United States
Environmental Protection
Agency

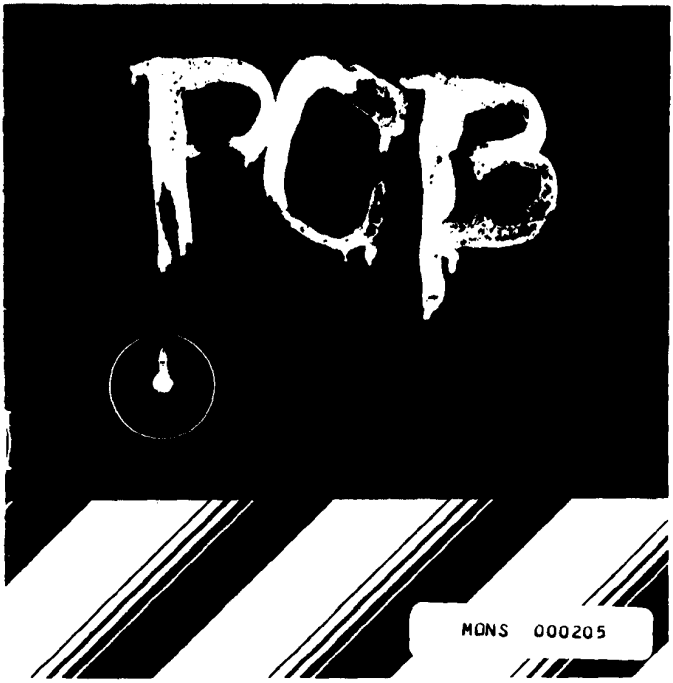
December 1979

Toxic Substances

EPA

Polychlorinated Biphenyls:

An Alert for Food and Feed Facilities



This booklet has been published by the Environmental Protection Agency in cooperation with the Department of Agriculture and the Food and Drug Administration.

Polychlorinated Biphenyls:

An Alert for Food and Feed Facilities

Important Notice: PCB Incinerators

At the time this booklet went to press, there were still no approved PCB incinerators available for commercial use in the United States. *Until incinerators are available, it is not advisable to remove PCB fluids or intact PCB-containing equipment unless safe storage facilities are available off the site.*

Several food contamination incidents have been caused by PCBs in storage. These incidents indicate that removing PCB equipment or draining fluid from a PCB transformer and storing the equipment or fluid may result in an increased risk of contamination. Therefore, instead of removing this equipment from service at this time, carefully examine the risk of leaks or spillage and monitor continued operations closely. (See suggestions in paragraph C of checklist.) If there is potential for leaks or spills, corrective measures must be taken, including removal of the equipment and fluid to a safe storage area away from the premises. If you have any questions, consult with your regional EPA or FDA office or local USDA inspector.

At the present time, we anticipate that the first incinerator will be available in spring 1980. EPA will publicize information on commercial PCB incinerators as soon as they are approved. In addition, you may check on the availability of incinerators by either calling EPA's Office of Industry Assistance toll-free (800) 424-9065 or calling your regional EPA or FDA contact or local USDA inspector. (See list of names and numbers in the booklet.)

December 1979

FOREWORD

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON D.C. 20460

December 1979

OFFICE OF TOXIC SUBSTANCES

The food and feed industries are particularly vulnerable to contamination from polychlorinated biphenyls (PCB). PCBs are ubiquitous, persistent industrial chemicals that are known to cause serious health and environmental effects. The Environmental Protection Agency has responsibility for regulatory control of PCBs and other toxic substances under the Toxic Substances Control Act of 1976. We are working cooperatively with the Food and Drug Administration, which regulates chemical substances in food and their use in food and animal feed plants, and the Department of Agriculture, which has responsibility for assuring the safety of meat and poultry, to protect our food supply from PCB contamination.

