Guidelines for the Management of Wastes Containing Polychlorinated Biphenyls (PCBs)

CCME-TS/WM-TRE008
Manual EPS 9/HA/1 (revised)
September 1989
GUIDELINES FOR THE MANAGEMENT OF WASTES CONTAINING POLYCHLORINATED BIPHENYLS (PCBs)

Industrial Programs Branch
Environmental Protection
Conservation and Protection
Environment Canada

Report CCME - TS/WM - TRE008 E
Manual EPS 9/HA/1 (revised)
September 1989
Canadian Cataloguing in Publication Data

Main entry under title:

Guidelines for the management of wastes containing polychlorinated biphenyls (PCBs)

(Report; CCME-TS/WM-TRE008E)
Issued also in French under title: Guide pour la gestion des déchets contenant des biphényles polychlorées (BPC).
Includes bibliographical references.
ISBN 0-662-17288-4
DSS cat. no. En108-3/1-8E

1. Polychlorinated biphenyls -- Waste disposal.

TD897.8.C32G84 1989 363.7'28 C89-097147-1
READERS COMMENTS

Comments on the content of this report may be directed to:

A. Burgess  
Industrial Programs Branch  
Environmental Protection  
Conservation and Protection  
Environment Canada  
Ottawa, Ontario  
K1A 0H3

Ce rapport est aussi disponible en français sous le titre "Guide pour la gestion des déchets contenant des biphényles polychlorés (BPC)", à l'adresse ci-dessous.

For additional copies of this report, please contact your provincial environment ministry or write to:

CCME Secretariat  
4905 Dufferin Street  
Downsview, Ontario  
M3H 5T4
PREFACE

The primary purpose of this manual is to recommend environmentally sound practices for the management of wastes containing polychlorinated biphenyls (PCBs). Procedures for decommissioning and decontamination, storage, transportation, disposal, labelling and recordkeeping, and emergency preparedness for PCB-contaminated equipment and containers, as well as for solid and liquid wastes are covered.

Regulations governing generation, storage, transportation and disposal of PCB wastes and emergency response planning are generally administered by the provinces for wastes containing PCBs that are managed within the provinces. The user of this manual is advised to contact the relevant provincial authority having jurisdiction and comply with the applicable provincial regulations.

For inter-provincial shipments of wastes containing PCBs, the appropriate provincial and federal transportation regulations shall apply.
PRÉFACE

Le guide a pour but principal de recommander des méthodes écologiques de gestion des déchets contenant des biphenyles polychlorés (BPC). Il traite des procédures à suivre pour la mise hors service, la décontamination, le stockage, le transport, l'élimination, l'étiquetage, la tenue de registres et de plans de mesure d'urgence, dans le cas des équipements et des contenants contaminés par les BPC ainsi que des déchets contaminés solides et liquides.

Les règlements portant sur la production, le stockage, le transport et l'élimination des déchets contenant des BPC de même que sur la planification des interventions d'urgence sont en général appliqués par les provinces de qui la gestion de ces déchets relève. L'utilisateur du guide devra communiquer avec l'autorité provinciale compétente et se conformer aux règlements provinciaux applicables.

Dans le cas des envois interprovinciaux de déchets contenant des BPC, les règlements provinciaux et fédéraux portant sur leur transport s'appliquent.
**TABLE OF CONTENTS**

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>PREFACE</td>
<td>v</td>
</tr>
<tr>
<td>PRÉFACE</td>
<td>vi</td>
</tr>
<tr>
<td>LIST OF FIGURES</td>
<td>x</td>
</tr>
<tr>
<td>LIST OF TABLES</td>
<td>xi</td>
</tr>
<tr>
<td>ACKNOWLEDGEMENTS</td>
<td>xii</td>
</tr>
<tr>
<td>1.1 INTRODUCTION</td>
<td>1</td>
</tr>
<tr>
<td>Purpose</td>
<td>1</td>
</tr>
<tr>
<td>Federal Legislative Mandate</td>
<td>1</td>
</tr>
<tr>
<td>PCB Waste Definition</td>
<td>3</td>
</tr>
<tr>
<td>Availability of Storage and Destruction Facilities</td>
<td>5</td>
</tr>
<tr>
<td>2.1 DECOMMISSIONING AND DECONTAMINATION</td>
<td>6</td>
</tr>
<tr>
<td>Decommissioning</td>
<td>6</td>
</tr>
<tr>
<td>Purpose of Decommissioning</td>
<td>6</td>
</tr>
<tr>
<td>Notification and Approval</td>
<td>6</td>
</tr>
<tr>
<td>Planning and Mobilization</td>
<td>7</td>
</tr>
<tr>
<td>Protective Clothing and Apparatus</td>
<td>8</td>
</tr>
<tr>
<td>Decommissioning Procedures</td>
<td>9</td>
</tr>
<tr>
<td>Site Cleanup</td>
<td>10</td>
</tr>
<tr>
<td>Decontamination</td>
<td>10</td>
</tr>
<tr>
<td>Decontamination by Solvent Extraction</td>
<td>11</td>
</tr>
<tr>
<td>Retrofilling</td>
<td>12</td>
</tr>
<tr>
<td>3.1 STORAGE</td>
<td>15</td>
</tr>
<tr>
<td>Siting</td>
<td>15</td>
</tr>
<tr>
<td>Access to Site</td>
<td>16</td>
</tr>
<tr>
<td>Design</td>
<td>16</td>
</tr>
<tr>
<td>Ventilation</td>
<td>16</td>
</tr>
<tr>
<td>Containment</td>
<td>16</td>
</tr>
<tr>
<td>Prevention of Water Contamination</td>
<td>17</td>
</tr>
<tr>
<td>Containers</td>
<td>17</td>
</tr>
<tr>
<td>Outside Storage</td>
<td>17</td>
</tr>
<tr>
<td>Operation of a Storage Facility</td>
<td>18</td>
</tr>
<tr>
<td>Fire Protection</td>
<td>18</td>
</tr>
<tr>
<td>Maintenance and Inspection</td>
<td>19</td>
</tr>
<tr>
<td>Page</td>
<td>4</td>
</tr>
<tr>
<td>------</td>
<td>---</td>
</tr>
<tr>
<td></td>
<td>4.1</td>
</tr>
<tr>
<td></td>
<td>4.1.1</td>
</tr>
<tr>
<td></td>
<td>4.1.2</td>
</tr>
<tr>
<td></td>
<td>4.1.3</td>
</tr>
<tr>
<td></td>
<td>4.2</td>
</tr>
<tr>
<td></td>
<td>4.3</td>
</tr>
<tr>
<td></td>
<td>4.3.1</td>
</tr>
<tr>
<td></td>
<td>4.3.2</td>
</tr>
<tr>
<td></td>
<td>4.3.3</td>
</tr>
<tr>
<td>5</td>
<td>TRANSPORTATION</td>
</tr>
<tr>
<td></td>
<td>5.1</td>
</tr>
<tr>
<td></td>
<td>5.2</td>
</tr>
<tr>
<td></td>
<td>5.3</td>
</tr>
<tr>
<td></td>
<td>5.4</td>
</tr>
<tr>
<td></td>
<td>5.5</td>
</tr>
<tr>
<td>6</td>
<td>DISPOSAL OF PCBs</td>
</tr>
<tr>
<td></td>
<td>6.1</td>
</tr>
<tr>
<td></td>
<td>6.2</td>
</tr>
<tr>
<td></td>
<td>6.2.1</td>
</tr>
<tr>
<td></td>
<td>6.2.2</td>
</tr>
<tr>
<td></td>
<td>6.2.3</td>
</tr>
<tr>
<td></td>
<td>6.2.4</td>
</tr>
<tr>
<td></td>
<td>6.2.5</td>
</tr>
<tr>
<td>7</td>
<td>EMERGENCY PREPAREDNESS AND PROCEDURES</td>
</tr>
<tr>
<td></td>
<td>7.1</td>
</tr>
<tr>
<td></td>
<td>7.2</td>
</tr>
<tr>
<td></td>
<td>7.2.1</td>
</tr>
<tr>
<td></td>
<td>7.2.2</td>
</tr>
<tr>
<td></td>
<td>7.2.3</td>
</tr>
<tr>
<td></td>
<td>7.3</td>
</tr>
<tr>
<td></td>
<td>7.3.1</td>
</tr>
<tr>
<td></td>
<td>7.3.2</td>
</tr>
<tr>
<td></td>
<td>7.4</td>
</tr>
<tr>
<td></td>
<td>REFERENCES</td>
</tr>
<tr>
<td></td>
<td>BIBLIOGRAPHY</td>
</tr>
<tr>
<td></td>
<td>APPENDIX A</td>
</tr>
<tr>
<td>Appendix</td>
<td>Title</td>
</tr>
<tr>
<td>----------</td>
<td>------------------------------------------------------------</td>
</tr>
<tr>
<td>B</td>
<td>PCB WASTE TYPES</td>
</tr>
<tr>
<td>C</td>
<td>PCB TREATMENT/DESTRUCTION REQUIREMENTS</td>
</tr>
<tr>
<td>D</td>
<td>HIGH EFFICIENCY BOILER REQUIREMENTS - U.S. EPA REQUIREMENTS</td>
</tr>
<tr>
<td>E</td>
<td>FEDERAL AND PROVINCIAL REGULATIONS RELATING TO PCBs</td>
</tr>
<tr>
<td>F</td>
<td>ENVIRONMENT RESOURCE CONTACTS PCBs AND HAZARDOUS WASTES - FEDERAL AND PROVINCIAL OFFICES</td>
</tr>
<tr>
<td>G</td>
<td>TRANSPORTATION RESOURCE CONTACTS - FEDERAL AND PROVINCIAL TRANSPORT CONTACTS</td>
</tr>
<tr>
<td>H</td>
<td>WRITTEN DIRECTIONS FOR THE DISTRIBUTION OF COPIES OF THE TRANSPORTATION MANIFEST</td>
</tr>
<tr>
<td>Figure</td>
<td>Description</td>
</tr>
<tr>
<td>--------</td>
<td>----------------------------------------------------------</td>
</tr>
<tr>
<td>1</td>
<td>LABELS FOR PCB EQUIPMENT</td>
</tr>
<tr>
<td>2</td>
<td>PCB GENERAL WARNING LABEL</td>
</tr>
<tr>
<td>3</td>
<td>PCB WARNING LABEL FOR CONTAMINATED EQUIPMENT</td>
</tr>
<tr>
<td>4</td>
<td>TDGA PCB LABEL</td>
</tr>
<tr>
<td>5</td>
<td>TDGA CLASS 9 LABEL</td>
</tr>
<tr>
<td>6</td>
<td>TDGA CLASS 9 PLACARD</td>
</tr>
<tr>
<td>7</td>
<td>NOTIFICATION FORM</td>
</tr>
<tr>
<td>8</td>
<td>TDGA WASTE MANIFEST</td>
</tr>
<tr>
<td>9</td>
<td>DISTRIBUTION OF MANIFEST COPIES (intra- and interprovincial shipments)</td>
</tr>
<tr>
<td>10</td>
<td>DISTRIBUTION OF MANIFEST COPIES (import and export)</td>
</tr>
<tr>
<td>11</td>
<td>DANGEROUS OCCURRENCE REPORT FORM</td>
</tr>
</tbody>
</table>
# LIST OF TABLES

<table>
<thead>
<tr>
<th>Table</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>MATERIALS USED FOR PROTECTION FROM DERMAL EXPOSURE TO UNDILUTED PCBs</td>
<td>8</td>
</tr>
<tr>
<td>2</td>
<td>PROPERTIES AND COSTS OF REPLACEMENT FLUIDS FOR PCBs</td>
<td>14</td>
</tr>
<tr>
<td>3</td>
<td>DISPOSAL TECHNOLOGIES FOR VARIOUS PCB WASTES</td>
<td>41</td>
</tr>
<tr>
<td>4</td>
<td>FIRST AID FOR EXPOSURE TO PCB LIQUIDS</td>
<td>50</td>
</tr>
</tbody>
</table>
ACKNOWLEDGEMENTS

Many people were involved in the development of this manual, which is based on a report prepared for Environment Canada by M.M. Dillon Limited. The project was supervised by an Environment Canada committee consisting of A. Burgess, H. Dibbs, and J. Armstrong. Significant contributions were provided by members of the Waste Committee of the Canadian Council of Ministers of the Environment (CCME) as well as by Environment Canada's headquarters staff and by staff in Environment Canada's regional offices. In addition, comments and suggestions from the Occupational Safety and Health Branch of Labour Canada, and from the Environmental Health Directorate of Health and Welfare Canada were incorporated in the manual.

Special acknowledgements are also due to electric utility companies and industrial associations for reviewing drafts of this manual and providing comments, recommendations, and background information.

This report is a revised edition of the Environment Canada report EPS 9/H/1. It provides a general updating of the manual as well as specific recommendations of the CCME Waste Committee and the major requirements of Environment Canada's Storage of PCB Waste Interim Order.
INTRODUCTION

1.1 Purpose

The purpose of this manual is to recommend environmentally sound practices for the management of wastes containing polychlorinated biphenyls (PCBs). It is intended for the guidance of PCB waste generators in the industrial and commercial sectors and the federal government and for provincial authorities in developing their own guidelines and regulations. With the exception of the specific federal responsibilities described in the following section (1.2), the management of hazardous wastes, including PCBs, falls mainly under provincial jurisdictions. Where provinces have regulations pertaining to the management of PCBs, the users of this manual must obtain copies of such regulations from the appropriate authority.

This manual is not intended to address all aspects of PCB waste management but rather to provide basic recommendations and practices (particularly for those wastes containing more than 50 ppm of PCBs) in order to promote good management of PCB wastes in a consistent manner across Canada.

To a large extent, the effectiveness of the regulations under the Canadian Environmental Protection Act (CEPA) restricting the use of PCBs depends on the adoption and implementation of effective PCB waste management practices. To assist in developing these practices and in response to a request for coordination from the provincial environment departments, Environment Canada undertook to develop this manual. The manual deals with solid and liquid PCB wastes and addresses the decommissioning, storage, transportation and disposal of PCB-contaminated equipment and containers, the labelling of PCB wastes for record keeping at storage and disposal facilities, and emergency procedures for spills or fires involving PCBs.

1.2 Federal Legislative Mandate

The federal government has responsibility for wastes within federal facilities and has specific responsibilities for the management of PCBs in accordance with the mandate prescribed by the following federal legislation:

- Canadian Environmental Protection Act;
- Fisheries Act;
- Ocean Dumping Control Act; and
The adoption of the *Canadian Environmental Protection Act* by the federal government on June 28, 1988, gives the federal government the legislative power to protect human health and the environment from the risks associated with the use of toxic substances. The Act establishes a comprehensive system for managing toxic chemicals throughout their life cycle, from development to production, transport, use, storage and disposal.

Under the Act, where the Minister believes that: 1) a substance is not adequately regulated; and 2) immediate action is required to deal with a significant danger to the environment or to human life or health; the Minister may make an interim order in respect of the substance and the order may contain any provision that may be contained in a regulation under the Act.

Under the Act, two Interim Orders have been made respecting the management of PCBs:

1) The Interim Order Respecting the Storage of Wastes Containing PCBs (September 16, 1988) (19). The requirements of this Order along with amendments dated February 20, 1989, (20) have been reflected in this manual.

2) Interim Order Respecting Chlorobiphenyls (February 20, 1989) (21). This Order includes all the requirements of the original regulations Nos. 1, 2, 3 under the *Environmental Contaminants Act* with some modifications. This Order is in the process of being replaced by a regulation under CEPA.

The main PCB manufacture, process, use, offer for sale as import restrictions covered by in the Interim Order Respecting Chlorobiphenyls are:

**Prohibition**

- prohibits the use of PCBs in the operation of any product, machinery or equipment, other than electrical transformers and capacitors that existed in Canada before July 1, 1980; 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; and machinery or equipment for the destruction of PCBs. It prohibits the importation or manufacture of any product, machinery or equipment containing PCBs as a constituent; 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; and the use of PCBs as new filling or as make-up fluid in electromagnets and electrical transformers and associated electrical equipment.

**Concentration in Products**

- the concentration of PCBs that may be contained in any liquid in products, machinery or equipment referred to under "Prohibition" that are manufactured,
imported or offered for sale in Canada shall not exceed 50 parts per million by weight of the liquid. This concentration limit does not apply where a product is: offered for sale as a necessary and integral part of a building, plant or structure; imported for the destruction of the PCBs contained in that product; or offered for sale for destruction or storage awaiting destruction of the PCBs contained in that product.

Concentrations or Quantities that may be Released

- the concentration of PCBs in any liquid that may be released into the environment, except where subsection 36(3) of the Fisheries Act applies, in the course of a commercial, manufacturing or processing activity shall not exceed 50 parts per million, except in an application to a road surface where the maximum concentration is 5 parts per million.

- the quantity of PCBs that may be released in the course of the operation, servicing, maintenance, decommissioning, transporting or storage of any of the products, machinery or equipment referred to under "Prohibition" or any receptacle or material containing the prescribed products, machinery or equipment shall not exceed one gram per day.

For a more detailed description of this Interim Order see Appendix A or contact the Commercial Chemicals Branch of Environment Canada (see Appendix F).

The Fisheries Act, Subsection 36(3) prohibits the deposition of deleterious substances into waters frequented by fish except as may be permitted by regulations. This Act applies to waters frequented by fish or waters leading to fish-frequented waters and takes precedence over Section 5 of the Interim Order Respecting Chlorobiphenyls.

Although the Ocean Dumping Control Act was repealed in June 1988 regulations under the Act still govern the disposal of PCBs at sea, including incineration, through permits and regulations which specify environmental operating requirements. These regulations are currently being rolled over to come under the jurisdiction of the Canadian Environmental Protection Act.

Regulations under the Transportation of Dangerous Goods Act (TDGA) govern the transportation of equipment and wastes containing PCBs. In this manual, these regulations are referred to as the Transportation of Dangerous Goods (TDG) Regulations.

1.3 PCB Waste Definition

For the purpose of this report, PCB wastes are defined as any PCB liquid, PCB solid, or PCB equipment that have been taken out of service for the purpose of disposal. Only those wastes containing greater than 50 ppm PCBs are addressed (with the exception of the few instances where current federal or provincial regulations specify lower permissible concentrations).
This limit of 50 ppm does not mean that wastes with lower PCB concentrations may not in some instances be of concern, for example, wastes released to an environmentally-sensitive area. It is recommended that provincial authorities be contacted for advice on disposal of wastes in this category on a case-by-case basis.

The following specific definitions are pertinent:

**PCBs**
Chlorobiphenyls that have the molecular formula \( \text{C}_12\text{H}_{10-n}\text{Cl}_n \) where \( n \) is greater than 2. (In Ontario, the definition includes all chlorobiphenyls, \( n \geq 1 \). All other provinces adhere to the federal definition).

**Askarel**
A generic name for synthetic electrical insulating dielectric materials which, when decomposed by an electric arc, evolve only non-explosive gases or gaseous mixtures. Mixtures containing PCBs and chlorinated benzenes (primarily tri- and tetrachlorobenzene) are the most common examples of askarels. For the purpose of this manual "askarel" means mixtures containing PCBs in excess of 30% by weight.

**PCB waste**
Any PCB liquid, PCB solids, or PCB equipment that have been taken out of service for the purpose of disposal.

**PCB equipment**
Any manufactured item, other than PCB packaging, which contains PCB liquids or PCB solids and whose surfaces have been in direct contact with PCBs. Examples of PCB equipment include transformers, capacitors, heat transfer systems, vapour diffusion pumps, electromagnets and hydraulic systems.

**PCB-contaminated Oil**
Oil containing PCBs in any concentration (e.g., transformer mineral oil contaminated with PCBs).

**PCB liquid**
Any liquid containing more than 50 ppm by weight of PCBs.

**PCB packaging**
Any receptacle or enveloping material used to contain or protect PCB wastes.

**PCB solid**
Any material or substance other than a PCB liquid that contains or is contaminated with PCBs at a concentration greater than 50 ppm by weight of PCBs.

