even as the per-unit mercury content declines, regulations on the disposal of mercury will prompt more recycling of mercury-bearing material to recover the

contained mercury. Consequently, secondary mercury is expected to remain an important component of domestic supply. Net imports are expected to make up any remaining annual supply/demand deficits, although mercury in the National Defense Stockpile and mercury recovered from the dismantling of mercury cells in some chloralkali operations are potential alternative sources of supply.

References Cited

- Garbarino, J.R., and Damrau, D.L., 2001, Methods of analysis by the U.S. Geological Survey National Water Quality Laboratory—Determination of organic plus inorganic mercury in filtered and unfiltered natural water with cold vapor-atomic fluorescence spectrometry: U.S. Geological Survey Water-Resources Investigations Report 01-4132, 16 p.
- Tewalt, S.J., Bragg, L.J., and Finkelman, R.B., 2001, Mercury in U.S. coal; abundance, distribution, and modes of occurrence: U.S. Geological Survey Fact Sheet FS0095-01, 4 p.

GENERAL SOURCES OF INFORMATION

U.S. Geological Survey Publications

- Ch. in Mineral Commodity Summaries, annual.
- Mercury. Ch. in United States Mineral Resources, Professional Paper 820, 1973.
- The Materials Flow of Mercury in the Economies of the United States and the World, U.S. Geological Survey Circular 1197, 2000.

Other

- The Materials Flow of Mercury in the United States, U.S. Bureau of Mines Information Circular 9412, 1994.

TABLE 1
SALIENT MERCURY STATISTICS 1/

(Metric tons, unless otherwise specified)

	1997	1998	1999	2000	2001
United States:					
Secondary production, industrial	389	NA	NA	NA	NA
Imports for consumption	164	128	62	103	100
Exports	134	63	181	182 r/	108
Industry stocks, yearend 2/	203	NA	NA	NA	NA
Industrial consumption	346	NA	NA	NA	NA
Price, average per flask: 3/					
Free market	\$159.52	\$139.84	\$140.00	\$155.00	\$155.00
World mine production	2,410 r/	1,580 r/	1,310 r/	1,320 r/	1,400

r/ Revised. NA Not available.

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

2/ Stocks at consumers and dealers only. Mine stocks withheld to avoid disclosing company proprietary data.

3/ Source: Platts Metals Week.

TABLE 2
U.S. IMPORTS AND EXPORTS OF MERCURY, BY COUNTRY 1/

(Gross weight, unless otherwise specified)

Country	2000		2001	
	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
Imports:				
Australia	25	\$58	--	--
Canada	4	16	8	\$11
Chile	--	--	41	27
Germany	25	797	22	730
Italy	--	--	(2/)	6
Netherlands	--	--	--	--
Peru	11	21	29	34
Russia	17	64	--	--
Taiwan	4	101	--	--
United Kingdom	17	70	(2/)	8
Total	103	1,130	100	816
Exports:				
Brazil	--	--	4	139
Canada	7	48	3	20
France	2	27	3	43
Germany	2	17	5	30
India	65	175	18	53
Israel	1	10	--	--
Japan	14	181	3	72
Korea, Republic of	14	68	2	32
Malaysia	1	7	2	17
Mexico	7	56	12	87
Netherlands	51	1,210	17	43
Peru	4	30	4	54
Singapore	1	11	1	17
Spain	--	--	18	57
Thailand	3	26	--	--
United Kingdom	4	58	4	63
Other	4 r/	109	12	124
Total	182 r/	2,040	108	851

r/ Revised. -- Zero.

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

2/ Less than 1/2 unit.

Source: U.S. Census Bureau.

TABLE 3
MERCURY: WORLD MINE PRODUCTION, BY COUNTRY 1/ 2/

(Metric tons)

Country	1997	1998	1999	2000	2001
Algeria	447	224	240	216 r/	240 e/
China e/	830	230	200	200	200
Finland	63	54	40	45	50
Kyrgyzstan	550 r/	250 r/	300 r/	257 r/	300
Mexico e/	15	15	15	15	15
Russia e/	50	50	50	50	50
Slovakia	--	20 e/	--	--	--
Slovenia	5 e/	5 e/	--	--	--
Spain	389 r/	675	433	500	500
Tajikistan e/	40	35	35	40	40
Ukraine	25 e/	20 e/	NA	NA	NA
United States 3/	W	NA	NA	NA	NA
Total	2,410 r/	1,580 r/	1,310 r/	1,320 r/	1,400

e/ Estimated. r/ Revised. NA Not available. W Withheld to avoid disclosing company proprietary data; not included in "Total." -- Zero.

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

2/ Table includes data available through May 2, 2001.

3/ Mercury was produced only as a byproduct of gold mining.