This booklet has been prepared to:

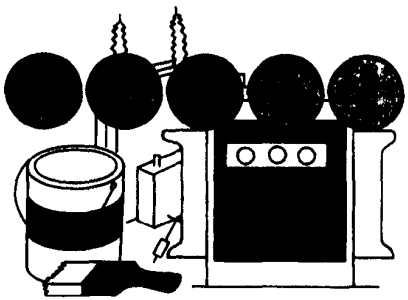
- Alert you to the serious potential problems associated with the use of PCB-containing equipment in the food and feed industry,
- Provide information that will help you establish a program for contamination prevention in these facilities, and
- Provide information on current PCB government regulations and a reference of sources of additional information.

PCB contamination has already caused costly destruction of large quantities of food and uncountable damage to our environment. We urge you to alert your managers and employees to the problem of PCB contamination and to institute a program for preventative action without delay. This brochure will assist you in your efforts.

Steven D. Jellinek

Why the concern?

In recent years, there have been a number of incidents where food has been contaminated with polychlorinated biphenyls (PCBs) and other toxic chemicals. This contamination has resulted from accidental spills, improper disposal, and unintentional misuse of PCB-containing materials and equipment. PCBs are now known to have extremely hazardous health and environmental effects, even at low levels of concentration in the food chain. PCB-containing equipment, such as electrical transformers, has been extensively used in food and feed processing facilities. We are especially concerned that future accidental contamination be prevented. This booklet has been prepared to help you identify potential problems and prevent costly future incidents that could have adverse effects on health and the environment.



What are PCBs — why, how, and where are they used?

PCBs are a class of chemicals called chlorinated hydrocarbons. PCBs range in consistency from heavy oily liquids to waxy solids. Their most important properties are chemical stability, low flammability, high boiling points, and low electrical conductivity.

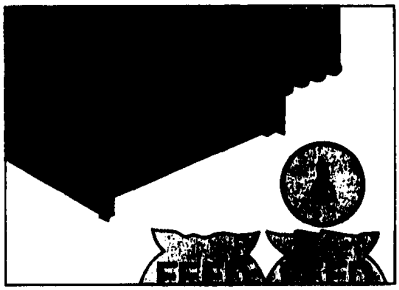
Since their development in 1929, PCBs have been used in a variety of industrial applications. Hundreds of millions of pounds of PCBs have been used as fluids in electrical transformers, capacitors, and electromagnets, and heat transfer and hydraulic systems.

PCBs have also been used as plasticizers in paints, adhesives, and caulking compounds; fillers for investment casting waxes; and dye carriers in carbonless copy paper.

Concern over PCBs' toxicity and persistence in the environment led Congress to prohibit their manufacture, processing, or distribution in commerce. Although PCBs have not been manufactured in the United States since 1977, the chemical has been permitted to remain in older electrical transformers and other industrial machinery.

Why are PCBs hazardous?

Knowledge of PCB toxicity in humans is based primarily on an incident which occurred in Yusho, Japan in 1968 when PCBs leaked from a heat exchanger and contaminated rice oil. Among the many symptoms observed were chloracne (skin rash), discoloration of the gums and nailbeds, swelling of joints, waxy secretions of glands in the eye lids, as well as more general effects such as lethargy and joint pain. There are also well documented tests on laboratory animals that show PCBs cause reproductive failures, gastric disorders, skin lesions, tumors, and other effects of concern.



Why should food and feed related industries be especially concerned about PCBs?

The Yusho incident illustrates the serious human health and economic consequences of PCB contamination in food or feed related industries. Several other incidents underline the need for special attention to prevent similar costly contamination in the future. These include:

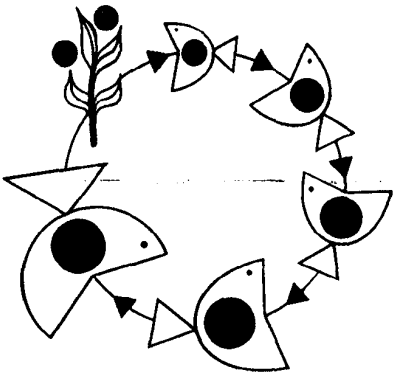
- Discovery of PCBs in fishmeal used as a feed ingredient in North Caroline as a result of a leaking heat exchanger,
- Contamination of fishmeal in Puerto Rico resulting from a fire involving stored electrical transformers in the same warehouse,
- Death and severe illness of feedlot cattle in Kansas caused by inadvertent use of PCB-contaminated oil as a carrier for insecticide,
- Contamination of animal feed ingredients with PCBs leaking from a transformer in storage at a packing company in Billings, Montana.

