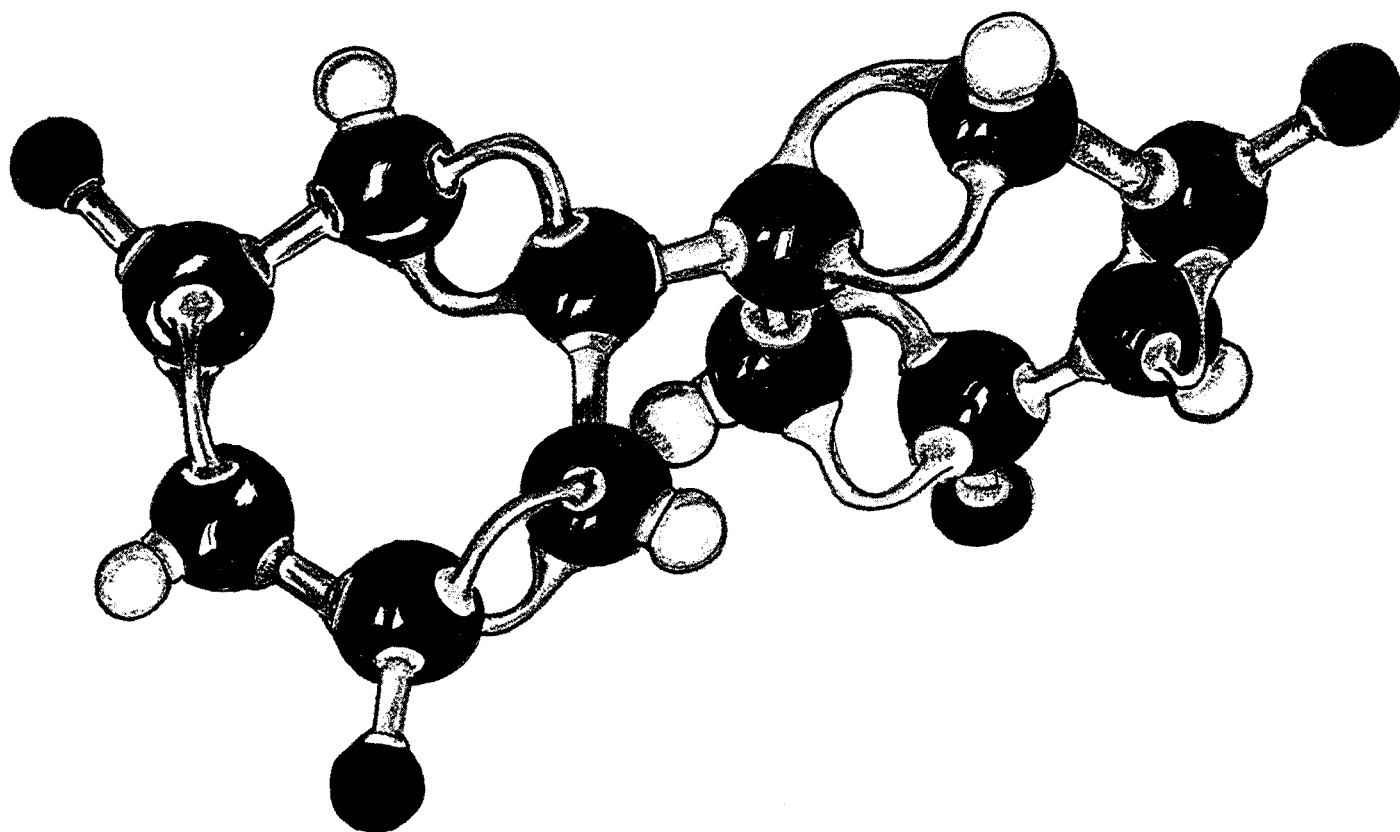


PCBs: Question and Answer Guide Concerning Polychlorinated Biphenyls



Environment
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ERRATUM

Page 9

- Q. What kind of protective clothing and gear should be worn when handling PCB fluids?
- A. When dealing with fluids containing very high concentrations of PCBs, such as askarels, proper clothing and gear must be worn to prevent skin and eye contact from spills or splashes and, also, to prevent inhalation of fumes which may be generated when PCB fluids are heated above 55°C...

Cover: Chemical Structure of a PCB Molecule. S. Wheatley
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**PCBs: QUESTION AND ANSWER GUIDE CONCERNING
POLYCHLORINATED BIPHENYLS**

Commercial Chemicals Branch
Environmental Protection Programs Directorate
Environmental Protection Service
Environment Canada

April 1986

COMMENTS

Any comments on the contents of this document should be addressed to:

Controls Implementation Section
Commercial Chemicals Branch
Environmental Protection Service
Environment Canada
Ottawa, Ontario
K1A 1C8

Cette publication est aussi disponible en français. S'adresser à la:

Section des publications
Service de la protection de l'environnement
Environnement Canada
Ottawa (Ontario)
K1A 1C8

Authors:

C.J. McDonald
R.E. Tourangeau

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1 PURPOSE OF THE QUESTION AND ANSWER GUIDE

Increasing public awareness and concern for the effects of polychlorinated biphenyls (PCBs), coupled with intensifying efforts on the part of industry and government to better manage the hazard posed by PCBs, have created a growing demand from governments, industries and the general public for information. This guide has been prepared to provide answers to many of the more commonly asked questions on commercial uses, handling, transportation, storage, disposal and regulation of PCBs.

The guide provides an explanation of the Environmental Contaminants Act, PCB regulations under the act, and their enforcement. It also describes the national non-regulatory programs administered by Environment Canada, such as the PCB inventory, and the equipment labelling program. Basic information on the health and environmental effects of PCBs is included along with instructions for PCB equipment identification, allowable servicing and maintenance procedures and proper methods of transport for equipment and wastes. Recommendations are made for the safe storage and disposal of PCBs and the owners' responsibilities in this regard are outlined. The guide is not intended to be used as a legal document. It is designed to help achieve more effective management of PCBs to prevent further contamination of the Canadian and global environment.

2 GENERAL INFORMATION ON PCBs

Q. What are PCBs?

- A. PCBs is the shortened name for a group of chemical compounds called polychlorinated biphenyls. PCBs belong to a family of organic chemicals known as chlorinated hydrocarbons. They are produced by attaching chlorine atoms to a biphenyl molecule. Up to 10 chlorine atoms may be attached at various locations, giving 209 possible PCB compounds. The PCB molecules containing only one or two chlorine atoms are referred to as mono and dichlorinated biphenyls, respectively. Because their hazardous properties are more moderate than the higher chlorinated compounds, they are not covered by the Environmental Contaminants Act. All PCBs have been synthetically produced.

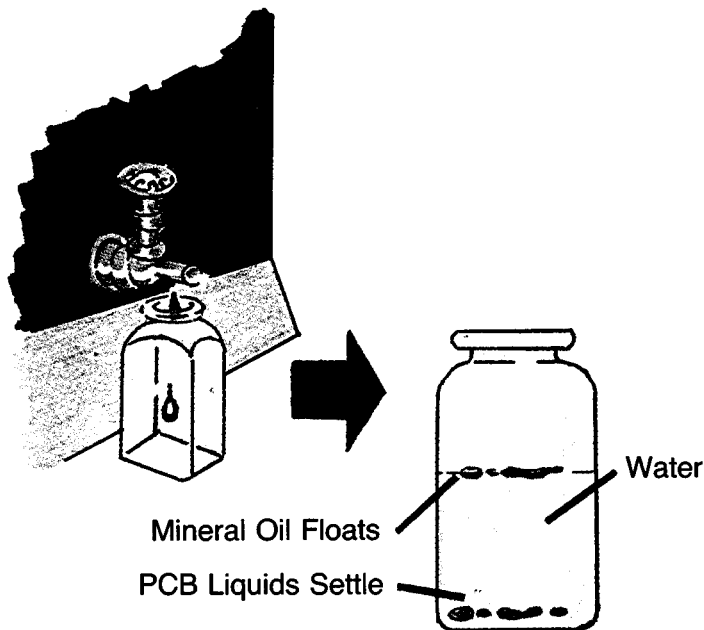
Q. What are the physical and chemical properties of PCBs?

- A. PCBs vary from colourless, oily liquids for the lower chlorinated compounds, to more viscous and increasingly darker liquids, to yellow and then black resins for the most highly chlorinated types. They are heavier than water and somewhat slippery. The vapour is invisible and has a bitter smell. This characteristic strong odour is one of the most obvious qualities. It is not one which should be used in identification, however - inhalation should be strictly avoided. PCBs are very stable, and exhibit low water solubility, low vapour pressure, low flammability, high heat capacity and low electrical conductivity.

Since PCBs manufactured as dielectric fluids were often mixed with organic solvents, such as chlorinated benzenes, the dielectric fluids in electrical equipment containing PCBs are not, in general, 100% PCBs. The presence of these other chemicals influences the chemical and physical properties of the PCB fluid.

Used PCB fluids may become contaminated with dirt, moisture, black carbon particles (from arcing that occurs in electrical equipment) and pieces of insulation from the inside of the equipment. These particles degrade the performance of the PCB fluids and cloud or darken their appearance.

