POLYCHLORINATED BIPHENYLS (PCBs): SOURCES AND REGULATIONS

BACKGROUND INFORMATION FOR THE VIRTUAL ELIMINATION PILOT PROJECT

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Background Information on
PCB Sources and Regulations

I. INTRODUCTION

Polychlorinated biphenyls (PCBs), although banned or tightly restricted in almost all industrial and commercial uses because of their persistence and high toxicity, remain a major cause of contamination in the waters of the Great Lakes. All five of the Great Lakes -- as well as numerous inland lakes -- have fish consumption advisories as a result of PCB contamination.

PCBs refer to a class of chlorinated, chemical compounds that includes numerous different substances favored for their low conductivity, high boiling point, chemical stability, and flame retardant properties. Throughout the 20th century, PCBs were used for many diverse purposes ranging from dielectric fluids to pesticides. As evidence of their toxicity took shape, their uses were curtailed sharply. In a span of less than 20 years, PCBs have moved from one of the most widely used chemicals to one of the most tightly controlled. Today, PCBs represent the only substance singled out for a customized regulatory framework, a self-contained system under which owners and users must operate. It is a series of regulations unmatched for any other industrial chemical.

Although most PCB-related activities have been banned or tightly restricted, PCBs still remain in industrial and commercial use in allowable circumstances. PCBs previously released into the environment are dispersed in the air and water and are located in landfills and sediments. Over half of the PCBs manufactured were disposed of prior to the enactment of specific regulations. Consequently, pathways exist for PCB exposure, and PCBs are still considered a threat to human health and the environment. For this reason, PCBs have been included in the Virtual Elimination Pilot Project.

The challenge for the Virtual Elimination Project is three-fold. It seeks to identify incentives necessary to encourage accelerated phaseout and proper disposal of PCBs in (1) specifically regulated and known items such as transformers and capacitors, (2) known but unregulated items, such as non-leaking capacitors in fluorescent lamp ballasts, and (3) those circumstances where PCBs are "unknown" either by source and/or location.

PCBs also reside in sediments, hazardous waste sites, and other areas as a result of past use and disposal practices. Because the Virtual Elimination project is focusing on current and future use and disposal practices, these sources are not included in the analysis. These sources of PCBs are addressed by current remediation programs.

Several recent efforts may change substantially the way in which PCBs are regulated and the manner in which they are disposed. The Virtual Elimination project will explore these current efforts and seek other appropriate options that would result in more rapid and proper PCB disposal.

This background report addresses the following issues:

(1) What **sources** potentially release PCBs into the environment?

(2) What **regulations** affect PCB use and disposal? The discussion focuses on current TSCA regulations and possible changes to these regulations, as they shape PCB use and disposal decisions.

(3) What **non-regulatory** programs encourage reductions in PCB use and disposal?

(4) What **potential changes** to PCB regulations are in progress?

The objective of this background information is to provide a context for understanding how PCBs are currently used, past uses that might contribute to current PCB releases, and the extent to which the current regulatory structure is encouraging -- or hindering -- timely and proper disposal of PCBs. From this information, recommendations can be developed to enhance proper PCB disposal. **Table 1** outlines the approach used for PCBs in the Virtual Elimination project.

Table 1: OUTLINE FOR PCB APPROACH

Overall Objective: **Timely and proper disposal of existing PCBs**

What we are looking for: **Incentives to encourage accelerated phaseout and proper disposal**

3-pronged approach that covers:

1) Specifically regulated items
2) Unregulated items
3) Unknown sources

Source Category	Cause of Problem	Challenge/Objective
Regulated and known items *(e.g. transformers, capacitors)*	Regulatory framework does not include incentives for rapid disposal (no remaining phaseout requirements)	Identify opportunities to increase benefits associated with rapid and proper disposal
Unregulated items *(e.g. fluorescent lamp ballasts)*	No specific disposal requirements *(may be disposed of as municipal solid waste, unless leaking--state laws vary)*	Identify incentives necessary to obtain better disposal
Unknown PCBs *(difficult to track and enforce legal disposal)*	1) Unknown sources/uses *(newly discovered past uses, such as corrosion protection for metal surfaces)*	Identify sources and proper regulatory/incentive structure
	2) Unknown location and/or uninformed owner of PCB items *(e.g. people who have PCB items but are not aware of their presence, or regulatory requirements)*	Identify appropriate incentives for source identification and proper disposal

II. What are the Sources of PCBs?

From 1929-1977, Monsanto Company, the sole manufacturer of PCBs in the United States, produced 700,000 tons of PCBs. Due to their low flammability, PCBs were used extensively for insulating and cooling electrical equipment, particularly in transformers, large capacitors, and fluorescent lamp ballasts. Annual PCB sales peaked at 85 million pounds in 1970. Recent estimates suggest that 141,000 tons of pure PCBs remained in service at the end of 1988.

In the United States PCBs are, for the most part, no longer used deliberately in product manufacture. PCBs are released to the environment from (1) items that contain PCBs introduced deliberately for their useful chemical properties, (2) inadvertent generation during certain production processes, and (3) storage and disposal facilities. A brief discussion of the different categories of potential PCB sources follows. This section concludes with a discussion of PCB release data available from several federal and state reporting programs. **Appendix A**, a detailed "use tree" of PCB sources, illustrates the diverse applications of PCBs before their general use was curtailed.

A. Items containing intentionally introduced PCBs

The majority of PCBs were used in the production of dielectric fluids for transformers, capacitors, and other electrical components. PCBs were also used in synthetic resins, epoxy paints and protective coatings, and hydraulic and heat transfer fluids (due to their high boiling point). Because of its low flammability property, many past uses of PCBs may not be known to regulators today. For instance, it was only recently discovered that the U.S. Navy painted some ships with paints that incorporated PCBs, which now causes difficult disposal issues.

Today, none of these items may be designed or manufactured with PCBs. Under current regulations, these uses must be recognized specifically by regulation, or are not allowed at all. However, items such as large appliances, transformers, fluorescent lamp ballasts, and many other products created before PCBs were banned have a long useful life, and thus, many of these items remain in service. In some cases, owners may not know that items on their property contain PCBs. The challenge for the virtual elimination project is to develop ideas that result in accelerated phaseout and proper disposal of these and other remaining PCBs.

1) Allowable uses

TSCA regulations, described in detail in section IV, include provisions for allowable uses of PCBs within its overall ban. Transformers and capacitors, the largest reservoirs of PCBs still in use, are included in this category.

Under TSCA, all uses of PCBs are banned unless they fall into one of the following categories of allowable uses: (1) "totally enclosed" activity; (2) authorized uses; or (3) exemptions obtained through specific petition. In addition to uses allowed in these three categories, several other activities are allowed without explicit authorization or exemption, provided the PCB concentration falls below the regulatory concentration limit: (1) the inadvertent generation of PCBs; (2) use or processing of excluded products; (3) use or processing of recycled PCBs; and (4) applying sewage sludge that contains less than 50ppm PCBs. **Table 2** summarizes these allowable use provisions. **Appendix B** lists the specific activities allowed under each category.

Why are certain PCB uses and activities still allowed? EPA has determined that certain PCB uses pose no unreasonable risk. This threshold of "no unreasonable risk" is the underpinning of the TSCA regulatory framework. Some PCB activities that EPA considers to pose "no unreasonable risk" avoid TSCA's regulatory levers.

a. Electrical Equipment

PCBs were used as electric current-insulating material and coolant in electrical equipment to prevent overheating and fires. Electrical products that relied on this type of insulation include transformers, capacitors, voltage regulators, and lamp ballasts. Capacitors containing PCBs were also used in refrigerators, air conditioners, and other large appliances. Industrial machinery and other electrical equipment also relied on PCBs' fire resistant and insulating properties.

The primary concerns with this type of equipment result from spills, fires, and improper disposal. Identifying all potential owners of equipment containing PCBs is quite difficult.

Transformers and capacitors. Transformers and capacitors are the focus of numerous regulations. Restrictions on allowable uses have tightened over the years since TSCA regulations were first promulgated. Transformer fires may release dioxin from incomplete combustion of PCBs. Current regulations, described in more detail in Section IV impose strict requirements on the locations of these items, and require recordkeeping, monitoring, marking and other obligations for owners. However, all phaseout dates for these items have already past. These phaseouts restricted the locations of PCB-transformers.

Table 2: CATEGORIES OF PCB USE / ACTIVITIES ALLOWED UNDER TSCA

PCBs may still be used in a variety of ways. Under TSCA, PCBs may be used, manufactured, distributed, processed and/or imported or exported if the activity fits into one of the categories below. Each allowable activity has its own set of conditions that restrict use and disposal, and include a wide range of requirements such as marking, registration, notification, etc.

	Definition	Comments
"Totally Enclosed" Use	"ensures that exposure of human beings or the environment to PCBs as a result of the activity will be insignificant" (TSCA §6(e))	Definition applies to distribution in commerce of intact non-leaking electrical equipment such as transformers, capacitors, electromagnets, voltage regulators, switches, circuit breakers, etc. (40 CFR 761.20)
Authorized Use	Activities specifically authorized, based on finding that they will not present an "unreasonable risk" (40 CFR 761.30).	The largest categories of remaining PCB use fall in this category (e.g., transformers and capacitors). Each has a list of conditions required for compliance (see Appendix A.)
Exemptions	Granted by petition approval process; based on showing of no unreasonable risk and good faith effort to develop substitute; granted for one year with opportunities for renewal. §6(e)(3)(B)	Exemptions may change over time. Some have automatic renewals, others change annually.
Inadvertent Generation	By-product of an excluded manufacturing process (must meet five-part definition to qualify)	Processes allowed, but subject to certification, recordkeeping, and reporting requirements; limits on PCB concentration in product, and air/water releases.
Excluded Products	No special authorization required for use of PCBs with less than 50 ppm.	
Recycled PCBs	PCBs used in the processing of paper products or asphalt roofing materials.	Limits on PCB concentration in product and air/water releases.

The majority of transformers are owned by utility companies. Regulators are concerned that (1) improper transformer servicing and disposal may result in spills and leaks to the environment, and (2) building owners may not be aware of a transformer containing PCBs on their premises. As discussed in Section V, EPA Region 5 is exploring options to promote a more rapid phaseout of PCB transformers.

Lamp ballasts. All fluorescent lamps manufactured before 1979 probably contain PCBs. However, they are not labeled as such. Only lamps manufactured after 1979 are labeled to indicate they do not contain PCBs. Because of the potential for future environmental liability, many building owners and others responsible for large quantities of discarded light ballasts are exploring combinations of incineration and recycling instead of landfill disposal. Several companies offer cleanup disposal services. Large building owners are likely aware of potential PCBs in their lamps, however, smaller owners may not be aware of this potential PCB source.

PCB ballast capacitors contain about 1 ounce of PCB dielectric fluid. Industry sources estimate that approximately 1 billion ballasts are in use in the United States. Ballasts with non-leaking small capacitors may be disposed of in sanitary landfills, although EPA encourages disposal in chemical waste landfills or incinerators. In Minnesota, large quantities of fluorescent lamp ballasts are considered hazardous waste, and must be disposed of accordingly.

b. Non-Electrical uses

PCBs used in inks and carbonless copy paper may cause paper mills and de-inking operations handling recycled fiber to generate PCBs in their effluent. Metal casting plants with PCB-containing hydraulic fluids are also potential sources of PCB releases. PCBs were also used in paints, adhesives, sealants, pesticides, plasticizers, and as lubricants. As indicated below, many of these uses are no longer allowed under any TSCA provisions.

2) Discontinued Uses of PCBs

Several previous uses of PCBs are not authorized or provided for under any TSCA provisions. These items may remain in circulation even if they are no longer produced. The following list illustrates products that have, in the past, contained PCBs although PCBs are no longer allowed in these items:

> Adhesives, construction materials, cutting oils, dedusting agents, fuel tank coatings, gaskets, inks, oil/lubricants for vacuum pumps, air compressors, and gas transmission turbines, paints, pesticide extenders, plastic electrical cable insulation, plasticizers in rubber, plasticizers in synthetic resins, sound deadening felt, viscosity testing liquids.

B. Inadvertent Generation of PCBs

Any chemical process that involves carbon, chlorine, and elevated temperatures may inadvertently generate PCBs. EPA has estimated that up to 200 chemical processes may inadvertently generate PCBs. For example, many of these processes are used to produce chlorinated solvents. In addition, numerous other products, such as paints, printing inks, agricultural chemicals, plastic materials, and detergent bars, may contain inadvertently generated PCBs. The concentration of inadvertently generated PCBs in products leaving any manufacturing site or imported into the United States must have an annual average of 25 ppm, with a 50 ppm maximum. The concentration of PCBs in detergent bars must be less than 5 ppm.

In 1984, EPA weighed the health and environmental risks and the economic costs of allowing these processes to continue. At that time, EPA concluded that the quantity of PCBs released to the environment from these ongoing processes was inconsequential compared to the quantity of PCBs released to the environment from items that contained intentionally introduced PCBs. For that reason, EPA decided against an outright ban of these processes, due to the potential for a major disruption in commerce.

Specifically, EPA recognized that the high costs associated with eliminating the low risks posed by inadvertently generated PCBs would place an excessive cost on society in light of the minimal reductions in public health risks that would accrue. Instead, EPA decided to add certification, recordkeeping, and reporting requirements to facilities that inadvertently generated PCBs, in combination with the specified regulatory concentration limits for air and water releases. Inadvertently generated PCBs vented to ambient air must be less than 10 ppm. The amount of inadvertently generated PCBs added to water discharged from a manufacturing site must be less than 100 ppb.

C. Waste Disposal Facilities

Under TSCA regulations, items containing PCBs must be disposed of in specified disposal facilities. However, some items, such as non-leaking fluorescent lamp ballasts, may be disposed of as municipal solid waste. These items may release PCBs if they break during disposal.

TSCA regulations outline operating standards and procedural requirements for incinerators and chemical waste landfills. Disposal contracts must specify that only EPA permitted or approved facilities will be used. Improper disposal may result in generator liability.

WASTEWATER TREATMENT PLANTS. Some wastewater treatment facilities in the Great Lakes states detect PCBs in their effluent. The specific source of these PCBs will vary by treatment plant, and may include contaminated sediments, illegally disposed PCBs, and other sources. Treatment plants such as the Western Lake Superior Sanitary District in Minnesota have aggressive programs to determine the sources of PCBs to their facilities.