These incidents have resulted in the destruction of large quantities of food, feed, and farm animals, and major disruption of the companies involved.

PCBs in the environment

Unlike most organic chemicals which break down fairly rapidly in the environment, PCBs are extremely stable. The potential for biomagnification in the food chain is of special concern. Biomagnification is the process through which small amounts of toxic substances reach higher levels of concentration at each stage of the food chain.

Microorganisms and plants take in traces of PCBs from the environment. These microorganisms and plants provide the food for small fish and other animals which are in turn eaten by higher forms of animal life. At each step of the sequence, the PCB content increases until human food supplies may be contaminated above the levels considered to be safe for consumption.

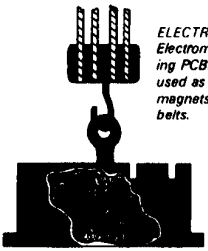


Where might PCBs be found in food industry facilities?

The following types of equipment may contain PCB fluids or other liquids such as mineral oil that are contaminated with PCBs:

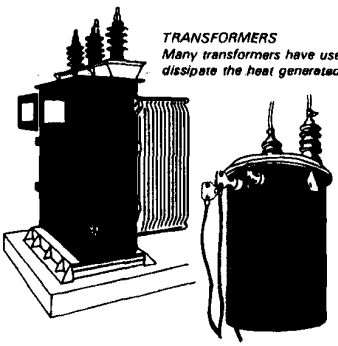
- ***Transformers***
- ***Large capacitors (over 3 lbs. of fluid)***
- ***Electromagnets***
- ***Heat transfer and hydraulic systems***
- Small capacitors
- Equipment containing small capacitors including: electrical switch gear, fractional HP motors, and ballasted lighting fixtures.

Transformers, large capacitors, electromagnets, and heat transfer and hydraulic systems are of primary importance because they contain free flowing liquid. Small capacitors are of less concern because the PCBs are usually in a nonliquid, nonmobile state.



ELECTROMAGNETS
Electromagnets containing PCBs have been used as separator magnets over conveyer belts.

CAPACITORS
Capacitors have been manufactured in a wide range of sizes for various industrial uses. Capacitors may contain PCB dielectric fluids.



TRANSFORMERS
Many transformers have used PCB liquids to dissipate the heat generated by transmission.

HEAT TRANSFER SYSTEM
Heat transfer systems containing PCBs have been used in food processing equipment.

Existing federal regulations concerning PCBs and food

Concern about highly toxic PCBs contaminating human food has led to a number of regulatory actions by the Food and Drug Administration (FDA), the U.S. Department of Agriculture (USDA), and the Environmental Protection Agency (EPA). Under FDA regulations foods and feeds are considered to be contaminated and may not be sold in interstate commerce if they contain PCBs in excess of certain prescribed concentrations. (See Table 1.) The use of PCBs in food and animal feed processing facilities, except enclosed use in transformers and capacitors, is prohibited by FDA regulation (21 CFR 110.40, 500.45).

EPA has issued rules governing the use of PCBs. In general, PCB mixtures with concentrations less than 50 parts per million (ppm) or 0.005 percent are not regulated. The use of intact, non-leaking transformers, electromagnets, capacitors, and capacitor-containing equipment with PCB concentrations greater than 50 ppm is allowed.

The EPA rule permits the continued use of PCBs in servicing of electromagnets and transformers and in heat transfer and hydraulic systems until July 1, 1984. As of November 1, 1979, PCBs may no longer be used in heat transfer systems in plants manufacturing or processing food, drugs, and cosmetics.

EPA rules include provisions for marking, disposal, storage, and recordkeeping, portions of which are discussed later in this booklet.

