

A Guide to the Disposal and Decontamination of PCB-contaminated Transformers and other PCB applications



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Please Note:

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Glossary

Term	Description
ADR	Acronym given to The European Agreement Concerning the International Carriage of Dangerous Goods by Road.
ASTM	American Society for Testing and Materials
Capacitor	A passive electrical component consisting of a pair of conductors separated by a dielectric (insulator). Capacitors allow the flow of alternating current in a circuit. Capacitors can be used to counteract inductive loadings from sources such as electric motors and transmission lines in electrical power distribution (see Power Factor Correction Unit).
Circuit Breaker (CB)	A device used to open or close an electric power circuit either during normal power system operation or during abnormal conditions. During abnormal conditions, e.g. when excessive current runs through the circuit, a circuit breaker opens to protect equipment and surroundings from possible damage due to excess current. Dielectrics used in CB range from oil to compressed gases, e.g. air, SF ₆ .
Closed PCB application	A PCB application where the PCB would not normally readily migrate into the environment, e.g. use of PCB in sealed capacitors - also known as a Non-dispersive Application.
DCC	Dublin City Council
DGSA	Dangerous Goods Safety Advisor – a consultant on ADR requirements for the entire process of the transportation of dangerous goods.
Dielectric	A material that does not conduct an electric current under normal conditions i.e. an electrical insulator.
Dispersive PCB Application	A PCB application where the PCB may readily migrate into the environment, e.g. the use of PCB in building calk or paints – also known as an “Open” application.
EPA	Environmental Protection Agency
EU-7	A group of 7 PCB congeners used to indicate PCB contamination – PCB28, PCB52, PCB101, PCB118, PCB138, PCB153 and PCB180.
HSA	Health and Safety Authority
IEC	International Electrotechnical Commission

Term	Description
IMDG Code	International Maritime Dangerous Goods (IMDG) Code – Internationally accepted guideline for the safe shipment of dangerous goods or hazardous materials on vessels.
In-scope equipment	Equipment covered by the Waste Management (Hazardous Waste) Regulation 1998 that contains oil and was manufactured before 1989, unless there is a clear indication that such equipment does not contain PCB-contaminated material, such as a ‘non-PCB’ designation on the manufacturer’s label, or recent PCB test results showing less than 50ppm concentration of total PCB, completed to IEC 61619 standard.
IPPC	Integrated Pollution Prevention and Control
mg/kg	Milligrams per kilogram – also denoted as parts per million (ppm)
Non-Dispersive PCB Application	See “Closed PCB Application”
NTFSO	National Transfrontier Shipment Office
Open PCB Application	See “Dispersive PCB Application”
PCB or PCBs (physical and chemical properties)	Polychlorinated Biphenyls - a group of organic chemicals consisting of two benzene rings linked by a carbon-carbon bond where some or all of the hydrogen atoms on the benzene rings have been replaced by chlorine. PCBs are extremely stable under normal conditions, are excellent electrical insulators, have excellent heat transfer properties and are resistant to thermal degradation. PCBs pose a threat to the environment because of their toxicity, persistence and tendency to bioaccumulate, i.e., to build up in the bodies of animals, particularly at the top of the food chain. Prolonged and repeated exposure to PCBs can cause adverse effects on human health. Some PCBs are suspect carcinogens.
PCB or PCBs (regulatory definition)	<p>The Waste Management (Hazardous Waste) Regulations 1998, S.I. No. 163 of 1998 define PCBs as:</p> <ul style="list-style-type: none"> • polychlorinated biphenyls; • polychlorinated terphenyls; • monomethyl-tetrachloro-diphenyl methane; • monomethyl-dichloro-diphenyl methane; • monomethyl-dibromo-diphenyl methane; or • any mixture of substances containing any one or more of the aforementioned substances in an aggregate amount which exceeds 0.005% (or 50ppm) by weight of the mixture.

Term	Description
PCB Congener	A unique well-defined compound in the PCB class of substances. PCB congeners differ (and are defined by) the number of chlorine atoms contained within the molecule, e.g. 2-Chlorobiphenyl (2 chlorine atoms), 3-Chlorobiphenyl (3 chlorine atoms).
PCB Directive	Council Directive 96/59/EC of 16 September 1996 on the disposal of polychlorinated biphenyls and polychlorinated terphenyls (PCB/PCT).
PCB-contaminated liquid	Any liquid that contains more than 0.005% (or 50ppm) by weight of total PCBs.
PCB-contaminated equipment	Equipment which contains PCB-contaminated liquid or contained PCB-contaminated liquid which was not appropriately decontaminated.
POPs	Persistent Organic Pollutants - a class of substances listed under the Stockholm Convention on Persistent Organic Pollutants regarded as exhibiting the following properties 1. Toxic, 2. Stable in the general environment, 3. Bioaccumulative and 4. On release can become widely distributed throughout the environment. PCB are classed as POPs.
Power Factor Correction Unit (PFCU)	A combination of capacitors and/or inductors used to correct power distortions caused by certain electrical components in a circuit. Some electrical components, e.g. motors, rectifiers, distort the delivery of current from a distribution system whereby the real power – the capacity of a circuit to perform work – is not equal to the apparent power – the product of the current and voltage of the circuit. Power Factor Corrections Units are used to minimise such distortion and make the circuit appear more resistive, i.e. to attain the situation where the real power equals apparent power of the circuit.
PPE	Personal Protective Equipment
ppm	Parts per million – also denoted by milligrams per kilogram (mg/kg)
TFS/TFS Regulation	Transfrontier Shipment/ Transfrontier Shipment Regulation – Regulates the movement of wastes between EU Member States and between EU Member States and other countries.

Term	Description
Transformer	An active component of power management systems, electrical transformers are used to ‘transform’ voltage or current from one level to another, usually from a higher voltage or current to a lower voltage or current by applying the principle of magnetic induction between coils to convert voltage and/or current levels. Dielectrics used in transformers can range from oils, air to solid resins.
TREM Card	Transfer Emergency Card used in the transportation of dangerous goods.
UNEP	United Nations Environment Programme
WTF	Waste Transfer Form

1. INTRODUCTION

1.1 PCBs and their use in Equipment

Polychlorinated Biphenyls (PCBs) are synthetic chlorinated organic chemicals and are classified as Persistent Organic Pollutants (POPs) under the Stockholm Convention¹ due to following characteristics:

- High Toxicity - They are highly toxic to people and animals;
- Persistence - They persist in the environment, lasting for years or even decades before degrading into less dangerous forms;
- Transportability - They evaporate and travel long distances through air and water; and
- Biomagnification capabilities - They accumulate in the fatty tissue of animals.

This document presents a guide on how to dispose of or decontaminate equipment containing PCBs taking into account relevant health, safety, environmental protection and waste legislation in Ireland. Figure 1 provides an overview of the process of identifying and managing PCB-contaminated equipment.

Sources of information are referenced throughout this guide and a list of references and links to on-line documents are provided in **Appendix A**.

PCB-contaminated equipment refers to equipment containing PCB-contaminated oil, where the contamination exceeds 0.005% (or 50ppm) by weight of PCBs.

Closed or Non-dispersive PCB applications are uses where the equipment that contains PCB-contaminated oil may be practicably drained without compromising the reuse of the equipment.

Closed PCB applications include insulation in:

- Transformers;
- Circuit breakers;
- Welding plant; and
- Many types of capacitors.

In-scope Equipment is Electrical Equipment which:

- Contains an aggregate volume of greater than 5 litres of fluids; **and**
- Was manufactured pre-1989; **and**

¹ The Stockholm Convention on Persistent Organic Pollutants, May 22, 2011 (see <http://chm.pops.int>).

- There is not appropriate documentation confirming the equipment's PCB-contamination free status.

Also, equipment of a type which is likely to contain PCBs, shall, for the purposes of the Waste Management (Hazardous Waste) Regulations 1998, be considered as containing PCBs unless it is reasonable to assume or proven the contrary (Article 13(2)).

