

MERCURY

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As has been the case since late 1990, nearly all domestic mercury production in 1997 was of secondary origin, derived from recycled mercury-containing devices. No domestic mine produced mercury as its primary product. Several companies were engaged in mercury refining, the three largest being in the eastern and central United States. Domestic mercury consumption continued to decline in 1997, and the value of the mercury consumed was estimated at nearly \$2 million. The production of chlorine and caustic soda remained the largest end use for mercury.

Legislation and Government Programs

On April 21, the Environmental Protection Agency (EPA), the U.S. Department of Justice, and the U.S. Attorney for Arizona filed an agreement in federal district court to settle a lawsuit brought by the Defenders of Wildlife, an environmental group (Environmental Protection Agency, 1997a). The suit concerned mercury pollution of certain waterways in Arizona. As part of the agreement, the EPA agreed to establish within 4.5 years the total maximum daily loads (TMDL) for 13 rivers and lakes in Arizona. A TMDL is the amount of a pollutant a waterway can absorb, plus a margin of safety, and still meet water quality standards, depending on the designated use of the waterbody. The affected waterbodies were Pena Blanca Lake, Arivaca Lake, Silver Creek from Low to Cottonwood, Painted Rock Lake, Salt River from Granite Reef to the River, and several segments of the Gila River downstream from Phoenix to Rock Lake.

On July 23, the EPA released its 1996 summary of State-issued warnings to the public to avoid or limit eating fish from certain waterbodies (Environmental Protection Agency, 1997b). Although the number of waterbodies affected by the warnings increased 26% in 1996, EPA attributed the increase primarily to better monitoring and reporting by the States. Mercury, polychlorinated biphenyls, chlordanes, dioxins, and DDT, the same primary contaminants observed since 1993, accounted for 95% of the fish consumption advisories in 1996.

On December 19, the EPA fulfilled the requirements of section 112(n)(1)(B) of the Clean Air Act as amended in 1990 by issuing its report on mercury (Environmental Protection Agency, 1997c).

The report assesses the magnitude of U.S. mercury emissions by source, the health and environmental implications of those emissions, and the availability and cost of control technologies.

Production

As has been the case since late 1990, no domestic mine produced mercury as its primary product. Owing in part to the environmental regulations to control mercury discharges to the environment, an insignificant quantity of mercury was recovered at some domestic mines and plants. Among these operations were

five gold mines in California, Nevada, and Utah. The quantity of mercury recovered by these mines has been withheld to avoid disclosing company proprietary data.

Nearly all of the mercury produced in the United States is derived from secondary sources. Common secondary sources include spent batteries, mercury vapor and fluorescent lamps, switches, dental amalgams, measuring devices, control instruments, and laboratory and electrolytic refining wastes. The secondary processors typically use high-temperature retorting to recover mercury from compounds and distillation to purify the contaminated liquid mercury metal. Refining of recycled mercury in 1997 was dominated by three companies: Bethlehem Apparatus Co., Hellertown, PA; D.F.G. Mercury Corp., Evanston, IL; and Mercury Refining Co., Albany, NY.

Mercury Waste Solutions Inc., a mercury waste collector and processor, announced on September 12, that it had acquired Ballast & Lamp Recycling Inc. (Mercury Waste Solutions, Inc., 1997a). Ballast & Lamp Recycling collects hazardous mercury-bearing lighting debris and ballasts for mercury reclamation. On October 14, Mercury Waste Solutions announced that it had signed a letter of intent to acquire certain assets and assume certain liabilities of Mercury Refining Co., a mercury recycler and refiner (Mercury Waste Solutions Inc., 1997b).

Consumption

Overall, domestic consumption of mercury has trended downward since the early 1980's, owing in part to regulations regarding mercury discharges and emissions, and to concern regarding the ultimate fate of mercury-bearing products. The largest use of mercury in 1997 continued to be the electrolytic production of chlorine and caustic soda. However, the quantity of mercury consumed is expected to continue declining as U.S. manufacturers replace existing plants that use mercury cells. In the electrical industry, mercury consumption is also declining. In many applications, mercury switches are being replaced with either electronic switches or other special switches. In fluorescent lighting, mercury content has been reduced, to the extent that light bulbs produced today contain less than 50% of the mercury used in those manufactured in the mid-1980's.

Regulations have virtually eliminated the use of mercury in electrical batteries. The only mercury oxide batteries still produced are for military and medical equipment. Only in dental applications, where it is the most cost-effective and longest lasting dental cavity-filler, has mercury use remained steady.

World Review

Spain's Minas de Almaden y Arrayanes remained the largest mercury producer in the world, with an output of approximately

1,500 tons. Almaden's annual capacity is about 3,500 tons. Mercury production at the Khaydarkan mining complex in Kyrgyzstan increased slightly in 1997 to 611 tons. In 1996, Khaydarkan produced 584 tons of mercury. It is believed that essentially all of the mercury was exported, primarily to China.

Outlook

Ever stricter environmental regulations and the development of new technology are expected to be the primary factors affecting the supply and demand for mercury in the near term. Regulations and technology development likely will work in tandem to reduce the demand for mercury in commercial products. However, even as the per unit mercury content of products declines, regulations on the disposal of mercury will result in more recycling of mercury-bearing material to recover the contained mercury. As a result, secondary mercury is expected to remain the primary component of domestic supply. Other potential sources of domestic supply could include sale of the mercury contained in the National Defense Stockpile, and the mercury resulting from the dismantling of mercury cells in some chloralkali operations.