Descriptions of common types of PCB wastes are provided in Appendix B. A list of procedures for the analysis of PCBs in various matrices is given in *Analytical Chemistry of PCBs* by Mitchell D. Erikson, Butterworth Publishers, 1986. For lists of commercial laboratories capable of analyzing PCBs in various matrices contact federal or provincial environment offices see Appendix F. Environment Canada gives detailed information on chemical and physical properties, fire properties, human health, and environmental toxicities. 
1.4 Availability of Storage and Destruction Facilities

At present, in Canada, with the exception of the Senneterre facility in Quebec, there are no commercial storage facilities for any type of PCB waste; the only storage option available for the owners of such waste is secure storage at the owner's site. Similarly, with the exception of the Swan Hills incinerator facility, the only PCB destruction processes available in Canada are chemical processes for the decontamination of low-level PCB-contaminated oil. A number of these processes have been licensed by and are being used in several provinces. Development of PCB destruction facilities (high-temperature incineration) similar to that at Swan Hills and capable of destroying all types of PCB wastes is actively underway in other provinces.

The Swan Hills incinerator facility is licensed for the high-temperature destruction of all types and concentrations of PCB wastes and is actively destroying such wastes. The use of mobile high-temperature destruction units are being planned by the federal government as well as by some provinces. Under certain circumstances, PCB wastes can be exported for disposal.
2 DECOMMISSIONING AND DECONTAMINATION

When PCB equipment becomes redundant, fails or is retrofilled, it must be carefully removed from service (decommissioned). Part of this process will be the draining and/or decontamination of the equipment to ensure that the equipment and the PCB liquids are safely stored, transported, or disposed of in an environmentally acceptable manner.

2.1 Decommissioning

2.1.1 Purpose of Decommissioning. PCB equipment may be removed from service for a number of reasons, including:

- transfer for re-installation at another location;
- transfer to safe storage;
- retrofilling for re-use (primarily equipment with low-level PCB contamination); and
- disposal.

Depending on the degree of contamination, size of equipment, transportation regulations, and disposal methods, draining and/or decontamination can take place at the point of removal from service, at some other location prior to transportation, or at the disposal site. Similarly, retrofilling could be accomplished with the equipment remaining in place, or at another location.

2.1.2 Notification and Approval. Notification and approval procedures required by provincial authorities should be followed when decommissioning involves generation of PCB wastes. Regulatory requirements for the handling, storage, and disposal of PCB equipment vary from province to province and it is therefore necessary to become thoroughly acquainted with all applicable provincial regulations prior to decommissioning of equipment. A brief summary of provincial regulations applicable to PCB waste management is given in Appendix E. It is also necessary to comply with the federal Interim Order Respecting Chlorobiphenyls during decommissioning, handling and storage procedures.

When transport of PCB-containing equipment or wastes away from the site is intended, the appropriate provincial and/or federal regulations relating to the transportation of dangerous goods and/or hazardous wastes must be observed. The requirements of these regulations are described in Chapter 5 of this report.
2.1.3 Planning and Mobilization. After reviewing all requirements, the next tasks are the preparation of a detailed plan of action and the mobilization of the necessary human and material resources to implement the plan in a safe and efficient manner.

All persons assigned to handle PCB equipment should be thoroughly instructed in the proposed procedures, particularly with respect to safety precautions, the use of safety equipment and the applicability of federal and provincial regulations.

The area where decommissioning will take place must be carefully examined with respect to containment of potential PCB spills, ventilation and working space available. All necessary safeguards should be taken to prevent the escape of PCB waste to adjacent areas.

The type and condition of the PCB equipment and the volume of PCB liquid involved in each case will dictate the extent of precautionary measures to be taken to ensure containment of PCB spills and to facilitate cleanup operations. The willful release to the environment of PCBs from any one piece of equipment during maintenance, decommissioning, or storage must be limited to one gram per day (3).

Where transformers are located in separate equipment rooms or vaults the Canadian Electrical Code requires that the rooms be equipped with either a gravity or a forced air ventilation system having direct exhaust to, and air intake from, the outside. These rooms should also have ample ventilation and holding capacity in accordance with design criteria given in Sections 3.3.1 and 3.3.2. Before proceeding with the decommissioning of equipment, the performance of the ventilation system (for enclosed areas) and the integrity of the liquid containment system should be checked and any deficiencies rectified.

Transformers, capacitors or other PCB equipment located in open manufacturing areas, or other locations with uncontrolled access, present additional problems. Suitable curbs, barriers and/or metal pans should be provided to prevent the escape of PCBs in case of spills during handling operations. Also, floor drains should be plugged and air ducts leading to other parts of the building should be closed.

The extent of other preparatory work depends on the condition of the equipment involved. Prior to movement, liquids should be removed from equipment where cracks or leaks are apparent. Any leaked fluid should be cleaned up immediately using the sorbent materials listed in Chapter 7.

The area of work should be appropriately identified and unauthorized persons prohibited from entering the area.
2.1.4 **Protective Clothing and Apparatus.** Routine precautions should be observed while handling liquids containing PCBs. The protective clothing to be worn will vary with individual circumstances, such as concentration, quantity of PCBs and whether in solid or liquid form. Where workers may come in direct contact with askarel, protective clothing impervious to PCBs should be worn. Gloves, boots, disposable coveralls, bib-type aprons, and eye protection (face shields or chemical safety goggles) should be worn as necessary. Materials used to protect against dermal exposure to PCBs are compared in Table 1.

**TABLE 1** MATERIALS USED FOR PROTECTION FROM DERMAL EXPOSURE TO UNDILUTED PCBs (5)

<table>
<thead>
<tr>
<th>Highly Recommended (provides protection for over one hour)</th>
<th>Recommended (provides protection for one hour)</th>
<th>Limited use or Not Recommended (provides protection for less than one hour)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Butyl Rubber</td>
<td>Chlorinated Polyethylene</td>
<td>Styrene Butadiene Rubber</td>
</tr>
<tr>
<td>Neoprene</td>
<td></td>
<td>Natural Rubber</td>
</tr>
<tr>
<td>Nitrile Rubber</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Polyvinyl Alcohol</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Viton</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Saranex</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teflon</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Where PCBs are in closed containers such as capacitors, transformers, tanks or drums, or are entrapped in solid substances or equipment, and there is no direct contact with PCBs, special clothing and apparatus may not be necessary, e.g., if a lift-truck operator is moving a drum or a palleted piece of PCB equipment.

As a general rule, the handling of hot liquids should be avoided. If the temperature of the liquid is above 55°C, a full-face, self-contained breathing apparatus should be worn for other than brief periods of exposure.

Federal and provincial regulations pertaining to the wearing of protective clothing and equipment must be observed at all times. For additional guidance on personnel protection refer to references 4, 5, and 6.
2.1.5 **Decommissioning Procedures.** Electrical equipment to be decommissioned should first be disconnected from the power supply by qualified personnel.

**Record keeping:** Before removal of any decommissioned equipment, a complete record of the equipment should be made, including nameplate data, serial numbers, dates of decommissioning and shipment, destination of equipment, and names of decommissioning personnel, as well as the Environment Canada label identification number, where applicable.

**Capacitors:** Sealed capacitors should be placed into 205-L, No. 18-gauge steel drums fitted with removable steel lids and gaskets made of PCB-resistant material, such as nitrile rubber, cork, or Teflon. Other leakproof containers providing protection equivalent to that of steel drums and meeting Transportation of Dangerous Goods Regulations and provincial requirements may be used for storing or transporting capacitors. Capacitors should be stored with the terminals up to prevent leakage from the capacitor bushings. As many capacitors as space allows may be placed in each drum. Drums or containers smaller than 205-L may be used when the size or quantity of capacitors does not justify the larger container.

Leaking capacitors should be drained, then placed in individual heavy duty polyethylene bags before storing in drums. These drums should be packed with sorbent material to absorb PCBs which may escape from the bags.

Drums should be sealed and labelled as described in Chapter 4. They are now ready for storage or transportation.

Non-leaking capacitors that are too large to fit into a 205-L drum should be wrapped in heavy gauge polyethylene and crated for transfer to the storage area. Leaking capacitors should be drained and stored over drip pans containing sufficient absorbent to absorb any remaining liquid. The requirements for off-site transportation are described in Chapter 5.

**Transformers:** Small transformers may be stored or transported in leakproof containers, without draining, in a manner similar to that for capacitors.

For on-site storage, transformers need not be drained providing they are structurally sound and all cooling tubes, valves and gauges are sealed and protected from damage and the weather, and spill containment is provided as described in Chapter 3.

Where large askarel transformers are being stored pending transportation or disposal, the askarel should be removed and stored in double-bung No. 16-gauge steel
drums. The requirements for transportation of PCB transformers are described in Chapter 5.

Polychlorinated biphenyl liquids may be stored in tanks rather than drums providing the tanks are above ground and are sound, properly labelled, regularly inspected, protected from the weather, and spill containment is provided.

Wherever possible, PCB liquids should be transferred by pumping, rather than pouring, to minimize splashing and spillage. Centrifugal-type pumps, having all wetted surfaces made of stainless steel, should be used. The shaft seal should be an external carbon ring type to eliminate exposure of the packing material to the deteriorating effects of PCBs. Valves should be brass or stainless-steel lined. Hoses should be flexible metal or lined with tetrafluoroethylene or silicone polymers, and drip trays should be placed under all pumps, valves and hose couplings.

Other equipment: PCB equipment such as hydraulic equipment, electromagnets, vapour diffusion pumps and heat transfer equipment should be removed from service only by qualified personnel. Care must be taken to prevent loss of liquid during this operation.

Pending ultimate disposal, the drained equipment should be put into storage in drums or wrapped in polyethylene, similar to the procedure for capacitors. Alternatively, the equipment could be appropriately decontaminated for re-use or metal recovery. Transportation requirements are described in Chapter 5.

2.1.6 Site Cleanup. Equipment removal should be followed by a thorough cleanup of the site. In general, the cleanup will include:

- absorbing spills (see Chapter 7 for procedures and applicable sorbents);
- wiping the affected area with solvents and rags; and
- placing all contaminated materials in steel drums for disposal.

Tools, pumps and equipment used in decommissioning and site cleanup should be dedicated to the handling of PCBs and labelled as such and thoroughly decontaminated at the completion of each cleanup project.

2.2 Decontamination

Decontamination is a process whereby PCBs are removed from equipment, mineral oil or other materials. Equipment (such as a transformer) is usually decontaminated to meet provincial requirements for disposal in an environmentally safe manner, or to allow it to be used or sold as a non-PCB unit. Decontaminated equipment and mineral
oil may be recycled, sold or disposed of. Polychlorinated biphenyl handling equipment, such as containers, pumps, hoses, is decontaminated so that it can be re-used for handling other materials, or disposed of.

2.2.1 Decontamination by Solvent Extraction.

**Equipment:** Decontamination procedures vary considerably depending upon the degree of contamination of the equipment and the purpose for which it is being decontaminated, e.g., for a given end purpose, equipment containing askarels will require more sophisticated procedures than equipment containing contaminated mineral oil.

**Askarel equipment:** Although scrapping for metal recovery is considered the most environmentally acceptable method of disposing of electrical equipment, the technologies available for decontamination of askarel equipment, other than high-temperature incineration, are still uncertain as to overall effectiveness and cost. Several commercial methods are offered in Canada; however, their use has been limited and their application to specific decontamination projects must be decided on a case-by-case approach. Potential users must consider such parameters as degree of decontamination; type and size of electrical equipment; energized or de-energized operation required; and equipment to be scrapped or re-used (cost of equipment replacement versus cost of decontamination).

An appraisal of commercial and near-commercial PCB treatment/destruction facilities is provided in an Ontario Research Foundation consultant's report *The Evaluation of Mobile and Stationary Facilities for the Destruction of PCBs* (7).

The most widely used technology, in Europe and the U.S.A., for the destruction of askarel liquids or askarel-contaminated wastes is that of high-temperature incineration. In Canada, the only high-temperature incinerator approved for the destruction of PCB wastes is located at Swan Hills, Alberta. Others are in the planning stage in several provinces.

For non-electrical askarel-filled equipment, decontamination by triple rinsing is considered suitable for metal recovery.

**Contaminated mineral oil equipment:** After draining, equipment (including transformers) that contained mineral oil contaminated with PCBs in concentrations less than 500 ppm may be refilled with clean oil for reuse. Scrapping for metal recovery is considered acceptable where all free liquid is removed from the hulk by an approved method. The metal recovery operation must meet all appropriate federal and provincial
health and environmental regulations. The drained oil must be treated as a PCB liquid waste; however, through chemical processes (see Section 6), the oil can usually be decontaminated and disposed of through licensed waste handlers or recyclers.

**Containers:** Askarel-contaminated containers, such as drums or tanks, should be decontaminated by triple rinsing with an appropriate solvent (see Chapter 7). The container should be filled with enough solvent to coat the sides of the container when it is tipped and rotated. A solvent volume of approximately 10% of the total container volume has been found to be a useful amount for this rinsing procedure, but a smaller volume may be sufficient as long as there is enough solvent to coat all surfaces of the container. The bottom and sides of the container should be thoroughly rinsed with the solvent and then drained. When containers are too large, or of a design that cannot be tipped and rotated, a method equivalent to rinsing should be used, e.g., the use of a mop or a pressure nozzle.

Containers that held PCB-contaminated mineral oil or solvent should be rinsed in a manner appropriate to the degree of contamination and the intended use of the empty container or to the disposal method.

**Solvent Disposal:** Solvents used for PCB decontamination should be disposed of as PCB waste when they contain more than 50 ppm (by weight) of PCBs. If, however, several PCB articles are being decontaminated, it is acceptable to use rinse solvent contaminated with greater than 50 ppm PCB as the first rinse where this will reduce the amount of PCB-contaminated liquid ultimately produced (i.e., when the article being rinsed is more highly contaminated).

### 2.2.2 Retrofilling.

Retrofilling involves the removal of PCBs from a piece of equipment followed by their replacement with an alternative non-PCB fluid (8). The purpose of this process is to permit the reclassification by the appropriate authorities of the piece of equipment as a non-PCB unit either for safety reasons, such as when the equipment is located in a food processing plant, or for sale (2).

**Retrofit procedures:** All retrofill procedures involve similar techniques regardless of the equipment that is being retrofilled. The equipment is drained, decontaminated and refilled with an appropriate replacement fluid. The amount of decontamination and chemical analysis required will vary with the type of equipment, the degree of contamination and, the purpose of decontamination.

**PCB-contaminated mineral oil equipment:** This equipment (including transformers) can usually be decontaminated to the required level simply by replacement of the
oil. Where the mineral oil is highly contaminated, e.g., where a transformer oil contains PCBs in concentrations above 500 ppm, two or more changes (or rinsings) may be required to reduce the level of contamination to below 50 ppm. When transformers are refilled it will be necessary to operate for several weeks to establish equilibrium before draining a second time.

Another method of decontamination that is being increasingly used is an "in situ" process where the decontamination unit is connected directly to the transformer, which may be energized or de-energized, and the oil is continuously recycled through the unit until the PCB concentration of the oil has been reduced to acceptable limits.

**Askarel equipment (other than electrical):** Triple rinsing, prior to retrofilling with a non-PCB fluid, is recommended for this type of equipment.

**Askarel electrical equipment:** Retrofilling of askarel transformers is a sophisticated procedure and should only be done by trained personnel. The success of retrofilling such transformers is highly dependent on the internal design of the transformer case and core, the electrical operating conditions, and the experience of personnel carrying out the procedure. Although very little data are available on the success of retrofilling askarel transformers, several companies in Canada and the U.S. have guaranteed that it can be done to required standards. It should be noted that, after retrofilling, the power ratings of transformers usually have to be downgraded due to the lower heat transmission characteristics of the replacement fluid (Table 2). In some cases, due to the complexity of a transformer's configuration, it may not be technically or economically feasible to remove PCBs to a level below the 50 ppm^9^. 
<table>
<thead>
<tr>
<th>Properties</th>
<th>PCB Replacement Fluid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Silicone Fluid</td>
<td>35</td>
</tr>
<tr>
<td>Aliphatic Hydrocarbons</td>
<td>44</td>
</tr>
<tr>
<td>Chlorinated Benzenes</td>
<td>32</td>
</tr>
<tr>
<td>Poly-α-olefins</td>
<td>40</td>
</tr>
<tr>
<td>SF6* (relative to nitrogen = 1)</td>
<td>2.4</td>
</tr>
<tr>
<td>Minimum dielectric strength (kV)</td>
<td></td>
</tr>
<tr>
<td>Thermal conductivity (W/(m·°C)) @25°C</td>
<td>15.1 x 10^-2</td>
</tr>
<tr>
<td></td>
<td>13 to 13.4 x 10^-2</td>
</tr>
<tr>
<td></td>
<td>6.7 x 10^-2</td>
</tr>
<tr>
<td></td>
<td>14 x 10^-2</td>
</tr>
<tr>
<td>Specific heat (kJ/(kg·°C)) @25°C</td>
<td>1.53</td>
</tr>
<tr>
<td></td>
<td>1.93</td>
</tr>
<tr>
<td></td>
<td>1.59</td>
</tr>
<tr>
<td></td>
<td>2.09</td>
</tr>
<tr>
<td></td>
<td>0.67</td>
</tr>
<tr>
<td>Viscosity (cm²/s)</td>
<td>3.0</td>
</tr>
<tr>
<td>-40°C</td>
<td>1.50</td>
</tr>
<tr>
<td>-17.8°C</td>
<td></td>
</tr>
<tr>
<td>20°C</td>
<td>0.50</td>
</tr>
<tr>
<td>25°C</td>
<td>3.5</td>
</tr>
<tr>
<td>50°C</td>
<td>0.85</td>
</tr>
<tr>
<td>100°C</td>
<td>0.16</td>
</tr>
<tr>
<td>150°C</td>
<td>0.15</td>
</tr>
<tr>
<td>Pour point (°C)</td>
<td>-55</td>
</tr>
<tr>
<td>-30</td>
<td>-30</td>
</tr>
<tr>
<td></td>
<td>-48</td>
</tr>
<tr>
<td>Specific gravity</td>
<td></td>
</tr>
<tr>
<td>at 15.6°C</td>
<td>0.960</td>
</tr>
<tr>
<td>20°C</td>
<td>0.877</td>
</tr>
<tr>
<td>25°C</td>
<td></td>
</tr>
<tr>
<td>Thermal coefficient of expansion (cm³/cm³/°C)</td>
<td>10.4 x 10^-4</td>
</tr>
<tr>
<td></td>
<td>7.5 to 8.5 x 10^-4</td>
</tr>
<tr>
<td></td>
<td>8 x 10^-4</td>
</tr>
<tr>
<td></td>
<td>4 x 10^-4</td>
</tr>
<tr>
<td>Fire point (°C)</td>
<td>365</td>
</tr>
<tr>
<td>310 to 312</td>
<td>none to 210°C(b.p.)</td>
</tr>
<tr>
<td></td>
<td>315 to 321</td>
</tr>
<tr>
<td>Rate of heat release (kW/m²)</td>
<td></td>
</tr>
<tr>
<td>- convective</td>
<td>53 to 66</td>
</tr>
<tr>
<td>- radiant</td>
<td>25 to 26</td>
</tr>
<tr>
<td>Cost ($/L, July, 1985)</td>
<td>7.23</td>
</tr>
<tr>
<td></td>
<td>4.70</td>
</tr>
<tr>
<td></td>
<td>3.12</td>
</tr>
<tr>
<td></td>
<td>4.46</td>
</tr>
</tbody>
</table>

* Sulphur hexafluoride (in the form of liquefied gas).
3 STORAGE

Since there are currently only limited PCB disposal facilities in Canada, storage of PCB wastes is usually the only alternative. The siting, construction, and operation of a PCB storage facility should comply with all federal and provincial environmental, occupational health and safety requirements, as well as with any applicable municipal by-laws and codes. Storage sites may require permits from appropriate provincial authorities.

