
MERCURY SOURCES AND REGULATIONS
BACKGROUND INFORMATION FOR THE VIRTUAL
ELIMINATION PILOT PROJECT

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Background Information on Mercury Sources and Regulations

I. INTRODUCTION

Mercury enters our lives more frequently than we may imagine. It may be in the fluorescent lights in our office, in old cans of latex paint, in our batteries, in our dental fillings, and numerous other sources. Within the United States alone, manufacturers use 500 - 600 metric tons of mercury annually as part of their manufacturing processes or to create products that rely on mercury's diverse properties.

A naturally-occurring, inorganic element, mercury's value in numerous industrial processes was discovered centuries ago. In very small quantities, it conducts electricity, measures temperature and pressure, acts as a biocide, and functions a catalyst. Over time, however, we have discovered that mercury is a potent neurotoxin, capable of impairing neurological development in fetuses and young children and damaging the central nervous system of adults. Mercury does not degrade and is not destroyed by combustion. When released to the environment, even in small quantities, it bioaccumulates, reaching dangerous levels in fish at the top of the aquatic food chain. Fish consumption advisories throughout Great Lakes waterbodies are testament to the health risks caused by mercury present in the Great Lakes ecosystem. Thirty-seven states have issued fish consumption advisories due to mercury contamination.

Scientists believe that atmospheric deposition contributes a large portion of the mercury found in the lakes and soil. Mercury emitted into the air by combustion, incineration, or manufacturing processes may later be deposited in lakes. Mercury emissions also come from natural sources including marine and aquatic environments, as well as volcanic and geothermal activity. However, recent studies suggest that anthropogenic sources contribute the majority of mercury releases.

At both federal and state levels, numerous efforts are underway to curtail mercury releases into the environment. To understand what options are available to reduce mercury use and release we must first answer four basic questions:

- (1) What are the **sources** of the mercury (supplying mercury and releasing mercury) into the environment?
- (2) What **products** contain mercury?
- (3) What **regulations** and **non-regulatory measures** currently influence mercury use and release?

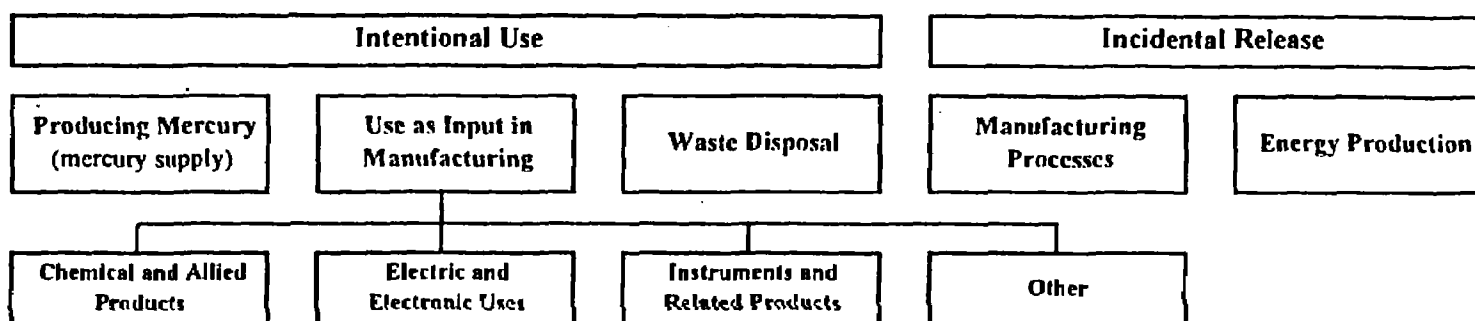
The objective of this background information is to provide a context for understanding the full range of mercury sources and existing regulations that affect mercury use and release. From this information, we will be able to understand the extent to which existing regulations encourage a reduction in mercury use and release, and identify other opportunities--including regulatory and non-regulatory programs--that might hasten the pace of reductions.

Table 1 provides an overview of the material covered in this background section.

TABLE 1: Overview

What are the Sources of Mercury?

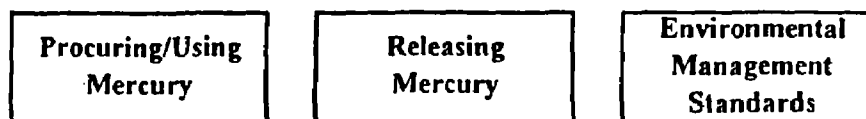
Describes five categories of anthropogenic mercury sources and the individual sources covered in this analysis.



How is Mercury Regulated?

Characterizes the different types of mercury regulations.

Describes how mercury use and release is regulated by the relevant statutes in each category:



Links regulations to specific mercury sources.

Identifies mercury products regulated at a federal and state level.

II. WHAT ARE THE SOURCES OF MERCURY?

Mercury is released into the environment from natural and anthropogenic sources. This report focuses on anthropogenic sources of mercury. Because mercury use is widespread throughout multiple industries as a process or product ingredient, its releases cannot be traced to one industrial sector. As a naturally occurring metallic element, mercury is also present as a trace contaminant in ores and fuels. It may be released into the environment when raw materials containing mercury are heated, even though the mercury itself plays no role in these processes. Thus, mercury releases occur as a result of decisions to **intentionally use mercury** in consumer products or manufacturing processes, and as a result of **incidental releases**.

Through a separate analysis, EPA is estimating the relative air emissions of different mercury sources. In the "Mercury Study," mandated by the Clean Air Act amendments of 1990 (§112(n)(1)(B); see discussion in Section III of this report), anthropogenic mercury sources are divided into the following broad groups, based on their emission properties: (1) combustion point sources; (2) manufacturing point sources; (3) miscellaneous point sources; and (4) area sources. Note that the individual source categories in the mercury study are similar to the ones used in this report.

Using emissions factors to estimate mercury releases, preliminary analysis indicates that, in the United States, anthropogenic sources emit 263 tons of mercury annually to the atmosphere. Of this total, combustion point sources, which include utility, commercial, industrial and other boilers, as well as municipal waste combustors and other incinerators, account for 85% of anthropogenic mercury emissions. Four specific combustion source categories account for the majority of anthropogenic emissions: municipal and medical waste incineration (25% each); utility boilers (21%); and commercial/industrial boilers (12%). In addition, manufacturing sources, which include chlor-alkali production, smelting, secondary mercury production, equipment manufacture, and other processes, account for 12% of total anthropogenic mercury emissions.

For the Virtual Elimination project, we have divided mercury sources into two broad groups, based on these two different roles of mercury: is mercury intentionally used or is it incidentally released? Table 2A shows the categories of mercury sources used in this report.

TABLE 2A: Categories of Mercury Sources

Mercury releases occur as a result of intentional use or incidental release. This table shows the categories of anthropogenic mercury sources discussed in this report. For each category, the issues involving the origin and release of mercury are different. Therefore, the options for obtaining additional mercury reductions differ. Table 2B lists the specific mercury sources for each category shown in this table.

Intentional Use

Mercury is used as a product or process ingredient. Mercury release is a result of intentional mercury use.

**Producing or
Supplying Mercury**

**Use in
Manufacturing**
(products contain mercury or
processes rely on mercury)

**Waste
Disposal**
(mercury-containing products
or waste streams)

Incidental Release

Mercury is released incidentally as a result of using raw materials that contain traces of mercury. Mercury is not used intentionally in these sources.

**Manufacturing
Processes**

(raw materials
contain mercury)

**Energy
Production**

(fuel sources
contain mercury)

INTENTIONAL USE: When mercury is used intentionally as an input in production processes or consumer products, three distinct but inter-related types of sources contribute to mercury releases. Sources in this category include:

- (1) **Produce or supply mercury;**
- (2) **Use mercury as an input to manufacture products containing mercury or as part of a manufacturing process; and**
- (3) **Receive mercury-containing wastes for disposal.**

All of these sources supply, use, or release intentionally used mercury into the environment. Because the quantity of mercury used in the manufacturing sector directly influences a significant amount of the mercury ultimately released into the environment, several leverage points are potentially available to reduce mercury releases. The price and supply of mercury, the feasibility of recycling, the availability of alternative inputs or processes, and the structure of existing regulations all contribute to a company's decision to use mercury in their production processes or products.

INCIDENTAL RELEASE: Incidentally released mercury comes from two categories of sources:

- (1) **Manufacturing processes** where the raw materials contain trace amounts of mercury; and
- (2) **Energy Production** where the fuel source (primarily coal) contains mercury.

These sources, particularly coal combustion, and copper, lead and zinc smelting, may contribute a large portion of overall mercury air emissions. However, because their processes or products do not rely on mercury, their mercury emissions are not influenced by the costs associated with using mercury. They are affected only by regulatory costs associated with releasing mercury. Therefore, the menu of opportunities for reducing mercury releases from these sources will differ from sources that rely on mercury for some aspect of their business.

The source categories used throughout this report are, for the most part, consistent with sources identified in recently released reports that track mercury use and emissions, specifically the Bureau of Mines *Mineral Industry Surveys*, and the EPA Mercury Study Report to Congress mandated under the Clean Air Act Amendments of 1990 (§112(n)(1)(B)) (in preparation). By using similar source categories, we can combine information on mercury use and emissions trends at a national level with an overview of existing regulations. **Table 2B** lists the specific source categories of mercury that are covered in this analysis.

TABLE 2B: Sources of Mercury

Intentional Use			Incidental Release	
Producing or Supplying Mercury	Use in Manufacturing* (products contain mercury or processes use mercury)	Waste Disposal (mercury-containing products or wastestreams)	Manufacturing Processes (raw materials contain mercury)	Energy Production (fuel source contains mercury)
Primary Mercury Production (by-product of gold mining) Secondary Hg production (mercury recovery) Mercury Compound Production Government Stocks • National Defense Stockpile (primary mercury) • Dept. of Energy stocks (secondary mercury) Imports	Chemical and Allied Products Chlorine/Caustic Soda Lab Uses Paint <u>Other Chemical and Allied Products</u> Catalysts Pesticides Pharmaceuticals Electrical and Electronic Uses Electric Lighting Wiring Devices & Switches Battery Manufacturing Instruments and Related Products Measuring & Control Instruments Dental Equipment & Supplies Hospitals, Dentists	Municipal Waste Incinerators Commercial/Industrial Waste Incinerators Sewage Sludge Driers & Incinerators Wastewater Treatment (POTWs) Hazardous Waste Incinerators Medical Waste Incinerators Landfills Ash disposal facilities Auto salvage/scrapyards Crematories	Carbon Black Production Coke Production Petroleum Refining Lime Manufacturing Portland Cement Manufacturing Phosphate-based fertilizer production Copper Smelting & Refining Non-ferrous Metals Smelting (except copper and aluminum)	Utility Boilers Commercial & Industrial Boilers Residential Boilers and wood stoves

* See Table 5 for a list of the main mercury-containing products

For this analysis, we have focused only on the largest uses and releases of mercury. Part D of this section discusses the reporting data available to track mercury sources. Data on mercury releases available through different reporting programs illustrates the industrial sectors where mercury release occurs most frequently in the Great Lakes states (based on the reporting requirements of each program). Because mercury has thousands of applications, these data may cover a much broader list of sources than the categories covered in this report. Appendix A includes a detailed "use tree" of mercury sources.

A. INTENTIONAL USE

This section provides a brief overview of the three source categories that contribute to mercury releases as a result of intentional mercury use: 1) production; 2) use; and 3) disposal.

1) Producing or Supplying Mercury

The mercury available for use in the United States comes from five main sources: (1) Primary mercury production; (2) Secondary mercury production (mercury recovery); (3) Mercury compound production; (4) Government stocks; and (5) Imports. Table 3 (and the accompanying figure) illustrates the relative contributions of these sources to the United States mercury supply.

(1) **PRIMARY MERCURY PRODUCTION.** Virgin mercury is mined from mercury ore or produced as a by-product of gold mining. In the United States, mercury is produced only as a by-product of gold mining. The last mercury ore mine, the McDermitt Mine in Nevada, closed in 1990. No by-product mercury mines are located in the Great Lakes States.

Byproduct Mercury-Producing Mines in the United States (1992)*

<u>Mine</u>	<u>Location</u>	<u>Operator</u>
Alligator Ridge	White Pine, NV	USMX Inc
Carlin Mines Complex	Eureka, NV	Newmont Gold Co.
Hog Ranch	Washoe, NV	Western Hog Ranch Co.
Enfield Bell	Elko, NV	Independence Mining Co., Inc.
Getchell	Humboldt, NV	FMC Gold Co.
McGlaughlin	Napa, CA	Homestake Mining Co.
Mercur	Tooele, UT	Barrick Mercur Gold Mines Inc.
Paradise Peak	Nye, NV	FMC Gold Co
Pinson	Humboldt, NV	Pinson Mining Co

*U.S. Department of the Interior Bureau of Mines,
Mineral Industry Surveys, July 1994.

(2) **SECONDARY MERCURY PRODUCTION.** Mercury is also recovered from discarded products and wastes such as chlor-alkali wastes, dental amalgams, fluorescent light tubes, electronic devices, and others. The mercury is vaporized in a retort and collected by condensation. Condensed mercury is then distilled to remove impurities. Triple-distilling yields the highest purity mercury. Secondary production almost doubled in 1993, expanding to 63% of U.S. total mercury consumption from 30% in 1991. The table below shows the trends in U.S. mercury consumption and secondary mercury production.

Secondary Mercury Production in the U.S.*

	1950	1960	1970	1980	1990	1991	1993
Industrial demand (consumption)	1697	1764	2120	2033	720	554	558
Secondary production (industrial)	69	184	253	234	108	165	350
Secondary production as a percent of consumption	4%	10%	12%	12%	15%	30%	63%

U.S. Department of Interior Bureau of Mines, *Recycled Metals in the U.S.*, October 1993, and *Mineral Industry Surveys: Mercury in 1993*, July 1994.

Three facilities, all located in Great Lakes states, produce the bulk of secondary mercury in the United States. D.F. Goldsmith Chemical and Metal in (Evanston, IL) specializes in distilling 99% or greater flowable mercury, and Bethlehem Apparatus (Hellertown, PA) and Mercury Refining Company (Albany, NY) retort and distill a wide variety of mercury wastes and scrap material. However, they do not accept certain types of RCRA wastes. At the end of 1993, eleven plants in the U.S. recycled mercury from fluorescent lights, using physical separation to recover mercury. Six of these facilities opened in 1993.

(3) **MERCURY COMPOUND PRODUCTION.** Mercury compounds are used in a wide variety of pharmaceutical and other uses. Commonly used mercury compounds include mercuric oxide (cathode material in batteries), mercuric chloride (pharmaceuticals), phenylmercuric acetate (used in paints and pharmaceuticals), mercuric sulfide (used in red pigment and other pharmaceuticals), and thimerosal (contact lens solution). Several mercury compound manufacturers are located in Great Lakes states:

Mercury Compound Producers in Great Lakes States*

Company	Location	Compound(s)
AAKASH Chemicals & Dye Stuffs, Inc.	Addison, IL	Hg acetate, HgBr ₂ , HgI ₂ , Hg(NO ₃) ₂ , HgO (red & yellow), HgSO ₄ , Mercurous Nitrate, Hg(ammoniated), Hg salts
Atomergic Chemetals Corp.	Farmingdale, NY	Hg cyanide, HgO (black), Mercurous Iodide, Mercurous Sulfate, Thimerosal
GFS Chemicals, Inc.	Powell, OH	Hg acetate, HgI ₂ , Hg(NO ₃) ₂ , HgSO ₄
R.S.A. Corp.	Ardsley, NY	Hg(SCN) ₂ - thiocyanate

Chemical Buyers Directory, 81st Annual Edition, 1994.

(4) **GOVERNMENT STOCKS.** The United States government maintains a supply of mercury as part of the National Defense Stockpile, established at the end of World War I to maintain adequate supplies of materials deemed critical to national defense. The Defense Logistics Agency (DLA), a unit of the Department of Defense, manages the stockpile. DLA periodically evaluates the quantity of mercury and other materials needed in the stockpile, and may sell any "excess" material on the open market. Mercury is stored and sold in flasks, which contain 34.5 kg of mercury. Regulations governing the sale of excess mercury are described in Section III ("Regulations").

At the end of April 1994, DLA held 127,000 flasks (4,381 metric tons) of mercury in the stockpile. With a current stockpile goal of zero for mercury, all of this material is considered excess. DLA suspended stockpile mercury sales in January after selling its entire 1994 mercury allocation (10,000 flasks). However, DLA received Congressional approval to increase the total amount of mercury available for sale in fiscal year 1994 to 50,000 flasks (1,725 metric tons), leaving 40,000 flasks (1,380 metric tons) available to sell by September 30, the end of the fiscal year. For comparison, DLA sold only 8,250 of the 10,000 (345 metric tons) flasks authorized for sale during fiscal year 1993. In July 1994, however, DLA suspended future mercury sales until the environmental implications of these sales are addressed.

In past years, DLA also sold mercury for the Department of Energy (DOE), at monthly auctions. DOE holds secondary mercury (scrap mercury) at its facility in Oak Ridge, TN, leftover from mercury accumulated by the Atomic Energy Commission (DOE's predecessor) for use in nuclear reactors. All of this mercury is also considered excess to government needs. DLA suspended these mercury sales in July 1993, and plans to continue the suspension through 1994 in order to concentrate on selling its own material.

(5) **IMPORTS.** The United States imported 92 metric tons of mercury in 1992, the most recent year for which data are available. Of this total, 70% (64 metric tons) came from Canada and 29% came from Germany. The remainder (one percent) came from Spain and the United Kingdom. Mercury compounds are also imported. Section III ("Regulations") discusses mercury imports and relevant tariffs in more detail.

2) Using Mercury as an Input

Mercury is used throughout the worldwide industrial base as a result of its diverse properties. In very small quantities, it conducts electricity, measures temperature and pressure, and forms alloys with almost all other metals. With these and other unique properties, mercury plays an important role as a process or product ingredient in several industrial sectors.

a) Industrial Categories

For this report we have used the industrial categories reflected in the Bureau of Mines *Minerals Commodities Summaries* to illustrate the quantities of mercury used in different industrial sectors. Table 4 shows the trends in domestic mercury use since 1988, and the relative amounts of mercury used in the following industrial categories:

- ▶ Chemical and Allied Products;
- ▶ Electrical and Electronic Uses; and
- ▶ Instruments and Related Products.

Mercury use in the United States has declined 63% since 1988, to 558 metric tons per year in 1993 from 1,503 metric tons in 1988. In many cases, manufacturers appear to be moving away from mercury except those uses for which mercury is currently considered essential. However, the rate of decline has slowed since 1990.

Public pressure has also driven manufacturers to seek alternatives to non-essential mercury in their products. For instance, recent public outcry against mercury switches contained in children's light-up sneakers caused the manufacturer to change to a non-mercury switch that accomplishes the same purpose. The manufacturer now provides a toll-free number for customers to request a postage-paid mailer and return the shoes for proper mercury disposal.

TABLE 3: UNITED STATES MERCURY SUPPLY AND DEMAND
(Metric tons)

	1988	1989	1990	1991	1992	1993
Mine production(1) - metric tons	379	414	448	0	0	0
By-product production(2)	W	W	114	58	64	W
Secondary production:						
Industrial	278	137	108	165	176	350
Government(3)	214	180	193	215	103	0
Industry stocks, year-end(4)	338	217	197	313	436	400
Shipments from the National Defense Stockpile(5)	52	170	52	103	267	543
Imports for consumption	329	131	15	56	92	40
Exports	NA	221	311	786	977	389
Industrial demand (consumption)	1503	1212	720	554	621	558*

(1) Comprised only the mercury produced at the McDermitt Mine, as reported in Placer Dome Inc. annual and 10-K reports. The mine was closed in November 1990.

(2) Mercury by-product from nine gold mining operations.

(3) Secondary mercury shipped from U.S. Department of Energy stocks.

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

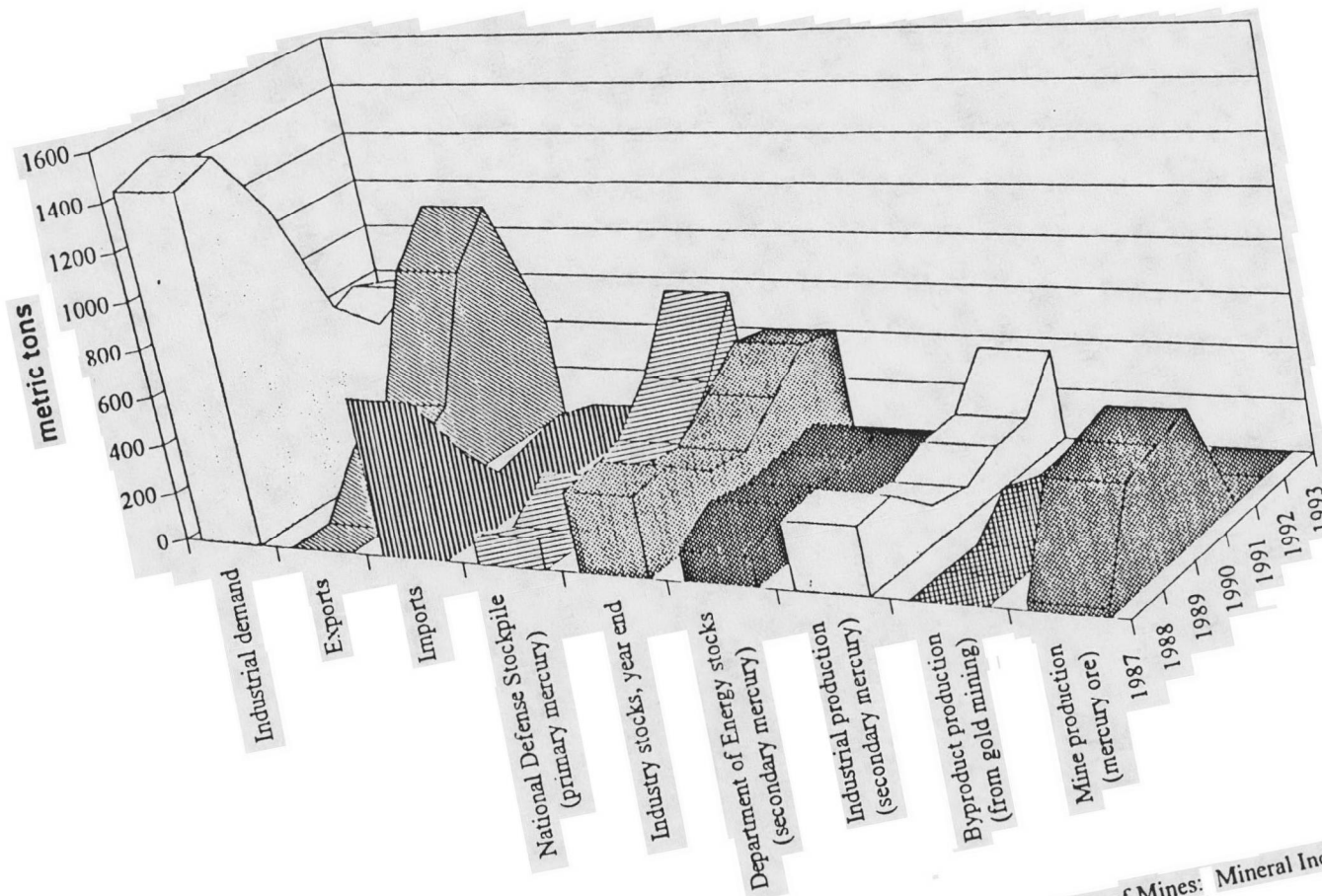
(5) Primary mercury. This quantity represents shipments during the 1993 calendar year. Congressional authorization for stockpile sales is based on a fiscal year (October-September) which bridges 2 calendar years.

w = withheld to avoid disclosing proprietary information

* Note: See Table 4 for a breakdown of mercury consumption by industrial category.

Source: United States Bureau of Mines, Mineral Industry Surveys, July 22, 1994.

U.S. Mercury Supply and Demand



Source: Bureau of Mines: Mineral Industry Surveys, July 1994.

CHEMICAL AND ALLIED PRODUCTS: Chemical and allied products are responsible for the largest quantity of mercury used in the United States. This is due to the fact that a single industrial process--chlorine and caustic soda manufacture--alone uses more mercury than any of the other industrial sectors that use mercury. One chlor-alkali process, known as the mercury-cell process, relies on a mercury cathode to produce hydrogen gas and caustic soda. Caustic soda produced from this process may contain mercury, which in turn may contaminate other products.

At a national level, the chlor-alkali industry is regulated more directly for mercury than any other industry, with national air emissions limits, water discharge limits, and waste disposal restrictions. Although most mercury-cell chlor-alkali plants in the United States have closed, two still exist in the Great Lakes. Fourteen facilities remain in the United States. The chlor-alkali facility in Wisconsin is the second largest source of mercury emissions in that state.

Until the early 1990s, paint manufacturing used large quantities of mercury. The mercury compound phenylmercuric acetate was used as a biocide to control mildew in latex paints. However, EPA curtailed this use, eliminating mercury in interior latex paints in 1990 and exterior paints in 1991. Mercury emissions from volatilized paint and demolition waste may continue from paints manufactured before the ban.

ELECTRIC AND ELECTRONIC USES: In the electrical industry, mercury is used in electric lighting devices such as fluorescent lamps, wiring devices and switches, and several different kinds of batteries. In 1992, electrical manufacturing accounted for approximately 25% of the mercury used in the United States. As recently as 1988, battery manufacturing alone consumed almost 25% of the total mercury use in the United States. As manufacturers have found alternatives to mercury in alkaline batteries, and states began limiting mercury content in batteries, the volume of mercury used in batteries declined by over 95%. Mercury substitutes are not as readily available in fluorescent and other lamps. Mercury use in lamps appears to be rising especially as fluorescent lamps are promoted for energy conservation. Some manufacturers are developing fluorescent lamps that rely on smaller quantities of mercury.

INSTRUMENTS AND RELATED PRODUCTS: Mercury is also used in navigational devices, instruments that measure temperature and pressure, and other related uses. It is also used frequently in dental amalgam tooth fillings, although substitutes are available. Mercury use in this area has declined.

TABLE 4: U.S. INDUSTRIAL CONSUMPTION OF REFINED MERCURY METAL, BY USE*

		(Metric tons)						1993 Category Total	% of 93 Total
SIC Code	Use	1988	1989	1990	1991	1992	1993		
28	Chemical and allied products							224	40.1%
2812	Chlorine and caustic soda manufacture	354	379	247	184	209	180		32.0%
2819	Laboratory uses	26	18	32	30	28	26		4.7%
2851	Paint	197	192	14	6	0	0		
	Other chemical and allied products ¹	86	40	29	26	20	18		3.6%
36	Electrical and electronic uses							131	23.5%
3641	Electric Lighting	31	31	33	39	55	38		6.8%
3643	Wiring devices and switches	176	141	70	71	82	83		14.9%
3692	Batteries	448	250	106	18	13	10		1.8%
38	Instruments and Related Products							100	17.9%
382	Measuring and control instruments	77	87	108	90	80	65		11.7%
3843	Dental equipment and supplies	53	39	44	41	42	35		6.3%
	Other Uses²	55	32	38	49	92	103	103	0.185
	Total³	1503	1212	721	554	621	558	558	

* The input of refined liquid mercury to domestic manufacturing establishments.

¹ Includes agricultural chemicals, pigments, and miscellaneous catalysts.

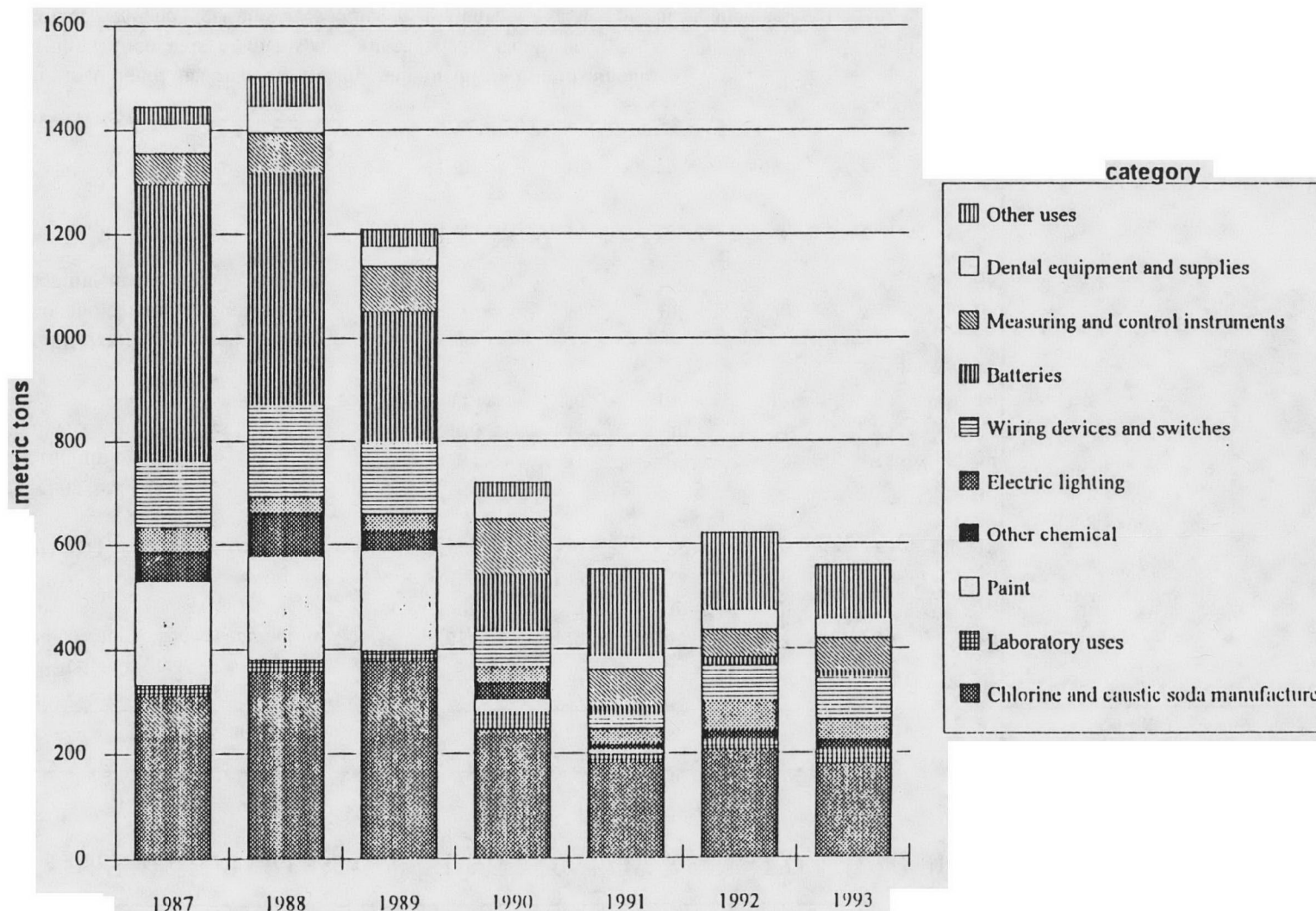
² Includes other electrical and electronic uses, other instruments and related products, and unclassified uses.

In 1991 and 1992, a large amount of mercury that was not reported by end use was included in this category.

³ Data may not add to totals shown because of independent rounding.

Source: United States Bureau of Mines, Mineral Industry Surveys, July 1994.

U.S. Consumption of Refined Mercury Metal, by Use



Source: Bureau of Mines, Mineral Industry Surveys, July, 1994.

b) Specific Uses of Mercury

In each of the industrial categories listed above, mercury plays a unique role in a manufacturing process or in a product. **Table 5** lists the primary products that contain mercury in each of the source categories discussed in this section. These products, which may not pose mercury-related health risks during regular use, contribute mercury to the environment upon disposal. In addition, **Appendix A** includes a detailed mercury use tree.

Several states regulate mercury-containing products directly by limiting or prohibiting mercury content in certain products, and restricting disposal options. These regulations, which have had a direct impact on the quantity of mercury consumed in industrial activities, are discussed in more detail in Section III ("Regulations"). Many mercury products are used as components in widely used products. Mercury may be released when products are discarded. For example, Honeywell, Inc. a thermostat manufacturer, has developed a thermostat collection program in Minnesota to recycle the mercury switches.

Mercury is also used in numerous industrial processes for amalgamation, wood processing, as a solvent for reactive and precious metals, in nuclear reactors, and as a catalyst. Any facility that uses mercury in its process is a potential source of mercury emissions. Available reporting data may help locate and identify these sources. However, many sources that use or release mercury may fall below existing reporting thresholds.

3) Waste Disposal

Mercury-containing waste streams and products sent offsite for disposal contribute mercury to waste disposal facilities, which then release mercury into the environment. Industrial facilities, hospitals, and dental offices that divert their wastewater to Publicly Owned Treatment Works (POTWs) contribute to mercury in POTW effluent. Batteries, electric lamps, old paint, and other mercury-containing products contribute to the mercury emissions at municipal, hazardous waste, and medical waste incinerators, and may leach or vent mercury from landfills. As long as mercury is used in industrial processes, facilities will generate wastes that contain mercury, and consumer products will contribute mercury upon disposal. **Table 6** shows the trends in mercury products contained in municipal solid waste.

Table 2B lists the different types of waste disposal sources. **Appendix B** provides details on the mercury-specific regulations for waste disposal sources. Note that cement kilns are not listed as a waste disposal source. However, cement kilns, used frequently as a waste disposal option, may burn hazardous wastes as a fuel source. Mercury may accumulate in the cement kiln dust. Metals emissions from cement kilns, which are regulated under EPA's interim standards for boilers and industrial furnaces (BIFs), are currently under review.

TABLE 5: Products That May Contain Mercury

This table lists the primary products that may contain mercury. It is not an exhaustive list of all mercury products. Rather, it illustrates the types of products where mercury may be used. In several cases, manufacturers are moving away from mercury use. See Table 4 for the relative amounts of mercury used in each industrial category. See Appendix A for a detailed mercury use tree.