The potential for further regulatory action exists. EPA, FDA, and USDA are considering prohibiting the use of PCBs in all transformers, capacitors, and other electrical equipment in food and feed related industries.

The following Checklist for Action has been prepared to assist you in conducting a full safety check of your facility. We urge you to use this checklist to implement a program for safety and contamination prevention in all your food and feed related facilities.

Checklist for Action
What can I do?

A. Determine if you have PCB equipment.

1. Locate any potential PCB source.

You should inventory your plant for transformers, capacitors, heat transfer systems, hydraulic systems, and fluid stored for use in this equipment. After you *have located these items,* . . .

2. Examine the equipment for caution labels.

A caution label specifically identifying the equipment as containing PCBs may be present. If so, skip to Section B of this checklist. If not, . . .

3. Transformers and large capacitors may bear nameplatee.

if your transformer or capacitor has a manufacturer's nameplate with a trade name, refer to Table 2 at the end of this booklet. If the trade name does not appear there, the equipment may still contain PCBs. Contact the manufacturer, referencing the serial number to determine if the equipment contains PCBs. If there is no nameplate, or if this approach is unsuccessful . . .

4. Seek assistance from a servicing expert.

Call on your local transformer servicing company or the *engineering service department of your utility company.* They can assist you to obtain a sample of your transformer fluid for analysis. You may also want to sample your heat transfer systems, hydraulic systems, or other *suspect oil.* (Do *not attempt to sample fluids in capacitors.*) Then . . .

5. Have the samples analyzed.

This is the only way to be certain whether or not your equipment contains PCBs.

If you determine that you have PCB equipment, . . .

B. Consider replacing PCB-containing equipment with non-PCB equipment.

EPA, FDA, and USDA are considering prohibiting the use of PCBs in all electrical equipment in food and feed related industries. Although the prohibition on PCB-containing equipment is not yet in effect, *we urge voluntary removal of this equipment and replacement with non-PCB equipment to prevent the possibility of future food contamination.*

As an alternative in transformers, you may want to consider replacing the PCB fluid with non-PCB fluid. You should be aware that the transformers will contain residual PCB concentrations after replacement and, therefore, may be subject to future federal regulation.

EPA disposal regulations require incineration of all PCB liquids with concentrations of 500 ppm (0.05%) or greater. The first approved incinerators will be available sometime in 1980. Until incinerators are available, PCBs removed from service must be stored for later disposal.

If it is not possible for you to replace your PCB-containing equipment, you will want to . . .

C. Take special precautions for continued use.

The risk of PCB contamination can be minimized by analyzing the risk of spillage associated with each individual PCB unit and by taking steps to contain the potential uncontrolled loss of PCBs from the unit. You should consider the following questions:

1. Is there any evidence of an active leak from the PCB unit? If so, take whatever steps are necessary to protect your product or usable byproduct. Of course, leaking equipment should be repaired immediately. If your product is being contaminated, contact the appropriate agency to determine the best way to destroy it.

2. Is the PCB unit located in an area where there is a way that leaking fluid from the unit could find its way into your process? If so, these units should be given priority in the development of spill prevention measures. Special consideration should be given to potential leaks resulting from accidents as discussed in the following.

3. Is any liquid ever pumped from the vicinity of the PCB unit to the process area? If so, can the PCB unit be isolated from the pump?

4. If the PCB unit is pad mounted, are there curbs or pans to serve as a barricade against loss of fluid?

5. If the PCB unit is located in an area surrounded by porous cinderblock walls, have they been sealed with material which will not dissolve in solvents such as PCB and trichlorobenzene? Is the wall/floor interface tight?

6. Is the floor in the vicinity of a PCB unit free from cracks? Cracks that look like they would not prevent the loss of fluid should be grouted and painted with solvent resistant materials, or government approved materials if required.

7. Is the PCB unit in a location where vehicular traffic might be a hazard? If so, a vehicle barrier might be useful.

8. Is the PCB unit located near machinery which might throw projectiles with sufficient energy to damage the unit? If so, a shield, such as a fence, may provide the necessary protection.