Transfer of PCB equipment or waste to secure storage should take place as soon as possible after equipment is removed from service or a PCB waste is generated. Between the time of generation of the waste and its placement in storage, all due care should be taken to prevent accidental release of PCBs. In the case of PCB equipment, security during interim storage should at least be equivalent to that provided while the equipment was in service.

Polychlorinated biphenyl storage facilities may be built in various sizes. Regardless of size, the same basic concerns should be addressed whether the facility will house a single out-of-service PCB transformer on existing premises or whether it will be a commercially operated facility storing thousands of kilograms of PCBs. In any case, precautions should be taken to minimize the risk of accidental release of PCBs, and contingency measures, such as spill containment, fire control, and emergency response training for personnel, all appropriate to the degree of hazard, should be in place to deal effectively with an emergency should it occur.

In the design of storage facilities, consideration should be given to the quantity and type of PCB equipment or waste to be stored and the frequency of its receipt or transfer. Facilities designed to store only solids, such as empty transformers, do not require as elaborate spill containment as those storing PCB liquids because there is less possibility of PCB leakage. Good judgement, based on individual needs and type and degree of hazard presented, should always be exercised in siting, choosing materials of construction, designing and operating storage facilities. Provincial and federal authorities will provide advice and council when planning PCB waste storage facilities.

3.1 Siting

A PCB storage facility should be located close to the point of generation of the PCB waste. This is to minimize the distance the PCB waste is transported and thereby decrease the risk associated with transportation. It is realized that this is not
always practical for owners of many PCB-containing units spread over a large area. These owners, such as utilities, may prefer centralized storage facilities.

In all cases, PCB storage facilities should be separated from processing and manufacturing activities and only personnel responsible for the operation of the PCB storage facility should be allowed into the storage area. It is recommended that PCB wastes be stored indoors. However, if outdoor storage is unavoidable, special precautions must be taken to ensure that all equipment and containers are weatherproofed and that a collection system is provided for rainwater which could be contaminated with PCBs.

3.2 Access to Site

Access to a PCB storage area should be restricted to authorized personnel. No other waste should be stored within the area and no manufacturing or other activity should be undertaken. A PCB storage facility may be housed in an occupied building but it should be isolated from other activities. If an isolated room is not available, the facility should be enclosed by a 2-m-high woven mesh fence, or equivalent, with lockable gates. The fence should be clearly labelled to warn people of the presence of PCBs. Personnel protection equipment and cleanup kits for PCB spills should be placed within easy access of the storage area.

3.3 Design

3.3.1 Ventilation. Indoor storage of PCBs provides protection from the weather, permits the control of temperature, and improves the security of the storage. All storage areas should be adequately ventilated and are subject to the regulations and guidelines of the appropriate provincial and federal occupational safety and health agencies. If a mechanical ventilation system is used, it should be controlled by a switch outside the storage room and be energized for several minutes prior to entry. Air intake and exhaust outlets for ventilation systems should be on the building exterior.

3.3.2 Containment. Storage areas should be designed to ensure that PCBs will not be released to the environment. Floors on which PCB liquids are stored should be made of steel, concrete, or similar durable material and equipped with continuous curbing. Concrete should be sealed with a PCB-resistant sealant, such as a two-component amine-cured epoxy paint similar to Plasite 7122 (Corrosion Services Company Ltd.), Flakeline 600 (Cellcote Canada Ltd., Toronto) or Valspar 78TC (Valspar Ltd., Toronto). It is recommended that the sealant coating be inspected periodically to check its integrity. The curbing for multi-equipment or container storage should be designed to accommodate
twice the liquid content of the largest piece of equipment or container or 25% of the total volume of PCB liquid at the location, whichever is larger. For single-unit storage, accommodation for 125% of the container's volume is acceptable. A 15-cm-high curbing will fulfill the above specifications in most instances, but the curbing may be designed to any height provided it will contain the PCB liquid to the specifications previously outlined. All floor drains, pumping systems and sumps leading from the PCB storage location should be sealed to prevent the spread of PCBs from the storage area in the event of a spill. No curbing is required where only solid waste is stored.

3.3.3 Prevention of Water Contamination. Storage facilities should be located and engineered so that PCBs will not be released in the event of flood, storm, or runoff from fire fighting. Storage facilities that have outdoor tanks and piping should have the means to manually divert storm water runoff from the site to a holding pond in the event of an emergency. If a PCB release does occur, the runoff collected in these containment systems should be prevented from entering the drainage system until it has been established that the concentration of PCBs does not exceed acceptable limits specified by the appropriate authorities.

3.3.4 Containers. Polychlorinated biphenyl solids should be stored in containers made of steel or other materials that provide sufficient durability and strength to prevent such solids from being released into the environment, affected by the weather, or contaminated from external sources. Containers for PCB liquids should meet the same requirements but be made out of metal.

Drums used to contain PCB solids should be of a capacity not greater than 205 litres, be made of steel having a gauge of 18 or heavier, and have a removable steel lid with a gasket of PCB resistant material. Drums used to contain PCB liquids should be of a capacity not greater than 205 litres, of double bung design, and made of steel having a gauge of 16 or heavier.

Overpacks may be used: (a) to consolidate two or more smaller containers or packages for convenience in handling or storage; (b) as additional security for single containers; or (c) as the only container if the overpack offers a degree of security equivalent to that mentioned above for containers and drums.

3.4.5 Outside Storage. Any PCB equipment containing PCBs or PCB liquids stored outside, besides meeting floor and containment requirements, should be covered by a weatherproof roof or barrier that protects the equipment or liquids and the curbing or drip pans under them.
Solids including drained PCB equipment and containers may be stored outside without being covered by a roof or other secondary covering providing the drained equipment and containers and containers of solids are structurally sound and sealed from the weather.

Bulk containers such as large international shipping containers or approved commercially manufactured metal storage containers or structures may be used for either primary or secondary containment for outdoor storage.

3.4 Operation of Storage Facility

Polychlorinated biphenyl wastes should be packaged so as to ensure that the potential for leakage or spills is kept to a minimum (e.g., small pieces of equipment, such as ballasts or capacitors, should be stored in drums or equivalent containers). The containers should be clearly labelled (see Chapter 4) and marked with the date of entry to storage. Drums or other portable containers of PCBs and PCB equipment should be placed on skids or pallets. Sufficient space should be left between stored containers and equipment to permit inspection and allow the safe movement of vehicles such as forklifts. Drums or other containers of PCB liquids that are stacked should be separated from each other by pallets and not stacked more than two containers high. Higher stacking may be utilized providing intermediate shelving or special bracing, strapping, or other proven storage systems are employed. Askarels should be segregated from combustibles such as Varsol rinsing fluid, oil, soaked rags, and contaminated mineral oil. PCB wastes should be stored so as to avoid the contamination of other materials in the event of a fire, leak, spill or other discharge.

Large-capacity PCB storage facilities should have a central receiving area where PCB equipment and wastes are loaded and unloaded from transport vehicles. This receiving area should also have a PCB-impervious floor and a containment system to properly control any spills during loading or unloading. The containment system could take the form of impervious dykes or grated drainage trenches connected to an isolated sump. This type of receiving area and containment system should be considered for a large centralized storage facility receiving mainly PCB liquids.

3.5 Fire Protection

The owner or operator of a PCB storage site should develop a fire control and emergency procedures plan in consultation with the local fire department. Indoor sites should be provided with a fully operative fire alarm system and suitable portable or flood
type fire extinguishers, such as: chemical foam, carbon dioxide, or nitrogen gas. An updated inventory of wastes and their location should be provided to the local fire department. Materials for cleanup should be readily available at or near the site.

Where a storage site is equipped with a mechanical exhaust system that exhausts into a building, the system must be provided with a smoke sensory control to stop the fan and close the damper(s) in the event of a fire.

3.6 Maintenance and Inspection

Personnel working at the facility should be made clearly aware of and understand current PCB waste management procedures including the use of personnel protection equipment and cleanup techniques. Training measures proposed should be made available to regulatory environmental and labour authorities to give them the opportunity to review and comment on their content.

The storage site should be inspected each month with particular attention to PCB equipment, floors, drains, drainage systems, fire prevention apparatus, personnel protection equipment, security fences. Any equipment or container found to be leaking PCBs should be repaired or replaced and any contaminated area cleaned up.
4

LABELLING AND RECORD KEEPING

This chapter covers labelling and record-keeping recommendations for in-use and out-of-service PCB equipment, and for PCB liquid and solid waste.

The purposes of labelling are:

- to provide immediate identification of PCB equipment and PCB wastes;
- to alert company officials that the labelled equipment or waste requires special handling and disposal considerations;
- to alert personnel to the presence of PCBs in the event of a spill or leakage;
- to assist company, provincial and federal officials in maintaining PCB inventories; and
- to assist with record keeping.

The purpose of record keeping is to keep track of PCB equipment and wastes until the PCBs are disposed of.

All equipment and wastes that contain PCBs at concentrations greater than 50 ppm should be labelled. Some owners may find it prudent to also label equipment and wastes that contain PCBs at concentrations of less than 50 ppm even though, strictly speaking, they are not defined as PCB wastes. The reason for this is that spills or leakages could conceivably result in high cleanup costs under certain circumstances and because federal regulations specify the maximum permissible concentration of PCBs in oils for dust control at 5 ppm (3). In addition, several provinces regulate PCBs in concentrations less than 50 ppm.

The labelling of in-service equipment is voluntary; however, it is strongly recommended by Environment Canada and, to date, industry has cooperated fully. Additional guidance on the labelling of in-service equipment is provided in reference (10).

Where PCB users have developed their own labelling and reporting procedures, the labels and procedures should incorporate the functions of the system described in this chapter.

Under the Transportation of Dangerous Goods Regulations, safety marking is mandatory for the offering for transport and transportation of PCB wastes and equipment. The Transportation of Dangerous Goods Regulations are discussed in Chapter 5.

4.1 Labelling of In-service Equipment

The proper labelling of in-service PCB equipment will ensure that it is correctly identified when it enters the waste stream (10). The PCB label also alerts
people to the presence of PCBs in the equipment and assists in inventory control while in-
service, and later, during handling, storage, and disposal.

4.1.1 Askarel Equipment. Environment Canada recommends four labels for PCB
equipment (Figures 1, 2, and 3). The first two (Figure 1) are serialized and have an
Environment Canada registration number at the bottom. These numbers allow
Environment Canada to keep track of the amounts and locations of askarel equipment and
liquids. All askarel equipment of sufficient physical size to take a label should be labelled
with one of the two serialized labels.

The label shown in Figure 1a) measures 15 x 15 cm and should be used on large
askarel equipment such as transformers. Once affixed, the label should only be removed
if the equipment has been decontaminated and Environment Canada is satisfied that the
PCB concentration is less than 50 ppm.

The label shown in Figure 1b) measures 7.6 x 7.6 cm and should be used for
small items, such as capacitors, where size permits. Where a number of smaller pieces of
PCB equipment are found together, such as a capacitor bank, one label may be used for
the entire group; however, when a capacitor is removed from the bank for disposal, it
should be labelled. Equipment that contains small PCB articles, for example a radio
transmitter that contains PCB capacitors, does not have to be labelled.

A non-serialized version of the 15 x 15 cm label is shown in Figure 2. It is to
be used as a general warning label and should be placed in a clearly visible position at the
entrances to locations where PCB equipment is found. Some examples of these locations
are fenced storage compounds, electrical rooms and transformer vaults.

4.1.2 PCB-contaminated Equipment. The PCB concentration in PCB-contaminated
equipment (e.g., a PCB-contaminated mineral oil transformer) is much lower than that
found in equipment using askarels. Nevertheless, if the PCB concentration is greater than
50 ppm, this equipment poses a potential hazard and is subject to the same regulations
that apply to equipment containing askarels. When it is suspected that a piece of
equipment may be contaminated with PCBs, and an activity is to be carried out to which
the regulations apply, then the fluid contained in the equipment should be tested. If PCBs
are found, a PCB warning label for contaminated equipment should be placed on the
equipment. This label (Figure 3) has space for entering: the PCB concentration, date of
analysis, company name, and the signature of an authorized company official. This label,
A TOXIC SUBSTANCE SCHEDULED UNDER THE CANADIAN ENVIRONMENTAL PROTECTION ACT. IN CASE OF ACCIDENT, SPILL OR FOR DISPOSAL INFORMATION, CONTACT THE NEAREST OFFICE OF ENVIRONMENTAL PROTECTION, ENVIRONMENT CANADA.

<table>
<thead>
<tr>
<th>ATTENTION PCB</th>
<th>BPC</th>
</tr>
</thead>
<tbody>
<tr>
<td>POLYCHLORINATED BIPHENYLS</td>
<td>CONTIENT DES BIPHENYLES POLYCHLORÉS</td>
</tr>
</tbody>
</table>

SUBSTANCE TOXIQUE MENTIONNÉE DANS L'ANNEXE DE LA LOICANADIENNE SUR LA PROTECTION DE L'ENVIRONNEMENT. EN CAS D'ACCIDENT, OU DE DÉVERSEMENT, OU POUR SAVOIR COMMENT L'ÉLIMINER, CONTACTER LE BUREAU DE LA PROTECTION DE L'ENVIRONNEMENT, MINISTÈRE DE L'ENVIRONNEMENT LE PLUS PRÈS.

OR 26900

---

**a)** Label for Large Equipment

---

**b)** Label for Small Equipment

---

**FIGURE 1** LABELS FOR PCB EQUIPMENT
**ATTENTION**

**PCB**

CONTAINS

POLYCHLORINATED BIPHENYLS

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

**BPC**

CONTIENT DES

BIPHÉNYLES POLYCHLORÉS

SUBSTANCE TOXIQUE MENTIONNÉE DANS L'ANNEXE DE LA LOI CANADIENNE SUR LA PROTECTION DE L'ENVIRONNEMENT. EN CAS D'ACCIDENT, OU DE DÉVERSEMENT, OU POUR SAVOIR COMMENT L'ÉLIMINER, CONTACTER LE BUREAU DE LA PROTECTION DE L'ENVIRONNEMENT, MINISTÈRE DE L'ENVIRONNEMENT LE PLUS PRÈS.
**ATTENTION**

<table>
<thead>
<tr>
<th>CONTAMINATED WITH PCBs (POLYCHLORINATED BIPHENYLS)</th>
<th>CONTAMINÉ PAR BPCs (BIPHÉNYLES POLYCHLORÉS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>THE CONTENTS OF THIS EQUIPMENT ARE CONTAMINATED WITH PCBs, A TOXIC SUBSTANCE SCHEDULED AND REGULATED UNDER THE CANADIAN ENVIRONMENTAL PROTECTION ACT. IN CASE OF ACCIDENT, SPILL OR FOR DISPOSAL INFORMATION, CONTACT THE NEAREST OFFICE OF ENVIRONMENTAL PROTECTION, ENVIRONMENT CANADA.</td>
<td>LE CONTENU DE CET APPAREIL EST CONTAMINÉ PAR DES BPCs, UNE SUBSTANCE TOXIQUE ANNEXÉE ET RÉGLEMENTÉE EN VERTU DE LA LOI CANADIENNE SUR LA PROTECTION DE L'ENVIRONNEMENT. EN CAS D'ACCIDENT, OU DE DÉVERSEMENT, OU POUR SAVOIR COMMENT L'ÉLIMINER, CONTACTER LE BUREAU LE PLUS PROCHE DE LA PROTECTION DE L'ENVIRONNEMENT, MINISTÈRE DE L'ENVIRONNEMENT.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PCB CONCENTRATION (parts per million)</th>
<th>CONCENTRATION DE BPC (parties par million)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DATE ANALYZED</td>
<td>DATE D'ANALYSE</td>
</tr>
<tr>
<td>COMPANY NAME</td>
<td>NOM DE LA COMPAGNIE</td>
</tr>
<tr>
<td>AUTHORIZED COMPANY OFFICIAL</td>
<td>AGENT OFFICIEL AUTORISE</td>
</tr>
</tbody>
</table>
or an appropriate equivalent, should also be used to identify drums, tanks or packaging where contaminated mineral oils, rinsing fluids, or other low level PCB-contaminated wastes are stored.

4.1.3 **Drums Containing High Concentration PCBs.** Drums or other containers containing PCB liquids in concentrations above 10 000 ppm (1%) require special identification to alert people to separate these liquids from low-level wastes in the storage area and also that special disposal requirements (usually by incineration) may be necessary. These containers should be labelled with the non-serialized 150 x 150 mm label as shown in Figure 2.

4.2 **Labelling of PCB Waste**

All labels applied to in-service equipment according to the recommendations given previously should be left on that equipment when it becomes waste material, unless liquids have been decontaminated to less than 50 ppm of PCBs. Additional safety marking requirements for PCB wastes, pursuant to the Transportation of Dangerous Goods Regulations, are described in Chapter 5.

4.3 **Record Keeping and Retention**

4.3.1 **Record Keeping for In-service Equipment.** Environment Canada maintains an inventory of all askarel and PCB-contaminated equipment that has been labelled. During inspections, this equipment may be identified, checked against the inventory list, and have its status updated if necessary. The Environment Canada office in the appropriate region should be informed whenever an organization alters the status of a piece of PCB equipment, e.g., if it is taken out of service, re-located, stored, decontaminated, or disposed of. See Appendix F for a list of Environment Canada offices where notification can be made.

4.3.2 **Record Keeping in Storage and Disposal.** Each owner or operator of a facility for the storage of PCB wastes should keep records which include:

- an inventory of each item of PCB waste and the quantity of PCB therein;
- the date and source of PCB waste transferred to storage and the date and destination of waste leaving storage;
- a description of the PCB waste, including the quantity and concentration of PCBs, nameplate description where available;
- identification number for the PCB waste (this can be the identification number from the label described in Section 4.1);
- name of carrier of PCB waste;
- name of recipient or shipper of PCB waste;
- date and quantity of PCBs spilled as a result of a leak or accident and cleanup procedures adopted; and
- dates and details of inspections by Environment Canada, the owner and provincial authorities.

The owner or operator of a disposal facility should maintain records in a manner similar to that for a storage facility with the inclusion of information on:

- the quantity of PCB wastes disposed of and the method(s) used;
- quantities and disposal methods for residues produced; and
- monitoring data appropriate to the particular disposal method(s) used (see Appendices C and D).

Owners of PCB equipment or PCB wastes should retain a record of their inventory for five years after removal or disposal of the last of their PCBs. During that time, the annual inventory reports will confirm the disposal of the PCBs and will enable the provinces and Environment Canada to verify the reduction and eventual exhaustion of the PCB inventory. This recommendation also applies to owners and operators of storage and disposal facilities.

This maintenance of records will parallel the requirements of the Transportation of Dangerous Goods Regulations except that, under the regulations, documents related to transportation are required to be kept for only two years.

**4.3.3 Reporting Requirements.** Each owner or operator of a storage site should provide the appropriate regulatory authority with an inventory of all wastes stored at the site. Periodic updates of wastes transferred into or out of the site along with complete descriptions of the wastes should also be provided. All records kept at the site should be available for review and examination by authorized inspectors.
5 TRANSPORTATION

The federal Transportation of Dangerous Goods Regulations, and complimentary provincial legislation, specify standards and requirements for the safe handling and transporting, by all modes of transportation within Canada, of dangerous goods and/or hazardous wastes. The federal regulations apply to all domestic consignments by air, marine and rail transportation, and to all inter-provincial, transborder (Canada and the U.S.A.) by road and rail, and international (Canada and another country by aircraft or by ship) consignments. Provincial regulations apply to road consignments within a province. The federal and provincial regulations also cover safety markings, documentation, packaging, safety and emergency reporting requirements, and training of personnel. Under the TDG regulations, PCBs or articles containing PCBs have a primary classification number of 9.1, a subsidiary classification number of 9.2, and a Product Identification Number (PIN) of 2315.