Chemical and Allied Products	Electrical and Electronic Uses	Instruments and Related Products
<p><i>Paint (existing stocks only)</i></p> <ul style="list-style-type: none"> • latex paint • maritime paint <p><i>Other</i></p> <ul style="list-style-type: none"> • agricultural products • catalysts • cosmetics • explosives • fireworks • livestock and poultry remedies • packaging • pharmaceuticals • pigments/dyes • poisons • preservatives • special paper coatings • turf products (existing stocks only) 	<p><i>Electric Lighting</i></p> <ul style="list-style-type: none"> • fluorescent lights • high intensity lamps • incandescent lamp filaments • mercury vapor lamps • metal halide lighting • UV disinfectant lamps <p><i>Wiring Devices and Switches</i></p> <ul style="list-style-type: none"> • electric wall switches • shoes • thermostats • toys • white goods (appliances) <p><i>Batteries</i></p> <ul style="list-style-type: none"> • alkaline batteries (no longer used) • carbon zinc batteries (no longer used) • mercuric oxide batteries • zinc air 	<p><i>Measure and Control Instruments</i></p> <ul style="list-style-type: none"> • barometers • medical and scientific instruments • thermometers <p><i>Dental Equipment and Supplies</i></p> <ul style="list-style-type: none"> • dental amalgam <div data-bbox="1503 1015 2009 1094"> <p>Other Uses</p> </div> <p><i>Electrical Components</i></p> <ul style="list-style-type: none"> • high purity copper foil • mercury arc rectifiers • relays • tilt switches

TABLE 6 Discards* of Mercury in Products in the Municipal Solid Waste Stream, 1970 to 2000 (in short tons)**

Products	1970	1975	1980	1985	1989	1995	2000
Household Batteries							
Alkaline	4.1	38.4	158.2	352.3	419.4	41.6	0.0
Mercury-Zinc	301.9	287.8	266.8	235.2	196.6	131.5	98.5
Others	4.8	4.7	4.5	4.5	5.2	3.5	0.0
<i>Subtotal Batteries</i>	310.8	330.9	429.5	592.0	621.2	176.6 ***	98.5 ***
Electric Lighting							
Florescent Lamps	18.9	21.5	23.2	27.9	26.0	32.6	39.7
High Intensity Lamps	0.2	0.3	1.1	0.7	0.8	1.0	1.2
<i>Subtotal Lighting</i>	19.1	21.8	24.3	28.6	26.8	33.6	40.9
Paint Residues	30.2	37.3	26.7	31.4	18.2	2.3	0.5
Fever Thermometers	12.2	23.2	25.7	32.5	16.3	16.9	16.8
Thermostats	5.3	6.8	7.0	9.5	11.2	8.1	10.3
Pigments	32.3	27.5	23.0	25.2	10.0	3.0	1.5
Dental Uses	9.3	9.7	7.1	6.2	4.0	2.9	2.3
Special Paper Coating	0.1	0.6	1.2	1.8	1.0	0.0	0.0
Mercury Light Switches	0.4	0.4	0.4	0.4	0.4	1.9	1.9
Film Pack Batteries	2.1	2.3	2.6	2.8	0.0	0.0	0.0
<i>TOTAL DISCARDS</i>	421.8	460.5	547.5	730.4	709.1	245.3	172.7

* Discards before recovery.

** Weights in this report are converted to short tons of 2000 pounds, and refer to the weight of mercury in the products, not the weight of the entire product.

Source: EPA, *Characterization of Products Containing Mercury in Municipal Solid Waste in the United States, 1970 to 2000*, April 1992

*** NOTE: These numbers may not reflect recent state, federal, and battery manufacturer efforts to reduce mercury content in batteries. Since this report was released, several states have restricted mercury content in alkaline batteries, and/or banned the sale of mercuric oxide batteries. Federal legislation to restrict mercury use in batteries is pending. The battery industry has eliminated mercury as an intentional additive in alkaline batteries, except button cells and reusable alkaline batteries.

B. INCIDENTAL RELEASE

1) Manufacturing Processes

As a natural element, mercury is found in many raw materials that form the backbone of the industrial base. Mercury is emitted from numerous manufacturing processes that use raw materials containing mercury as a trace element. A list of these sources is included in Table 2B, and Appendices A and B describe these sources in greater detail.

Smelting processes, such as copper, lead, and zinc smelting, may contribute a large percentage of overall mercury releases. For example, the Copper Range Smelter in White Pine, Michigan, releases over 1000 pounds of mercury annually. In 1992, Zinc Corporation of America contributed 90% of total mercury releases reported in Toxic Chemical Release Inventory (TRI) for the Great Lakes states. This high level of mercury release, which was sent off site for recycling, reflected periodic cleaning of the sulfuric acid plants, not ongoing releases. Mercury is also present in zinc concentrates and is removed as an impurity during sulfuric acid production.

Because these sources are not dependent on mercury as a component of their business, they are not influenced by the costs associated with using mercury. In some cases, they may be more amenable to control technology or to incentives that are not tied directly to mercury.

2) Energy Production

Utility boilers, particularly coal-fired utilities, may contribute a large portion of the overall atmospheric mercury emissions due to the presence of mercury in fuel sources. Although currently unregulated for mercury emissions, they are the subject of intensive study under a separate Utility Study mandated by the 1990 Clean Air Act amendments (§112(n)(1)(A)). The report, scheduled for completion in 1995, is evaluating the extent to which coal combustion contributes to overall mercury releases, as well as the need for specific mercury emissions regulations for the utility industry. Given this in-depth report on the full range of utility emissions, we will not focus on utility mercury emissions in this report, beyond identifying any relevant existing regulations.

C. DATA SOURCES FOR THE GREAT LAKES STATES

Mercury releases are reported under several different federal and state programs, each with a different set of regulatory requirements, and each covering a different subset of the regulated community. Mercury information is available from three federal reporting programs: (1) the Toxic Chemical Release Inventory (TRI), (2) RCRA Biennial Report System (BRS) data, and (3) the Permit Compliance System (PCS) data for water releases. In addition to these federal reporting programs, some Great Lakes states maintain other reporting systems that provide additional information on mercury releases. Data is included for Wisconsin air point sources, Michigan's Critical Materials Wastewater Report, and Indiana's Aerometric Information Retrieval System (AIRS).

Information from each of these sources is summarized below, and included in detail in Appendix F. With the exception of TRI data, all information is shown by SIC code to illustrate the distribution of mercury releases across different industrial sectors. Appendix F1 provides a summary of the number of facilities that report mercury releases under each of these programs, and shows how the number of facilities varies by reporting program as a result of differing reporting requirements. For instance, 572 facilities in the Great Lakes states report mercury-bearing wastestreams under RCRA biennial reporting requirements, while only 14 facilities report mercury releases under TRI.

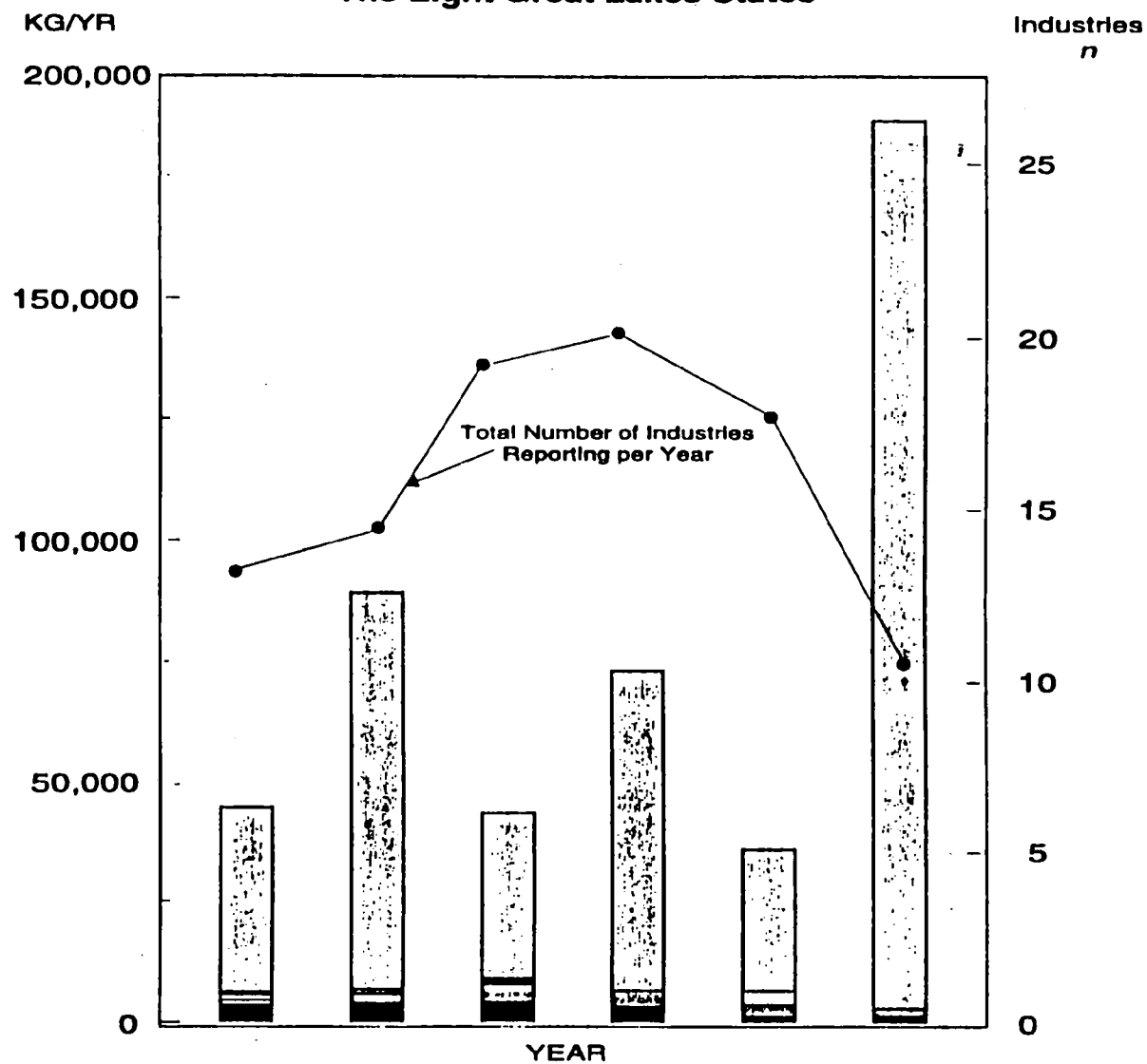
Toxic Chemical Release Inventory (TRI). Appendix F2 shows TRI mercury releases for the Great Lakes states. The Toxic Chemical Release Inventory contains chemical release and transfer information from manufacturing facilities (SIC codes 20 - 39) that meet reporting thresholds (manufacture or process 25,000 pounds of a listed chemical or otherwise use 10,000 pounds of a listed chemical). Appendix F2a includes 1992 data for the eight Great Lakes states, including any source reduction activities implemented by each facility. Appendix F2b contains similar data for the 1991 reporting year.

In 1992, 14 facilities in the Great Lakes States reported mercury releases, down from 20 facilities that reported in 1991. Tables 7A shows the trends in mercury releases from 1987 - 1992, and Table 7B shows the industrial sectors that reported mercury releases in 1992. The majority of mercury releases reported in 1992 came from Zinc Corporation of America. Because zinc concentrates contain mercury that is released during the sulfuric acid production process, mercury builds up in the sulfuric acid plants. Periodically, these plants must be cleaned, which generates a higher than normal volume of waste for that year.

Appendices F2c and F2d show nationwide mercury releases reported in TRI for 1992 and 1991, respectively. Great Lakes states reported 60.65% of the mercury releases and transfers reported nationwide in TRI for 1992. This number was skewed by the large volume of waste generated by Zinc Corporation of America, as described above. In 1991, Great Lakes states reported 18.13% of total mercury releases and transfers nationwide.

TABLE 7A

Mercury Releases and Transfers, The Eight Great Lakes States



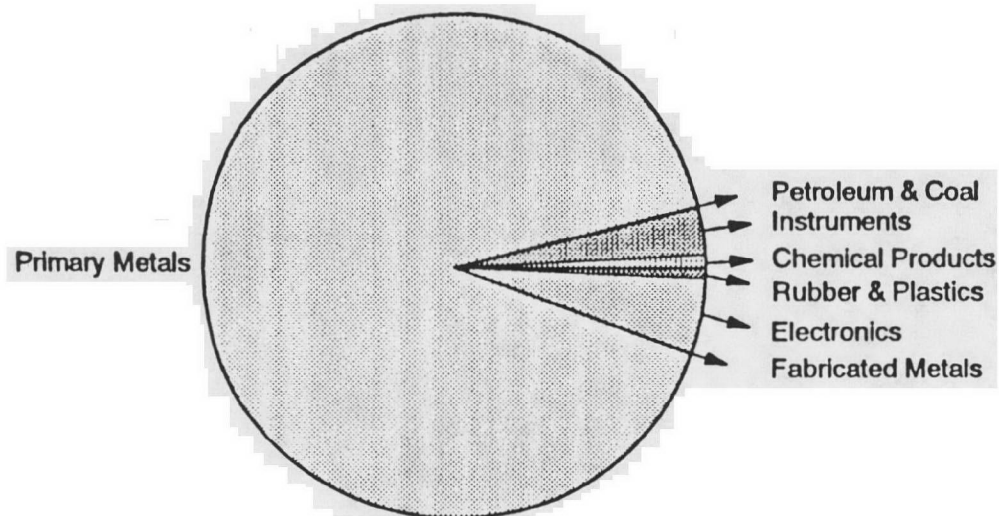
YEAR	1987	1988	1989	1990	1991	1992
Offsite	38,826	82,263	34,337	68,473	29,484	183,368
POTW	538	285	1,019	35	47	20
Land	262	519	256	14	2,750	5
Underground	0	0	0	0	0	0
Water	889	374	16	10	14	5
Air Nonpt	976	1,682	3,482	3,218	2,422	1,435
Air Point	3,650	4,013	4,217	3,168	1,078	1,215
TOTAL	45,139	89,136	43,329	72,916	35,795	186,046

Source: Toxics Chemical Release Inventory
Data downloaded June 21, 1994

TABLE 7B

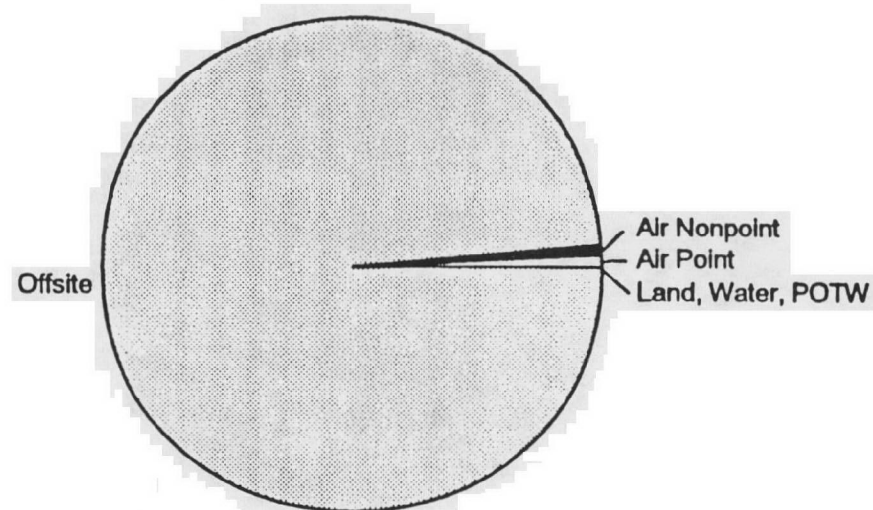
Mercury Releases and Transfers,
The Eight Great Lakes States, 1992

SOURCES



SIC Code	Quantity kg/yr	% of Total	Total Number of Facilities n
28 Chemical and Allied Products			
2819 Industrial Inorganic Chemicals Not Elsewhere Classified (mercury, redistilled)	1,553	.83	2
2821 Plastics Material, Synthetic Resins	0	0	1
29 Petroleum Refining and Related Industries			
2911 Petroleum Refining	128	.07	1
30 Rubber and Miscellaneous Plastics Products			
3067 Custom Compounding of Purchased Plastic Resins	1,261	.68	1
33 Primary Metal Industries			
3339 Primary Smelting and Refining Nonferrous Metals	168,294	90.48	1
3341 Secondary Smelting and Refining of Nonferrous Metals	270	.14	1
34 Fabricated Metal Products			
3471 Electroplating, Plating, Polishing, Anodizing, and Coloring	20	.01	1
36 Electronic and Other Electrical Equipment			
3641 Electric Lamp Bulbs and Tubes	3,514	1.89	1
3679 Electrical Components Not Elsewhere Classified	5,358	2.88	3
3692 Primary Batteries, Dry and Wet	0	0	1
38 Measuring, Analyzing, and Controlling Instruments			
3843 Dental Equipment and Supplies	5,650	3.04	1
TOTAL	186,046	100	14

DESTINATION



Destination	Quantity kg/yr	% of Total	Facilities Reporting Releases (Out of 14)
Air Point	1,215	.65	8
Air Nonpoint	1,435	.77	7
Offsite	183,366	98.56	10
Water	5		1
Land	5		1
POTW	20		4
Underground	0	0	0
TOTAL	186,046	100	N/A

Source: Toxic Chemical Release Inventory
Data downloaded June 21, 1994

RCRA Biennial Report data. Appendix F3 includes 1991 data from the RCRA Biennial Report System (BRS). BRS data tracks information on hazardous waste generated and managed by large quantity generators and permitted Treatment, Storage, and Disposal (TSD) facilities. RCRA wastes are identified by waste code, several of which indicate the presence of mercury in a wastestream or discarded product (see RCRA discussion in section III).

Appendix F3a shows the number of facilities, by SIC code, that report mercury-bearing wastestreams. The data reflects only recurrent waste generation, and does not include one-time waste or remediation wastes. A total of 572 facilities reported mercury-bearing wastestreams. Mercury-bearing wastestreams showed up most frequently in the following industrial sectors: colleges and universities (5 facilities), pharmaceutical preparations (28 facilities), electric services (22 facilities), plastics materials and resins (21 facilities), and industrial organic chemicals (20 facilities). Because most of the mercury-bearing wastes are characteristic for mercury (i.e., they exceed the regulatory concentration limit for mercury), and include other substances, it is difficult to gauge the quantity of mercury in the wastestreams.

Biennial report data also indicates the source processes that generated a given waste stream. Appendix F3b lists the sources processes in each SIC code that generated mercury-bearing waste streams. A summary table at the end of the appendix shows the frequency with which each process occurred. A total of 39 different sources processes contributed to mercury-bearing wastestreams. Laboratory wastes was reported most frequently (168 facilities), followed by discarded out of data products or chemicals (76 facilities).

PCS data. Appendix F4 contains data from EPA's Permit Compliance System (PCS) for water discharges. PCS data approximates point source loads from municipal and industrial dischargers. The information is based on monitoring data supplied by regulated facilities. EPA uses PCS data as the basis for its enforcement program. In 1993, the top 10 mercury dischargers in Region 5 were:

Detroit WWTP	108kg
Lake County - Mentor	54kg
City of Fostoria	27kg
Gary Wastewater Treatment Plant	17kg
Hammond Municipal STP	16kg
Milwaukee MSO - South Shore	13kg
Fort Wayne Municipal STP	12kg
Watertown(C) WPCP	11kg
Ashta Chemicals	10kg
Milwaukee MSD - Jones Island	8kg

Wisconsin Air Point Source Emissions Data. Appendix F5 contains air emissions data for Wisconsin facilities (1992 data). As part of its Clean Air Act Title V Operating Permit Program, Wisconsin collected emissions data from facilities that reported releases greater than one pound of hazardous air pollutants, including mercury. Sixty one facilities reported mercury emissions under this program. This total includes 13 utilities and nine paper mills. A utility reported the largest emissions (1272 pounds), followed by a chlor-alkali facility (1071 pounds).

Michigan Critical Materials Registry. Appendix F6 includes data from Michigan's Critical Materials Wastewater Report (1991 data). As part of its water quality program, Michigan collects information on chemical use and release from facilities that use any substance, including mercury, on the "Critical Materials Registry." It is the only program that requires facilities to report information about chemical use. Under this program, "use" means the presence of the chemical on site. A total of 270 facilities reported mercury use, including 19 hospitals, 18 motor vehicle parts facilities, 16 plastics products facilities, and 16 utilities. The total mercury use was between 288,174 - 308,510 pounds. Of this total, 121 facilities reported discharges ranging in total between 271 and 1740 pounds. 160 facilities reported residuals ranging in total between 2720 and 10,420 pounds.

Indiana Aerometric Information Retrieval System (AIRS): Appendix F7 includes data from Indiana's 1991 AIRS database. Mercury emissions quantities in this database are estimates derived by the Indiana Department of Environmental Management, based on data reported for criteria pollutant emissions. As such, the quantities do not represent measured data, nor data supplied directly by individual facilities.

III. HOW IS MERCURY REGULATED?

Mercury regulations span multiple federal and state statutes, as well as multiple agency jurisdictions. For example, the Environmental Protection Agency (EPA) regulates mercury in pesticides, and mercury releases into the environment through air, water, and land disposal limits. The Food and Drug Administration (FDA) regulates mercury in cosmetics, food, and dental products. The Occupational Safety and Health Administration (OSHA) regulates mercury air exposures in the workplace.

Unlike the separate regulatory structure created for PCBs under the Toxic Substances Control Act (TSCA), no statute, at a federal level, has strategically identified mercury as a sole source of concern. Instead, mercury is one of several substances covered under the overarching structure of numerous statutes. In some cases, mercury receives more attention than other substances covered in the same statute. Mercury regulations do not apply uniformly to all source categories. Thus, the nature and completeness of mercury regulation varies by statute. Furthermore, aspects of mercury regulation extend beyond the traditional realm of environmental statutes. Federal and state agencies are exploring efforts to curtail the use of mercury, not just its release, in order to focus on prevention opportunities.

Individually, no single regulation appears to motivate substantial change in mercury use and release. Collectively, however, the existing set of regulations has caused a dramatic decline in mercury use. Whether or not these regulations have caused a similar drop in mercury releases is not readily known. However, mercury is beginning to command more widespread public recognition, and public concern is becoming a powerful leveraging tool to change manufacturing practices. It is important to recognize that the face of mercury regulations is changing rapidly.

This section describes the regulations that affect mercury use and release. We have provided tables that describe how existing mercury regulations apply to mercury-containing products and sources that use and/or release mercury. From this information, we can identify the extent to which individual mercury sources are covered--or not covered--by existing regulations, and the opportunities that might exist to encourage additional reductions mercury use and release.

Table 8 illustrates the different categories of mercury regulations used in this report, and the applicable statutes or regulations for each category. **Table 9** shows the federal environmental management standards for mercury. **Tables 10 and 11** summarize mercury product regulations. **Table 12** summarizes the potential changes in mercury regulation. At the end of the report, **Appendix B** provides a detailed description of mercury sources and specific release regulations; **Appendix C** describes the regulations affecting mercury products; and **Appendix D** describes the main provisions of Great Lakes states' mercury-specific statutes.

A) TYPES OF MERCURY REGULATIONS

To understand how existing mercury regulations influence the full spectrum of economic activities that involve mercury, it is helpful to first distinguish between regulations that have a *direct* effect on sources from those that have an *indirect* effect on sources.

Use- or release-related regulations have a *direct* effect on sources that use mercury or release mercury into the environment. These regulations specify, for individual mercury sources, the costs and/or conditions associated with using and releasing mercury during production or disposal. This project is concerned primarily with the *structure* of use- and release-related regulations and the extent to which existing regulations encourage pollution prevention.

Environmental management standards, on the other hand, have an *indirect* effect on individual sources. Environmental standards are numeric criteria that specify a maximum acceptable mercury concentration for different media, based on scientific or risk-based criteria. For instance, mercury standards exist for water, sludge, fish tissue, drinking water, and several other media. These standards provide a yardstick against which to measure the effectiveness of mercury release regulations.

In contrast to use- and release-related regulations which apply directly to individual sources, environmental standards remain independent of specific sources. However, environmental standards exert an important effect on sources that release mercury to any media. For instance, sewage treatment plants must ensure that the mercury content of their sludge remains below the mercury concentration specified for land application. Even absent a specific mercury effluent limit, the POTW must still work with its dischargers to minimize mercury content in their discharges to the treatment plant.

TABLE 8:
Mercury: Regulatory Overview

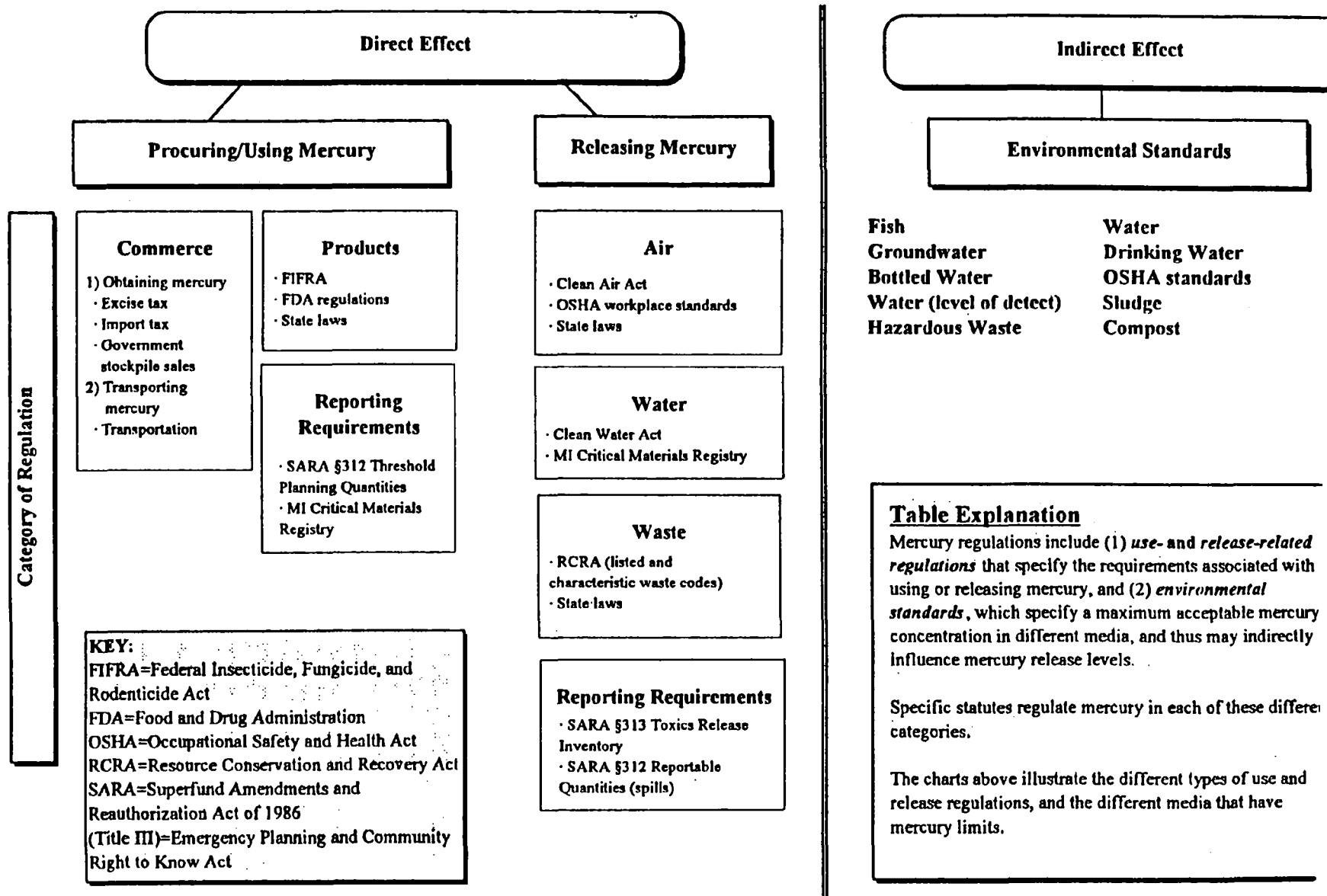


Table 9: Environmental Standards for Mercury

Media	Mercury Standard	Explanation
Ambient Water	<ul style="list-style-type: none"> • 0.144 u/l for ingestion of both water and aquatic organisms; • 0.146 u/l for ingestion of only aquatic organism. • 2.4 u/l for freshwater acute exposure; • 0.012 u/l for freshwater chronic exposure; • 2.1 u/l for marine acute exposure; • 0.025 u/l for marine chronic exposure. (50 FR 30791)	<ul style="list-style-type: none"> • Established under Clean Water Act §304(a) • Ambient water criteria varies by state (may change with GLI)
Drinking Water	<ul style="list-style-type: none"> • Maximum contaminant level = .002 mg/l (40 CFR 141.62) 	<ul style="list-style-type: none"> • Maximum contaminant level for mercury established under the Safe Drinking Water Act.
Air	<ul style="list-style-type: none"> • No ambient standard. 	
Sludge	<p>Limits:</p> <ul style="list-style-type: none"> • 17 mg/kg (dry wt) and 17 kg/hectare cumulative loading for sludge applied on agricultural, forest and publicly accessible lands. • 17 mg/kg (dry wt) and .85 kg/hectare annual loading rate for sludge sold or distributed for application to a lawn or home garden. • 57 mg/kg (dry wt) for sludge sold or distributed for other types of land disposal • 100 g/kg (dry wt) for sludge disposed in lined or unlined facilities (40 CFR 503). 	
Compost	<ul style="list-style-type: none"> • No federal standards. 	<ul style="list-style-type: none"> • Minnesota sets mercury concentration limits in compost.
Fish	<ul style="list-style-type: none"> • 1 ug/g (1 mg/kg or 1 ppm) 	<ul style="list-style-type: none"> • FDA action level for methyl mercury. ug/g (1 mg/kg or 1 ppm)
Groundwater	<ul style="list-style-type: none"> • 2 ug/l 	
Bottled Water	<ul style="list-style-type: none"> • .002 mg/l (21 CFR 103.35) 	
Water-level of detect	<ul style="list-style-type: none"> • .2 ug/l (200 mg/l) = recommended method 	<ul style="list-style-type: none"> • EPA-approved method to detect Hg in water. Lower detection methods are available, but not yet approved by EPA.
Hazardous Waste	<ul style="list-style-type: none"> • TCLP = .2 mg/l or .2 ppm (40 CFR 261.24, 264) 	<ul style="list-style-type: none"> • Land disposal (Subtitle D, nonhazardous landfills) prohibited unless leachate contains less than .2 mg/l.

B) Mercury Use Regulations

Regulations associated with mercury use in commerce impose costs, conditions, and/or restrictions associated with obtaining, selling, using, or transporting mercury. We have used the following categories to describe mercury use regulations: (1) commerce-related regulations such as taxes and transportation requirements; (2) product-related restrictions; and (3) reporting requirements.

Mercury use regulations affect only those facilities that use mercury as an input. They do not affect those sources that release mercury incidentally as a by-product. For each statute, we describe the mercury-specific information, the type of regulatory mechanism used, and any potential changes to the current regulatory status.

1) Mercury in Commerce

Provisions of several statutes regulate different aspects of mercury in commerce. Excise taxes and import taxes directly affect the cost of using mercury as an input in manufacturing processes; regulations governing mercury sales from the National Defense Stockpile influence the amount of mercury available for purchase; and transportation requirements impose restrictions on mercury transport.

a) Obtaining Mercury

EXCISE TAX: Internal Revenue Code of 1986 (26 USCA §4661)

Mercury Information: The Internal Revenue Code imposes taxes on 40 chemicals, including mercury, that are sold by the manufacturer, producer, or importer. The tax rate for mercury is \$4.45/ton, the second highest tax rate listed (10 substances have the highest tax rate of \$4.87/ton).

Regulatory Mechanism: Input/sales tax

Potential changes: None identified

IMPORT TAX: Harmonized Tariff Schedule of the United States

Mercury Information: Mercury and several mercury compounds are subject to import taxes under the Harmonized Tariff Schedule of the United States, which identifies import taxes on all goods imported into the United States from most-favored-nation (MFN) countries, as well as from special treaty nations and non-most-favored-nation (non-MFN) countries.

For 1994, the tax rate for mercury imports from MFN countries is 16.5 ¢/kg, compared to a 55.1 ¢/kg tax on imports from non-MFN countries (item 2805.40). Due to special treaty agreements, no duty is imposed on mercury imports from Canada, Israel, Bolivia, Colombia, Ecuador, and Caribbean Basin countries.

Regulatory Mechanism: tax

Potential Changes: Under GATT, mercuric oxide, a mercury compound used frequently in medical and military batteries, will be exempt from all U.S. import duties, effective July 1, 1995. Until the end of 1992, facilities that imported mercuric oxide enjoyed duty-free imports, as a result of a special line-item tariff exemption heading (9902.28.25). This duty-waiver lapsed at the end of December 1992. In January 1993, Iowa representatives introduced bills into both houses of Congress designed to extend the waiver for several more years (S.397 (Grassley), HB2522 (Grandy)). Neither bill emerged from committee, and, thus, the import duty on mercuric oxide has remained in effect since January 1993. The GATT duty-waiver will replace the need to amend the Harmonized Tariff Schedule with specific legislation.

Mercury recycling equipment is also subject to import taxes. A bill introduced by Minnesota Senator Durenberger (S.1308) would suspend the duty on equipment used to recycle mercury and other parts of fluorescent light bulbs (adding sections 9902.87.17 and .18 to amend sections 8419.40.00 and 8479.82.00). A Swedish company manufactures the only equipment capable of separating each part of a fluorescent bulb and distilling mercury pure enough for industrial reuse. A duty-waiver would lower the cost of recycling mercury from fluorescent lamps.

GOVERNMENT MERCURY STOCKPILE SALES: Strategic and Critical Materials Stockpile Act (50 USCA §98)

Mercury Information: The Strategic and Critical Materials Stockpile Act regulates mercury that the Defense Logistics Agency (DLA) sells from the National Defense Stockpile. The amount of mercury sold from the stockpile has the potential to affect the mercury market, although DLA considers its impact on the market when requesting Congressional authorization for sales. DLA accepts daily bids for mercury. Over the last year, the price of DLA mercury has ranged from \$57 - 82 per flask.

DLA must submit an Annual Materials Plan to Congress that includes its requests for selling materials deemed excess to stockpile needs for each fiscal year, including projections for the following four years. For fiscal year 1994, DLA initially received authorization to sell 10,000 flasks of mercury, but reached that limit by early 1994. In April, DLA received Congressional authorization to increase fiscal year 1994 mercury sales to 50,000 flasks, a five-fold increase that is more than three times the estimated

total US consumption of mercury for 1993. By comparison, DLA had authority to sell 10,000 flasks of mercury (345 metric tons) in fiscal year 1993, but by year's end, sold only 8,250 flasks (284.6 metric tons).

Until fiscal year 1994, funds received from stockpile sales were used only for stockpile-related activities. However, the Defense Appropriation Act for fiscal year 1994 (PL 103-160, §305) changed the allowable uses of stockpile revenues, specifying that up to \$500 million be transferred to Department of Defense operations and maintenance accounts. This change, combined with favorable market conditions and increasing interest in stockpile materials, motivated DLA to seek approval to sell additional quantities of several stockpile materials, including mercury.