9. Is the PCB unit mounted on a surface which might be difficult to seal, such as unwelded steel plates or in a mobile machine? If so, a catchbasin might be installed under the unit.

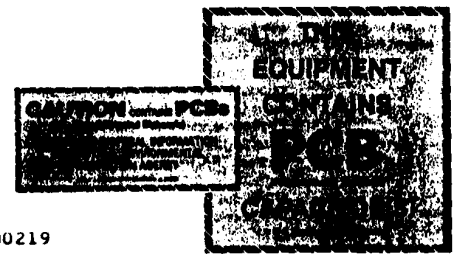
10. Are there floor drains in the vicinity of a PCB unit? If so, can they be sealed or otherwise isolated from the unit?

11. If you have PCB equipment or drums of PCB fluid in storage for future use, can they be removed from the process area? Are they marked or labeled to warn of PCB presence? If you have PCB equipment, you may be subject to mandatory labeling and storage requirements.

D. Be familiar with mandatory labeling and storage requirements.

1. Labeling requirements.

The EPA label for PCBs looks like this.



You must label the following items: transformers containing liquids with more than 500 ppm of PCBs, PCB capacitors with 3 (three) or more pounds of fluid operating at 2,000 volts or more, containers such as bags, barrels, or drums used to hold PCBs, electric motors using coolant with 50 ppm or more of PCBs, hydraulic systems or heat transfer systems containing 50 ppm or more of PCBs, and the storage areas described in the following.

In addition, labels must be placed on the following items when they are removed from service: PCB capacitors containing more than 3 pounds of fluid operating at less than 2,000 volts and equipment containing a PCB transformer or large high voltage capacitor.

2. Storage requirements.

PCBs and PCB items which you remove from service for disposal must be stored in a location meeting EPA criteria to insure that they are properly contained. This location should not be near your process area. It should be isolated so that it is not vulnerable to damage and puncture from vehicular, forklift, and other moving equipment. For assistance with the storage design criteria, contact the EPA regional office for your state. A list of EPA regional offices appears at the back of this booklet. (See Appendix B.)

E. Obtain further information.

If you do not yet have the EPA regulations on PCBs, you can obtain a free copy from EPA by calling toll free (800) 424-9065 (in Washington, DC, 554-1404) and asking for a reprint of the PCB Ban Regulation, *Federal Register,* May 31, 1979, and for a list of the approved PCB Disposal Facilities.

If you want more background information on the regulation, ask for a free copy of the EPA Support Document to the PCB Ban Regulation at the same phone number. The mailing address is: Industry Assistance Office (TS-799), Office of Toxic Substances, U.S. Environmental Protection Agency, 401 M Street, S.W., Washington, DC 20460. You may also contact the nearest EPA Regional Office. (See Appendix B.)

Other useful background information on PCBs is listed in Appendix A.

Table 1. **FDA Limits on PCB Concentration in Food**

Food	Concentration (parts per million)
Milk and manufactured dairy products	1.5 ppm (fat basis)
Poultry	3 ppm (fat basis)
Red meat	3 ppm (action level) (fat basis)
Eggs	0.3 ppm
Fish and shellfish	5 ppm (edible portion)*
Feed for food producing animals	0.2 ppm (except concentrates, supplements, and premixes)
Infant and junior foods	0.2 ppm
Animal feed components of animal origin	2.0 ppm
Paper food packaging in direct contact with food	10 ppm (action level)

Source: Title 21, Code of Federal Regulations, Section 109.30; Federal Register, Vol. 44, No. 127, June 29, 1979, pp. 38330-38340.

**A regulation establishing a new level of 2 ppm was promulgated but was stayed on October 5, 1979 until further notice.*

Table 2.
PCB Manufacturers and Trade Names

PCBs have been marketed and used by manufacturers in their products under various trade names. This list is not necessarily complete since many companies have gone out of business and information is no longer available.