Since PCBs are heavier than water, a simple test to determine whether a fluid removed from a transformer is a PCB liquid is to add a few drops of the sample to water. If the fluid is a PCB liquid, it will settle on the bottom; if it is mineral oil, it will float. If the fluid does neither, it is contaminated and should be taken to a laboratory for analysis. The water containing the sample of fluid should never be



poured back into the transformer, because the water will degrade the electrical performance of the PCBs (or mineral oil) in the transformer. If the test demonstrates that the transformer contains PCBs, the sample and its container should be disposed of in an appropriate safe manner. Instructions are available from the Environmental Protection Service (EPS) of Environment Canada.

- Q. Why were PCBs selected for such widespread commercial and industrial use?**
- A. PCBs are very resistant to decomposition and have excellent electrical insulating and thermal properties. They are also noncorrosive and relatively non-flammable.
- Q. What properties of PCBs account for their persistence and their widespread dispersal in the environment?**
- A. Many of the properties that made PCBs ideal for industrial and commercial use have contributed to their becoming environmental contaminants. Three properties in particular account for their persistence and to their widespread dispersal in the environment:
- i) They do not decompose or biodegrade significantly in the natural environment.
 - ii) They tend to migrate widely through natural atmospheric and water transport mechanisms.
 - iii) Though only slightly soluble in water, they dissolve readily in oils and the fatty tissues of fish, birds, animals and humans. They are thus able to move through the food chain.
- Q. Do all PCBs have the same characteristics?**
- A. No. PCBs with fewer chlorine atoms are, in general, less persistent, more water soluble, and more flammable than PCBs with more chlorine atoms. Since PCBs with

fewer chlorine atoms do degrade more readily to form new chemical arrangements, they display less of a tendency to bioconcentrate.

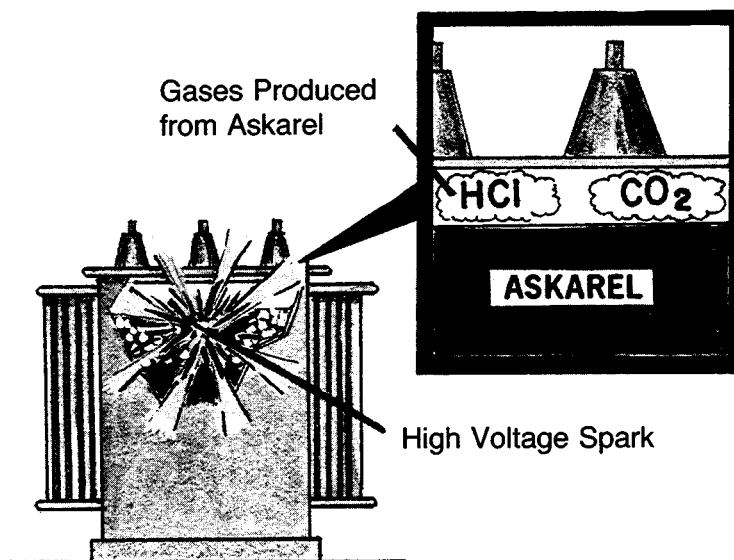
Q. In what products were PCBs used?

A. The major Canadian use of PCBs was in dielectric fluid for industrial electrical equipment. Other products containing PCBs included:

- | | | |
|----------------------------|--------------------------|-----------------------------|
| - waxes | - adhesives | - paints |
| - heat exchange fluids | - dedusting agents | - vacuum pump oils |
| - caulking compounds | - hydraulic fluids | - printing inks |
| - cutting oils | - sealants | - plasticizers |
| - carbonless copying paper | - specialized lubricants | - bridge bearing lubricants |
| - fire retardants | - cable insulating paper | |
| - flameproofing | | |

Q. What is askarel?

A. Askarel is a generic name for synthetic electrical insulating material which, when decomposed by an electric arc, generates only non-explosive gases or gaseous mixtures. Commercial mixtures combining PCBs, chlorinated benzenes and contaminants are the most common examples of askarels. These are also called PCB fluids or PCB liquids.



Q. Who manufactured PCBs?

A. PCBs were first manufactured on a commercial scale in 1929. Monsanto Corporation in the U.S. was the principal manufacturer of PCBs for the North American market. One other U.S. firm is known to have produced PCBs briefly. There were no Canadian manufacturers. No PCBs have been produced in North America since 1977 although some are still being produced in Europe.

Q. What are some of the trade names under which PCB fluids have been sold?

A. Some of the trade names under which PCB fluids (askarel mixtures) have been sold are:

- | | | |
|---------------------------------|----------------------------|---------------------|
| - Apirolio (Italy) | - Dykanol | - Pyralene (France) |
| - Aroclor (U.S & Great Britain) | - Elemex | - Pyranol |
| - Aroclor B | - Eucarel | (Canada & U.S.) |
| - Asbestol | - Fenclor (Italy) | - Pyroclor |
| - Askarel | - Hyvol | (Great Britain) |
| - Askarel EEC-18 | - Inclor | - Saf-t-kuhl |
| - Chlorextol | - Inerteen (Canada & U.S.) | - Santotherm FR |
| - Chlorinol | - Kanechlor (Japan) | (Japan) |
| - Chlopen (Germany) | - Nepolin | - Santovec 1 and 2 |
| - DK decachlorodiphenyl (Italy) | - No-flamol | - Sovol |
| - Diacolor | - Phenoclor (France) | - Therminol FR |
| | - Pydraul (U.S.) | series (U.S.) |

Q. How many kilograms of PCBs were imported into Canada prior to 1977?

A. Canada imported approximately 40 million kilograms of PCBs in total from all sources.

Q. What types of equipment could contain PCBs?

A. The following types of equipment could contain PCBs: electrical transformers and associated electrical equipment, electrical capacitors, electro-magnets, heat transfer equipment, hydraulic equipment, and vapour diffusion pumps. Most non-electrical equipment would not contain PCBs. It is more likely that fluids in some of this equipment may be contaminated with PCBs.

Q. Are there many PCB-filled transformers in use in Canada?

A. There are more than 10 000 PCB-filled transformers in Canada. These transformers were made in a variety of sizes to meet specifications for various uses, and could contain anywhere from 10 to 12 000 litres of PCB liquid. They were generally used in locations where flammability is a concern. It is extremely important to locate, identify and regularly inspect all PCB-filled transformers.

Q. What is the possibility of leakage from fluorescent lamp ballasts containing PCBs?

A. Because of the elaborate containment of the material in the ballast and the low normal operating temperatures, there is little likelihood of PCBs escaping. Canadian Standards Association (CSA) fixture safety specifications require that the

ballast case temperatures not exceed 90°C under normal operation. Furthermore, the thermal protector within the ballast de-energizes the circuit when the hottest internal temperature exceeds 105°C (some ballasts are designed to de-energize at 120°C). At this temperature, a small amount of asphalt compound may soften and leak out. It is this small amount of leakage of the asphalt compound that is generally mistaken for a PCB leakage. However, when cooled to room temperature, the asphalt compound will re-harden whereas the PCB dielectric fluid from the capacitor will remain as a heavy oil.

3 PCBs - HEALTH AND THE ENVIRONMENT

Q. How do PCBs enter the environment?

A. PCBs enter the environment in three ways:

- i) It is estimated that more than half of the PCBs produced have been discarded in landfill sites and dumps, in the form of junked plastics, paints and electrical equipment. Contaminants washed out from such sites can enter groundwater or can be carried by rain and snow into nearby streams and rivers, and so find their way into lakes and oceans.
- ii) PCBs can enter the environment through the incomplete combustion of PCB-containing wastes. Very high temperatures, in the order of 1200°C, are necessary to completely destroy PCBs. At the lower temperatures typical of general waste incineration, some PCBs may be released into the atmosphere in the combustion gases and return to earth in rain or snow or as dry minute particles.
- iii) PCBs can enter the environment through leaks from electrical transformers and capacitors, through runoff from roads on which recycled oils contaminated by liquids containing PCBs have been sprayed as a dust-suppressant, or from illegal dumping or disposal into sewerage systems.

Q. How are PCBs able to enter into and accumulate in people?

- A.** The most common route of PCB entry into humans is ingestion of contaminated food, such as fish; however, PCBs may also be inhaled and absorbed through the skin.

Q. What are some of the environmental and health effects associated with the use of PCBs?

- A.** The effects of ingestion by human beings were observed following a number of industrial accidents. The worst occurred in Japan in 1968 when rice oil was contaminated by PCBs. The "Yusho" incident affected more than 1500 people. With a total intake of 0.5 to 2 grams, the symptoms included chloracne (severe skin eruptions), increased eye discharge, systemic gastrointestinal symptoms with jaundice, edema and abdominal pain. Chloracne is very persistent and some patients showed evidence of it after three years.

The toxic effects noted in repeated low-level exposure to laboratory animals and their excessive persistence in the environment point to PCBs having the potential to

seriously affect the earth's ecosystems. Because of their extreme mobility in the environment, the point of emission has little relation to their impact. PCB compounds have been found in the oceans of the world, in Arctic bears, Great Lakes fish, in rainfall, as well as in human beings. Recent studies continue to find high, possibly dangerous, levels in some freshwater fish, particularly in the Great Lakes. Some affected areas have been closed to commercial fishing, and there have been recommendations to limit the consumption of certain sport fish.