Under provincial hazardous waste legislation, it may also be necessary for the consignor (generator), carrier, and consignee (receiver) involved in the transportation of PCB wastes and equipment to obtain approvals or licenses which may specify further contractual responsibilities for these parties.

Another federal regulation applicable to the transportation of PCBs is the Interim Order Respecting Chlorobiphenyls (February 20, 1989) which specifies that the maximum quantity of PCBs that may be released to the environment during the transportation of transformers, capacitors, heat transfer and hydraulic equipment, electromagnets and vapour diffusion pumps, or any package containing PCB equipment, is one gram per day for any one piece of equipment or any one package of equipment.

5.1 Definitions

The following definitions are from the amendment (SOR/86-526, Canada Gazette II, May 28, 1986) of the Transportation of Dangerous Goods Act and apply to all road and rail PCB transportation-related activities subject to the regulations.

**Electrical Equipment** - means a piece of equipment that:

a). contains a PCB mixture;

b). is used in the transmission or distribution of 60 Hz, 25 Hz or high voltage direct current (HVDC) electrical power;
c). is designed to perform a function other than solely to contain the PCB mixture; and
d). is normally leak-free while in service.

PCB Article - means any article that contains a PCB mixture, but does not include electrical equipment, a packaging or a container.

PCB Mixture - means a mixture containing PCBs in a concentration greater than 50 parts per million by weight.

Serviceable Electrical Equipment - includes electrical equipment that:
a). may show evidence of leakage;
b). is temporarily out of service for the purpose of maintenance, repair or relocation; and
c). is not in temporary storage for the purpose of disposal.

Larger Container - means a container with a capacity greater than 454 L.

5.2 Exemptions

The recent amendments to the Transportation of Dangerous Goods Regulations provide a regulatory scheme for the transportation of PCB materials, equipment, and articles contaminated with PCBs and provide certain exemptions for small-quantity samples, articles and wastes, and some types of electrical equipment containing PCBs. Securely packaged (including absorbent) samples, solids in quantities less than 10 kg gross weight and liquids when their net quantity is the lesser of 2 L or 2 kg are exempt. When a waste is a PCB mixture, or a PCB article or electrical equipment containing a PCB mixture, it is also exempt if the quantity of PCB mixture is not greater than 500 g. PCB articles in leak-free condition and containing not greater than 500 g of PCB mixture are exempt from all regulation.

Certain electrical equipment is exempt from most regulatory requirements, (except those requirements for dangerous occurrence reporting), provided specific conditions of transport are met. In particular, equipment never designed to operate with PCBs, but nonetheless contaminated with PCBs, is treated in this fashion if it is being transported for servicing, relocation or for use as an emergency replacement. This situation applies to all such equipment only if it contains less than 500 L of PCB liquid and is in leak-free condition.

The additional conditions for transportation for this type of equipment and those for all other PCB mixtures, articles, and equipment are discussed in Section 5.4.
5.3 Safety Marking and Documentation

Polychlorinated biphenyls in containers or articles, or equipment containing PCBs, when offered for transport, must be labelled as shown in Figures 4 and 5, and the containers, articles or equipment must clearly show the shipping name and the PIN number.

When PCBs are to be transported in a large container or transport unit a Class 9 placard (Figure 6) must be displayed. An exception to this rule is for PCB goods (i.e., not PCB wastes) in road vehicles travelling solely on land and when the gross quantity of PCB goods is less than 500 kg. No such exception applies for PCB wastes.

Under the Transportation of Dangerous Goods Regulations, three documentation requirements affect shipments of PCB wastes. Consignments of PCB waste destined for or imported from any international location are subject to a 60-day advance notification requirement (Figure 7). This notification must contain specific information, including the identity of all parties involved in the shipment (including a confirmation of generator/receiver contractual arrangements), a description of the waste, the quantity involved, the packaging and means of transport, the ports of entry and/or exit, and the approximate date of shipment of the consignment. Such a notification can cover a series of consignments over a twelve month period if estimated shipping dates for each consignment in such a series are given. However, seven days before the intended shipping date of the second and each subsequent consignment in a series, the shipper must again notify both Transport Canada and Environment Canada. The Canadian party must also forward to Environment Canada and Transport Canada a letter confirming that arrangements have been made by the Canadian party, when dealing with a party outside Canada, to receive completed copies of the Waste Manifest. Environment Canada will issue a letter of acknowledgement which must accompany imported or exported waste along with the Manifest. In transit shipments differ slightly in that the actual Notification must accompany the shipment. Interprovincial shipments differ in that PCB shipments require a 30-day advance Notification and seven days prior to the shipment arrangements must be made for an inspection of the consignment by the appropriate authority.

Before dangerous goods that are PCB mixtures or articles or equipment containing PCBs are transported, the consignor must prepare and sign a shipping document and deliver it to the initial carrier. When the consignment is waste PCB mixtures or
FIGURE 4    TDGA PCB LABEL (being revised by Transport Canada)

FIGURE 5    TDGA CLASS 9 LABEL

FIGURE 6    TDGA CLASS 9 PLACARD
CONSIGNOR (GENERATOR) EXPEDITEUR (PRODUCTEUR)

Company Name: Nom de l'entreprise
Tel. No. (Area Code) - N° de tel. (incl. ind.): 20785

Address: Adresse
City - Ville: Prov.
Postal Code - Code postal:

Shipping Site Address - Adresse du lieu d'expédition:
City - Ville: Prov.
Postal Code - Code postal:

CONSIGNEE (RECEIVER) DESTINATAIRE (RECEPTIONNANT)

Company Name: Nom de l'entreprise
Tel. No. (Area Code) - N° de tel. (incl. ind.): 20785

Address: Adresse
City - Ville: Prov.
Postal Code - Code postal:

Receiving Site Address - Adresse du lieu de destination:
City - Ville: Prov.
Postal Code - Code postal:

Length of Stay in Transit Country(ies):
Duree du sejour dans les pays de transit:

Handling Method in Transit Country(ies):
Methode de manutention dans les pays de transit:

METHODS OF DISPOSAL - METHODES D'ÉLIMINATION

First Shipments - Premiers envois

Date of Departure - Date de depart
Estimated Date of Arrival - Date d'arrivée prevue

Province(s) or Country(ies) of Transit:
Provinces(s) ou pays traversé(s):

Point of Entry or Exit:
Port d'entrée ou de sortie

Highway Used:
Route utilisee:

PCB only - PCB seul

Multiple Shipments: Including _______ shipments to be completed by: _______ (Y/M/D) with a total quantity of: _______ L or _______ kg.

Envois multiples: Nombre d'envois _______ à être transportés pour le _______ (A/M/J) d'une quantité totale de: _______ L ou _______ kg.

Shipping Name of Waste Appellation réglementaire du déchet

<table>
<thead>
<tr>
<th>Waste Identification Identification du déchet</th>
<th>Quantity per Ship ment Quantité par envoi</th>
<th>Units L or kg Unites (litres ou kg)</th>
<th>Classification Classification</th>
<th>Packing Group Groupe d'emba chage</th>
<th>PB - only PCB seul</th>
<th>Unites (pieces) Unites (paquets)</th>
<th>Packaging/ Container Emballage/ Conteneur</th>
<th>Notes Notes</th>
<th>Cores Cores</th>
</tr>
</thead>
<tbody>
<tr>
<td>1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Special Handling/ Emergency Instructions Manutention speciale / Instructions d'urgence

Attached: Oui Non: Oui

Consignor/ Consignee Certification: I declare that arrangements have been made to receive and dispose of the consignment of waste.
Déclaration de l'expéditeur / destinateur: Je déclare que des dispositions ont été prises pour la réception et l'élimination de l'envoi de déchet.

Name of authorized Person (projet) - Nom de l'agent autorisé (caracteres d'imprimerie)
Signature
Date Yr. - Mo. - Day - J day

Copy 1 (white) - Transport Canada for Inter-Provincial Consignment (PCB)
Transport Canada for International and Transborder Consignment(s)

Copy 1 (blanche) - Transports Canada, envoi inter-provincial (BPC)
Transports Canada, envoi(s) international(aux) et transfrontalière(s)

FIGURE 7 NOTIFICATION FORM
**MANIFEST—MANIFESTE**

**THIS MANIFEST CONFORMS TO ALL FEDERAL AND PROVINCIAL TRANSPORT AND ENVIRONMENTAL LEGISLATION REQUIRING MANIFESTS.**

**CE MANIFESTE EST CONFORME AUX LEGISLATIONS FEDERALE ET PROVINCIALE SUR L'ENVIRONNEMENT ET LE TRANSPORT, REQUIERANT UN MANIFESTE.**

**CONSIGNOR (GENERATOR) / EXPÉDIATEUR (PRODUCTEUR)**

<table>
<thead>
<tr>
<th>Company Name</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Mail or Address</td>
<td>City, Vîle</td>
</tr>
<tr>
<td>Phone</td>
<td>Postal Code</td>
</tr>
</tbody>
</table>

**CARRIER / TRANSPORTEUR**

<table>
<thead>
<tr>
<th>Company Name</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Mail or Address</td>
<td>City, Vîle</td>
</tr>
<tr>
<td>Phone</td>
<td>Postal Code</td>
</tr>
</tbody>
</table>

**SHIPPER / Expéditionnaire**

<table>
<thead>
<tr>
<th>Partial Site</th>
<th>City, Vîle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phone</td>
<td>Postal Code</td>
</tr>
</tbody>
</table>

**DESCRIPTION OF WASTE / DESCRIPTION DE DECHET**

<table>
<thead>
<tr>
<th>Waste Identification Numbers</th>
<th>Quantity</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**DO NOT WRITE IN THIS AREA.**

**DO NOT WRIT IN CET ESPACE.**

**FIGURE 8**

**TDGA WASTE MANIFEST**

**MAILED BY CONSIGNOR (GENERATOR) to Province of Consignee (Receiver) - Postée par l'expéditeur à la province du destinataire**

**COPIE 1 (BLANCHE)**
waste articles or equipment containing PCBs, a manifest form (Figure 8) is required for each shipment. Completion of part A of the form is the responsibility of the consignor (generator) and Part B of the carrier. The manifest form then accompanies the shipment during transport to the consignee (receiver) who must check the shipment on receipt for any discrepancies and ensure that it matches the description on the manifest before completing Part C of the manifest. The required distribution of the various copies of the manifest for intra- or interprovincial shipments is shown in Figure 9 (11). The distribution of copies for import and export shipments is shown in Figure 10. Written directions for the distribution of manifest copies for the three types of shipments are included in Appendix H.

FIGURE 9 DISTRIBUTION OF MANIFEST COPIES (inter- and intraprovincial shipments) *When the province of origin and destination is different.

For PCB equipment, the manifest's Special Handling Section should include the Environment Canada (EC) inventory number so that, by exchange of information between the provincial environment ministries and Environment Canada, the EC inventory can be updated.

There is one additional documentation requirement. In the event of a spill of 50 kg or more of a PCB mixture during transportation-related activities, a Dangerous Occurrence Report Form (Figure 11) must be completed as required by the Transportation of Dangerous Goods Regulations.
FIGURE 10 DISTRIBUTION OF MANIFEST COPIES (import and export)
## Dangerous Occurrence Report Form (Front)

### 1. Type of Dangerous Occurrence — Genre de Cas de Danger
   - Explosive
   - Fire
   - Contamination

### 2. Date of Dangerous Occurrence — Date du Cas de Danger
   - [ ] Y
   - [ ] A
   - [ ] M
   - [ ] D
   - [ ] J

### 3. Time of Dangerous Occurrence (in hr. system) — Heure du Cas de Danger (sur 24 heures)
   - [ ]

### 4. Location of Dangerous Occurrence (be specific) — Lieu du Cas de Danger (précisez)
   - Residential Area
   - Commercial and Residential Area
   - Rural Area
   - Urban Area
   - Industrial Area

### 5. Dangerous Occurrence Happened — Le Cas de Danger s'est Produit Pendant
   - [ ] During Transport
   - [ ] During Handling (Specify)
   - [ ] During Temporary Storage

### 7. Complete A or B — Remplir A ou B

#### (A) Dangerous Occurrence During Transport

1. **Mode of Transport — Mode de Transport**
   - [ ] Road
   - [ ] Rail

2. **Type of Vehicle — Genre de Véhicule**

3. **Carrier (Name and Address) — Transporteur (Nom et Adresse)**

#### (B) Dangerous Occurrence During Handling or Temporary Storage

1. **Facility — Installation**
   - Terminal: [ ] Air
   - Port: [ ] On Shore

2. **Type of Carrier (Specify) — Autre (Précisez)**

3. **Carrier Address — Adresse du Transporteur**

### 9. Consignor — Expéditeur

#### 10. Origin of Consignment — Point d'Origine de l'Envoi

#### 10. Destination of Consignment — Point de Destination de l'Envoi
11. DANGEROUS GOODS INVOLVED IN THE OCCURRENCE WERE:
LES MARCHANDISÉES DANGEREUSES EN CAUSE DANS LE CAS DE DANGER ÉTAIENT:

<table>
<thead>
<tr>
<th>P.I.N. NIP</th>
<th>CLASSIFICATION</th>
<th>SHIPPING NAME — APPELLATION RÉGLEMENTAIRE</th>
<th>TYPE OF PACKAGE GENRE DE COLIS</th>
<th>TOTAL MASS OR VOLUME OF SHIPMENT MASSE OU VOLUME TOTAL DE L'ENVOY</th>
<th>MASS OR VOLUME OF ESTIMATED LOSS MASSE OU VOLUME DES PERTES ESTIMATIVES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

12. DESCRIBE THE EVENTS LEADING TO, DURING AND RESULTING FROM THE DANGEROUS OCCURRENCE
DÉCRIVEZ LES CIRCONSTANCES AYANT CONDUIT AU CAS DE DANGER ET CELLES QUI PRÉVAIENT DURANT ET APRÈS LE CAS DE DANGER


13. NUMBER OF DEATHS
NOMBRE DE DÉCÈS

14. NUMBER OF INJURED PERSONS REQUIRING HOSPITALIZATION
NOMBRE DE BLESSÉS QUI ONT DÛ ÊTRE HOSPITALISÉS

15. EVACUATION OF SURROUNDING AREA
EVACUATION DES ENVIRONS

| YES | OUI | NO | NON |

16. EMERGENCY RESPONSE PERSONNEL AT SITE OF DANGEROUS OCCURRENCE
PERSONNEL D'INTERVENTION D'URGENCE SUR LES LIEUX

<table>
<thead>
<tr>
<th>POLICE</th>
<th>P.S.</th>
<th>FIRE DEPARTMENT</th>
<th>SERVICE D'INCENDIE</th>
</tr>
</thead>
</table>

17. COMMENTS AND ADDITIONAL INFORMATION — COMMENTAIRES ET RENSEIGNEMENTS SUPPLEMENTAIRES


18. PERSON COMPLETING THIS FORM — FORMULE REMPLIE PAR:

<table>
<thead>
<tr>
<th>NAME — NOM</th>
<th>TITLE — TITRE</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>ADDRESS — ADRESSE</th>
<th>TELEPHONE — TELEPHONE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>AREA CODE / CODE REG.</td>
</tr>
</tbody>
</table>

I CERTIFY THAT THIS INFORMATION IS ACCURATE TO THE BEST OF MY KNOWLEDGE.
J'ATTESTE QUE LES RENSEIGNEMENTS CI-DESSUS SONT EXACTS AU MEILLEUR DE MA CONNAISSANCE.

SIGNATURE: ___________________ DATE: __________

SEND TO: TRANSPORT DANGEROUS GOODS, TDGA / T, TRANSPORT CANADA, OTTAWA, ONT. K1A 0N5

FIGURE 11 DANGEROUS OCCURRENCE REPORT FORM (Back)
Depending upon provincial requirements, additional information may be required for shipments of waste PCB mixture and waste articles/equipment containing PCBs.

5.4 Packaging

To avoid problems under normal transportation conditions, the Transportation of Dangerous Goods Regulations require that articles containing a PCB mixture be securely enclosed in a leak-proof container suitable for PCBs.

Polychlorinated biphenyl mixtures not contained in articles or equipment must be packaged in suitable liquid-tight containers that conform to relevant specifications in Rules 40, 41 or 54 of CFC 6000 (Canadian Freight Classification CFC 6000 January 1979, Canadian Freight Association).

Serviceable electrical equipment that is exempt under the conditions described in Section 5.2 must be transported in its normal operating position. Serviceable electrical equipment used as emergency replacement for stationary equipment must also be permanently mounted on a railway or road vehicle. This type of equipment, if it is drained, must have any remaining PCB mixture contained in the base below the drain opening. When transportation occurs by road vehicles, the equipment must be inspected by the carrier every two hours or every 200 km, whichever is more frequent.

All other serviceable electrical equipment (i.e., that not exempt in Section 5.2 and that containing greater than 500 L PCB mixture) and PCB electrical equipment, either in use or waste, must be transported in the following manner. The equipment must first be drained to the greatest extent possible over 48 hours before all orifices are capped or sealed. The equipment is then protected by a means of containment that will prevent any escape of remaining liquid; sufficient absorbent material is placed inside the containment to absorb the remaining liquid; and finally, the entire equipment plus containment is covered to protect against the weather.

One final type of packaging for transport may be necessary. The regulations presently offer an alternative method for transporting electrical equipment, when it is impossible or inadvisable to drain the equipment before transport. In such instances, transportation can proceed if the equipment is placed in a leakproof container. If complete containment is not feasible, the equipment must be placed in a drip pan with a capacity of 125% of the nameplate capacity of the equipment; the drip pan must be filled with sufficient absorbent material to absorb 110% of the equipment's capacity; and the entire equipment and drip pan must be covered to protect against the weather.
When packaging PCB liquids for transport (e.g., askarel, PCB-contaminated mineral oil, solvent flushings, or water), the liquids should be pumped rather than poured into containers, leaving a 7- to 10-cm air space for liquid expansion; full open head containers must not be used.

### 5.5 Safety During Transport

All containers and vehicles should be inspected for mechanical defects and leaks; any leaks must be cleaned up using sorbents and/or solvents listed in Chapter 7.

According to the Transportation of Dangerous Goods Regulations, no person shall handle, offer for transport or transport PCBs or articles containing PCBs, including waste, unless he is trained to do so, or is performing those activities under the direct supervision of a trained person. A person is considered suitably trained:

i). when his employer
   a). is satisfied that the person has received adequate training in the aspects of the handling, offering for transport or transporting of dangerous goods related to the duties that he proposes to assign to the person, and
   b). issues to the person a Certificate of Training that indicates
      - the date the person completed an initial training in the handling, offering for transport or transporting of dangerous goods,
      - the date the person completed each subsequent training in the handling, offering for transport or transporting of dangerous goods, if any, and
      - the aspects of the handling, offering for transport or transporting of dangerous goods for which the person was trained; or

ii). when the person is the holder of a certificate, license or authorization recognized under:
   a). the Ships' Deck Watch Regulations,
   b). *The Pest Control Products Act*,
   c). the Regulations No. 0-8, Uniform Code of Operating Rules, or
   d). the *Atomic Energy Control Act*.

and the certificate, license or authorization relates, at least in part, to the aspects of handling, offering for transport or transporting of dangerous goods that are applicable to his assigned duties.

In the case of an incident involving PCBs, transportation personnel must be fully aware of the requirement to notify the appropriate provincial/territorial emergency authority at the emergency telephone numbers listed on the waste manifest (Figure 7). Information on dealing with PCB releases can also be obtained from a 24-hour hotline.
service called CANUTEC operated by Transport Canada, which can be reached at (613) 996-6666.

The appropriate provincial environmental authority should be informed of spills and cleanup measures being taken. Environment Canada should also be contacted where they are considered by the provincial authority to have the best information on emergency and spill cleanup procedures.
6 DISPOSAL OF PCBs

6.1 General

A critical issue in the management of PCB waste is the PCB concentration or mass at which a material is defined as a PCB waste. The main criterion defined by the federal government is any waste material containing more than 50 ppm PCBs. This does not mean that PCB wastes that do not meet its criterion should be disposed of indiscriminately or routinely go to municipal landfills. Low-concentration or small-quantity PCB wastes should be addressed individually and disposed of in accordance with provincial regulations or requirements.