INCINERATORS. PCBs are destroyed almost completely when incinerated in a TSCA-approved incinerator burning at permitted operating temperatures. The minimum operating temperature for PCB liquids > 500 ppm is 1200 degrees celsius (2200 degrees fahrenheit). TSCA operating permits and regulations prohibit adding PCB feedstock during start-up or shut-down. Combustion processes, such as incinerators, boilers, and furnaces, may not reach a high enough temperature to destroy PCBs if they burn items containing PCBs during startup or shutdown. PCBs may convert to dioxins if they are not destroyed properly. EPA does not have as tight control over the operating conditions at boilers and industrial furnaces that burn wastes, or used oil as fuel, as it does for TSCA-permitted incinerators.

LANDFILLS. Landfills are a potential source of PCB release to the environment due to past disposal of PCB-containing items as well as current, allowable disposal of PCB-containing items. Landfill operators must monitor the groundwater for PCB contamination.

D. DATA SOURCES FOR THE GREAT LAKES STATES

PCB releases and transfers are reported under several reporting programs, each with a different set of regulatory requirements, and each covering a different subset of the regulated community. The primary sources of PCB release information are (1) the Toxic Chemical Release Inventory (TRI), (2) Permit Compliance System (PCS) of water discharges, (3) the National Response Center for information on PCB spills, and (4) the Notification and Manifesting Rule for PCB disposal. In addition to these federal reporting programs, some Great Lakes states maintain other reporting systems that provide additional information on PCB releases. Data is included for Wisconsin air point sources and Michigan's Critical Materials Wastewater Report.

Information from each of these sources is summarized below, and included in detail in **Appendix H**. With the exception of TRI data, all information is shown by SIC code to illustrate the distribution of PCB releases across different industrial sectors. **Appendix H1** provides a summary of the number of facilities that report PCB 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, 360 facilities in the Great Lakes states report PCBs under Michigan's Critical Materials Wastewater Reporting program, while only 9 facilities report PCB releases under TRI.

Region 5 has also estimated the number of remaining PCB transformers and capacitors as part of its efforts to phaseout this equipment. EPA estimates that Region 5 may have 17,500 PCB transformers and 400,000 PCB capacitors. Many of these items have several years left of useful life. As PCB equipment approaches the end of its useful life, spills become more common. EPA estimates that 3.3% of transformers and 0.75% of capacitors will spill, with 560 transformer leaks and spills, and 3000 capacitor leaks and spills annually. Utilities in the Great Lakes states estimate that they have already removed 87% of their PCB equipment.

Toxic Chemical Release Inventory (TRI). **Appendix H2** shows TRI PCB releases for the Great Lakes states. TRI tracks chemical releases from facilities in the manufacturing sector (SIC codes 20-39) that meet reporting thresholds. TRI thresholds are based on the quantity of each substance used, processed, manufactured, or imported at any of these facilities. **Appendix H2a** includes 1992 data for the eight Great Lakes states, including any source reduction activities implemented by each facility. Nine facilities reported PCB releases in 1992. All PCB releases were reported as offsite transfers. No facilities reported releases to air or water. **Table 3** shows the types of releases reported in TRI. Electric utilities do not fall into the SIC code range covered by TRI, and therefore do not report any PCB activities under this program.

PCS data. **Appendix H3** 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, eight facilities reported PCB discharges in Region 5 during 1993.

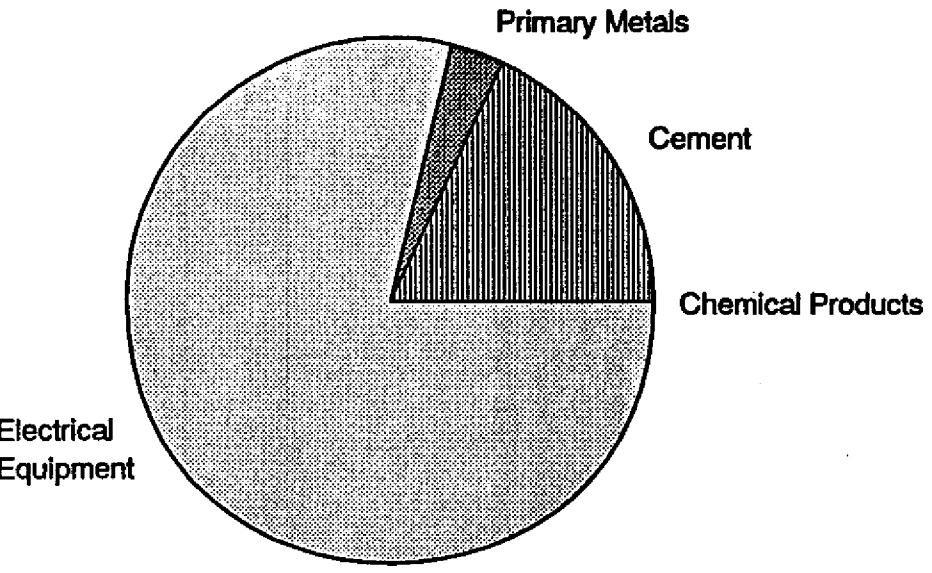
Facility	kg/yr
Kalamazoo WWTP	4.96
Bay City WWTP	4.96
GM-Engine Division-Bay City	2.51
Alcan Sheet & Plate Division	1.25
Outboard Marine - Waukegan	1.08
Detroit WWTP	0.89
Trenton WWTP	0.20
Fort Howard Paper Company	0.16
	16.01 kg

National Response Center. Spills of PCBs that exceed one pound must be reported to the National Response Center. Based on National Response Center data, Region 5 had 27% of the nation's spills from 1987-1992. Michigan, alone, had nine percent of the nation's spills, and 34% of the Region's spills.

Table 3

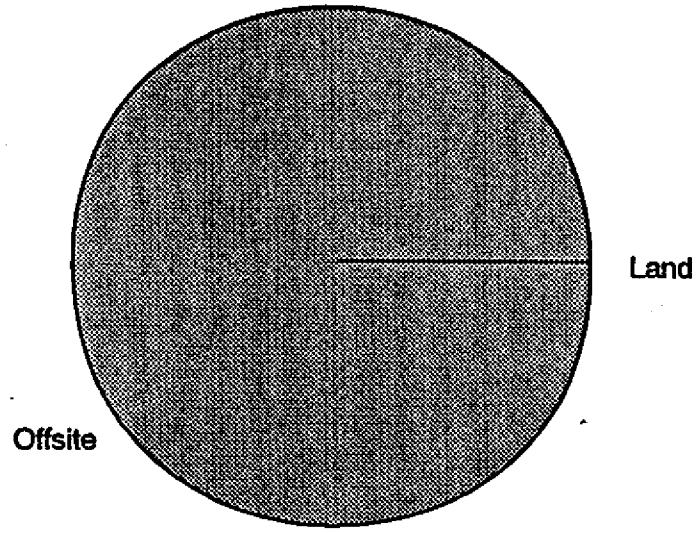
PCB Releases and Transfers, The Eight Great Lakes States, 1992

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)	2	0.0002	1
29 Petroleum Refining and Related Industries			
2911 Petroleum Refining	0	0	1
32 Clay, Glass, Stone Products			
3241 Cement, Hydraulic	214,469	18	1
3274 Lime Products	0	0	1
33 Primary Metal Industries			
3313 Electrometallurgical Products	26,400	2	1
3321 Grey Iron Foundry	12,268	1	2
36 Electronic and Other Electrical Equipment			
3612 Transformers	896,647	75	1
3621 Motors and Generators	41,306	4	1
TOTAL	**1,191,094**	**100**	**9**

DESTINATION



Offsite transfer is the primary destination of PCBs.

Destination	Quantity kg/yr	% of Total	Facilities Reporting Releases (Out of 9)
Air Point	0	0	0
Air Nonpoint	0	0	0
Offsite	1,191,093	99.99999	6
Water	0	0	0
Land	1	0.00001	1
POTW	0	0	0
Underground	0	0	0
TOTAL	**1,191,094**	**100**	**N/A**

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

Wisconsin Air Point Source Emissions Data. **Appendix H4** 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 PCBs. Three facilities reported PCB emissions under this program. This total includes two paper and allied products facilities.

Michigan Critical Materials Registry. **Appendix H5** 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 PCBs, 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 360 facilities reported PCB use, including 61 motor vehicle-related facilities, 21 electric utilities, and 13 paper mills. The total PCB use was between 12,596,890 - 12,631,657 pounds. Of this total, 11 facilities reported discharges ranging in total between 114 and 627 pounds; 115 facilities reported residuals ranging in total between 916,831 and 930,556 pounds.

Notification and Manifesting Rule. EPA promulgated a notification and manifesting rule in 1990 to track PCB waste disposal in a manner similar to RCRA waste disposal tracking. Under the notification and manifesting rule, storage and disposal facilities must track and report all PCB wastes received. This data illustrates the volume of PCBs disposed annually in each EPA region, but it does not track the source of this waste.

Appendix H6 shows the trends in PCB disposal (at a national level) since the inception of the notification and manifesting rule. In 1992, 746 million kilograms of PCB-contaminated waste were disposed of in TSCA disposal facilities, representing an increase of 62% over 1991 PCB disposal. EPA estimates that 91% of this waste was bulk waste, most likely from remediation. The volume of PCB waste accounted for in transformers, capacitors, article containers, and containers has remained relatively constant over the three-year period.

EPA regions with large PCB disposal facilities show the largest disposal volumes. Region II (NY, NJ, RI) reported 152,800,000 kilograms disposed of in 1992. Almost all of this was disposed of at a chemical waste management PCB landfill in New York (152,500,00 kg). Region III (PA, VA, WV) reported 14,700,000 kilograms of PCB waste, and Region V reported 24,100,000 kilograms.

III. Environmental and Health Concerns

PCBs are classified as probable human carcinogens. As a class of chlorinated compounds, PCBs may include more than 200 different isomers. The specific toxicity varies among chemical products based on the number and position of the chlorine atoms. Tests on laboratory animals show that PCB exposure can cause cancers, tumors, birth defects, reproductive failures, as well as liver, eye, and gastric tract disorders. PCBs persist in the environment after they are released. Because PCBs are stable compounds, they do not degrade rapidly, and are passed up the aquatic food chain in increasing levels in a phenomenon known as bioaccumulation.

The major source of PCB exposure for the general public is contaminated fish consumption. PCB contamination in fish and shellfish populations has resulted in closure of fisheries across the country. In addition, PCB exposure may result from servicing PCB containing products such as transformers and other electrical equipment. These activities are also regulated under OSHA occupational safety standards at a level designed to protect against skin disorders (29 CFR 1910).

IV. How are PCBs Regulated?

PCBs occupy a unique niche in the federal chemical regulatory arena. Singled out for special attention under TSCA, PCBs are subject to a management regime largely independent of other environmental laws. PCBs are regulated primarily under the Toxics Substances Control Act (TSCA), which dictates restrictions on the manufacture, sale, use, disposal, import and export of PCBs. The statute also includes provisions for allowable uses. TSCA is not a program delegated to the states like many other statutes. States may regulate the disposal of PCBs under their own authorities, but those rules cannot be less stringent than TSCA rules.

PCB releases are also regulated by the Clean Air Act (CAA), Clean Water Act (CWA), Resource Conservation and Recovery Act (RCRA), and PCB releases are also reported in the Toxic Chemical Release Inventory (TRI). However, TSCA regulations shape the principal regulatory framework. Thus, the costs associated with having PCBs are generally independent of costs associated with other chemicals.

A. TSCA Regulations

TSCA establishes a legal presumption that PCBs pose an unreasonable risk to human health and the environment, unless EPA determines otherwise. TSCA regulations establish an elaborate concentration-based hierarchy that governs all aspects of PCB use and disposal, and dictates specific behaviors that are necessary for compliance. Regulations and policy specify:

(1) How PCBs may be used, processed, distributed, manufactured, exported, and/or imported;
(2) Acceptable storage and disposal conditions;
(3) Spill clean-up requirements; and
(4) Recordkeeping and reporting requirements.

Each of these categories has a separate series of costs associated with it, as well as different thresholds, and criteria for achieving compliance. TSCA regulations, codified at 40CFR 761, apply to all persons who manufacture, process, distribute in commerce, use, or dispose of PCBs or PCB items, including dielectric fluids, contaminated solvents, oils, waste oils, heat transfer fluids, hydraulic fluids, paints, sludges, and spill contaminated soils. TSCA regulations apply as well to items that have been in contact with PCBs.

TSCA relies on a theory of increasing regulatory burdens and maintaining management requirements with each higher level of PCB concentration.

- PCBs in concentrations <50ppm are known as "non-PCB" items. These items are generally excluded from regulation, with the exception of a prohibition on using and burning waste oil (40CFR 761.20(d) and (e)); disposal is still regulated if wastestreams are diluted to <50ppm (40CFR761.1(b)). In addition, PCB concentrations in heat transfer and hydraulic equipment must be less than 50 ppm.

- Electrical equipment containing PCBs in concentrations between 50 - 500ppm are known as "PCB-contaminated" electrical equipment. These items have some recordkeeping and disposal requirements, along with specifications for storage, cleanup, and notification; and

- PCBs found in electrical equipment in concentrations >500ppm are known as "PCB-transformers". These items have requirements for marking, recordkeeping, inspection, cleanup, registration, notification, location, and limited disposal options.

Costs associated with TSCA regulations include inspection, recordkeeping, servicing, marking, location requirements, notification and other issues. **Table 4** shows the basic framework for TSCA regulations of PCBs. **Table 5** highlights the major provisions within this framework.

Despite the clear message of TSCA regulations, existing regulations may not necessarily encourage accelerated phaseout or proper removal and disposal of PCBs. Frequently, it is difficult to move between concentration levels, especially given TSCA's prohibition on dilution, and stringent rules for reclassifying equipment with PCBs. In addition, current regulations are noticeably lacking in requiring the elimination of PCBs in existing -- and allowable -- uses. All previously specified phaseout deadlines have come and gone. Yet, lingering over all PCB owners is the potential for heavy costs associated with leaks, spills, improper disposal, and future liability costs. TSCA violations average $25,000 per action for violations that include paperwork errors and unauthorized uses or releases.

The implication of this regulatory regime is easily recognizable: lower concentrations of PCBs (or elimination of PCBs) reduces the regulatory burden and compliance costs. Thus, the TSCA message is clear: eliminate PCBs or move to a lower threshold category, and many costs associated with PCB management disappear. This clear message lies in stark contrast to regulations that affect multiple chemicals.

Table 4: TSCA Framework for Regulating PCBs -- Summary

TSCA §6(e) and regulations at 40CFR761 outline an elaborate system for allowable PCB uses / activities, and the conditions associated with use, clean-up, and disposal for each activity.