Manufacturer	Country	Trade Name
Aerovox	US	Hyvol
Allis-Chalmers	US	Chlorextol
American Corp.	US	Asbestol
Axel Electronics	—	
Bayer	Germany	Clophen
Caffaro	Italy	Dk
Caffaro	Italy	Fenclor
Caffaro	Italy	Inclor
Capacitor Specialists	US	
Chemko	Czechoslovakia	
Cornell Dubilier	US	Dykanol
Dings Co.	US	
Electrical Utilities Corp.	US	Eucarel
Electro Engineering Works	US	
Electromagnetic Filter Co.	US	
Envirotech Buell	US	
Erlez Magnets	US	Pyranol
ESCO Mfg. Co.	US	Askarel*
Ferranti-Packard Ltd.	US	Askarel*
General Electric	US	Pyranol
Geneva Industries	US	
H. K. Porter	US	
Helena Corp.	US	
Hevi-Duty Electric	—	Askarel*
ITE Circuit Breaker	US	Non-Flammable Liquid
Jard Corp.	US	Clorphen
Kanegafuchi	Japan	Kennechlor
Kuhlman Electric	US	Saf-T-Kuhl
McGraw Edison	US	Elemex
Maloney Electric	US	
Monsanto	UK and US	Aroclor
Monsanto	UK and Japan	Santotherm FR
Monsanto	UK and Europe	Pyroclor

Manufacturer	Country	Trade Name
Monsanto	US	Therminol**
Monsanto	US	Pydraul***
Monsanto	US	Santovac 1 and 2
Niagara Transformer Corp.	US	Askarel*, EEC-18
P. R. Mallory & Co.	US	Aroclor B
Power Zone Transformer	US	EEC-18
Prodelec	France	Phenoclor
Prodelec	France	Phyralene
R. C. Uptegraff	US	
R. F. Interonics	US	
Reliance Electric Co.	US	
Research-Cottrell	US	Askarel*
Sangamo Electric	US	Diaclor
Sovol	USSR	
Sprague Electric Co.	US	Chlorinol
Standard Transformer Corp.	US	
Stens Magnetics	US	
Tobe Deutschmann Labs.	US	
Universal Mfg. Corp.	US	Askarel*
Van Tran Electric	US	
Wagner Electric	US	No-Flamol
Westinghouse Electric	US	Inerteen
York Electronics	US	
—	US	Nepolin
—	—	Apirolio
—	—	Kaneclor

**Askarel is the generic name used for nonflammable insulating liquid in transformers and capacitors.*

***Various products used as heat transfer fluids, such as Therminol FR-0, were manufactured under this name.*

****Various products used as hydraulic fluid, such as Pydraul A-200, were manufactured under this name.*

Appendix A

Other Available Information on PCBs

This booklet does not go into detail about the health and environmental effects of PCBs or the chemicals now being used as substitutes for PCBs. The following reports cover these technical areas. The NIOSH Criteria Document is particularly recommended for its discussion of health issues for servicing PCB equipment or cleaning up PCB spills.

"Criteria for a Recommended Standard . . . Occupational Exposure to Polychlorinated Biphenyls (PCBs)." DHEW (NIOSH) Publication No. 77-225, September 1977. Order from Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Price $4.00 plus postage.

"Assessment of the Use of Selected Replacement Fluids for PCBs in Electrical Equipment." Report No. EPA 560/6-77-008, March 1979. Order from National Technical Information Service, Springfield, Virginia 22161. Report No. NTIS-PB-296 377.

"Polychlorinated Biphenyls and the Environment." 1972. Order from National Technical Information Service, Springfield, Virginia 22161. Report No. NTIS COM-72-10419. This is a thorough discussion of the properties and uses of PCBs.

"PCBs in the United States: Industrial Use and Environment Distribution." 1976. Order from National Technical Information Service, Springfield, Virginia 22161. Report No. NTIS PC 252-012.

Appendix B

Where Can I Seek Assistance?

Assistance from EPA or FDA may be obtained by contacting your nearest regional office. Plants regulated by the Food Quality Service of USDA may obtain help from their local inspector. The following table lists by the state the ten Federal regional offices for FDA and EPA.