A specific federal restriction on the release of PCBs in concentrations lower than 50 ppm is given in the Interim Order Respecting Chlorobiphenyls (February 20, 1989) the maximum concentration of PCBs in oil applied to a road surface is limited to 5 ppm. This limit was imposed because of the potential for contamination of surface water and sediments from runoff from roads. Some provinces have lower limits than this for road oiling or have banned it completely.

Although there is a 0.5 kg exemption on PCB mixtures for transportation purposes (see the May 26, 1986, amendments to the Transportation of Dangerous Goods Regulations) as a general principle, small items coming within this category, such as capacitors sometimes found in home appliances, electronic equipment and fluorescent light fixtures (12), should not be ignored but should be segregated and collected, stored and disposed of in a manner that is as environmentally acceptable as the requirements for larger items.

As previously mentioned, except for the incinerator installation at Swan Hills, Alberta, and several mobile chemical treatment units for decontaminating low-level, PCB-contaminated mineral oil, there are no commercial facilities in Canada available for the destruction of waste PCB-contaminated equipment, soils or other solids, containers or packaging or PCB-contaminated liquids.

This section on disposal is not intended to be all embracing and additional information and evaluations on specific commercial or near-commercial PCB treatment/destruction technologies is provided in reports such as those by the Ontario Research Foundation (7) and Kupchanko (13). High temperature incineration has a proven track record in the destruction of all types of PCB waste.

A summary of disposal technologies for the various types of PCB wastes most frequently encountered is given in Table 3, and brief descriptions of these technologies follow.
### TABLE 3  DISPOSAL TECHNOLOGIES FOR VARIOUS PCB WASTES

<table>
<thead>
<tr>
<th>Waste Type a</th>
<th>Typical PCB Content</th>
<th>Disposal Option</th>
<th>Liquid Injection Incinerator</th>
<th>Rotary Kiln Incinerator</th>
<th>High Efficiency Boiler c</th>
<th>Material Recovery</th>
<th>Approved Landfill</th>
<th>Municipal Landfill</th>
<th>Sodium-based Processes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Askarel</td>
<td>30 to 70%</td>
<td></td>
<td>○</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Decontamination Flushing (Concentrated)</td>
<td>1 to 10%</td>
<td></td>
<td>○</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>&lt;1%</td>
<td></td>
<td>○</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mineral Oil</td>
<td>&lt;1%</td>
<td></td>
<td>○</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>○</td>
<td></td>
</tr>
<tr>
<td>Retrofilling Fluids</td>
<td>100 to 1000 ppm</td>
<td></td>
<td>○</td>
<td></td>
<td></td>
<td></td>
<td>○</td>
<td>○</td>
<td></td>
</tr>
<tr>
<td>Major Equipment b</td>
<td>&lt;500 ppm</td>
<td></td>
<td>○</td>
<td></td>
<td></td>
<td></td>
<td>○</td>
<td>○</td>
<td></td>
</tr>
<tr>
<td>Major Equipment b</td>
<td>≤50 ppm</td>
<td></td>
<td>○</td>
<td></td>
<td></td>
<td></td>
<td>○</td>
<td>○</td>
<td></td>
</tr>
<tr>
<td>Large Capacitors</td>
<td>&gt;0.5 kg</td>
<td></td>
<td>○</td>
<td></td>
<td></td>
<td></td>
<td>○</td>
<td>○</td>
<td></td>
</tr>
<tr>
<td>Small Capacitors</td>
<td>&lt;0.5 kg</td>
<td></td>
<td>○</td>
<td></td>
<td></td>
<td></td>
<td>○</td>
<td>○</td>
<td></td>
</tr>
<tr>
<td>Maintenance Waste</td>
<td>varies</td>
<td></td>
<td>○</td>
<td></td>
<td></td>
<td></td>
<td>○</td>
<td>○</td>
<td></td>
</tr>
<tr>
<td>Packaging</td>
<td>varies</td>
<td></td>
<td>○</td>
<td></td>
<td></td>
<td></td>
<td>○</td>
<td>○</td>
<td></td>
</tr>
<tr>
<td>Waste Lubricating Oil</td>
<td>10 to 500 ppm</td>
<td></td>
<td>○</td>
<td></td>
<td></td>
<td></td>
<td>○</td>
<td>○</td>
<td></td>
</tr>
<tr>
<td>Soil, Demolition Spoils and PCB Destruction Residues</td>
<td>&gt;50 ppm</td>
<td></td>
<td>○</td>
<td></td>
<td></td>
<td></td>
<td>○</td>
<td>○</td>
<td></td>
</tr>
<tr>
<td>Dredging Spoils</td>
<td>varies</td>
<td></td>
<td>○</td>
<td></td>
<td></td>
<td></td>
<td>○</td>
<td>○</td>
<td></td>
</tr>
<tr>
<td>Aqueous Waste</td>
<td>μg/L to mg/L</td>
<td></td>
<td>○</td>
<td></td>
<td></td>
<td></td>
<td>○</td>
<td>○</td>
<td></td>
</tr>
</tbody>
</table>

Recommended Possible Options: where no option is recommended, the best option must be determined case-by-case, depending upon such variables as degree of contamination, costs, and availability of option.

a  See Appendix B for broader descriptions of wastes.
b  Drained equipment.
c  Limited to PCB concentrations <500 ppm.
d  Not recommended, although unregulated small PCB capacitors in light ballasts, electronic equipment and appliances, and small quantity PCBs in equipment, soils or residues are sometimes disposed of here.

6.2  Technologies

6.2.1  Liquid Injection Incinerators. These incinerators burn a support fuel and accept PCB liquid wastes as part of their total fuel requirements. Although they are not designed to accept solids, some ash is usually manageable so that pumpable sludges can be incinerated. The incinerator should be fitted with a gas scrubbing system to remove by-product hydrogen chloride from the flue gas. Liquid injection incineration is currently the preferred technology for the destruction of high-concentration PCB fluids, such as askarel, and may also be used for aqueous wastes from which PCBs cannot be economically removed. The U.S. Environmental Protection Agency (U.S. EPA) combustion criteria and related operating conditions and controls for PCB liquid injection incinerations are given in Appendix C. Proposed Canadian regulations respecting mobile systems
for the destruction of PCBs by thermal means that are operated on federal lands are also given in Appendix C.

Kokoszka and Kuntz (14) have summarized the advantages and disadvantages of this destruction technology. The advantages of liquid injection incinerators include the ability to handle a variety of liquid wastes, no moving parts in the combustion chamber, the capability of operating over a wide range of feed rates, and low maintenance cost. The disadvantages include plugging and corrosion of burners due to incompatible fluids, the need for liquids to have low enough viscosities not only to be pumped but also to be atomized in the burner, and the need for sophisticated instrumentation to maintain the required combustion efficiency because these incinerators are highly sensitive to changes in waste composition and flow.

6.2.2 Rotary Kiln Incinerators. This type of incinerator is recommended for wastes containing mainly solid materials and, in many cases, the wastes (e.g., capacitors) will be shredded before entering the kiln. Provision should be made to prevent the escape of vapour-phase PCBs during shredding. This can be accomplished by hooping, operational sequencing of gates, and providing an air flow through the system that becomes the combustion air source. Large quantities of solid residues are produced; the major portion is usually dropped out after the rotary kiln section and the remainder is removed by the emission control system. The residence time of solids in the kiln is usually about 30 minutes. The gases from the rotary kiln are passed into a second incineration zone, which is typically a liquid injection incinerator. Operating conditions for this type of incinerator are given in Appendix C.

Some advantages of rotary kiln incinerators are the capabilities to handle solids and liquids, either separately or in combination, to handle large containers, and to adjust residence time for solids by varying the rotational speed of the kiln (14). Some disadvantages are that the units have a relatively high capital cost; emission control is necessary for particulate and hydrogen chloride; and the seals on the kiln ends and feed chute may leak (14).

6.2.3 High Efficiency Boilers. Many companies or utilities that have PCB wastes also own high efficiency industrial boilers which are used for steam and/or electricity generation. These boilers, fired by oil, coal or natural gas, often approach the time and temperature regimes of liquid injection incinerators. Energy recovery and decreased transportation of PCB wastes provide an incentive to use these boilers to destroy PCBs. However, the boilers are often limited in their capability to destroy PCBs by their lack of
hydrogen chloride emission control systems, marginal time-temperature conditions or boiler metallurgy (chloride resistant) (15). As a result, the use of high efficiency boilers is restricted to liquid wastes containing less than 500 ppm PCBs. The U.S. EPA criteria for the use of a high efficiency boiler are given in Appendix D.

6.2.4 Dechlorination Using Sodium-based Processes. Sodium-based dechlorination processes can be used to decontaminate mineral oil containing up to a few thousand parts per million PCBs; the upper concentration limit is set by process costs in each case. In this process, the sodium reagent reacts with the chlorine atoms on the PCB molecule to form sodium chloride, and the biphenyl part of the PCB molecule polymerizes to form a non-chlorinated polymer (polyphenylene); the mineral oil is unchanged. Sodium chloride and polyphenylene are the wastes from this process. The PCB-free mineral oil can be reused or disposed of as a non-hazardous waste. Dechlorination of PCBs by sodium reagents must be conducted in a nitrogen or other inert atmosphere to prevent the fire hazard created when hydrogen is generated by reaction of the sodium reagent with any moisture in the oil. Sodium-based dechlorination processes cannot be used to treat PCBs in oil containing significant amounts of water (16). Proposed regulations respecting mobile systems for the chemical treatment of PCBs that are operated on federal lands are given in Appendix C.

Sodium-based processes are recommended for treatment of PCB-contaminated mineral oil because the systems can be brought directly to the PCB source, and the decontaminated mineral oil can be reused.

6.2.5 Disposal Priorities

Recovery of suitably decontaminated articles or liquids for scrap metal or for re-use, such as: transformers, hydraulic equipment, heat exchanger equipment, and mineral oils, should be given first priority. Incineration should be given second priority. Landfilling of PCBs is usually not an alternative and is banned by most provinces.
EMERGENCY PREPAREDNESS AND PROCEDURES

Emergencies involving PCBs can occur with equipment in-service, in storage, during transport, or at a disposal facility. These emergencies may take the form of:

- a leak or spill of PCB liquid;
- the catastrophic failure of a piece of in-service equipment;
- the accidental breach of a container of PCBs; and
- fires.

Of these four emergency situations, fires involving PCBs may have the most serious consequences because they generate large quantities of oily soot which may be contaminated with PCBs, polychlorinated dibenzo-furans (PCDFs) and polychlorinated dibenzo-p-dioxins (PCDDs). The latter are often referred to as "furans" and "dioxins". This soot could be extremely hazardous to human health and is very difficult to remove during cleanup (15). Polychlorinated dibenzo-furans originate from the combustion of PCBs, while PCDDs originate from the combustion of chlorobenzenes which are an askarel constituent.

The precautions outlined in the sections of this manual dealing with the design and operation of PCB storage and disposal facilities as well as following the requirements of the Storage of PCB Wastes Interim Order (20) can help prevent most emergencies.

7.1 Emergency Preparedness through Emergency Planning

All companies operating storage or disposal facilities or transporting PCBs should develop and implement a fire and emergency action plan. This plan should be developed in conjunction with the local fire department and should provide information on:

- emergency actions that should be taken in the event of a PCB spill or fire;
- personal protection equipment that should be used during an emergency response;
- corporate personnel who can be contacted on a 24-hour basis to supervise emergency actions; and
- regulatory notification requirements detailing who must be notified in the event of an emergency, both provincially and federally.

The degree of planning and preparation required for a specific emergency plan will vary with the quantity and concentrations of PCBs involved, e.g., a slightly contaminated mineral oil transformer located at an outdoor substation would require a
less sophisticated emergency plan than a similar transformer containing askarel located in
a commercial or industrial building. All the elements of emergency planning should be
considered and a degree of preparedness decided upon prior to any action being taken with
respect to any PCB equipment or waste.

All personnel working with PCBs should become familiar with the contents of
the emergency plan. It is recommended that employees be trained in use of the plan,
preferably through emergency drills. As well, employees should be trained in the use of
personal protection equipment, spill control kits, and fire extinguishers. They should also
be made aware of the hazards of PCBs.

7.2 Emergency Procedures for PCB Spills

Spills of PCB liquid must be acted upon and cleanup operations commenced as
soon as possible after detection. In an emergency or cleanup situation, an assessment
should first be made of all possible hazards associated with the situation so that
appropriate safety procedures and protective equipment may be used.

7.2.1 General Spill Cleanup Procedures. Spill cleanup procedures presented in this
section address spills of PCB liquids such as askarel, decontamination flushings, and
contaminated mineral oil. Spills of PCB-contaminated solid materials have less tendency
to spread and are considerably easier to clean up than spills of liquids. Cleanup
procedures for spills of PCB solids are discussed briefly at the end of this section. The
special case of cleanup of spills of PCB-contaminated aqueous materials is presented in
Section 7.3.

The following steps are recommended for the cleanup of PCB liquids:

- stop source of spill if possible;
- control further spread of the spill;
- notify authorized personnel of the spill and cleanup intentions;
- if workers or the public are at risk the provincial environment and health authorities
  as well as Environment Canada should be notified;
- consult with the provincial environment authority on the cleanup procedures;
- remove the PCBs from the surface where they have spilled; and
- obtain samples from the contaminated surface and test for the completeness of the
  cleanup.

Spread control: Immediate action should be taken to limit the spread of
contamination by using dykes and drain plugs, as available, by removing articles that are
not yet contaminated, and by any other action that can be readily undertaken.
Notification: Immediate notification of the appropriate authorities is required to ensure that they are informed about the PCB spill and that all cleanup resources are made available. For a spill on private property, authorized personnel identified in the facility's emergency plan should be contacted to respond to the spill emergency or give cleanup advice to on-site personnel. On-site personnel should assess the situation and contact other emergency agencies (fire or police) as warranted. The provincial environmental authority should be informed of all spills and the cleanup measures being taken. Environment Canada should also be contacted if information on emergency and spill cleanup procedures is needed. Transportation accidents involving PCB spills should be reported to local police and fire departments, and appropriate provincial/territorial authorities at the telephone numbers given on the TDG Waste Manifest.

Spill removal: PCB liquids should be removed from the contaminated area to as large an extent as possible using pumps and sorbent materials.

Sorbents: Some of the materials available in Canada and capable of absorbing PCBs and PCB-contaminated mineral oil are:

- sawdust
- vermiculite
- activated charcoal
- Oclansorb (Hi-Point Peat Ltd.)
- Imbiber beads (Dow Chemical Canada Inc., Sarnia)
- Hy-Dry (Tennier Absorbent Products Ltd., Hamilton)
- Diasorb (Diamond Shamrock Canada Inc., Cleveland)
- Stay-Dry (Waverly Mineral Products Co., Philadelphia)
- Oil-Dry (Waverly Mineral Products Co., Philadelphia)
- Conwed (C-I-L Inc.)
- 3-M matting (3M Canada Inc.)

These materials all absorb PCBs to create a "quasi-solid" product that can be swept or shovelled into a container for disposal. Adequate supplies of sorbent material should be kept close to PCB equipment at all times. Other spill cleanup equipment including pumps and barrels should also be readily available.

Decontamination solvents: After the liquid PCBs have been removed through the use of sorbents or pumps, the affected surfaces must be thoroughly decontaminated.
Surfaces that do not absorb PCBs, such as steel or PCB-resistant concrete, should be decontaminated by thoroughly rinsing with a solvent, such as Varsol, turpentine, No. 1 fuel oil, or kerosene, until the PCBs are removed. PCB-contaminated solvents and cleaning rags should be disposed of as a PCB waste. Materials that absorb PCBs, such as wood, asphalt, concrete, soil and sediments, should be examined to determine the depth of PCB penetration. The contaminated surface layer should be decontaminated or physically removed to meet provincial requirements. The material removed should be dealt with as a PCB waste when it contains more than 50 ppm PCB. Less contaminated material should be handled and disposed in a manner acceptable to provincial authorities.

7.2.2 Specific Cleanup Procedures. As mentioned previously, PCBs spilled onto concrete or into a containment system can be removed using pumps (if the liquid is pumpable) or sorbents. Spills onto soil or into water require more complex cleanup techniques.

Specific control actions for spills into containment systems, onto concrete or asphalt, soil, and into water, are given in the following (10). These control action plans are not intended to be all inclusive or to be applicable or adequate in all situations. For instance, to assess the threat to groundwater quality in the event of a large PCB spill on soil, provincial authorities may require extensive monitoring to determine the degree and extent of contamination and rate of migration. On the other hand, a small spill may not require such actions as building a dyke, taking core samples or pumping into drums. The purpose of the plans is to highlight the main actions that should be considered for spills in typical settings. Recommended national criteria are being developed for concentrations of PCBs in various media and will be published separately.

Spills into containment systems:

Notify authorized personnel and appropriate authorities of spill and cleanup intentions.

Take precautions to avoid personal contamination (see Section 7.2.3).

Pump PCB liquids into drums. If impossible to pump, soak up PCB liquids with sorbents such as those listed in Section 7.2.1.

Wipe area clean with rags and appropriate solvent, such as Varsol, turpentine, No. 1 fuel oil, or kerosene.

Dispose of all contaminated cleanup materials and waste PCB liquid.
Spills on concrete or asphalt:

Control the spread of the spill.
Notify authorized personnel and appropriate authorities of spill and cleanup intentions.
Take precautions to avoid personal contamination (see Section 7.2.3).
Plug or dyke all drains to sewers and ditches.
Soak up PCB liquids with sorbents of the type listed in Section 7.2.1.
Wipe area clean with rags and appropriate solvent, such as Varsol, turpentine, No. 1 fuel oil, or kerosene.
Take core samples to determine penetration and need to excavate.
If necessary remove contaminated surface material and handle as PCB waste.
Dispose of contaminated materials and waste PCB liquid.

Spills on soil:

Control the spread of the spill by building dykes to contain the PCB liquids.
Notify authorized personnel and appropriate authorities of spill and cleanup intentions.
Take precautions to avoid personal contamination (see Section 7.2.3).
Pump PCB liquids to drums. If impossible to pump, soak up PCB liquids with sorbents such as those listed in Section 7.2.1.
Dispose of contaminated cleanup materials and waste PCB liquid.
Take core samples to determine penetration and need to excavate.
If necessary remove contaminated soil and handle as PCB waste.
If requested by the local regulatory authority monitor wells and other waters in proximity of spill for PCB contamination.

Spills into water bodies:

Notify authorized personnel, downstream water filtration plants, and appropriate authorities of spill and cleanup intentions.
Take precautions to avoid personal contamination (see Section 7.2.3).
Dam area if possible and close off to vessels in navigable waters.
Use dredges to collect contaminated sediment.
Dispose of contaminated materials as PCB waste.

PCB-solid spills:

Spills of PCB solids should be removed by shovelling or scooping the solid into drums, followed by wiping the contaminated area, where possible, with a solvent.
The drummed solid waste and contaminated cleaning materials should be disposed of as PCB waste.

**Spill control kit:**

Equipment and materials for the cleanup of PCB spills, such as sorbents, pumps, solvents, cleaning rags, plugs for blocking drains, and portable dykes, should be stored together as a PCB "spill control kit" within easy access of a PCB storage area. All persons authorized to work in a PCB storage or disposal area should be familiar with the location of the "spill control kit" and be thoroughly trained in its use. They should also be familiar with methods of packaging and handling of PCB-contaminated waste generated in the cleanup.

### 7.2.3 Personal Safety Equipment and First Aid

Cleanup personnel should take care to avoid contact with PCBs and volatile cleaning solvents. Protective equipment, appropriate to the degree of hazard of a specific spill, should be worn at all times and must comply with the appropriate federal and provincial regulations. It is recommended that the following protective equipment and clothing be available, all of which should be made of PCB-resistant materials (see Table 1).