1.2 Who does what in relation to PCBs

Environmental Protection Agency (EPA):-

Under the Waste Management (Hazardous Waste) Regulations 1998, S.I. No. 163 of 1998, (hereafter referred to as the "Hazardous Waste Regulations" in this guidance), the EPA is charged with the establishment and maintenance of the National PCB Inventory. The EPA also enforces regulatory obligations of holders of PCB-contaminated equipment of IPPC-licensed sites. The EPA has also provided training for Local Authority personnel for the inspection of sites for potentially PCB-contaminated equipment. The EPA has worked with Local Authorities on sites where PCB contamination has occurred and has developed guidance for Local Authorities in the event such contamination is encountered.

Local Authorities:-

Local Authorities are responsible for the enforcement of requirements relating to PCB-contaminated equipment under the Hazardous Waste Regulations relating to sites (non-IPPC-licensed) within their functional areas. Local Authorities have enforcement powers under the Waste Management Act 1996, as amended, concerning the requirements for waste storage, recovery and disposal. Additionally, the Persistent Organic Pollutant Regulations 2010² require Local Authorities and the EPA to cooperate in the identification of certain stockpiles of waste containing persistent organic pollutants.

Health and Safety Authority (HSA):-

The HSA is responsible for the enforcement of requirements for the carriage of dangerous goods by road under the Carriage of Dangerous Goods by Road Act 1998 and the Carriage of Dangerous Goods by Road Regulations 2007. PCBs and PCB-contaminated waste are considered dangerous goods for the purposes of the legislation.

² Statutory Instrument No. 235 of 2010.

National Transfrontier Shipment (TFS) Office:-

The National TFS Office is the designated competent authority for export, import and transit of waste shipments under the Waste Management (Shipments of Waste) Regulations 2007³.

Holders of PCB-containing Equipment:-

Under the Hazardous Waste Regulations, holders of certain PCB-contaminated equipment must ensure the equipment is properly decontaminated or disposed of in an environmentally sound manner either immediately, or as appropriate, at the end of its useful life. Additionally, the holder of PCB-contaminated equipment containing an aggregate volume of more than 5 litres of PCB-contaminated material with a total PCB concentration greater than 50ppm PCB must notify the EPA of the equipment annually before September 1 either in writing or via the PCB On-line Notification System (see www.pcbs.ie) and label the equipment and premises housing the equipment in accordance with the Regulations. Further information concerning the regulatory obligations of holders of certain PCB-contaminated equipment can be found in Section 3 – Legal Requirements.

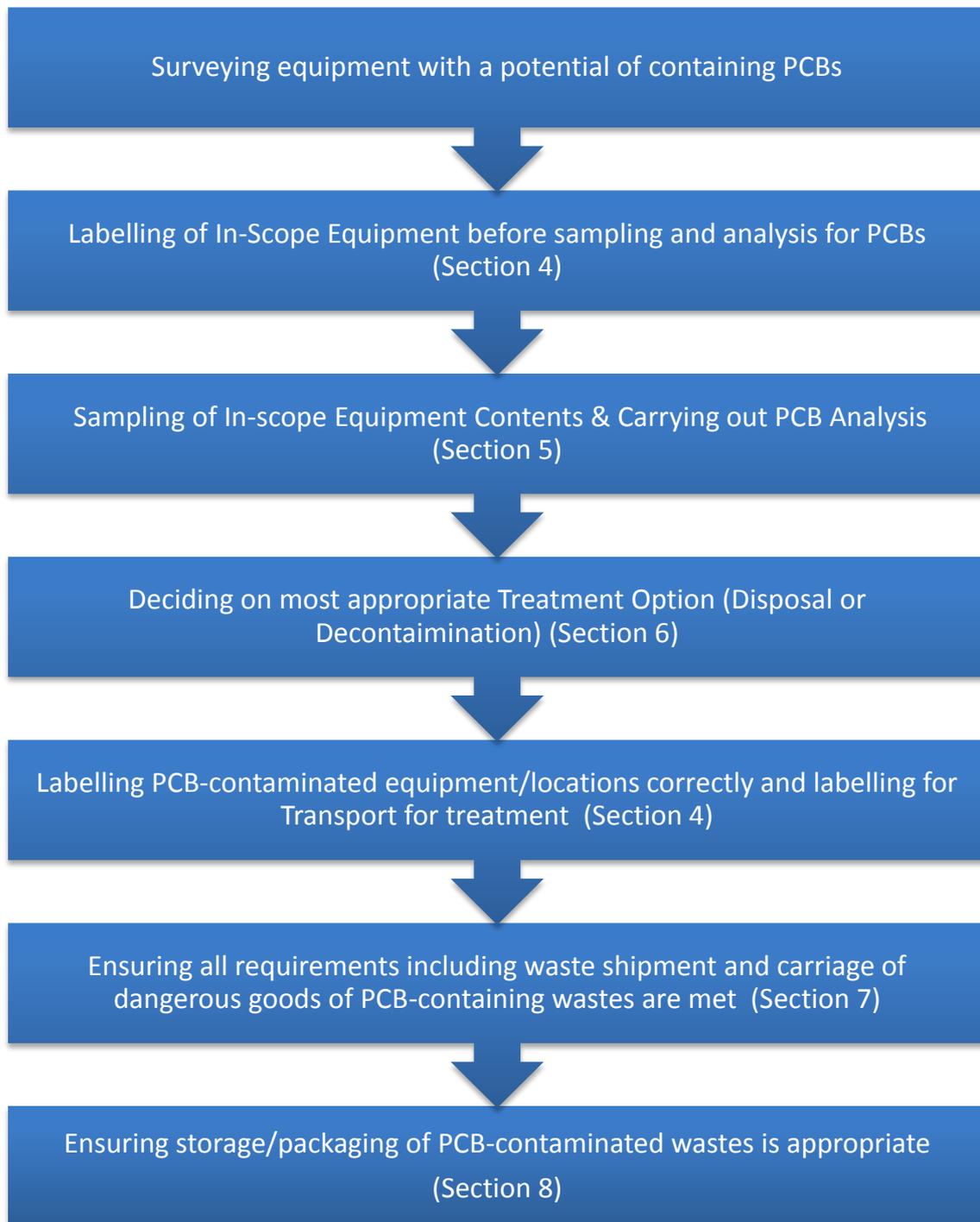
1.3 Managing PCB-contaminated equipment

There are two options in relation to the management of PCB-contaminated equipment, namely decontamination and disposal. **Decontamination** is an operation by which the concentration of PCBs in fluids in equipment is reduced. For decontamination to be effective it should result in a residual total PCB concentration of at most 0.05% (500ppm) and ideally less than 0.005% (50ppm). **Disposal** is any operation by which PCBs and PCB-contaminated equipment is treated to destroy or irreversibly transform the PCB content.

If your organisation is a holder of in-scope equipment or equipment that has been confirmed to contain PCBs, the remainder of this guidance document provides information to assist in fulfilling your organisation's regulatory obligations. Figure 1 gives an overview of these obligations.

³ Statutory Instrument No. 419 of 2007.

Figure 1 - Overview of the Process of Identification and Treatment of PCB-contaminated Equipment.



2. HEALTH, SAFETY AND ENVIRONMENTAL PROTECTION

PCB-contaminated equipment presents considerable health, safety and environmental risks. Furthermore, as many PCB applications concern electrical devices - mostly high voltage electrical equipment - it is imperative to also take electrical safety measures into account. **Only appropriately trained and experienced staff should handle such equipment.**

Prior to working on suspected or confirmed PCB-contaminated equipment, a Health, Safety and Environmental plan and protection measures should be in place and relevant staff should be trained on chemical safety, electrical safety and spill management. This is important in the following instances:

- Sampling of oils and insulating fluids;
- Servicing equipment or taking equipment out of service (including decontamination);
- Moving equipment to temporary storage or into transport vehicles; and
- Transporting equipment.

Health, safety and environmental considerations apply equally to PCB-contaminated equipment owners, and all companies and staff contracted to service, decommission, transport, decontaminate or dispose of such equipment.