References Cited

- Environmental Protection Agency, 1997a, EPA addresses mercury pollution in Arizona Waterways: San Francisco, CA, Environmental Protection Agency press release, April 25, 1 p.
- 1997b, EPA issues 1996 fish advisory data: Washington, D.C., Environmental Protection Agency, press release, July 23, 2 p.
- 1997c, EPA releases mercury report: Washington, D.C., Environmental Protection Agency, press release, December 19, 3 p.
- Mercury Waste Solutions, Inc., 1997a, Mercury Waste Solutions, Inc. acquires Ballast & Lamp Recycling Inc: Minneapolis, MN, Mercury Waste Solutions press release, September 12, 1 p.
- 1997b, Mercury Waste Solutions, Inc. signs letter of intent to acquire Mercury Refining Co., Inc.: Minneapolis, MN, Mercury Waste Solutions press release, October 14, 1 p.

SOURCE OF INFORMATION

U.S. Geological Survey Publication

- Mercury. Ch. in United States mineral resources, U.S. Geological Survey Professional Paper 820, 1973.

TABLE 1
SALIENT MERCURY STATISTICS 1/

(Metric tons, unless otherwise specified)

	1993	1994	1995	1996	1997
United States:					
Producing mines	9	7	8	6	5
Mine production, byproduct	W	W	W	W	W
Secondary production:					
Industrial	350	466	534	446	389
Government 2/	--	--	--	--	--
Shipments from the National Defense Stockpile 3/	543	86	--	--	--
Imports for consumption	40	129	377	340	164
Exports	389	316	179	45	134
Industry stocks, yearend 4/	384	469	321	446	203
Industrial consumption	558	483	436	372	346
Price: 5/					
D.F. goldsmith, average per flask	\$186.51	\$194.45	\$247.40	\$261.65	NA
Free market, average per flask	NA	NA	NA	NA	\$159.52
World: Mine production	1,730 r/	1,960 r/	3,240 r/	3,210 r/	3,160 e/

e/ Estimated. r/ Revised. NA Not available. W Withheld to avoid disclosing company proprietary data.

1/ Data are rounded to three significant digits, except prices.

2/ Secondary mercury shipped from U.S. Department of Energy stocks.

3/ Primary mercury.

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

5/ Source: Platt's Metals Week.

TABLE 2
BYPRODUCT MERCURY-PRODUCING MINES IN THE UNITED STATES IN 1997

Mine	County and State	Operator
Alligator Ridge	White Pine, NV	Placer Dome U. S.
Carlin Mines Complex	Eureka, NV	Newmont Gold Co.
McLaughlin	Napa, CA	Homestake Mining Co.
Mercur	Tooele, UT	Barrick Mercur Gold Mines Inc.
Pinson Mine	Humboldt, NV	Pinson Mining Co.

TABLE 3
U.S. INDUSTRIAL CONSUMPTION OF REFINED MERCURY METAL, BY USE e/ 1/

(Metric tons)

SIC code	Use	1996	1997
28	Chemical and allied products:		
2812	Chlorine and caustic soda manufacture	136	160
36	Electrical and electronic uses:		
3641	Electric lighting	29	29
3643	Wiring devices and switches	49	57
38	Instruments and related products:		
382	Measuring and control instruments	41	24
3843	Dental equipment and supplies	31	40
--	Other uses 2/	86	36
	Total	372	346

e/ Estimated.

1/ The input of refined liquid mercury to domestic manufacturing establishments.

2/ Comprises unclassified uses and those uses from the three principal end-use categories for which the figures are withheld to protect company proprietary data or for which the volume of use is small.

TABLE 4
U.S. TRADE IN MERCURY AND MERCURY-BEARING WASTE AND SCRAP, BY COUNTRY 1/

Country	1996		1997	
	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
Imports:				
Canada	137	\$791	4	\$5
Germany	(2/)	20	(2/)	3
Japan	(2/)	3	--	--
Kyrgyzstan	33	266	53	219
Russia	79	302	--	--
South Africa	--	--	32	136
Spain	68	327	19	90
Taiwan	--	--	36	105
United Kingdom	(2/)	1	17	141
Other	23	92	3	5
Total	340	1,800	164	704
Exports:				
Brazil	3	16	5	34
Canada	4	29	3	21
Germany	4	25	2	9
Hong Kong	--	--	97	245
Japan	13	15	--	--
Korea, Republic of	5	50	2	19
Mexico	3	26	7	51
United Kingdom	1	10	7	72
Other	12 r/	173 r/	11	111
Total	45	344	134	562

r/ Revised.

1/ Data are rounded to three significant digits; may not add to totals shown.

2/ Less than 1/2 unit.

Source: Bureau of the Census.

TABLE 5
MERCURY: WORLD PRODUCTION, BY COUNTRY 1/ 2/

(Metric tons)

Country	1993	1994	1995	1996	1997 e/
Algeria	459	414	292	368 r/	370
China e/	520	470	780	510 r/	500
Finland	98 r/	83 r/	90	88 r/	90
Kyrgyzstan	1,000 r/	379	380	584 r/	611
Mexico e/	12 3/	12 r/	15	15	15
Morocco	-- r/	-- r/	-- r/	-- r/	--
Russia e/	60	50	50	50	50
Slovakia e/	50	50	50	20	20
Slovenia	--	6 r/	5 r/	5 r/	5
Spain	64	393	1,497	862 r/	1,000
Tajikistan e/	80	55	50	45	40
Ukraine	50 r/	50	40 e/	30 e/	25
United States 4/	W	W	W	W	W
Total	2,390 r/	1,960 r/	3,250 r/	2,580 r/	2,730

e/ Estimated. r/ Revised. W Withheld to avoid disclosing company proprietary data; excluded from "Total."

1/ Table includes data available through April 29, 1998.

2/ World totals and estimated data are rounded to three significant digits; may not add to totals shown.

3/ Reported figure.

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