- disposable coveralls that completely cover arms and legs;
- gloves with high gauntlets that completely cover hands and wrists;
- boots and splash aprons;
- tight-fitting chemical resistant goggles or full face shield; and
- clothing of heat-resistant materials when working with hot liquids.

If exposure to hot PCB liquid (>55°C) or volatile cleaning solvents is anticipated for more than short intervals during cleanup, it is recommended that self-contained breathing apparatus be worn. References 5 and 6 guidance on protective clothing and equipment.

During spill cleanup, it is recommended that the cleanup area be well ventilated to minimize exposure to PCB vapour or volatile solvents. Cleanup personnel should take care to avoid splashing PCB liquids and should decontaminate or dispose of all protective equipment and clothing that have been contaminated with PCBs. Workers should remove contaminated protective equipment before leaving the spill area in order to limit the spread of PCBs from the area.

If a person is exposed to PCBs during a cleanup or in any other situation, the appropriate Labour and Health officials should be notified and the first aid treatments shown in Table 4 followed.
### TABLE 4  FIRST AID FOR EXPOSURE TO PCB LIQUIDS

<table>
<thead>
<tr>
<th>Exposure Type</th>
<th>First Action</th>
<th>Second Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCB liquids on skin</td>
<td>Wash thoroughly with soap and water.</td>
<td>See physician if rash develops.</td>
</tr>
<tr>
<td>PCB liquid in eyes</td>
<td>Flush eyes with gentle stream of lukewarm water for 15 minutes keeping eyelids apart.*</td>
<td>See physician.</td>
</tr>
<tr>
<td>PCB/chlorobenzene liquids swallowed</td>
<td>Do not give victim anything to drink, rinse out mouth with water.</td>
<td>Write down details about the swallowed liquid and take victim to hospital emergency or physician immediately.</td>
</tr>
<tr>
<td>Strong PCB/chlorobenzene fumes, e.g., vapour from PCBs and chlorobenzenes</td>
<td>Get victim into fresh air.</td>
<td>If discomfort does not clear up, take victim to physician.</td>
</tr>
</tbody>
</table>

* An on-site eye wash station should be provided where PCBs are handled frequently.

### 7.3 Emergency Procedures for Fires Involving PCBs

Although PCBs are classified as non-flammable liquids, they will burn at elevated temperatures. As a result, PCB liquids should be stored in isolation from other flammable materials (such as oils, coal, wood products and compressed gases). Fires involving PCBs are smoky and yield large amounts of black oily soot. This soot may be contaminated with PCBs, PCDFs and, if chlorobenzenes are present in the PCB fluid, PCDDs (17).

Polychlorinated biphenyl fires are typically "small" and are easily extinguished with chemical foam, nitrogen flood, or carbon dioxide. Water should not be used as an extinguishing agent as contaminated water is very difficult to contain in an emergency situation and could spread contamination. In the case of PCB fires in electrical equipment, always disconnect the equipment from its power source before attempting to extinguish the fire.

Because most of the contamination resulting from a fire involving PCBs is not from PCB liquid release, but from contaminated soot, the transport of soot during the fire must be minimized. This can be accomplished by:
- extinguishing the fire as soon as possible; and
- shutting down the ventilation system in the fire area.

The automatic ventilation shut-off, where available, should be triggered by the fire alarm system in the PCB location. Unnecessary personnel working in the area of a PCB fire should leave immediately. The local fire department and company PCB-response personnel should always be kept up-to-date on the location of PCB equipment and PCB storage on a particular property so that they are fully aware of the special hazards in the event of a fire.

Recommendations to prevent contamination by PCDFs in fires involving electrical equipment containing PCBs are given in an Environment Canada report (17).

Response to PCB fires falls into two distinct phases: a). extinguishing the fire; and b). cleanup of surfaces contaminated with PCB liquid and soot which may be contaminated with PCBs, PCDFs, and PCDDs. Polychlorinated biphenyl fires should be extinguished as soon as possible. Firemen should always be advised that they are dealing with a fire involving PCBs.

7.3.1 Protective Clothing. Firemen should ensure that all skin is covered to prevent exposure to smoke containing PCBs. The following protective clothing and equipment should be worn by all personnel entering the fire area:

- polyethylene/canvas jacket and pants,
- rubber boots,
- gauntlet gloves, and
- self-contained breathing apparatus such as that produced by Mine Safety Appliances Company or a Scott Airpak.

Protective clothing that cannot be decontaminated should be disposed of immediately after the fire, and all responding firemen should shower thoroughly to remove any soot that may have contacted uncovered skin. If a fireman develops a skin rash after the fire, he should go for a medical checkup.

7.3.2 Cleanup Procedures. Once the fire has been extinguished, the amount of surface contamination (PCBs, PCDFs, PCDDs) from the PCB soot should be determined and, if necessary, cleanup procedures undertaken. These procedures are similar to those recommended for surfaces contaminated with PCB liquid. A three-step procedure should be followed:

- first, remove soot immediately from surfaces with a high efficiency vacuum;
- wash surfaces next with an industrial strength anionic cleaner, such as Triton X-100 and water; and
- finally, wash surfaces with one of the decontamination solvents recommended in Section 7.2.1.

Care should be taken to prevent the release of PCBs, PCDFs and PCDDs to the environment. Contaminated soot, water and cleaners should be collected and disposed of as PCB waste. In large-scale cleanups, PCB-contaminated water can also be treated for removal of PCBs by filtration through activated carbon filters (17) or reverse osmosis (18). The water should be continuously recycled until the PCB concentration meets provincial and municipal minimum requirements for release to the sewer system. Cleanup personnel should remove contaminated clothing, shower and then enter an uncontaminated "clean area" to change into street clothes. Air leaving the contaminated area should be exhausted through a high efficiency filtration system (17). Spent filters from air and water treatment systems should be handled as a PCB solid waste. This waste, along with discarded clothing and cleanup materials should be stored securely to await destruction by incineration.

Cleanup personnel should wear protective clothing and self-contained breathing apparatus at all times during the cleanup procedure. The protective clothing should be:

- light-weight because of the activity required in the cleanup process;
- PCB resistant; and
- either easy to decontaminate or discardable.

Fires involving PCBs should be reported to local and provincial environmental authorities as well as to Environment Canada, and these agencies should also be kept informed of the progress of the cleanup. Because of the special hazard and toxicity of PCDFs and PCDDs, surfaces must be decontaminated to extremely low levels of these contaminants. Cleanup personnel should consult the regulatory authorities identified previously to determine the required level of decontamination and the testing methods required to determine it. Washing should be repeated until the surface contamination is reduced to the required level.

7.4 Emergency Response to a Transportation Accident

Spills or fires involving PCBs during transportation should be responded to in the manner described in Sections 7.2 and 7.3. During transportation, a spill control kit should be readily available. Personnel responsible for transport vehicles (conductors or
drivers) should be thoroughly trained on what actions to take in the event of a PCB spill. The "Special Handling/Emergency Instruction" section of the manifest form should be read and understood by the conductor or driver before transportation commences.

In the event of an emergency involving a spill, the PCB leak should be contained inside the vehicle if possible. Plastic sheets should be placed under the vehicle to prevent PCB contamination of the ground underneath. The special actions spelled out in the manifest should be followed and the driver or conductor should then call the appropriate emergency telephone number given on the manifest.
REFERENCES


12. Environment Canada, Environmental Protection Service, Identification of Fluorescent Lamp Ballasts Containing PCBs, Report EPS 2/CC/2 (September, 1985.)


**BIBLIOGRAPHY**


APPENDIX A

SYNOPSIS OF THE INTERIM ORDER RESPECTING
CHLOROBIPHENYLS UNDER THE CANADIAN ENVIRONMENTAL
PROTECTION ACT

NOTE: This Interim Order, with modifications, is currently in the process of being replaced by a regulation under the Canadian Environmental Protection Act (CEPA).
APPENDIX A - SYNOPSIS OF THE INTERIM ORDER RESPECTING CHLOROBIPHENYLS UNDER THE CANADIAN ENVIRONMENTAL PROTECTION ACT

Prohibitions

a. Use of PCBs in the operation of any product, machinery or equipment other than electrical capacitors and electrical transformers and associated electrical equipment manufactured in or imported into Canada before July 1, 1980; 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; and machinery or equipment intended to destroy the chemical structure of PCBs.

b. Use of PCBs in the operation of electromagnets that are operated over food or animal feed or anything intended to be added to food or animal feed.

c. Use of PCBs as a constituent of any product, machinery or equipment manufactured in or imported into Canada after September 1, 1977, except for electrical capacitors and electrical transformers and associated electrical equipment.

d. Use of PCBs as a constituent of electrical capacitors and electrical transformers and associated electrical equipment manufactured in or imported into Canada after July 1, 1980.

e. Use of PCBs in the servicing or maintenance of any product, machinery or equipment, other than electromagnets and electrical transformers and associated electrical equipment.

f. Use of PCBs as new filling or as makeup fluid in the servicing or maintenance of any electromagnet, electrical transformer or associated electrical equipment.

Concentration in Products

a. Importing, manufacturing or knowingly offering for sale any equipment listed above that contains more than 50 parts per million of PCBs by weight.

Exemptions (allowed sales and import)

a. Sale of PCB-filled equipment as a necessary and integral part of an immovable building, plant or structure that is offered for sale.

b. Sale of PCB-filled equipment for destruction or for storage awaiting destruction of the PCBs contained therein.

c. Importation of PCB-filled equipment for destruction of the PCBs contained therein. (This exemption is required in order to develop a reciprocal agreement between Canada and the U.S. for use of PCB-destruction facilities in either country once PCB destruction facilities are available in Canada).
Concentrations or Quantities that may be Released

a. Release of PCBs in excess of one gram per day for any one piece or package of equipment listed in the Interim Order in the course of the operation, servicing, maintenance, decommissioning, transportation or storage of this equipment.

b. Release of PCBs from all other sources or activities in excess of 50 parts per million except for the application of PCBs to a road surface where the limit is five parts per million by weight.

Exemptions

a. The PCB Interim Order does not apply in any water or place where subsection 36(3) of the *Fisheries Act* applies, i.e. waters frequented by fish or waters leading to fish-frequented waters. Places would include any industry or facility subject to regulations developed under subsection 36(3) of the *Fisheries Act*.

Subsection 36(3) of the *Fisheries Act* prohibits deposition of deleterious substances into fisheries waters except as may be permitted by regulations.
APPENDIX B

PCB WASTE TYPES
APPENDIX B - PCB WASTE TYPES

The following list of waste types and descriptions is provided to assist the reader in interpreting and applying the recommendations of this manual.

**Askarels** are usually a mixture of PCBs and tri- and tetrachlorobenzene. In most equipment, this was the original PCB-containing fluid used. Typical transformer askarel will contain 65% PCB but it could also be in the 40% range. It will usually be a clear liquid with a density of the order of 1.5 kg/L. This waste is usually generated by draining equipment. Handling this waste separately, rather than mixing it with other waste streams, has the advantage of keeping the total mass of PCB waste to a minimum.

**Concentrated Decontamination Flushings** are usually the first flushings from decontamination of a transformer or from solvent washing of solid PCB waste. The PCB content is likely to be in the 1 to 10% range in solvents such as fuel oil, kerosene, trichloroethylene, Varsol, turpentine, or trichlorobenzene. The mixture could contain suspended solids but would generally behave as a liquid. Another process generating this waste would be the concentrated waste solvent from a rinse/soak process.

**Decontamination Flushings** are wastes which comprise solvents similar to those described above but with PCB concentrations less than 1%. These are generated in the later stages of equipment or solid waste decontamination, particularly from operations when only a few pieces of equipment are decontaminated and countercurrent washing is not feasible. This category could also include solvent washings from lightly contaminated solids or solvent-washing extraction-liquor from the extraction of aqueous waste streams. These wastes will likely contain significant solids and may have an aqueous layer.

**Contaminated Mineral Oil** usually contains less than 1% PCBs. Mineral oil is used in most outdoor transformers and may have become contaminated by common industrial practices before the concern for PCBs was raised. The oil itself is generally a flammable liquid with a density somewhat below 1 kg/L; it usually does not contain significant amounts of suspended matter.

**Contaminated Retrofitting Fluids:** retrofilling fluids are liquids used to replace PCBs in transformer applications (Table 2). Quite often, at some time subsequent to retrofilling, the new fluid becomes contaminated with residual amounts of PCB not removed by the original decontamination process.

**PCB Transformers, Hydraulic Equipment, Electromagnets, Heat Transfer Equipment, Vapour Diffusion Pumps:** these large pieces of electrical/mechanical equipment may be drained and/or decontaminated hulks or complete units still containing PCBs or PCB-contaminated fluids. At some point in the waste management process they will be drained and, depending upon the degree of contamination and the intended method of disposal, decontamination may or may not be required. Drained equipment that previously contained a liquid contaminated with <500 ppm of PCBs can be scrapped for metal recovery providing all appropriate federal and provincial regulations are observed.

**Large PCB Capacitors** are capacitors which contain more than 0.5 kg of PCBs. The size will range from that of a small book to tall thin rectangular cans up to 1 m in height. The internals are paper and metal foil wound together, totally immersed and thoroughly
impregnated with PCBs. Free PCB liquid that can be collected from an opened PCB capacitor will typically amount to about 50% of the total quantity of PCBs contained in the unit. PCB capacitors are shreddable.

**Small PCB Capacitors** are capacitors which contain less than 0.5 kg of PCB. They may be associated with electronic or lighting equipment, and may be difficult (time consuming) to identify or separate from this equipment. While they will be difficult to identify individually, they may be collectable from a large number of similar units, e.g., lighting ballasts. Where possible they should be collected and treated as a PCB waste. Environment Canada has published a report on the procedures for identifying ballasts that contain PCBs (12).

**Maintenance and Decommissioning Wastes** will be similar to industrial waste from maintenance operations, and will include small tools, rags, plastics, paper, sorbents, and some free liquid—usually a cleaning solvent contaminated with PCBs. The PCB concentration will be highly variable.

**Waste Oil** includes used lubricating oils or other oils that have become contaminated with PCBs. Generally this waste will be a liquid but sludge may also be present.

**Residues** may be ash from incineration, organic sludge from sodium-based oil-decontamination processes, or solids from the decontamination of solid wastes. These should be handled with care as they can be contaminated with PCBs. The disposal method will depend upon the degree of contamination of the residues.

**Soils and Demolition Spoils** are solid wastes resulting from a spill cleanup. These wastes could be building materials (wood, cement, paint, plastics, plaster, and metal) that have been contaminated as a result of a spill of PCBs. They could also contain sorbents, decontamination liquids, rags or paper.

**Dredging Spoils** are sediments from streams, urban drains, or marine dredging. Dredging spoils are similar to soil wastes except that water content is much higher and they may have to be handled as liquids. The PCB concentration can range up to thousands of parts per million, and may be largely associated with an organic component of the waste.

**Aqueous Waste:** Although solubility of PCBs in water is very low, aqueous waste from a variety of sources may be contaminated with PCBs that are associated with suspended matter. Some examples of aqueous waste are water from fire-fighting cleanup operations, groundwater at a spill site, and scrubber discharge from a PCB destruction incinerator.
APPENDIX C

PCB TREATMENT/DESTRUCTION REQUIREMENTS
APPENDIX C - PCB TREATMENT/DESTRUCTION REQUIREMENTS

1. U.S. Environmental Protection Agency requirements for Liquid Injection and Rotary Kiln Incinerators

1.1 Liquid Injection for PCB Liquids

An incinerator used for the destruction of PCB liquids shall satisfy the following requirements, which are intended to ensure a destruction efficiency of not less than 99.9999% on the basis of a PCB mass emission to air of 1 mg/L kg of PCB introduced into the unit.

a) Combustion criteria shall be either:
   i). maintenance of the introduced liquids for a 2-second dwell time at 1200°C (+ 100°C) and 3% excess oxygen in the stack gas; or
   ii). maintenance of the introduced liquids for a 1.5-second dwell time at 1600°C (+ 100°C) and 2% excess oxygen in the stack gas.

b) Combustion efficiency shall be at least 99.9%, as calculated by:

\[
\text{Combustion efficiency} = \frac{\text{CO}_2}{\text{CO} + \text{CO}_2} \times 100\%
\]

where: \(\text{CO}\) = concentration of carbon monoxide in the flue gas, and \(\text{CO}_2\) = concentration of carbon dioxide in the flue gas.

c) The rate and quantity of PCBs fed into the combustion system shall be measured and recorded at regular intervals of no longer than 15 minutes.

d) The temperatures of the incineration process shall be continuously measured and recorded.

e) The concentration of oxygen and carbon monoxide in the flue gas shall be continuously measured and recorded. The concentration of carbon dioxide shall be measured and recorded at a frequency to be specified by the appropriate authority.

f) Testing of the stack emission products for oxygen, carbon monoxide, carbon dioxide, oxides of nitrogen, hydrochloric acid, total chlorinated organics, PCBs, furans, dioxins, and particulate matter shall be conducted:

i). when an incinerator is first used for the disposal of PCBs;
ii). when the incinerator is first used for the disposal of PCBs after the incinerator or operating parameters have been modified in a manner which may affect the stack emissions; or

iii). annually thereafter.

g) Automatic means shall be provided to prevent the burning of PCBs when the temperature or excess oxygen falls below the levels specified in Section 1a), monitoring operations fail, or the PCB feed-rate measuring and recording equipment fails.

h) Hydrogen chloride emissions from a PCB incinerator shall be controlled and shall meet the requirements specified by the appropriate authority.

i) Solid residues and liquid effluents from the incinerator should be tested on the same schedule as for stack emissions. These wastes will be disposed of according to the requirements specified by the appropriate authority.

1.2 Rotary Kiln for Non-liquid PCB Wastes

An incinerator used for the destruction of PCB wastes other than PCB liquids shall meet the following requirements:

a) The mass air emissions from the incinerator shall contain no greater than 1 mg PCBs/1 kg of PCBs introduced into the incinerator.

b) The incinerator shall comply with the provisions of 1 (b) through 1 (i) previously listed.
Regulations Respecting Mobile Systems for the Treatment and Destruction of Chlorobiphenyls that are Operated on Federal Lands or Operated by or Under Contract with Federal Institutions (proposed)

Short Title

1. These Regulations may be cited as the Federal Mobile PCB Treatment and Destruction Regulations.

Interpretation

2. In these Regulations:

"Act" means the Canadian Environmental Protection Act;

"chlorobiphenyls" or "PCBs" means chlorobiphenyls set out in the List of Toxic Substances in Schedule I to the Act;

"federal institution" means a department, board or agency of the Government of Canada or any corporation named in Schedule III to the Financial Administration Act;

"mobile PCB destruction system" means mobile equipment that is capable of destroying PCBs by thermal means;

"mobile PCB treatment system" means mobile equipment that is capable of destroying PCBs by chemical means;

"normal cubic metre" means the volume of a gas at 25°C and 101.3 kPa;

"2,3,7,8-substituted PCDDs" means any polychlorinated dibenzo-p-dioxin with the molecular formula C_{12}H_{n-2}Cl_{n}O_{2}, in which "n" is from 4 to 8 and chlorine atoms are located at the 2,3,7,8 positions on the molecule;

2,3,7,8-substituted PCDFs" means any polychlorinated dibenzofuran with the molecular formula C_{12}H_{n-2}Cl_{n}O, in which "n" is from 4 to 8 and chlorine atoms are located at the 2,3,7,8 positions on the molecule.

Application

3. These regulations apply in respect of mobile PCB destruction systems and mobile PCB treatment systems that are operated:

(a) on federal lands, as defined in Section 52 of the Act; and

(b) anywhere in Canada by or under contract with a federal institution.
Duty of Federal Institutions

4. Where a mobile PCB destruction system or mobile PCB treatment system is operated under contract with a federal institution, the federal institution shall ensure that the person who operates the system complies with sections 5 to 17.