Potential changes: In July, 1994, DLA suspended future mercury sales until a number of potential environmental implications can be addressed. EPA will be represented on the market impact committee that reviews stockpile sales. DLA has submitted its 1995 Annual Materials Plan to Congress, requesting authorization to sell 20,000 flasks of mercury for fiscal year 1995. The House Armed Services subcommittee, chaired by Rep. Earl Hutto (D-FL), handles strategic material issues. DLA is also considering offering long-term contracts for mercury purchases.

b) Transporting Mercury

TRANSPORTATION: The Hazardous Materials Transportation Act

Mercury Information: The Department of Transportation regulates hazardous materials transport under the Hazardous Materials Transportation Act (HMTA). Mercury and mercury compounds are hazardous substances subject to packaging, shipping and transportation rules for hazardous materials. RCRA regulations for hazardous waste transporters incorporate HMTA rules.

Regulatory mechanism: operating requirements, labeling

Potential changes: None identified

c) Using Mercury

Mercury Information: Currently, only Minnesota has a use-restriction law providing that mercury sold in the state will be used only for medical, dental, instructional, research, or manufacturing purposes. Sellers must provide buyers with a material safety data sheet and have the buyer sign a statement of proper use and disposal.

2) Mercury in Products

Mercury-containing products are regulated in several different ways. At a federal level, mercury product regulation has generally centered around health-based reasons to eliminate mercury from products, using the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) and the Federal Food, Drug, and Cosmetic Act (FFDCA) regulations.

In recent years, many states have taken a different approach. Restrictions on mercury-containing products, once used sparingly by the federal government, are increasing rapidly at the state level. States are beginning to move beyond strictly health-based concerns associated with particular products, and are looking instead to the waste disposal problems associated with mercury containing products. Many Great Lakes states, most notably Minnesota, are beginning to ban the sale of certain products that contain mercury (e.g., toys and shoes), limit the content of mercury in other products (e.g., batteries and packaging), and impose recycling requirements and disposal restrictions on mercury-containing products.

At present, mercury product laws represent a patchwork of regulations that vary by state. Table 10 compares characteristics of the most common mercury product regulations in each of the Great Lakes states. Table 11 summarizes the regulations that affect mercury-containing products at a national level and in each of the Great Lakes states. Appendices C and D describe each of these regulations in more detail. Appendix E shows the different types of mercury battery legislation in place nationwide.

At a federal level, two statutes have been used to limit mercury content or curtail mercury use in specific products.

Statute: FEDERAL INSECTICIDE, FUNGICIDE AND RODENTICIDE ACT (FIFRA)

Mercury Information: FIFRA covers the sale and use of pesticides, including registration of chemicals that meet health and safety tests. Until recently, several mercury compounds were registered as pesticides, bactericides, and fungicides. By 1991, however, all registrations for mercury compounds in paints had been canceled by EPA or voluntarily withdrawn by the manufacturer. Registrations for calo-chlor and calo-gran, the last mercury-based pesticides registered for use in the United States (to control pink and grey snow mold) were voluntarily canceled by the manufacturer in November 1993. Existing stocks may be sold until depleted.

Regulatory Mechanism: ban, cancellation

Potential changes: None identified

Statute: FEDERAL FOOD, DRUG, AND COSMETIC ACT (FFDCA)

Mercury Information: The Food and Drug Administration is responsible for mercury in food, drugs, and cosmetics. Mercury use as a preservative or antimicrobial is limited to eye-area cosmetics or ointments in concentrations below 60ppm. Yellow mercuric oxide is not recognized as a safe and effective ophthalmic anti-infective ingredient. The FDA also regulates dental amalgam under FFDCA. Dental mercury is classified as a Class I medical device, with extensive safety regulations on its use. Dental amalgam alloy is classified as a Class II device, subject to additional special controls.

Regulatory Mechanism: content restriction, use conditions, labeling

Potential Changes: None identified. However, California may require warnings on dental amalgam above and beyond FFDCA rules, under its Safe Drinking Water and Toxic Enforcement Act (Proposition 65), which requires businesses to warn employees and the public if business activities result in emissions of listed chemicals.

Federal regulations may soon take a different approach to mercury product regulation. Two bills introduced recently into Congress would impose restrictions on the mercury content in packaging and batteries ("Mercury-Containing and Rechargeable Battery Management Act," S1949 (passed the Senate in May 1994); and HB4528 (same language). Similar language is included in the "Lead Exposure Reduction Act," which will be considered by Congressman John Dingell's Energy and Commerce Committee). A bill to limit mercury content in packaging materials was introduced in 1993. If passed, these bills would establish national standards for allowable mercury content in batteries and packaging. Currently, over a dozen states independently limit mercury content in batteries and packaging.

Table 10: Common Mercury Product Regulations in the Great Lakes States

	ILLINOIS	INDIANA	MICHIGAN	MINNESOTA	NEW YORK	OHIO	PENN.	WISCONSIN
Batteries*	TF		SC,R,DR,D	CR,SB,SC,D,R, L	CR,SB^,SC,P			CR,SB^,D,R,SC*
Packaging**	CR,SB			CR,SB	CR,SB,L		P	CR,SB
Toys, Clothes, Footwear			P	SB, SC				SB
Electric Lamps***				D, SC, L	CR*			
Thermostats				D, R, SC*, L				
White Goods	D,SC,R			D, R, L, SC				
Thermometers				L, R				
Dental Supplies				D, R, L				

FEDERAL REGULATIONS:

* Batteries: Bills introduced recently to the U.S. House and Senate are designed to phase out mercury in batteries by imposing limitations on the sale of (1) alkaline- manganese and zinc carbon batteries containing mercury; and (2) mercury button cell and other mercuric-oxide batteries. (S.1949, Lautenberg (D-NJ), "Mercury-Containing and Rechargeable Battery Management Act", passed the Senate on 5/25/94; HB 4528, Richardson (D-NM) contains same language.) Mercury battery provisions of HB4528 were added to HB4882 (Lead Exposure Reduction Act of 1994; Swift, 8/11/94) and will be considered by Congressman Dingell's (MI) Energy and Commerce Committee after Labor Day.

** Packaging: A bill introduced into the U.S. Senate would prohibit intentionally introduced mercury in packaging. (S.966, Lautenberg (D-NJ) introduced May 13, 1993. "Reduction of Metals in Packaging Act")

*** Electric lamps: EPA is considering two options to modify RCRA disposal restrictions for mercury-containing lamps: (1) inclusion in universal waste rule; and (2) conditional exemption.

Key

CR = content restriction - *design restriction
D = disposal restrictions
DR = deposit refund
L = labeling
P = pending legislation (see table 9 for details)
R = Hg recycled before product disposal
SB = sale banned-*distribution restricted
^ = sales banned unless content restriction met
SC = special collection program -*public education
TF = task force

Key: IL = Illinois IN = Indiana MI = Michigan MN = Minnesota NY = New York OH = Ohio PA = Pennsylvania WI = Wisconsin fed = federal regs * = pending		Content Restriction	Sale Banned Use Cancelled or Restricted	Disposal Restrictions	Hg Recycled Before Disposal	Labeling	Special Collection Pgm.	Deposit Refund	Information Requirements
Chemical and Allied Products									
Paint									
Latex paint		fed	fed						
Maritime paint		fed	fed						
Other									
Agricultural products			fed						
Cosmetics		fed							
Explosives				MN, WI					
Fireworks			MI						
Livestock and poultry remedies						MI			
Packaging		IL, MN, NY, PA*, WI	IL, MN, PA*, NY, WI			NY			
Pharmaceuticals		fed				IL, IN, NY, OH,			
Pigment, dyes		MN	fed						
Poisons		PA	OH						
Special paper coatings									
Turf products			fed, MN						
Electrical and Electronic Uses									
Electric Lighting									
Fluorescent lights				MN	MN	MN	MN		MN, fed
High intensity lamps				MN		MN	MN		MN, fed
Incandescent lamp filaments									
Mercury vapor lamp		NY	MN	MN					MN, fed
Metal halide lighting									
Wiring Devices and Switches									
Electric wall switches		PA		MN	MN	MN	MN		
Electrical components				MN	MN	MN	MN		
Thermostats				MN	MN	MN	MN		
Tilt switches, relays, rectifiers			MN	MN	MN	MN	MN		
Toys			MN, WI, MI*						
White goods				MN, IL	MN, IL	MN	IL, MN		
Batteries									
Alkaline batteries		MN, NY, WI	MN, NY, WI, fed*						
Carbon zinc		NY, WI	NY, WI, fed*						
Mercuric oxide batteries			MN, WI, fed*	MI, MN, WI	MI, MN, WI	MN, fed*	MN, WI	MI	MN
Zinc air		MN							
Instruments and Related Products									
Measure and Control Instruments									
Barometers							MN		
Medical, scientific instruments				MN	MN	MN	MN		
Thermometers			MN	MN	MN	MN	MN		
Dental Equipment and Supplies				MN	MN	MN	MN		

3) Reporting Requirements

Mercury *use* reporting is seldom required under the existing regulatory framework. Most reporting requirements track mercury *releases*, and are discussed separately in the "Mercury Release" section that follows.

At a federal level, only facilities that exceed threshold planning quantities for mercury under SARA Title III regulations must report that quantity to their local emergency planning commission. This program is included under "Releases," because it is geared toward spill prevention, rather than use. EPA is currently considering a chemical use inventory, which would track the quantities of chemicals used at individual facilities.

Currently, only Michigan has regulations that specifically require facilities to report the quantities of chemicals used. Under the Part 9 rules of Act 245, Michigan's water pollution control act, businesses that use any substance listed on the "Critical Materials Registry" must report the quantities of each substance used and released. Mercury is included the Critical Materials Registry. The state uses this information to assist in permit development and compliance in its water program.

C) MERCURY RELEASE REGULATIONS

This section describes regulations that affect mercury *release* into air and water, as well as waste disposal, and requirements for public disclosure of releases (e.g., TRI reporting). Specific statutes--at a federal and/or state level--regulate mercury in each of these different categories. Appendix B shows the specific mercury release regulations that apply to each mercury source.

The Clean Air Act, Clean Water Act, and the Resource Recovery and Conservation Act (RCRA) all operate differently, and impose different thresholds that influence the extent to which mercury releases are covered. In addition, states have the flexibility to impose site-specific mercury regulations on individual sources. With the exception of the Toxic Chemical Release Inventory (TRI), which specifically requires facilities to report chemical releases into all media, programs that require mercury release reporting are incorporated into broader regulatory programs.

The following information is provided for each statute discussed: the principal provisions that affect mercury releases; the specific sources regulated; the threshold that triggers coverage; the regulatory mechanism(s) used; environmental standards included in the statute; potential changes to existing regulations; and other relevant statutes that may provide similar information.

1) Mercury Air Emissions

Statute: CLEAN AIR ACT

Principal Provisions that affect mercury releases:

Mercury and mercury compounds are considered Hazardous Air Pollutants (HAPs) under the Clean Air Act. To date, EPA has established National Emission Standards for Hazardous Air Pollutants (NESHAPs) for mercury emissions from three source categories: ore processing facilities, mercury cell chlor-alkali plants, and sewage sludge driers.

EPA will also be promulgating a new category of regulation, known as maximum achievable control technology (MACT standards) for "major source" in any listed source category. Major sources are defined as those sources that release 10 tons per year of any HAP, or 25 tons per year in total HAP emissions. Mercury releases alone are unlikely to trigger the major source definition. For instance, Wisconsin's air point source inventory showed the highest mercury release at 1000 pounds, well below a 10 ton (20,000 pound) threshold for major sources.

It is too early to tell the extent to which MACT standards will influence mercury release levels. MACT standards will be defined based on an analysis of existing control technology for a given source category. Thus, if mercury controls are not currently in use, they may not be part of a defined MACT standard. EPA may set lesser quantity cutoffs, which would redefine the level at which a facility would be defined as a major source.

Under the Title V Operating Permits program, states may impose emissions fees up to \$25/ton of emissions for all chemicals. Facilities releasing mercury are subject to this fee for their mercury emissions. Without a differential fee structure, the fee alone is not likely to be high enough to spur reductions in mercury emissions. For instance, Wisconsin's largest source of mercury air emissions, an electric utility, would only pay \$15.90 for its mercury releases (.63 ton @ \$25/ton).

Specific Sources covered: Only three source categories have NESHAPs for mercury emissions: (1) mercury cell chlor alkali plants (2) sewage sludge incinerators and driers (3) mercury ore processing facilities.

Individual states may impose specific mercury emissions limits on individual facilities. For instance, many states impose mercury emissions limits on municipal and hazardous waste incinerators.

Threshold that triggers coverage: Listed source category for NESHAPs (no numeric thresholds); MACT threshold not yet defined, but will probably be specific to source categories.

Regulatory mechanism(s): emissions limits, emissions fees, permits, monitoring, operating requirements (which may include pollution prevention), reporting.

Environmental Standards: No federal ambient air mercury standards

Potential Changes: The 1990 Clean Air Act amendments single out mercury for additional study--and potential future regulations--more than any other substance. The following studies may potentially alter significantly the manner in which mercury air emissions are regulated:

Mercury Study (§112(n)(1)(B)): The 1990 Clean Air Act amendments mandated a special study of mercury emissions to the environment. The study, which will be finalized in early 1995, is estimating the relative contribution of mercury emissions from source categories, the public health and environmental effect of such emissions and evaluating available control technologies and their costs.

EPA must also list (by 1995) the source categories that account for at least 90% of aggregate emissions for seven pollutants, including mercury (§112(c)(6)). Information developed for the mercury study will contribute to this evaluation. Sources identified in the §112(c)(6) strategy will be subject to MACT standards within ten years.

Utility Study (§112(n)(1)(A)): Closely tied to the mercury study is the Utility Emissions Study, mandated by Section 112(n)(1)(A) of the 1990 Clean Air Act amendments. This study, scheduled for completion in November 1995, will describe in detail the contribution of utilities to mercury emissions and other HAPs. The CAA exempted utilities from the categories of sources potentially subject to MACT standards until the study is completed. The study may recommend specific controls, including controls for utility boilers, which are currently unregulated for mercury emissions.

Municipal Waste Incinerator Limits (§129): EPA has begun a rulemaking for mercury emissions from municipal and medical waste incinerators.

Great Waters Program: Section 112(m) required EPA to study atmospheric deposition of mercury and other substances into several large water bodies, including the Great Lakes. The program is geared toward building an improved atmospheric monitoring network that will enable EPA and other agencies to study the relative contributions of different HAPs and the extent to which atmospheric deposition causes human health or environmental problems. If necessary, EPA may require additional controls on certain

sources as a result of this study. Under §112(m)(5), EPA is required to assess the contribution of atmospheric deposition to pollutant loadings, the environmental and public health effects of atmospheric deposition and the extent to which atmospheric deposition contributes to water quality standard exceedances. The Great Waters report recommends that EPA promulgate Lesser-Quantity Emissions Rates for mercury.

Other relevant statutes: Mercury air releases are listed in a facility's TRI report, provided the facility meets the TRI threshold reporting requirements. RCRA regulations cover emissions from hazardous waste combustion, and boilers and industrial furnaces. Existing regulations do not include specific mercury standards.

Statute: OCCUPATIONAL SAFETY AND HEALTH ACT

Mercury Information: The Occupational Safety and Health Administration has responsibility for maintaining safe workplace conditions. OSHA sets permissible exposure levels for mercury in workplace settings. Mercury is listed as a neurotoxin capable of causing behavioral changes, decreased motor function and other effects on the nervous system (29CFR1926.59). OSHA mercury standards also recommend that skin contact should be avoided.

Workplace standards may influence the types of processes used at a facility. For instance, OSHA standards for cadmium were tightened recently. Stricter OSHA limits for cadmium will force many cadmium users to modify their processes or eliminate cadmium entirely in order to meet these new standards.

Regulatory Mechanism(s): operating requirements, inspections

Environmental Standards: workplace air concentration levels

Specific Sources covered: Facilities that use mercury are subject to mercury standard

Potential Changes: None identified. However, the Agency for Toxic Substances and Disease Registry (ATSDR), which evaluates exposure levels for hazardous substances at superfund sites under CERCLA, recently revised its toxicological profile for mercury. Although these levels have no direct regulatory effect, they may cause other agencies that evaluate mercury exposure levels to re-evaluate existing standards.

2) Mercury Discharges to Water

Statute: CLEAN WATER ACT

Principal Provisions that affect mercury releases:

Mercury is listed as a toxic pollutant under §307(a) of the Clean Water Act. For mercury discharge, Clean Water Act regulations specify technology-based effluent limits for classes and categories of industries, and describes the circumstances in which states may require effluent limits or monitoring requirements more stringent than technology-based standards. States may also set water quality standards for pollutants including mercury. The Clean Water Act relies on a permit system, known as the National Pollutant Discharge Elimination System (NPDES) to regulate water discharges. Facilities may be assigned a specific mercury discharge limit, or may only be required to monitor their discharge for mercury. Facilities report actual discharge levels in Discharge Monitoring Reports (DMRs), which serve as the basis for determining compliance.

Pretreatment standards regulate industries that discharge into a publicly owned treatment plant (POTW) instead of discharging directly into a receiving water body. Regulations list industrial categories subject to national categorical pretreatment standards for new and existing facilities that discharge into treatment plants. POTWs with approved pretreatment programs may set permit limits and conduct inspections of industrial users. Facilities that do not have specific pretreatment standards for mercury (or other hazardous substances), are supposed to notify the POTW of any hazardous waste discharge that exceeds 100kg per month. Wastestreams from certain manufacturing processes that may involve mercury, such as fluorescent lamps and switchgear, are excluded from categorical pretreatment standards because they are considered dilute.

Mercury is included in the list of chemicals eligible for removal credits at a POTW. That is, a POTW may allow a facility to discharge a higher quantity of mercury provided that the POTW meets the applicable mercury standard in its sludge without additional costs.

EPA Region 5 Water Division recently revised its enforcement program for certain chemicals to trigger enforcement investigations earlier than the previous program. Under the Great Lakes Enforcement Strategy, EPA will target violations of *daily* maximum permit limits. This screening criteria is more stringent than the national definition of significant noncompliance, which targets violations of *monthly* average limits.

Specific Sources covered: The Clean Water Act lists technology-based standards for the following industry source categories: Inorganic Chemicals Manufacturing, chlor-alkali subcategory (mercury cell process)(40CFR415.60); Nonferrous Metals category including, primary antimony subcategory (40CFR421.140), secondary mercury subcategory (40CFR421.200), primary precious metals and mercury subcategory (40CFR250); Steam electric power generation (40CFR423--mercury is an Appendix A priority pollutant); Ore Mining and Dressing Category including, mercury ore subcategory (40CFR440.40), copper, lead, zinc subcategory (40CFR440.100), platinum ores subcategory; Pesticide Manufacturing category, metallo organic pesticide chemicals subcategory (40CFR455); Battery Manufacturing category, LeClanche and zinc subcategories (40CFR461.40).

However, this list does not limit the types of dischargers that may have mercury effluent limits or monitoring requirements in their NPDES permits. Individual states may impose specific mercury discharge limits and/or monitoring requirements on individual facilities that discharge into water quality-limited waterbodies. The current EPA-approved level of detect for mercury is 200 ng/L, which may be higher than water quality based effluent limits, and higher than some states' water quality standards for mercury.

Threshold that triggers coverage: No volume or quantity threshold

Regulatory Mechanism(s): effluent limits, effluent fees (WI), permits, operating requirements, control requirements, monitoring/reporting

Environmental Standards: surface water, sludge

Potential Changes:

Great Lakes Water Quality Initiative (GLI): In recognition of the vulnerability of the Great Lakes to bioaccumulative pollutants, including mercury, EPA proposed water quality criteria designed to protect aquatic life, wildlife, and human health on a long term basis. The GLI is designed to remedy the differences in water quality standards of the Great Lakes states and protect lakes from chemicals that bioaccumulate in the food chain. Released in draft form, the GLI proposes several major changes to water quality programs in the Great Lakes states, including water quality standards for mercury designed to protect wildlife.

Clean Water Act Reauthorization: Several bills introduced into Congress as part of the Clean Water Act reauthorization process may change the current regulations governing mercury water discharges. Proposed changes include a ban and/or discharge tax on all mercury discharges.

Other relevant statutes: Mercury water releases are listed in a facilities Toxic Release Inventory, provided the facility meets the TRI threshold reporting requirements (see discussion under Mercury Reporting Requirement). Michigan also collects information on use and release in its Critical Materials Registry.

3) Mercury Waste Disposal

Statute: RESOURCE CONSERVATION AND RECOVERY ACT (RCRA) (*see also 40 CFR 261*)

Principal Provisions that affect mercury disposal:

RCRA regulations outline specific classification and disposal requirements for products and wastes that contain mercury. In general, RCRA regulations are waste-specific, not source-specific, and thus may apply to any facility that generates mercury-containing wastes.

Waste code identification: RCRA regulations assign specific waste codes to five types of wastes that are either "characteristic" wastes or "listed" wastes. Mercury is both a characteristic and a listed waste under RCRA.

Wastes are considered "characteristic" hazardous wastes if they exhibit any of four specified characteristics: ignitability, corrosivity, reactivity, or toxicity. Ignitability, corrosivity, and reactivity describe general properties of the waste, whereas the toxicity characteristic identifies wastes likely to leach specific toxic constituents into groundwater if managed improperly. Wastes that exhibit concentrations above a specific regulatory level for any of 40 substances, including mercury, are considered hazardous.

A specific "D" waste code identifies the contaminant(s) for which a waste exhibits the toxicity characteristic. The regulatory level for mercury is 0.2 mg/l (or 0.2ppm), and the waste code D009, identifies wastes that exceed the toxicity characteristic for mercury (40CFR261.24). Regulations outline the required toxicity characteristic leaching procedure (TCLP) test necessary to determine the concentration of each substance (40CFR261 AppII).

"Listed" wastes are specifically identified wastestreams or products that appear on one of three hazardous waste lists in RCRA. Each listed waste is assigned a different waste code. Wastes from non-specific sources such as spent solvents, are assigned an "F" code. Wastes from specific sources are assigned a "K" code. Each of these wastes are listed for a specific substance (40CFR 261.30). Appendix VII of the regulations lists the constituents that caused specific wastestreams to be listed.

Commercial chemical products such as manufacturing chemical intermediates, off-specification species, container residues, and spill residues may also be considered hazardous wastes when discarded. Two sublists identify waste codes for commercial chemical products. Chemicals assigned a "P" code are considered acute hazardous wastes when discarded (40CFR261.33 (e)); chemicals assigned a "U" code are toxic chemicals considered hazardous when discarded and are regulated like other listed hazardous wastes (40CFR261.33(f)). The P and U lists are triggered only when the P or U chemical is the sole active ingredient, a commercial product is discarded, or a listed chemical is spilled. These lists do not apply to manufacturing process wastestreams that contain listed chemicals.

In addition to the D009 waste code, the following waste codes identify mercury-containing wastes or discarded chemical products:

F039: Leachate (liquids that have percolated through land disposed wastes) resulting from the disposal of more than one restricted waste classified as hazardous. F039 is listed for multiple substances and may not be a reliable indicator of mercury in the wastestream.

K071: Brine purification muds from the mercury cell process in chlorine production, where separately prepurified brine is not used. K071 is listed only for mercury.

K106: wastewater treatment sludge from the mercury cell process in chlorine production. K106 is listed only for mercury.

P065 identifies mercury fulminate (mercury compound used in explosives) as an acute hazardous waste;

P092 identifies phenylmercuric acetate (mercury compound used in paints) as an acute hazardous waste; and

U151 identifies mercury as a toxic waste.

Disposal Requirements, including prohibitions on land disposal: RCRA regulations describe specific disposal requirements for individual waste codes. All mercury-bearing wastes (wastewaters and nonwastewaters) are subject to land disposal restrictions. That is, the mercury concentration in these wastes must be below the regulatory concentration level before the wastes may be land-disposed. For some types of waste, the regulations require a specific treatment, such as incineration or thermal treatment. In other cases, only a maximum mercury concentration is required, and any treatment method may be used. As a result of recently imposed land disposal restrictions on chlor

alkali wastes (K071 and K106), some facilities are building their own mercury recovery facilities, whereas others are shipping their wastes to Canada or elsewhere for disposal.

RCRA regulations also influence product disposal and recycling options for mercury containing products. Discarded products considered hazardous wastes are subject to storage, transportation, and permitting requirements under RCRA subtitle C (hazardous wastes). Currently, batteries are included in a "universal waste rule" that eases RCRA restrictions on hazardous waste management and enables states to set up special collection programs. Fluorescent lamps, however, are considered hazardous waste because levels of mercury exceed the toxicity characteristic for mercury. EPA is considering two options to ease disposal restrictions: (1) including mercury-lamps in the universal waste rule to facilitate recycling, or (2) a conditional exemption which would allow disposal in solid waste landfills.

Requirements for owners and operators of hazardous waste land treatment facilities: Landfill owners must determine the mercury concentrations in any wastes if food chain crops are grown at the facility. Food chain crops cannot be grown on the treated area of a hazardous waste land treatment facility unless the owner or operator can demonstrate, based on field testing that any mercury and other specified constituent will not impair the quality of the food grown there (40CFR 265.273 and .276).

Hazardous waste combustion: RCRA regulates air emissions from hazardous waste combustion and boiler and industrial furnaces (BIFs). Cement kilns, regulated under interim BIF standards, frequently burn hazardous waste as a fuel source. Federal regulations for hazardous waste incinerators do not currently set metals limits. A potential for regulatory overlap exists between RCRA hazardous waste combustion rules and Clean Air Act municipal waste combustion rules.

Specific Sources covered: Any facility that uses mercury may generate waste that exceeds the toxicity characteristic for mercury. Facility operators use best professional judgment to determine whether or not to test their waste specifically for mercury. Mercury-cell chlor-alkali facilities are the only mercury sources that have specifically listed wastestreams (K071, K106).

Threshold that triggers coverage: Facilities must meet RCRA hazardous waste quantity thresholds before they are required to report information on their hazardous waste generation and management. Thresholds are based on the *total amount* of hazardous waste generated at a facility, not on the amount of any one kind of waste (e.g., facilities that generate more than 2,200 pounds per month of hazardous waste are considered large quantity generators; facilities that generates 220 - 2,200 pounds of hazardous waste per month are considered small quantity generators). Therefore, levels

of mercury waste alone are not likely to determine whether or not an individual facility is subject to RCRA requirements.

Regulatory Mechanisms: disposal restrictions, labeling, control requirements, inspections, planning requirements, operating requirements, permits, reporting

Environmental Standards: hazardous waste concentration, groundwater standards

Potential Changes: EPA is revising the hazardous waste combustion rules, the interim standards that regulate boilers and industrial furnaces, and fluorescent lamp disposal requirements. The "universal waste rule" for batteries, and possibly thermostats, is scheduled to be finalized in the fall of 1994.

4) Mercury Reporting Requirements

Several sections of the Superfund Amendments and Reauthorization Act of 1986 (SARA), which amended CERCLA to address ongoing activities that result in releases of hazardous substances, impose reporting requirements on mercury use, release, and spills. Title III, known as the "Emergency Planning and Community Right-to-Know Act" establishes emergency release, inventory, and release reporting requirements. The most well known requirement is the Toxics Release Inventory (TRI), which requires facilities in the manufacturing sector (SIC codes 20-39) to report releases to air, water, and land for all listed chemicals, including mercury. Other sections require facilities to report spills of listed substances above a threshold reporting quantity (reportable quantities), and the quantities of chemicals stored above a specified threshold planning quantity. Each of these sections is discussed separately below.

Statute: (SARA TITLE III, §313) TOXIC CHEMICAL RELEASE INVENTORY (TRI)

Principal Provisions that affect mercury reporting: All facilities in the manufacturing sector (SIC codes 20 - 39) that meet the threshold reporting requirements must report their releases of mercury to all media. TRI thresholds are based on the quantity of each substance used, processed, manufactured, or imported at any of these facilities.

Mercury is one of 17 priority chemicals target by EPA's 33/50 program, a voluntary pollution prevention initiative that established an interim goal of achieving a 33% reduction in releases of targeted chemicals by 1992 and a 50% reduction by 1995, using 1988 TRI reporting data as a baseline. The 33/50 program is one of EPA's primary voluntary reduction programs designed to augment traditional command and control regulations. Releases and transfers of the 33/50 chemicals declined four times faster than non-33/50 chemicals between 1991 and 1992.

Specific Sources covered: Any manufacturing facility that uses quantities of mercury above the reporting threshold.

Threshold that triggers coverage: Facilities that manufacture, process, or import 25,000 pounds of mercury and/or otherwise use 10,000 pounds of mercury must report releases to all media. These thresholds are generally too high to capture the vast majority of sources that use mercury.

Regulatory Mechanism: public disclosure, reporting

Potential Changes: EPA is considering two proposals that would affect the number and types of facilities required to report under TRI. One proposal would lower the TRI reporting threshold, and perhaps include multiple thresholds. Given the low number of sources captured under the current reporting threshold, it is conceivable that, depending on the level of a new threshold, many new facilities would be captured under TRI. Another proposal would expand the reporting universe beyond the manufacturing sector. At present, mining operations, waste disposal sources, and other facilities not included in SIC codes 20 - 39, are not required to report releases under TRI. Again, depending on how this expansion is structured, different types of facilities would likely be captured under TRI.

Other relevant statutes: Clean Air Act, Clean Water Act, RCRA. Courts are currently reviewing whether or not a facility that reports mercury releases to water in its TRI report but does not have a Clean Water Act NPDES permit for those discharges is in violation of its NPDES permit.

Statute: SARA TITLE III §302, §304, §311 and §312 (threshold planning quantities and reportable quantities)

Principal Provisions that affect mercury reporting: SARA reportable quantities are linked closely to CERCLA §102 reporting requirements. Under SARA §302, any facility that produces, uses, or stores "extremely hazardous" substances must notify the State Emergency Response Commission. Mercuric acetate, mercuric chloride, and mercuric oxide (mercury compounds) are considered extremely hazardous substances (40CFR355). Under §304, a facility must notify the state emergency response commission and a local emergency planning committee of releases that exceed reportable quantities for hazardous substances. Facilities must also notify the National Response Center (1-800-424-8802). The reportable quantity for mercury spills is one pound (40CFR302).

Under §311 and §312, facilities that keep hazardous substances on-site in quantities greater than threshold levels must submit a chemical inventory to the state emergency response commission, the local emergency planning commission, and the local fire department (40CFR370). The threshold for mercury (a hazardous substance) is 10,000 pounds, and the threshold for listed mercury compounds is 500 pounds (extremely hazardous substances).

Specific Sources covered: Any facility that uses mercury may be potentially subject to these regulations.

Threshold that triggers coverage: Hazardous substances in quantities greater than 10,000 pounds, and extremely hazardous substances in quantities greater than 500 pounds must be reported. The reporting threshold for mercury spills is one pound (40CFR355.40).

Regulatory Mechanism(s): reporting, public disclosure

Environmental Standards: n/a

Potential Changes: None identified.

Other relevant statutes: Clean Air Act, Clean Water Act, CERCLA. Ohio imposes an annual chemical inventory filing fee of \$100.00 base fee, plus \$10 for each additional hazardous substance over 5 substances and \$50 per extremely hazardous substance reported. The facility filing fee cap is \$2,500.