Q. Does PCB contamination in the food and feed industries pose any threat to human health?

A. Contamination of food, feed and the environment from accidental discharge of PCBs is of considerable concern. Because of this concern, a joint inspection program was developed by the Federal Departments of the Environment, Fisheries and Oceans, Agriculture, and National Health and Welfare, and the Canadian Grain Commission. Equipment that may contain PCBs is inspected regularly to assess its condition and to determine whether there is a potential for contamination of food, feed or the environment from the use of this equipment. Any problem areas are discussed with plant managers and recommendations regarding the movement of equipment or the installation of protective devices or measures to prevent wide-spread contamination from PCB spills or leaks are readily implemented by plant managers.

Q. Has there ever been an incident of food or feed contamination as a result of the use of PCB-equipment?

A. In recent years, there have been several cases throughout the world where food and feed have become contaminated from accidentally discharged and inadequately contained PCB fluids. In North America there have been several incidents of contamination. A few of these occurred at Canadian grain elevators where PCB-filled electromagnets accidentally leaked over grain conveyor belts. The electromagnets were used in these facilities to remove tramp metal from grain. Fortunately, at the facilities where PCB leakage occurred, federal Department of Agriculture inspectors, who routinely inspect and monitor grain handling, immediately identified the problem and all contaminated grain was detained within the facility until it was properly destroyed. PCB use in the operation of electromagnets that are used to handle food, animal feed or anything intended to be added to food or animal feed for any purpose whatsoever was prohibited in 1980. All

PCB-filled electromagnets have now been removed from food/feed facilities.

The most significant incident in North America occurred in 1979 at a rendering plant in the United States. PCBs leaking from a transformer contaminated bone meal, meat meal and rendered fat. These materials were shipped to some 17 states and one Canadian province, incorporated into feed, and subsequently fed to food producing animals and poultry. Millions of dollars worth of food and feed had to be recalled, detained and destroyed. Implicated foods included primary produce and also second generation products containing contaminated ingredients. Claims for damages are reported to be in the tens of millions of dollars.

Q. Do PCBs cause cancer?

- A. Laboratory studies indicate that PCBs can cause cancer in animals, depending on the degree of exposure. The available data are not adequate to confirm or negate similar effects in humans at this time. Until further research is completed, PCBs remain a suspected carcinogenic agent in humans.

Q. What kind of protective clothing and gear should be worn when handling PCB fluids?

- A. Proper clothing and gear must be worn to prevent contact of skin and eyes with PCBs from spills or splashes and, also, to prevent inhalation of fumes which may be



generated when PCB fluids are heated above 55°C. In any operation where there is risk of contact, plastic or rubber clothing should be worn, including gloves, boots or overshoes, overalls and a bib-type apron which covers the boot tops. Eye protection is also necessary. Chemical safety goggles, face shields or safety glasses with side shields are all satisfactory. For major spill cleanup activities, a full suit of non-porous material may be appropriate. Clothing that has become contaminated should be disposed of as a PCB waste rather than attempting to decontaminate and reuse it. Handling of hot PCB fluids should be

avoided. A full face respirator is required when fluid temperatures exceed 55°C. Ventilation of the working area must also be sufficient to remove generated vapours.

Q. What would happen if I accidentally came into direct contact with a PCB fluid?

- A. If a PCB fluid comes into contact with your skin, you should wash with soap and water for at least 15 minutes and see a physician. Of greater concern would be those situations where a PCB fluid came into contact with the eyes or was swallowed or if you were exposed to strong PCB vapours.

For PCB fluid in the eyes, the eyes should be flushed immediately with a gentle stream of lukewarm water for 15 minutes keeping the eyelids apart while flushing. You should then see a physician immediately.

If PCB fluid is swallowed, the victim should not drink anything. Thoroughly rinse mouth with water. The details about the PCB fluid should be written down and you should proceed immediately to hospital emergency or to a physician.

If you inhale vapours from a PCB fluid, you should get fresh air and see a physician.

4 LEGISLATION

Q. What legislation provides the federal government with the authority and responsibility for controlling PCBs in commerce?

A. The Environmental Contaminants Act, which came into force on April 1, 1976.

Q. Who is responsible for the administration of the Environmental Contaminants Act?

A. The act is the joint responsibility of the Departments of the Environment and National Health and Welfare. The latter is concerned with human health matters, while Environment Canada assesses the ecological and environmental impact of chemicals. The Commercial Chemicals Branch of Environment Canada administers the act in cooperation with the Bureau of Chemical Hazards, Health and Welfare Canada.

Q. Is the Environmental Contaminants Act binding on the federal and provincial governments?

A. Yes. Subsection 2(2) of the Environmental Contaminants Act states that the Act is binding on Her Majesty in right of Canada or a province and any agent thereof. Such a definition would necessarily include a Crown corporation.

Q. How are controls under the Environmental Contaminants Act developed?

A. Controls under the Act are developed by adding a chemical (or class of chemicals) to the schedule to the Act and by prescribing regulations under the provisions of Section 18 of the Act.

Q. What is the "schedule" to the Environmental Contaminants Act?

A. The schedule to the Environmental Contaminants Act is a list of chemicals that the government believes pose a significant danger to human health or the environment, and for which regulations will be or have been prescribed under the Act.

Q. Are PCBs a scheduled substance?

A. Yes. PCBs or chlorobiphenyls that have the molecular formula $C_{12}H_{(10-n)}Cl_n$ in which "n" is greater than 2 have been placed on the schedule of the Environmental Contaminants Act by the Governor in Council, on the recommendation of the Ministers of the Environment and National Health and Welfare.

Q. Can anyone object to a proposed regulation or to a substance being scheduled?

A. Any person having an interest in any order or regulations proposed by the Governor in Council may, within 60 days of publication of such order or regulation in the Canada Gazette, file a notice of objection with the Minister of the Environment.

Q. What is the legal definition of the term polychlorinated biphenyl (PCB)?

A. The definition as to what constitutes a PCB is contained in the Chlorobiphenyl Regulations No. 1. In the regulations, PCBs are referred to as chlorobiphenyls and the chlorobiphenyls that are regulated by the Environmental Contaminants Act are those that have the molecular formula $C_{12}H_{(10-n)}Cl_{(n)}$ in which "n" is greater than 2. The Schedule to the Environmental Contaminants Act also contains the definition for PCBs.

Q. What is the status of regulation development for PCBs under the Environmental Contaminants Act?

A. The following table indicates the status of regulations development for PCBs under the Environmental Contaminants Act.

Item	Canada Gazette Part I (Proposed)	Canada Gazette Part II (Final)
Notice to Disclose	Jan. 8, 1977	
PCB-No. 1	Feb. 26, 1977	Sept. 28, 1977
PCB-No. 1, Amendment	Dec. 2, 1978	July 9, 1980
PCB-No. 2, (Product)	Jan. 21, 1984	May 15, 1985
PCB-No. 3, (Release)	Jan. 21, 1984	May 15, 1985

Q. What are the general prohibitions and requirements of the Chlorobiphenyl Regulations No. 1?

A. These regulations prohibit the use of PCBs in the operation of any product, machinery or equipment other than:

- (i) electrical capacitors, electrical transformers and associated electrical equipment that were manufactured in or imported into Canada before July 1, 1980;

- (ii) heat transfer equipment, hydraulic equipment, electromagnets and vapour diffusion pumps that were designed to use PCBs and were in use in Canada before September 1, 1977;
- (iii) machinery or equipment (such as specially designed incinerators or specially equipped cement kilns), the operation of which is intended to destroy the chemical structure of chlorobiphenyls.

The regulations prohibit the use of PCBs in electromagnets that are used to handle food, animal feed or anything intended to be added to food or animal feed. In other words, an electromagnet that was designed to use PCBs and was in use in Canada before September 1, 1977, could continue to be used over such things as coal conveyors at hydro-electric facilities, but not in the food or feed industries.

The regulations prohibit the use of PCBs as a constituent of any product, machinery or equipment manufactured in or imported into Canada after September 1, 1977, other than capacitors and transformers and associated electrical equipment which were allowed to be imported or manufactured until they were prohibited on July 1, 1980.

The regulations prohibit the use of PCBs in the servicing or maintenance of any product, machinery or equipment other than electromagnets and electrical transformers and associated electrical equipment. This means that, if PCBs must be removed in order to service or maintain equipment such as heat transfer or hydraulic equipment, the PCBs cannot be returned for use in that unit. The fluid must be replaced by a non-PCB fluid. In the servicing or maintenance of electromagnets and transformers, the dielectric fluid may be removed from the unit and filtered to remove moisture or particulate matter and returned to the same unit. Similarly, the fluid may be removed to permit the servicing and maintenance of the unit itself and returned to the same unit. Since the regulations prohibit the use of PCBs as new filling or as make-up fluid in the servicing or maintenance of electromagnets and transformers, if any unit requires topping up after servicing or maintenance, a non-PCB fluid would have to be used.