TSCA regulations fall into the following categories:

Allowable [illegible] TIVITIES	DISPOSAL / STORAGE	SPILL CLEANUP POLICY	RECORDKEEPING
Criteria for compliance:	*Criteria for compliance:*	*Criteria for compliance:*	*Criteria for compliance:*
All PCB uses or activities are banned UNLESS they fit into a specifically listed category	Date Purpose Pollutant form Intent of storage	Location of spill Quantity spilled Concentration released Date spilled (reporting, disposal, and pre-cleanup requirements are consistent with requirements in other [illegible]s)	What is used or stored

Table 5: TSCA Framework for Regulating PCBs

Allowable USES / ACTIVITIES

Criteria: all PCB uses or activities are banned unless they fit into one of these categories

"Totally enclosed"

"ensures that exposure of human beings or the environment to PCBs as a result of the activity will be insignificant" (TSCA §6(e))

Authorized uses (non-enclosed)
- uses listed in 40CFR 761.30 -- do not present "unreasonable risk"

Exemptions (via petition)
- companies must petition for specific use/activity
- granted up to one year; may be renewed

No authorization or exemption required for:

Inadvertent generation
- by-product of excluded manufacturing process (5 parts to definition)

Excluded products (<50ppm)

Recycled PCBs (PCBs in processing of paper products or asphalt roofing materials)

Applying sewage sludge <50ppm PCBs

DISPOSAL / STORAGE

Criteria: date, purpose, pollutant form, intent of storage

Past disposal (prior to 1978)
- exempt unless removed from disposal site or >50 ppm is found in a non-disposal site

POLLUTANT FORM determines Type of disposal permitted
- incineration, chemical waste landfill, or alternative (separate conditions for each)
- may become acute waste under RCRA if disposal facilities unavailable
- commercial storage and disposal facilities must be approved

"In storage for disposal"
- store for up to one year before disposal
- PCB mixtures >50ppm
- marking, recordkeeping, inspection requirements
- requirements for storage facilities

Issues:
- High disposal costs may inhibit disposa
- Storage for "reuse" may avoid 1-year storage limit
- Many items unregulated for disposal

SPILL CLEANUP POLICY

Criteria: location of spill, quantity, concentration released, date

Spills > 50ppm

Cleanup standards:
- **Numeric standards** for spills >1987 (except into certain areas like surface water, grazing lands)
- **Site-specific standards** (EPA Regional Office discretion) for spills <1987, and into certain areas (surface water, etc.)

Reporting requirements (based on spill classification)

Spill Classification:
- **Low concentration** <500ppm and <1lb
- **High concentration** >500ppm or low conc. >1lb or >270 gal untested mineral oil

Disposal requirements for spill cleanup debris

RECORDKEEPING

Criteria: what you use or store

Annual Recordkeeping Requirements for the facilities that use or store::
- >45kg PCBs in PCB containers
- One or more PCB transformers
- 50 or more PCB large high or low voltage capacitors

Reporting and recordkeeping requirements for commercial storage and disposal facilities :

Annual records/reports
- Disposal companies, transporters, commercial storers, and generators of PCB waste
- waste in/waste out must be tracked

Notification and Manifesting Rule tracking system for PCB wastes (since 1990)

Enforcement
Violations carry $25,000/violation penalty (actual average $25,000/action)

PCB regulations have been revised periodically based on new risk information. In several instances, EPA has rejected additional outright bans on continued use because the societal costs of doing so far outweighed the benefits of additional risk reduction. For example, in the mid 1980s, EPA imposed additional regulatory requirements (inspection, servicing, registration, labeling, location requirements, etc) on PCB transformers to minimize fire risks instead of immediately banning them because of the estimated multi-billion dollar costs associated with electrical service disruption.

EPA promulgated the "fire rule" in 1985, after reassessing its earlier position on the expected frequency of fire-related incidents involving transformers containing PCBs. PCBs released during transformer fires may be volatilized and converted into other toxic materials such as dioxins. With this rule, EPA imposed restrictions on the locations of electrical equipment containing PCBs, and required registration and marking of PCB electrical equipment. In so doing, EPA determined that the continued use of PCB transformers without these additional restrictions posed an unreasonable risk of injury to health and the environment (see "fire rule," at 50 FR 29170, July 17, 1985).

1) Allowable Uses of PCBs

In general, all PCB uses or activities are banned unless they fit into a specifically listed category. **Table 2**, included earlier in this report, summarized the different types of allowable uses. **Appendix B** describes these activities in greater detail. PCB activities are allowed in the following areas:

TOTALLY ENCLOSED ACTIVITIES. "Totally enclosed" activities are defined in TSCA regulations as an activity that results in "no exposure to humans or the environment" (40CFR761.20). Regulations list the distribution in commerce of certain intact, nonleaking electrical equipment as totally enclosed activities.

AUTHORIZED USES. "Authorized uses" are non-totally enclosed uses that must be specifically authorized by rule (TSCA §6(e)(2)(B)). Generally, authorized uses are based on a finding that the use will not pose an unreasonable risk of injury to health or the environment. Regulations list such authorized uses (40CFR761.30). EPA may modify this list as appropriate. For instance, in April 1994, EPA added analytical reference samples to the list of authorized uses.

EXEMPTIONS. "Exemptions" are required for activities that are not considered totally enclosed, or are not specifically authorized by rule. Individuals may petition EPA to approve a one-year exemption for their specific use. EPA may grant an exemption if it determines that the activity would not pose an unreasonable risk of injury to health or the

environment and the applicant has made good faith efforts to develop a chemical substitute. **Appendix C** lists the companies (as of July 1993), that have been granted exemptions for PCB activities.

Until recently, these exemptions renewed automatically as long as no changes were made to the allowed activity. However, in April 1994, EPA revised the regulations governing renewals of exemptions (59 *FR* 16991-16999). Under the revised regulations, petitioners must submit a certified letter to EPA at least six months prior to the expiration date of the current exemption stating that the specific types of PCB activities have not changed. Any changes to an original exemption are considered a new petition for exemption. The revised regulations apply to exemptions granted on or after April 25, 1994.

2) Disposal / Storage Costs

TSCA regulations require specific disposal methods that vary by the type and concentration of PCB items. The pollutant form determines the type of disposal options available. These options include:

(1) incineration in a regulated PCB incinerator;
(2) disposal at a licensed chemical waste landfill;
(3) disposal in a high efficiency boiler;
(4) alternative disposal methods subject to EPA approval;
(5) disposal as municipal solid waste; and
(6) unregulated disposal.

Appendix D shows the regulatory framework for PCB disposal in detail. Incineration destroys PCBs and eliminates the potential for future liability that may result from landfill disposal options. However, incineration has the highest short term costs of available disposal options.

EPA approves several different methods for PCB disposal. Several PCB disposal companies operate a variety of commercially permitted disposal facilities throughout the United States. These companies offer PCB disposal related services that include incineration, alternate thermal treatment, chemical treatment, physical separation, pipeline removal, PCB transformer decommissioning (disassembly/smelting), chemical waste landfills, and biological treatment. A full list of these companies is included as **Appendix E.**

EPA regulations impose a one year time limit on PCB items placed in storage for disposal. However, EPA has learned of many instances where owners of PCB equipment place it in storage in anticipation of re-use to avoid the one year time limit. EPA is evaluating this in its upcoming PCB disposal amendments.

EPA has also promulgated rules that guide the approval process for commercial PCB storage facilities. EPA revised its regulations in November 1993 defining the criteria it will use to evaluate a PCB storage approval application (see 58 *FR* 59372-59374, modifying 40CFR761.65). EPA evaluates commercial storage applications on a case-by-case basis, including the environmental compliance history of the applicant.

B. Other Regulations Governing PCB Releases

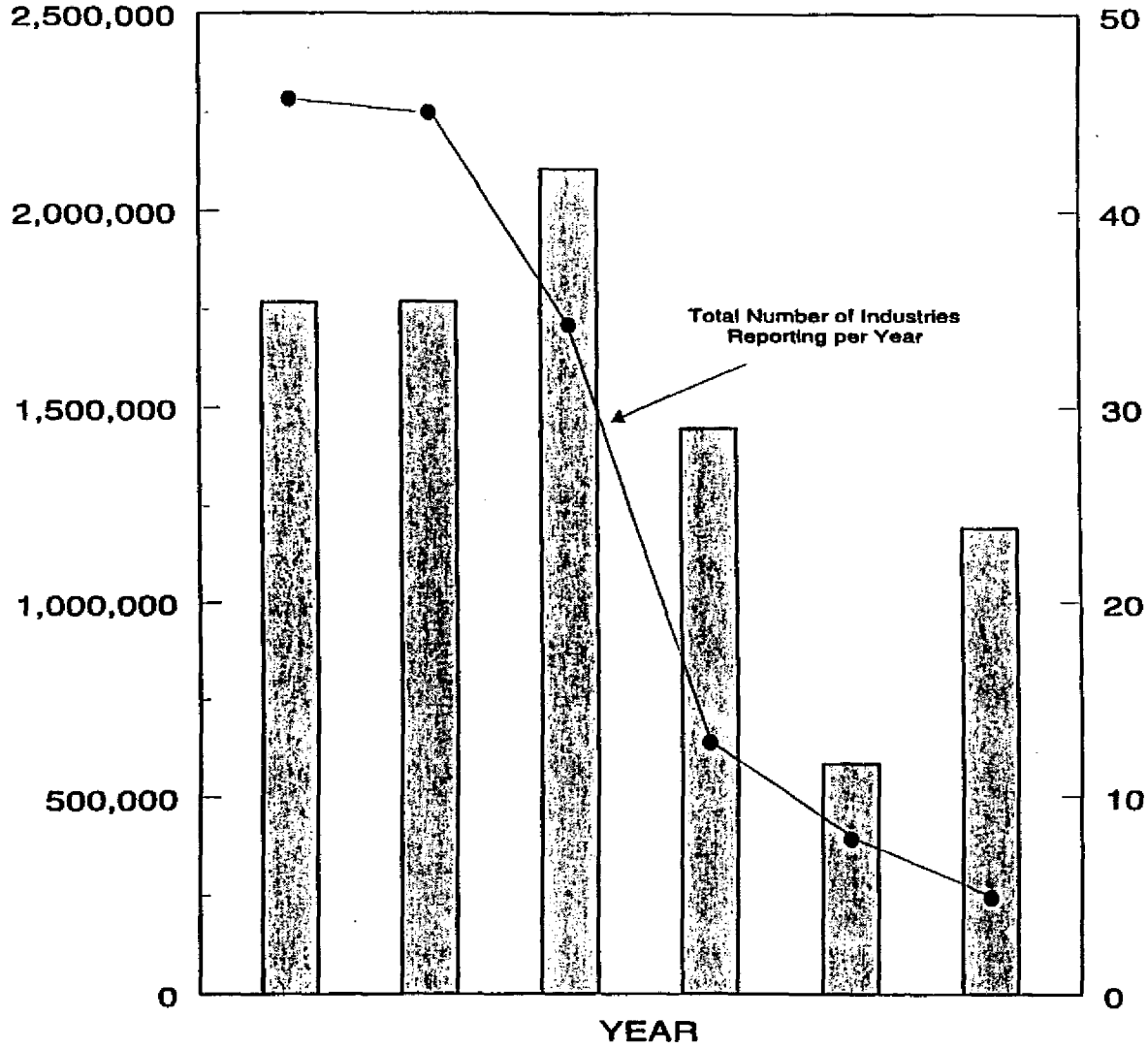
PCB releases are regulated to some extent under the major environmental statutes. However, these regulations are not the primary driving force shaping decisions about how fast to dispose of PCBs.

Clean Air Act. PCBs are considered Hazardous Air Pollutants (HAPs) under the Clean Air Act. EPA will be promulgating a new category of regulation, known as maximum achievable control technology (MACT standards) for "major source" facilities 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. EPA must also list, by 1995, the source categories that account for at least 90 percent of aggregate emissions for seven pollutants, including PCBs. These sources will be subject to MACT standards within ten years.

Clean Water Act: The ambient water quality criteria for PCBs in surface waters is 0.001 $\mu g/l$. Section 129 of the Clean Water Act specifically bans the discharge of PCBs from PCB, electric transformer, and electric capacitor manufacturers. Facilities may apply to EPA or a state director for an adjustment of their PCB effluent limits if the PCBs in their effluent result from PCBs present in intake water. The facility owner or operator must show that the facility wastewater does not contain a higher PCB concentration than the intake water. (40CFR129.05)

TRI: PCB releases are reported under the Toxic Chemical Release Inventory (TRI). All PCB releases reported in TRI were offsite transfers. **Table 6** shows the trends in PCB disposal reported in TRI.

Table 6 PCB Releases and Transfers, The Eight Great Lakes States



YEAR	1987	1988	1989	1990	1991	1992
Offsite	1,767,423	1,769,247	2,106,028	1,447,135	583,538	1,191,093
POTW	0	250	0	0	0	0
Land	0	1	0	0	0	1
Underground	0	0	0	0	0	0
Water	0	0	250	0	0	0
Air Nonpt	0	0	0	0	0	0
Air Point	500	0	0	5	0	0
TOTAL	1,767,923	1,769,498	2,106,278	1,447,140	583,538	1,191,094

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

RCRA: The interplay between TSCA and RCRA for PCB regulation is complex. In general, TSCA regulations apply to all aspects of PCB use and disposal. Because of this specific regulatory framework, RCRA's in-depth storage, treatment, and disposal rules generally do not apply to PCBs. Instead, RCRA regulations defer to TSCA requirements for PCB wastes.

In some cases, however, RCRA regulations apply to PCBs. Following are some examples of the types of situations where RCRA regulations do apply to PCBs:

- Dielectric fluids and electric equipment with dielectric fluids treated under TSCA are not regulated under RCRA (40CFR 261.8);

- Municipal Solid Waste landfills must have in place programs that detect and prevent PCB disposal (40 CFR 258.20);

- Hazardous wastes containing liquid PCB wastes greater than 50 ppm are prohibited from land disposal unless approval is granted by petition.

- PCBs are a hazardous constituent under RCRA. As a result, the following RCRA regulations apply: groundwater monitoring (40CFR 264, App. IX); incineration requirements as a POHC (40CFR 264, 347); and corrective action (40CFR 264.100).

OSHA: The Occupational Safety and Health Act (OSHA) regulates workplace safety and sets permissible exposure levels for dangerous chemicals. The legal airborne permissible limit (PEL) for PCBs is 1 mg/m^3 (42% chlorine) and .5 mg/m^3 (54% chlorine) averaged over an 8-hour workshift. The National Institute of Occupational Safety and Health (NIOSH) recommends an airborne exposure limit of .001 mg/m3, averaged over a ten hour period. These exposure limits pertain to air levels only. They do not apply to skin contact.