TABLE 12: POTENTIAL CHANGES IN MERCURY REGULATIONS

Using Mercury

Regulation Category	Fed/State	Potential Change
Commerce: Import tax	Fed	<ul style="list-style-type: none"> • Mercuric oxide, a mercury compound used in military and medical batteries, will be exempt from all import duties under GATT effective July 1, 1995. • Bills introduced into the House and Senate would extend the duty waiver on mercuric oxide that expired at the end of 1992. • A bill introduced into the Senate would suspend the duty on equipment used to recycle mercury and other parts of fluorescent bulbs.
Government Stockpile sales	Fed	<ul style="list-style-type: none"> • 1995 Annual Materials Plan requests authorization to sell 20,000 flasks of mercury • DLA may offer long term sales contracts for mercury fiscal year 1994 mercury sales.
Products	Fed	<ul style="list-style-type: none"> • Bills introduced into Congress would limit the mercury content and impose sales restrictions on batteries containing mercury, and limit the mercury content in packaging

Releasing Mercury

Regulation Category	Fed/State	Potential Change
Air emissions	Fed (CAA)	<ul style="list-style-type: none"> • Mercury study: identifying sources of mercury, public health, and environmental effects, and available control technologies • Utility study: evaluating utility HAP emissions and public health effects; may recommend emissions limits • Municipal waste incinerator rules (CAA §129): may result in mercury emissions limits for municipal and medical waste incinerators • Great waters study: • MACT standards
	Fed (RCRA)	<ul style="list-style-type: none"> • Hazardous waste combustion rules, BIF rules
Water discharge	Fed (CWA)	<ul style="list-style-type: none"> • GLI: uniform water quality standards for mercury • CWA reauthorization: proposed changes include discharge taxes and bans
Waste disposal	Fed (RCRA) MN	<ul style="list-style-type: none"> • Hazardous waste combustion rules, BIF rules, lamp disposal rules • Solid waste incinerator standards
Reporting requirements	Fed (TRI)	<ul style="list-style-type: none"> • Lower thresholds, expanded reporting community

Appendices

Appendix A: Mercury Use Tree

Appendix B: Industrial Sources of Mercury and Applicable Mercury-Specific Regulations

Appendix C: Products that Contain Mercury

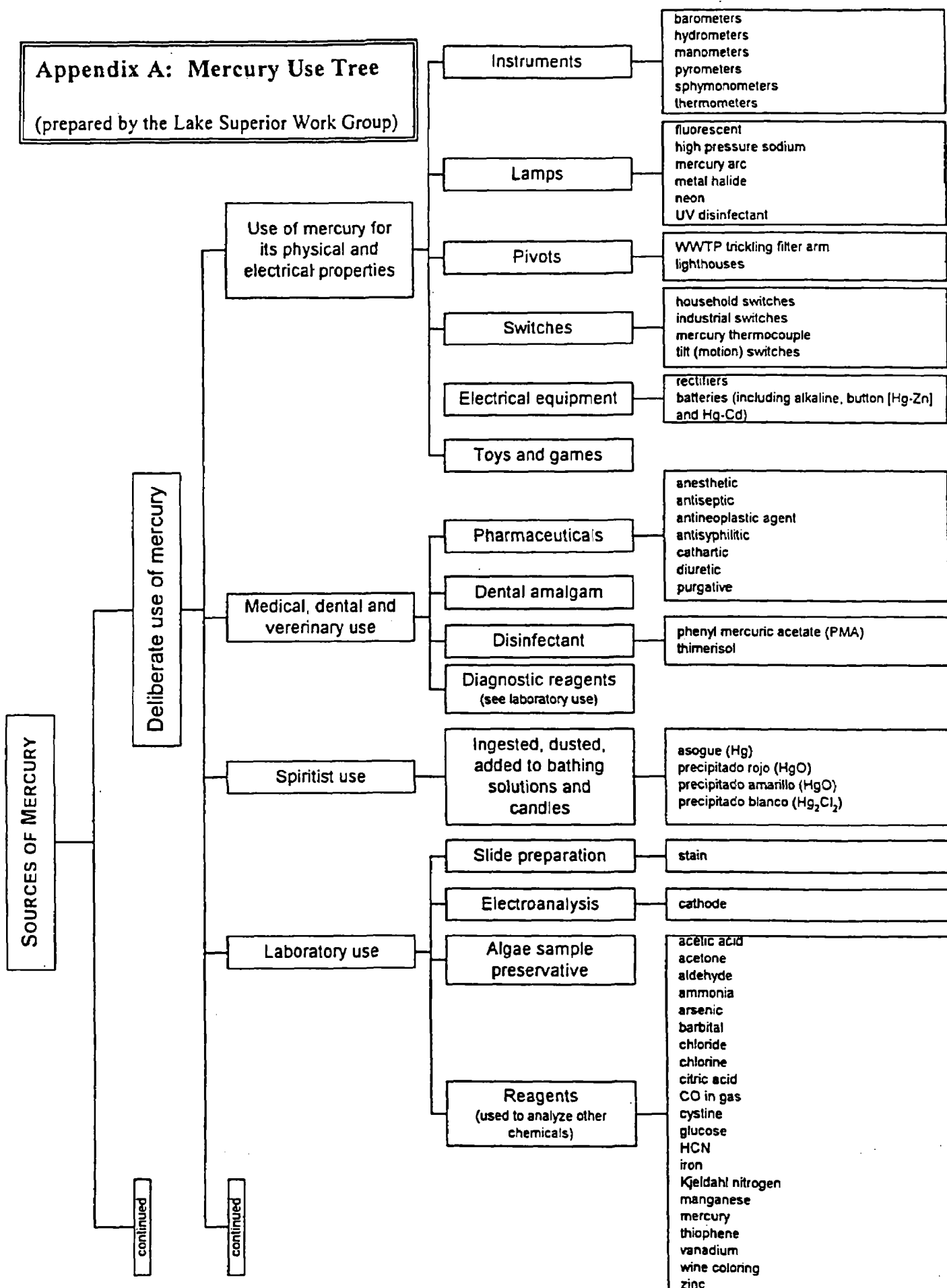
Appendix D: Summary of Mercury-Specific Statutes in the Great Lakes States

Appendix E: Battery Statutes

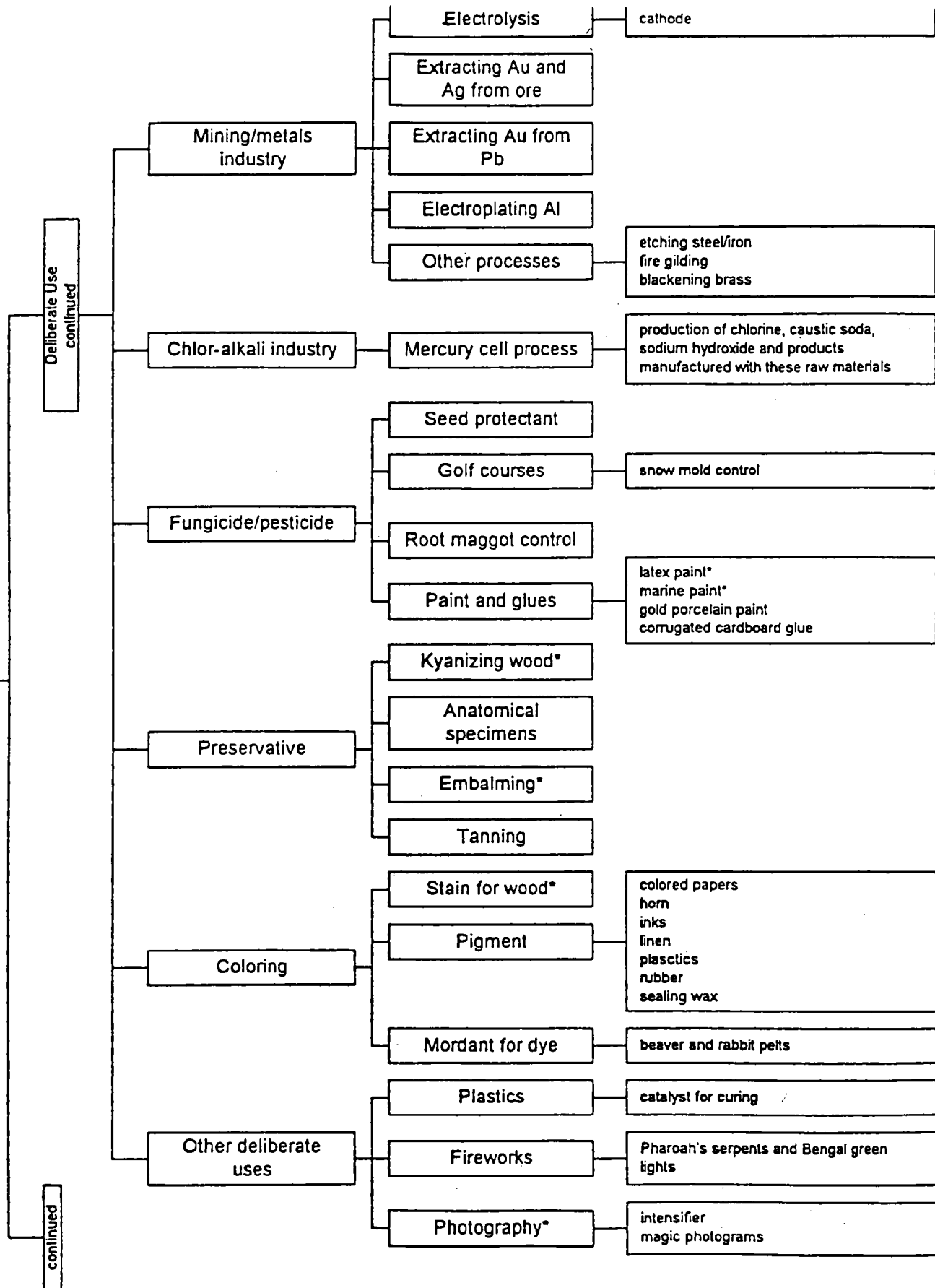
Appendix F: Data on Mercury Releases

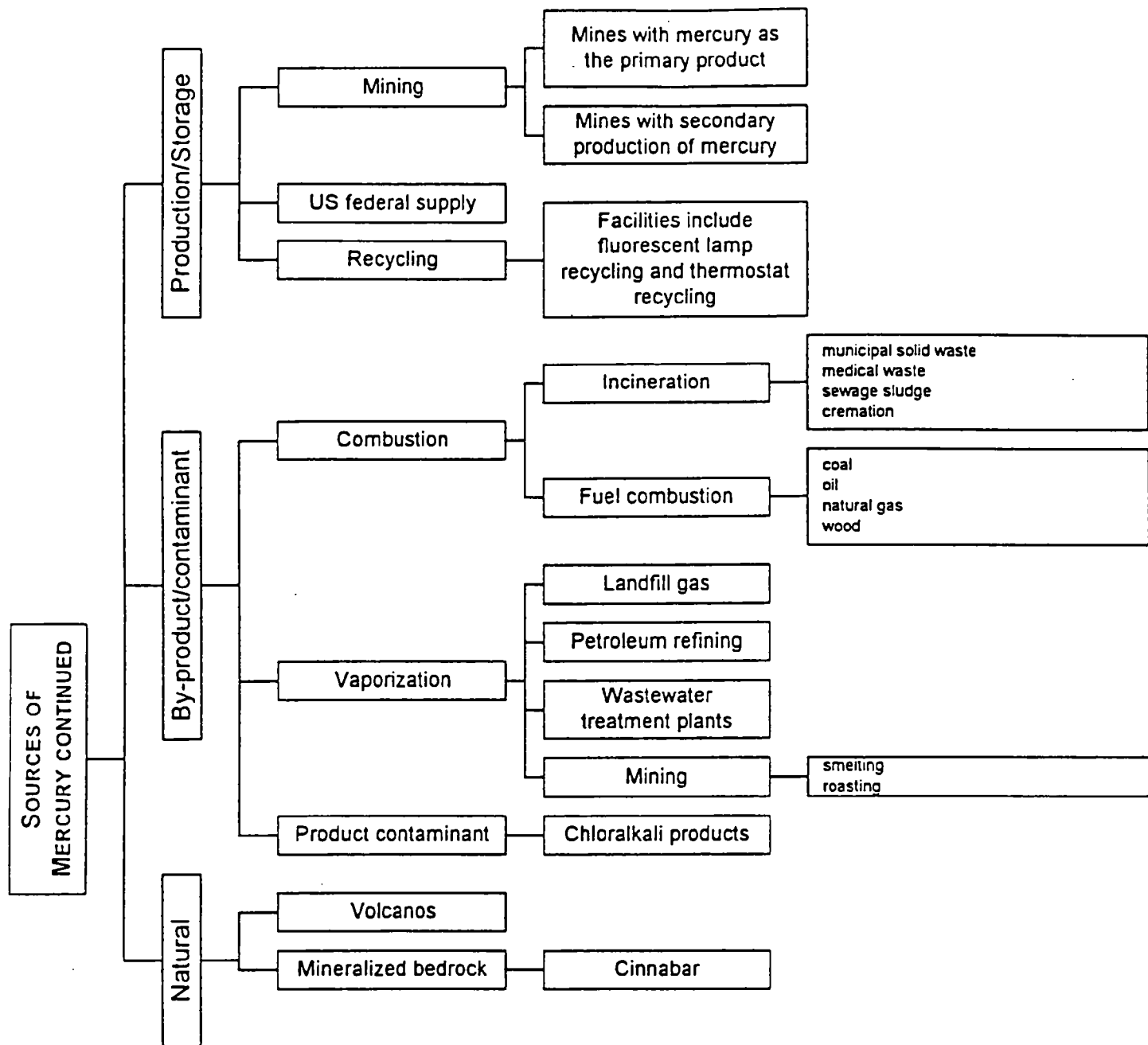
Appendix A: Mercury Use Tree

(prepared by the Lake Superior Work Group)



SOURCES OF MERCURY CONTINUED





* = discontinued

The mercury use tree was developed by Carri Lohse-Hanson of the Minnesota Pollution Control Agency on behalf of the Lake Superior Workgroup. The use tree is part of the Binational Program to restore and protect the Lake Superior basin.

Appendix B: Industrial Sources of Mercury and Applicable Mercury-Specific Regulations

SOURCE	# FAC. IN GL*	ORIGIN/USES OF MERCURY	AIR RELEASES **	WATER DISCHARGES ***	WASTE MANAGEMENT****	COMMENTS
MERCURY PRODUCTION						
Primary Hg Production		Hg no longer produced from Hg ore; primary Hg recovered as by-product from gold ores	NESHA/PS: Hg air emissions shall not exceed 2300 grams Hg/24hrs for mercury ore processing facilities (40CFR61.52)	Hg effluent limits for primary precious metals and Hg subcategory (40CFR 421.250) and mercury ore subcategory (40CFR440.40)	Solid wastes from extraction, beneficiation, and processing of ores exempt from RCRA hazardous waste regulations under DeVill amendment.	Mining facilities do not report chemical releases under TRI.
Secondary Hg Production	PA--2 IL--1 NY--1	Recycling/recovery of Hg containing products (e.g. dental amalgams, batteries); industrial waste and scrap (e.g. instrument and electrical manufacturing, waste, sludges from research labs)	Designated major source category of HAP emissions (CAA§112(c))	Hg effluent limits for secondary Hg subcategory (40CFR421.200)--NSPS, PSNS based on amount of Hg produced or processed		In-house Hg reclamation also occurs at industrial plants. A bill introduced into the US Senate would eliminate the tariff on machines used to recycle Hg from fluorescent bulbs. MN: drafting management standards for facilities recycling hazardous wastes. Hg refining plants in NY, PA, IL. MN also has three lamp recycling facilities.

Key: Hg - Mercury, CAA - Clean Air Act, NESHA/PS -
National Emissions Standards for Hazardous Air
Pollutants, HIF - boilers and industrial furnaces, TRI -
Toxic Release Inventory, MSW - municipal solid waste,
HAP - hazardous air pollutant, MACT - maximum
achievable control technology

Note: This table shows the significant sources of Hg releases by source category, and how those releases are currently regulated. Appendix A includes five categories of mercury sources: (1) Mercury Production, (2) Use as a Manufacturing Input, (3) Waste Disposal, (4) Release as a By-Product of Manufacturing, (5) Release as a By-Product of Electrical Generation. An asterisk (*) indicates that additional information appears on the last page.

Appendix B: Industrial Sources of Mercury and Applicable Mercury-Specific Regulations

SOURCE	# FAC. IN CL*	ORIGIN/USES OF MERCURY	AIR RELEASES **	WATER DISCHARGES ***	WASTE MANAGEMENT****	COMMENTS
MERCURY PRODUCTION CONT.						
Hg compound production	NY--3 OH--1 PA--1	Hg compounds include mercuric oxide, mercuric chloride, mercuric & mercurous sulfate, mercurous nitrate, organic Hg salt, thimersol				Many mercury compounds are imported. Duty for mercuric oxide will be suspended under GATT

NOTE: Other sources of Hg, including the National Defense Stockpile, Department of Energy stocks, and imports are discussed in the overview of mercury regulation.

Appendix B: Industrial Sources of Mercury and Applicable Mercury-Specific Regulations

SOURCE	# FAC. IN GL*	ORIGIN/USES OF MERCURY	AIR RELEASES **	WATER DISCHARGES ***	WASTE MANAGEMENT****	COMMENTS
MERCURY USE IN MANUFACTURING*****						
Chemical And Allied Products						
Chlorine/Caustic Soda Manufacture (mercury cell chlor-alkali process)	WI--1 OI--1	Used as a catalyst in mercury cell process at chlor-alkali plants, which manufacture chlorine and sodium hydroxide. Hg cell process accounted for 14% of 1992 US chlorine production.	Hg emissions cannot exceed 2300g /24hrs; prescribed stack sampling methods required, and approved practices to meet specified ventilation emissions. (CAA (40CFR61, NESHAPS))	Existing Sources: BAT, BPT Hg effluent limits New Sources: NSPS, PSNS No pretreatment standards for existing sources using mercury cell process (40CFR415.60)	Industry Specific: K071 and K106 are chlor-alkali wastes listed specifically for Hg. Land disposal restrictions for chlor-alkali process wastes effective May 1993	Largest single use of Hg in US Impact of land disposal restrictions: some facilities are building mercury recovery plants; others are shipping wastes to Canada Many Hg cell plants have changed to diaphragm cell process
Laboratory Uses		Used in instruments as reagent, catalyst, indicator, and for calibration, sealing, and radioactive diagnosis		No restriction --POTWs may develop public education campaigns for labs		Use declined from 32 metric tons in 1990 to 10 metric tons in 1991.
Paint		Mercury compounds used to control microbial growth in latex paint cans; prevent mildew growth on painted surfaces; anti-fouling agent in maritime paint			1992 - Phenylmercuric acetate (Hg compound used in paints) is an acute RCRA waste	<ul style="list-style-type: none"> All registrations for mercury biocides used in paint banned or voluntarily cancelled by registrant Hg in paints expected to continue declining as existing supplies depleted. Paint on buildings is demolition waste (not RCRA)
Other Chemical and Allied Products		(see Table 5 and Appendix B for mercury- containing products.)				

Appendix B: Industrial Sources of Mercury and Applicable Mercury-Specific Regulations

SOURCE	# FAC. IN GL*	ORIGIN/USES OF MERCURY	AIR RELEASES **	WATER DISCHARGES ***	WASTE MANAGEMENT****	COMMENTS
Chemical And Allied Products						
Pesticides		Mercury compounds used as pesticides, biocides, fungicides		Process wastewater from manufacture of metallo-organic pesticides w/active ingredient containing Hg prohibited, subject to variances approved by EPA (40CFR455.30)		Voluntary cancellation of last two mercury-containing fungicides announced in November 1993

Appendix B: Industrial Sources of Mercury and Applicable Mercury-Specific Regulations

SOURCE	# FAC. IN GL*	ORIGIN/USES OF MERCURY	AIR RELEASES **	WATER DISCHARGES ***	WASTE MANAGEMENT****	COMMENTS
Electrical And Electronic Uses						
Electric Lamps		<p>Use: electrical conductor Hg emitted when lamps break</p> <p>Products: High intensity lamps; mercury vapor lamps (used in motion picture production, photography, heat therapy); metal halide lamps; high pressure sodium lamps; incandescent lamp filaments, fluorescent lights</p>		Waste streams from fluorescent bulb manufacturing exempted from pretreatment regulations (for all chemicals)	Hg levels in some products meet RCRA or state hazardous waste definition and require special management and disposal	<p>Second largest source of mercury in MSW</p> <p>Fluorescent bulbs are promoted for energy conservation, but considered hazardous waste due to Hg levels; EPA is considering two options to avoid full Subtitle C regulation: (1) conditional exemption; (2) inclusion in universal waste rule.</p> <p>MN has three lamp recycling facilities</p>
Wiring Devices & Switches		<p>Hg encased in metal is used as conductor to close electrical circuit</p> <p>Products: thermostats, Hg cells in smoke detectors, mercury arc rectifiers, silent switches, tilt switches, relays, cathode tubes used for radios, radar, & telecommunications equipment, electric toys</p>		No pretreatment limits for switchgear wastestreams (for any chemicals)		Components found in a wide variety of equipment with electrical parts (e.g. white goods)

Appendix B: Industrial Sources of Mercury and Applicable Mercury-Specific Regulations

SOURCE	# FAC. IN GL*	ORIGIN/USES OF MERCURY	AIR RELEASES **	WATER DISCHARGES ***	WASTE MANAGEMENT****	COMMENTS
Electrical And Electronic Uses, Cont.						
Battery Manufacturing		(1) Used as anode or electrolyte to prevent corrosion and hydrogen release; extends shelf-life; improves performance in extreme temperatures. Products: alkaline batteries		Hg effluent limitations for LeClanche subcategory (zinc anode batteries w/acid electrolyte) (40CFR461.40); NSPS, PSNS, PSES based on mg/kg cell produced for specified operations only; no discharge allowed from nonspecified operations		Battery manufacturers have eliminated Hg levels in alkaline batteries to .025% (zero added mercury); Hg cannot be eliminated from mercuric oxide batteries where mercuric oxide is used as an electrode material. Batteries are largest source of Hg in MSW incinerators.
		(2) used as cathode in Hg oxide batteries. Products: mercuric oxide (Hg zinc) button batteries, silver oxide, zinc-air, carbon zinc batteries, mercuric oxide cannister batteries. Hg leaches from corrosion in landfill; volatilizes during combustion		Hg effluent limits for zinc subcategory (40CFR461.70) - BPT, BAT, NSPS, PSES, PSNS specified for various processes		Military and medical batteries use mercuric oxide to meet performance specifications; the import duty for mercuric oxide will be suspended under GATT MN, WI, NY: restrict the Hg content in alkaline batteries MN bans sale of mercuric oxide batteries; pending federal legislation may ban mercuric oxide batteries

Appendix B: Industrial Sources of Mercury and Applicable Mercury-Specific Regulations

SOURCE	# FAC. IN GL*	ORIGIN/USES OF MERCURY	AIR RELEASES **	WATER DISCHARGES ***	WASTE MANAGEMENT****	COMMENTS
Instruments And Related Products						
Mensuring & Control Instruments		Use: Hg used to measure or control reactions and equipment functions; Products: thermometers (primary use), pressure sensing devices (barometers, manometers), navigational equipment, seals, valves; medical/scientific instruments: Hg emissions occur during cleaning and refilling, and from instruments in municipal solid waste	None	None		Digital thermometers are replacing Hg thermometers. Hg thermometers banned in Sweden. MN has special management and disposal restrictions on thermostats.
Dental Equipment & Supplies		Uses: forms alloys; chemically binds compounds together to form stable restorative material (amalgam is an alloy) Products: dental amalgam -- fillings for teeth, other dental equipment and supplies.	None	No specific pretreatment regulations -- POTWs may develop education programs for dental offices		Dental amalgams may be a major source of elemental mercury vapor exposure to the general population. Dental amalgam in waste water contributes to POTW Hg levels; may contribute to mercury emissions in crematoriums.
NOTE: For product-specific information, please see Appendix B. Mercury has several thousand applications. Not all products and uses are specifically listed.						

Appendix B: Industrial Sources of Mercury and Applicable Mercury-Specific Regulations

SOURCE	# FAC. IN GL*	ORIGIN/USES OF MERCURY	AIR RELEASES **	WATER DISCHARGES ***	WASTE MANAGEMENT****	COMMENTS
PRODUCT DISPOSAL- INCINERATION AND LAND DISPOSAL						
Municipal Waste Incineration (under CAA, fuel feed stream must be >30% municipal waste)		Hg is present in solid waste (batteries, electric lighting, etc.) - Hg emitted when waste is burned at high temperatures	No existing federal Hg limit; EPA must establish numerical limits for Hg emissions (§129(u)(4)); not included in list of HAP source categories. MN - proposed waste combustion rules including emissions limits; new incinerator permits with Hg limits will require air monitoring systems and periodic stack testing.	N/A	MSW ash is considered hazardous waste if it exceeds RCRA toxicity levels. Supreme Court decision (<i>Chicago v. EDF, March 1994</i>)	Municipal solid waste include waste generated from residential, commercial, and institutional sources; equipment installed to trap Hg ash and acid rain gases do not control Hg emissions MN: Hg must be removed from products before disposal. OH: Considering installing Hg emission control equipment and separating Hg containing products; IL: Incinerator technology based on consideration of specific pollutants.
Commercial/Industrial Waste Incinerators		Hg present in wastes: batteries, lighting, etc.	No existing federal Hg limit; EPA must establish numerical limits for Hg emissions (§129(u)(4)); not included in list of HAP source categories.	N/A		

Appendix B: Industrial Sources of Mercury and Applicable Mercury-Specific Regulations

SOURCE	# FAC. IN GL*	ORIGIN/USES OF MERCURY	AIR RELEASES **	WATER DISCHARGES ***	WASTE MANAGEMENT****	COMMENTS
PRODUCT DISPOSAL - INCINERATION AND LAND DISPOSAL, CONT.						
Sewage Sludge Driers & Incinerators	NY--33 PA--21 MI--19	Hg in sludge from wastewater treatment plants.	CAA - Hg emissions limit = 3200g/24hrs; annual monitoring and reporting if Hg emissions exceed 1600 g/24hrs; prescribed emissions testing procedure or procedures for sludge to demonstrate compliance (40CFR61.52, NESIAPS); Listed as source category for HAP emissions limits (CAA §112(c)(1))	(see wastewater treatment)		
Wastewater Treatment		Hg present in wastewater entering facility	No existing standards; listed as category of HAP sources -- MACT standards due 1995 (CAA §112(c)(5)) - standards may include pretreatment control measures and process or product substitutions or limitations (§112(n))	Mercury is eligible for removal credits - POTWs may request removal credits against facility pretreatment limits, as long as POTW meets sludge concentration limits	Sludges for land application or surface disposal must meet specific concentration requirements for agricultural land, forest land, public contact sites, home garden application or landfills Hg concentration limits in sludge: 57 mg/kg limit for land application of sludge (40CFR503)	EPA will conduct studies to characterize HAP emissions from industries discharging to POTWs Hazardous waste incinerators may test Hg content in sludge in lieu of emissions testing requirements. Western Lake Superior Sanitary District (WLSSD) in Duluth, MN has active pollution prevention program MI - POTWs must have waste minimization plans
Hazardous Waste Incinerators	IL--1		No uniform emissions standards; Hg limits depend on individual		Residues must meet LDR specifications	Not specifically listed as CAA §112 (c) source category for HAP emissions limits or

Appendix B: Industrial Sources of Mercury and Applicable Mercury-Specific Regulations

SOURCE	# FAC. IN GL*	ORIGIN/USES OF MERCURY	AIR RELEASES **	WATER DISCHARGES ***	WASTE MANAGEMENT****	COMMENTS
PRODUCT DISPOSAL - INCINERATION AND LAND DISPOSAL, CONT.						
Hazardous Waste Incinerators (cont.)			permits; facilities shielded from regulatory changes until permit expires (CFR 264.344) Waste analysis required to determine Hg concentrations unless incinerator has documentation of no Hg presence (40CFR265.341)			§129 (solid waste incineration) EPA is revising draft hazardous waste combustion rules - considering technology-based vs risk-based standards Cement kilns also burn hazardous waste
Medical Waste Incinerators		Hg in wastes generated from hospitals, clinics, labs, etc.	No existing Hg limits; EPA must establish numerical limits for Hg emissions (§129(u)(4)); not included in list of HAP source categories. WI - incinerators with capacity >5 tons/day must be tested for Hg during first 90 day period and following year			
Landfills				Monitor for Hg in groundwater; leachate testing requirements	Subtitle D (non-hazardous) landfills: leachate cannot exceed 0.2mg/l Hg;	MN - studying Hg content of landfill gas and leachate. IL - Hg components must be removed from discarded white goods (e.g. appliances) before disposal
PRODUCT DISPOSAL - INCINERATION AND LAND DISPOSAL, CONT.						

Appendix B: Industrial Sources of Mercury and Applicable Mercury-Specific Regulations

SOURCE	# FAC. IN GL*	ORIGIN/USES OF MERCURY	AIR RELEASES **	WATER DISCHARGES ***	WASTE MANAGEMENT****	COMMENTS
Landfills (cont.)					Subtitle C (hazardous waste) landfills: disposal prohibited unless waste undergoes prescribed treatment to reduce Hg to regulated levels	MN: Hg must be removed from products before disposal.
					Determine Hg concentrations if food chain crops are grown - Hg cannot be transferred to food chain portion of crop	
Ash disposal facilities		Mercury in incinerator ash	permit specific			
Auto salvage/scrap yards		Automobile components have Hg, some automobiles used for illegal disposal; Hg released from crushing switches			MN monitors mercury levels	MN: developing best management practices for yard operators
Crematories		Hg in dental fillings volatilizes during cremation				
Hospitals, Dentists		Mercury in waste streams (water and solid waste)		No pretreatment regs		IL: P2 Bureau gives guidance on Hg disposal MN: WISSD has a brochure for dentists OH: Community volunteer efforts address Hg in waste
MERCURY AS A BY-PRODUCT OF MANUFACTURING PROCESSES						

Appendix B: Industrial Sources of Mercury and Applicable Mercury-Specific Regulations

SOURCE	# FAC. IN GL*	ORIGIN/USES OF MERCURY	AIR RELEASES **	WATER DISCHARGES ***	WASTE MANAGEMENT****	COMMENTS
Carbon Black Production	MI--1 OI--1	Hg present in oil feedstock		No Hg limits; but discharge of process waste water prohibited except to POTWs. 40CFR458		
Coke Production	IL--3 IN--3 MI--1 NY--1 OI--3, PA--3	Hg is By-product present in coal used as feedstock for coke oven batteries (primary feedstock for iron and coal industry)				
Petroleum Refining		Hg present in petroleum crude		No specific Hg limits.		
Lime Manufacturing	IL--1 OI--1 PA--1	Hg present as impurity in processed stone and from fuel used to heat kilns				
Portland Cement Manufacturing		Hg present in ore and minerals used as raw materials; Hg in fossil fuels used in cement kilns	No specific Hg limits; RCRA BIF rule sets emissions limits and operating standards for kilns and other facilities that burn wastes; all BIFs operate under interim status Feed rate screening limits for mercury specified under interim standards for burners or industrial furnaces (40CFR266.103 and 266.106)			Cement kiln dust exempt from RCRA hazardous waste definition. Cement industry is increasing its use of municipal, industrial, and hazardous wastes for kiln firing to replace fossil fuel use (for energy conservation); EPA is revising draft hazardous waste combustion rules
Phosphate-based fertilizer factories		Hg is trace element in rock phosphate				

Appendix B: Industrial Sources of Mercury and Applicable Mercury-Specific Regulations

SOURCE	# FAC. IN GL*	ORIGIN/USES OF MERCURY	AIR RELEASES **	WATER DISCHARGES ***	WASTE MANAGEMENT****	COMMENTS
MERCURY AS A BY-PRODUCT OF MANUFACTURING PROCESSES, CONT.						
Primary Smelting & Refining of Copper	MI--1	Copper recovered from sulfide ore that contains Hg		Hg effluent limits for copper, lead, zinc, gold, silver ores subcategory (40 CFR 440.100)		Residues exempted from RCRA under Bevill exclusion
Primary Smelting & Refining of Nonferrous Metals, Except Copper & aluminum		Hg present in almost all minerals; lead recovered from sulfide ore that contains Hg; zinc smelting process generates Hg emissions	No existing regulations for mercury Many mining facilities are listed as source categories for HAPS	Hg effluent limitations for: primary antimony subcategory (nonferrous metals category). (40CFR421.140); copper, lead, zinc, gold, silver, and molybdenum ores (40CFR440.100), and platinum ores subcategory (440.110)		Residues exempted from RCRA under Bevill exclusion

Appendix B: Industrial Sources of Mercury and Applicable Mercury-Specific Regulations

SOURCE	# FAC. IN GL*	ORIGIN/USES OF MERCURY	AIR RELEASES **	WATER DISCHARGES ***	WASTE MANAGEMENT****	COMMENTS
MERCURY RELEASED AS A BY-PRODUCT IN POWER GENERATION AND HEATING						
Electric Power Generation (Utility Boilers)		Hg present in coal, oil, natural gas, or wood used in electric utility steam generating units - emitted as trace contaminant when volatilized at high temperatures.	No current Hg emissions limits under CAA. CAA 112(n)(1)(A) Utility Study Report to Congress due 11/94 will analyze the public health hazards from utilities; EPA may promulgate regulations based on study results; utilities exempted from list of sources accounting for 90% of Hg emissions that will require MACT standards (§112(c)(6))	No detectable Hg allowed in discharge	Residues exempt from RCRA under Bevill exclusion	Coal has highest Hg content of fossil fuels. 80% of energy consumption in utility boilers is from coal combustion; 95% of coal is bituminous and subbituminous coal.
Commercial & Industrial Boilers		Hg present in fuels				
Residential Boilers and Wood Stoves		Hg present in fuels				

Appendix B: Industrial Sources of Mercury and Applicable Mercury-Specific Regulations

SOURCE	# FAC. IN GL*	ORIGIN/USES OF MERCURY	AIR RELEASES **	WATER DISCHARGES ***	WASTE MANAGEMENT****	COMMENTS
<p>Notes:</p> <p>Source categories used to identify manufacturing uses of mercury follow Bureau of Mines categories, which track U.S. industrial consumption of refined Hg metal.</p> <p>Mercury releases to air, water and land are reported by manufacturing firms that meet TRI threshold requirements. Manufacturing facilities (SIC codes 20-39) that have 10 or more full time employees and manufacture/process 25,000 pounds of a listed chemical or otherwise use 10,000 pounds of a listed chemical must report chemical release information in TRI.</p> <p>* "# FAC. IN GL" = number of facilities in Great Lakes States. Source: National Emissions Inventory of Mercury and Mercury Compounds: Interim Final Report, USEPA, 12/93.</p> <p>** Air emissions: EPA must list source categories that account for 90% of aggregate Hg emissions by 1995, excluding electric utilities. Sources will be subject to MACT standards within 10 years (§112(c)(6)). EPA has also published a list of major categories and subcategories of sources that emit hazardous air pollutants (including mercury and compounds). Any stationary source emitting more than 10 tons per year of a listed substance or 25 tons per year of any combination of substances will be subject to MACT standards. Major air toxics emitters will require permits.</p> <p>*** Water discharge: BAT=best available control technology, BPT=best practicable control technology, NSPS=new source performance standards, PSNS=pretreatment standards for new sources, PSES=pretreatment standards for existing sources. States may impose more stringent permit limits to meet water quality standards for mercury (standards vary by state). Facilities must notify POTW of hazardous substances discharged which are not covered by pretreatment standards.</p> <p>**** Waste management: Mercury is a listed and characteristic waste under RCRA. Any source listed here may be generating D009, the RCRA hazardous waste code that identifies wastes characteristic for mercury. Other RCRA waste codes that identify mercury include U151 (mercury), K071 and K106 (listed for mercury), F039 (listed for multiple sources), P065 and P092 (mercury compounds). All mercury-containing wastes have land disposal restrictions. Specified treatment for mercury-containing wastes is incineration or thermal processing (40CFR 268.42).</p>						

Appendix C: Regulations on Products that Contain Mercury

Note: This table highlights regulations that affect the most common mercury-containing products. It is not a comprehensive list of all products that may contain mercury. The "Comments" section includes general information that expands on the regulatory information.