Q. To what products do the Chlorobiphenyl Regulations No. 2 (Product) apply?

- A. The Chlorobiphenyl Regulations No. 2 (Product) make it an offence for any person to import, manufacture or knowingly offer for sale any electrical capacitor, electrical transformer, electromagnet, heat transfer equipment, hydraulic equipment or

vapour diffusion pump that was designed to use PCBs and which contains PCBs in excess of 50 parts per million (ppm) by weight of the liquid therein. This regulation does not apply to any of this equipment that is offered for sale as a necessary and integral part of an immovable building, plant or structure that is offered for sale; imported for destruction of the chemical structure of the PCBs contained therein; or offered for sale for destruction or storage awaiting destruction of the chemical structure of the PCBs contained therein.

Q. Are all transformers that contain PCBs subject to the Chlorobiphenyl Regulations No. 2 (Product)?

A. No. The Chlorobiphenyl Regulations No. 2 (Product) apply only to those transformers that were designed to use PCBs and that contain PCBs in a concentration greater than 50 parts per million.

Q. Are fluorescent lamp ballasts that contain PCB capacitors subject to the Chlorobiphenyl Regulations No. 2 (Product)?

A. Yes. If the capacitor in the ballast contains more than 50 parts per million PCBs, the ballast may not be imported or knowingly offered for sale. Also, the PCB capacitors may not be used in the manufacture of new lamp ballasts.

Q. To what do the Chlorobiphenyl Regulations No. 3 (Release) apply?

A. The Chlorobiphenyl Regulations No. 3 (Release) make it an offence for any person to wilfully release or permit the release of PCBs into the environment in a quantity or concentration prescribed by the regulations. The first part of the PCB release regulations prescribes that the maximum concentration of PCBs that may be released into the environment in the course of any commercial, manufacturing or processing activity, other than an application to a road surface, is 50 ppm by weight. This part of the regulations would apply to such activities as sewage treatment facilities and pulp and paper plants where low concentrations of PCBs would be released in the plants' effluents. The regulations go on to say that the maximum concentration of PCBs in oil used as a dust suppressant on a road surface must not exceed five ppm by weight. The second part of the PCB release regulations also makes it an offence for any person to wilfully release or permit the release of PCBs into the environment in a quantity exceeding one gram per day from the operation, servicing, maintenance, decommissioning, transportation or storage of electrical transformers and associated electrical equipment, electromagnets designed to use PCBs, electrical capacitors, heat transfer equipment, hydraulic equipment or vapour

diffusion pumps. The maximum quantity of one gram per day applies to any one piece of equipment or for any one package of equipment. The PCB release regulations do not apply to any water or place to which subsection 33(2) of the Fisheries Act applies.

Q. Do the Chlorobiphenyl Regulations No. 1 apply to all equipment and products that contain PCBs or is there a cut-off point based on the concentration of PCBs?

A. The regulations do not specify a PCB concentration that would constitute a "use" of PCBs; consequently, the Environmental Protection Service, in conjunction with departmental legal advisors from the Department of Justice, determines the application and interpretation of the regulations for specific situations. For example, a mineral oil-filled transformer contaminated with PCBs in a concentration exceeding 50 parts per million would be considered to be "using" the PCBs as a constituent and, as a result, would not be permitted entry into Canada. If a similar transformer were in use in Canada, the Chlorobiphenyl Regulations No. 1 would not apply to its use or to its resale.

Q. Under Chlorobiphenyl Regulations No. 1, PCBs may be used in the operation of electrical transformers and capacitors manufactured in or imported into Canada before July 1, 1980. Does this mean I can continue to use my transformers and capacitors for their service lives?

A. Yes, unless, of course, more stringent regulations are developed to accelerate the phasing out of the use of PCBs.

Q. May I purchase PCB dielectric fluids or sell them to someone else?

A. PCB dielectric fluids may not be purchased or offered for sale for any use prescribed under the Chlorobiphenyl Regulations No. 1. They may be offered for sale for destruction or storage awaiting destruction. These fluids are subject to the Chlorobiphenyl Regulations No. 3 (Release).

Q. The Chlorobiphenyl Regulations No. 3 (Release) essentially prohibit the release of PCBs to the environment. Are there any guidelines that can be followed in order to comply with these regulations?

A. Environment Canada provides comprehensive information on the management of PCB equipment and wastes. If the recommended procedures are followed, any potential releases of PCBs into the environment should be greatly minimized if not totally eliminated.

- Q. The Chlorobiphenyl Regulations No. 3 (Release) greatly restrict the amount of PCB-contaminated material that can be applied to road surfaces. How can I help in the implementation of this regulation?**
- A.** Waste or unused dielectric fluids containing PCBs should not be sold or otherwise given to waste oil collectors for reuse or recycling. Waste oil collectors may indiscriminately mix the PCB fluids with other waste oils for use on road surfaces. If the waste oil contains PCBs in a concentration greater than 5 ppm, this would result in a violation of the Chlorobiphenyl Regulations No. 3. Therefore, it is best for all concerned if PCB fluids or equipment are sent to a specialized PCB waste facility rather than to waste recycling or reuse.
- Q. If my mineral oil-filled transformers are contaminated with PCBs, are these units subject to the PCB regulations?**
- A.** Chlorobiphenyl Regulations No. 1 apply to any product, machinery or equipment that contains PCBs; consequently, they apply to PCB-contaminated transformers. The Chlorobiphenyl Regulations No. 2 (Product) do not apply to PCB-contaminated mineral oil-filled transformers since these transformers were not designed to use PCBs in the dielectric fluid. However, PCB-contaminated mineral oil-filled transformers are subject to the provisions of the Chlorobiphenyl Regulations No. 3 if release of the mineral oil containing PCBs results in a release of more than one gram of PCBs per day.
- Q. Does this mean I may sell mineral oil-filled transformers contaminated with PCBs?**
- A.** Yes, provided that the transformer is physically located in Canada; a PCB-contaminated mineral oil-filled transformer may not be imported into Canada.
- Q. Do the Chlorobiphenyl Regulations apply to both large and small capacitors?**
- A.** Yes.
- Q. Are there any regulations governing PCB residues in foods?**
- A.** The Health Protection Branch of the Department of National Health and Welfare set a guideline of 2 milligrams per kilogram (mg/kg) for PCB residues in the edible portion of commercial fish. This guideline was set in 1975 and is administered through the cancellation of commercial fishing licenses for those fish that are likely to contain PCB residues greater than 2 mg/kg. This program requires the cooperative participation of the federal Department of Fisheries and Oceans and the provincial department that has jurisdiction over commercial fishing.

Although residues of PCBs are not frequently detected in foods other than freshwater fish, administrative guidelines have also been established for PCB residues in dairy products (0.2 mg/kg, fat basis), poultry (0.5 mg/kg, fat basis), eggs (0.1 mg/kg, whole weight less shell), and beef (0.2 mg/kg, fat basis). These administrative guidelines, as well as the 2 mg/kg guidelines for commercial fish, would be enforced under Part 1, Section 4(a) of the Food and Drug Regulation, which states, "No person shall sell an article of food that has in or upon it any poisonous or harmful substance".

Q. Can PCBs be exported or imported? What about PCB equipment? What about importing or exporting PCBs for disposal?

A. As of July 1, 1980, no product, machinery or equipment in which PCBs are used as a constituent can be imported into Canada. The Canadian government has not passed any legislation restricting the export of PCBs. However, other countries may very well have legislation restricting imports and where this legislation exists it necessarily restricts the export of PCBs from Canada.

Q. May I import PCB transformers and PCB capacitors into Canada?

A. No.

Q. May I import mineral oil-filled transformers contaminated with PCBs into Canada?

A. Not if the level of concentration of PCBs exceeds 50 parts per million.

Q. Who is responsible for enforcing legislation pertaining to PCBs?

A. Both the federal and provincial governments have legislation to ensure the proper use, handling, storage, transportation and safe disposal of PCBs and PCB-contaminated materials and equipment.

At the federal level, Environment Canada is responsible for enforcing legislation governing the release of PCBs into the environment as well as the importation, manufacture, sale and use of any machinery, equipment or product that contains PCBs. The Federal Department of Transport is responsible for enforcing regulations under the Transport of Dangerous Goods Act.

The provincial governments are directly concerned with PCBs once they become "waste"; consequently, provincial agencies have the responsibility for ensuring the safe storage and disposal of PCBs and PCB-contaminated wastes.

Q. How does Environment Canada ensure compliance with the PCB regulations and the proper handling and maintenance of in-use PCBs and PCB-filled equipment?

A. Compliance with the federal PCB regulations and other control measures are achieved through various procedures. For example:

- i) **MANDATORY REPORTING** - Environment Canada has published a notice in the Canada Gazette and periodically sends notices directly to any person who uses any equipment, machinery or products containing PCBs. Under the authority of the Environmental Contaminants Act, any person to whom the Gazette notice applies or who receives a written notice and who is using PCBs must respond and provide whatever information the Minister of the Environment requires. If the information does not agree with previous information for that facility and reasonable justification is not provided regarding the discrepancy in the information, company officials are contacted to clarify the response or to obtain details on the disposition of the PCBs. This may include a follow-up inspection by an inspector.
- ii) **OTHER SOURCES** - Information is regularly obtained from other sources, such as other federal agencies, regarding the importation of machinery, equipment or products that may contain PCBs. If Environment Canada has reason to believe that any goods are being imported into Canada in contravention of the PCB regulations, an inspector conducts an inspection/investigation under the authority of the Environmental Contaminants Act.
- iii) **INTERDEPARTMENTAL/INTERGOVERNMENTAL INSPECTION PROGRAMS** - Over two thousand federal, provincial and municipal environment, agriculture, fisheries, and health inspectors and emergency response personnel routinely inspect PCB equipment in use at food, feed and grain handling facilities as well as at hospitals, office buildings, schools, and many industrial sites. Reports on the condition of the equipment, its potential for causing contamination and the specific number of pieces of PCB equipment in use at the facility are sent to the Environmental Protection Service (EPS) regional office and are closely scrutinized to determine whether a potential problem exists that requires a follow-up inspection by an EPS inspector, as well as to determine whether there has been any movement or acquisition of PCB equipment.