Department of Transportation container requirements: DOT currently requires specialized containers for packaging and transporting liquid and non-liquid PCBs (49CFR178). TSCA allows larger containers for use in transporting PCBs if they are in compliance with OSHA flammable and combustible liquid rules (29CFR1910). EPA is reviewing these container requirements as part of the PCB disposal amendments (see Section VI).

Department of Agriculture Regulations: PCB contamination of foodstocks may occur as the direct result of spills or leaks from PCB equipment, as well as indirectly from packaging contaminated with PCBs originating from recycled carbonless copy paper. The United States Department of Agriculture (USDA) regulates PCB contamination of food products by placing restrictions on food packaging operations and by setting tolerance levels for PCBs in certain foods. (21CFR109). New equipment or machinery for manufacturing food-packaging materials cannot contain or use PCBs. Equipment must be tested for PCBs and removed from use where they could contaminate food-packaging materials.

Safe Drinking Water Act: Under the Safe Drinking Water Act, EPA established maximum contaminant levels for all public water systems in the United States. The MCL for PCBs is 0.0005 mg/l.

CERCLA: Facilities must report disposal of PCBs in quantities greater than one pound to EPA for the purpose of tracking future liabilities. (§102(a)) CERCLA also requires spills greater than 1 pound to be reported to the National Response Center.

V. Non-Regulatory Programs

Region 5 has developed an innovative, non-regulatory program designed to encourage more rapid and proper disposal of PCBs. Known as the PCB Phasedown program, it is designed to seek creative solutions cooperatively with the Region's utilities to remove PCB transformers and capacitors. For its early stages, the program is geared only toward "PCB-transformers," and PCB capacitor items with the highest concentrations of PCBs. All remaining regulatory phasedown deadlines for these items have already passed, and many transformers containing PCBs still have a useful life. The cost of decommissioning, removing, and disposing of a transformer containing PCBs may cost tens of thousands of dollars.

The overall goal of the PCB Phasedown Program is to have all PCB electrical equipment in Region 5 decommissioned within five years. EPA has formed a partnership with the utilities in the Region to accomplish this goal.

EPA is asking participating utilities to agree to a five year commitment to:

- Phasedown all PCB nameplated electrical equipment that has not already been removed from service;

- Test all non-nameplated electrical equipment in vaults, substations, and power plants, and phaseout any discovered to contain 500 ppm PCBs or greater; and

- Develop and implement an aggressive testing program for non-nameplated transformers and voltage regulators, and phaseout any found to contain 500 ppm PCBs or greater in sensitive areas such as agricultural lands, schools, hospitals, waterways and wetlands.

Utilities participating in the program include:

American Power & Light - Columbus, OH
Centerior Energy - Independence, OH
Commonwealth Edison - Chicago, IL
Consumers Power - Jackson, MI
Dayton Power & Light - Dayton, OH
Detroit Edison - Detroit, MI
Minnesota Power - Duluth, MN

NIPSCO (Northern Indiana Public Service Company) - Hammond, IN
Northern States Power - Minneapolis and Eau Claire, WI
Ohio Edison - Akron, OH
PSI Energy - Plainfield, IN
Wisconsin Electric Power Company - Milwaukee, WI

EPA is also seeking the utilities' help with outreach to other customers; influencing other users of PCB electrical equipment to participate in the program; sharing technical expertise with smaller electricity suppliers; insuring that PCB electrical equipment at abandoned sites or buildings are included in the PCB phasedown program; and providing incentives to smaller utilities and industrial and commercial customers. EPA has requested that participating utilities submit a report showing their previous PCB disposal activities, remaining PCB items in service, and commitments for future disposal.

Participating utilities report that they have already removed 87% of PCBs in service in electrical equipment through voluntary programs and regulatory requirements. They cited the following barriers to accelerated phaseout of PCB equipment:

- limited disposal options
- storage regulations (facility standards and time limits)
- enforcement penalties
- regulations on retrofilling transformers
- commercial storage regulations
- lack of economic incentives for decommissioning transformers
- liability for handling PCBs and PCB equipment generated by others

EPA is exploring options that might reward more rapid disposal of PCB equipment. Specifically, EPA is looking for options to build flexibility into enforcement actions for participating utilities. EPA will also prepare reports that discuss phasedown program efforts, and work to overcome perceived regulatory barriers that deter utilities from removing their PCB equipment.

The phasedown program is still in the preliminary stages, however EPA is considering expanding it to other industrial sectors that may have large volumes of PCB transformers.

VI. Potential Changes in PCB Regulation

Several existing barriers in PCB regulations may be addressed in upcoming rulemakings. Most notable are the "disposal amendments" which illustrate EPA's self-reflection after two decades of regulating PCBs. EPA has recognized the need to revisit certain aspects of existing regulations in order to provide the flexibility necessary to ensure proper disposal. In addition to the disposal amendments, EPA has proposed regulations that revise the criteria to reclassify transformers to lower regulatory levels. Both of these potential rule changes are summarized below.

A. Disposal Amendments

In June 1991, EPA announced an advance notice of proposed rule making designed to restructure existing disposal regulations for PCBs. Several key tenets of PCB regulations may change significantly as a result of new disposal amendments. To date, the "disposal amendments" have not been issued, although they are anticipated to be released in proposed form by the end of 1994.

Revised disposal rules could address changes in three areas:

(1) Alternative disposal methods that do not pose an unreasonable risk of injury to human health and the environment;
(2) Classes of PCBs and PCB Items that are not specifically regulated under existing requirements; and
(3) Revised regulatory requirements for existing classes of PCBs and PCB items.

In the Advance Notice of Proposed Rulemaking, EPA identified regulatory gaps in existing regulations, situations where implementation of existing regulations needed to be clarified, and situations where additional flexibility might promote disposal more effectively. Specifically, the disposal rules may address changes in the following areas:

(1) *Alternative storage and disposal methods:*

- Large volume, non-liquid PCB wastes;
- Large volume PCB items;
- PCB wastes (PCB/Radioactive);

(2) Classes of PCBs and PCB items not currently regulated under general disposal requirements:
- Household PCB waste
- Unknown or unauthorized uses of PCBs

(3) Revised regulatory requirements for existing classes of PCBs
- Marking transport vehicles
- DOT containers for storage of PCB waste
- Definition of PCB transformer
- Drained PCB-contaminated transformers
- Temporary storage of PCB liquid <500ppm
- Sale of totally enclosed PCBs or PCB items
- PCB storage requirements
- Exclusion for labs providing PCB analytical samples
- Class exemption for EPA and NIST to process and/or distribute PCB standards in commerce
- 500 gallon exemption under PCB notification and manifesting rule
- Coordinated approach (state enhancement activities)

Appendix F describes, in detail, the specific issues that will be addressed in this rulemaking. When the amendments are released, they may also include other revisions as well. The draft amendments are undergoing internal EPA review, and will likely be released in draft form before the end of the calendar year. Depending on the specific content of these regulations, several existing disposal barriers and loopholes may be eliminated.

B. Transformer Reclassification Rules

EPA has released a proposed electrical transformer reclassification rule that eases many requirements to reclassify PCB and PCB-contaminated transformers into a lower concentration category that avoids several regulatory requirements. **Table 7** highlights the major changes proposed in the transformer reclassification rule. **Appendix G** describes these proposed changes in greater detail.

Comments received on the proposed rule have included several proposed changes. EPA is currently reviewing the comments received on the draft rule to determine the next steps. Depending on the outcome of this review, the rule may be proposed again, or EPA may do additional studies, which would shift promulgation back for several months.

Table 7: OVERVIEW OF PROPOSED CHANGES IN TRANSFORMER RECLASSIFICATION RULES

Transformer Category	Changes in proposed rule
< 50 ppm *non-PCB transformers*	• No change
50 - 500 ppm *PCB-contaminated transformers*	• Testing PCB concentration after retrofill eliminated under proposed rules • Revised documentation under proposed rules
500 - 1000 ppm *PCB transformers*	• Testing time decreased to 21 days from 90 days • Temperature testing requirement eliminated • PCB concentration requirement lowered to 25 ppm from 50 ppm to reclassify as a non-PCB transformer • Revised documentation under proposed rules
> 1000 ppm *PCB transformers*	• Temperature testing requirement eliminated • Revised documentation under proposed rules.

Appendices

Appendix A: PCB Use Tree

Appendix B: PCB Activities / Uses Allowed Under TSCA

Appendix C: Exemptions for Manufacturing, Processing, and Distribution

Appendix D: Regulatory Framework for PCB Disposal

Appendix E: Commercially Permitted PCB Disposal Companies

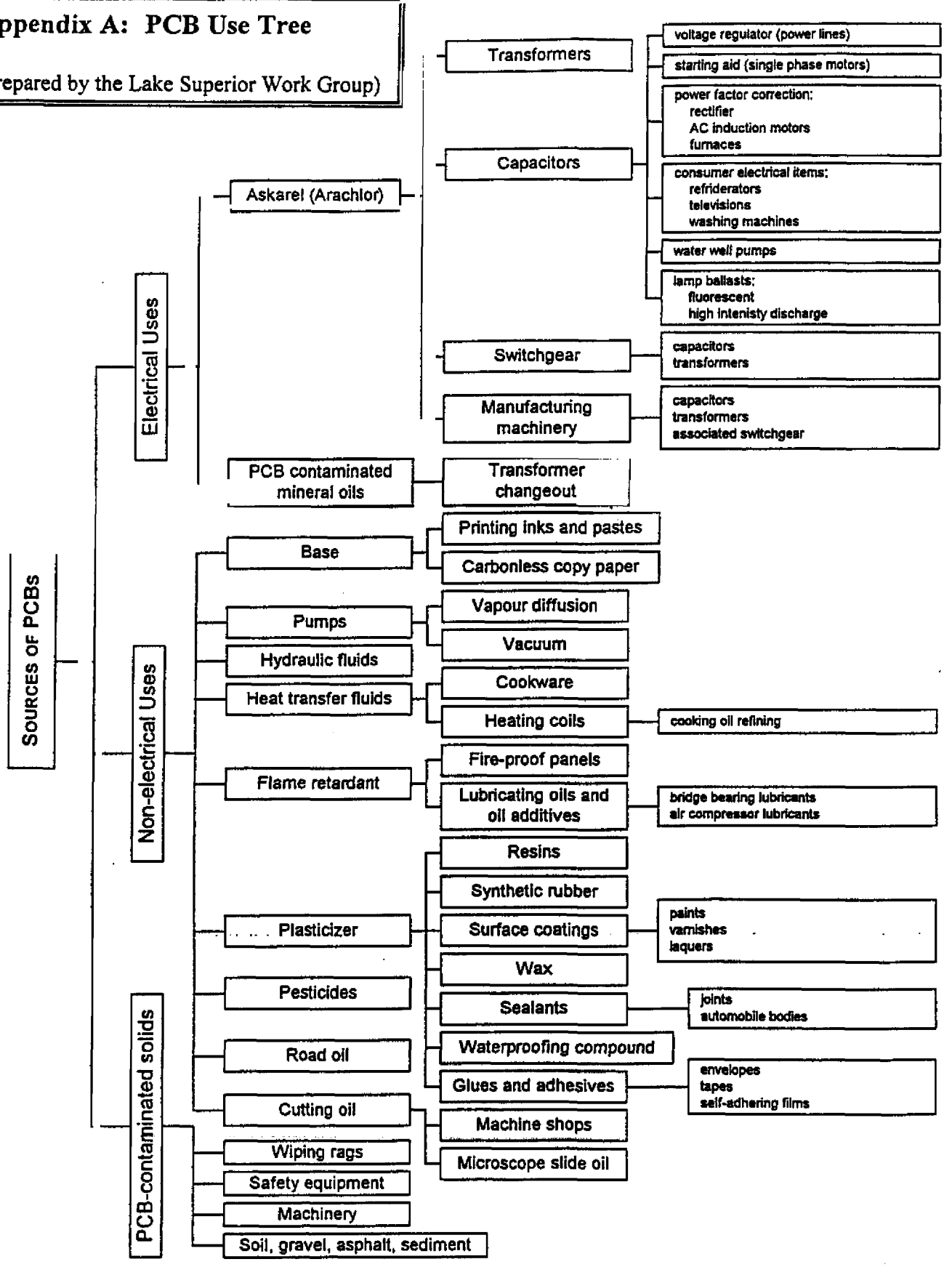
Appendix F: Issues Considered in PCB Disposal Amendments

Appendix G: Comparison of Transformer Reclassification Rules (Existing and Proposed)

Appendix H: Data on PCB Releases

Appendix A: PCB Use Tree

(prepared by the Lake Superior Work Group)



The PCB use tree was developed by Shirley Thompson, a consultant working for the Ontario Ministry of Environment and Energy, 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: PCB Activities/Uses (Use and Release) Allowed Under TSCA

Activities/Uses	What is allowed	Comments
Authorized Non-Enclosed Uses (40 CFR 761.30)		
Transformers	Use allowed for remainder of useful life. Specific requirements for different types of transformers: inspection; recordkeeping; location; registration; labeling; removing stored combustibles; disposal; notification.	3 classes: < 50 ppm; 50 ppm to 499 ppm; 500 ppm or >.
Railroad Transformers	Use allowed: specific requirements for servicing transformers and reclassification; limits on allowable PCB concentration; last phaseout = 1986.	
Mining Equipment	Processing and distribution in commerce of PCBs for servicing mining equipment is permitted for persons with exemptions; requirements for servicing equipment, rebuilding machinery.	
Heat Transfer Systems	Use allowed if PCB concentration is < 50 ppm; specific requirements for testing, retrofilling procedures and recordkeeping.	When concentration < 50 ppm, no further testing is required.
Hydraulic Systems	Use allowed if PCB concentration < 50 ppm; specific requirements for testing, retrofilling procedures and recordkeeping.	When concentration < 50 ppm, no further testing is required.
Carbonless Copy Paper	May be used in unenclosed manner indefinitely.	Not used any more
Pigments	Processing and distribution allowed with an exemption.	
Electromagnets, switches, and voltage regulators	Use allowed at any concentration; requirements for servicing, reclassification, inspection, storage of fluids (for repair) and recycling; restrictions on use near food or feed; prohibits servicing equipment with > 500 ppm PCBs, if work requires manipulation of internal components.	
Compressors, the liquid of natural gas pipelines	Use allowed indefinitely at < 50 ppm, provided compressors and pipelines are marked.	
Research and Development	Use allowed indefinitely in small quantities; defined as PCBs originally packaged in one or more hermetically sealed container, volume < 5.0 ml and used only for scientific experimentation or analysis. Manufacture, processing and distribution in commerce permitted with exemption.	
Microscopy mounting medium	Use allowed indefinitely. Manufacture, processing and distribution in commerce permitted with exemption.	