Product/Use	Role of Mercury	Regulations/Programs on Mercury Products	Fed/State Regulation	Comments
Chemical and Allied Products				
Agricultural Products	Mercury compounds used as pesticides, bactericides, disinfectants, fungicide	Restricted and/or banned under FIFRA	Federal	
Turf Products	Pesticide	Calo-chlor and calo-gran, the last mercury-based pesticides registered for use in U.S. voluntarily cancelled by manufacturer (Grace Sierra Crop Protection) in November 1993	Federal	Approximately 21,000 pounds used annually on golf course turf and greens to control fungi Pink Snow Mold and Grey Snow Mold; manufacturer may sell and distribute products labeled for release or shipment before 6/93 until 6/94; retailers may sell products until stocks exhausted; users may use products until stocks depleted.
	Fungicide	Prohibits use of mercury in fungicides	MN	
Paint	Mercury compounds used as biocide to control microbial growth in paint cans and prevent mildew on painted surfaces	Registrations for mercury compounds in indoor and outdoor latex paint banned or cancelled (1990, 1991)	Federal	Manufacturers may use up existing stocks
		Anti-fouling paints for marine use banned in 1972	Federal	Cancellation of biocide registrations has reduced Hg consumption in paint, and paint residue in municipal solid waste; paint cans w/mercury residue are still discarded
		No Hg deliberately introduced into paint intended for use in MN (except in art supplies)	MN	
Pigment, Dyes	Coloring (maroon, red, orange) primarily for plastics	Cadmium-mercury pigments no longer manufactured in U.S. (domestic production ceased in 1988); may still be imported	Federal	Many states have laws that phase out metals in pigments
		No Hg deliberately introduced into pigments and dyes intended for use in MN (except in art supplies)	MN	
Cosmetics	Preservative, antimicrobial	Limited to eye area cosmetics or ointments with concentration <65 ppm (21CFR700.13)	Federal	

Appendix C: Regulations on Products that Contain Mercury

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Product/Use	Role of Mercury	Regulations/Programs on Mercury Products	Fed/State Regulation	Comments
Pharmaceuticals	Used in antiseptics, ointments, diuretics	Misbranded drug laws - list quantity of mercury in product	IL, IN, NY, OH, PA	
		Yellow mercuric oxide is not generally recognized as safe and effective, or is misbranded for over the counter use	Federal	
Poisons		Restrictions on sale of mercury and mercury compounds	OH	
		Levels established for Hg products to be considered poisons	PA	
Catalysts	Hg used as catalysts for production of vinyl chloride monomers and urethane foams, as well as other products			
Packaging		Restrictions on mercury content in packaging and packaging components; no products may be sold in packaging that contains intentionally introduced Hg	IL, MN, NY, WI	Implementation dates vary by state, and include general exceptions if no feasible alternatives exist; Pennsylvania is considering bill to regulate toxic materials in packaging
Special Paper Coatings	Mercury bromide and mercury acetic acid used in specialized paper and film with cathode ray tubes			Manufacturers plan to phase out use of mercury in coating
Explosives	Mercury fulminate is detonator	Explosives containing mercury are Class A, maximum hazards	MN, WI	In the last 20 years, only the military has used mercury explosives
Fireworks	Catalyst/explosive	Permits required for fireworks with mercury	MI	
Livestock and Poultry Remedies		List percentage of mercury on remedy	MI	

Appendix C: Regulations on Products that Contain Mercury

Note: This table highlights regulations that affect the most common mercury-containing products. It is not a comprehensive list of all products that may contain mercury. The "Comments" section includes general information that expands on the regulatory information.

Product/Use	Role of Mercury	Regulations/Programs on Mercury Products	Fed/State Regulation	Comments
Electrical and Electronic Uses				
Electric Lighting				Electric lighting products are second largest component of municipal solid waste (after batteries)
Fluorescent Lamps (low pressure)	Mercury vapor fluoresces at UV wavelength	Encouraged as replacement for incandescent bulbs for energy conservation (see 10CFR450.31 - energy conservation measures)	Federal	Fluorescent lights are largest component of electric lighting discards in municipal solid waste; used bulbs considered hazardous waste because high levels of mercury exceed RCRA toxicity characteristic limit (.2 mg/l in leachate)
		Lamps in state-owned buildings must be recycled	MN	
		Viewed as by-product that can be recycled, and exempt from RCRA	OH	
		Lamps sold to managers of industrial, commercial, office, or multiunit buildings must be labeled; building contractors must specify mercury management plans for removed lamps	MN	
Mercury Vapor Lamps	Facilitates light production by electric arc	Encouraged for energy conservation (see 10CFR450.31 - energy conservation measures)	Federal	
		Lamps must be self-extinguishing or have protective shield; efficiency standards in public areas (theaters, gyms)	NY	
		Mercury must be removed before disposal; lamp sellers and contractors responsible for public education about mercury management requirements; limits on production and distribution of lamps	MN	
High Intensity Lamps		Lamps sold to managers of industrial, commercial, offices, or multiunit buildings must be labeled; building contractors must specify mercury management plans for removed lamps	MN	Used for outdoor lighting; mercury lamps are more efficient and brighter than other outdoor lights

Appendix C: Regulations on Products that Contain Mercury

Note: This table highlights regulations that affect the most common mercury-containing products. It is not a comprehensive list of all products that may contain mercury. The "Comments" section includes general information that expands on the regulatory information.

Product/Use	Role of Mercury	Regulations/Programs on Mercury Products	Fed/State Regulation	Comments
Metal Halide Lamps			Federal	Encouraged for energy conservation (see 10CFR - energy conservation measures)
Incandescent Lamp Filaments	Hg used as continuous electrical contact in tungsten bar sintering			
Wiring Devices and Switches				
Thermostats	Temperature measurement	Mercury must be removed for recycling or recovery before disposal; manufacturers must provide information and incentives to ensure recycling or proper management; heating, ventilating and air-conditioning (HVAC) dealers required to properly manage or recycle used mercury thermostats (MN St 115A.93, 115A.9561, 115.932)	MN	Digital thermostats are replacing mercury thermostats; long lag time before old Hg thermostats discarded
		Products containing Hg must be labeled, including disposal restrictions	MN	MN just began pilot program for HVAC dealers to recycle mercury containing thermostats by return them to HVAC wholesaler who, in turn, returns them to Honeywell for recycling/reclaiming
White Goods	Mercury components (e.g., switches) may be included in large appliances (e.g., refrigerators, air conditioners, etc.)	Mercury components must be removed prior to disposal	MN, IL	
		Hg in repaired or replaced items must be reused or recycled	MN	
Toys		Ban on toys with Hg; fines imposed for retail sales	MN, WI	
Electric Wall Switches		Products containing Hg must be labeled, including disposal restrictions	MN	

Appendix C: Regulations on Products that Contain Mercury

Note: This table highlights regulations that affect the most common mercury-containing products. It is not a comprehensive list of all products that may contain mercury. The "Comments" section includes general information that expands on the regulatory information.

Product/Use	Role of Mercury	Regulations/Programs on Mercury Products	Fed/State Regulation	Comments
Electrical Components	May be included in any electrical machinery (e.g., mining, automotive, and industrial equipment, smoke detectors, etc.)	Limits on mercury use in mining equipment	PA	
		Products containing mercury must be labelled, including disposal restrictions	MN	
Batteries				
General Mercury Containing Batteries		Batteries included in universal waste rule to ease RCRA restrictions on hazardous waste management and divert waste from MSW landfills; states may set up special collection programs not subject to storage, transportation, and permitting requirements of RCRA		Batteries were largest source of Hg in municipal solid waste. Many states have banned mercury in batteries; manufacturers have reduced mercury use by over 90% since 1988.
		Deposit/refund system will begin in 1998: purchasers return used mercury batteries to retailer or approved collection facility	MI	EPA is requesting comments on labeling batteries to aid in collection, sorting, and recycling; denied a petition filed under §TSCA to require deposit on mercury-containing batteries.
		Task force on storage, transport, disposal, recycling	IL	Industry groups have developed uniform voluntary industry labeling standards for lead and cadmium batteries
Alkaline Batteries	Prevents corrosion and hydrogen release, extends shelf life; improves performance over temperature range (batteries used in flashlights, radios, and other electronics)	Hg concentrations <.025% by weight	MN, NY	Battery manufacturers have eliminated mercury in alkaline batteries, except button cells and reusable batteries.
		Hg banned in alkaline batteries in 1996	MN, WI	
			MN	

Appendix C: Regulations on Products that Contain Mercury

Note: This table highlights regulations that affect the most common mercury-containing products. It is not a comprehensive list of all products that may contain mercury. The "Comments" section includes general information that expands on the regulatory information.

Product/Use	Role of Mercury	Regulations/Programs on Mercury Products	Fed/State Regulation	Comments
Mercuric Oxide Batteries (also button cell, mercury-zinc button cell)	Mercury used as cathode material and is integral component (button cell batteries contain ~40% mercury)	Sale of dry cell batteries with mercuric oxide, electrode batteries prohibited without exemption; button cell nonrechargeable batteries restricted to <25mg Hg; labeling requirements; disposal prohibited; manufacturers responsible for collection system Hg content of alkaline button cell batteries must be <25 mg by weight	MN NY	Primarily used in hearing aids; also used in calculators, watches, cameras, photographic equipment, electronic games, health/hospital equipment, airplane underwater locator beacons NY is exploring recycling options for these batteries Some mercuric oxide cells used in military and medical operations (e.g., night vision devices, EKG machines, etc.) are disposed of as hazardous waste Proposed federal legislation may ban mercuric oxide batteries.
Carbon Zinc (LeClanche)	Contain ~1% Hg; Hg controls chemical reactions between zinc and other battery components	Sale prohibited if Hg concentration > 1ppm Sale of batteries with Hg banned after 1994	NY WI	Carbon zinc cells have shorter life than alkaline batteries. Mercury is no longer used in certain zinc battery products.
Zinc Air	Hg content ~ 1%	Button cells restricted to <25 mg mercury, labelling	MN	Used in pagers, hearing aids
Instruments and Related Products				
<i>Measure and Control Instruments</i>				
Thermometers	Elemental mercury indicates temperature	Limits on distribution of Hg thermometers; mercury must be removed before disposal; no routine distribution of Hg thermometers by medical facilities	MN	Digital thermometers are replacing mercury thermometers
Barometers	Indicates pressure			
Medical, Scientific Instruments	Temperature and pressure measuring devices	Products w/Hg must be labeled, including disposal restrictions	MN	

Appendix C: Regulations on Products that Contain Mercury

Note: This table highlights regulations that affect the most common mercury-containing products. It is not a comprehensive list of all products that may contain mercury. The "Comments" section includes general information that expands on the regulatory information.

Product/Use	Role of Mercury	Regulations/Programs on Mercury Products	Fed/State Regulation	Comments
<i>Dental Equipment and Supplies</i>				
Dental Equipment/Supplies	Forms alloys; chemically binds compounds to form restorative material	FDA regulates dental mercury and amalgam alloys separately as class I and class II devices under Federal Food, Drug, and Cosmetic Act	Federal	One of nation's largest manufacturers of mercury amalgam dental fillings will place warnings on amalgam containers shipped to California and provide warning signs for dental patient waiting rooms under California's Proposition 65 (Safe Drinking Water and Toxic Enforcement Act). The Act requires businesses that use or distribute toxics to label or otherwise notify the public about possible exposure to chemicals.
		Disposal banned unless mercury reused, recycled or managed to ensure compliance	MN	
		Purchaser must sign agreement of use for medical or dental uses	MN	
Discontinued Uses				
embalming fluid	Preservative	Use discontinued as of 1988 Registrations suspended in 1972	Federal	
film pack batteries				
maritime paints	Antifouling agent			
photographic development				
soap				
wood preservatives				

Appendix D: Summary of Mercury-Specific Statutes in Great Lakes States

NOTE: This table summarizes provisions of statutes that specifically regulate mercury in the Great Lakes States. At this time, not all states have specific mercury statutes. This table does not include state regulations for implementing federal environmental programs.

State	Item(s)	Provisions
IL	Batteries	Task force studied storage, transport, disposal, and recycling
	Packaging	After 7/1/94, no package or packaging component may be sold if it contains mercury above 600ppm; levels decrease to 250ppm (7/1/95), 100ppm (7/1/96)
	White Goods	Mercury must be removed before disposal (landfill operators may have permits to remove Hg components at landfill)
MI	Batteries	After 1/1/98, deposit refund system to facilitate return of used mercury batteries to distributor or recycling/disposal contractor
	Fireworks	Permits required for fireworks containing mercury
	Use/release	Water Pollution Control Act- businesses must report use and discharge information for chemicals on "critical materials registry", which includes mercury
	Pending: Toys, Shoes, Clothes	No sale of toys w/Hg
MN	Batteries	No batteries >.025% Hg by weight may be sold or distributed; after 1/1/96, alkaline manganese batteries must have no added Hg Button cell nonrechargeable batteries must have <25mg Hg and must be labeled Exemption required to sell batteries containing mercuric oxide electrodes
	Lamps	Mercury must be removed before disposal; lamp sellers and contractors responsible for informing buyer/generator of mercury management requirements.

Appendix D: Summary of Mercury-Specific Statutes in Great Lakes States

NOTE: This table summarizes provisions of statutes that specifically regulate mercury in the Great Lakes States. At this time, not all states have specific mercury statutes. This table does not include state regulations for implementing federal environmental programs.

State	Item(s)	Provisions
MN cont'd	Product Disposal	Disposal banned unless mercury removed (reused or recycled) from items such as thermometers, thermostats, etc.
	Product Servicing	Repair person must ensure proper Hg management when Hg items removed from service
	Product Labeling	Thermostats, thermometers, switches, appliances, and medical and scientific instruments must be labeled to inform purchaser/consumer that mercury must be removed before disposal
	Inks, Dyes Paints, Fungicides	No mercury after 7/1/94
	Packaging	No mercury in packaging after 8/1/93 (threshold 600ppm); allowable concentration decreases to 100ppm in 8/1/95
	Toys, Shoes, Clothes	No sale of toys, clothes, or shoes w/Hg
	Thermometers	No routine distribution of Hg thermometers in medical facilities
	Thermostats	Manufacturers must provide incentives for proper management (Honeywell, a thermostat manufacturer, implemented a thermostat take-back and recycling program)
NY	Batteries	After 1/1/92, alkaline manganese batteries must have <0.25mg Hg by weight; alkaline button batteries must have <25mg Hg; zinc carbon batteries <1ppm Hg
	Packaging	No mercury in packaging after 7/1/94 (threshold 600ppm), allowable concentration decreases to 100ppm 7/1/96

Appendix D: Summary of Mercury-Specific Statutes in Great Lakes States

NOTE: This table summarizes provisions of statutes that specifically regulate mercury in the Great Lakes States. At this time, not all states have specific mercury statutes. This table does not include state regulations for implementing federal environmental programs.

State	Item(s)	Provisions
PA	Packaging: (pending)	No intentionally introduced mercury in packaging
WI	Batteries	After 1/1/96, alkaline manganese batteries cannot contain intentionally introduced mercury; button-shaped alkaline manganese batteries <25mg Hg; after 1/1/94 zinc carbon batteries cannot contain Hg
	Packaging	No mercury in packaging after 6/1/92 (threshold 600ppm), allowable concentration decreases to 100ppm 6/1/94
	Medical Waste Incinerators	Incinerators with >5 tons/day capacity must be tested once for mercury
	Toys	No sale of toys containing Hg

APPENDIX E

MERCURY BATTERIES
 (except Button Cells)
 Information as of July 31, 1994

JURISDICTION	STATUS OF LEGISLATION	EFFECTIVE DATE	NOTES (see separate page for explanation)
FEDERAL	Pending	1-1-97	1(a)
ARKANSAS	Passed	1-1-94	2(a), 4(a)
CONNECTICUT	Passed	1-1-92	3(a), 4(a), 6(a,b)
FLORIDA	Passed	1-1-94	1(c), 2(b[ii]), 3(a,b,g), 4(a)
IOWA	Passed	7-1-96	1(c), 3(b,c,e), 6(a,b)
MAINE	Passed	1-1-94	2(a,b[i]), 3(b,c,d,e,f), 4(a)
MARYLAND	Passed	7-1-94	1(b,c), 2(b[i]), 3(b,c,d,e,f), 4(a), 6(a,b)
MASSACHUSETTS	Pending	??	1(c), 3(b,c), 4(a,b)
MICHIGAN	Passed	1-1-98	5, 6(a)
	Pending	7-1-95	3(b,c,h), 4(a,b)
MINNESOTA	Passed	2-1-92	1(b), 3(b,c,d), 4(a), 6(a)
NEW HAMPSHIRE	Passed	1-1-93 (Dept. has not yet issued rules)	2(a)
NEW JERSEY	Passed	1-20-93	1(c), 2(b[i]), 3(b,c,d,e,f,h), 4(a)
RHODE ISLAND	Passed	1-1-94	2(a), 3(a,b,c,e), 4(a)
VERMONT	Passed	1-1-93	3(a,b,c,e), 4(a)
WISCONSIN	Passed	7-1-94	1(c), 2(b[ii]), 3(b,c,g), 4(a)

1: BAN ON SALE OF PRODUCT

- (a) Absolute ban (no exemptions possible).
- (b) Banned generally, but state agency authorized to grant exemptions (conditioned on: showing of need; collection requirements; manufacturers responsibilities; etc.)
- (c) Banned only if manufacturer fails to meet collection and other responsibilities.

2: STATE REGULATORY AGENCIES

- (a) State agency authorized or required to issued regulations defining collection procedures, responsibilities, etc.
- (b) State statute generally defines collection procedures, responsibilities, etc.
 - [i] Manufacturers must get approval of collection plans from state agency prior to implementation.
 - [ii] Prior approval of implementation plans not required, but manufacturer must notify state agency of plans.

3: MANUFACTURER RESPONSIBILITIES

- (a) Accept used batteries.
- (b) Identify collection site having necessary treatment and disposal permits.
- (c) Inform purchasers about:
 - [i] Prohibition against disposal in solid, medical waste.
 - [ii] Collection site available to user.
 - [iii] Telephone number user can call for more information.
- (d) Pay for consumer (user) education efforts.
- (e) Pay for transportation and disposal of used batteries.
- (f) Get approval of collection plans, etc. from state agency prior to implementation.
- (g) Notify state agency of collection plans, etc. (approval not required).
- (h) Manufacturer must submit periodic reports to state agency.

4: USER RESPONSIBILITIES

- (a) Don't dispose of batteries in solid or medical waste.
- (b) Pay for proper disposal.

5: DEPOSITS

- (a) \$2/battery required at time of sale, unless trade-ins of used batteries made at that time.

6: OTHER

- (a) Legislation does not distinguish between button cells and larger sizes of mercury batteries.
- (b) "Retailer," "wholesaler," "supplier," "all participants in the stream of commerce," etc. mentioned in legislation, may have responsibilities.

APPENDIX E

ALKALINE BATTERIES

STATE	EFFECTIVE DATE, 250 PPM (0.025%) MERCURY	EFFECTIVE DATE, NO-MERCURY FORMULA
Federal (pending)	----	1-1-96 (mfg. date)
Arkansas	----	1-1-96 (mfg. date)
California	1-1-94 (mfg. date)	1-1-96 (mfg. date)
Connecticut	1-1-92 (mfg. date)	--
Florida	7-1-93 (sale date)	1-1-96 (sale date, rtl.)
Iowa	7-1-93 (sale date)	1-1-96 (sale date, rtl.)
Maine	1-1-94 (sale date)	1-1-96 (mfg. date)
Massachusetts (pending)	----	1-1-95 (sale date, rtl.)
Michigan (pending)	----	7-1-95 (sale date, mfg.)
Minnesota	2-1-92 (sale date, mfg.)	1-1-96 (sale date, mfg.)
New Hampshire	1-1-93 (mfg. date)	1-1-96 (sale date, mfg.)
New Jersey	1-1-92 (mfg. date)	1-1-96 (mfg. date)
New York	1-1-92 (mfg. date)	--
Oregon	1-1-92 (mfg. date)	--
Rhode Island	1-1-92 (mfg. date)	--
Vermont	2-1-92 (mfg. date)	1-1-96 (sale date, rtl.)
Wisconsin	----	1-1-96 (mfg. date)

NOTES:

1. Information as of August 18, 1994.
2. State laws banning the sale of alkaline batteries containing more than allowable mercury content may be either of two types:
 - . Effective date refers to manufacture. Batteries made prior to the effective date may be sold after the effective date, even if they exceed allowable mercury content. ("Mfg. date")
 - . Effective date refers to sale. Batteries containing more than allowable mercury content may not be sold, regardless of when manufactured. But the legislation may refer either to the date of sale by the battery manufacturer ("sale date, mfg.") or by the retailer ("sale date, rtl. ").
3. Mercury limitations do not apply to alkaline button cells.

APPENDIX E

ZINC CARBON BATTERIES

STATE	EFFECTIVE DATE, NO-MERCURY FORMULA
Federal (pending)	1-1-95 (mfg. date)
Arkansas	1-1-94 (mfg. date)
California	1-1-94 (mfg. date)
Connecticut	1-1-93 (mfg. date)
Florida	1-1-96 (sale date)
Maine	1-1-93 (sale date)
Michigan (pending)	1-1-95 (mfg. date)
New Hampshire	1-1-93 (mfg. date)
New Jersey	1-1-92 (mfg. date)
New York	1-1-93 (mfg. date)
Wisconsin	7-1-94 (mfg. date)

NOTES:

1. Information as of August 18, 1994.
2. State laws banning the sale of zinc carbon batteries containing more than allowable mercury content may be either of two types:
 - Effective date refers to manufacture. Batteries made prior to the effective date may be sold after the effective date, even if they exceed allowable mercury content. ("Mfg. date")
 - Effective date refers to retail sales. Batteries containing more than allowable mercury content may not be sold at retail, regardless of when manufactured. ("Sale date")

APPENDIX E CONSUMER MERCURY BUTTON CELL BATTERIES
Information as of July 31, 1994

JURISDICTION	STATUS OF LEGISLATION	EFFECTIVE DATE		NOTE(S)
		BAN	COLLECTION	
FEDERAL	Pending	1-1-95	--	--
ARKANSAS	Passed	1-1-94	--	--
CALIFORNIA	Passed	1-1-94	--	--
CONNECTICUT	Passed	--	1-1-92	2(a), (b)
FLORIDA	Passed	10-1-93	--	--
IOWA	Passed	--	7-1-96	1, 2(a)
MAINE	Passed	1-1-93	--	--
MARYLAND	Passed	--	7-1-94	1
MASSACHUSETTS	Pending	??	--	--
MICHIGAN	Passed	--	1-1-98	3
	Pending	7-1-95	--	--
MINNESOTA	Passed	2-1-92	--	--
NEW HAMPSHIRE	Passed	--	1-1-93	2(b)
NEW JERSEY	Passed	1-1-94	--	--
RHODE ISLAND	Passed	1-1-93	--	--
VERMONT	Passed	1-1-93	--	--

Note 1: Battery manufacturers financially responsible for collection, transportation, disposal, consumer education, etc. Failure to meet these requirements results in a sales ban for the manufacturer's mercury button cells.

Note 2: Battery manufacturer not expressly responsible, but:

- (a) Retailer required to collect;
- (b) State regulatory agency to issue regulations.

Note 3: \$2/battery required at time of sale, unless trade-ins of used batteries made at that time.

APPENDIX F: DATA ON MERCURY RELEASES

Appendix F contains information on mercury releases available from several federal and state reporting systems. Federal and state agencies collect information on mercury releases as part of broader programs designed to meet reporting requirements for multiple substances. It is important to keep in mind that each data set must be interpreted separately due to differences in reporting requirements and the types of information collected.

All data is organized by Standard Industrial Classification codes (SIC codes). This structure offers a uniform method to identify industrial sectors. The first two digits of an SIC code identify major industrial sectors. The full four digit code allows more specific identification of industry type. Even with this detailed breakdown, variation exists within a given SIC code. For a complete list and description of SIC codes, as well as the specific industrial processes covered by each code, refer to the Standard Industrial Classification Manual.

By using SIC codes, it is possible, on a broad scale, to identify the types of industrial sectors where mercury releases occur most frequently. However, particularly for air emissions data, the link to SIC code may be misleading. For example, any facility that maintains a coal-fired boiler on site may generate mercury releases that are independent of a specific industrial process that uses mercury.

Appendix F includes mercury release information from six specific data sources. The list below indicates the specific components of Appendix F. The first page of each set of data includes an explanation of the reporting program and the data reviewed.

App. F1 **Summary of Reporting Information:** The table shows, by SIC code, the frequency with which mercury releases appear in each data set reviewed for this analysis. It is organized by SIC code and by state.

App. F2 **Toxic Chemical Release Inventory (TRI) data:** TRI data for 1992 and 1991.

F2a = 1992 data for Great Lakes states only

F2b = 1991 data for Great Lakes states only

F2c = 1992 national mercury data

F2d = 1991 national mercury data

App. F3 **RCRA Biennial Report System (BRS) data:** 1991 BRS data for mercury-bearing waste codes.

F3a = Summary of facilities reporting mercury-bearing wastes in each SIC code

F3b = Summary of source processes that generate mercury-bearing wastes

App. F4 **Permit Compliance System (PCS) data:** PCS data for the Great Lakes basin (facilities located in the Great Lakes basin only; not necessarily statewide)

F4a = July 1992 - June 1993 data

F4b = July 1991 - June 1992 data

App. F5 **Wisconsin Air Point Source data:** Mercury air emissions data collected for Wisconsin's Clean Air Act Title V Operating Permit Program (reported data).

App. F6 **Michigan Critical Materials Registry:** 1991 data collected under Michigan's wastewater reporting program. Data indicates the number of facilities reporting mercury use.

App. F7 **Indiana AIRs data:** Air emissions derived from data reported on criteria pollutants. This is not measured data. Instead, it represents estimated mercury releases based on emissions factor calculations.

Appendix F1: Summary of Mercury Reporting Data

of Facilities Reporting Mercury Releases

SIC Category	SIC Code	Total			IL			IN				MI				MN			NY		OH			PA			WI			
		BRS*	TRI	PCS	BRS	TRI	PCS	BRS	TRI	PCS	IN	BRS	TRI	PCS	MI	BRS	TRI	PCS	TRI	PCS	BRS	TRI	PCS	BRS	TRI	PCS	BRS	TRI	PCS	WI
7	Agricultural Services																													
	723 Crop Preparation Services	1																			1									
10	Metal Mining																													
	1011 Iron Ores	5																5												
	1021 Copper Ores			1										1	1															
	1081 Metal Mining Services														2															
14	Nonmetallic Minerals, Except Fuels																													
	1422 Crushed And Broken Limestone	1									1	1																		
15	General Building Contractors																													
	1542 Nonresidential Construction, Nec	1										1																		
17	Special trade contractors, NEC																													
	1799 Special Trade Contractors, Nec	1																			1									

NOTE: This table compares the number of facilities in each SIC code that report mercury releases under the different federal reporting programs discussed in this report. In addition, three Great Lakes states collect state-specific information on mercury releases, which is also captured in this table. The data is the most current available for each program.

This table illustrates how the number of facilities reporting mercury releases varies based on the reporting requirements and thresholds of each reporting program.

More detailed data sets for each program are provided following this summary table.

* BRS data for New York and Wisconsin are not included in this total due to technical difficulties in obtaining the data. Additional information may be provided at the September meeting. Ohio data did not include waste origin codes, and therefore may include remediation wastes as well as ongoing process wastes.

KEY: TRI = Toxic Chemical Release Inventory, 1992 data
 BRS = RCRA Biennial Report System, 1991 data
 PCS = Permit Compliance System, July 1992 - June 1993 data
 IN = AIRS Inventory, 1990 data
 MI = Michigan Critical Materials Wastewater Report, 1991 data
 WI = Wisconsin Title V Operating Permits Program, 1991 data

Appendix F1: Summary of Mercury Reporting Data

SIC Category		SIC Code	# of Facilities Reporting Mercury Releases																											
			Total			IL			IN				MI				MN			NY		OH			PA			WI		
			BRS*	TRI	PCS	BRS	TRI	PCS	BRS	TRI	PCS	IN	BRS	TRI	PCS	MI	BRS	TRI	PCS	TRI	PCS	BRS	TRI	PCS	BRS	TRI	PCS	BRS	TRI	PCS
20	Food and Kindred Products																													
	2011 Meal Packing Plants										1				2															
	2013 Sausages and Other Prepared Meat Products																													
	2020 Dairy Products														3															
	2022 Cheese, Natural And Processed	1				1																								
	2023 Dry, Condensed, Evaporated Products	1										1																		
	2033 Canned Fruits and Vegetables										1																			
	2037 Frozen Fruits, Fruit Juices, and Vegetables																													
	2035 Pickles, Sauces, And Salad Dressings	1				1																								
	2043 Cereal Breakfast Foods														2															
	2046 Wet Corn Milling										1																			
	2048 Prepared Feeds, NEC										1																			
	2063 Beet Sugar				1									1	4															
	2075 Soybean Oil Mills										1																			
	2077 Animal and marine fats and oils										1				1															
	2082 Malt Beverages										1																			
	2085 Distilled and Blended Liquors										1																			
	2087 Flavoring Extracts And Syrups, Nec	1																			1									
	2092 Fresh Or Frozen Prepared Fish	1																						1						
	2099 Food Preparations, Nec	1				1					1																			
22	Textile Mill Products																													
	2295 Coated Fabrics	1																			1									
	2299 Textile Goods, Nec	1																						1						
24	Lumber and Wood Products																													
	2431 Millwork	2																		2										
	2434 Wood Kitchen Cabinets											3																		
	2435 Hardwood Veneer and Plywood											2																		
	2491 Wood Preserving	1																			1									
	2493 Not Listed																													

Appendix F1: Summary of Mercury Reporting Data

		# of Facilities Reporting Mercury Releases																												
SIC Category	SIC Code	Total			IL			IN				MI				MN			NY		OH			PA			WI			
		BRS*	TRI	PCS	BRS	TRI	PCS	BRS	TRI	PCS	IN	BRS	TRI	PCS	MI	BRS	TRI	PCS	TRI	PCS	BRS	TRI	PCS	BRS	TRI	PCS	BRS	TRI	PCS	WI
25	Furniture and Fixtures																													
	2500 Furniture and Fixtures													4																
	2511 Wood Household Furniture									5																				
	2512 Upholstered Household Furniture									2																				
	2521 Wood Office Furniture									2																				
	2522 Office Furniture, Except Wood	1										1																		
	2531 Public Building and Related Furniture									2																				
26	Paper and Allied Products													2																
	2600 Paper and Allied Products													2																
	2611 Pulp Mills			1																								1	2	
	2621 Paper Mills	3		2								1		4						1			1					2	9	
	2631 Paperboard Mills									1				3																2
	2641 Not Listed	1														1														
	2645 Not Listed									1																				
	2650 Paperboard Containers and Boxes													3																
	2657 Folding Paperboard Boxes	1																		1										
	2670 Misc. Converted Paper Products													1																
	2679 Converted Paper Products, Nec.	1		1							1									1									1	
27	Printing and Publishing																													
	2700 Printing and Publishing													1																
	2710 Newspapers													2																
	2731 Book Publishing	1														1														
	2750 Commercial Printing													5																
	2754 Commercial Printing, Gravure	2																		1			1							
	2759 Commercial Printing, Nec	2			1																		1							
28	Chemicals and Allied Products																													
	2800 Chemicals and Allied Products													2																
	2810 Industrial Inorganic Chemicals													1																
	2812 Alkalies And Chlorine	1		3															2	1		1								1
	2816 Inorganic Pigments	2			1															1										
	2819 Industrial Inorganic Chemicals, Nec	12	2	1	2						1	1		2						4		1	5	2						

Appendix F1: Summary of Mercury Reporting Data

		# of Facilities Reporting Mercury Releases																											
SIC Category	SIC Code	Total			IL			IN				MI				MN			NY		OH			PA			WI		
		BRS*	TRI	PCS	BRS	TRI	PCS	BRS	TRI	PCS	IN	BRS	TRI	PCS	MI	BRS	TRI	PCS	TRI	PCS	BRS	TRI	PCS	BRS	TRI	PCS	BRS	TRI	PCS
	2820 Plastics Materials and Synthetics													2															
	2821 Plastics Materials And Resins	21	1	2	4	1		1				3		1					1	7		1	6						
	2822 Synthetic Rubber	1		1						1										1									
	2830 Drugs													10															
	2833 Medicinals And Botanicals	6						4			1												2						
	2834 Pharmaceutical Preparations	28			5			7			3	2		1						2			12						
	2835 Diagnostic Substances	2						2																					
	2841 Soap And Other Detergents	3			1															2									
	2842 Polishes And Sanitation Goods	2																		1			1						
	2843 Surface Active Agents	2			2																								
	2844 Toilet Preparations	1														1													
	2850 Paints and Allied Products													5															
	2851 Paints And Allied Products	15						1				3		1						8			3						
	2860 Industrial Organic Chemicals													2															
	2865 Cyclic Crudes And Intermediates	1																		1									
	2868 Not Listed	1																		1									
	2869 Industrial Organic Chemicals, Nec	20		3	4			1			1	3				1			3	7			4						
	2875 Fertilizers, Mixing Only	1																		1									
	2879 Agricultural Chemicals, Nec	1																		1									
	2890 Miscellaneous Chemical Products													1															
	2891 Adhesives And Sealants	4												1						4									
	2899 Chemical Preparations, Nec	11										3		1						6			2						
29	Petroleum and Coal Products																												
	2900 Petroleum and Coal Products													1															
	2911 Petroleum Refining	5	1					1						1		1	1						3						
	2951 Asphalt Paving Mixtures and Blocks																												
	2992 Lubricating Oils And Greases	3			1															2									
	2999 Petroleum And Coal Products, Nec	1																		1									
30	Rubber and Miscellaneous Plastic Products																												
	3011 Tires And Inner Tubes	3			1															2									
	3069 Fabricated Rubber Products, Nec	3										1		3						1			1						
	3079													2															

Appendix F1: Summary of Mercury Reporting Data

		# of Facilities Reporting Mercury Releases																												
SIC Category	SIC Code	Total			IL			IN				MI				MN			NY		OH			PA			WI			
		BRS*	TRI	PCS	BRS	TRI	PCS	BRS	TRI	PCS	IN	BRS	TRI	PCS	MI	BRS	TRI	PCS	TRI	PCS	BRS	TRI	PCS	BRS	TRI	PCS	BRS	TRI	PCS	WI
	3080 Miscellaneous Plastics Products, NEC													16																
	3081 Unsupported Plastics, Film And Sheet	1									1												1							
	3086 Plastics, Foam Products	1																					1							
	3087 Custom Compound Purchased Resins		1																		1									
	3089 Plastics Products, Nec	3			1									1						2										
31	Leather and Leather Products																													
	3111 Leather Tanning and Finishing													1																
32	Stone, Clay, and Glass Products																													
	3211 Flat Glass	1																		1										
	3220 Glass and Glassware, Pressed or Blown													1																
	3229 Pressed And Blown Glass, Nec	1																					1							
	3231 Products Of Purchased Glass	1											1																	
	3241 Cement, Hydraulic	2									2	1								1										
	3251 Brick and Structural Clay Tile										1																			
	3255 Clay Refractories	1																		1										
	3269 Pottery Products, NEC										1																			
	3272 Concrete Products, NEC										1																			
	3274 Lime										1																			4
	3291 Abrasive Products	4			1											2				1										
	3296 Mineral Wool	1																		1										
	3297 Nonclay Refractories													1																
33	Primary Metal Industries																													
	3312 Blast Furnaces And Steel Mills	6		2			1				2	1		3						3		1	2							
	3313 Electrometallurgical Products			1										1																
	3315 Steel Wire and Related Products			2										2																
	3316 Cold Finishing Of Steel Shapes	2						1															1							
	3317 Steel Pipe And Tubes	3																		2			1							
	3320 Iron and Steel Foundries													1																
	3321 Gray And Ductile Iron Foundries	4			1							1		2						1			1							
	3322 Malleable Iron Foundries	1										1		1																
	3330 Primary Nonferrous Metals													1																
	3331 Primary Copper	1										1																		