Additional information on specific health, safety and environmental plans and protection measures is provided in **Appendix B**.

For more detailed information on Safety, Health and Welfare at Work Regulations and PCB- related health and safety issues, please contact the Workplace Contact Unit of the Health and Safety Authority (HSA) whose contact details are provided in **Appendix A**.

3. LEGAL REQUIREMENTS

Council Directive 96/59/EC on PCBs and PCTs - The PCB Directive - sets out the requirements for each Member State to inventory certain PCB-contaminated equipment and to ensure such equipment is decontaminated or disposed of in an environmentally sound manner.

The Hazardous Waste Regulations implement the provisions of the PCB Directive into Irish law and set out the requirements on holders of in-scope confirmed or suspected PCB-contaminated equipment to:

- Label the equipment appropriately;
- Notify the EPA of the equipment annually before September 1;

- Have disposed of or decontaminated PCB-contaminated equipment containing aggregate volumes greater than 5 litres of PCB-contaminated materials with PCB concentrations in excess of 0.05% total PCB by weight in an environmentally sound manner by the 31st December 2010;
- Dispose of equipment with aggregate volumes greater than 5 litres of PCB-contaminated materials with PCB-concentrations between 0.005% and 0.05% total PCB by weight in an environmentally sound manner at the end of its useful life.

Equipment which can be reasonably considered to contain PCB-contaminated materials is considered to contain PCB-contaminated materials unless proven otherwise.

The key requirements regarding labeling, disposal and decontamination of PCB-contaminated equipment, set out in the Hazardous Waste Regulations are:

Labelling

Labeling is required for:

- any equipment which contains or is likely to contain more than 5 litres of PCB-contaminated materials;
- all entrances to the building where the PCB-contaminated equipment is located; and
- decontaminated transformers.

All labels should state that the equipment (and premises containing equipment) is “**Contaminated by PCBs**” and must be visible, legible, indelible and of contrasting colour to the equipment they are affixed to. (Examples of labels are shown in Section 4)

Notifying the EPA

Holders of waste PCBs or PCB-contaminated equipment containing more than 5 litres of PCB-contaminated materials are obliged to notify the EPA by the 1st of September each year regarding the equipment. Such annual notifications can be made via the on-line PCB notification system (see www.pcbs.ie for link) or the Notification form is available to download on www.pcbs.ie. Also holders of waste PCBs or PCB-contaminated equipment containing more than 5 litres of PCB-contaminated materials should inform the waste department within the Environmental Section of the relevant Local Authority (in whose functional area the facility retaining the equipment is located) as soon the equipment has been identified.

Disposal

PCB-contaminated equipment containing more than 5 litres of PCB-contaminated fluid with PCB concentrations in excess of 0.05% total PCB by weight must be disposed of immediately in an environmentally sound manner.

PCB-contaminated equipment containing PCB-contaminated material with PCB concentrations between 0.005% (50ppm) and 0.05% (500ppm) total PCB by weight must be disposed in an environmentally sound manner at the end of its useful life.

Decontamination

PCB-contaminated equipment containing more than 5 litres of PCB-contaminated materials with a PCB-concentration greater than 0.05% total PCB by weight may be decontaminated to PCB-contamination concentrations less than 0.05% total PCB, and if possible to less than 0.005% total PCB as an alternative to equipment disposal. In practice, this alternative applies mainly to transformers.

Disposal/Decontamination Plans

Whether the disposal or decontamination option is chosen, holders should inform the Environmental Section of their Local Authority and the EPA in writing about disposal or decontamination plans, **in advance** of undertaking disposal or decontamination. These plans should include details of;

- the type and quantity of PCB-contaminated equipment, e.g. transformer, capacitor, equipment manufacturer, model and serial number, being disposed of and/or being decontaminated;
- the total volumes of PCB-contaminated materials involved (where exact volumes are not available an estimate will suffice);
- the proposed waste management company and/or decontamination contractor;
- the proposed collection date and ultimate disposal and/or decontamination location;
- The proposed method of disposal and/or decontamination; and
- The Transfrontier Shipment (TFS) movement notification form planned to be used to allow the export of the hazardous waste out of Ireland.

Once the PCB-contaminated equipment is disposed of and/or decontaminated, the owners of such waste should provide the Environmental Section of the relevant Local Authority and the EPA (via the on-line PCB notification system, see www.pcbs.ie for link) with a copy of the associated Waste Transfer Form (WTF) for hazardous waste movement, copies of TFS movement tracking forms and certificates of final disposal and/or decontamination (when available). Please note the holder of such waste is responsible for its proper disposal and must demonstrate to their Local Authority that the waste fluids (in the case of equipment decontamination) or waste equipment has been disposed of appropriately.

Table 1 summarises actions related to PCB-contaminated equipment required under the Hazardous Waste Regulations.

Table 1: Summary of actions related to PCB-contaminated equipment required under the Hazardous Waste Regulations

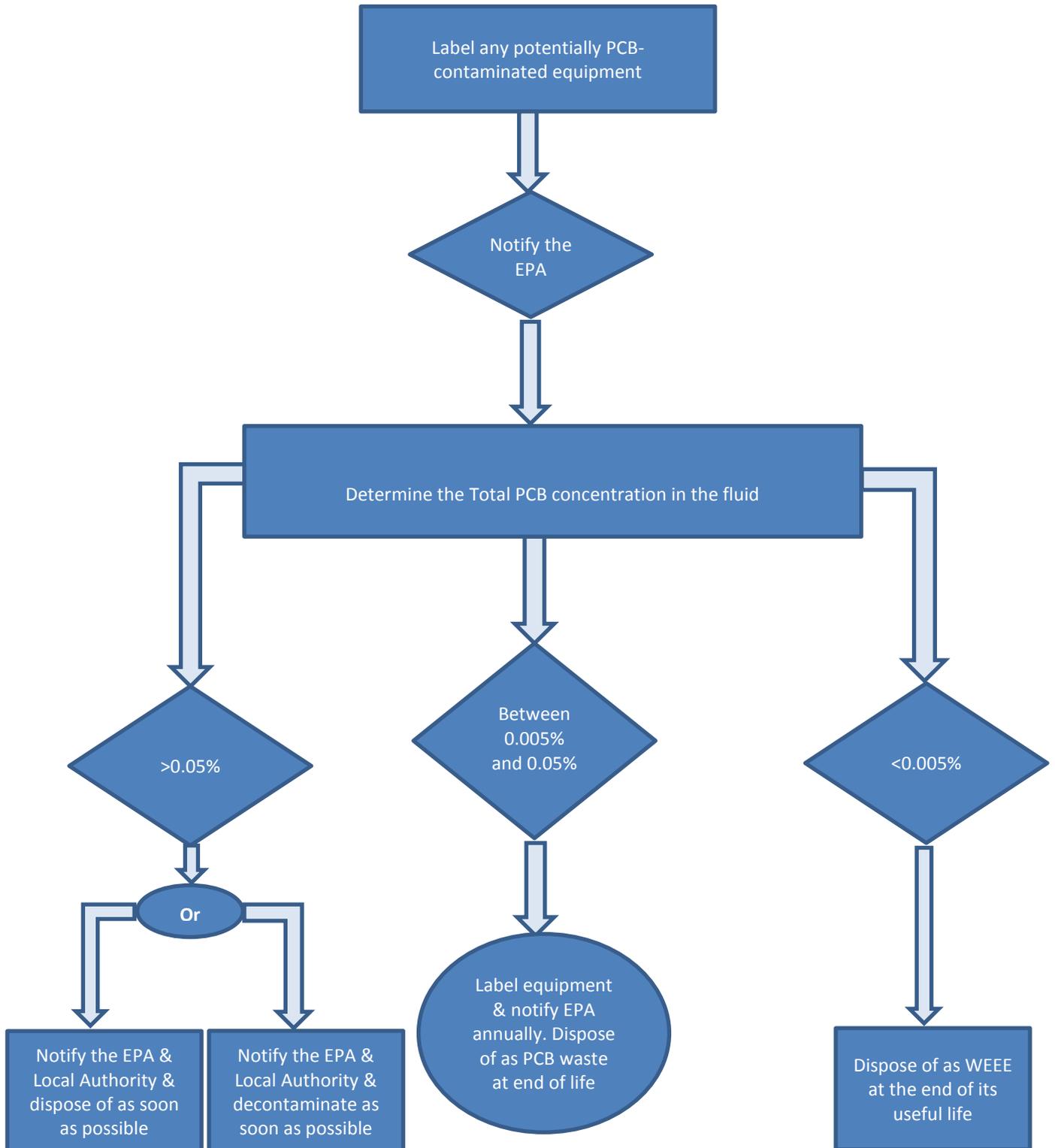
Volume of PCB-contaminated materials	Any volume	<5 litres	>5 litres	
Total PCB contamination level (% w/w)	Less than 0.005%	Greater than 0.05%	Between 0.005% and 0.05%	Greater than 0.05%
Required Action				
Dispose as WEEE at end of useful life	√			
Dispose of as PCB waste (WEEE) at end of useful life		√		
Notify EPA of equipment Dispose of as PCB waste (WEEE) at end of useful life			√*	
Notify EPA of equipment Decontaminate or dispose of immediately				√