Appendix B: PCB Activities/Uses (Use and Release) Allowed Under TSCA

Activities/Uses	What is allowed	Comments
Authorized Non-Enclosed Uses (40 CFR 761.30), continued		
Use in capacitors	Use allowed at any concentration; capacitors posing a risk to food or feed prohibited; location of capacitors confined to restricted-access substations or indoor installations.	
Use in and servicing of circuit breakers, reclosers and cable	Use allowed at any concentration in these products; PCBs < 50 ppm may be used for servicing these items for the remainder of their useful lives;	
Microscopy Immersion Oil	Use allowed indefinitely. Manufacture, processing and distribution in commerce permitted with exemption.	
Optical Liquids	Use allowed indefinitely. Manufacture, processing and distribution in commerce permitted with exemption.	
Analytical Reference Samples	Analytical Reference samples derived from waste materials that contain PCBs; samples analyzed by laboratories that have procedures for handling PCBs.	Added in 4/11/94 rule (59 FR 16991-16999) - EPA granted an exemption to a company to process and distribute analytical reference samples derived from waste materials containing PCBs in order to create "real world" reference samples. Such use must be specifically authorized by rule.
No authorizations required for:		
	• excluded PCB products • using PCBs from excluded or recycling process • applying sewage sludge < 50 ppm	Subject to specific regulatory requirements.

Appendix B: PCB Activities/Uses (Use and Release) Allowed Under TSCA

Activities/Uses	What is allowed	Comments
Inadvertent PCB Generation - Excluded Processes (40 CFR 761.3)		
Definition	Excluded manufacturing processes include the inadvertent release of PCBs to products, air, and water. The following conditions identify instances where inadvertent PCB generation is excluded from the regulations.	
Concentration limits	• Concentration of PCBs in products leaving a manufacturing site or imported to the U.S. have an annual average of < 25 ppm, with a 50 ppm maximum.	
Detergent bars	• PCB concentration in detergent bars from manufacturer or imported is less than 5 ppm.	
Air emissions	• Release of PCBs at point at which emissions are vented to ambient air < 10 ppm.	
Discharge to water	• Amount of PCBs added to water from discharge < 100 micrograms/resolvable gas chromatographic peak per liter of water discharged.	
Disposal	• Disposal of process wastes above 50 ppm in accordance with TSCA disposal rules.	
Excluded PCB Products (40 CFR 761.3)		
	• Excluded PCB products are PCB materials with concentrations < 50 ppm, including but not limited to:	
Process by-products	• Non-Aroclor inadvertently generated PCBs as a by-product or impurity from a chemical manufacturing process.	
Historic Uses	• Products contaminated with PCBs from historic uses.	
Recycled Fluids	• Recycled fluids and/or equipment contaminated during use involving products described in the previous two examples.	
Used Oils	• Used oils containing <50 ppm, and legally manufactured, processed, distributed in commerce, or used before 10/1/84. • PCB concentration cannot be below 50 ppm due to dilution via leaks or spills of PCBs > 50 ppm. Note: Products or sources of PCBs in waste oils must have been manufactured, processed, distributed in commerce, or used, pursuant to EPA regulatory authority, exemption petition, settlement agreement, or other agency programs.	Note: General prohibition on waste oil with PCBs.
Small Capacitors - light ballasts	• No disposal restrictions unless capacitor is leaking.	If leaking, incinerate

Appendix B: PCB Activities/Uses (Use and Release) Allowed Under TSCA

Activities/Uses	What is allowed	Comments
PCB Exemptions (40 CFR 761.3)		

Individual and Company Exemptions	One year exemption granted to specifically identified companies for designated activities:
	• Processing and distributing in commerce PCBs for the following uses or activities:
	  • Mounting medium in microscopy
	  • Immersion oil in low fluorescence microscopy
	  • Optical liquids
	  • Exporting PCBs for use in small quantities for research and development
	  • Importing (manufacture) into the U.S. small quantities of existing PCB fluids from electrical equipment for analysis.
	  • Manufacturing PCBs for use in small quantities for research and development.
	  • Processing and exporting small quantities of PCBs for research and development.	

Renewal of Individual and Company Exemptions	• One-year exemptions for all individual companies renewed automatically unless a petitioning company notifies EPA of (1) increased PCB amounts to be processed, distributed, imported, or exported, and (2) any changes in activity. • Unless EPA initiates rulemaking to terminate the exemption or acts on the petition, petitioner is allowed to continue activities under exemption.	
Class Exemptions (Research and Development)	• Class exemption to all processors and distributors of PCBs in small quantities for research and development, provided they meet recordkeeping and reporting conditions.	

(Non-porous transformers)	One-year class exemption granted to members of the Electrical Apparatus Service Association with the following allowances:
	  • The exempted may process and distribute in commerce non-porous transformer component parts that have been decontaminated of PCB residues.
	  • Members may buy and sell certain types of PCB or PCB-Contaminated Transformers.
	  • No provision for renewal.	

Renewal of Research and Development Class Exemption	• Research and development class exemption is renewed automatically, unless EPA finds that the activities of any individual or company poses an unreasonable risk of injury to health or the environment. • EPA evaluates the information, issues proposed rules affecting the class exemption or individuals included in the exemption. Until final rule is issued, processing and distributing PCBs for research and development could continue.	Note different standard required to discontinue automatic renewal.

Appendix B: PCB Activities/Uses (Use and Release) Allowed Under TSCA

Activities/Uses	What is allowed	Comments
PCB Exemptions (40 CFR 761.3) Continued		
Renewals for Exemptions granted after 4/25.94	Must submit certified letter to EPA at least 6 months prior to expiration of current exemption, stating that specific types of activities (e.g., procedures for handling PCBs, amount handled, and any other activities listed in original exemption) have not changed. Any changes considered require a new petition submittal.	Change made in final rule issued 4/11/94 (59 FR 16991-16999)
Recycled PCBs (40 CFR 761.3)		

Paper products/asphalt roofing	• Recycled PCBs are those PCBs that appear in the processing of paper products or asphalt roofing materials from PCB-Contaminated raw materials.
	• Processes that recycle PCBs must meet the following requirements:
	  • Asphalt roofing products leaving processing sites must not have detectable PCB concentration levels.
	  • Paper products leaving manufacturing sites, or in imported paper products are required to have an annual average < 25 ppm, with a 50 ppm maximum.	

Air emissions	• Emissions of PCBs to ambient air must be less than 10 ppm.	
Discharge to Water	• The amount of Aroclor PCBs added to water discharges from asphalt roofing processing sites and the processing of paper products is restricted.	
Disposal	• Disposal of any other process wastes with PCBs > 50 ppm falls under storage and disposal rules. (Subpart D)	
Totally Enclosed Activities 40 CFR 761.20		
The DISTRIBUTION IN COMMERCE of the intact, non-leaking electrical equipment listed below constitute "totally enclosed activities."	• transformers (including transformers used in railway locomotives and self-propelled cars) • capacitors • electromagnets • voltage regulators • switches (including sectionalizers and motor starters) • circuit breakers • reclosers • cable • equipment containing non-leaking PCB capacitors	

Appendix C: PCB Exemptions for Manufacturing, Processing and Distribution in Commerce 40 CFR 761.80, July 1993

Note: EPA has granted the following 1 year exemptions for PCB activities in 40 CFR 761.80, July 1993.

Company	Exemption (allowed activities)	Comments/conditions
McCrone Accessories Components Chicago, IL	Processing and distribution in commerce for use as a mounting medium in microscopy	
R.P. Cargille Laboratories, Inc. Cedar Grove, NJ	Processing and distribution in commerce for use as a mounting medium in microscopy, and immersion oil in low fluorescence microscopy and an optical liquid	
Accu-Standard New Haven, CT	Exportation of PCBs for use in small quantities for research and development	
Unison Transformer Services Tarrytown, NY	Importation (manufacture) into the U.S., small quantities of existing PCB fluids from electrical equipment for analysis	• Samples must be shipped in 5.0 ml or less, in hermetically sealed vials • Exemption is limited to no more than 250 total samples per year • Unison must make quarterly inspections of laboratories to ensure safety procedures are followed • Unison must annually notify and describe to EPA its attempts to have samples analyzed abroad
California Bionuclear Corp. Sun Valley, CA **Foxboro Co.** North Haven, CT **ULTRA-Scientific, Inc.** Hope, RI **Midwest Research Institute** Kansas City, MO **Pathfinder Laboratories** St. Louis, MO **Radian Corp.** Austin, TX **Wellington Sciences USA** College Station, TX **Accu-Standard** New Haven, CT	Manufacture PCBs for use in small quantities for research and development	

Appendix C: PCB Exemptions for Manufacturing, Processing and Distribution in Commerce 40 CFR 761.80, July 1993

Note: EPA has granted the following 1 year exemptions for PCB activities in 40 CFR 761.80, July 1993.

Company	Exemption (allowed activities)	Comments/conditions
Class Exemption	A class exemption is granted to all processors and distributors of PCBs in small quantities for research and development, subject to specific conditions.	• All processors and distributors must maintain records of their PCB activities for a period of 5 years • Any person or company which expects to process or distribute in commerce 100 or more PCBs in 1 year must report to EPA, identifying sites of activities and quantity of PCBs to processed or distributed in commerce • The one year class exemption will be renewed automatically unless information is submitted affecting EPA's concludes that there is an unreasonable risk of injury to health or the environment from the activity of the exempted party.
Electrical Apparatus Service Association St. Louis, MO (class exemption to members)	Processing and distribution in commerce of non-porous transformer component parts which have been decontaminated of PCB residues; buying and selling PCB Transformers or PCB-Contaminated Transformers to which only double-rinsed non-porous component parts have been added.	
Chem Service, Inc. West Chester, PA **Foxboro Co.** North Haven, CT **PolyScience Corp.** Niles, IL **ULTRA-Scientific** Hope, RI **Supelco, Inc.** Bellefonte, PA **Radian Corp.** Austin, TX	Processing and exportation of small quantities of PCBs for research and development	

These 1 year exemptions renew automatically, subject to provisions described in 40 CFR 761.80(n). Petitions approved after April 1994 will no longer renew automatically.

Appendix D: Regulatory Framework for PCB Disposal

TSCA Regulations require specified disposal methods for each type of PCB item.

Structure: Pollutant form determines the type of disposal options available.

Disposal options are: (1) incineration in regulated PCB incinerator; (2) disposal at licensed chemical waste landfill; (3) disposal in a high efficiency boiler; (4) alternative method (subject to EPA approval); (5) disposal as municipal solid waste; (6) no restrictions (unregulated disposal of PCB items).

REQUIREMENT	PCB ITEM
Incineration only	• PCBs >50ppm, except mineral oil dielectric fluid, liquids 50-500ppm, and non-liquid PCBs>50ppm. (The exceptions have separate disposal requirements) • Liquids from PCB transformers > 500 ppm • PCB capacitors > 500 ppm owned by person who manufactured PCB capacitors or equipment; also applies if PCB capacitors were acquired during manufacturing.
Incineration or chemical waste landfill only	• non-liquid PCBs>50ppm (contaminated soil, rags, other debris) • PCB transformer carcasses (PCBs > 500 ppm) before draining require incineration; after draining, may be sent to landfill. • PCB-Contaminated Electrical Equipment (50-500 ppm capacitors); after draining, may be sent to landfill. • PCB articles > 500 ppm before draining require incineration; after draining, may be sent to landfill. • PCB containers > 500 ppm before draining require incineration; after draining, may be sent to landfill.
Alternative disposal methods includes high efficiency boilers subject to EPA approval; conditions for approval vary by pollution form)	• mineral oil dielectric fluid from PCB-Contaminated electrical equipment (50-500ppm) • liquids, other than mineral oil dielectric fluid (50-500ppm) • dredged materials and municipal sewage treatment sludges > 50ppm, if required disposal methods are proved unreasonable • drained electrical equipment is unregulated; liquid must be disposed of properly
Disposal as Municipal Solid Waste allowed	• small non-leaking capacitors (fluorescent light ballasts), hydraulic machines < 500 ppm PCB if drained. • PCB containers, if concentration < 500 ppm • PCB hydraulic machines may be disposed of as MUNICIPAL SOLID WASTE if drained (if > 1000 ppm, flushed). Liquids must be disposed of appropriately.
Unregulated	• PCB-Contaminated electrical equipment (50-500 ppm) except capacitors is unregulated, if liquid is disposed of properly. • PCB articles (50-500 ppm) are unregulated if drained.

APPENDIX E

COMMERCIALLY PERMITTED PCB DISPOSAL COMPANIES

The following companies are permitted to operate different types of PCB disposal facilities (as of June 30, 1993):

INCINERATOR
Aptus, Inc.
Chemical Waste Management
Rollins
Weston

ALTERNATE THERMAL
General Electric
Ogden Environmental Services, Inc.
O.H. Materials Corporation

CHEMICAL
Chemical Waste Management
Exceltech, Inc.
General Electric
Aptus, Inc.
PPM, Inc.
ENSR Operations
Transformer Consultants
Trinity Chemical Co. Inc.

PHYSICAL SEPARATION
CECOS International Process Center
ENSCO
Aptus, Inc.
Unison Transformer Services, Inc.
Quadrex HPS, Inc.
General Electric
S.D. Myers, Inc.

PIPELINE REMOVAL
Texas Eastern Gas Pipeline Company
Alguonguin Gas Transmission Company
Chemical Processors, Inc.
Columbia Gas Transmission Corp.
Columbia Gulf Transmission Co.
Tennessee Gas Pipeline Company (Tenneco)

PCB TRANSFORMER DECOMMISSIONING (Disassembly/Smelting)
Aptus, Inc.
Environmental International Electric Services/Unison
Transformer Consultants
Unison

CHEMICAL WASTE LANDFILLS
Chemical Waste Management
Chem-Security Systems Incorporated
Envirosafe Services Inc. of Idaho
CWM Chemical Services Control, Inc.
U.S. Ecology, Inc.
U.S. Pollution Control, Inc.

BIOLOGICAL
Detox Industries, Inc.