Appendix F1: Summary of Mercury Reporting Data

		# of Facilities Reporting Mercury Releases																											
SIC Category	SIC Code	Total			IL			IN				MI				MN			NY		OH			PA			WI		
		BRS*	TRI	PCS	BRS	TRI	PCS	BRS	TRI	PCS	IN	BRS	TRI	PCS	MI	BRS	TRI	PCS	TRI	PCS	BRS	TRI	PCS	BRS	TRI	PCS	BRS	TRI	PCS
	3334 Primary Aluminum	1		1															1				1						
	3339 Not Listed		1																					1					
	3340 Secondary Nonferrous Metals													1															
	3341 Secondary Nonferrous Metals		1							1								1											
	3353 Aluminum Sheet, Plate, And Foil	3			1															1			1						
	3354 Aluminum Extruded Products	1						1																					
	3356 Nonferrous Rolling And Drawing, Nec	4										1								2			1						
	3360 Nonferrous Foundries (Casings)													1															
	3361 Not Listed	1														1													
	3365 Aluminum Foundries													1															
	3366 Copper Foundries													1															
34	Fabricated Metal Products																												
	3400 Fabricated Metal Products													2															
	3411 Metal Cans	1			1																								
	3412 Metal Barrels, Drums, And Pails	1																		1									
	3429 Hardware, Nec	2						1															1						
	3441 Fabricated Structural Metal	1												1						1									
	3443 Fabricated Plate Work (Boiler Shops)	1								1													1						
	3446 Architectural Metal Work	1																					1						
	3449 Miscellaneous Metal Work	1												1									1						
	3452 Bolts, Nuts, Rivets, And Washers	1																					1						
	3456 Not Listed	1										1																	
	3462 Iron and Steel Forgings													1															
	3465 Automotive Stampings	7										2		5						4			1						
	3470 Metal Services, NEC													1															
	3471 Plating And Polishing	5	1	2	1					1			1	5						3			1						
	3479 Metal Coating And Allied Services	1						1						4															
	3482 Small Arms Ammunition	4			3											1													
	3483 Ammunition, Except For Small Arms, N	2																		2									
	3489 Ordnance And Accessories, Nec	2			1											1													
	3490 Misc. Fabricated Metal Products													4															
	3494 Valves And Pipe Fittings, Nec	1																					1						
	3496 Miscellaneous Fabricated Wire Product	1																					1						

Appendix F1: Summary of Mercury Reporting Data

		# of Facilities Reporting Mercury Releases																												
SIC Category	SIC Code	Total			IL			IN				MI				MN			NY		OH			PA			WI			
		BRS*	TRI	PCS	BRS	TRI	PCS	BRS	TRI	PCS	IN	BRS	TRI	PCS	MI	BRS	TRI	PCS	TRI	PCS	BRS	TRI	PCS	BRS	TRI	PCS	BRS	TRI	PCS	WI
	3499 Fabricated Metal Products, Nec	8			1							1			1	1					4			1						
35	Industrial Machinery and Equipment														4															
	3510 Engines and Turbines														4															
	3519 Internal Combustion Engines, Nec	1									1	1																		1
	3523 Farm Machinery And Equipment	1			1																									1
	3531 Construction Machinery	2			2																									1
	3535 Conveyors And Conveying Equipment	1																						1						
	3540 Metalworking Machinery														1															
	3541 Machine Tools, Metal Cutting Types										1																			
	3545 Machine Tool Accessories	1																							1					
	3548 Welding Apparatus	1																			1									
	3560 General Industrial Machinery														2															
	3562 Ball and Roller Bearings																													
	3563 Air And Gas Compressors	1																			1									
	3569 General Industrial Machinery, NEC										1																			
	3571 Electronic Computers	2															1							1						
	3585 Refrigeration And Heating Equipment	3																			3									2
	3599 Industrial Machinery, Nec	1										1																		
36	Electronic and Other Electronic Equipment																													
	3612 Transformers, Except Electronic	2						1			1													1						
	3613 Switchgear And Switchboard Apparatus	1																						1						
	3621 Motors And Generators	3						1													1			1						
	3624 Carbon And Graphite Products	1																			1									
	3630 Household Appliances														1															
	3632 Household Refrigerators And Freezers	2						2			1																			
	3633 Household Laundry Equipment	1																			1									
	3641 Electric Lamps	3																			3									
	3645 Residential Lighting Fixtures	1																						1						
	3647 Vehicular Lighting Equipment	1	1								1										1	1								
	3663 Radio And Tv Communication Equipm	3						2									1													
	3665 Not Listed	2																			2									
	3669 Communications Equipment, Nec	2			1																			1						

Appendix F1: Summary of Mercury Reporting Data

of Facilities Reporting Mercury Releases

SIC Category	SIC Code	Total			IL			IN				MI				MN			NY		OH			PA			WI		
		BRS*	TRI	PCS	BRS	TRI	PCS	BRS	TRI	PCS	IN	BRS	TRI	PCS	MI	BRS	TRI	PCS	TRI	PCS	BRS	TRI	PCS	BRS	TRI	PCS	BRS	TRI	PCS
	3670 Not Listed	1												1	1														
	3671 Electron Tubes	1																					1						
	3672 Printed Circuit Boards	1														1													
	3674 Semiconductors And Related Devices	6																					6						
	3678 Electronic Connectors	1																					1						
	3679 Electronic Components	6	3		2	1		2	2														2						
	3691 Storage Batteries										1			1															
	3692 Primary Batteries, Dry And Wet	5	1					2												3							1		
	3694 Engine Electrical Equipment										1																		
	3695 Magnetic And Optical Recording Media	2													1					1									
	3699 Electrical Equipment And Supplies, Nec	1																		1									
37	Transportation Equipment																												
	3700 Transportation Equipment													1															
	3710 Motor Vehicles and Equipment													4															
	3711 Motor Vehicles And Car Bodies	10		1	1			1				4		8						4		1							
	3713 Truck And Bus Bodies	1																		1									
	3714 Motor Vehicle Parts And Accessories	17		1				1			7	10		1	18					4			2						
	3720 Aircraft and Parts													2															
	3721 Aircraft	1			1																								
	3724 Aircraft Engines And Engine Parts	3									1									3									
	3728 Aircraft Parts And Equipment, Nec	2													1					1									
	3731 Ship Building And Repairing	1																					1						
	3743 Railroad Equipment	3			1																		2						
	3769 Space Vehicle Equipment, Nec	1																					1						
	3790 Miscellaneous Transportation Equipme													1															
38	Instruments and Related Products																												
	3812 Search And Navigation Equipment	2			1			1						1															
	3820 Measuring and Controlling Devices													2															
	3821 Laboratory Apparatus and Furniture													1															
	3822 Environmental Controls	3						1								1				1									
	3823 Process Control Instruments	2																					2						
	3824 Fluid Meters And Counting Devices	1																					1						

Appendix F1: Summary of Mercury Reporting Data

		# of Facilities Reporting Mercury Releases																												
SIC Category	SIC Code	Total			IL			IN				MI				MN			NY		OH			PA			WI			
		BRS*	TRI	PCS	BRS	TRI	PCS	BRS	TRI	PCS	IN	BRS	TRI	PCS	MI	BRS	TRI	PCS	TRI	PCS	BRS	TRI	PCS	BRS	TRI	PCS	BRS	TRI	PCS	WI
	3826 Analytical Instruments	1																												
	3829 Measuring And Controlling Devices, N	2																			1				1					
	3840 Medical Instruments and Supplies													1																
	3841 Surgical And Medical Instruments	1						1																						
	3842 Surgical Appliances And Supplies	2						1																1						
	3843 Dental Equipment and Supplies		1											1																
	3845 Electromedical Equipment	1														1														
	Photographic Equip.& Supplies-																													
	3861 Instruments & Related Products	1																						1						
39	Miscellaneous Manufacturing Industries																													
	3953 Marking Devices	1				1																								
	3996 Hard Surface Floor Coverings, Nec	2																						2						
	3999 Manufacturing Industries, Nec	2		1									1			1				1										1
40	Railroad Transportation																													
	4011 Railroads, Line-Haul Operating	3																			1			2						
41	Local and Interurban Passenger Transit																													
	4111 Local And Suburban Transit	1																						1						
	4173 Bus Terminal And Service Facilities	1																			1									
42	Trucking and Warehousing																													
	4200 Trucking and Warehousing													1																
	4213 Trucking, Except Local	1																			1									
	4225 General Warehousing And Storage	3						1																2						
	4226 Special Warehousing And Storage, Nec	2				2																								
45	Transportation by Air																													
	4511 Not Listed	1														1														
	4512 Air Transportation, Scheduled	2														2														
	4581 Airports, Flying Fields, And Services	1				1																								
46	Pipelines, Except Natural Gas																													
	4613 Refined Petroleum Pipelines	2														1					1									

Appendix F1: Summary of Mercury Reporting Data

of Facilities Reporting Mercury Releases

SIC Category	SIC Code	Total			IL			IN				MI				MN			NY		OH			PA			WI		
		BRS*	TRI	PCS	BRS	TRI	PCS	BRS	TRI	PCS	IN	BRS	TRI	PCS	MI	BRS	TRI	PCS	TRI	PCS	BRS	TRI	PCS	BRS	TRI	PCS	BRS	TRI	PCS
47	Transportation Services																												
	4785 Inspection and Fixed Facilities														1														
	4789 Transportation Services, Nec	1									1													1					
48	Communications																												
	4813 Telephone Communications, Except Ra	2																						2					
49	Electric, Gas, and Sanitary Services																												
	4911 Electric Services	22			5						30	6		16							2			9					
	4925 Gas Production And/Or Distribution													2															
	4931 Electric and Other Services Combined			1															1										
	4950 Sanitary Systems													1															
	4952 Sewerage Systems	1		109						9				33				1		15	1		44						7
	4953 Refuse Systems	8		1	3					1				1	1				1	4									
	4959 Sanitary Services, Nec	1																		1									
	4961 Steam and Air-Conditioning Supply																												
50	Wholesale Trade - Durable Goods																												
	Motor Vehicle Supplies and New Parts																												
	5013 Wholesale Trade													2															
	Industrial Supplies																												
	5085 Wholesale Trade													1															
51	Wholesale Trade - Non-Durable Goods																												
	5122 Drugs, Proprietarys, And Sundries	1			1																								
	5169 Chemicals And Allied Products, Nec	3			2									1						1									
	5171 Petroleum Bulk Stations And Terminals	1			1																								
	5191 Farm Supplies	1																						1					
65	Real Estate																												
	6512 Nonresidential Building Operators													3															
72	Personal Services																												
	7210 Laundry, Cleaning, & Garment Services													6															
73	Business Services																												
	7331 Direct Mail Advertising Services	1																						1					

Appendix F1: Summary of Mercury Reporting Data

		# of Facilities Reporting Mercury Releases																												
SIC Category	SIC Code	Total			IL			IN				MI				MN			NY		OH			PA			WI			
		BRS*	TRI	PCS	BRS	TRI	PCS	BRS	TRI	PCS	IN	BRS	TRI	PCS	MI	BRS	TRI	PCS	TRI	PCS	BRS	TRI	PCS	BRS	TRI	PCS	BRS	TRI	PCS	WI
	7389 Business Services, Nec	2																		2										
	7391 Not Listed	1												3						1										
75	Automotive Repair, Services, and Parking																													
	7538 General Automotive Repair Shops	2			1			1																						
76	Miscellaneous Repair Services																													
	7699 Repair Services, Nec	3			1									1	1								1							
80	Health Services																													
	8011 Offices And Clinics Of Medical Doctors	1			1																									
	8021 Offices And Clinics Of Dentists																													
	8050 Nursing and Personal Care Facilities													1																
	8060 Hospitals													19																
	8061 Hospitals									4																				
	8062 General Medical And Surgical Hospital	16			5			1				2								3			5							
	8063 Psychiatric Hospitals									5																				
	8070 Medical and Dental Laboratories													4																
	8071 Medical Laboratories	1																		1										
	8093 Specialty Outpatient Clinics, NEC													8																
82	Educational Services																													
	8211 Elementary And Secondary Schools	5			1															4										
	8221 Colleges And Universities	35			5			5			9	4				2				13			6							3
	8249 Vocational Schools, NEC										1																			
83	Social Services																													
	8361 Residential Care										2																			
84	Museums, Art Galleries, & Botanical & Zoos																													
	8422 Botanical And Zoological Gardens	1			1																									
87	Engineering and Management Services																													
	8711 Engineering Services	1			1																									
	8730 Research and Testing Services													12																
	8731 Commercial Physical Research	15			3			1				2		1	1					4			4							
	8732 Commercial Nonphysical Research	1																					1							

Appendix F1: Summary of Mercury Reporting Data

		# of Facilities Reporting Mercury Releases																												
SIC Category	SIC Code	Total			IL			IN				MI				MN			NY		OH			PA			WI			
		BRS*	TRI	PCS	BRS	TRI	PCS	BRS	TRI	PCS	IN	BRS	TRI	PCS	MI	BRS	TRI	PCS	TRI	PCS	BRS	TRI	PCS	BRS	TRI	PCS	BRS	TRI	PCS	
	8733 Noncommercial Research Organization	3			1									1	1								1							
	8734 Testing Laboratories	12			5			1						2	1						1			4						
	8741 Management Services													1																
	8744 Facilities Support Services													1																
91	Executive, Legislative, and General																													
	9199 General Government, Nec	3			1																1			1						
92	Justice, Public Order, and Safety																													
	9223 Correctional Institutions										2																			
94	Administration of Human Resource Programs																													
	9451 Administration Of Veterans' Affairs	1			1																									
95	Environmental Quality, and Housing																													
	9511 Air, Water, And Solid Waste Managemen	5		1															1	3			2							
96	Administration of Economic Programs																													
	9661 Space Research And Technology	2																			2									
97	National Security and International Affairs																													
	9711 National Security	9		1	2			2			2								1	4			1							
99	Nonclassifiable Establishments																													
	9999 Nonclassifiable Establishment	8			3			1				1									1			2						
Grand Total		572	14	140	94	2	1	50	2	10	120	65	2	40	273	38	1	1	1	27	181	2	49	144	3			1	1	

Appendix F2a

TRI MERCURY DATA, THE EIGHT GREAT LAKES STATES (kg/yr)

REPORTING YEAR: 1992

GREAT LAKES				ROLE OF MERCURY	SOURCE REDUCTION ACTIVITIES & ID METHODS	NONPT							TOTAL	
BASIN	STATE	SICCODE	FACILITY NAME			AIR	AIR	WATER	UNDRGRND	LAND	POTW	OFFSITE	RELEASES	
Y	PA	2819	MALLINCKROOT SPECIALTY	1A1C1D2A	NA	250	250	0	0	0	5	1020	1525	
N	PA	2819 3559	BETHLEHEM APPARATUS CO. INC.	1A1B1C1D2D	W52T04 W58T04	20	0	0	0	0	5	3	28	
N	IL	2821	GE CHEMICALS INC.	2B	W42T02111NA NA	0	0	0	0	0	0	0	0	
N	MM	2911	KOCH REFINING CO.	1A1E1F3C	W52T01104T05	5	100	0	0	0	0	23	128	
Y	OH	3087	PMS CONSOLIDATED	2B		180	2	0	0	0	0	1079	1261	
N	PA	3339 3341	ZINC CORP. OF AMERICA	1A1F	NA	0	14	0	0	0	0	168280	168294	
N	NY	3341	MERCURY REFINING CO. INC.	1A1C1D2D	NA	250	5	5	0	5	0	5	270	
Y	MI	3471	ELM METAL FINISHING USA	2C	NA	5	0	0	0	0	5	10	20	
Y	OH	3641	GE CO.	2C3C	NA	500	1060	0	0	0	0	1954	3514	
N	IL	3679	HONEYWELL INC.	2C	NA	0	4	0	0	0	0	5342	5346	
Y	IN	3679	HERMASEAL CO.	2C	NA	0	0	0	0	0	0	0	0	
Y	IN	3679	DURAKOOL INC.	2C	NA	5	0	0	0	0	5	0	10	
N	MI	3692	RAYOVAC CORP.	2B		0	0	0	0	0	0	0	0	
Y	MI	3843	KERR MFG. CO.	2D	NA	0	0	0	0	0	0	5650	5650	

ROLE OF MERCURY AND ITS USES AT THE FACILITY

1 = Manufacture the toxic chemical

A = Produce

B = Import

C = For on-site use/processing

D = For sale/distribution

E = As a byproduct

F = As an impurity

2 = Process the toxic chemical

A = As a reactant

B = As a formulation component

C = As an article component

D = Repackaging

3 = Otherwise use the toxic chemical

A = As a chemical processing aid

B = As a manufacturing aid

C = Ancillary or other use

SOURCE REDUCTION ACTIVITIES

W13 = Improved maintenance scheduling, recordkeeping, or procedures

W19 = Other changes in operating practices

W36 = Implemented inspection or monitoring program of potential spill or leak sources

W42 = Substituted raw materials

W52 = Modified equipment, layout or piping

W58 = Other process modifications

W82 = Modified design or composition of product

METHODS USED TO ID SOURCE REDUCTION ACTIVITIES

T01 = Internal Pollution Prev. Opportunity Audit

T02 = External Pollution Prev. Opportunity Audit

T03 = Materials Balance Audits

T04 = Participative Team Management

T05 = Employee Recommendation (Independent of a formal company program)

T10 = Vendor Assistance

T11 = Other

Source: Toxic Chemical Release Inventory, data downloaded June 21, 1994

Appendix F2b

TRI MERCURY DATA, THE EIGHT GREAT LAKES STATES (kg/yr)

REPORTING YEAR: 1991

GREAT LAKES				ROLE OF MERCURY	SOURCE REDUCTION ACTIVITIES & ID METHODS	NONPT		POINT		WATER	UNDRGRND	LAND	POTW	OFFSITE	TOTAL RELEASES
BASIN	STATE	SICCODE	FACILITY NAME			AIR	AIR								
N	NY	2812 2865	OCCIDENTAL CHEMICAL CORP.	2D	NA	1	0	0	0	0	0	0	14	2514	2529
N	NY	2819	OLIN CHEMICALS	3C	NA	0	0	3	0	0	0	0	13	2138	2154
Y	PA	2819	HALLINCKRODT SPECIALTY	1A1C1D2A	W13T10NA W36T01103NA	250	250	0	0	0	0	0	5	750	1255
N	PA	2819 3559	BETHLEHEM APPARATUS CO. INC.	1A1C1D2D	NA	5	0	0	0	0	0	0	5	250	260
N	IL	2821	GE CHEMICALS INC.	2B	W42T02T11NA NA	0	0	0	0	0	0	0	0	0	0
N	OH	2821 3086	MONSANTO CO.	1B1C2B	NA	0	2	1	0	0	0	0	0	320	323
Y	OH	2821	SAJAR PLASTICS	2B	NA	0	5	0	0	0	0	0	0	490	495
N	MN	2911	KOCH REFINING CO.	1A1E		0	0	0	0	0	0	0	0	0	0
N	MN	2911	KOCH REFINING CO.	1A1F	W52T01104T05	3	120	0	0	0	0	0	0	1	124
Y	OH	3087	PMS CONSOLIDATED	2B	NA	49	1	0	0	0	0	0	0	296	346
N	PA	3333 3341	ZINC CORP. OF AMERICA	1A1F	NA	0	250	0	0	0	0	0	0	0	250
N	NY	3341	MERCURY REFINING CO. INC.	1A1C1D2D	NA	5	5	5	0	0	0	0	0	5	20
N	NY	3341	MERCURY REFINING CO. INC.	1A1C1D2D	NA	250	5	5	0	0	0	0	0	5	265
Y	MI	3471	ELM METAL FINISHING USA	2C	NA	5	0	0	0	0	0	0	5	5	15
Y	OH	3641	GE CO.	2C3C	W19T01NA NA	500	1780	0	0	0	0	2750	0	13450	18480
N	IL	3679	HONEYWELL INC.	2C	NA	0	4	0	0	0	0	0	0	7234	7238
Y	IN	3679	DURAKOOL INC.	2C2D	NA	5	0	0	0	0	0	0	5	0	10
Y	IN	3679	HERMASEAL CO.	2D	NA	5	0	0	0	0	0	0	0	0	5
N	WI	3692	RAYOVAC CORP.	2B	W58T01T04T11W82T01T04T11	0	0	0	0	0	0	0	0	26	26
Y	MI	3843	KERR MFG. CO.	2D	NA	0	0	0	0	0	0	0	0	2000	2000

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program of potential spill or leak sources

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W58 = Other process modifications

W82 = Modified design or composition of product

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T01 = Internal Pollution Prev. Opportunity Audit

T02 = External Pollution Prev. Opportunity Audit

T03 = Materials Balance Audits

T04 = Participative Team Management

T05 = Employee Recommendation (Independent of a
formal company program)

T10 = Vendor Assistance

T11 = Other

Source: Toxic Chemical Release Inventory, data downloaded June 21, 1996

Appendix F2c

1992 NATIONWIDE TRI MERCURY DATA (KG/YR)

FACILITY NAME	STATE	SIC CODE	ROLE OF MERCURY	NONPT AIR	POINT AIR	WATER	UNDGRND	LAND	POIW	OFFSITE	TOTAL
GEORGIA-PACIFIC CORP.	WA	2611 2621	3A	1000	250	250	0	0	0	10610	12110
OCCIDENTAL CHEMICAL CORP.	AL	2812	3A	176	1	33	0	0	0	2286	2496
OCCIDENTAL CHEMICAL CORP.	DE	2812 NA	3A	430	40	15	0	0	0	4936	5421
LCP CHEMICALS	GA	2812	3A	1000	380	38	0	0	0	81	1499
OLIN CORP.	GA	2812 2819	3A	1046	271	12	0	0	0	5933	7262
BF GOODRICH	KY	2812 2821	3A	0	391	35	0	0	0	12902	13328
POINEER CHLOR ALKALI CO. INC.	LA	2812 NA	3A	0	1286	18	0	0	0	15229	16533
PPG IND. INC.	LA	2812 2816	3A	1100	160	24	0	0	0	327	1611
DOW CHEMICAL CO.	LA	2812 2821	2A3C	0	130	0	0	0	0	0	130
LCP CHEMICALS	ME	2812 2819	3A	743	13	4	0	1	0	1358	2118
LCP CHEMICALS	NC	2812 2819	3A	1046	49	4	0	0	0	326	1425
OLIN CORP.	TN	2812 NA	3A	1045	180	17	0	3111	0	743	1985
OCCIDENTAL CHEMICAL CORP.	TX	2812 2869	3A	1000	40	4	0	0	0	6130	7174
HANLIN CHEMICALS	WV	2812 2819	2D	0	0	28	0	0	0	69	97
PPG IND. INC.	WV	2812 2819	3A	1045	85	33	0	0	0	250	1413
BORDEN CHEMICALS & PLASTICS	LA	2813 2821	1B1C3A	0	0	14	9	0	0	1450	1473
BETHLEHEM APPARATUS CO. INC.	PA	2819 3559	1A1B1C1D2D	20	0	0	0	0	5	3	28
MALLINCKRODT SPECIALTY	PA	2819 NA	1A1C1D2A	250	250	0	0	0	5	1020	1525
GE CHEMICALS INC.	IL	2821 NA	2B	0	0	0	0	0	0	0	0
GE CHEMICALS INC.	WV	2821 NA	2B	0	1	29	0	17	0	2400	2430
COSAN CHEMICAL CORP.	NJ	2869 2879	2A	46	1	0	0	0	1	738	786
TEXACO REFINING & MARKETING	CA	2911 NA	1A1F	0	96	0	0	0	0	0	96
KOCH REFINING CO.	MN	2911	1A1E1F3C	5	100	0	0	0	0	23	128
COOPER TIRE & RUBBER CO.	AR	3069 3061	2A2C	5	5	0	0	0	0	4000	4010
PMS CONSOLIDATED	OH	3087 NA	2B	180	2	0	0	0	0	1079	1261
ZINC CORP. OF AMERICA	PA	3339 3341	1A1F	0	14	0	0	0	0	168280	168294

ROLE OF MERCURY AND ITS USES AT THE FACILITY

1 = Manufacture the toxic chemical

A = Produce

B = Import

C = For on-site use/processing

D = For sale/distribution

E = As a byproduct

F = As an impurity

3 = Otherwise use the toxic chemical

A = As a chemical processing aid

B = As a manufacturing aid

C = Ancillary or other use

2 = Process the toxic chemical

A = As a reactant

B = As a formulation component

C = As an article component

D = Repackaging

Sources: Toxic Chemical Release Inventory, data downloaded March 28, 1994

1992 NATIONWIDE TRI MERCURY DATA (KG/YR)

<u>FACILITY NAME</u>	<u>STATE</u>	<u>SIC CODE</u>	<u>ROLE OF MERCURY</u>	<u>NONPT AIR</u>	<u>POINT AIR</u>	<u>WATER</u>	<u>UNDGRND</u>	<u>LAND</u>	<u>POTW</u>	<u>OFFSITE</u>	<u>TOTAL</u>
MERCURY REFINING CO. INC.	NY	3341	1A1C1D2D	250	5	5	0	5	0	5	265
ELM METAL FINISHING USA	MI	3471 NA	2C	5	0	0	0	0	5	10	20
GE CO.	OH	3641 NA	2C3C	500	1060	0	0	0	0	1954	3514
MONEYWELL INC.	IL	3679 NA	2C	0	4	0	0	0	0	5342	5346
DURAKOOL INC.	IN	3679 NA	2C	5	0	0	0	0	5	0	10
HEMASEAL CO.	IN	3679	2C	0	0	0	0	0	0	0	0
ALEXANDER MFG. CO.	IA	3692 NA	1B1C2B	1	1	0	0	0	1	250	253
EVEREADY BATTERY CO. INC.	VT	3692 NA	2C	1	1	0	0	0	0	37056	37058
RAYOVAC CORP.	WI	3692	2B	0	0	0	0	0	0	0	0
KERR MFG. CO.	MI	3843	2D	0	0	0	0	0	0	5650	5650
NASA	MS	9661 NA	1B1C2C3C	5	0	0	0	0	0	0	5
Total Number of Facilities:	37		TOTALS	10904	4816	563	9	3134	22	290440	306754
				*****	*****	*****	*****	*****	*****	*****	*****

60.65 % (186,046) of Total Releases and Transfers of Mercury came from Great Lakes States

ROLE OF MERCURY AND ITS USES AT THE FACILITY

1 = Manufacture the toxic chemical

- A = Produce
- B = Import
- C = For on-site use/processing

- D = For sale/distribution
- E = As a byproduct
- F = As an impurity

3 = Otherwise use the toxic chemical

- A = As a chemical processing aid
- B = As a manufacturing aid
- C = Ancillary or other use

2 = Process the toxic chemical

- A = As a reactant
- B = As a formulation component
- C = As an article component
- D = Repackaging

Source: Toxic Chemical Release Inventory, data downloaded March 28, 1994

Appendix F2d

1991 NATIONWIDE TRI MERCURY DATA (KG/YR)

FACILITY NAME	STATE	SIC CODE	ROLE OF		AIR NONPT	AIR POINT	WATER	UNDGRND	LAND	POTW	OFFSITE	TOTAL
			MERCURY									
GEORGIA-PACIFIC CORP.	VA	2611 2621	3A		1000	250	250	0	0	0	14250	15750
OCCIDENTAL CHEMICAL CORP.	AL	2812	3A		93	89	49	0	0	0	4164	4395
OCCIDENTAL CHEMICAL CORP.	DE	2812	3A		488	44	19	0	0	0	8795	9346
LCP CHEMICALS	GA	2812	1B1C3A		1046	379	20	0	0	0	85	1530
OLIN CORP.	GA	2812 2819	3A		1000	270	15	0	0	0	5740	7025
BF GOODRICH	KY	2812 2821	3A		0	980	50	0	0	0	23383	24413
DOM CHEMICAL CO.	LA	2812 2821	2A3C		0	44	0	0	0	0	0	44
POINEER CHLOR ALKALI CO. INC.	LA	2812 NA	3A		11	1286	17	0	0	0	41044	42358
PPG INDUSTRIES INC.	LA	2812 2816	3A		1060	162	11	0	0	0	857	2090
LCP CHEMICALS	ME	2812 2819	3A		869	21	4	0	1	0	2034	2929
LCP CHEMICALS	NC	2812 2819	3A		1046	49	3	0	0	0	282	1380
OCCIDENTAL CHEMICAL CORP.	NY	2812 2865	2D		1	0	0	0	0	14	2514	2529
OLIN CORP.	TN	2812	3A		1045	378	22	0	2335	0	1342	5122
OCCIDENTAL CHEMICAL CORP.	TX	2812 2869	3A		1000	230	5	0	0	0	11740	12975
HANLIN CHEMICALS	WV	2812 2819	3A		633	179	89	0	200	0	545	1646
BORDEN CHEMICALS & PLASTICS	LA	2813 2821	1B1C3A		0	0	11	9	0	0	62	82
AKZO CHEMICALS INC.	AL	2819 2812	3A		490	350	6	0	1	0	2700	3547
OLIN CHEMICALS	NY	2819	3C		0	0	3	0	0	13	2138	2154
BETHLEHEM APPARATUS CO. INC.	PA	2819 3559	1A1C1D2D		5	0	0	0	0	5	250	260
MALLINCKRODT SPECIALTY	PA	2819 NA	1A1C1D2A		250	250	0	0	0	5	750	1255
GE PLASTICS INC.	CA	2821 NA	2B2C		0	0	0	0	0	0	6	6
GE CHEMICALS INC.	IL	2821 NA	2B		0	0	0	0	0	0	0	0
MONSANTO CO.	OH	2821 3086	1B1C2B		0	2	1	0	0	0	320	323
SAJAN PLASTICS	OH	2821 NA	2B		0	5	0	0	0	0	490	495

ROLE OF MERCURY AND ITS USES AT THE FACILITY

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E = As a byproduct

F = As an impurity

3 = Otherwise use the toxic chemical

A = As a chemical processing aid

B = As a manufacturing aid

C = Ancillary or other use

2 = Process the toxic chemical

A = As a reactant

B = As a formulation component

C = As an article component

D = Repackaging

Source: Toxic Chemical Release Inventory, data downloaded April 21, 1993

1991 NATIONWIDE TRI MERCURY DATA (KG/YR)

<u>FACILITY NAME</u>	<u>STATE</u>	<u>SIC CODE</u>	<u>ROLE OF MERCURY</u>	<u>AIR NONPT</u>	<u>AIR POINT</u>	<u>WATER</u>	<u>UNDGRND</u>	<u>LAND</u>	<u>POTH</u>	<u>OFFSITE</u>	<u>TOTAL</u>
GE CHEMICALS INC.	WV	2821 NA	2B	1	0	25	0	2	0	2400	2428
AMERICAN CYANAMID CO.	NJ	2833 2869	3A	0	0	0	0	0	6	16287	16293
KELLY-MOORE PAINT CO. INC.	CA	2851 NA	2B	0	0	0	0	0	0	5	5
TROY CHEMICAL CORP.	NJ	2851 NA	1B1D	0	0	0	0	0	0	0	0
COSAN CHEMICAL CORP.	NJ	2869 2879	2A	46	1	0	0	0	1	260	308
MULS AMERICA INC.	NJ	2869 2851	1B1D	0	0	0	0	0	0	3241	3241
TEXACO REFINING & MARKETING	CA	2911	1A1F	0	96	0	0	0	0	0	96
KOCH REFINING CO.	MN	2911 NA	1A1F	3	120	0	0	0	0	1	124
VALERO REFINING CO.	TX	2911 NA	1B1F3A	0	0	1	0	0	0	3	4
PPG INDUSTRIES INC.	WV	2912 2819	3A	1000	85	60	0	0	0	1800	2945
CROSSVILLE RUBBER PRODUCTS	TN	3069	2B	0	499	0	0	0	10	0	509
PMS CONSOLIDATED	OH	3087 NA	2B	49	1	0	0	0	0	296	346
CHATAS GLASS CO.	NJ	3231	3B	0	0	0	0	0	0	0	0
ZINC CORP. OF AMERICA	PA	3333 3341	1A1F	0	250	0	0	0	0	0	250
MERCURY REFINING CO. INC.	NY	3341	1A1C1D2D	5	5	5	0	0	0	5	20
MERCURY REFINING CO. INC.	NY	3341	1A1C1D2D	250	5	5	0	0	0	5	265
ELM PLATING CO.	MI	3471 NA	2C	5	0	0	0	0	5	5	15
GE CO.	OH	3641 NA	2C3C	500	1780	0	0	2750	0	13450	18480
HONEYWELL INC.	IL	3679	2C	0	4	0	0	0	0	7234	7238
DURAKOOL INC.	IN	3679	2C2D	5	0	0	0	0	5	0	10
HERMASEAL CO.	IN	3679	2D	5	0	0	0	0	0	0	5
ALEXANDER MFG. CO.	IA	3692	1B1C2B	0	0	0	0	0	0	250	250
DURACELL USA	SC	3692 NA	2B	0	15	0	0	0	0	372	387
EVEREADY BATTERY CO. INC.	VT	3692 NA	2C	1	1	0	0	0	0	11	13

ROLE OF MERCURY AND ITS USES AT THE FACILITY

1 = Manufacture the toxic chemical

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C = For on-site use/processing

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2 = Process the toxic chemical

A = As a reactant

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C = As an article component

D = Repackaging

1991 NATIONWIDE TRI MERCURY DATA (KG/YR)

<u>FACILITY NAME</u>	<u>STATE</u>	<u>SIC CODE</u>	<u>ROLE OF MERCURY</u>	<u>AIR NONPT</u>	<u>AIR POINT</u>	<u>WATER</u>	<u>UNDGRND</u>	<u>LAND</u>	<u>POTW</u>	<u>OFFSITE</u>	<u>TOTAL</u>
RAYOVAC CORP.	WI	3692	2B	0	0	0	0	26	0	26	52
KERR MANUFACTURING CO.	MI	3843	2D	0	0	0	0	0	0	2000	2000
NASA	MS	9661 NA	3C	5	0	0	0	0	0	0	5
NASA	MS	9661 NA	3C	250	0	0	0	5	0	250	505
Total Number of Facilities: 52*				12162	7830	671	9	5320	64	171392	197448
				*****	*****	*****	*****	*****	*****	*****	*****

18.13 % (35,795 kg/yr) of Total Releases and Transfers of Mercury come from Great Lakes States

*TRI information may be edited after it is originally reported. The 1991 reporting year data shown in this table reflect a TRI download performed nearly concurrently with the TRI information published in April 1993, with one exception. One Great Lakes facility that had reported mercury releases in this version of TRI was no longer included in a later version of TRI. To maintain consistency with 1991 TRI mercury data pulled specifically for the Great Lakes states (downloaded 6/21/94), that facility was removed from this table.