* In-use PCB-contaminated equipment must be labelled and a notification sent to the EPA annually.

Summary of Other Key Regulations

A summary of the key points contained in other legislation, besides the Hazardous Waste Regulations, regarding the proper handling of PCB-contaminated wastes and PCB-contaminated equipment is provided in **Appendix C** and is referred to in subsequent sections to this guide.

Figure 2: Flow diagram describing management options for PCB-contaminated equipment with aggregate volumes > 5lt of contaminated materials depending on PCB contamination level.



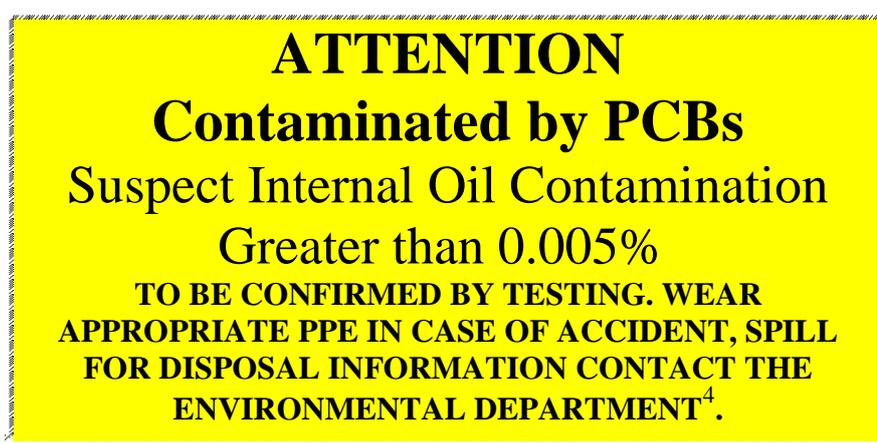
4. LABELLING

All equipment potentially contaminated with PCBs must be labelled as soon as it has been identified (i.e. oil-containing and manufactured before 1989). See Figure 3 below. Labelling is required for equipment on site and additional labelling is required if the equipment is being moved off site for treatment. Additionally, all the entrances to all buildings housing PCB-contaminated equipment must be labelled.

The purpose of labeling PCB-contaminated equipment is:

- To provide immediate identification of PCB-contaminated equipment and PCB-containing wastes;
- To alert personnel that the labeled equipment or waste requires special handling and disposal considerations;
- To alert emergency services personnel to the presence of PCBs in the event of a spill, leakage or fire; and
- To assist holders of PCB-contaminated equipment in reporting to the EPA on their PCB inventories.

Figure 3: Label for suspect PCB-contaminated equipment



Once such equipment has been tested, if the test results are negative the label can be removed, and if the test results are positive, then the label should be changed as appropriate to a label shown in Figure 3 or Figure 4.

⁴ If the owner of the PCB-contaminated equipment does not have an Environmental Department, then provide a name of a person or department responsible for disposal of PCB-contaminated equipment.

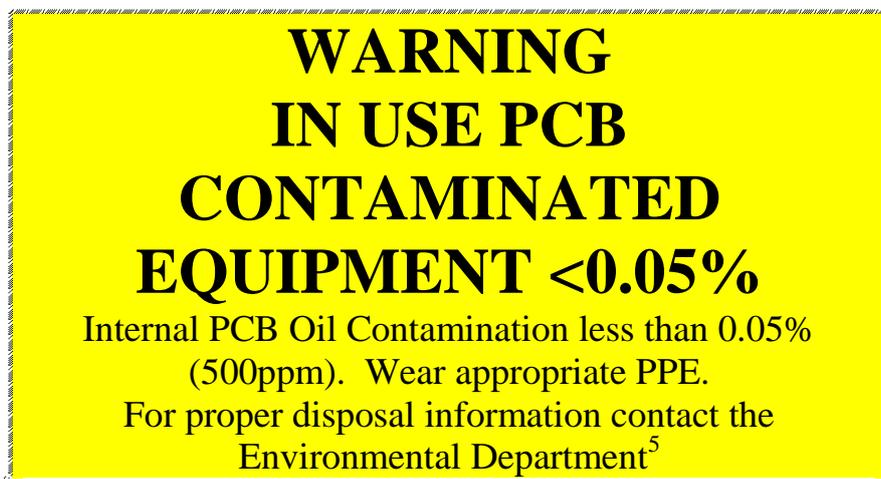
Confirmed PCB-contaminated equipment, contaminated with more than 0.05% total PCB must be labeled as presented in **Figure 4** below, as soon as contamination is confirmed. All doors of the premises where this equipment is kept should also be labeled with the same label.

Figure 4: Label for confirmed PCB-contaminated equipment



From 31 December 2010, the only allowed in-service PCB-contaminated equipment is equipment contaminated with less than 0.05% total PCB. Such equipment must be labeled as shown in **Figure 5**. All doors of the premises where such equipment is kept should also be labeled with the same label.

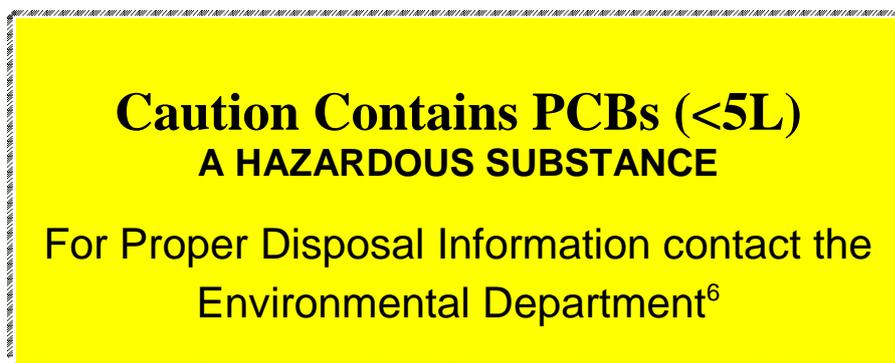
Figure 5: Label for confirmed PCB-contaminated equipment with contamination level less than 0.05% total PCB



It is best practice to label PCB-contaminated equipment containing less than 5 litres of PCB-contaminated fluids as shown in **Figure 6**.

⁵ If the owner of the PCB-contaminated equipment does not have an Environmental Department, then provide a name of a person or department responsible for disposal of PCB-contaminated equipment.

Figure 6: Label for PCB-contaminated equipment containing less than 5 litres of PCB-contaminated liquid



In order to comply with Safety, Health and Welfare at Work Regulations⁷ the label shown in **Figure 7** should be used in conjunction with labels presented in **Figures 3 to 6**. The reason for this requirement is that signs are intended to be understood independently of the literacy or language ability of the worker viewing it.

Figure 6: Toxic Material



Toxic if swallowed: Do not eat, drink or smoke when using this product.