Appendix F: Issues Considered in PCB Disposal Amendments

Topic	Issue / barrier / gap	Change under consideration
(1) Alternative Disposal methods		
Large Volume, PCB Wastes (e.g., wastes from automobile shredding, white goods and industrial scrap, soils, sludges, and sediments)	Under current regulations, these materials may be disposed of by incineration, in a chemical waste landfill, or by approved alternative method of destruction	· Additional disposal methods that do not present unreasonable risk of injury to human health or the environment
Large Volume PCB Items (e.g., natural gas pipelines, natural gas ventilation systems, air compressor systems)	· Comparatively large surface areas contaminated w/comparatively small quantities of PCBs · Items must be disposed of in chemical waste landfill if item not decontaminated under alternative disposal technology permit -- may not be the best use of limited chemical waste landfill space	· Additional disposal methods · Methods of decontaminating large volume PCB items
	· Smelting of PCB-contaminated electrical equipment allowed because disposal of drained equipment unregulated	· Should EPA regulate disposal of these items, including whether such regulation is necessary to prevent unreasonable risk of injury to health or the environment
PCB Radioactive Wastes	Continued use, storage and disposal of mixtures, items, and wastes with PCB and radioactive constituents may not be coordinated with other Federal statutory or regulatory requirements	· How to develop criteria for authorization of continued use, storage and disposal of such materials to minimize risks to human health and the environment

Note: This table summarizes the issues described in EPA's advance notice of proposed rulemaking regarding disposal of PCBs. 56 FR 26738 - 26744, June 10, 1991.

Appendix F: Issues Considered in PCB Disposal Amendments

Topic	Issue / barrier / gap	Change under consideration
(2) Issues not Originally Contemplated When TSCA Rules Promulgated		
Household PCB waste (e.g., PCBs in household paint)	· Household wastes must be separated (e.g, regulated from unregulated wastes); unregulated waste must be manifested and moved to storage or disposal facility w/in 10 days, subject to 1-yr storage requirement	· Should EPA exclude PCB household waste under TSCA, e.g., using similar criteria to RCRA household waste exemption (distinguish commercial storage activities from collection programs; household wastes would be unregulated)
Unknown or unauthorized uses of PCBs	Several widespread PCB applications not considered when original regulations developed (e.g., PCB contamination in HVAC gaskets, and gaskets and felt sound-dampening materials in marine applications)	Seeking information on other locations where PCBs have been identified where use is not authorized under current regulations
Modifications to Existing Regulations		
Marking Transport Vehicles	Duplication in existing regulating regarding marking a transport vehicle when it is loaded with PCB containers that contain more than 45kg of liquid PCBs >50ppm (40CFR761.40(b) and (e)	How to remedy duplication: delete one of the sections, or delete both and rewrite requirement

Note: This table summarizes the issues described in EPA's advance notice of proposed rulemaking regarding disposal of PCBs. 56 FR 26738 - 26744, June 10, 1991.

Appendix F: Issues Considered in PCB Disposal Amendments

Topic	Issue / barrier / gap	Change under consideration
DOT Containers for Storage of PCB Waste	Current EPA requirements (design specs) for PCB containers may be unnecessarily stringent given the physical and chemical properties of PCBs. EPA regulations prohibit temporary storage of mixed radioactive/PCB wastes in non-DOT containers (40 CFR 761.60(b)(2)(vi), 761.65(c)(6)); In some cases of temporary storage, DOT containers may be inappropriate due to limited access.	Appropriate situations to defer to DOT requirements regarding the types of packaging us transport or store PCB waste.
Definition of a PCB Transformer	PCB transformers may have manufacturers' name plate and other identifying information removed to avoid expense of proper disposal (40 CFR 761.3).	Amend the regulatory language defining PCB transformers to clarify EPA policy.
	The definition of "PCB-Contaminated Electrical Equipment" has been confusing for the regulated community (40 CFR 761.3) (mineral oil vs. "oil-filled")	Amend the language of the PCB electrical equipment definition.
Drained PCB-Contaminated Transformers	The disposal of drained PCB-Contaminated electrical equipment is unregulated (smelting of transformer carcasses for recycling constitutes disposal). EPA has received anecdotal information that exposure from drained equipment may be significant. (40 CFR 761.60(b)(4), 761.60(a)(2) or (3)	Restrict the disposal of drained pieces of electrical equipment to ensure they are not illegally re-used.

Note: This table summarizes the issues described in EPA's advance notice of proposed rulemaking regarding disposal of PCBs. 56 FR 26738 - 26744, June 10, 1991.

Appendix F: Issues Considered in PCB Disposal Amendments

Topic	Issue / barrier / gap	Change under consideration
Temporary Storage of PCB Liquid <500ppm	Temporary storage is not allowed for liquid PCB waste greater than 500 ppm (761.65(c)). However, other sections allow "processing and distribution" in commerce of PCBs > 50 ppm for purposes of disposal.	Clarify activities considered "processing for disposal" or allow temporary storage of liquid PCB waste > 500 ppm.
Sale of Totally Enclosed PCBs or PCB Items	No recordkeeping is required for the sale of totally enclosed PCB transformers and large PCB capacitors (40 CFR 761.20). EPA is attempting to limit the illegal disposal of these units by parties claiming their equipment has been sold, when illegal disposal has occurred instead..	Establish recordkeeping requirements for such items.
Spill Cleanup Policy	Current regulations do not reflect new CERCLA reportable quantities. (40 CFR 761.125)	Amend TSCA language to be consistent with CERCLA (PCB spills of 1 lb. or more reported to the National Response Center).
	Spill Cleanup Policy has been applied to some spills inappropriately. (40 CFR 761.120)	Coordination of PCB spill cleanups with the requirements of other federal statutes. Clarify EPA policy that spill clean up policy only addresses recent spills.

Note: This table summarizes the issues described in EPA's advance notice of proposed rulemaking regarding disposal of PCBs. 56 FR 26738 - 26744, June 10, 1991.

Appendix F: Issues Considered in PCB Disposal Amendments

Topic	Issue / barrier / gap	Change under consideration
PCB Storage Requirements		
1) Indefinite Storage of articles designated for reuse	· Current regulations limit the amount of time PCB articles or containers may be stored for DISPOSAL, but no regulations limit the length of time an article may be stored for REUSE · PCB- and PCB-contaminated transformers have been held "in storage" well beyond a reasonable time for reuse	· Options to clarify that items may not be placed in storage for an indefinite period of time under the pretense that they are "in use" -- e.g., labeling articles when placed in storage for limiting reuse storage time. · Should EPA place limitations on the time allowed for storage for reuse or develop a more flexible approach such as a "reuse or reclassification schedule" on a case-specific basis
2) Clarification of 1-year storage for disposal requirement	Confusion exists as to WHEN the 1-year disposal clock begins -- whether it is the date it is placed into storage, or the date it is designated for disposal. The intent of regulation is to ensure disposal 1 year from the data the item is removed from service	Amend language §761.65(a) to make explicit that the "storage for disposal" clock starts when the item is removed from service, even if it is not placed into storage until a later date
3) Situations that warrant an extension of the 1-year storage for disposal requirement	Long-term biological destruction processes and the absence of adequate capacity for disposal of mixed wastes are instances where the one-year storage requirement may need to be suspended.	Temporarily suspend one-year storage limits for certain situations , or extend time limit at the beginning of the storage period. Allow for renewal of extensions if requirements are met.

Note: This table summarizes the issues described in EPA's advance notice of proposed rulemaking regarding disposal of PCBs. 56 FR 26738 - 26744, June 10, 1991.

Appendix F: Issues Considered in PCB Disposal Amendments

Topic	Issue / barrier / gap	Change under consideration
Exclusion for labs providing PCB analytical samples	Laboratories involved in routine quality assurance measures may be subject to the restrictions on distribution of PCBs.	Exempt labs participating in multi-laboratory studies from PCB distribution restrictions if PCBs are used for analysis; impose restrictions on activities, including notification requirement.
Class exemption for EPA and NIST to process and/or distribute PCB Standards in commerce	Confusion exists as to whether or not EPA and the National Institute for Standards and Testing need an exemption to distribute PCB materials and audit samples.	Clarify regulations to state that exemption or authorization not required.
500 gallon exemption under the PCB notification and manifesting rule.	Facilities that store less than 500 gallons of "liquid" PCB waste are not required to seek approval as a commercial storer may need to establish a similar exemption for non-liquid PCB waste (40 CFR 761.3).	Establish a small quantity exemption for non-liquid PCB waste to complement notification and manifest regulation's small quantity exemption for liquids.
State enhancement activities	There is no formal federal recognition of state-issued PCB storage and disposal permits. The regulated community must obtain both state and federal permits. (40 CFR 761.60, 761.65, and 761.70)	Allow federal recognition of state PCB storage and disposal permits to eliminate concurrent state and federal permitting where possible; encourage states to list PCBs under their RCRA programs by making resources available through grant programs.

Note: This table summarizes the issues described in EPA's advance notice of proposed rulemaking regarding disposal of PCBs. 56 FR 26738 - 26744. June 10, 1991.

Appendix G: Comparison of Transformer Reclassification Rules--Existing and Proposed

Transformer Category	EXISTING Rules	PROPOSED Rules	Highlights
<50 ppm			
Non-PCB Transformers	No reclassification required	No reclassification required	• No change
50 to < 500 ppm			
PCB-Contaminated Transformers			
Actions	Drain, refill and/or service transformer. Installer records concentrations, retrofill schedules.	Drain, flush, and refill transformer Facilities record sample results, retrofill schedules.	• Testing requirement eliminated under proposed rules. • Revised recordkeeping under proposed rules.
Testing Requirements	Test 3 months after installation (in-service) Raise temperature of the fluid to 50 C during test.	No testing required Not required to reach 50 degrees Celsius	
Threshold for Reclassification	**After testing, PCB concentration is:** < 50 ppm: reclassify as non-PCB transformer 50 - 500ppm: PCB contaminated transformer	**After retrofill:** Drained and flushed transformer may be reclassified immediately as a non-PCB transformer No further testing required.	
500 to < 1000 ppm			• Testing time decreases from 90 to 21 days.
PCB Transformers			
Actions	Drain, refill and/or service transformer. Installer records concentrations, retrofill schedules.	Drain, flush, and refill transformer Facilities record sample results, retrofill schedules.	• Temperature requirement eliminated. • PCB reclassification thresholds have been altered. • Revised recordkeeping under proposed rules.
Testing Requirements	Test 90 days after installation (in-service) Raise temperature of the fluid to 50 C during test.	Test after 21 days No 50 degree Celsius temperature requirement	
Threshold for Reclassification	**After testing, PCB concentration is:** < 50 ppm: reclassify as non-PCB transformer 50 - 500ppm: PCB contaminated transformer >500ppm: repeat process until concentration is below 500ppm	**After retrofill, PCB concentration is:** < 25 ppm: reclassify as non-PCB transformer 25 - 500 ppm: reclassify as PCB - contaminated transformer or retest after 90 days >500ppm: retrofill may be repeated following same procedures	
>1000 ppm			
PCB Transformers			
Actions	Drain, refill and/or service transformer. Installer records concentrations, retrofill schedules.	Drain, flush, and refill transformer. Place unit in service. Record samples, retrofill schedule.	• Very few changes • Eliminate temperature requirement • Revised recordkeeping under proposed rules.
Testing Requirements	Test 90 days after installation (in-service) Raise temperature of the fluid 50 C during test.	Test 90 days after installation (in-service)	
Threshold for Reclassification	**After testing, PCB concentration is:** < 50 ppm: reclassify as non-PCB transformer 50 - 500ppm: PCB contaminated transformer >500ppm: repeat process until concentration is below 500ppm	**After, retrofill PCB concentration is:** < 50 ppm: reclassify as non-PCB transformer 50 - 500ppm: PCB contaminated transformer >500ppm: retrofill may be repeated following same procedures	

APPENDIX H: DATA ON PCB RELEASES

Appendix H contains information on PCB releases available from several federal and state reporting systems. Federal and state agencies collect information on PCB 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 a 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 PCB releases occur most frequently.

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

App. H1 **Summary of Reporting Information**: The table shows, by SIC code, the frequency with which PCB releases appear in each data set reviewed for this analysis. It is organized by SIC code and by state.

App. H2 **Toxic Chemical Release Inventory (TRI) data**: TRI data for 1992 and 1991.
H2a = 1992 data for Great Lakes states only
H2b = 1991 data for Great Lakes states only

App. H3 **Permit Compliance System (PCS) data**: PCS data for the Great Lakes basin (facilities located in the Great Lakes basin only; not necessarily statewide)
H3a = July 1992 - June 1993 data
H3b = July 1991 - June 1992 data

(cont'd)

App. H4 **Wisconsin Air Point Source data:** PCB air emissions data collected for Wisconsin's Clean Air Act Title V Operating Permit Program (reported data).

App. H5 **Michigan Critical Materials Registry:** 1991 data collected under Michigan's wastewater reporting program. Data indicates the number of facilities reporting PCB use (including material on-site).

App. H6 **Notification and Manifesting data**

Appendix H1: Summary of PCB Reporting Data

SIC Category	SIC Code	Total		IL		IN		MI			MN		NY		OH		PA		WI		
		TRI	*PCS*	*TRI*	*PCS*	*TRI*	*PCS*	*TRI*	*PCS*	*MI*	*TRI*	*PCS*	*TRI*	*PCS*	*TRI*	*PCS*	*TRI*	*PCS*	*TRI*	*PCS*	*W*
10	**Metal Mining**																				
	1011 Iron Ores									1											
	1021 Copper Ores									1											
	1081 Metal Mining Services									1											
14	**Nonmetallic Minerals, Except Fuels**																				
	1422 Crushed And Broken Limestone									4											
	1440 Sand and Gravel									2											
20	**Food and Kindred Products**																				
	2050 Bakery Products									1											
	2063 Beet Sugar									3											
	2087 Flavoring Extracts And Syrups, Nec									1											
24	**Lumber and Wood Products**																				
	2493 Reconstituted Wood Products									2											
25	**Furniture and Fixtures**																				
	2500 Furniture and Fixtures									7											
	2522 Office Furniture, Except Wood									3											
	2591 Drapery Hardware and Blinds and Shades									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. The data is the most current available for each program.