Standards

5. No person shall operate a mobile PCB destruction system that releases into the environment a gas that contains PCBs in excess of 1 mg/kg of PCBs put into the system.

6. No person shall operate a mobile PCB treatment system to treat oil containing PCBs unless the system is operated so as to reduce the concentration of PCBs in the oil to 2 mg/kg or less.

7.(1) No person shall operate a mobile PCB destruction system or mobile PCB treatment system that releases into the environment a gas that contains a concentration of:

(a) particulate matter that exceeds 50 mg per normal cubic metre;

(b) hydrogen chloride that exceeds 75 mg per normal cubic metre; or

(c) 2,3,7,8-substituted PCDDs and 2,3,7,8-substituted PCDFs that exceeds 12 ng per normal cubic metre, when determined in accordance with section 10.

(2) The concentrations referred to in subsection (1) are corrected to 11% oxygen, on a dry basis.

8. No person shall operate a mobile PCB destruction system that releases into the environment a liquid that contains a concentration of:

(a) PCBs that exceeds 5 μg/L; or

(b) 2,3,7,8-substituted PCDDs and 2,3,7,8-substituted PCDFs that exceeds 0.6 ng/L, when determined in accordance with section 10.

9. No person shall operate a mobile PCB destruction system or mobile PCB treatment system that releases into the environment a solid that contains a concentration, on a dry basis, of:

(a) PCBs that exceeds 0.5 mg/kg; or

(b) 2,3,7,8-substituted PCDDs and 2,3,7,8-substituted PCDFs that exceeds 1 μg/kg, when determined in accordance with section 10.

10. The concentrations referred to in paragraphs 7(1)(c), 8(b) and 9(b) are determined by multiplying the concentration of each 2,3,7,8-substituted PCDD and 2,3,7,8-substituted PCDF congener that is set out in an item of column I of the schedule by the corresponding toxicity factor set out in column II of that item and adding the products thereof.
Information on Design and Performance

11. No person shall operate a mobile PCB destruction system or mobile PCB treatment system unless the person provides the Minister with information on the design and performance of the system, including the results of a test that demonstrates the system meets the standards set out in sections 5 to 9 and is authorized by the Minister in writing to operate the system.

Testing

12.(1) A person may, with the written permission of the Minister and subject to such terms and conditions as the Minister may impose, conduct a test of a mobile PCB destruction system or mobile PCB treatment system for the purpose of providing to the Minister the information referred to in section 11.

(2) A person who conducts a test under subsection (1) does not contravene these Regulations if the mobile PCB destruction system or mobile PCB treatment system does not meet the standards set out in sections 5 to 9 during the test.

13.(1) Any person who operates a mobile PCB destruction system or mobile PCB treatment system shall, at the request of the Minister, conduct tests during its operation to determine if the system meets the standards set out in sections 5 to 9.

(2) Any person who operates a mobile PCB destruction system or mobile PCB treatment system shall submit to the Minister in writing the results of any test made pursuant to subsection (1) no later than sixty days after the day on which the test was completed.

Test Methods

14. Every person who conducts a test pursuant to section 12 or 13 shall employ the methods referred to in sections 15 to 17.

15(1) For the purposes of paragraph 7(1)(a), the concentration of particulate matter in a gas shall be measured in accordance with the methods set out in the Standard Reference Methods for Source Testing: Measurement of Emissions of Particulates from Stationary Sources, Report EPS 1-AP-74-1, published by the Department of the Environment in February, 1974, as amended from time to time.

(2) For the purposes of paragraph 7(1)(b), the concentration of hydrogen chloride in a gas shall be measured in accordance with the methods set out in the Reference Method for Source Testing: Measurement of Emissions of Hydrogen Chloride from Stationary Sources, Report EPS 1/RM/1, published by the Department of the Environment in June 1989, as amended from time to time.

(3) For the purposes of section 5 and paragraph 7(1)(c), the concentration of PCBs, 2,3,7,8-substituted PCDDs and 2,3,7,8-substituted PCDFs in a gas shall be measured in accordance with:
(a) the sampling method set out in Reference Method for Source Testing: Measurement of Releases of Selected Semi-Volatile Organic Compounds from Stationary Sources, Department of the Environment, Report EPS 1/RM/2, June 1989, as amended from time to time; and

(b) the method of analysis set out in A Method for the Analysis of Polychlorinated Dibenzo-para-Dioxins (PCDDs), and Polychlorinated Biphenyls (PCBs) in Samples from the Incineration of PCB Waste, Department of the Environment, Report EPS 1/RM/3, June 1989, as amended from time to time.

16. For the purposes of section 8, the concentration of PCBs, 2,3,7,8-substituted PCDDs and 2,3,7,8-substituted PCDFs in liquids shall be measured by

(a) taking a representative sample of the liquids released by the system every 15 minutes while samples of the gases are being taken in accordance with the methods set out in section 15;

(b) taking a representative sample of the mixture of all the samples taken pursuant to paragraph (a); and

(c) analyzing the sample taken pursuant to paragraph (b) in accordance with the method referred to in paragraph 15(3)(b).

17. For the purposes of section 9, the concentration of PCBs, 2,3,7,8-substituted PCDDs and 2,3,7,8-substituted PCDFs in solids shall be measured by

(a) taking a representative sample of the solids released by the system every 15 minutes while samples of the gases are being taken in accordance with the methods set out in section 15;

(b) taking a representative sample of the mixture of all the samples taken pursuant to paragraph (a); and

(c) analyzing the sample taken pursuant to paragraph (b) in accordance with the method referred to in paragraph 15(3)(b).
### SCHEDULE (Section 10)

**TOXICITY FACTORS**

<table>
<thead>
<tr>
<th>Item</th>
<th>Column I Congener</th>
<th>Column II Toxicity Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2,3,7,8 - substituted PCDD</td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>2,3,7,8-T4CDD</td>
<td>1.0</td>
</tr>
<tr>
<td>2.</td>
<td>1,2,3,7,8-P5CDD</td>
<td>0.5</td>
</tr>
<tr>
<td>3.</td>
<td>1,2,3,4,7,8-H6CDD</td>
<td>0.1</td>
</tr>
<tr>
<td>4.</td>
<td>1,2,3,6,7,8-H6CDD</td>
<td>0.1</td>
</tr>
<tr>
<td>5.</td>
<td>1,2,3,7,8,9-H6CDD</td>
<td>0.1</td>
</tr>
<tr>
<td>6.</td>
<td>1,2,3,4,6,7,8-H7CDD</td>
<td>0.01</td>
</tr>
<tr>
<td>7.</td>
<td>08CDD</td>
<td>0.001</td>
</tr>
</tbody>
</table>

|      | 2,3,7,8 - substituted PCDF                              |
| 8.   | 2,3,7,8-T4CDF    | 0.1                       |
| 9.   | 1,2,3,7,8-P5CDF  | 0.01                      |
| 10.  | 2,3,4,7,8-P5CDF  | 0.5                       |
| 11.  | 1,2,3,4,7,8-H6CDF | 0.1                      |
| 12.  | 1,2,3,6,7,8-H6CDF | 0.1                      |
| 13.  | 1,2,3,7,8,9-H6CDF | 0.1                      |
| 14.  | 2,3,4,6,7,8-H6CDF | 0.1                      |
| 15.  | 1,2,3,4,6,7,8-H7CDF | 0.01                   |
| 16.  | 2,3,4,6,7,8,9-H7CDF | 0.01                    |
| 17.  | 08CDF             | 0.001                     |
APPENDIX D

HIGH EFFICIENCY BOILER REQUIREMENTS
U.S. EPA REQUIREMENTS
APPENDIX D - HIGH EFFICIENCY BOILER REQUIREMENTS (U.S. EPA Requirements)

PCB liquids may be co-fired in high efficiency boilers if they contain less than 500 ppm PCBs, provided that:

a) The boiler is rated at a minimum of 15 MJ/s.
b) For natural gas and oil-fired boilers, the carbon monoxide concentration in the stack gas is 50 ppm or less, and the excess oxygen is at least 3% when PCBs are burned.
c) For coal-fired boilers, the carbon monoxide concentration in the stack gas is 100 ppm or less, and the excess oxygen is at least 3% when PCBs are burned.
d) At any given time, the mass flow rate of the PCB liquid does not exceed 10% of the mass flow rate of the fuel.
e) PCB liquids are not fed into the boiler unless the boiler is operating at a minimum of 90% capacity.
f) The concentration of carbon monoxide and oxygen in the stack gas are measured and recorded continuously or at intervals of not longer than one hour if the boiler will burn less than 115,000 litres per year of PCB liquids.
g) The feed rates of the primary fuel and the PCB liquid, and the total quantity of primary fuel and PCB liquid, fed to the boiler are measured and recorded at intervals of not longer than 15 minutes.
h) The concentration of PCBs in each batch of waste is measured and recorded.
i) The flow of PCB liquid to the boiler shall stop automatically if the criteria noted in b) and c) are not met, or if there is a failure in the monitoring equipment.
APPENDIX E

FEDERAL AND PROVINCIAL REGULATIONS RELATING TO PCBs
## APPENDIX E - FEDERAL AND PROVINCIAL REGULATIONS RELATING TO PCBs

<table>
<thead>
<tr>
<th>Jurisdiction</th>
<th>Legislation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>British Columbia</td>
<td><em>Waste Management Act, 1984</em></td>
<td>- not specific to PCBs</td>
</tr>
<tr>
<td></td>
<td>Special Waste Regulation, 1988</td>
<td>- regulation applies to PCBs in concentrations ≥ 50 ppm and waste</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- regulation permits use of oil for road oiling if PCB concentrations are not greater than 5.0 mg/L maximum</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- regulation permits use of waste oil as fuel if PCB concentrations are not greater than 3.0 mg/L maximum</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- regulation requires permits for storage and disposal facilities and use of manifest for waste in transport</td>
</tr>
<tr>
<td>Alberta</td>
<td>Hazardous Chemicals Act</td>
<td>- controls handling, storage, and ultimate disposal of PCB wastes</td>
</tr>
<tr>
<td></td>
<td>Hazardous Waste Regulation</td>
<td>- prohibits storing PCB waste for longer than 365 days or in an amount exceeding 10 tonnes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- requires license to operate a stand alone PCB storage facility or if the above limits are exceeded</td>
</tr>
<tr>
<td></td>
<td>Hazardous Waste Storage Guidelines</td>
<td>- 50 ppm in maximum concentration of PCBs for landfilling at approved Class II landfill</td>
</tr>
<tr>
<td></td>
<td>Guidelines for Industrial Landfills</td>
<td>- specifies design criteria for storage facilities</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- specifies design criteria and other requirements for classes of industrial landfill</td>
</tr>
<tr>
<td>Jurisdiction</td>
<td>Legislation</td>
<td>Description</td>
</tr>
<tr>
<td>------------------</td>
<td>------------------------------------------------------------</td>
<td>------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Saskatchewan</td>
<td>Municipal Drinking Water Objectives</td>
<td>- not specific to PCBs</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- PCBs should be undetectable (&lt;0.02 μg/L) in drinking water</td>
</tr>
<tr>
<td></td>
<td>Environmental Spill Control Regulations</td>
<td>- maximum PCB concentration allowable for short-term (6 to 8 month maximum) release to drinking water is 3 μg/L</td>
</tr>
<tr>
<td></td>
<td>Environmental Protection Act</td>
<td>- accidental releases of PCBs must be reported to the Spill Response and Control Section of Saskatchewan Environment</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- regulations require appropriate cleanup and disposal of spill-contaminated material</td>
</tr>
<tr>
<td></td>
<td>Saskatchewan Environment</td>
<td>- Saskatchewan Environment must approve storage and disposal facilities</td>
</tr>
<tr>
<td>Manitoba</td>
<td>Dangerous Goods Handling and Transportation Act, August 1984</td>
<td>- requires licensing for handling, transport and disposal of PCBs; defines requirements for operation of a disposal facility</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- requires reporting of environmental accidents</td>
</tr>
<tr>
<td></td>
<td>Regulation 474/88</td>
<td>- controls storage of PCB wastes</td>
</tr>
</tbody>
</table>
APPENDIX E - FEDERAL AND PROVINCIAL REGULATIONS RELATING TO PCBs  
(Cont'd)

<table>
<thead>
<tr>
<th>Jurisdiction</th>
<th>Legislation</th>
<th>Description</th>
</tr>
</thead>
</table>
| Ontario      | *Environmental Protection Act*  
Waste Management - PCBs, Regulation 11/82  
- January 1982  
- Amendment 1984 | - controls handling, storage and ultimate disposal of PCB wastes  
- requires approvals for storage and disposal facilities; licensing includes specifications for operation, environmental controls and record keeping in storage and disposal facilities  
- defines PCB wastes as wastes containing all PCBs at concentrations greater than 50 ppm |
|              | Mobile PCB Destruction Facilities Regulations  
O. Reg. 148/86 gazetted April, 1986 | - describes siting, operation, environmental control, monitoring, and bonding requirements for three types of mobile PCB destruction technologies: mobile incineration and mobile chemical destruction facilities  
- includes requirements for record keeping and record retention at disposal facilities  
- exempts mobile units on Crown or public lands from assessment |
|              | Ontario Drinking Water Objectives - 1983 | - maximum allowable concentrations of PCBs in drinking water is 3 μg/L |
|              | Waste Management-General  
O. Reg. 309, November, 1985 | - controls movement, treatment and disposal of hazardous wastes, including PCBs |
APPENDIX E - FEDERAL AND PROVINCIAL REGULATIONS RELATING TO PCBs  
(Cont'd)

<table>
<thead>
<tr>
<th>Jurisdiction</th>
<th>Legislation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quebec</td>
<td><em>Environmental Quality Act</em></td>
<td>- includes PCB requirements</td>
</tr>
<tr>
<td></td>
<td>Hazardous Waste Regulations 1985</td>
<td>- requires certificate of approval and operating permit for storage facilities</td>
</tr>
<tr>
<td></td>
<td>Amended - 1988</td>
<td>- details proposed siting, operational (containment, waste mixing) and maximum storage time requirements for facilities storing hazardous wastes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- requires operating permit for transportation of hazardous wastes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- details transportation and waste handling requirements</td>
</tr>
<tr>
<td>New Brunswick</td>
<td><em>Clean Environment Act</em></td>
<td>- no specific PCB legislation</td>
</tr>
<tr>
<td></td>
<td>Reg. 82-126 - August 1982</td>
<td>- requires certificate of approval for storage and disposal facilities</td>
</tr>
<tr>
<td>Nova Scotia</td>
<td><em>Dangerous Goods and Hazardous Wastes Management Act</em></td>
<td>- enabling legislation requiring regulations</td>
</tr>
<tr>
<td></td>
<td>PCB Waste Storage Regulations - November 15, 1988</td>
<td>- requires storage sites with more than 1 kg PCBs, 100L PCB liquids or 100 kg PCB solids to be registered with the Department of Environment</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- storage site must meet specific standards</td>
</tr>
<tr>
<td></td>
<td>Other</td>
<td>- guideline for PCBs in drinking water is 3 ppb</td>
</tr>
</tbody>
</table>
APPENDIX E - FEDERAL AND PROVINCIAL REGULATIONS RELATING TO PCBs (Cont'd)

<table>
<thead>
<tr>
<th>Jurisdiction</th>
<th>Legislation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prince Edward Island</td>
<td>- no specific PCB or hazardous waste management legislation</td>
<td></td>
</tr>
<tr>
<td></td>
<td>The Storage of PCB Waste Regulations</td>
<td>- requires record keeping, regular inspections, immediate repairs, spill reporting, fire alarm and control apparatus, labelling and signs</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- gives minimum size for exemption</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- requires notification of PCB storage sites for which the owner does not have a current approval within 30 days of a site being established</td>
</tr>
<tr>
<td></td>
<td>The Waste Material (Disposal) Act, 1973</td>
<td>- requires licensing of storage sites, disposal facilities and/or regular hazardous waste transportation services as part of a waste management system</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- enables bonding of owners/proponents to ensure compliance with the terms and conditions of their Certificate of Approval</td>
</tr>
<tr>
<td>Yukon Territory</td>
<td>- no specific PCB or hazardous waste management legislation</td>
<td></td>
</tr>
<tr>
<td>Northwest Territories</td>
<td>- no specific PCB legislation</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Commissioner's Land Act</td>
<td>- requires licensing of waste disposal facilities</td>
</tr>
<tr>
<td></td>
<td>Environmental Protection Act</td>
<td>- regulates waste and spill control and disposal of contaminants</td>
</tr>
<tr>
<td></td>
<td>Transportation of Dangerous Goods Act</td>
<td>- adopts some of the federal transportation regulations</td>
</tr>
</tbody>
</table>
APPENDIX E - FEDERAL AND PROVINCIAL REGULATIONS RELATING TO PCBs
(Cont'd)

<table>
<thead>
<tr>
<th>Jurisdiction</th>
<th>Legislation</th>
<th>Description</th>
</tr>
</thead>
</table>
| Canada             | *Canadian Environmental Protection Act (CEPA)*   | **Prohibition** - restricts the use and prohibits the importation, manufacture and processing of all PCBs with more than two chlorine atoms on the PCB molecule  
                     |                                                  | **Concentration in Products** - prohibits importation, manufacture and sale of electric capacitors and transformers, electromagnets, heat exchangers, hydraulic equipment or vapour diffusion pumps, that contain more than "50 ppm PCB by weight"  
                     |                                                  | **Releases** - controls the maximum concentration of PCBs that can be released to the environment in the course of a commercial, manufacturing or processing activity at:  
                     |                                                  | 50 ppm (general case); 5 ppm for road oiling;  
                     |                                                  | - controls the maximum quantity of PCBs that may be released at 1 g/day per piece or package of equipment  
                     |                                                  | **Storage of PCB Wastes Interim Order (Sept 16/88)** Amended (Feb 20/89) Amended (May 1/89) - ensures that PCBs are stored in a manner and under conditions which do not pose any threat to the environment or to human life or health |
APPENDIX F

ENVIRONMENT RESOURCE CONTACTS
PCBs AND HAZARDOUS WASTES
FEDERAL AND PROVINCIAL OFFICES
APPENDIX E - FEDERAL AND PROVINCIAL REGULATIONS RELATING TO PCBs (Cont'd)

<table>
<thead>
<tr>
<th>Jurisdiction</th>
<th>Legislation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Federal Mobile PCB Treatment and Destruction Regulations (Proposed)</td>
</tr>
<tr>
<td></td>
<td>- ensures that mobile systems for the treatment and destruction of PCBs, by thermal and by chemical means, that are operated on federal lands or operated by or under contract with federal institutions, do not present a threat to the environment or to human life or health</td>
</tr>
<tr>
<td></td>
<td>Fisheries Act</td>
</tr>
<tr>
<td></td>
<td>- controls the release of deleterious substances to waterways frequented by fish</td>
</tr>
<tr>
<td></td>
<td>Transportation of Dangerous Goods Regulations - 1985</td>
</tr>
<tr>
<td></td>
<td>- regulates the documentation, handling and control of dangerous goods for all interprovincial and international modes of transport; through agreements with the federal government, provinces have jurisdiction for intraprovincial transportation of dangerous goods</td>
</tr>
<tr>
<td></td>
<td>Transportation of Dangerous Goods Act - Appendix 1, Amendments concerning the Transportation of PCBs, May, 1986</td>
</tr>
<tr>
<td></td>
<td>- regulates all road and rail PCB transportation activities and includes special exemptions for equipment in service and describes specific handling and packaging for PCBs</td>
</tr>
<tr>
<td></td>
<td>Transportation of Dangerous Goods Act - Amendment Schedule 8, 18 January 1989</td>
</tr>
<tr>
<td></td>
<td>- clarifies requirements for labelling PCBs</td>
</tr>
</tbody>
</table>
Canadian Council of Ministers of the Environment (CCME) Guidelines