- iv) **ROUTINE INSPECTIONS** - To ensure proper management of PCBs and to provide a service to industry, EPS inspectors conduct routine inspections across Canada to periodically check on the use and condition of PCB equipment, machinery and products. Plant owners and operators are generally cooperative with an inspector who requests permission to conduct a routine inspection and with implementing any recommendations regarding the better management of PCBs. Any discrepancies regarding the number of pieces of PCB equipment in use at a facility are routinely investigated.

Q. Have any charges ever been laid under the Environmental Contaminants Act for a violation of the PCB regulations?

A. Yes. However, it is extremely unlikely that plant managers or owners would not implement Environment Canada's recommendations regarding the use and management of PCBs because of the potential problems that PCB leakages or spills could create. In some situations, inspectors initiate legal proceedings, but this is by far the exception, not the norm.

Q. Are the penalties severe for contravening the Environmental Contaminants Act and PCB regulations?

A. Yes! The penalties that may be imposed by the courts are severe as violations of this legislation would be detrimental to human health and the environment. Any offences under the PCB regulations are a contravention of section 8 of the Environmental Contaminants Act. On summary conviction, a person is liable for a fine of up to \$100 000. On conviction upon indictment, the penalty could be up to two years in prison, as well as a fine.

5 INVENTORY

Q. Does Environment Canada maintain an inventory of PCBs in Canada?

A. Yes. Each regional office of the Environmental Protection Service (EPS) maintains an inventory of PCB equipment in use and in storage for disposal.

Q. Is it mandatory to report the use of PCBs to Environment Canada?

A. Yes. A notice was published in the Canada Gazette in 1977 requiring, under the authority of the Environmental Contaminants Act, any person who uses PCBs to report such usage and the quantities involved to EPS. This inventory is brought up to date periodically.

Q. Why does Environment Canada maintain a PCB inventory?

A. Initially, the inventory was designed to determine the quantities of PCBs in use, in storage for use and in storage for disposal. This information was required by the Departments of Environment and National Health and Welfare in order to ascertain whether PCBs were entering the environment or were likely to enter the environment in quantities that constituted a danger to human health and the environment. As a result of the information obtained, the PCB regulations were developed and implemented.

The inventory is maintained to determine the quantities of PCBs still in use or in storage for disposal and to ensure that any PCB equipment and any PCBs in storage are handled in an environmentally safe manner. The inventory also permits Environment Canada to properly monitor the use, movement and phase-out of PCB-equipment and to ensure compliance with the PCB regulations.

Q. What does the PCB inventory include?

A. The PCB inventory includes information on all PCB equipment in use and in storage for disposal by industrial sectors in Canada as well as private and public institutions such as hospitals, schools, etc.

Q. Are PCB-contaminated mineral oil filled transformers included in the PCB inventory?

A. No. Monitoring of the use and movement of PCB-contaminated mineral oil filled transformers is not considered necessary for the prevention of indiscriminate or intentional release of PCBs into the environment.

- Q. **Should a person notify Environment Canada if any PCBs or PCB equipment is moved from one location to another?**
- A. Yes. Unless there is complete cooperation between all industries and governments, a meaningful and useful inventory could not possibly be maintained.
- Q. **Some information on the use of equipment containing PCBs may be considered confidential by the user. Would Environment Canada maintain this information on a confidential basis?**
- A. Yes. As long as the information is considered sensitive and confidential, Environment Canada will not release this information without the prior approval of the person who submitted the information. However, the PCB inventory will be released to provincial environmental, health, and fire-protection agencies which require the information for their own PCB management programs.

6 IDENTIFICATION OF EQUIPMENT CONTAINING PCBs

Q. How can I tell whether a transformer contains PCBs?

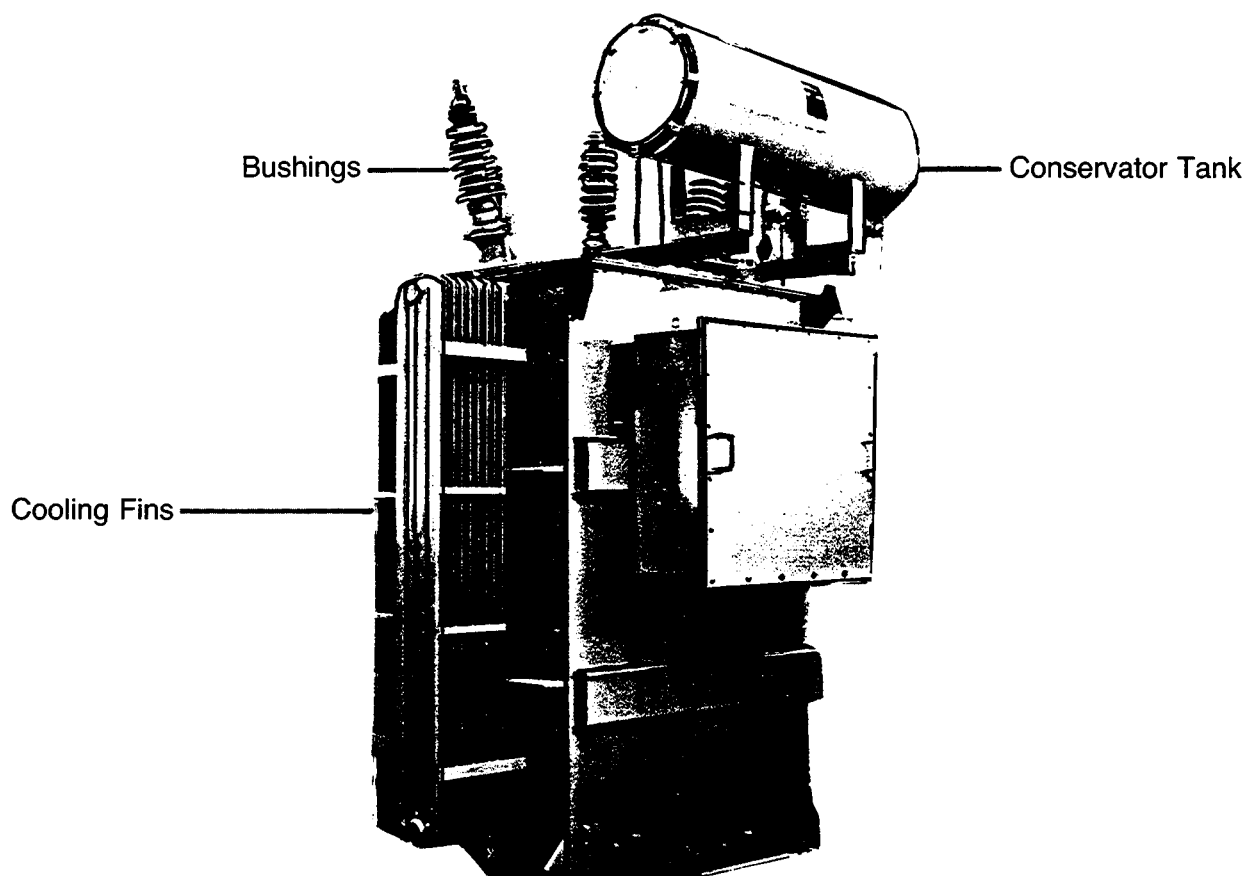
- A. There are some basic rules that you may use to determine whether a transformer contains PCBs. For example, not all transformers are liquid filled. Some are dry transformers. Your first step is to rule out all dry type transformers, which do not have the cooling fins that are so prominent on liquid-filled transformers (see drawing, p. 23). Since only liquid filled transformers may contain PCBs, all dry type transformers can be eliminated from further concern.

The liquid filled transformers can now be divided into two groups simply by their outside appearance. The first group includes all transformers with a conservator tank (a large cylindrical object) mounted on top of the transformer (see drawing, p. 23). Any transformer that has a conservator tank and was manufactured in North America was not designed to use PCBs; it is probably filled with mineral oil, and you can rule out these transformers. Exceptions could include transformers manufactured in some European countries which may contain PCBs. If you have a transformer that is equipped with a conservator tank and the transformer was manufactured in Europe, check the nameplate for the type of fluid contained in the transformer. The second group includes all transformers of sealed tank construction; in other words, transformers without conservator tanks (see drawing, p. 23). Transformers of sealed tank design may contain PCBs.