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

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

Appendix H1: Summary of PCB Reporting Data

SIC Category	SIC Code		Total		IL		IN		MI			MN		NY		OH		PA		WI		
			TRI	PCS	TRI	PCS	TRI	PCS	TRI	PCS	MI	TRI	PCS	TRI	PCS	TRI	PCS	TRI	PCS	TRI	PCS	W
26	**Paper and Allied Products**																					
	2600	Paper and Allied Products									2											
	2611	Pulp Mills		4																	4	
	2621	Paper Mills		1							13										1	
	2631	Paperboard Mills									6											
	2640	Not Listed									1											
	2650	Paperboard Containers and Boxes									1											
	2651	Not listed									1											
	2670	Misc. Converted Paper Products									1											
	2679	Converted Paper Products, Nec																				
27	**Printing and Publishing**																					
	2700	Printing and Publishing									1											
	2710	Newspapers									3											
	2750	Commercial Printing									2											
	2782	Blankbooks and Looseleaf Binders									1											
	2790	Printing Trade Services									1											
28	**Chemicals and Allied Products**																					
	2800	Chemicals and Allied Products									2											
	2810	Industrial Inorganic Chemicals									2											
	2813	Industrial Gases									1											
	2819	Industrial Inorganic Chemicals, Nec	1									1										
	2820	Plastics Materials and Synthetics									2											
	2830	Drugs									4											
	2840	Soap, Cleaners, and Toilet Goods									1											
	2850	Paints and Allied Products									2											
	2851	Paints And Allied Products									2											
	2860	Industrial Organic Chemicals									4											
	2865	Cyclic Crudes And Intermediates									2											
	2870	Agricultural Chemicals									1											
	2890	Miscellaneous Chemical Products									2											
	2891	Adhesives And Sealants									2											
	2899	Chemical Preparations, Nec		1						1	3											
29	**Petroleum and Coal Products**																					
	2900	Petroleum and Coal Products									1											

Appendix H1: Summary of PCB Reporting Data

SIC Category	SIC Code		Total		IL		IN		MI			MN		NY		OH		PA		WI		
			TRI	PCS	TRI	PCS	TRI	PCS	TRI	PCS	MI	TRI	PCS	TRI	PCS	TRI	PCS	TRI	PCS	TRI	PCS	W
	2911	Petroleum Refining	1								2	1										
30		**Rubber and Miscellaneous Plastic Products**																				
	3053	Gaskets, Packing and Sealing Devices									1											
	3069	Fabricated Rubber Products, Nec									3											
	3079										4											
	3080	Miscellaneous Plastics Products, NEC									11											
32		**Stone, Clay, and Glass Products**																				
	3220	Glass and Glassware, Pressed or Blown									3											
	3221	Glass Containers									1											
	3241	Cement, Hydraulic	1						1		5											
	3273	Ready-Mixed Concrete									1											
	3274	Lime	1								1							1				
	3290	Misc. Nonmetallic Mineral Products									1											
	3295	Minerals, Ground or Treated									5											
	3297	Nonclay Refractories									2											
33		**Primary Metal Industries**																				
	3312	Blast Furnaces And Steel Mills									6											
	3313	Electrometallurgical Products	1								1			1								
	3316	Cold Finishing Of Steel Shapes									5											
	3317	Steel Pipe And Tubes									1											
	3320	Iron and Steel Foundries									1											
	3321	Gray And Ductile Iron Foundries	2						2		10											
	3322	Malleable Iron Foundries									2											
	3334	Primary Aluminum		2											2							
	3339	Primary Nonferrous Metals, NEC									1											
	3340	Secondary Nonferrous Metals									4											
	3341	Secondary Nonferrous Metals		1							1				1							
	3354	Aluminum Extruded Products									1											
	3360	Nonferrous Foundries (Castings)									1											
	3365	Aluminum Foundries									1											
	3366	Copper Foundries									2											
	3369	Nonferrous Foundries, NEC									1											
	3398	Metal Heat Treating									6											

Appendix H1: Summary of PCB Reporting Data

SIC ategory	SIC Code		Total		IL		IN		MI			MN		NY		OH		PA		WI		
			TRI	PCS	TRI	PCS	TRI	PCS	TRI	PCS		TRI	PCS	TRI	PCS	TRI	PCS	TRI	PCS	TRI	PCS	W
34	**Fabricated Metal Products**																					
	3400	Fabricated Metal Products									5											
	3442	Metal Doors, Sash, and Trim									1											
	3443	Fabricated Plate Work (Boiler Shops)																				
	3449	Miscellaneous Metal Work									1											
	3460	Metal Forgings and Stampings									1											
	3462	Iron and Steel Forgings									6											
	3465	Automotive Stampings									13											
	3471	Plating And Polishing									4											
	3479	Metal Coating And Allied Services									1											
	3490	Misc. Fabricated Metal Products									9											
	3499	Fabricated Metal Products, Nec									1											
35	**Industrial Machinery and Equipment**																					
	3510	Engines and Turbines									5											
	3519	Internal combustion engines, Nec		1		1																
	3530	Construction and Related Machinery									2											
	3540	Metalworking Machinery									1											
	3544	Special Dies, Tools, Jigs, and Fixture									1											
	3545	Machine Tool Accessories									1											
	3550	Special Industry Machinery									3											
	3566	Speed Changers, Drives, and Gears									1											
	3570	Computer and Office Equipment									1											
	3580	Refrigeration and Service Machinery									1											
	3585	Refrigeration And Heating Equipment																1				
	3590	Industrial Machinery, NEC									1											
36	**Electronic and Other Electronic Equipment**																					
	3612	Transformers, Except Electronic	1						1													
	3620	Electrical Industrial Apparatus									1											
	3621	Motors And Generators	1				1				1											
	3630	Household Appliances									1											
	3651	Household Audio and Video Equipment									1											
37	**Transportation Equipment**																					
	3710	Motor Vehicles and Equipment									3											
	3711	Motor Vehicles And Car Bodies									15											

Appendix H1: Summary of PCB Reporting Data

SIC Category	SIC Code		Total		IL		IN		MI			MN		NY		OH		PA		WI		W
			TRI	PCS	TRI	PCS	TRI	PCS	TRI	PCS	MI	TRI	PCS	TRI	PCS	TRI	PCS	TRI	PCS	TRI	PCS	
	3714	Motor Vehicle Parts And Accessories		2					1	1	46				1							
	3790	Miscellaneous Transportation Equipment									1											
38	**Instruments and Related Products**																					
	3812	Search And Navigation Equipment									1											
	3840	Medical Instruments and Supplies									1											
	3843	Dental Equipment and Supplies									1											
39	**Miscellaneous Manufacturing Industries**																					
	3940	Toys and Sporting Goods									1											
	3970	Not listed									1											
	3990	Miscellaneous Manufactures									1											
42	**Trucking and Warehousing**																					
	4230	Trucking Terminal Facilities									1											
47	**Transportation Services**																					
	4785	Inspection and Fixed Facilities									1											
49	**Electric, Gas, and Sanitary Services**																					
	4911	Electric Services									21											
	4952	Sewerage Systems		24						16			1		2						5	
	4953	Refuse Systems		1											1							
50	**Wholesale Trade - Durable Goods**																					
	5013	Motor Vehicle Supplies and New Parts - Wholesale Trade									3											
65	**Real Estate**																					
	6512	Nonresidential Building Operators									5											
72	**Personal Services**																					
	7215	Coin-operated Laundries and Cleaning									1											
76	**Miscellaneous Repair Services**																					
	7699	Repair Services, Nec									1											
80	**Health Services**																					
	8060	Hospitals									3											
	8070	Medical and Dental Laboratories									1											

Appendix H1: Summary of PCB Reporting Data

SIC Category	SIC Code		Total		IL		IN		MI			MN		NY		OH		PA		WI		
			TRI	*PCS*	*TRI*	*PCS*	*TRI*	*PCS*	*TRI*	*PCS*	*MI*	*TRI*	*PCS*	*TRI*	*PCS*	*TRI*	*PCS*	*TRI*	*PCS*	*TRI*	*PCS*	*W*
	8091	Health and Allied Service, NEC																				
87	**Engineering and Management Services**																					
	8730	Research and Testing Services									10											
	8731	Commercial Physical Research									1											
	8734	Testing Laboratories									3											
Grand Total			9	37		1	1		5	18	360	2	1	1	7			2			10	

Appendix H2a

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

TING YEAR: 1992

EAT LAKES SIN	STATE	SICCODE	FACILITY NAME	ROLE OF PCB	SOURCE REDUCTION ACTIVITIES & ID METHODS	NONPT AIR	POINT AIR	WATER	UNDRGRND	LAND	POTW	OFFSITE	TOTAL RELEASES
N	MN	2819	KOCH REFINING CO.	3C		0	0	0	0	1	0	1	2
N	MN	2911	KOCH REFINING CO.	3C	NA	0	0	0	0	0	0	0	0
Y	MI	3241	LAFARGE CORP.	3C		0	0	0	0	0	0	214469	214469
N	PA	3274	MILLARD LIME & STONE CO.	3C	NA	0	0	0	0	0	0	0	0
Y	NY	3313	SPECIAL METALS CORP.	3C	NA	0	0	0	0	0	0	26400	26400
Y	MI	3321	TEXTRON INC.	3C		0	0	0	0	0	0	12268	12268
Y	MI	3321	MARTIN FOUNDRIES CO.	3B		0	0	0	0	0	0	0	0
N	MI	3612	DYNEX ENVIRONMENTAL INC.	3C	NA	0	0	0	0	0	0	896647	896647
Y	IN	3621	GE CO.	3C	W52T01T04T10NA	0	0	0	0	0	0	41308	41308

OF PCB AND ITS USES AT THE FACILITY

Otherwise use the toxic chemical
A = As a chemical processing aid
B = As a manufacturing aid
C = Ancillary or other use

SOURCE REDUCTION ACTIVITIES

W52 = Modified equipment, layout or piping

METHODS USED TO ID SOURCE REDUCTION ACTIVITIES

T01 = Internal Pollution Prev. Opportunity Audit(s)
T04 = Participative Team Management
T10 = Vendor Assistance

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

Appendix H2b

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

TING YEAR: 1991

EAT LAKES SIN	STATE	SICCODE	FACILITY NAME	ROLE OF PCB	SOURCE REDUCTION ACTIVITIES & ID METHODS	NONPT AIR	POINT AIR	WATER	UNDRGRND	LAND	POTW	OFFSITE	TOTAL RELEASES
N	MN	2911	KOCH REFINING CO.	3C	NA	0	0	0	0	0	0	490	490
N	PA	3241	ESSROC MATERIALS INC.	3C	NA	0	0	0	0	0	0	40417	40417
N	PA	3274	MILLARD LIME & STONE CO.	3C	NA	0	0	0	0	0	0	0	0
N	NY	3313	SPECIAL METALS CORP.	3C		0	0	0	0	0	0	27190	27190
Y	MI	3321	MARTIN FOUNDRIES CO.	3B	NA	0	0	0	0	0	0	0	0
N	IL	3333	BIG RIVER ZINC CORP.	3C	NA	0	0	0	0	0	0	0	0
N	OH	3443	BABCOCK & WILCOX CO.	3C	NA	0	0	0	0	0	0	2000	2000
N	IL	3462	KRUPP GERLACH CRANKSHAFT CO.	3B		0	0	0	0	0	0	1890	1890
N	PA	3585	FRICK CO.	3C	NA	0	0	0	0	0	0	75000	75000
N	MI	3612	DYNEX ENVIRONMENTAL INC.	3C	NANA	0	0	0	0	0	0	435801	435801
N	MI	3714	GMC	3C	NA	0	0	0	0	0	0	750	750

OF PCB AND ITS USES AT THE FACILITY

otherwise use the toxic chemical
= As a chemical processing aid
= As a manufacturing aid
= Ancillary or other use

SOURCE REDUCTION ACTIVITIES

W52 = Modified equipment, layout or piping

METHODS USED TO ID SOURCE REDUCTION ACTIVITIES

T01 = Internal Pollution Prev. Opportunity Audit(s)
T04 = Participative Team Management
T10 = Vendor Assistance

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

APPENDIX H3a: PCB DISCHARGES IN THE GREAT LAKES BASIN
JULY 1992 - JUNE 1993 (PCS DATA)

SIC CODE/SIC NAME	NUMBER of FACILITIES	TOTAL PCB DISCHARGES (kg/yr)	RANGE of RELEASES (kg/yr)
26 Paper & Allied Products			
2611 Pulp mills	4	0.16	0 - 0.16
2621 Paper mills, except building paper	1	0	0
28 Chemicals and Allied Products			
2899 Chemical preparations, not elsewhere classified	1	0	0
33 Primary Metal Industries			
3334 Primary aluminum	2	0.02	0 - 0.02
3341 Secondary nonferrous metals	1	1.25	1.25
35 Machinery, Except Electrical			
3519 Internal combustion engines, not elsewhere classified	1	1.08	1.08
37 Transportation Equipment			
3714 Motor vehicle parts and accessories	2	2.52	0.01 - 2.51
49 Electric, Gas and Sanitary Services			
4952 Sewerage systems	24	11.01	0 - 4.96
4953 Refuse systems	1	0	0
TOTALS:	**37**	**16.04**	**0 - 4.96**

Note: This table shows the number of facilities in the Great Lakes basin, by SIC code, that reported PCB 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 PCB Discharges = total PCB discharges from all facilities reporting in each SIC code.
Range = range of reported releases from all sources reporting in each SIC code.

Source: Permit Compliance System

APPENDIX H3b: PCB DISCHARGES IN THE GREAT LAKES BASIN JUNE 1991 - JULY 1992 (PCS DATA)

SIC CODE/SIC NAME	NUMBER of FACILITIES	TOTAL PCB DISCHARGES (kg/yr)	RANGE of RELEASES (kg/yr)
26 Paper & Allied Products			
2611 Pulp mills	3	0.08	0 - 0.08
2621 Paper mills, except building paper	2	0	0
28 Chemicals and Allied Products			
2899 Chemical preparations, not elsewhere classified	1	0.01	0.01
33 Primary Metal Industries			
3334 Primary aluminum	2	0.03	0 - 0.03
3341 Secondary nonferrous metals	1	0.06	0.06
35 Machinery, Except Electrical			
3519 Internal combustion engines, not elsewhere classified	1	1.07	1.07
37 Transportation Equipment			
3714 Motor vehicle parts and accessories	3	8.78	0 - 6.47
49 Electric, Gas and Sanitary Services			
4952 Sewerage systems	24	51.77	0 - 31.94
4953 Refuse systems	1	1.20	1.20
TOTALS:	**38**	**63.0**	**0 - 31.94**

Note: This table shows the number of facilities in the Great Lakes basin, by SIC code, that reported PCB 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 PCB discharges from all facilities reporting in each SIC code.
Range = range of reported releases from all sources reporting in each SIC code.