ROLE OF MERCURY AND ITS USES AT THE FACILITY

1 = Manufacture the toxic chemical

A = Produce

B = Import

C = For on-site use/processing

D = For sale/distribution

E = As a byproduct

F = As an impurity

3 = Otherwise use the toxic chemical

A = As a chemical processing aid

B = As a manufacturing aid

C = Ancillary or other use

2 = Process the toxic chemical

A = As a reactant

B = As a formulation component

C = As an article component

D = Repackaging

Source: Toxic Chemical Release Inventory, data downloaded April 21, 1993

Appendix F3a: Facilities Reporting Mercury-Bearing Wastes in RCRA Biennial Report System

SIC Category	SIC Code	# of Facilities Reporting						Total
		IL	IN	MI	MN	OH	PA	
7	Agricultural Services							
	723 Crop Preparation Services For Market	0	0	0	0	1	0	1
10	Metal Mining							
	1011 Iron Ores	0	0	0	5	0	0	5
14	Nonmetallic Minerals, Except Fuels							
	1422 Crushed And Broken Limestone	0	0	1	0	0	0	1
15	General Building Contractors							
	1542 Nonresidential Construction, Nec	0	0	1	0	0	0	1
17	Special trade contractors, NEC							
	1799 Special Trade Contractors, Nec	0	0	0	0	1	0	1
20	Food and Kindred Products							
	2022 Cheese, Natural And Processed	1	0	0	0	0	0	1
	2023 Dry, Condensed, Evaporated Products	0	0	1	0	0	0	1
	2035 Pickles, Sauces, And Salad Dressings	1	0	0	0	0	0	1
	2087 Flavoring Extracts And Syrups, Nec	0	0	0	0	1	0	1
	2092 Fresh Or Frozen Prepared Fish	0	0	0	0	0	1	1
	2099 Food Preparations, Nec	1	0	0	0	0	0	1
22	Textile Mill Products							
	2295 Coated Fabrics	0	0	0	0	1	0	1
	2299 Textile Goods, Nec	0	0	0	0	0	1	1
24	Lumber and Wood Products							
	2431 Millwork	0	0	0	2	0	0	2
	2491 Wood Preserving	0	0	0	0	1	0	1
25	Furniture and Fixtures							
	2522 Office Furniture, Except Wood	0	0	1	0	0	0	1

NOTE: This table shows, by the SIC code of the generating facility, the number of generators that reported hazardous mercury-bearing waste streams for the 1991 reporting year, the most recent year for which data is widely available. Large Quantity Generators (LQGs) and permitted Treatment, Storage, and Disposal facilities (TSDs) are required to report on waste generation and management activities biannually, although some states require more frequent reporting or have lower generation thresholds that trigger reporting requirements. Most states manage this data through the Biennial Reporting System (BRS) or Biennial-Report compatible data systems. Mercury-bearing wastes include the following waste codes: D009 (characteristic for mercury), U151 (discarded product), K071 (chlor alkali process waste), K106 (chlor-alkali process waste), P092 (phenylmercuric acetate), and P065 (mercury fulminate). This table includes only data for waste of recurrent origin: that is, waste generated as a result of ongoing production or services processes. Data for waste streams of other waste origins (remediation-derived waste hazardous residuals resulting from the treatment of other waste streams, and waste not generated originally at the reporting facility) are not included. Ohio does not collect waste origin information, and as a result, any hazardous mercury-bearing remediation waste, treatment residuals, or wastes passing through Transfer/Storage facilities may be included in Ohio data. Wisconsin and New York data are not included due to technical delays in obtaining the data.

Report System

SIC Category	SIC Code	# of Facilities Reporting						Total
		IL	IN	MI	MN	OH	PA	
26	Paper and Allied Products							
	2621 Paper Mills	0	0	1	0	1	1	3
	2641 Not Listed	0	0	0	1	0	0	1
	2657 Folding Paperboard Boxes	0	0	0	0	1	0	1
	2679 Converted Paper Products. Nec	0	0	0	0	1	0	1
27	Printing and Publishing							
	2731 Book Publishing	0	0	0	1	0	0	1
	2754 Commercial Printing. Gravure	0	0	0	0	1	1	2
	2759 Commercial Printing. Nec	1	0	0	0	0	1	2
28	Chemicals and Allied Products							
	2812 Alkalies And Chlorine	0	0	0	0	1	0	1
	2816 Inorganic Pigments	1	0	0	0	1	0	2
	2819 Industrial Inorganic Chemicals. Nec	2	0	1	0	4	5	12
	2821 Plastics Materials And Resins	4	1	3	0	7	6	21
	2822 Synthetic Rubber	0	0	0	0	1	0	1
	2833 Medicinals And Botanicals	0	4	0	0	0	2	6
	2834 Pharmaceutical Preparations	5	7	2	0	2	12	28
	2835 Diagnostic Substances	0	2	0	0	0	0	2
	2841 Soap And Other Detergents	1	0	0	0	2	0	3
	2842 Polishes And Sasnitiation Goods	0	0	0	0	1	1	2
	2843 Surface Active Agents	2	0	0	0	0	0	2
	2844 Toilet Preparations	0	0	0	1	0	0	1
	2851 Paints And Allied Products	0	1	3	0	8	3	15
	2865 Cyclic Crudes And Intermediates	0	0	0	0	1	0	1
	2868 Not Listed	0	0	0	0	1	0	1
	2869 Industrial Organic Chemicals. Nec	4	1	3	1	7	4	20
	2875 Fertilizers. Mixing Only	0	0	0	0	1	0	1
	2879 Agricultural Chemicals. Nec	0	0	0	0	1	0	1
	2891 Adhesives And Sealants	0	0	0	0	4	0	4
	2899 Chemical Preparations. Nec	0	0	3	0	6	2	11
29	Petroleum and Coal Products							
	2911 Petroleum Refining	0	1	0	1	0	3	5
	2992 Lubricating Oils And Greases	1	0	0	0	2	0	3
	2999 Petroleum And Coal Products. Nec	0	0	0	0	1	0	1
30	Rubber and Miscellaneous Plastic Products							
	3011 Tires And Inner Tubes	1	0	0	0	2	0	3
	3069 Fabricated Rubber Products. Nec	0	0	1	0	1	1	3
	3081 Unsupported Plastics. Film And Sheet	0	0	0	0	0	1	1
	3086 Plastics. Foam Products	0	0	0	0	0	1	1
	3089 Plastics Products. Nec	1	0	0	0	2	0	3
32	Stone, Clay, and Glass Products							
	3211 Flat Glass	0	0	0	0	1	0	1
	3229 Pressed And Blown Glass. Nec	0	0	0	0	0	1	1
	3231 Products Of Purchased Glass	0	0	1	0	0	0	1
	3241 Cement. Hydraulic	0	0	1	0	1	0	2

Appendix F3a: Facilities Reporting Mercury-Bearing Wastes in RCRA Biennial Report System

SIC Category	SIC Code	# of Facilities Reporting						Total
		IL	IN	MI	MN	OH	PA	
	3255 Clay Refractories	0	0	0	0	1	0	1
	3291 Abrasive Products	1	0	0	2	1	0	4
	3296 Mineral Wool	0	0	0	0	1	0	1
33	Primary Metal Industries							
	3312 Blast Furnaces And Steel Mills	0	0	1	0	3	2	6
	3316 Cold Finishing Of Steel Shapes	0	1	0	0	0	1	2
	3317 Steel Pipe And Tubes	0	0	0	0	2	1	3
	3321 Gray And Ductile Iron Foundries	1	0	1	0	1	1	4
	3322 Malleable Iron Foundries	0	0	1	0	0	0	1
	3331 Primary Copper	0	0	1	0	0	0	1
	3334 Primary Aluminum	0	0	0	0	0	1	1
	3353 Aluminum Sheet, Plate, And Foil	1	0	0	0	1	1	3
	3354 Aluminum Extruded Products	0	1	0	0	0	0	1
	3356 Nonferrous Rolling And Drawing, Nec	0	0	1	0	2	1	4
	3361 Not Listed	0	0	0	1	0	0	1
34	Fabricated Metal Products							
	3411 Metal Cans	1	0	0	0	0	0	1
	3412 Metal Barrels, Drums, And Pails	0	0	0	0	1	0	1
	3429 Hardware, Nec	0	1	0	0	0	1	2
	3441 Fabricated Structural Metal	0	0	0	0	1	0	1
	3443 Fabricated Plate Work (Boiler Shops)	0	0	0	0	0	1	1
	3446 Architectural Metal Work	0	0	0	0	0	1	1
	3449 Miscellaneous Metal Work	0	0	0	0	0	1	1
	3452 Bolts, Nuts, Rivets, And Washers	0	0	0	0	0	1	1
	3456 Not Listed	0	0	1	0	0	0	1
	3465 Automotive Stampings	0	0	2	0	4	1	7
	3471 Plating And Polishing	1	0	0	0	3	1	5
	3479 Metal Coating And Allied Services	0	1	0	0	0	0	1
	3482 Small Arms Ammunition	3	0	0	1	0	0	4
	3483 Ammunition, Except For Small Arms	0	0	0	0	2	0	2
	3489 Ordnance And Accessories, Nec	1	0	0	1	0	0	2
	3494 Valves And Pipe Fittings, Nec	0	0	0	0	0	1	1
	3496 Miscellaneous Fabricated Wire Product	0	0	0	0	0	1	1
	3499 Fabricated Metal Products, Nec	1	0	1	1	4	1	8
35	Industrial Machinery and Equipment							
	3519 Internal Combustion Engines, Nec	0	0	1	0	0	0	1
	3523 Farm Machinery And Equipment	1	0	0	0	0	0	1
	3531 Construction Machinery	2	0	0	0	0	0	2
	3535 Conveyors And Conveying Equipment	0	0	0	0	0	1	1
	3545 Machine Tool Accessories	0	0	0	0	0	1	1
	3548 Welding Apparatus	0	0	0	0	1	0	1
	3563 Air And Gas Compressors	0	0	0	0	1	0	1
	3571 Electronic Computers	0	0	0	1	0	1	2
	3585 Refrigeration And Heating Equipment	0	0	0	0	3	0	3
	3599 Industrial Machinery, Nec	0	0	1	0	0	0	1

Report System

SIC Category	SIC Code	# of Facilities Reporting						Total
		IL	IN	MI	MN	OH	PA	
36	Electronic and Other Electronic Equipment							
	3612 Transformers, Except Electronic	0	1	0	0	0	1	2
	3613 Switchgear And Switchboard Apparatu	0	0	0	0	0	1	1
	3621 Motors And Generators	0	1	0	0	1	1	3
	3624 Carbon And Graphite Products	0	0	0	0	1	0	1
	3632 Household Refrigerators And Freezers	0	2	0	0	0	0	2
	3633 Houschold Laundry Equipment	0	0	0	0	1	0	1
	3641 Electric Lamps	0	0	0	0	3	0	3
	3645 Residential Lighting Fixtures	0	0	0	0	0	1	1
	3647 Vehicular Lighting Equipment	0	0	0	0	1	0	1
	3663 Radio And Tv Communication Equipm	0	2	0	1	0	0	3
	3665 Not Listed	0	0	0	0	2	0	2
	3669 Communications Equipment, Nec	1	0	0	0	0	1	2
	3670 Not Listed	0	0	0	1	0	0	1
	3671 Electron Tubes	0	0	0	0	0	1	1
	3672 Printed Circuit Boards	0	0	0	1	0	0	1
	3674 Semiconductors And Related Devices	0	0	0	0	0	6	6
	3678 Electronic Connectors	0	0	0	0	0	1	1
	3679 Electronic Components	2	2	0	0	0	2	6
	3692 Primary Batteries, Dry And Wet	0	2	0	0	3	0	5
	3695 Magnetic And Optical Recording Medi	0	0	0	1	1	0	2
	3699 Electrical Equipment And Supplies, Ne	0	0	0	0	1	0	1
37	Transportation Equipment							
	3711 Motor Vehicles And Car Bodies	1	1	4	0	4	0	10
	3713 Truck And Bus Bodies	0	0	0	0	1	0	1
	3714 Motor Vehicle Parts And Accessories	0	1	10	0	4	2	17
	3721 Aircraft	1	0	0	0	0	0	1
	3724 Aircraft Engines And Engine Parts	0	0	0	0	3	0	3
	3728 Aircraft Parts And Equipment, Nec	0	0	0	1	1	0	2
	3731 Ship Building And Repairing	0	0	0	0	0	1	1
	3743 Railroad Equipment	1	0	0	0	0	2	3
	3769 Space Vehicle Equipment, Nec	0	0	0	0	0	1	1
38	Instruments and Related Products							
	3812 Search And Navigation Equipment	1	1	0	0	0	0	2
	3822 Environmental Controls	0	1	0	1	1	0	3
	3823 Process Control Instruments	0	0	0	0	0	2	2
	3824 Fluid Meters And Counting Devices	0	0	0	0	0	1	1
	3826 Analytical Instruments	0	0	1	0	0	0	1
	3829 Measuring And Controlling Devices, N	0	0	0	0	1	1	2
	3841 Surgical And Medical Instruments	0	1	0	0	0	0	1
	3842 Surgical Appliances And Supplies	0	1	0	0	0	1	2
	3845 Electromedical Equipment	0	0	0	1	0	0	1
	3861 Photographic Equip.& Supplies-Instru	0	0	0	0	0	1	1

Appendix F3a: Facilities Reporting Mercury-Bearing Wastes in RCRA Biennial Report System

SIC Category	SIC Code	# of Facilities Reporting						Total
		IL	IN	MI	MN	OH	PA	
39	Miscellaneous Manufacturing Industries							
	3953 Marking Devices	1	0	0	0	0	0	1
	3996 Hard Surface Floor Coverings, Nec	0	0	0	0	0	2	2
	3999 Manufacturing Industries, Nec	0	0	1	1	0	0	2
40	Railroad Transportation							
	4011 Railroads, Line-Haul Operating	0	0	0	0	1	2	3
41	Local and Interurban Passenger Transit							
	4111 Local And Suburban Transit	0	0	0	0	0	1	1
	4173 Bus Terminal And Service Facilities	0	0	0	0	1	0	1
42	Trucking and Warehousing							
	4213 Trucking, Except Local	0	0	0	0	1	0	1
	4225 General Warehousing And Storage	0	1	0	0	0	2	3
	4226 Special Warehousing And Storage, Nec	2	0	0	0	0	0	2
45	Transportation by Air							
	4511 Not Listed	0	0	0	1	0	0	1
	4512 Air Transportation, Scheduled	0	0	0	2	0	0	2
	4581 Airports, Flying Fields, And Services	1	0	0	0	0	0	1
46	Pipelines, Except Natural Gas							
	4613 Refined Petroleum Pipelines	0	0	0	1	1	0	2
47	Transportation Services							
	4789 Transportation Services, Nec	0	0	0	0	0	1	1
48	Communications							
	4813 Telephone Communications, Except Ra	0	0	0	0	0	2	2
49	Electric, Gas, and Sanitary Services							
	4911 Electric Services	5	0	6	0	2	9	22
	4952 Sewerage Systems	0	0	0	0	1	0	1
	4953 Refuse Systems	3	0	0	1	4	0	8
	4959 Sanitary Services, Nec	0	0	0	0	1	0	1
51	Wholesale Trade - Non-Durable Goods							
	5122 Drugs, Proprietarys, And Sundries	1	0	0	0	0	0	1
	5169 Chemicals And Allied Products, Nec	2	0	0	0	1	0	3
	5171 Petroleum Bulk Stations And Terminal	1	0	0	0	0	0	1
	5191 Farm Supplies	0	0	0	0	0	1	1
73	Business Services							
	7331 Direct Mail Advertising Services	0	0	0	0	0	1	1
	7389 Business Services, Nec	0	0	0	0	2	0	2
	7391 Not Listed	0	0	0	0	1	0	1
75	Automotive Repair, Services, and Parking							
	7538 General Automotive Repair Shops	1	1	0	0	0	0	2
76	Miscellaneous Repair Services							
	7699 Repair Services, Nec	1	0	0	1	0	1	3

Appendix F3a: Facilities Reporting Mercury-Bearing Wastes in RCRA Biennial Report System

SIC Category	SIC Code	# of Facilities Reporting						Total
		IL	IN	MI	MN	OH	PA	
80	Health Services							
	8011 Offices And Clinics Of Medical Doctor	1	0	0	0	0	0	1
	8021 Offices And Clinics Of Dentists	0	0	0	0	0	0	0
	8062 General Medical And Surgical Hospital	5	1	2	0	3	5	16
	8071 Medical Laboratories	0	0	0	0	1	0	1
82	Educational Services							
	8211 Elementary And Secondary Schools	1	0	0	0	4	0	5
	8221 Colleges And Universities	5	5	4	2	13	6	35
84	Museums, Art Galleries, & Botanical & Zoological Gardens							
	8422 Botanical And Zoological Gardens	1	0	0	0	0	0	1
87	Engineering and Management Services							
	8711 Engineering Services	1	0	0	0	0	0	1
	8731 Commercial Physical Research	3	1	2	1	4	4	15
	8732 Commercial Nonphysical Research	0	0	0	0	0	1	1
	8733 Noncommercial Research Organization	1	0	0	1	0	1	3
	8734 Testing Laboratories	5	1	0	1	1	4	12
91	Executive, Legislative, and General							
	9199 Genral Government, Nec	1	0	0	0	1	1	3
94	Administration of Human Resource Programs							
	9451 Administration Of Veterans' Affairs	1	0	0	0	0	0	1
95	Environmental Quality, and Housing							
	9511 Air, Water, And Solid Waste Managem	0	0	0	0	3	2	5
96	Administration of Economic Programs							
	9661 Space Research And Technology	0	0	0	0	2	0	2
97	National Security and International Affairs							
	9711 National Security	2	2	0	0	4	1	9
99	Nonclassifiable Establishments							
	9999 Nonclassifiable Establishment	3	1	1	0	1	2	8
Grand Total		94	50	65	38	181	144	572

Appendix F3b: Source Processes that Generate Mercury-Bearing Wastes (1991 BRS data)

SIC Category	SIC Code	Sic Description	Source Code	Source Code Description	# of Facilities Reporting Source Code
10	Metal Mining				
	1011	Iron Ores	A58	Discard out-of-die prods/chems - 1-Time & Intermit Processes	1
			A94	Laboratory wastes - Other Processes	4
14	Mining and Quarrying of Nonmetallic Minerals, Except Fuels				
	1422	Crushed And Broken Limestone	A94	Laboratory wastes - Other Processes	1
15	Building Construction - General Contractors and Operative Builders				
	1542	Nonresidential Construction, Nec	A99	Other - Other Processes	1
20	Food and Kindred Products				
	2022	Cheese, Natural And Processed	A94	Laboratory wastes - Other Processes	1
	2023	Dry, Condensed, Evaporated Products	A59	Other - 1-Time & Intermit Processes	1
			A94	Laboratory wastes - Other Processes	1
	2035	Pickles, Sauces, And Salad Dressings	A94	Laboratory wastes - Other Processes	1
	2092	Fresh Or Frozen Prepared Fish	A58	Discard out-of-die prods/chems - 1-Time & Intermit Processes	1
	2099	Food Preparations, Nec	A56	Discontinue use process equip - 1-Time & Intermit Processes	1
22	Textile Mill Products				
	2299	Textile Goods, Nec	A59	Other - 1-Time & Intermit Processes	1
24	Lumber and Wood Products, Except Furniture				
	2431	Milwork	A49	Other - Processes Not Surface Prep	1
			A55	Filter/Battery replacement - 1-Time & Intermit Processes	1
25	Furniture and Fixtures				
	2522	Office Furniture, Except Wood	A58	Discard out-of-die prods/chems - 1-Time & Intermit Processes	1

NOTE: This table, organized by facility SIC Code, shows the specific processes responsible for generating mercury-bearing waste streams, as reported in 1991 BRS data. Facilities supply a source code, describing the specific process or activity that created the waste, for each waste stream generated. Ohio data did not include source code information, and therefore, Ohio facilities are not included in the totals. Wisconsin and New York data are not included at present due to technical delays in obtaining the data. Facilities are counted once for each source code they report in connection with mercury-bearing waste streams, regardless of the number of mercury-bearing waste streams associated with the source process. A summary page of source codes and total number of facilities reporting each source code is included at the end of this section.

Appendix F3b: Source Processes that Generate Mercury-Bearing Wastes (1991 BRS data)

SIC Category	SIC Code	Sic Description	Source Code	Source Code Description	# of Facilities Reporting Source Code
26	Paper and Allied Products				
	2621	Paper Mills	A56	Discontinue use process equip - I-Time & Intermit Processes	1
			A94	Laboratory wastes - Other Processes	1
	2641	Not Listed	A35	By-product processing - Processes Not Surface Prep	1
27	Printing and Publishing				
	2731	Book Publishing	A55	Filter/Battery replacement - I-Time & Intermit Processes	1
	2754	Commercial Printing, Gravure	A99	Other - Other Processes	1
	2759	Commercial Printing, Nec	A19	Other - Cleaning & Degreasing	1
			A59	Other - I-Time & Intermit Processes	1
28	Chemicals and Allied Products				
	2816	Inorganic Pigments	A58	Discard out-of-dtc prods/chems - I-Time & Intermit Processes	1
	2819	Industrial Inorganic Chemicals, Nec	A54	Oil changes - I-Time & Intermit Processes	1
			A58	Discard out-of-dtc prods/chems - I-Time & Intermit Processes	5
			A78	Air pollution ctrl dev - Pollution Ctrl/Wst Trtmnt Processes	2
			A92	Routine clean-up wastes - Other Processes	1
			A94	Laboratory wastes - Other Processes	2
	2821	Plastics Materials And Resins	A08	Physical scraping & removal - Cleaning & Degreasing	1
			A49	Other - Processes Not Surface Prep	1
			A53	Cleanup of spill residues - I-Time & Intermit Processes	1
			A57	Discarding off-spec material - I-Time & Intermit Processes	1
			A58	Discard out-of-dtc prods/chems - I-Time & Intermit Processes	2
			A94	Laboratory wastes - Other Processes	11
	2833	Medicinals And Botanicals	A32	Product filtering - Processes Not Surface Prep	1
			A37	Spent process liquids removal - Processes Not Surface Prep	1
			A53	Cleanup of spill residues - I-Time & Intermit Processes	1
			A57	Discarding off-spec material - I-Time & Intermit Processes	1
			A58	Discard out-of-dtc prods/chems - I-Time & Intermit Processes	1
			A59	Other - I-Time & Intermit Processes	2
			A94	Laboratory wastes - Other Processes	2
	2834	Pharmaceutical Preparations	A08	Physical scraping & removal - Cleaning & Degreasing	1
			A49	Other - Processes Not Surface Prep	1
			A53	Cleanup of spill residues - I-Time & Intermit Processes	2

Appendix F3b: Source Processes that Generate Mercury-Bearing Wastes (1991 BRS data)

SIC Category	SIC Code	Sic Description	Source Code	Source Code Description	# of Facilities Reporting Source Code
			A54	Oil changes - 1-Time & Intermit Processes	1
			A55	Filter/Battery replacement - 1-Time & Intermit Processes	1
			A56	Discontinue use process equip - 1-Time & Intermit Processes	2
			A57	Discarding off-spec material - 1-Time & Intermit Processes	2
			A58	Discard out-of-dtc prods/chems - 1-Time & Intermit Processes	4
			A59	Other - 1-Time & Intermit Processes	1
			A69	Other - Remediation Derived Waste	1
			A89	Other - Pollution Ctrl/Wst Trtmt Processes	1
			A94	Laboratory wastes - Other Processes	18
			A99	Other - Other Processes	2
	2835	Diagnostic Substances	A37	Spent process liquids removal - Processes Not Surface Prep	1
			A58	Discard out-of-dtc prods/chems - 1-Time & Intermit Processes	1
	2841	Soap And Other Detergents	A94	Laboratory wastes - Other Processes	1
	2842	Polishes And Sanitation Goods	A58	Discard out-of-dtc prods/chems - 1-Time & Intermit Processes	1
	2843	Surface Active Agents	A94	Laboratory wastes - Other Processes	2
	2844	Toilet Preparations	A58	Discard out-of-dtc prods/chems - 1-Time & Intermit Processes	1
	2851	Paints And Allied Products	A09	Clean out process equipment - Cleaning & Degreasing	1
			A57	Discarding off-spec material - 1-Time & Intermit Processes	1
			A58	Discard out-of-dtc prods/chems - 1-Time & Intermit Processes	1
			A59	Other - 1-Time & Intermit Processes	1
			A94	Laboratory wastes - Other Processes	3
	2869	Industrial Organic Chemicals, Nec	A57	Discarding off-spec material - 1-Time & Intermit Processes	1
			A58	Discard out-of-dtc prods/chems - 1-Time & Intermit Processes	1
			A59	Other - 1-Time & Intermit Processes	1
			A94	Laboratory wastes - Other Processes	10
			A99	Other - Other Processes	1
	2899	Chemical Preparations, Nec	A24	Phosphating - Surface Prep & Finishing	1
			A32	Product filtering - Processes Not Surface Prep	1
			A57	Discarding off-spec material - 1-Time & Intermit Processes	1
			A94	Laboratory wastes - Other Processes	2
29	Petroleum and Coal Products				
	2911	Petroleum Refining	A08	Physical scraping & removal - Cleaning & Degreasing	1
			A58	Discard out-of-dtc prods/chems - 1-Time & Intermit Processes	2

Appendix F3b: Source Processes that Generate Mercury-Bearing Wastes (1991 BRS data)

SIC Category	SIC Code	Sic Description	Source Code	Source Code Description	# of Facilities Reporting Source Code
			A94	Laboratory wastes - Other Processes	2
	2992	Lubricating Oils And Greases	A58	Discard out-of-dte prods/chems - I-Time & Intermit Processes	1
30	Rubber and Miscellaneous Plastic Products				
	3011	Tires And Inner Tubes	A58	Discard out-of-dte prods/chems - I-Time & Intermit Processes	1
	3069	Fabricated Rubber Products, Nec	A53	Cleanup of spill residues - I-Time & Intermit Processes	2
	3081	Unsupported Plastics, Film And Sheet	A94	Laboratory wastes - Other Processes	1
	3086	Plastics, Foam Products	A19	Other - Cleaning & Degreasing	1
	3089	Plastics Products, Nec	A94	Laboratory wastes - Other Processes	1
32	Stone, Clay, and Glass Products				
	3229	Pressed And Blown Glass, Nec	A09	Clean out process equipment - Cleaning & Degreasing	1
			A78	Air pollution ctrl dev - Pollution Ctrl/Wst Trtmnt Processes	1
	3231	Products Of Purchased Glass	A94	Laboratory wastes - Other Processes	1
	3241	Cement, Hydraulic	A56	Discontinue use process equip - I-Time & Intermit Processes	1
	3291	Abrasive Products	A37	Spent process liquids removal - Processes Not Surface Prep	1
			A94	Laboratory wastes - Other Processes	2
			A99	Other - Other Processes	1
33	Primary Metal Industries				
	3312	Blast Furnaces And Steel Mills	A58	Discard out-of-dte prods/chems - I-Time & Intermit Processes	2
			A59	Other - I-Time & Intermit Processes	1
			A69	Other - Remediation Derived Waste	1
	3316	Cold Finishing Of Steel Shapes	A58	Discard out-of-dte prods/chems - I-Time & Intermit Processes	1
			A94	Laboratory wastes - Other Processes	1
	3317	Steel Pipe And Tubes	A94	Laboratory wastes - Other Processes	1
	3321	Gray And Ductile Iron Foundries	A21	Painting - Surface Prep & Finishing	1
			A57	Discarding off-spec material - I-Time & Intermit Processes	1
			A58	Discard out-of-dte prods/chems - I-Time & Intermit Processes	1
	3322	Malleable Iron Foundries	A69	Other - Remediation Derived Waste	1
	3331	Primary Copper	A94	Laboratory wastes - Other Processes	1
	3334	Primary Aluminum	A94	Laboratory wastes - Other Processes	1
	3353	Aluminum Sheet, Plate, And Foil	A94	Laboratory wastes - Other Processes	2
	3354	Aluminum Extruded Products	A94	Laboratory wastes - Other Processes	1
			A99	Other - Other Processes	1

Appendix F3b: Source Processes that Generate Mercury-Bearing Wastes (1991 BRS data)

SIC Category	SIC Code	Sic Description	Source Code	Source Code Description	# of Facilities Reporting Source Code
	3356	Nonferrous Rolling And Drawing, Nec	A19	Other - Cleaning & Degreasing	1
			A59	Other - I-Time & Intermitt Processes	1
	3361	Not Listed	A01	Stripping - Cleaning & Degreasing	1
34	Fabricated Metal Products				
	3411	Metal Cans	A51	Leak collection - I-Time & Intermitt Processes	1
	3429	Hardware, Nec	A21	Painting - Surface Prep & Finishing	1
			A99	Other - Other Processes	1
	3443	Fabricated Plate Work (Boiler Shops)	A54	Oil changes - I-Time & Intermitt Processes	1
	3446	Architectural Metal Work	A09	Clean out process equipment - Cleaning & Degreasing	1
	3449	Miscellaneous Metal Work	A53	Cleanup of spill residues - I-Time & Intermitt Processes	1
			A57	Discarding off-spec material - I-Time & Intermitt Processes	1
			A59	Other - I-Time & Intermitt Processes	1
			A91	Clothing & personal protective equipment - Other Processes	1
	3452	Bolts, Nuts, Rivets, And Washers	A19	Other - Cleaning & Degreasing	1
	3456	Not Listed	A21	Painting - Surface Prep & Finishing	1
	3465	Automotive Stampings	A56	Discontinue use process equip - I-Time & Intermitt Processes	1
			A58	Discard out-of-dte prods/chems - I-Time & Intermitt Processes	1
			A59	Other - I-Time & Intermitt Processes	1
	3471	Plating And Polishing	A22	Electroplating - Surface Prep & Finishing	1
			A94	Laboratory wastes - Other Processes	1
	3479	Metal Coating And Allied Services	A01	Stripping - Cleaning & Degreasing	1
			A32	Product filtering - Processes Not Surface Prep	1
	3482	Small Arms Ammunition	A21	Painting - Surface Prep & Finishing	1
			A53	Cleanup of spill residues - I-Time & Intermitt Processes	1
			A58	Discard out-of-dte prods/chems - I-Time & Intermitt Processes	1
			A79	Leachate collection - Pollution Ctrl/Wst Trtmt Processes	1
			A92	Routine clean-up wastes - Other Processes	1
	3489	Ordinance And Accessories, Nec	A56	Discontinue use process equip - I-Time & Intermitt Processes	1
			A58	Discard out-of-dte prods/chems - I-Time & Intermitt Processes	1
	3494	Valves And Pipe Fittings, Nec	A58	Discard out-of-dte prods/chems - I-Time & Intermitt Processes	1
	3496	Miscellaneous Fabricated Wire Products	A94	Laboratory wastes - Other Processes	1
	3499	Fabricated Metal Products, Nec	A09	Clean out process equipment - Cleaning & Degreasing	1
			A35	By-product processing - Processes Not Surface Prep	1

Appendix F3b: Source Processes that Generate Mercury-Bearing Wastes (1991 BRS data)

SIC Category	SIC Code	Sic Description	Source Code	Source Code Description	# of Facilities Reporting Source Code
			A60	Sludge removal - I-Time & Intermit Processes	1
			A59	Other - I-Time & Intermit Processes	1
35	Industrial Machinery and Equipment				
	3519	Internal Combustion Engines, Nec	A27	Etching - Surface Prep & Finishing	1
			A94	Laboratory wastes - Other Processes	1
	3523	Farm Machinery And Equipment	A55	Filter/Battery replacement - I-Time & Intermit Processes	1
			A94	Laboratory wastes - Other Processes	1
	3531	Construction Machinery	A56	Discontinue use process equip - I-Time & Intermit Processes	1
			A58	Discard out-of-dte prods/chems - I-Time & Intermit Processes	1
	3535	Conveyors And Conveying Equipment	A53	Cleanup of spill residues - I-Time & Intermit Processes	1
	3545	Machine Tool Accessories	A29	Other - Surface Prep & Finishing	1
	3571	Electronic Computers	A53	Cleanup of spill residues - I-Time & Intermit Processes	1
			A69	Other - Remediation Derived Waste	1
	3599	Industrial Machinery, Nec	A53	Cleanup of spill residues - I-Time & Intermit Processes	1
36	Electronic and Other Electronic Equipment				
	3612	Transformers, Except Electronic	A94	Laboratory wastes - Other Processes	2
	3613	Switchgear And Switchboard Apparatus	A40	Metal forming - Processes Not Surface Prep	1
	3621	Motors And Generators	A58	Discard out-of-dte prods/chems - I-Time & Intermit Processes	2
	3632	Household Refrigerators And Freezers	A94	Laboratory wastes - Other Processes	1
			A99	Other - Other Processes	1
	3645	Residential Lighting Fixtures	A22	Electroplating - Surface Prep & Finishing	1
	3663	Radio And Tv Communication Equipment	A55	Filter/Battery replacement - I-Time & Intermit Processes	1
			A58	Discard out-of-dte prods/chems - I-Time & Intermit Processes	2
	3669	Communications Equipment, Nec	A37	Spent process liquids removal - Processes Not Surface Prep	1
			A51	Leak collection - I-Time & Intermit Processes	1
			A58	Discard out-of-dte prods/chems - I-Time & Intermit Processes	1
	3670	Not Listed	A49	Other - Processes Not Surface Prep	1
	3671	Electron Tubes	A58	Discard out-of-dte prods/chems - I-Time & Intermit Processes	1
	3672	Printed Circuit Boards	A27	Etching - Surface Prep & Finishing	1
	3674	Semiconductors And Related Devices	A01	Stripping - Cleaning & Degreasing	1
			A56	Discontinue use process equip - I-Time & Intermit Processes	1
			A57	Discarding off-spec material - I-Time & Intermit Processes	2
			A59	Other - I-Time & Intermit Processes	2

Appendix F3b: Source Processes that Generate Mercury-Bearing Wastes (1991 BRS data)