⁶ If the owner of the PCB-contaminated equipment does not have an Environmental Department, then provide a name of a person or department responsible for disposal of PCB-contaminated equipment.

⁷ <http://www.hsa.ie/eng/Legislation/Acts/Safety Health and Welfare at Work/>



Toxic to the aquatic life with long lasting effects: Avoid release to the environment.

It is a legal requirement under Article 14(d) of the Hazardous Waste Regulations that a decontaminated transformer be labeled with an indelible and embossed or engraved sign. **Figure 8** shows the label required for transformers decontaminated below 0.005% total PCBs and **Figure 5** shows a label required for transformers decontaminated to between 0.005% and 0.05% total PCB.

Figure 8: Label for transformer decontaminated below 0.005% PCBs

DECONTAMINATED PCB EQUIPMENT

Fluid containing PCBs was replaced
_ with(name of substitute)
_ on(date)
_ by (undertaking)

Concentration of PCBs in
_ old fluid(% by weight)
_ new fluid(% by weight)

All labels applied to PCB-contaminated equipment while in service (**Figures 3 to 7**) should be left on that equipment until disposal is complete or until decontaminated to less than 0.005% total PCB whereby the label in **Figure 8** should be used.

5. ANALYTICAL TESTING

It is reasonable to assume that all oil-filled transformers, circuit breakers, welding plant and capacitors manufactured before 1989 (so called 'in-scope equipment') potentially contain PCBs, unless proven otherwise.

The only way to verify the PCB-contamination status of such equipment is by sampling the oil and analysing it for the presence of PCBs.

ASTM Standard D-923 is the recommended reference method for sampling the equipment fluids. Samples should be taken by suitably qualified and experienced electrical maintenance technicians.

For analysis of PCBs in insulating liquids, European standard method IEC 61619 and subsequent revisions must be used, as stipulated in European Commission Decision 2001/68/EC.

The PCB analysis reports are valid verification of PCB contamination status only if the report clearly states that analysis was completed to standard method IEC 61619.

Contact details of laboratories providing the required testing at the time of publication of this document are listed in **Appendix D** of this guide.

Owners of in-scope equipment should provide PCB analysis reports to the EPA as soon as available via the on-line PCB notification system (see www.pcbs.ie for link).

Each analysis report should clearly reference the equipment to which the report relates, e.g. by stating the equipment serial number. When submitting equipment analysis reports, all details of the equipment (including location, type, manufacturer, year of manufacture, serial number, volume of liquid) should also be provided.

6. PCB-CONTAMINATED EQUIPMENT: DECONTAMINATION OR DISPOSAL?

When choosing between equipment disposal versus decontamination certain following considerations should be taken into account.

In practice, the only PCB application relating to electrical equipment on which decontamination has been successfully carried out and described in literature is PCB-contaminated transformers. It is not practical to decontaminate other such PCB applications because:

- 50% of materials contained in capacitors (insulating materials such as paper and aluminium foil) cannot be decontaminated, and if one of these materials are removed the capacitor is effectively destroyed;

- Although it is theoretically possible to decontaminate circuit breakers and welders, this is not done in practice for two reasons:
 1. circuit breakers and welders older than 20 years are not considered safe and it is recommended by the Irish Health & Safety Authority, that manufacturers and electrical maintenance professionals replace them with newer equipment; and
 2. it is often not cost effective to decontaminate such equipment.

All PCB-contaminated equipment, other than transformers, should be disposed of in an environmentally sound manner.

6.1 Cost

Cost is probably the most important consideration when deciding whether to decontaminate or dispose of a PCB-contaminated transformer.

If disposal is chosen, the most expensive element is the replacement transformer. Due to the fact that a decontaminated transformer is still a used transformer and is likely to be over 20 years old at the time of publication of this guide, a second hand PCB-free transformer should be considered as a replacement transformer when comparing the price of decontamination of a PCB-contaminated transformer with the price of disposal and purchase of a replacement transformer.

However, purchasing a new replacement transformer may result in significant savings during its operation due to increased efficiency compared to operating costs of a decontaminated or used transformer⁸.

In order to assess an accurate cost of decontamination the following three elements must be taken into account:

- A quote provided by the chosen decontamination (by refilling) service provider including, at minimum, the following costs,:
 - Testing the transformer's general mechanical and electrical condition;
 - Replacement insulating fluid;
 - Replacement transformer during decontamination (if required);
 - Service charges; and
 - PCB testing.
- A separate quote is required from a waste management company for disposal of, at minimum, the following:
 - PCB-contaminated oil;
 - PCB-contaminated drained equipment;
 - PCB-contaminated wastes (such as PPE, rags, hoses, valves, etc.);
 - If relevant, disposal of other associated contaminated equipment (pumps, etc.); and
 - Transport costs and Service charges;

⁸ Transformer manufacturers can provide information on operating costs and efficiency.

- In addition, the costs of preparing a method statement, including a risk assessment and health, safety and environment plan, should be taken into account.

6.2 Level of PCB contamination

Due to the fact that decontamination must achieve a total PCB contamination level below 0.05% PCBs, decontamination is only feasible for transformers with an initially relatively low level of PCB contamination. Decontaminating transformers containing pure PCB oils or oils with a high level of PCB contamination is **NOT** recommended as continuous leaching of residual PCBs from paper and wood components within the transformer is likely to result in contamination of the replacement transformer oil to a level in excess of 0.05% total PCB [Ref. 1].

A practical limit for decontaminating PCB-contaminated transformers is approximately 0.5% w/w of total PCB (5000ppm). This means that transformers with a total PCB contamination higher than 0.5% should be disposed of in an environmentally sound manner.

If the residual contamination is above 0.005% total PCB, this will result in on-going costs associated with in-use PCB management and future PCB-contaminated equipment disposal costs. Furthermore, if contamination is above 0.5% total PCB, disposal is the only option as decontamination is unlikely to achieve a residual total PCB concentration below 0.05%.

6.3 Remaining life of transformer

PCB-contaminated transformers are over 20 years old at the time of publication of this guide, with some being 30-40 years old. It is considered that the maximum operational life of a transformer is approximately 40 years. Therefore, it can be expected that after decontamination a transformer may remain in service for only a relatively short time.

6.4 Transformer's Condition

If a PCB-contaminated transformer is in an unsatisfactory mechanical and/or electrical condition, decontamination is not a feasible option, as such a transformer is unlikely to operate effectively after decontamination. In such a case, disposal is the only logical route.

6.5 Health, Safety and Environmental Risk

Even with careful planning, there is a risk of a PCB spill that could lead to site, soil and/or water contamination and related costly remediation and liabilities during an on-site decontamination process. Furthermore, if residual contamination in the decontaminated transformer is above 0.005% total PCB, then this risk remains during the useful life of the transformer.

7. DECONTAMINATION OF TRANSFORMERS

There are currently two options for decontamination of PCB-contaminated transformers located in Ireland:

1. Decontaminate on site in Ireland using the retrofilling method; or
2. Export of the transformer abroad for decontamination using a more complex method for example, via solvent cleaning.

Decontamination methods other than retrofilling are not described in this guide due to the following:

- None of these methods are known to be commercially available in Ireland. Decontamination services were widely offered in the 1980s when the bulk of PCB-contaminated equipment was disposed of or decontaminated. Many of the companies that were providing decontamination services either no longer provide these services or no longer exist;
- These methods involve complex engineering processes, and may be proprietary;
- In **Appendix A** links are provided to four documents that describe various decontamination methods and technologies that are available (Refs. 4, 5, 6 and 7).

Prior to undertaking decontamination of a PCB-contaminated transformer, the owner of the transformer should notify the environment section of their relevant Local Authority about the planned decontamination and provide a decontamination method statement described in Section 9.4. Decontamination should not be undertaken until the Local Authority has reviewed the submitted method statement.

7.1 Retrofilling

Retrofilling is a crude decontamination method that involves draining PCB-contaminated oil from a transformer and refilling it with a PCB-free insulating fluid. It is important to allow sufficient time (two hours or more, depending on the size of the transformer) for all PCB-contaminated oil to drain from the transformer. It is recommended to use pumping rather than simple gravity assisted draining [Ref. 1], as pumping minimises residual PCB contamination. Once the transformer is drained, it is re-filled with PCB-free insulating fluid.