Source: Permit Compliance System

Appendix H4: Wisconsin PCB Emissions (Air point sources, 1992 Data)

SIC Code/SIC Name	Number of Facilities	Total HG Emissions (pounds/yr)	Range of Releases (pounds/yr)
26 Paper and Allied Products			
2631 Paperboard Mills	1	0.396	0.396
2679 Converted Paper Products, NEC	1	1.188	1.188
82 Health Services			
8091 Health and Allied Services, NEC	1	0.5	0.5
TOTALS:	**3**	**2.084**	**.396 - 1.188**

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, state 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 combusion 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 H5: Michigan Critical Materials Wastewater Report - 1991 data (PCBs)

SIC Code	SIC Name		Number of Facilities
10	**Metal Mining**		
	1011	Iron Ores	1
	1021	Copper Ores	1
	1081	Metal Mining Services	1
14	**Nonmetallic Minerals**		
	1422	Crushed And Broken Limestone	4
	1440	Sand and Gravel	2
20	**Food and Kindred Products**		
	2050	Bakery Products	1
	2063	Beet Sugar	3
	2087	Flavoring Extracts And Syrups, Nec	1
24	**Lumber and Wood Products**		
	2493	Reconstituted Wood Products	2
25	**Furniture and Fixtures**		
	2500	Furniture and Fixtures	7
	2522	Office Furniture, Except Wood	3
	2591	Drapery Hardware And Blinds And Shades	1
26	**Paper and Allied Products**		
	2600	Paper and Allied Products	2
	2621	Paper Mills	13
	2631	Paperboard Mills	6
	2640		1
	2650	Paperboard Containers and Boxes	1
	2651		1
	2670	Misc. Converted Paper Products	1
27	**Printing and Publishing**		
	2700	Printing and Publishing	1
	2710	Newspapers	3
	2750	Commercial Printing	2
	2782	Blankbooks And Looseleaf Binders	1
	2790	Printing Trade Services	1
28	**Chemicals and Allied Products**		
	2800	Chemicals and Allied Products	2
	2810	Industrial Organic Chemicals	2
	2813	Industrial Gases	1
	2820	Plastic Materials and Synthetics	2
	2830	Drugs	4
	2840	Soap, Cleaners, and Toilet Goods	1
	2850	Paints and Allied Products	2
	2851	Paints And Allied Products	2
	2860	Industrial Organic Chemicals	4

NOTE This table shows the facilities (by SIC code) that reported PCBs 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 PCBs > 1 lb. in each sic code.

Appendix H5: Michigan Critical Materials Wastewater Report - 1991 data (PCBs)

SIC Code	SIC Name		Number of Facilities
28	Chemicals and Allied Products (continued)		
	2865	Cyclic Crudes And Intermediates	2
	2870	Agricultural Chemicals	1
	2890	Misc. Chemical Products	2
	2891	Adhesives And Sealants	2
	2899	Chemical Preparations, Nec	3
29	Petroleum and Coal Products		
	2900	Petroleum and Coal Products	1
	2911	Petroleum Refining	2
30	Rubber and Misc. Plastics		
	3053	Gaskets, Packing And Sealing Devices	1
	3069	Fabricated Rubber Products, Nec	3
	3079		4
	3080	Miscellaneous Plastics Products, NEC	11
	3220	Glass and Glassware, Pressed or Blown	3
	3221	Glass Containers	1
	3241	Cement, Hydraulic	5
	3273	Ready-Mixed Concrete	1
	3274	Lime	1
	3290	Misc. Nonmetallic Mineral Products	1
	3295	Minerals, Ground or Treated	5
	3297	Nonclay Refractories	2
33	Primary Metal Industries		
	3312	Blast Furnaces And Steel Mills	6
	3313	Electrometallurgical Products	1
	3316	Cold Finishing Of Steel Shapes	5
	3317	Steel Pipe And Tubes	1
	3320	Iron and Steel Foundries	1
	3321	Gray And Ductile Iron Foundries	10
	3322	Malleable Iron Foundries	2
	3339	Primary Nonferrous Metals, Nec	1
	3340	Secondary Nonferrous Metals	4
	3341	Secondary Nonferrous Metals	1
	3354	Aluminum Extruded Products	1
	3360	Nonferrous Foundries (Castings)	1
	3365	Aluminum Foundries	1
	3366	Copper Foundries	2
	3369	Nonferrous Foundries, Nec	1
	3398	Metal Heat Treating	6
34	Fabricated Metal Products		
	3400	Fabricated Metal Products	5
	3442	Metal Doors, Sash, And Trim	1
	3449	Miscellaneous Metal Work	1
	3460	Metal Forgings and Stampings	1
	3462	Iron And Steel Forgings	6
	3465	Automotive Stampings	13
	3471	Plating And Polishing	4
	3479	Metal Coating And Allied Services	1
	3490	Misc. Fabricated Metal Products	9
	3499	Fabricated Metal Products, Nec	1

Appendix H5: Michigan Critical Materials Wastewater Report - 1991 data (PCBs)

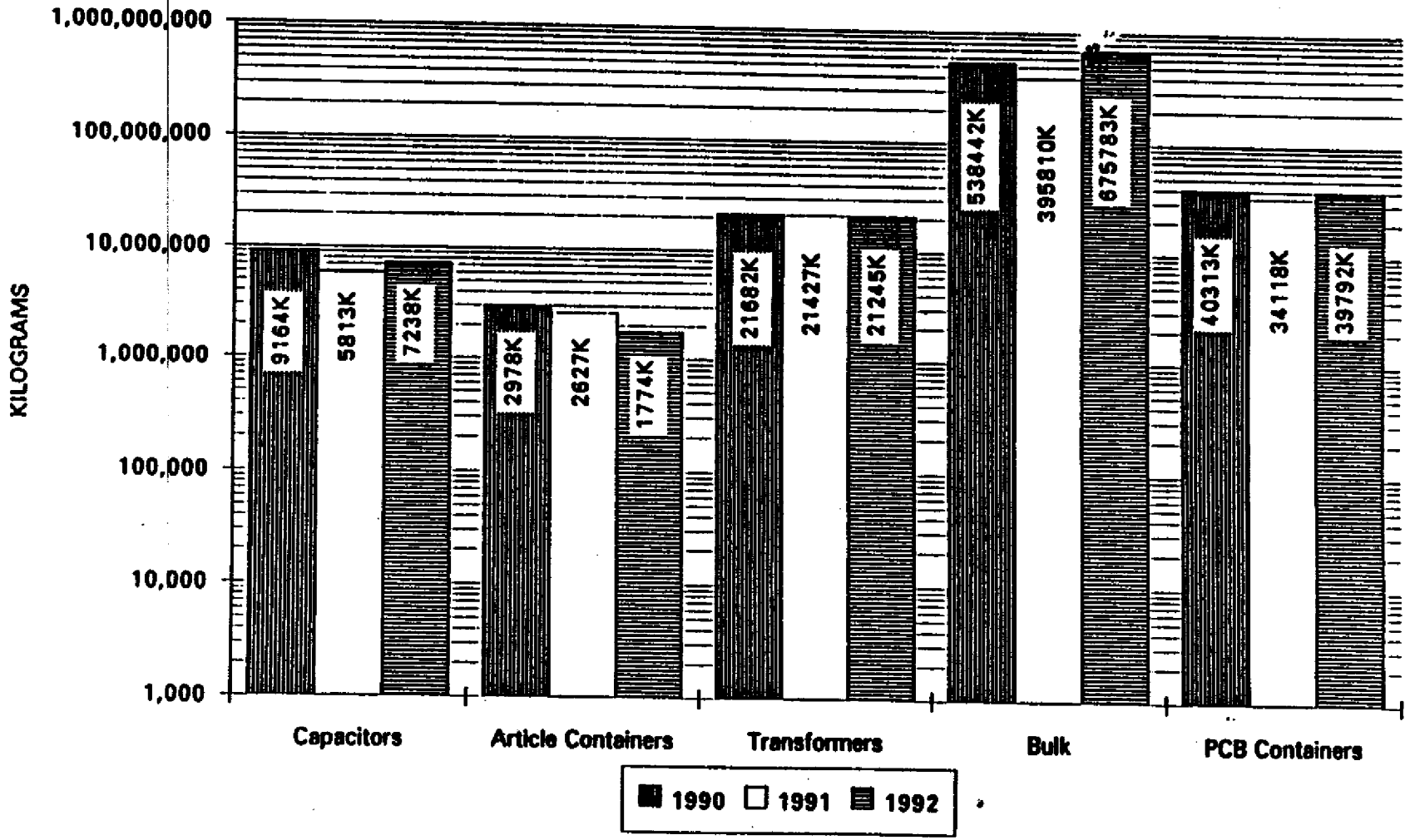
SIC Code	SIC Name		Number of Facilities
35	**Industrial Machinery and Equipment**		
	3510	Engines and Turbines	5
	3530	Construction and Related Machinery	2
	3540	Metalworking Machinery	1
	3544	Special Dies, Tools, Jigs, And Fixture	1
	3545	Machine Tool Accessories	1
	3550	Special Industry Machinery	3
	3566	Speed Changers, Drives, and Gears	1
	3570	Computer and Office Equipment	1
	3580	Refrigeration and Service Machinery	1
	3590	Industrial Machinery, NEC	1
36	**Electronic & Other Electric Equipment**		
	3620	Electrical Industrial Apparatus	1
	3621	Motors and Generators	1
	3630	Household Appliances	1
	3651	Household Audio And Video Equipment	1
37	**Transportation Equipment**		
	3710	Vehicles and Equipment	3
	3711	Motor Vehicles And Car Bodies	15
	3714	Motor Vehicle Parts And Accessories	46
	3790	Miscellaneous Transportation Equipment	1
38	**Instruments and Related Products**		
	3812	Search and navigation equipment	1
	3840	Medical Instruments and Supplies	1
	3843	Dental Equipment And Supplies	1
39	**Miscellaneous Manufacturing Industries**		
	3940	Toys and Sporting Goods	1
	3970		1
	3990	Miscellaneous Manufactures	1
42	**Trucking and Warehousing**		
	4230	Trucking Terminal Facilities	1
47	**Transportation Services**		
	4785	Inspection And Fixed Facilities	1
49	**Electric, Gas, and Sanitary Services**		
	4911	Electric Services	21
50	**Wholesale Trade - Durable Goods**		
	5013	Motor Vehicle Supplies And New Parts-Wholesale Trade	3
65	**Real Estate**		
	6512	Nonresidential Building Operators	5
72	**Personal Services**		
	7215	Coin-operated Laundries and Cleaning	1
76	**Miscellaneous Repair Services**		
	7699	Repair Services, Nec	1
80	**Health Services**		
	8060	Hospitals	3
	8070	Medical and Dental Laboratories	1

Appendix H5: Michigan Critical Materials Wastewater Report - 1991 data (PCBs)

SIC Code	SIC Name		Number of Facilities
87	Engineering & Management Services		
	8730	Research and Testing Services	10
	8731	Commercial Physical Research	1
	8734	Testing Laboratories	3
		Total:	**360**

Appendix H6

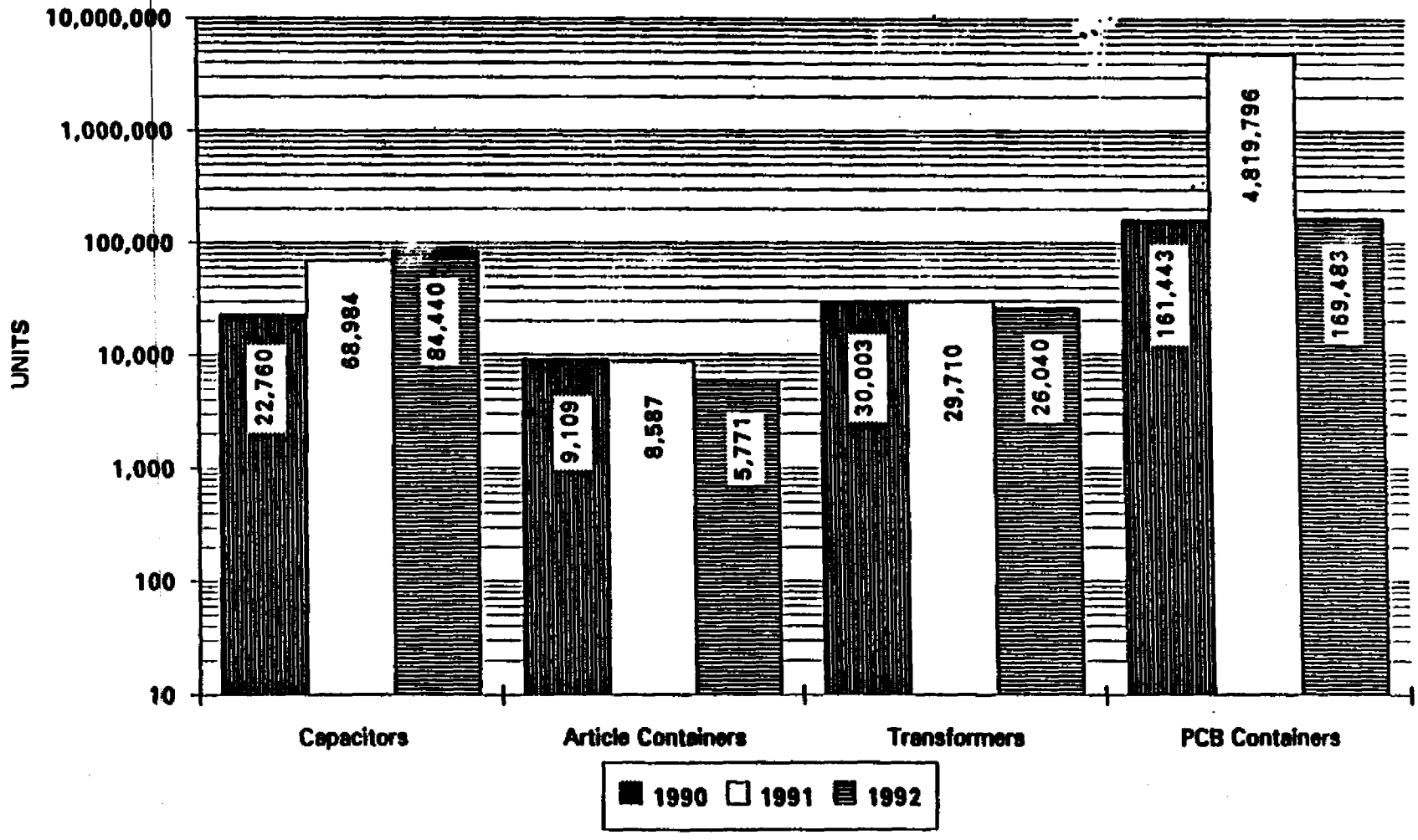
1990/1991/1992 NATIONAL SUMMARY FROM PCB ANNUAL REPORT (IN KILOGRAMS x 1000 (K)) DISPOSED DURING YEAR



Please note scale values

Appendix H6

1990/1991/1992 NATIONAL SUMMARY FROM PCB ANNUAL REPORT (IN UNITS) DISPOSED DURING YEAR



Please note scale values