SIC Category	SIC Code	Sic Description	Source Code	Source Code Description	# of Facilities Reporting Source Code
			A94	Laboratory wastes - Other Processes	1
	3678	Electronic Connectors	A58	Discard out-of-dte prods/chems - I-Time & Intermit Processes	1
	3679	Electronic Components	A09	Clean out process equipment - Cleaning & Degreasing	1
			A27	Etching - Surface Prep & Finishing	1
			A54	Oil changes - I-Time & Intermit Processes	1
			A56	Discontinue use process equip - I-Time & Intermit Processes	1
			A57	Discarding off-spec material - I-Time & Intermit Processes	2
			A58	Discard out-of-dte prods/chems - I-Time & Intermit Processes	1
			A92	Routine clean-up wastes - Other Processes	1
			A99	Other - Other Processes	3
	3692	Primary Batteries, Dry And Wet	A55	Filter/Battery replacement - I-Time & Intermit Processes	1
			A94	Laboratory wastes - Other Processes	1
	3695	Magnetic And Optical Recording Media	A55	Filter/Battery replacement - I-Time & Intermit Processes	1
37	Transportation Equipment				
	3711	Motor Vehicles And Car Bodies	A04	Flush rinsing - Cleaning & Degreasing	1
			A05	Dip rinsing - Cleaning & Degreasing	1
			A09	Clean out process equipment - Cleaning & Degreasing	1
			A21	Painting - Surface Prep & Finishing	2
			A29	Other - Surface Prep & Finishing	1
			A37	Spent process liquids removal - Processes Not Surface Prep	1
			A51	Leak collection - I-Time & Intermit Processes	1
			A54	Oil changes - I-Time & Intermit Processes	1
			A56	Discontinue use process equip - I-Time & Intermit Processes	1
			A57	Discarding off-spec material - I-Time & Intermit Processes	2
			A58	Discard out-of-dte prods/chems - I-Time & Intermit Processes	3
			A59	Other - I-Time & Intermit Processes	2
			A72	Metals recovery - Pollution Ctrl/Wst Trtnmt Processes	1
			A94	Laboratory wastes - Other Processes	2
	3714	Motor Vehicle Parts And Accessories	A21	Painting - Surface Prep & Finishing	1
			A53	Cleanup of spill residues - I-Time & Intermit Processes	1
			A56	Discontinue use process equip - I-Time & Intermit Processes	2
			A57	Discarding off-spec material - I-Time & Intermit Processes	1
			A58	Discard out-of-dte prods/chems - I-Time & Intermit Processes	2

Appendix 150: Source Processes that Generate Mercury-Bearing Wastes (1991 BRS data)

SIC Category	SIC Code	Sic Description	Source Code	Source Code Description	# of Facilities Reporting Source Code
			A59	Other - I-Time & Intermit Processes	1
			A94	Laboratory wastes - Other Processes	6
			A99	Other - Other Processes	1
	3721	Aircraft	A65	Underground storage tank cleanup - Remediation Derived Was	1
	3728	Aircraft Parts And Equipment, Nec	A01	Stripping - Cleaning & Degreasing	1
			A19	Other - Cleaning & Degreasing	1
	3731	Ship Building And Repairing	A26	Pickling - Surface Prep & Finishing	1
			A58	Discard out-of-dtc prods/chems - I-Time & Intermit Processes	1
			A59	Other - I-Time & Intermit Processes	1
	3743	Railroad Equipment	A19	Other - Cleaning & Degreasing	1
			A21	Painting - Surface Prep & Finishing	1
			A59	Other - I-Time & Intermit Processes	1
	3769	Space Vehicle Equipment, Nec	A94	Laboratory wastes - Other Processes	1
38	Instruments and Related Products				
	3812	Search And Navigation Equipment	A55	Filter/Battery replacement - I-Time & Intermit Processes	1
			A57	Discarding off-spec material - I-Time & Intermit Processes	1
	3822	Environmental Controls	A53	Cleanup of spill residues - I-Time & Intermit Processes	1
			A58	Discard out-of-dtc prods/chems - I-Time & Intermit Processes	1
	3824	Fluid Meters And Counting Devices	A56	Discontinue use process equip - I-Time & Intermit Processes	1
			A59	Other - I-Time & Intermit Processes	1
	3823	Process Control Instruments	A02	Acid cleaning - Cleaning & Degreasing	1
			A57	Discarding off-spec material - I-Time & Intermit Processes	1
			A58	Discard out-of-dtc prods/chems - I-Time & Intermit Processes	1
	3826	Analytical Instruments	A94	Laboratory wastes - Other Processes	1
	3829	Measuring And Controlling Devices, Nec	A94	Laboratory wastes - Other Processes	1
	3841	Surgical And Medical Instruments	A57	Discarding off-spec material - I-Time & Intermit Processes	1
			A58	Discard out-of-dtc prods/chems - I-Time & Intermit Processes	1
			A94	Laboratory wastes - Other Processes	1
	3842	Surgical Appliances And Supplies	A04	Flush rinsing - Cleaning & Degreasing	1
			A05	Dip rinsing - Cleaning & Degreasing	1
			A57	Discarding off-spec material - I-Time & Intermit Processes	1
			A94	Laboratory wastes - Other Processes	1

Appendix F3b: Source Processes that Generate Mercury-Bearing Wastes (1991 BRS data)

SIC Category	SIC Code	Sic Description	Source Code	Source Code Description	# of Facilities Reporting Source Code
	3845	Electromedical Equipment	A94	Laboratory wastes - Other Processes	1
	3861	Photographic Equip. & Supplies-Instrument	A94	Laboratory wastes - Other Processes	1
39	Miscellaneous Manufacturing Industries				
	3953	Marking Devices	A94	Laboratory wastes - Other Processes	1
	3996	Hard Surface Floor Coverings, Nec	A19	Other - Cleaning & Degreasing	1
			A56	Discontinue use process equip - 1-Time & Intermit Processes	1
			A58	Discard out-of-dte prods/chems - 1-Time & Intermit Processes	1
			A94	Laboratory wastes - Other Processes	1
	3999	Manufacturing Industries, Nec	A19	Other - Cleaning & Degreasing	1
			A49	Other - Processes Not Surface Prep	1
			A59	Other - 1-Time & Intermit Processes	1
			A99	Other - Other Processes	1
40	Railroad Transportation				
	4011	Railroads, Line-Haul Operating	A21	Painting - Surface Prep & Finishing	1
			A99	Other - Other Processes	1
41	Local & Suburban Transit & Interurban Highway Passenger Transportation				
	4111	Local And Suburban Transit	A03	Caustic (Alkali) cleaning - Cleaning & Degreasing	1
42	Trucking and Warehousing				
	4225	General Warehousing And Storage	A57	Discarding off-spec material - 1-Time & Intermit Processes	1
			A58	Discard out-of-dte prods/chems - 1-Time & Intermit Processes	3
	4226	Special Warehousing And Storage, Nec	A09	Clean out process equipment - Cleaning & Degreasing	1
			A55	Filter/Battery replacement - 1-Time & Intermit Processes	1
			A58	Discard out-of-dte prods/chems - 1-Time & Intermit Processes	1
			A59	Other - 1-Time & Intermit Processes	1
45	Transportation by Air				
	4511	Not Listed	A55	Filter/Battery replacement - 1-Time & Intermit Processes	1
	4512	Air Transportation, Scheduled	A19	Other - Cleaning & Degreasing	2
			A55	Filter/Battery replacement - 1-Time & Intermit Processes	1
			A57	Discarding off-spec material - 1-Time & Intermit Processes	1
	4581	Airports, Flying Fields, And Services	A55	Filter/Battery replacement - 1-Time & Intermit Processes	1

Appendix F3b: Source Processes that Generate Mercury-Bearing Wastes (1991 BRS data)

SIC Category	SIC Code	Sic Description	Source Code	Source Code Description	# of Facilities Reporting Source Code
46	Pipelines, Except Natural Gas				
	4613	Refined Petroleum Pipelines	A59	Other - 1-Time & Intermit Processes	1
47	Transportation Services				
	4789	Transportation Services, Nec	A58	Discard out-of-dte prods/chems - 1-Time & Intermit Processes	1
48	Communications				
	4813	Telephone Communications, Except Radio	A58	Discard out-of-dte prods/chems - 1-Time & Intermit Processes	1
			A99	Other - Other Processes	1
49	Electric, Gas, and Sanitary Services				
	4911	Electric Services	A02	Acid cleaning - Cleaning & Degreasing	1
			A55	Filter/Battery replacement - 1-Time & Intermit Processes	2
			A56	Discontinue use process equip - 1-Time & Intermit Processes	4
			A57	Discarding off-spec material - 1-Time & Intermit Processes	3
			A58	Discard out-of-dte prods/chems - 1-Time & Intermit Processes	8
			A59	Other - 1-Time & Intermit Processes	1
			A94	Laboratory wastes - Other Processes	4
			A99	Other - Other Processes	1
	4953	Refuse Systems	A79	Leachate collection - Pollution Ctrl/Wst Trtmnt Processes	1
			A94	Laboratory wastes - Other Processes	3
			A99	Other - Other Processes	1
51	Wholesale Trade - Non-Durable Goods				
	5122	Drugs, Proprietarys, And Sundries	A58	Discard out-of-dte prods/chems - 1-Time & Intermit Processes	1
	5169	Chemicals And Allied Products, Nec	A57	Discarding off-spec material - 1-Time & Intermit Processes	1
			A58	Discard out-of-dte prods/chems - 1-Time & Intermit Processes	1
	5171	Petroleum Bulk Stations And Terminals	A92	Routine clean-up wastes - Other Processes	1
	5191	Farm Supplies	A58	Discard out-of-dte prods/chems - 1-Time & Intermit Processes	1
			A94	Laboratory wastes - Other Processes	1
73	Business Services				
	7331	Direct-Mail Advertising Services	A04	Flush rinsing - Cleaning & Degreasing	1
75	Automotive Repair, Services, and Parking				
	7538	General Automotive Repair Shops	A55	Filter/Battery replacement - 1-Time & Intermit Processes	2

Appendix F3b: Source Processes that Generate Mercury-Bearing Wastes (1991 BRS data)

SIC Category	SIC Code	Sic Description	Source Code	Source Code Description	# of Facilities Reporting Source Code	
76	Miscellaneous Repair Services					
	7699	Repair Services, Nec	A04	Flush rinsing - Cleaning & Degreasing	1	
			A22	Electroplating - Surface Prep & Finishing	1	
			A56	Discontinue use process equip - 1-Time & Intermit Processes	1	
80	Health Services					
	8011	Offices And Clinics Of Medical Doctors	A58	Discard out-of-dtc prods/chems - 1-Time & Intermit Processes	1	
	8021	Offices And Clinics Of Dentists	A99	Other - Other Processes	1	
	8062	General Medical And Surgical Hospitals	A55	Filter/Battery replacement - 1-Time & Intermit Processes	1	
			A59	Other - 1-Time & Intermit Processes	2	
			A75	Wastewater treatment - Pollution Ctrl/Wst Trtmt Processes	1	
			A94	Laboratory wastes - Other Processes	10	
82	Educational Services					
	8211	Elementary And Secondary Schools	A94	Laboratory wastes - Other Processes	1	
	8221	Colleges And Universities	A02	Acid cleaning - Cleaning & Degreasing	1	
			A03	Caustic (Alkali) cleaning - Cleaning & Degreasing	1	
			A53	Cleanup of spill residues - 1-Time & Intermit Processes	2	
			A55	Filter/Battery replacement - 1-Time & Intermit Processes	3	
			A57	Discarding off-spec material - 1-Time & Intermit Processes	1	
			A58	Discard out-of-dtc prods/chems - 1-Time & Intermit Processes	3	
			A60	Sludge removal - 1-Time & Intermit Processes	1	
			A59	Other - 1-Time & Intermit Processes	2	
			A94	Laboratory wastes - Other Processes	16	
			84	Museums, Art Galleries, & Botanical & Zoological Gardens		
	8422	Botanical And Zoological Gardens		A94	Laboratory wastes - Other Processes	1
87	Engineering and Management Services					
	8711	Engineering Services	A94	Laboratory wastes - Other Processes	1	
	8731	Commercial Physical Research	A51	Leak collection - 1-Time & Intermit Processes	1	
			A59	Other - 1-Time & Intermit Processes	1	
			A94	Laboratory wastes - Other Processes	11	
	8732	Commercial Nonphysical Research	A94	Laboratory wastes - Other Processes	1	
	8733	Noncommercial Research Organizations	A57	Discarding off-spec material - 1-Time & Intermit Processes	1	

Appendix F3b: Source Processes that Generate Mercury-Bearing Wastes (1991 BRS data)

SIC Category	SIC Code	Sic Description	Source Code	Source Code Description	# of Facilities Reporting Source Code
			A94	Laboratory wastes - Other Processes	2
	8734	Testing Laboratories	A94	Laboratory wastes - Other Processes	11
91		Executive, Legislative, and General			
	9199	Genral Government, Nec	A94	Laboratory wastes - Other Processes	2
94		Administration of Human Resource Programs			
	9451	Administration Of Veterans' Affairs	A58	Discard out-of-dte prods/chems - I-Time & Intermit Processes	1
95		Administration of Environmental Quality & Housing Programs			
	9511	Air, Water, And Solid Waste Management	A94	Laboratory wastes - Other Processes	1
			A99	Other - Other Processes	1
97		National Security and International Affairs			
	9711	National Security	A53	Cleanup of spill residues - I-Time & Intermit Processes	1
			A55	Filter/Battery replacement - I-Time & Intermit Processes	3
			A57	Discarding off-spec material - I-Time & Intermit Processes	1
			A58	Discard out-of-dte prods/chems - I-Time & Intermit Processes	1
			A99	Other - Other Processes	1
99		Nonclassifiable Establishments			
	9999	Nonclassifiable Establishment	A37	Spent process liquids removal - Processes Not Surface Prep	1
			A55	Filter/Battery replacement - I-Time & Intermit Processes	2
			A58	Discard out-of-dte prods/chems - I-Time & Intermit Processes	1
			A94	Laboratory wastes - Other Processes	3
Grand total					485

Appendix F3b: Summary Data of Source Processes that Generate Mercury-Bearing Wastes

Source Code	Source Code Description	Sum of # of Facilities Reporting Source Code
A01	Stripping - Cleaning & Degreasing	4
A02	Acid cleaning - Cleaning & Degreasing	3
A03	Caustic (Alkali) cleaning - Cleaning & Degreasing	2
A04	Flush rinsing - Cleaning & Degreasing	4
A05	Dip rinsing - Cleaning & Degreasing	2
A08	Physical scraping & removal - Cleaning & Degreasing	3
A09	Clean-out process equipment - Cleaning & Degreasing	7
A19	Other - Cleaning & Degreasing	10
A22	Electroplating - Surface Prep & Finishing	3
A21	Painting - Surface Prep & Finishing	9
A24	Phosphating - Surface Prep & Finishing	1
A26	Pickling - Surface Prep & Finishing	1
A27	Etching - Surface Prep & Finishing	3
A29	Other - Surface Prep & Finishing	2
A32	Product filtering - Processes Not Surface Prep	3
A35	By-product processing - Processes Not Surface Prep	2
A37	Spent process liquids removal - Processes Not Surface Prep	6
A40	Metal forming - Processes Not Surface Prep	1
A49	Other - Processes Not Surface Prep	5
A51	Leak collection - 1-Time & Intermit Processes	4
A53	Cleanup of spill residues - 1-Time & Intermit Processes	16
A54	Oil changes - 1-Time & Intermit Processes	5
A55	Filter/Battery replacement - 1-Time & Intermit Processes	25
A56	Discontinue use process equip - 1-Time & Intermit Processes	20
A57	Discarding off-spec material - 1-Time & Intermit Processes	29
A58	Discard out-of-dte prods/chems - 1-Time & Intermit Processes	76
A59	Other - 1-Time & Intermit Processes	30
A60	Sludge removal - 1-Time & Intermit Processes	2
A65	Underground storage tank cleanup - Remediation Derived Waste	1
A69	Other - Remediation Derived Waste	4
A72	Metals recovery - Pollution Ctrl/Wst Trtmt Processes	1
A75	Wastewater treatment - Pollution Ctrl/Wst Trtmt Processes	1
A78	Air pollution ctrl dev - Pollution Ctrl/Wst Trtmt Processes	3
A91	Clothing & personal protective equipment - Other Processes	1
A89	Other - Pollution Ctrl/Wst Trtmt Processes	1
A79	Leachate collection - Pollution Ctrl/Wst Trtmt Processes	2
A92	Routine clean-up wastes - Other Processes	4
A94	Laboratory wastes - Other Processes	168
A99	Other - Other Processes	21

39

<<Totals # of Source Processes Reported

APPENDIX F4a: MERCURY DISCHARGES IN THE GREAT LAKES BASIN (PCS DATA)
JULY 1992 - JUNE 1993

SIC CODE/SIC NAME	NUMBER of FACILITIES	TOTAL Hg DISCHARGES (kg/yr)	RANGE of RELEASES (kg/yr)
10 Metal Mining			
1021 Copper ores	1	1.08	1.08
20 Food and Kindred Products			
2063 Beet Sugar	1	0	0
26 Paper & Allied Products			
2611 Pulp mills	1	0	0
2621 Paper mills, except building paper	2	0	0
2679 Converted paper and paperboard products, not elsewhere classified	1	0.08	0.08
28 Chemicals and Allied Products			
2812 Alkalies and chlorine	3	10.25	0.01 - 10.17
2819 Industrial inorganic chemicals, not elsewhere classified	1	0	0
2821 Plastics materials and synthetics	2	0.11	0 - 0.11
2822 Synthetic rubber	1	0.37	0.37
2869 Industrial organic chemicals, not elsewhere classified	3	1.49	0.03 - 1.46
33 Primary Metal Industries			
3312 Blast furnaces and steel mills	2	0	0
3313 Electrometallurgical products	1	0	0
3315 Steel wire and related products	2	0	0
3334 Primary aluminum	1	0	0
Note: This table shows the number of facilities in the Great Lakes basin, by SIC code, that reported mercury discharges under the Permit Compliance System (PCS). PCS data approximates point source loads from municipal and industrial discharges. Information is based on monitoring data supplied by regulated facilities.		Key: <i>Number of Facilities</i> = # of facilities reporting <i>Total Mercury Discharges</i> = total mercury discharges from all facilities reporting in each SIC code. <i>Range</i> = range of reported releases from all sources reporting in each SIC code.	

Source: Permit Compliance System

**APPENDIX F4a: MERCURY DISCHARGES IN THE GREAT LAKES BASIN (PCS DATA)
JULY 1992 - JUNE 1993**

SIC CODE/SIC NAME	NUMBER of FACILITIES	TOTAL HG DISCHARGES (kg/yr)	RANGE of RELEASES (kg/yr)
34 Fabricated Metal Products			
3471 Plating and polishing	2	0.01	0 - 0.01
37 Transportation Equipment			
3711 Motor vehicles and car bodies	1	0	0
3714 Motor vehicle parts and accessories	1	0	0
39 Miscellaneous Manufacturing Industries			
3999 Manufacturing industries, not elsewhere classified	1	5.17	5.17
49 Electric, Gas and Sanitary Services			
4931 Electric and other services combined	1	0	0
4952 Sewerage systems	109	451.85	0 - 162.21
4953 Refuse systems	1	0	0
Public Administration			
9511 Air, water resource and solid waste management	1	0	0
9711 National Security	1	0	0
TOTALS:	140	470.41	0 - 162.21

Source: Permit Compliance System

**APPENDIX F4b: MERCURY DISCHARGES IN THE GREAT LAKES BASIN (PCS DATA)
JUNE 1991 - JULY 1992**

SIC CODE/SIC NAME	NUMBER of FACILITIES	TOTAL HG DISCHARGES (kg/yr)	RANGE of RELEASES (kg/yr)
10 Metal Mining			
1021 Copper ores	1	0.68	0.68
24 Lumber & Wood Products			
2493 Reconstituted Wood Products	1	0	0
26 Paper & Allied Products			
2611 Pulp mills	2	0.04	0 - 0.04
2621 Paper mills, except building paper	2	0.45	0.17 - 0.28
2679 Converted paper and paperboard products, not elsewhere classified	1	0.03	0.03
28 Chemicals and Allied Products			
2812 Alkalies and chlorine	3	12.75	0.03 - 12.63
2819 Industrial inorganic chemicals, not elsewhere classified	1	0.15	0.15
2821 Plastics materials and synthetics	2	1.60	0.21 - 1.39
2822 Synthetic rubber	1	3.96	3.96
2869 Industrial organic chemicals, not elsewhere classified	3	32.69	0.09 - 23.82
2879 Agricultural chemicals, not elsewhere classified	1	0	0
33 Primary Metal Industries			
3312 Blast furnaces and steel mills	1	0	0
3313 Electrometallurgical products	1	0.02	0.02
3315 Steel wire and related products	2	0	0
3334 Primary aluminum	1	0.02	0.02

Note: This table shows the number of facilities in the Great Lakes basin, by SIC code, that reported mercury discharges under the Permit Compliance System (PCS). PCS data approximates point source loads from municipal and industrial discharges. Information is based on monitoring data supplied by regulated facilities.

Key:

Number of Facilities = # of facilities reporting.

Total Mercury Discharges = total mercury discharges from all facilities reporting in each SIC code.

Range = range of reported releases from all sources reporting in each SIC code.

**APPENDIX F4b: MERCURY DISCHARGES IN THE GREAT LAKES BASIN (PCS DATA)
JUNE 1991 - JULY 1992**

SIC CODE/SIC NAME	NUMBER of FACILITIES	TOTAL HG DISCHARGES (kg/yr)	RANGE of RELEASES (kg/yr)
34 Fabricated Metal Products			
3471 Plating and polishing	2	0.07	0 - 0.07
35 Machinery, Except Electrical			
3562 Ball and roller bearings	1	0	0
37 Transportation Equipment			
3711 Motor vehicles and car bodies	1	0.07	0.07
3714 Motor vehicle parts and accessories	1	0	0
39 Miscellaneous Manufacturing Industries			
3999 Manufacturing industries, not elsewhere classified	1	9.80	9.80
49 Electric, Gas and Sanitary Services			
4952 Sewerage systems	105	424.52	0 - 97.35
4953 Refuse systems	1	0.24	0.24
Public Administration			
9511 Air, water resource and solid waste management	1	0.01	0.01
9711 National Security	1	0	0
TOTALS:	137	487.10	0 - 97.35

Source: Permit Compliance System

Appendix F5: WISCONSIN MERCURY EMISSIONS (Air point sources, 1992 Data)

SIC CODE/SIC NAME	NUMBER of FACILITIES	TOTAL Hg EMISSIONS (pounds/yr)	RANGE of RELEASES (pounds/yr)
20 Food and Kindred Products			
2013 Sausages and Other Prepared Meat Products	1	15	15
2020 Dairy Products	1	2	2
2037 Frozen Fruits, Fruit Juices, and Vegetables	1	1	1
26 Paper and Allied Products			
2611 Pulp Mills	2	33	1 - 32
2621 Paper Mills	9	302	7 - 59
2631 Paperboard Mills	2	33	12 - 21
28 Chemicals and Allied Products			
2812 Alkalies and Chlorine	1	1071	1071
2821 Plastics Materials, Synthetic Resins, and Non-vulcanizable Elastomers	1	1	1
29 Petroleum Refining and Related Industries			
2911 Petroleum Refining	1	7	7
2951 Asphalt Paving Mixtures and Blocks	1	75	75
30 Rubber and Miscellaneous Plastics Products			
3011 Tires and Inner Tubes	1	1	1
32 Stone, Clay, Glass, and Concrete Products			
3274 Lime	4	17	1 - 6
33 Primary Metal Industries			
3341 Secondary Smelting and Refining of Nonferrous Metals	1	1	1

Note: This table shows the facilities (by SIC code) that reported mercury emissions under Wisconsin's Clean Air Act Title V Operating Permits Program. Under the Title V Program, states may impose fees up to \$25/ton of emissions of all eligible substances. In Wisconsin, facilities report emissions that exceed 1 pound.

In some cases, mercury emissions may be linked to processes such as fuel combustion that are independent of SIC codes.

Key

Number of Facilities = # of facilities reporting emissions equal or greater than 1 lb.

Total Emissions= total Hg emissions from all sources reporting in each SIC Code.

Range = range of reported releases from all sources reporting in each SIC Code.

Continued

Appendix F5: WISCONSIN MERCURY EMISSIONS (Air point sources, 1992 Data)

SIC CODE/SIC NAME	NUMBER of FACILITIES	TOTAL Hg EMISSIONS (pounds/yr)	RANGE of RELEASES (pounds/yr)
35 Industrial and Commercial Machinery and Computer Equipment			
3519 Internal Combustion Engines, Not Elsewhere Classified	1	4	4
3523 Farm Machinery and Equipment	1	21	21
3531 Construction Machinery and Equipment	1	1	1
3585 Air-Conditioning and Warm Air Heating Equipment and Commercial and Industrial Refrigeration Equipment	2	2	1
36 Electronic and other Electrical Equipment and Components, Except Computer Equipment			
3692 Primary Batteries, Dry and Wet	2	4	1 - 3
37 Transportation Equipment			
3713 Truck and Bus Bodies	1	11	11
39 Miscellaneous Manufacturing Industries			
3999 Manufacturing Industries, Not elsewhere classified	1	3	3
49 Electric, Gas, and Sanitary Services			
4911 Electric Services	13	5220	10 - 1272
4931 Electric and Other Services Combined	3	79	12 - 44
4953 Refuse Systems	3	355	4 - 223
4961 Steam and Air-Conditioning Supply	5	7	1 - 2
82 Educational Services			
8221 Colleges, Universities, and Professional Schools	3	56	3 - 42
TOTALS:	61	7307	1 - 1272

Note: This table shows the facilities (by SIC code) that reported mercury emissions under Wisconsin's Clean Air Act Title V Operating Permits Program. Under the Title V Program, states may impose fees up to \$25/ton of emissions of all eligible substances. In Wisconsin, facilities report emissions that exceed 1 pound.

In some cases, mercury emissions may be linked to processes such as fuel combustion that are independent of SIC codes.

Key

Number of Facilities = # of facilities reporting emissions equal or greater than 1 lb.

Total Emissions= total Hg emissions from all sources reporting in each SIC Code.

Range = range of reported releases from all sources reporting in each SIC Code.

Appendix F6: Michigan Critical Materials Wastewater Report - 1991 Data (Mercury)

SIC Code	SIC Name	Number of Facilities
10	Metal Mining	
1021	Copper Ores	1
1081	Metal Mining Services	2
20	Food and Kindred Products	
2011	Meat Packing Plants	2
2020	Dairy Products	3
2043	Cereal Breakfast Foods	2
2063	Beet Sugar	4
2077	Animal And Marine Fats And Oils	1
25	Furniture and Fixtures	
2500	Furniture And Fixtures	4
26	Paper and Allied Products	
2600	Paper and Allied Products	2
2621	Paper Mills	4
2631	Paperboard Mills	3
2650	Paperboard Containers and Boxes	3
2670	Misc. Converted Paper Products	1
27	Printing and Publishing	
2700	Printing and Publishing	1
2710	Newspapers	2
2750	Commercial Printing	5
28	Chemicals and Allied Products	
2800	Chemicals and Allied Products	2
2810	Industrial Inorganic Chemicals	1
2819	Industrial Inorganic Chemicals, Nec	2
2820	Plastics Materials and Synthetics	2
2821	Plastics Materials And Resins	1
2830	Drugs	10
2834	Pharmaceutical Preparations	1
2850	Paints and Allied Products	5
2851	Paints And Allied Products	1
2860	Industrial Organic Chemicals	2
2890	Miscellaneous Chemical Products	1
2891	Adhesives And Sealants	1
2899	Chemical Preparations. Nec	1
29	Petroleum and Coal Products	
2900	Petroleum and Coal Products	1
2911	Petroleum Refining	1

NOTE: This table shows the number of facilities (by SIC code) that reported mercury use under Michigan's Critical Materials and Wastewater Data System. In this program, Michigan collects information about use and release of chemicals included on its "Critical Materials Registry."

KEY:

Facilities = number of facilities reporting emissions > 1 lb. in each sic code

(Mercury)

Code	SIC Name	Facilities
30	Rubber and Misc. Plastic Products	
3069	Fabricated Rubber Products, Nec	3
3079		2
3080	Miscellaneous Plastics Products, NEC	16
3089	Plastics Products, Nec	1
31	Leather and Leather Products	
3111	Leather Tanning And Finishing	1
32	Stone, Clay and Glass Products	
3220	Glass and Glassware, Pressed or Blown	1
3297	Nonclay Refractories	1
33	Primary Metal Industries	
3312	Blast Furnaces And Steel Mills	3
3320	Iron and Steel Foundries	1
3321	Gray And Ductile Iron Foundries	2
3322	Malleable Iron Foundries	1
3330	Primary Nonferrous Metals	1
3340	Secondary Nonferrous Metals	1
3360	Nonferrous Foundries (Castings)	1
3365	Aluminum Foundries	1
3366	Copper Foundries	1
34	Fabricated Metal Products	
3400	Fabricated Metal Products	2
3441	Fabricated Structural Metal	1
3449	Miscellaneous Metal Work	1
3462	Iron And Steel Forgings	1
3465	Automotive Stampings	5
3470	Metal Services, NEC	1
3471	Plating And Polishing	5
3479	Metal Coating And Allied Services	4
3490	Misc. Fabricated Metal Products	4
3499	Fabricated Metal Products, Nec	1
35	Industrial Machinery and Equipment	
3510	Engines and Turbines	4
3540	Metalworking Machinery	1
3560	General Industrial Machinery	2
36	Electronic & Other Electric Equipment	
3630	Household Appliances	1
3670	Electronic Components and Accessories	1
3691	Storage Batteries	1
37	Transportation Equipment	
3700	Transportation Equipment	1
3710	Motor Vehicles and Equipment	4
3711	Motor Vehicles And Car Bodies	8
3714	Motor Vehicle Parts And Accessories	18
3720	Aircraft and Parts	2
3790	Miscellaneous Transportation Equipment	1

Appendix F6: Michigan Critical Materials Wastewater Report - 1991 Data (Mercury)

Code	SIC Name	Facilities
38	Instruments and Related Products	
3812	Search And Navigation Equipment	1
3820	Measuring and Controlling Devices	2
3821	Laboratory Apparatus And Furniture	1
3840	Medical Instruments and Supplies	1
3843	Dental Equipment And Supplies	1
42	Trucking and Warehousing	
4200	Trucking and Warehousing	1
47	Transportation Services	
4785	Inspection And Fixed Facilities	1
49	Electric, Gas, and Sanitary Services	
4911	Electric Services	16
4925	Gas Production And/Or Distribution	2
4950	Sanitary Services	1
4953	Refuse Systems	1
50	Wholesale Trade - Durable Goods	
5013	Motor Vehicle Supplies And New Parts-Wholesale Trade	2
5085	Industrial Supplies-Wholesale Trade	1
51	Wholesale Trade - Nondurable Goods	
5169	Chemicals And Allied Products. Nec	1
65	Real Estate	
6512	Nonresidential Building Operators	3
72	Personal Services	
7210	Laundry, Cleaning, & Garment Services	6
73	Business Services	
7391		3
76	Miscellaneous Repair Services	
7699	Repair Services. Nec	1
80	Health Services	
8050	Nursing and Personal Care Facilities	1
8060	Hospitals	19
8070	Medical and Dental Laboratories	4
8093	Specialty Outpatient Clinics. Nec	8
87	Engineering & Management Services	
8730	Research and Testing Services	12
8731	Commercial Physical Research	1
8733	Noncommercial Research Organizations	1
8734	Testing Laboratories	2
8741	Management Services	1
8744	Facilities Support Services	1
Total:		273

Appendix F7: Indiana Mercury Emissions (Air Point Sources, 1990 Data)

SIC Code	SIC Category	# OF FACILITIES
14	Nonmetallic Minerals, Except Fuels	
1422	Crushed and Broken Limestone	1
20	Food and Kindred Products	
2011	Meat Packing Plants	1
2033	Canned Fruits and Vegetables	1
2046	Wet Corn Milling	1
2048	Prepared Feeds, NEC	1
2075	Soybean Oil Mills	1
2077	Animal and marine fats and oils	1
2082	Malt Beverages	1
2085	Distilled and Blended Liquors	1
2099	Food Preparations, nec	1
24	Lumber and Wood Products	
2434	Wood Kitchen Cabinets	3
2435	Hardwood Veneer and Plywood	2
25	Furniture and Fixtures	
2511	Wood Household Furniture	5
2512	Upholstered household furniture	2
2521	Wood Office Furniture	2
2531	Public Building and Related Furniture	2
26	Paper and Allied Products	
2631	Paperboard Mills	1
2645		1
2679	Converted Paper Products, nec	1
28	Chemicals and Allied Products	
2819	Industrial Inorganic Chemicals, nec	1
2833	Medicinals And Botanicals	1
2834	Pharmaceutical Preparations	3
2869	Industrial Organic Chemicals, Nec	1
30	Rubber and Misc. Plastic Products	
3081	Unsupported Plastics, Film And Sheet	1

NOTE: This table shows the facilities (by SIC code) that may generate mercury emissions in Indiana. The information is included in Indiana's Aerometric Information Retrieval System (AIRS) 1990 emissions inventory, which contains data on criteria pollutant emissions. Mercury emissions quantities are estimates derived by the Indiana Department of Environmental Management, based on reported data. As such, the quantities do not represent measured data, nor data supplied directly by individual facilities. The quality of this data may be suspect based on uncertainty of specific emissions factors used and its completeness.

In some cases, mercury emissions may be linked to processes such as coal-burning boilers that are independent of SIC codes and specific industrial processes.

SIC Code	SIC Category	# OF FACILITIES
32	Stone, Clay, and Glass Products	
3241	Cement, Hydraulic	2
3251	Brick and Structural Clay Tile	1
3269	Pottery Products, nec	1
3272	Concrete Products, nec	1
3274	Lime	1
33	Primary Metal Industries	
3312	Blast Furnaces And Steel Mills	2
3341	Secondary Non-ferrous Metals	1
34	Fabricated Metal Products	
3443	Fabricated Plate Work (Boiler Shops)	1
3471	Plating And Polishing	1
35	Industrial Machinery and Equipment	
3519	Internal Combustion Engines, nec	1
3541	Machine Tools, Metal Cutting Types	1
3569	General Industrial Machinery, nec	1
36	Electronic & other Electric Equipment	
3612	Transformers, Except Electronic	1
3632	Household Refrigerators and Freezers	1
3647	Vehicular Lighting Equipment	1
3691	Storage Batteries	1
3694	Engine Electrical Equipment	1
37	Transportation Equipment	
3714	Motor Vehicle Parts And Accessories	7
3724	Aircraft Engines and Engine Parts	1
47	Transportation Services	
4789	Transportation Services, Nec	1
49	Electric, Gas, and Sanitary Services	
4911	Electric Services	30
4953	Refuse Systems	1
80	Health Services	
8061	Hospitals	4
8063	Psychiatric Hospitals	5
82	Educational Services	
8221	Colleges And Universities	9
8249	Vocational Schools, nec	1
83	Social Services	
8361	Residential Care	2
92	Justice, Public Order, and Safety	
9223	Correctional Institutions	2
97	National Security and Int'l Affairs	
9711	National Security	2
Totals:		120