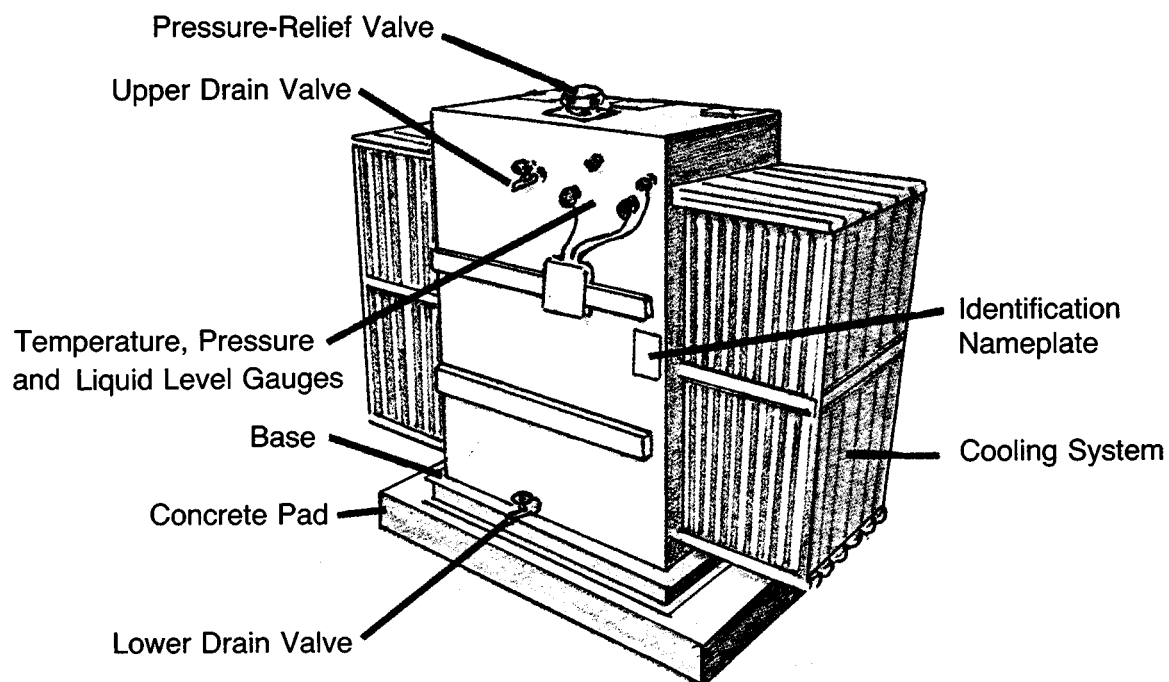
You could also rule out small, outdoor type transformers that are usually pole-mounted, individually or in a cluster. These small, pole-mounted transformers contain mineral oil, not PCBs. A small canister-type transformer mounted on the wall of a building or inside a building may, because of the fire hazard, contain PCBs; you should check the nameplate on any such small units.

The last step is to examine the nameplate on any transformers of sealed tank design. Check the transformer "TYPE", which is usually located at the upper right or left hand corner of the nameplate. If the "TYPE" is shown as "LNS" or "LNAN" or any other designation starting with a capital "L", the transformer may have been designed to use PCBs. On the other hand, if the "TYPE" designation is "ONS" or "ONAN" or any other starting with a capital "O", the transformer is a non-PCB transformer, filled with mineral oil. If the "TYPE" is shown as starting with a capital "L", then check the nameplate to see if the manufacturer identified the type of "LIQUID" or "COOLANT" that is contained in the transformer. If it is identified

23



Conservator Tank Design Oil-Filled Transformer



Sealed Tank Design Construction

with one of the trade names listed on page 5, then the unit contains PCBs. Any transformer that is identified as a PCB-filled transformer should be reported to the Environmental Protection Service in order that it may be properly labelled and included in the EPS inventory.

Q. What are capacitors?

- A. Capacitors are devices designed to accumulate and hold an electric charge for power factor correction, and can be found both inside and outside industrial buildings. PCBs were used as a dielectric fluid in most capacitors manufactured between 1929 and 1978. As of July 1, 1980, PCBs have been prohibited from use as a constituent in any capacitor manufactured in or imported into Canada. The regulations do not specify any specific quantity or concentration of PCBs in use as a constituent of capacitors; any capacitor containing PCBs, regardless of size or use (such as in televisions, VDTs, computers, fluorescent lights etc.) cannot be imported into or manufactured in Canada.

Because of the multitude of uses of capacitors, their size, shape and appearance vary widely. Capacitors are hermetically sealed units which contain metal foil, paper, plastic film and dielectric fluid. There are no moving parts in a capacitor and there are no provisions for taking samples of the dielectric fluid unless, of course, there is some leaking or seepage of fluid. Capacitors can be found on racks or inside cabinets or mounted on walls, ceilings or floors, singly or in banks, as well as on electrical motors, heat exchangers, hydraulic systems and contained within fluorescent lamp ballasts.

Q. How can I tell whether a capacitor contains PCBs?

- A. Capacitors are generally provided with a nameplate, which lists the name of the manufacturer, its power rating, its serial number, test number and type number and, on larger capacitors, the name of the dielectric fluid, such as askarel (see the various trade names listed on page 5). If the capacitor is small and does not have a nameplate, estimate the length of time it has been in service; if before 1978, assume that it contains PCBs.

Q. Do fluorescent lamp ballasts contain PCB capacitors? How can I tell if a ballast contains PCBs?

- A. Some fluorescent lamp ballasts contain PCB capacitors. Eight domestic and foreign manufacturers of fluorescent lamp ballasts account for the largest sources of

ballasts in use in Canada. Each of these companies uses a distinct code to identify the ballasts or capacitors manufactured by them. Although these codes vary from one manufacturer to the next, each code allows for the identification of the type of ballast or capacitor, its dielectric fluid and, most important, its date of manufacture. Generally, any ballast containing a capacitor manufactured after 1977 is marked as "NON PCB".

Q. What PCB equipment needs to be labelled?

- A. All equipment containing PCBs in a concentration exceeding 50 ppm should be labelled as a precautionary measure to users of the equipment and as a reminder that it must be treated as PCB-contaminated waste when taken out of service.

Q. Is labelling of PCB equipment and wastes mandatory?

- A. Environment Canada operates a voluntary labelling program. All levels of government and all industries are fully cooperating with Environment Canada to identify equipment and machinery that contain PCBs or is contaminated with PCBs.

Q. What do the PCB labels look like?

- A. Special black and white labels are available for application to equipment and containers holding PCBs. Large labels are available for application to transformers or drums of PCB liquids, and small labels are available for small items such as capacitors. Serialized black and white labels are used to identify equipment designed to use PCBs. Green and white labels are designed for equipment contaminated with PCBs (for example contaminated mineral oil-filled transformers). Unserialized labels can be used as placards for placement on entrance ways to electrical rooms, transformer vaults, chain-linked areas, or storage compounds. Labelling of PCBs for transport is mandatory under Transportation of Dangerous Goods Regulations. The standard label is the large PCB label used for PCB transformers, etc. Transport vehicles require placarding and containers carrying waste must be marked "Waste Polychlorinated Biphenyls". The requirements for safety marking are contained in Part V of the Transport of Dangerous Goods Act Regulations.

Q. Do all capacitors have to be labelled?

- A. If possible, all capacitors containing PCBs should be labelled primarily as a reminder in case of disposal or leakage. It is desirable to label these capacitors while in

ATTENTION

PCB

CONTAINS POLYCHLORINATED BIPHENYLS CONTIENT DES BIPHÉNYLES POLYCHLORÉS

A TOXIC ENVIRONMENTAL CONTAMINANT SCHEDULED UNDER THE ENVIRONMENTAL CONTAMINANTS ACT. IN CASE OF ACCIDENT, SPILL OR FOR DISPOSAL INFORMATION, CONTACT THE NEAREST OFFICE OF THE ENVIRONMENTAL PROTECTION SERVICE, ENVIRONMENT CANADA.

PRODUITS TOXIQUES MENTIONNÉS DANS L'ANNEXE DE LA LOI SUR LES CONTAMINANTS DE L'ENVIRONNEMENT. EN CAS D'ACCIDENT, OU DE DÉVERSEMENT, OU POUR SAVOIR COMMENT LES ÉLIMINER, CONTACTER LE BUREAU DU SERVICE DE LA PROTECTION DE L'ENVIRONNEMENT, MINISTÈRE DE L'ENVIRONNEMENT, LE PLUS PRÈS.

OR 23016

CAUTION

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OR 23015

service. If it is not feasible to label each capacitor in a capacitor bank, then the entire bank should be labelled with a large PCB label and individual capacitors labelled with small PCB labels when taken out of service.

Small capacitors such as those used in fluorescent light ballasts do not require a label. Electronic equipment containing PCB capacitors does not have to be labelled, although the individual capacitors should be labelled if they are of the large type.

Q. Where may I obtain PCB labels?

- A. PCB labels may be obtained in limited quantities from any one of the Environmental Protection Service's regional or district offices across Canada (Appendix).

7 **SERVICING AND MAINTENANCE**

Q. What does the term "retrofilling" a PCB transformer mean?

A. Retrofilling involves the removal of askarel from the equipment and its replacement with other types of liquids. In certain applications, retrofilling may be preferred to replacement of a PCB transformer with a PCB-free transformer.