INTERIM ENVIRONMENTAL QUALITY OBJECTIVES FOR PCBS IN AIR, WATER AND SOIL

<table>
<thead>
<tr>
<th>Medium</th>
<th>Condition</th>
<th>PCB Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ambient Air</td>
<td>annual average</td>
<td>35 ng/m³</td>
</tr>
<tr>
<td></td>
<td>24-h average</td>
<td>150 ng/m³</td>
</tr>
<tr>
<td></td>
<td>0.5-h average</td>
<td>450 ng/m³</td>
</tr>
<tr>
<td>Ambient Water</td>
<td>-</td>
<td>1 ng/L</td>
</tr>
<tr>
<td>Soil</td>
<td>agricultural</td>
<td>0.5 ppm</td>
</tr>
<tr>
<td></td>
<td>non-agricultural</td>
<td>5 ppm</td>
</tr>
<tr>
<td></td>
<td>(residential/public access)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>industrial/commercial</td>
<td>50 ppm</td>
</tr>
</tbody>
</table>
FEDERAL ENVIRONMENT CONTACTS FOR PCBs AND HAZARDOUS WASTES

Headquarters:

Officer, TDGA Program  
Waste Management Division  
Conservation and Protection  
Environment Canada  
Place Vincent Massey, 13th Floor  
351 St. Joseph Boulevard  
Hull, Québec  
K1A 0H3  
Telephone: (819) 997-3377  
Telex: 053-4567  
Fax: (819) 997-3068

Compliance Officer  
Chemicals Control Division  
Commercial Chemicals Branch  
Conservation and Protection  
Environment Canada  
Place Vincent Massey, 14th Floor  
351 St. Joseph Boulevard  
Hull, Québec  
K1A 1C8  
Telephone: (819) 953-1676  
Telex: 053-4567

Regional Offices

Contaminants Control Officer  
Conservation and Protection  
Environment Canada  
Kapilano 100-Park Royal  
3rd Floor  
West Vancouver, British Columbia  
V7T 1A2  
Telephone: (604) 666-6711  
Telex: 04-54476

Head, Environmental Quality Branch  
Conservation and Protection  
Environment Canada  
Twin Atria No. 2, 2nd Floor  
4999-98 Avenue  
Edmonton, Alberta  
T6B 2X3  
Telephone: (403) 468-8057  
Telex: 037-2099  
Fax: (403) 468-8042

Manager, Environmental Contaminants Branch  
Conservation and Protection  
Environment Canada  
25 St. Clair Avenue East, 7th Floor  
Toronto, Ontario  
M4T 1M2  
Telephone: (416) 973-1075  
Telex: 062-3601  
Fax: (416) 973-8342

Project Engineer  
Emergency and Wastes  
Conservation and Protection  
Environment Canada  
1179 Bleury St., 2nd Floor  
Montréal, Québec  
H3B 3H9  
Téléphone: (514) 283-2349  
Télex: 055-62234  
Fax: (514) 283-4423

Head, Hazardous Waste Section  
Contaminants and Assessments Branch  
Environmental Protection Service  
Environment Canada  
5th Floor, Queen Square  
45 Alderney Drive  
Dartmouth, Nova Scotia  
B2Y 2N6  
Telephone: (902) 426-6670  
Telex: 019-21565  
Fax: (902) 426-2690
### FEDERAL ENVIRONMENT CONTACTS (Continued)

<table>
<thead>
<tr>
<th>District</th>
<th>Address</th>
<th>Telephone</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Newfoundland</strong></td>
<td>Conservation and Protection Environment Canada</td>
<td>Office - (709)772-5488</td>
</tr>
<tr>
<td></td>
<td>P.O. Box 5037, Building 310 Pleasantville</td>
<td></td>
</tr>
<tr>
<td></td>
<td>St. John's, <strong>Newfoundland</strong> A1C 5V3</td>
<td></td>
</tr>
<tr>
<td><strong>Prince Edward Island</strong></td>
<td>Conservation and Protection Environment Canada</td>
<td>Office - (902)566-7042</td>
</tr>
<tr>
<td></td>
<td>P.O. Box 1115 Charlottetown, <strong>Prince Edward Island</strong> C1A 7M8</td>
<td></td>
</tr>
<tr>
<td><strong>New Brunswick</strong></td>
<td>Conservation and Protection Environment Canada</td>
<td>Office - (506)452-3286</td>
</tr>
<tr>
<td></td>
<td>P.O. Box 400, Queen St. Fredericton, <strong>New Brunswick</strong> E3B 4Z9</td>
<td>Fax - (506)452-3003</td>
</tr>
<tr>
<td><strong>Ontario</strong></td>
<td>Manager, National Capital Area Environment Canada</td>
<td>Office - (613)991-1954</td>
</tr>
<tr>
<td></td>
<td>Environmental Protection 3439 River Road</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ottawa, <strong>Ontario</strong> K1A 0H3</td>
<td></td>
</tr>
<tr>
<td><strong>Manitoba</strong></td>
<td>Conservation and Protection Environment Canada</td>
<td>Office - (204)983-4811</td>
</tr>
<tr>
<td></td>
<td>503-269 Main Street Winnipeg, <strong>Manitoba</strong> R3C 1B2</td>
<td>Fax - (204)983-4506</td>
</tr>
<tr>
<td><strong>Saskatchewan</strong></td>
<td>Conservation and Protection Environment Canada</td>
<td>Office - (306)780-6464</td>
</tr>
<tr>
<td></td>
<td>2nd Floor 1901 Victoria Avenue Regina, <strong>Saskatchewan</strong> S4P 3R4</td>
<td>Fax - (306)780-6466</td>
</tr>
<tr>
<td><strong>Northwest Territories</strong></td>
<td>Conservation and Protection Environment Canada</td>
<td>Office - (403)873-3456</td>
</tr>
<tr>
<td></td>
<td>P.O. Box 370 9th Floor, Bellanca Building</td>
<td>Fax - (403)873-8185</td>
</tr>
<tr>
<td></td>
<td>Yellowknife, <strong>Northwest Territories</strong> X1A 2N3</td>
<td></td>
</tr>
<tr>
<td>Yukon Territory Conservation and Protection Environment Canada Room 225, Federal Building Whitehorse, Yukon Territory Y1A 2B5</td>
<td>Office</td>
<td>(403)667-3400</td>
</tr>
</tbody>
</table>
PROVINCIAL ENVIRONMENT CONTACTS

<table>
<thead>
<tr>
<th>Ministry of the Environment</th>
<th>Municipal Affairs and Environment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parliament Buildings</td>
<td>364 Argyle Street</td>
</tr>
<tr>
<td>810 Blanshard Street</td>
<td>P.O. Box 6000</td>
</tr>
<tr>
<td>Victoria, British Columbia</td>
<td>Fredericton, New Brunswick</td>
</tr>
<tr>
<td>V8V 1X5</td>
<td>E3B 5H1</td>
</tr>
<tr>
<td>Telephone: (604) 387-9955</td>
<td>Telephone: (506) 453-2861</td>
</tr>
<tr>
<td>Fax: (604) 336-7197</td>
<td>Fax: (506) 453-2265</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Alberta Environment</th>
<th>Department of the Environment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oxbridge Place</td>
<td>5151 Terminal Road</td>
</tr>
<tr>
<td>9820-106th Street, 5th Floor</td>
<td>P.O. Box 2107</td>
</tr>
<tr>
<td>Edmonton, Alberta</td>
<td>Halifax, Nova Scotia</td>
</tr>
<tr>
<td>T5K 236</td>
<td>B3J 3B7</td>
</tr>
<tr>
<td>Telephone: (403) 427-5847</td>
<td>Telephone: (902) 424-5300</td>
</tr>
<tr>
<td>Fax: (403) 422-5120</td>
<td>Fax: (902) 424-0503</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Saskatchewan Environment &amp; Public Safety</th>
<th>Department of Environment and Lands</th>
</tr>
</thead>
<tbody>
<tr>
<td>Walter Scott Building</td>
<td>Confederation Building</td>
</tr>
<tr>
<td>3085 Albert Street</td>
<td>P.O. Box 8700</td>
</tr>
<tr>
<td>Regina, Saskatchewan</td>
<td>St. John's, Newfoundland</td>
</tr>
<tr>
<td>S4S 0B1</td>
<td>A1B 4J6</td>
</tr>
<tr>
<td>Telephone: (306) 787-2255</td>
<td>Telephone: (709) 576-2565</td>
</tr>
<tr>
<td>Fax: (306) 787-0197</td>
<td>Telex: 016-4197</td>
</tr>
<tr>
<td></td>
<td>Fax: (709) 576-1930</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dangerous Goods Handling and Transportation Information</th>
<th>Pollution Control Division</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental Management Division</td>
<td>Department of Renewable Resources</td>
</tr>
<tr>
<td>Department of Environment, Workplace Safety &amp; Health</td>
<td>Government of the Northwest Territories</td>
</tr>
<tr>
<td>Bldg. 2, 139 Tuxedo Avenue</td>
<td>Yellowknife, Northwest Territories</td>
</tr>
<tr>
<td>P.O. Box 7</td>
<td>X1A 2L9</td>
</tr>
<tr>
<td>Winnipeg, Manitoba</td>
<td>Telephone: (403) 873-7654</td>
</tr>
<tr>
<td>R3N 0H6</td>
<td>Fax: (403) 873-0221</td>
</tr>
<tr>
<td>Telephone: (204) 945-7039</td>
<td></td>
</tr>
<tr>
<td>Fax: (204) 945-5229</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ontario Ministry of the Environment Waste Management Branch</th>
<th>Department of Community and Transportation Services - S7</th>
</tr>
</thead>
<tbody>
<tr>
<td>135 St. Clair Avenue West, Toronto, Ontario</td>
<td>P.O. Box 2703</td>
</tr>
<tr>
<td>M4V 1P5</td>
<td>Whitehorse, Yukon</td>
</tr>
<tr>
<td>Telephone: (416) 323-5200</td>
<td>Y1A 2C6</td>
</tr>
<tr>
<td>Fax: (416) 963-3109</td>
<td>Telephone: (403) 667-3032</td>
</tr>
<tr>
<td></td>
<td>Fax: (403) 668-7864</td>
</tr>
</tbody>
</table>

Direction des Substances Dangereuses
Ministère de l'Environnement
3900, rue Marly
Ste-Foy, Québec
G1X 4E4
Téléphone: (418) 644-3420
Fax: (418) 646-0001
APPENDIX G
TRANSPORTATION RESOURCE CONTACTS
FEDERAL AND PROVINCIAL TRANSPORT CONTACTS
# FEDERAL TRANSPORT CONTACTS

**Consignors, Manufacturers, Consignees, Warehousemen, Freight Forwarders, Brokers, etc.**

<table>
<thead>
<tr>
<th>Region</th>
<th>Address 1</th>
<th>Address 2</th>
<th>City</th>
<th>Province</th>
<th>Telephone</th>
<th>Fax</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transport of Dangerous Goods Directorate</td>
<td>Transport Canada</td>
<td>Canada Bldg.</td>
<td>Ottawa</td>
<td>Ontario</td>
<td>(613) 992-4624</td>
<td>(613) 952-1340</td>
</tr>
<tr>
<td>Regional Manager</td>
<td>Transport Dangerous Goods</td>
<td>Suite 309</td>
<td>549 Columbia Street</td>
<td>New Westminster</td>
<td>British Columbia</td>
<td>(604) 666-2955</td>
</tr>
<tr>
<td>Regional Manager</td>
<td>Transport Dangerous Goods</td>
<td>101-22nd Street East</td>
<td>Room 604, Federal Building</td>
<td>Saskatoon</td>
<td>Saskatchewan</td>
<td>(306) 975-5105</td>
</tr>
<tr>
<td>Regional Manager</td>
<td>Transport Dangerous Goods</td>
<td>391 York Avenue</td>
<td>5670 Spring Garden Road</td>
<td>Halifax</td>
<td>Nova Scotia</td>
<td>(902) 426-6532</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Region</th>
<th>Address 1</th>
<th>Address 2</th>
<th>City</th>
<th>Province</th>
<th>Telephone</th>
<th>Fax</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regional Manager</td>
<td>Transport Dangerous Goods</td>
<td>200 Town Centre Court</td>
<td>Scarborough</td>
<td>Ontario</td>
<td>(416) 973-4599</td>
<td>(416) 973-5905</td>
</tr>
<tr>
<td>Regional Manager</td>
<td>Transport Dangerous Goods</td>
<td>Wing No. 3, 3rd Floor</td>
<td>Cité du Havre</td>
<td>Montreal</td>
<td>Quebec</td>
<td>(514) 283-7369</td>
</tr>
<tr>
<td>Regional Manager</td>
<td>Transport Dangerous Goods</td>
<td>5670 Spring Garden Road</td>
<td>Halifax</td>
<td>Nova Scotia</td>
<td>(902) 436-6921</td>
<td></td>
</tr>
</tbody>
</table>
Surface Transport*

Compliance and Dangerous Goods Coordinator
Operations Branch
Transport Canada
344 Slater St.
14th Floor
Canada Bldg.
Ottawa, Ontario
K1A 0N5
Telephone: (613) 998-5239
Fax: (613) 952-1340

SURFACE TRANSPORT REGIONAL OFFICES

Pacific Region

Transport of Dangerous Goods
Directorate
Transport Canada
201-549 Columbia St.
New Westminster, British Columbia
V3L 1B3
Telephone: (604) 666-6740
Fax: (604) 666-7747

Western Region

Transport of Dangerous Goods
Directorate
Transport Canada
101, 22nd St. East
Room 305, Federal Building
Saskatoon, Saskatchewan
S7K 0E5
Telephone: (306) 975-5527
Fax: (306) 975-4555

Prairies Region

Transport of Dangerous Goods
Directorate
Transport Canada
305-391 York Avenue
Winnipeg, Manitoba
R3C 0P4
Telephone: (204) 983-8839
Fax: (204) 983-8992

Central Region

Transport of Dangerous Goods
Directorate
Transport Canada
830-200 Town Centre Court
Scarborough, Ontario
M1P 4X8
Telephone: (416) 973-4599
Fax: (416) 973-5905

Eastern Region

Transport of Dangerous Goods
Directorate
Transport Canada
Édifice du Port de Montréal
3rd Floor, Cité du Havre
Montréal, Québec
H3C 3R5
Telephone: (514) 283-0696
Fax: (514) 283-0297

Atlantic Region

Transport of Dangerous Goods
Directorate
Transport Canada
5670 Spring Garden Rd.
7th Floor
Halifax, Nova Scotia
B3J 1H6
Telephone: (902) 426-9351
Fax: (902) 426-6921

* Transport by rail is designated as surface travel and comes under Transport Canada
PROVINCIAL TRANSPORT CONTACTS

Road Transport

Director, Administration and Safety
Motor Vehicle Department
Ministry of Solicitor General
2631 Douglas Street
Victoria, British Columbia
V8T 5A3
Telephone: (604) 387-3142
Fax: (604) 387-0047

Executive Director
Dangerous Goods Control
Public Safety Services
No. 144, 14315 - 118 Avenue
Edmonton, Alberta
T5L 2M3
Telephone: (403) 422-9600
Telex: 037-43363

Co-ordinator
Dangerous Goods Project
Ontario Ministry of Transportation and Communications
Room 212, West Building
1201 Wilson Avenue
Downsview, Ontario
M3M 1J8
Telephone: (416) 235-3568
Telex: 065-24145

Direction du transport routier des marchandises
Ministere des Transports
700, est, St-Cyrille - 22e etage
Quebec (Quebec)
G1R 5H1
Telephone: (418) 643-2235
Telex: 051-3733

Deputy Registrar of Motor Vehicles
Motor Vehicle Division
Department of Transportation
Kings Place, York Tower
York Street
P.O. Box 6000
Fredericton, New Brunswick
E3B 5H1
Telephone: (506) 453-2407
Telex: 041-46230

Supervisor or Director
Motor Vehicle Inspection Division
Road Transport Inspection Section
Department of Transportation
6061 Young Street
P.O. Box 156
Halifax, Nova Scotia
Telephone: (902) 424-4335
Telex: 019-2286

Dangerous Goods Transportation Section
Saskatchewan Highways and Transportation
1855 Victoria Avenue
Regina, Saskatchewan
S4P 3V5
Telephone: (306) 787-5527

Dangerous Goods Handling and Transportation Information
Environment Management Division
Department of Environment, Workplace Safety & Health
Bldg. 2, 139 Tuxedo Avenue
P.O. Box 7
Winnipeg, Manitoba
R3N 0H6
Telephone: (204) 945-7094
Telex: 07-587589
Manager, Transportation Regulation
   Enforcement
Department of Works Services and
   Transportation
P.O. Box 8700
St. John's, Newfoundland
A1B 4J6
Telephone: (709) 576-3454
Telex: 016-3101
Fax: (704) 576-6955

Highway Safety Division
Transportation and Public Works
17 Haviland Street
P.O. Box 2000
Charlottetown, Prince Edward Island
C1A 7N8
Telephone: (902) 368-5200
Telex: 014-44154

Pollution Control Division
Department of Renewable Resources
Government of the Northwest
   Territories
Yellowknife, Northwest Territories
X1A 2L9
Telephone: (403) 873-7654
Telex: 034-45528
Tele: 034-45528

Administrator, Transport Services
Department of Community &
   Transportation Services
P.O. Box 2703
Whitehorse, Yukon
Y1A 2C6
Telephone: (403) 667-3032
Telex: 036-8-260
APPENDIX H

WRITTEN DIRECTIONS FOR DISTRIBUTION OF COPIES OF TRANSPORTATION MANIFEST
APPENDIX H - WRITTEN DIRECTIONS FOR DISTRIBUTION OF COPIES OF TRANSPORTATION MANIFEST

Each waste manifest form has six copies which are distributed as follows:

1 Interprovincial and Intraprovincial Shipments

Copy 1 - mailed by **consignor to provincial authority** within two days of goods being received by carrier:

- the original Copy 1 is sent to province of destination;
- a photocopy of Copy 1 is sent to the province of origin.

Copy 2 - **retained by the consignor** for a period of two years after the goods have reached their destination.

Copy 3 - mailed by **consignee to provincial authority** within two days of receiving goods from the carrier:

- the original Copy 3 is sent to province of destination;
- a photocopy of Copy 3 is sent to the province of origin.

Copy 4 - **retained by the carrier** for a period of two years after the goods have reached their destination.

Copy 5 - **retained by the consignee** for a period of two years after the goods have reached their destination.

Copy 6 - mailed by the **consignee to the consignor**.
2 Shipments Destined for Canada from Other Countries:

Copy 1 - mailed by consignor to provincial authority within two days of goods being received by carrier:
• the original Copy 1 is sent to provinces of destination;
• a photocopy of Copy 1 is sent to Environment Canada.

Copy 2 - retained by the consignor for a period of two years after the goods have reached their destination.

Copy 3 - mailed by consignee to provincial authority within two days of receiving goods from the carrier:
• the original Copy 3 is sent to province of destination;
• a photocopy of Copy 3 is sent to Environment Canada.

Copy 4 - retained by the carrier for a period of two years after the goods have reached their destination.

Copy 5 - retained by the consignee for a period of two years after the goods have reached their destination.

Copy 6 - mailed by the consignee to the consignor.
3 Shipments Destined Out of Canada:

**Copy 1** - mailed by consignor to provincial authority within two days of goods being received by carrier:
- the original Copy 1 is sent to province of origin;
- a photocopy of Copy 1 is sent to Environment Canada.

**Copy 2** - retained by the consignor for a period of two years after the goods have reached their destination.

**Copy 3** - mailed by consignee to provincial authority within two days of receiving goods from the carrier:
- the original Copy 3 is sent to province of origin;
- a photocopy of Copy 3 is sent to Environment Canada.

**Copy 4** - retained by the carrier for a period of two years after the goods have reached their destination.

**Copy 5** - retained by the consignee for a period of two years after the goods have reached their destination.

**Copy 6** - mailed by the consignee to the consignor.