The residual PCB concentration in the new transformer fluid after retrofilling could be approximately up to 10% of the original PCB contamination [Ref. 1]. Applying the 10% approximation, if a transformer containing less than 0.5% is retrofilled correctly, a residual PCB concentration of between 0.005% and 0.05% total PCB is probable but not guaranteed.

Retrofilling should ONLY be undertaken by a company experienced in working with high voltage equipment and in replacing dielectric fluids.

Once a PCB-contaminated transformer is retrofilled, it should be put back into operation for at least 90 days [Ref.1] and then the oil must be sampled and analysed for PCB content using a test method conforming to IEC 61619. If residual PCB contamination is below 0.05% total PCB then decontamination by retrofilling is considered to have been successful.

It is important to note that a retrofilled transformer, with PCB contamination of more than 0.005% (but less than 0.05%) total PCB is still considered a PCB-contaminated transformer and must be disposed of as PCB waste at the end of its useful life. There are also the other requirements associated with in-use PCB-contaminated equipment, such as labeling and an annual notification to the EPA, as described in this guide and on www.pcbs.ie.

More details on decontamination by retrofilling are provided in the UNEP's document PCB Transformers and Capacitors: From Management to Reclassification; May 2002 [Ref. 1].

Who can perform a retrofilling operation?

Due to the relative straightforwardness of the retrofilling operation, a transformer maintenance company, qualified and experienced in changing transformer oil, could in theory perform this service. However, in order for the waste producer i.e. the owner of the PCB-contaminated transformer, to meet their legal requirements under the Hazardous Waste Regulations, it is recommended that an appropriate waste management company⁹ provide on-site assistance with specific aspects of hazardous waste management during the planning and implementation of a retrofilling process.

All precautions must be undertaken to avoid any PCB spills during retrofilling. Also, it must be ensured that all materials contaminated with PCBs generated during the retrofilling operation are disposed of appropriately.

7.2 Decontamination Abroad

For reasons explained earlier in this section, the only option for decontamination using a method other than retrofilling, is to identify a suitable decontamination company abroad and export the transformer(s) for decontamination.

Details of two companies offering decontamination services abroad at the time of publication of this guide are provided in **Appendix G**.

⁹ See Section 9.1 'Choosing waste management contractor'.

Some considerations to be taken into account when opting for decontamination abroad are:

- Exporting PCB-contaminated transformers for decontamination to other European countries is only economically viable for companies that have several PCB-contaminated transformers, where the total weight of PCB-contaminated transformers exceeds 20 tonnes¹⁰;
- Exporting transformers for decontamination will require the same management as outlined in **Section 8** for export of PCB-contaminated waste;
- Decontamination costs tend to be high due to the large amount of PCB-contaminated oil, cleaning agent and other equipment that must be disposed of as PCB-contaminated waste;
- A thorough mechanical and electrical assessment of the transformer must be completed in order to determine whether it is fit for decontamination, thereby increasing costs;
- The costs, logistics and timeframe associated with disconnecting over 20 tonnes of transformers, preparing appropriate method statements to ensure proper environmental protection, fulfilling dangerous goods (ADR) transportation law requirements and the actual decontamination period;
- Replacement transformers will be required while PCB-contaminated transformers are being decontaminated, increasing costs; and
- Potential liabilities from spills during loading.

7.3 Preparing the decontamination method statement

If decontamination is the chosen PCB-contaminated transformer management method, it is recommended that a detailed decontamination method statement is prepared. This method statement should explicitly outline the proposed scope of work and include, at minimum, the following information:

- Details of the transformer(s) to be decontaminated (current location, manufacturer, year of manufacture, type, serial number, PCB analysis results);
- Details of the company that will perform the decontamination, their qualifications and experience;
- Detailed description of how the transformer(s) will be decontaminated. The description should include any specific equipment that will be used, length of time allowed for PCB oil to be pumped or drained, details on the replacement oil, how will contaminated equipment, including hoses, valves, pumps, etc. be decontaminated or disposed of;

¹⁰ This figure was supplied by the decontamination company Orion during the development of this guide and is subject to change.

- A health, safety and environmental plan:
 - from the company contracted to undertake the decontamination; and
 - for the transformer owner site and staff¹¹;
- Details of the waste management contractor chosen for disposal of wastes arising from the decontamination process or for the export of the transformer and method statement provided by this contractor¹²;
- Planned date and laboratory details for PCB testing (to IEC method 61619) to prove that the transformer is decontaminated, noting the recommendation to allow at least 90 days to pass after retrofilling before retesting the new fluid for PCB content.

7.4 Reporting Requirements

Once the decontamination is completed, the following must be provided to the EPA via the on-line PCB notification system (see www.pcbs.ie for link):

- PCB analysis report for test conforming to standard IEC 61619 for decontaminated transformer, after the decontaminated transformer was in operation for at least 90 days;
- If the residual PCB contamination is between 0.005% and 0.05% total PCB, an annual PCB notification concerning the equipment must be submitted to the EPA via the on-line PCB notification system. Such a transformer must be labeled appropriately (See Figure 8) and disposed of as PCB-contaminated waste at end of its useful life.

8. DISPOSAL OF PCB-CONTAMINATED EQUIPMENT AND PCB-CONTAMINATED WASTE

Once the decision has been made to dispose of PCB-contaminated equipment, and it is taken out of service, it becomes waste. Any equipment containing an aggregate volume of more than 5 litres of PCB-contaminated material with PCB concentrations greater than 0.05% total PCB by weight must be considered PCB waste after 1 January 2011 and either decontaminated or disposed of in an environmentally sound manner following the provision of details of the equipment to EPA including proposed plans for the decontamination or disposal of the equipment. Equipment containing PCB-contaminated materials with PCB concentrations between 0.005% and 0.05% total PCB by weight is considered waste when it has reached the end of its useful life.

PCB waste is hazardous waste and must be managed according to all relevant hazardous waste and hazardous goods transportation legislation.

¹¹ See Section 3 on Health, Safety and Environmental Protection.

¹² See Section 9.1 on Choosing waste management contractor.

The following are the key steps for disposal of PCB-contaminated equipment and any associated wastes (such as insulating fluid contaminated with PCBs, PCB-contaminated rags or removed/disturbed PCB-contaminated soil), collectively termed PCB waste in accordance with the Hazardous Waste Regulations and the Waste Management Act 1996 (No. 10 of 1996):

Prepare a disposal plan and submit it to the relevant Local Authority and the EPA before disposal commences;

- Prepare the PCB-containing waste for collection on the site where the waste originated;
- Prepare the required paperwork e.g. WTF and/or TFS documentation;
- Engage an appropriately licensed hazardous waste management company to transport, handle and store the PCB-containing waste prior to export;
- Export of the PCB-containing waste by a company registered as a waste broker/dealer with the National Transfrontier Shipment Office (NTFSO) to a licensed hazardous waste disposal facility;
- Ensure proper and final destruction or transformation of the PCB-containing waste;
- Obtain the waste destruction certificate from the appropriately licensed waste disposal facility; and
- Report the disposal of the PCB-containing waste to the EPA including all related waste management documentation.

At the time of publication of this guide, there was no facility in Ireland where PCB-containing waste can be disposed of. Therefore, all PCB-containing waste is exported from Ireland to waste disposal facilities in other European countries. These facilities must be licensed for disposal of PCBs by the competent authorities in the country where the facility is located.

8.1 Choosing the Waste Management Contractor

In order to dispose of PCB-contaminated waste, the waste owner must engage an appropriate waste management company. However, the waste owner¹³ is responsible for ensuring that their waste is appropriately disposed of.

Therefore, the waste owner must ensure that the chosen waste management company is:

- licensed for hazardous waste management (see **Appendix E** for a list of companies licensed for management of hazardous waste);

¹³ Waste owner or waste producer, i.e. the person or organisation that owns the PCB-contaminated equipment/waste awaiting disposal.