Q. May I retrofill my transformers?

A. PCB-filled transformers may be retrofilled with a non-PCB fluid. However, since these transformers were originally designed to use PCBs, they are subject to the Chlorobiphenyl Regulations No. 2 (Product) if the PCB concentrations exceed 50 parts per million by weight of liquid contained. The restrictions of the Chlorobiphenyl Regulations No. 1 and No. 3 would also apply.

Retrofilling or replacement of a PCB-filled transformer may be desirable if it is located in an environmentally sensitive area; however, if PCB levels cannot be maintained at or below 50 parts per million over the lifetime of the units, then these transformers will still be considered PCB-filled transformers and subject to the PCB regulations.

Q. Can I top up my transformer tank with PCBs to replenish the PCB liquid lost due to leakage or sample testing?

A. No. Topping up a transformer with PCB liquids is prohibited. A suitable substitute such as tri/tetrachlorobenzene (TTCB) or refined paraffinic oil may be used. Information concerning the maximum allowable make-up fluid, (usually 20-40% of the tank size) should be available from the equipment manufacturer. Excessive amounts of make-up fluid may alter the transformer performance or soften the insulation on the transformer windings. If a large quantity of make-up fluid needs to be added, it must be added slowly to allow mixing with the PCB liquids.

Q. Can I use PCBs as a new filling in my transformer during servicing or maintenance?

A. No. However, the original PCBs may be reused, i.e., removed, filtered and returned to the same piece of equipment.

Q. What are some of the PCB-liquid alternatives?

A. Some of the PCB-liquid alternatives are:

- silicone fluids

- aliphatic hydrocarbons
- poly- α -olefins
- chlorinated benzenes
- pentaerythritol ester blend
- SF₆ (sulphur hexafluoride)
- Formel NF (blends of chlorinated hydrocarbons and chlorofluorocarbons)

For a full discussion of these PCB alternatives and their properties, refer to the "Handbook on PCBs in Electrical Equipment" published by Environment Canada.

8 OIL-FILLED TRANSFORMERS

Q. Should I assume that my mineral oil-filled transformers are PCB-contaminated?

A. Current data show that anywhere from 4% to 20% of the existing mineral oil-filled transformers are contaminated with 50 parts per million (ppm) or more of PCBs. Although no clear pattern exists to explain why one transformer is contaminated more than another, it is suspected that the year of manufacture plays a role in the contamination problem. Therefore, when a unit is taken out of service, it would be necessary to determine PCB levels in the mineral oil dielectric fluid in order to be certain that concentrations are below 50 ppm PCBs.

Q. What are the restrictions on the use of PCB-contaminated mineral oil-filled transformers and their contents?

A. There are no restrictions on the use of PCB-contaminated mineral oil-filled transformers as long as they were imported into or manufactured in Canada before July 1, 1980, as required by the PCB Regulations No. 1. They are, however, subject to the Chlorobiphenyl Regulations No. 3 (Release) in that any release of PCBs into the environment in a quantity of one gram or more per day is prohibited. When PCB-contaminated transformers are removed from service, the fluid should be tested and disposed of as a PCB fluid if it contains more than 50 parts per million PCBs. It is also recommended that PCB-contaminated mineral oil-filled transformers be identified with the Environment Canada green and white label while in service.

Q. Should PCB-contaminated oil-filled transformers be protected with curbs, fences, etc., to the same degree that PCB-equipment is protected?

A. Although there is no federal legislation governing the installation of any protective measures for PCB-containing or PCB-contaminated equipment, such as oil-filled transformers (for out-of-service units, provincial agencies may have requirements for containment), there are a number of factors that owners and operators of PCB-containing or PCB-contaminated equipment must take into consideration in deciding the degree to which protective measures should be taken. Under the Chlorobiphenyl Regulations No. 3, Environment Canada will take legal action against any person who wilfully releases or permits the release of PCBs into the environment. This will include legal action against any person who failed to take

appropriate and immediate protective measures to preclude the release of PCBs into the environment as a result of equipment failure or leakage or spills.

A PCB-contaminated oil-filled transformer may not pose the same degree of hazard to human health and the environment that a PCB-transformer poses, but a spill or leakage of mineral oil containing PCBs in a concentration greater than 50 parts per million could cause widespread contamination and the cleanup costs will be high. Owners and operators of contaminated equipment are encouraged to provide adequate measures to prevent contamination of food, feed and the environment. It is always up to the owner and operator to decide on the type and degree of protection his equipment requires and to determine the risk that he is prepared to accept.

Q. At what PCB concentration should oil-filled equipment be considered equal in hazard potential to an askarel transformer?

A. A mineral oil-filled transformer containing PCBs in a concentration of 50 to 500 parts per million would certainly pose much less of a hazard to human health and the environment than a transformer containing 50 or 65% PCBs; nevertheless, when cleanup costs of a PCB spill or leakage are taken into consideration, there is no "insignificant" level. Any spill or leakage from a contaminated transformer could result in cleanup costs for the total removal or scraping of any contaminated pavement, concrete and surface soil, and the packaging, storing and disposal of all PCB-contaminated materials.

Q. Is it reasonable to retrofill a PCB-contaminated oil-filled transformer or decontaminate the oil and if so, at what level?

A. Replacing contaminated mineral oil with new fluid or decontaminating the oil by chemical means are two retrofilling procedures which are becoming increasingly attractive to owners of PCB-contaminated transformers. Although the hazard associated with the accidental release of contaminated fluid is less than it would be for askarel, it can be quite significant depending on the size and location of the transformer and the amount of PCBs present in the mineral oil. While it is entirely up to the owner to decide, many owners are cognizant of the benefits of having the contamination level of their equipment below 50 ppm. They can avoid the costs, liabilities and problems associated with spills, containment facilities, government regulations, occupational health considerations and waste disposal. It should be

noted that most provincial environment departments require prior notification of retrofilling or decontamination activities.

Q. If an oil-filled transformer were to be retrofilled, at what level would it be considered to be a non-PCB contaminated piece of equipment?

A. Less than 50 parts per million by weight.

Q. Is there a PCB contamination level above which the mineral oil-filled transformer should not be sold?

A. Although federal legislation does not apply to the sale of PCB-contaminated mineral oil-filled transformers, Environment Canada strongly urges that any contaminated unit that is offered for sale should be clearly brought to the attention of the potential buyer and that the level of contamination should be duly noted in the sales agreement. This would advise the buyer that the transformer would be subject to the PCB Regulations and that protective measures to prevent contamination in the event of a PCB spill or leakage would be necessary. Environment Canada also strongly urges any person who is contemplating the purchase of a used mineral oil-filled transformer to have the fluid tested for PCB contamination.

Q. Over what period of time should the retrofilled transformer be sampled to ensure that the PCB level does not increase above the specified maximum?

A. From studies conducted by Environment Canada, it can be reasonably estimated that complete stabilization of the PCB concentration will be reached after six to nine months of operation; consequently, sampling should be conducted at the sixth month interval as well as at the ninth month to ensure stabilization and a reasonably accurate determination of PCB concentration.

Q. Should PCB-contaminated mineral oil-filled transformers be labelled?

A. There is no legislation making it mandatory to label PCB-contaminated transformers; however, if a transformer is contaminated above a level of 50 parts per million and is located in an environmentally-sensitive area or poses a direct threat to human health, all precautionary measures, such as labelling and the installation of protective equipment, would be recommended.

Q. What are the minimum precautions recommended to owners and operators of mineral oil-filled transformers?

A. It is common for mineral oil-filled transformers manufactured prior to 1977 to contain 10 to 20 ppm of PCBs. The exact level can be confirmed by testing but in the absence of tests it is prudent to assume contamination to this degree. Owners should take precautions to prevent endangerment of human health or contamination of the environment from a large scale leak or disposal operation. Similarly, any unit that is found to be leaking fluid should be immediately tested to determine the PCB concentration so that appropriate action to repair and clean up the leak can be taken.

9 STORAGE AND DISPOSAL

Q. Which level of government has the responsibility for overseeing facilities pertaining to the storage and disposal of PCB wastes?

A. Facilities for storage and disposal of PCB wastes come under provincial control. The provincial environment departments regulate how PCB wastes should be stored, how destruction facilities should be operated and what use may be made of municipal disposal services for PCB wastes. The federal government controls waste at federal facilities and regulates the movement of dangerous goods and wastes into and out of Canada and across provincial boundaries under the Transportation of Dangerous Goods Act and Regulations. The transport of PCB waste will be subject to the provisions of the Act and regulations, and provincial legislation.

Q. Can fluorescent lamp ballasts be disposed in a municipal landfill?

A. Small capacitors, such as those used in fluorescent lamp lighting ballasts and starting circuits of electric motors, may be disposed of in municipal or industrial waste streams where permitted by provincial authorities. In situations where small capacitors will be generated as waste on a continuing basis, such as at electrical repair shops, or on a large scale one-time basis, such as in renovation to building lighting systems, the capacitors should be collected in drums or other suitable containers and treated as PCB waste.

Q. Is high-temperature incineration an acceptable method of disposing of PCBs?

A. Yes, high temperature incineration is the preferred method of destruction for PCB waste. At a temperature of 1200°C and residence time over two seconds, more than 99.9999% destruction is achieved. Other destruction systems that can achieve the same level of performance are equally acceptable, but up to now, high-temperature incinerators are the most commonly used system for PCB disposal.