REGION I: Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont

EPA
Mr. Robert Dangel
Toxic Substances Coordinator
John F. Kennedy Federal Building
Boston, MA 02203
(617) 223-0585

FDA
Mr. A. J. Beebe
Regional Director
585 Commercial Street
Boston, MA 02109
(617) 223-1278

REGION II: New Jersey, New York, Virgin Islands, Puerto Rico

EPA
Mr. Ralph Larsen
PCB Coordinator
26 Federal Plaza
New York, NY 10007
(212) 264-1925

FDA
Mr. Caesar A. Roy
Regional Director
830 3rd Avenue
Brooklyn, NY 11232
(212) 965-5416

REGION III: Delaware, Maryland, Pennsylvania, Virginia, West Virginia, District of Columbia

EPA
Mr. Charles Sapp
Toxic Substances Coordinator
Curtis Building (3AH20)
6th & Walnut Street
Philadelphia, PA 19106
(215) 597-4058

FDA
Mr. R. J. Davis
Regional Director
2nd and Chestnut Street
Room 900
Philadelphia, PA 19106
(215) 597-4390

REGION IV: Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee

EPA
Mr. Ralph Jennings
Toxic Substances Coordinator
345 Courtland Street, NE
Atlanta, GA 30308
(404) 881-3864

FDA
Mr. M. D. Kinslow
Regional Director
880 W. Peachtree Street
Atlanta, GA 30309
(404) 881-4266

REGION V: Indiana, Illinois, Michigan, Minnesota, Ohio, Wisconsin

EPA
Mr. Karl Bremer
Toxic Substances Coordinator
230 South Dearborn Street, Room 1165
Chicago, IL 60604
(312) 353-2291

FDA
Mr. L. R. Claiborne
Regional Director
175 W. Jackson Boulevard
Room A-1945
Chicago, IL 60604
(312) 353-1047

REGION VI: Arkansas, Louisiana, New Mexico, Oklahoma, Texas

EPA
Mr. John West
PCB Coordinator
First International Building
1201 Elm Street
Dallas, TX 75270
(214) 767-2734

FDA
Mr. P. B. White
Regional Director
3032 Bryan Street
Dallas, TX 75204
(214) 749-2735

REGION VII: Iowa, Kansas, Missouri, Nebraska

EPA
Mr. Wolfgang Brandner
Toxic Substances Coordinator
324 East 11 Street
Kansas City, MO 64106
(816) 374-6538

FDA
Mr. Clifford G. Shane
109 Cherry Street
Kansas City, MO 64106
(816) 374-5646

REGION VIII: Colorado, Montana, North Dakota, South Dakota, Utah, Wyoming

EPA
Mr. Dean Gillam
Toxic Substances Coordinator
1860 Lincoln Street
Denver, CO 80295
(303) 837-3926

FDA
Mr. F. L. Lofsvold
Regional Director
721 19th Street
US Customhouse Room 500
Denver, CO 80202
(303) 837-4915

REGION IX: Arizona, California, Hawaii, Nevada, American Samoa, Guam, Trust Territories of the Pacific, Wake Island

EPA
Mr. Gerald Gavin
PCB Coordinator
215 Fremont Street
San Francisco, CA 94105
(415) 556-4606

FDA
Mr. I. B. Berch
Regional Director
UN Plaza
Federal Office Bldg.
Room 526
San Francisco, CA 94102
(415) 556-2062

REGION X: Alaska, Idaho, Oregon, Washington

EPA
Dr. Jim Everts
Toxic Substances Coordinator
1200 6th Avenue
Seattle, WA 98101
(206) 442-5560

FDA
Mr. J. W. Swanson
Regional Director
909 1st Avenue
Room 5003
Seattle, WA 98174

For additional information you may call the Industry Assistance Office toll free at (800) 424-9065 (in Washington, DC 554-1404), or write to Director, Industry Assistance Office (TS-799), Office of Toxic Substances, U.S. Environmental Protection Agency, 401 M Street, S.W., Washington, DC 20460.

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TS-799

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