- aware of and compliant with all relevant waste regulations, health and safety regulations, and hazardous waste and dangerous goods transportation regulations; and
- competent in managing PCB-contaminated waste.

When seeking a quote for PCB-contaminated waste disposal, the waste owner should ask the waste management contractors to provide a written method statement. This statement should, at minimum, contain the following information:

- Hazardous waste management license details;
- Description of PCB-containing waste treatment and disposal methods;
- Details of recovery and final disposal facility (location, licenses and permits);
- Details of any subcontractors that may be used;
- References to similar projects previously undertaken involving PCB-containing waste;
- List of documentation that will be provided following collection and disposal of waste, including List of Waste codes to be used (see Section 8.2.4);
- Health and Safety Plan for PCB-containing waste management operations (including PPE to be used);
- Environmental protection measures to be employed during loading/unloading of the equipment into vehicles, during transport and during storage;
- Transport requirements under ADR:
 - Packaging details, including labels to be used;
 - DGSA assessment details, assessor's name and certificate of training;
 - Vehicle description;
 - TREM card;
 - Driver ADR training certificate;
- Details of the waste exporter (broker) and evidence of the broker's registration.

8.2 Documentation requirements

The Hazardous Waste Regulations place duties on hazardous waste holders to keep specific records of any hazardous waste arising from their premises. These records, which must be kept for a minimum of 5 years, must set out:

- The quantity, nature and origin of waste produced;
- Any treatment carried out; and
- The quantity, nature, destination, frequency of collection and mode of transport of any hazardous waste transferred to another person.

In practice, most of this information will be contained in the Waste Transfer Form (WTF) required for movement of hazardous waste within Ireland and the export of waste to final destination form - Transfrontier Shipment (TFS) form.

8.2.1 Waste Transfer Form

Under the European Communities (Shipments of Hazardous Waste exclusively within Ireland) Regulations, S.I. No. 324 of 2011, Dublin City Council (DCC) has been designated as the competent authority for the purposes of the control of shipments of hazardous waste within the State. The Waste Transfer Form (WTF) is an online electronic system administered nationally by DCC. The WTF is an identification document that must be used whenever hazardous waste is shipped or transferred within the State. Since October 2011 the WTF has replaced the previously used C1 consignment note. The following points should be noted:

- An account must be setup to use the electronic system on the Dublin City Council website. The system can be accessed at <https://wrms.dublincity.ie/wrms/frontoffice/>;
- Once an account is set up users can purchase a WFT at a charge of €6¹⁴;
- The WTF should be completed online and downloaded;
- A copy of the WTF must be signed and accompany the waste while in transit;
- The receiving facility logs onto the online system and validates the acceptance of the load on the electronic WTF;
- One WTF can be completed for a number of collections but these must relate to a single facility on a particular day; and
- A WTF may be purchased by a consignor (producer/holder of the waste), carrier (person who moves the waste), or consignee (person responsible for the recovery/disposal of the waste).

Most likely, the waste management company will organise the WTF, provide it to the waste holder and assist in completing the WTF. A Carrier or Consignee may download a WTF on behalf of a Producer. An example WTF is provided in **Appendix F**.

A WTF is not required for authorised movements of hazardous wastes, when such materials are to be exported from Ireland directly to other countries. In such cases TFS forms are used. However, in practice, PCB-containing waste is often transferred from the waste producer site to a licensed waste transfer station in Ireland, before export, in which case a WTF is required.

¹⁴ At time of publication of this guidance.

8.2.2 Transfrontier Shipment (TFS) form

The TFS form is a Movement and Notification Document set out in Annex IA and IB of the Regulation (EC) No. 1013/2006¹⁵ and an example is presented in **Appendix F** of this guide. These documents are required for export of hazardous waste and must be submitted to the National Transfrontier Shipments Office (NTSFO) with other documentation required for export of hazardous waste.

According to the Waste Management (Registration of Brokers and Dealers) Regulations 2008, S.I. No. 113 of 2008, in Ireland, only brokers and dealers who are registered with the NTFSO are allowed to arrange export of waste. Contact details for NTFSO are provided in **Appendix A**.

Exporting hazardous waste is a highly regulated and very complex activity that is usually managed by a licensed waste management company, who will use a registered broker or dealer to organise export and complete and submit the required documentation.

8.2.3 Final destruction document

Once the PCB waste reaches its final destination, i.e. the licensed hazardous waste disposal facility, this facility must provide a final certificate of destruction or recovery for the waste, according to the Waste Management (Shipments of Waste) Regulations 2007. The waste management company must provide this document to the waste holder. There is no standard form for this.

8.2.4 Recovery and Disposal Codes

It is important that the correct List of Waste codes¹⁶ and disposal codes¹⁷ are used on all waste shipment and transfer documentation as follows:

List of Waste Codes	Description
16 01 09*	Components containing PCBs
16 02 09*	Transformer and capacitors containing PCBs
16 02 10*	Discarded equipment containing or contaminated by PCBs other than those mentioned in 16 02 09
13 01 01*	Hydraulic oils, containing PCBs
13 03 01*	Insulating or heat transmission oils containing PCBs

Disposal and recovery operations that may lead to recovery, recycling, reclamation or re-use of PCBs are prohibited.

¹⁵ Regulation (EC) No. 1013/2006 is transposed into the Irish law through the Waste Management (Shipments of Waste) Regulations 2007, S.I. No. 419 of 2007.

¹⁶ The List of Wastes was established by Commission Decision 2000/532/EC of 3 May 2000. The different types of wastes in the list are fully defined by the six-digit code for the waste.

¹⁷ Waste related activities are classed as recovery (R) or disposal (D) as defined in the Waste Framework Directive (2006/12/EC).

The Persistent Organic Pollutants Regulations¹⁸ (POPs Regulations) require that waste consisting of, containing or contaminated by PCBs, must be disposed of or recovered, without undue delay by any of the following treatment methods:

- D9: Physico-chemical treatment;
- D10: Incineration on land;
- in such a way as to ensure that the POP content is destroyed or irreversibly transformed so that the remaining waste and releases do not exhibit the characteristics of POPs.

Pre-treatment operations prior to the treatment above may be performed. PCBs may be isolated from waste provided that the waste is subsequently disposed of by one of the methods outlined above. In addition, repackaging and temporary storage operations may be performed prior to such pre-treatment or prior to destruction or irreversible transformation.

The following recovery codes may be applicable to some parts of PCB-contaminated equipment (see **Section 8.3**):

- R4 : Recovery of inorganic materials;
- A combination of disposal codes may have to be used, for example D10 and R4 if PCB oil is incinerated and transformer metal recycled.

It is important to specify on the Waste Transfer Form which disposal code refers to which part of the PCB-contaminated equipment.

The following combination disposal codes could be used for PCB-contaminated equipment:

- If the equipment is incinerated as a whole (including PCB-contaminated liquid): D10. This is usually the case with capacitors and other small items of equipment;
- If the equipment is drained of PCB oil, disassembled and metal parts are decontaminated and recycled and all other materials incinerated: D9 and R5 for metal components of the equipment, and D10 for incinerated materials (PCB oil, paper, wood). This is usually the case for transformers and circuit breakers;
- If PCB-containing or contaminated oils or solvents are de-chlorinated and then used as fuel, then D9 and R1 should be used.

8.3 Steps involved in the disposal/recycling of PCB-contaminated equipment

Due to the fact that transformers and some circuit breakers contain large amounts of valuable metal, such PCB-contaminated equipment is more often disposed of/recycled in the following way at the European licensed hazardous waste disposal facilities:

- PCB-contaminated oil is drained from the transformer or circuit breaker;

¹⁸ Statutory Instrument No. 235 of 2010.