Q. One of the options available for the control of PCBs is disposal of PCBs at safe destruction facilities. Does Canada have any such facilities?

A. Destruction of PCBs is the ultimate goal in PCB waste management. In Canada, there are numerous technologies capable of effectively breaking down the molecular structure of PCBs into non-hazardous products. Two of these technologies, high-temperature incineration and chemical dechlorination, are well developed and are currently used on a commercial basis in a number of countries around the world.

Plans exist for several hazardous waste incinerators capable of burning PCBs. However, the development process has been slow because of the length of time required by governments, industry and the public to reach agreement on sites on which to locate these plants. Mobile facilities have been developed and are operating in the U.S. and to a very limited extent in Canada. The object of the mobile units is to destroy the wastes where they are stored. But siting even on a temporary basis is not done without difficulty. Permanent destruction facilities are needed to complete the final link in the PCB control programs. Until these facilities are sited and in place, disposal options in Canada will be extremely limited.

Q. May I sell my PCB-filled transformers or capacitors for scrap or reuse?

A. No. Under the Chlorobiphenyl Regulations No. 2 (Product), the sale of a transformer or a capacitor containing more than 50 ppm PCBs is prohibited.

Q. Are there any guidelines available on the management of PCB wastes?

A. Yes, Environment Canada has been developing guidelines in concert with the provincial environment ministries, industry and public interest groups. Proposed guidelines were published under the title "Guidelines for the Management of PCB Wastes" in the Canada Gazette Part I on December 11, 1982. They set out recommended procedures and criteria for the safe storage, handling and disposal of PCB wastes. They are intended to provide a unified approach to the management and regulation of these wastes across Canada. They will be published under the title "National Manual for the Management of PCB Wastes", in 1986.

Q. Is there a cut-off concentration of PCBs associated with the guidelines for the management of PCB wastes?

A. Yes, the guidelines set out recommended handling and disposal procedures for wastes that contain 50 ppm or more PCBs. These wastes require secure storage and monitoring until disposal in approved facilities. Wastes with PCB concentrations less than 50 ppm should be treated according to the hazard they present. Indiscriminate dumping of even low concentration wastes is unacceptable. High temperature incineration of vast quantities of low concentration waste is equally inappropriate. Wastes in this category are encountered frequently and are usually the result of spill cleanup activities or waste oil contamination. Provincial

authorities responsible for PCB waste disposal will have to exercise judgement in deciding on the most suitable means of disposal of these wastes.

Q. What are the principal sources of waste PCBs?

A. PCBs used in electrical transformers and capacitors are the principal sources of waste PCBs.

Q. Where can I obtain information concerning incinerator requirements for the thermal destruction of PCB wastes?

A. Information concerning incinerator requirements for the thermal destruction of PCB wastes will be included in the "National Manual for the Management of PCB Wastes" to be published by Environment Canada in 1986.

Q. Where can I get information on the disposal of PCB wastes?

A. The "Handbook on PCBs in Electrical Equipment" and the "National Manual on the Management of PCB Wastes" will provide detailed information on the containerization and storage of PCB wastes designated for collection, transport and disposal. Information on commercial facilities that will accept PCB wastes is available from provincial environmental agencies.

Q. What are my obligations in regard to PCB wastes?

A. The owner of the PCB wastes is responsible for the storage, transportation, collection and disposal. Companies or institutions should ensure that out-of-service equipment is disposed of in an approved manner, rather than being left where it is susceptible to vandalism or to accidental rupture and release of PCBs into the environment. Willful release of PCBs into the environment is prohibited under the Chlorobiphenyl Regulations No. 3 (Release). Records should be kept of the identity, amount, and location of all PCB waste materials and equipment held in storage or removed for disposal. These records will be required for the periodic up-dating of the PCB inventory to keep track of the phase-out of equipment over the years.

Q. Who is responsible for the disposal of PCBs once they become waste?

A. The owner is responsible for ensuring proper disposal. Provincial environmental agencies as well as Environment Canada will provide guidance as well as copies of published waste management manuals upon request.

- Q. If I am disposing of a PCB transformer, is it just the PCBs that require proper storage and disposal?**
- A. No. The entire transformer as well as any other PCB-contaminated materials are considered PCB waste and must be properly handled and disposed.
- Q. What do I do with PCB transformers or capacitors when I have no further use for them?**
- A. They must be stored by the owner on the site or by the owner or his agent in a provincially authorized PCB storage facility.
- Q. How do I dispose of PCB spill residue and cleanup materials?**
- A. Contaminated surface soil, concrete, pavement, etc., and cleanup materials, if contaminated by PCBs in a concentration greater than 50 parts per million, must be handled, stored and disposed of according to the proper procedures for PCB wastes. Provincial environmental agencies should be consulted for specific requirements.

10 TRANSPORTATION**Q. Who should I contact before I transport PCBs?**

A. Before transporting PCBs anywhere, you should contact the following:

- the provincial government,
- Transport Canada,
- the Environmental Protection Service, Environment Canada,
- the receiver, and
- the transport company.

Under the Transportation of Dangerous Goods Regulations and international codes, PCBs are listed under United Nations number UN2315, which is a permanently assigned number that enables shipments of PCBs to be recognized internationally. For more information concerning the transportation of PCBs, you should refer to the "Handbook on PCBs in Electrical Equipment" and both the federal and provincial Transportation of Dangerous Goods Regulations.

Q. Are there any regulations governing the transportation of PCB-filled equipment or wastes?

A. Under the federal Transportation of Dangerous Goods Act and Regulations, any shipment of dangerous goods must be accompanied by shipping documents containing specified information. In the case of waste dangerous goods the document will be a manifest. The manifest system is intended to track the movement of hazardous wastes off the original site to a proper disposal site and consists of a multi-copy shipping document to be completed by the shipper, transporter and receiver. All PCB shipments, whether provincial, interprovincial or international, must comply with the requirements of the waste management, manifest and prenotification systems. Companies engaged in the collection and transport of PCB wastes may also be required to obtain licences to ensure adequate safety is maintained. The "Handbook on PCBs in Electrical Equipment" provides information on the requirements for transporting PCB equipment and wastes. Further information on the manifest system may be obtained by contacting an Environment Canada, Environmental Protection Service regional office, or the appropriate provincial environmental agency.

APPENDIX
ENVIRONMENTAL PROTECTION SERVICE OFFICES
ENVIRONMENT CANADA

Regional Offices

Ontario	7th Floor 25 St. Clair Avenue East Toronto, Ontario M4T 1M2	Office - (416) 973-5840 Emergency - (416) 973-5840*
Quebec	1179 Bleury Street Montreal, Quebec H3B 3H9	Office - (514) 283-2349 Emergency - (514) 283-2333*
Atlantic	5th Floor, Queen's Square 45 Alderney Drive Dartmouth, N.S. B2Y 2N6	Office - (902) 426-6141 Emergency - Maritimes Zenith 49000* - Newfoundland (709) 737-2083*
Western and Northern	2nd Floor 4999-98th Avenue Edmonton, Alberta T6B 2X3	Office - (403) 468-8001 Emergency - (403) 468-8020*
Pacific/Yukon	Kapilano 100, Park Royal South West Vancouver, B.C. V7T 1A2	Office - (604) 666-6711 Emergency - (604) 666-6100*
Headquarters	Controls Implementation Section Commercial Chemicals Branch 14th Floor 351 St. Joseph Blvd. Ottawa, Ontario K1A 1C8	Office - (819) 997-1640

*24-h service

PROVINCIAL ENVIRONMENT MINISTRY OFFICES

Nova Scotia	Nova Scotia Department of Environment Assessment Division P.O. Box 2107 Halifax, N.S. B3J 3B7	(902) 424-5300
New Brunswick	New Brunswick Department of Municipal Affairs and Environment Pollution Control Branch P.O. Box 6000 364 Argyle St. Fredericton, N.B. E3B 5H1	(506) 453-2861
Newfoundland	Government of Newfoundland and Labrador Department of Environment P.O. Box 4750 St. John's, Nfld. A1C 5T7	(709) 576-2557
Prince Edward Island	PEI Department of Community and Cultural Affairs P.O. Box 2000 3 Queen St. Charlottetown, P.E.I. C1A 7N8	(902) 892-0311
Quebec	Environment Quebec Dangerous Substances Directorate 3900 Marly St. St. Foy, P.Q. G1X 4E4	(418) 644-3420
Ontario	Ontario Ministry of Environment Waste Management Division 40 St. Clair West - 5th floor Toronto, Ont. M4V 1M2	(416) 965-4120
Manitoba	Manitoba Department of Environment Waste Management Division Box 7 Bldg. 2 139 Tuxedo Ave. Winnipeg, Man. R3N 0H6	(204) 945-7083
Saskatchewan	Saskatchewan Department of Environment Waste Management Division 3085 Albert St. Regina, Sask. S4S 0B1	(306) 787-6259

Alberta	Alberta Department of Environment Waste Management Division 9820 106th St. - 4th floor Edmonton, Alta. T5K 2J6	(403) 427-5868
British Columbia	B.C. Ministry of Environment Waste Management Branch 810 Blanshard St. Victoria, B.C. V8V 1X5	(604) 387-4321