- The transformer or circuit breaker casing is decontaminated by rinsing with a specialist cleaning agent;
- PCB-contaminated oil and PCB-contaminated cleaning agent are either incinerated in a special facility licensed for high temperature incineration of PCB-containing waste or decontaminated using distillation or other appropriate chemical methods (usually using sodium reagent) which removes chlorine from PCB-contaminated liquids, thereby destroying its PCBs content (consistent with POPs Regulations requirement);
- Metal parts, including steel casing, copper or aluminium coils, and metal sheets from the transformer core are recycled as scrap metal;
- Remaining PCB-contaminated wooden and paper parts of the transformer are also incinerated.

Smaller PCB-contaminated equipment, such as capacitors, are generally shredded and incinerated.

8.4 Moving PCB-contaminated Equipment to On Site Storage Area

Between the time of identification of PCB-containing waste and its placement in storage, all due care should be taken to prevent accidental release of PCBs to the environment.

It is essential that there is no risk of the accidental and uncontained release of PCBs during transportation to the designated storage area, however short the distance travelled. The option of draining the equipment of PCB-contaminated oils prior to equipment movement should be considered on a case-by-case basis and where chosen must be shown to pose the lesser environmental risk. Any such on-site draining of equipment must be carried out by appropriately trained personnel.

Owners of PCB-contaminated equipment /waste should notify their relevant Local Authority and EPA about planned movement of PCB-contaminated equipment/waste, even within the site, before commencing any operation, including equipment draining, associated with the move.

The following information should be provided to the Local Authority and EPA **prior** to any movement of PCB-contaminated equipment:

- Details of the equipment to be moved (location, type, manufacturer, manufacture year, serial number, volume of PCB liquid);
- Description and location of the proposed storage area;
- Proposed environmental protection measures to be used during the move and while in storage including proposed containment measures.

8.5 PCB Storage Areas

Decommissioned PCB-contaminated equipment or PCB-containing waste should be transferred to an appropriate storage area. The storage area must have the following characteristics:

- Security – The storage area should be securely locked and access should be restricted to authorised personnel. Doors must be appropriately labeled (see Section 4 on labeling);
- Fire protection – PCBs and PCB-contaminated equipment must be kept separate from flammable materials and holders should take all necessary precautions to avoid any risk of fire involving PCBs. The storage of combustibles should not be allowed within 10 metres of the equipment, and the storage area should have the necessary firefighting equipment;
- Spill containment – The storage area should be bunded. The floors and bund should be impermeable to PCBs. All floor drains, sumps or other openings in the floor should be closed and sealed to prevent the release of liquids. Spill kits should be readily available and all staff authorised to enter the storage area must be trained in using spill kits and the hazards associated with PCBs. Where sites have spillage response procedures specific details should be provided on PCB containment;
- PCBs segregation - No other waste should be stored within the designated storage area and no manufacturing or other activity should be undertaken there. Solids and liquids should be stored in separate drums. **PCB-contaminated oils must not be mixed with other waste oils;**
- Weatherproofing – The storage area should be located indoors, but if this is not possible an outside storage area should be covered with a waterproof barrier that protects the PCB-contaminated equipment and/or waste PCB containers and prevents moisture from entering the curbing or sides of the floor surface underneath;
- Adequate ventilation – there should be a fresh air inlet and an air exhaust to the outside;
- A copy of the site's Accident Prevention and Emergency Response plan should be posted in the storage area and should contain specific information on PCBs on site. A first aid kit should also be located in the storage area; and
- The storage area should be inspected weekly to verify that PCB-contaminated equipment and PCB-containing waste is appropriately stored and to minimize the potential of leaks or spillages.

PCB waste cannot be stored at the site of generation for a period greater than six months, as this is the maximum time allowed for temporary storage of hazardous waste without a Waste Licence under the Waste Management Acts 1996 to 2008.

More information on storage of PCB-containing waste is provided in section 6 of the UNEP's 'Preparation of a National Environmentally Sound Management Plan for PCBs and PCB-Contaminated Equipment' See [Ref. 3] **Appendix A** of this guide.

Figure 9 shows waste PCB-contaminated capacitors found on an Irish site in 2009 awaiting disposal, stored in two closed drums in a chemical store that is bunded, can be locked, and is weather-proof. The drums are clearly labelled with their content.



Figure 10: Waste PCB capacitors stored in a drum

9. TRANSPORTATION OF PCB-CONTAMINATED WASTE

9.1 Overview

The movement of PCB-contaminated waste requires compliance with a variety of regulations including those regarding the carriage of dangerous goods, legislation governing the movement of hazardous wastes within Ireland and the EU Transfrontier Shipment Regulations which deals with the movement of wastes between countries.

This section only provides guidance on the movement of PCB-contaminated waste.

Before commencement of such movements, further information should be sought from the appropriate authorities to ensure compliance with the relevant legislation.

9.2 Carriage of Dangerous Goods

PCB-contaminated equipment or waste contaminated with more than 0.005% total PCBs are classified as “dangerous goods” for transport purposes by road.

All dangerous goods transported by road within the EU must be transported in accordance with the European Agreement Concerning the International Carriage of Dangerous Goods by Road (ADR). It is ultimately the responsibility of the waste holder (which may be the waste producer) to make appropriate arrangements.

The Carriage of Dangerous Goods by Road Act 1998 and the Carriage of Dangerous Goods by Road Regulations (S.I. No. 288/289 of 2007) give effect to the ADR requirements in Ireland. Operators should however adhere to the current ADR (at the time of writing the 2011 edition). The Competent Authority for enforcement of the ADR requirements for road transport in Ireland is the Health and Safety Authority.

As all PCB-contaminated waste must be exported from Ireland for final disposal, the transport of dangerous goods regulations across other modes of transport may apply (most likely by sea). The Department of Transport, Marine Survey Office, are responsible for the transport of dangerous goods regulations across sea, regulated through the Merchant Shipping (Dangerous Goods) Rules, 1992, S.I. No. 391 of 1992, which give effect to International Maritime Dangerous Goods (IMDG) Code.

Organisations involved in the transportation of dangerous goods by road, rail and on inland waterways must appoint a suitably qualified Dangerous Goods Safety Adviser (DGSA). Waste producers or holders (considered Consignors in transportation law) must consult with a DGSA for specific, case-by-case advice regarding compliance. Advice must be sought on classification, packaging and labeling and the differing transport modal requirements that may apply. In practice, the waste producer/holder can contractually request a waste

management company to act as a consignor in which case the waste management company would take over all responsibilities under ADR. Most large waste management companies typically have at least one in-house DGSA.

Important provisions of ADR are outlined in the remainder of this section.

9.3 Designation of correct UN codes and labelling for transport

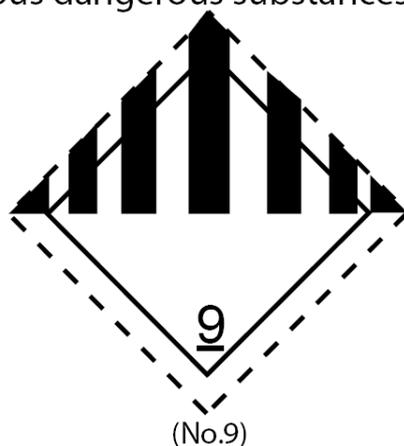
The following key ADR code information applies to PCB-contaminated waste:

- **UN 3432:** Proper Shipping Name: Polychlorinated Biphenyls, Solid; and
 - **UN 2315:** Proper shipping Name: Polychlorinated Biphenyls, Liquid;
 - Class 9 Hazard;
 - Packing Group II.
- } For both UN 3432 and UN 2315

The appropriate Class 9 hazard label is provided in **Figure 11** and is attached to packages of PCB-contaminated wastes designated for transport. The ADR is very specific in relation to packaging and labelling and is dependent on the PCB-contaminated waste type.

Figure 11: Hazard Label for Class 9 Dangerous Goods (applicable to PCB-contaminated wastes)

CLASS 9 HAZARD
Miscellaneous dangerous substances and articles



Symbol (seven vertical stripes in upper left half): black;
Background: white:

9.4 Packaging requirements

Packaging requirements under the ADR described below are more appropriate for small PCB-contaminated equipment (such as capacitors) and other PCB-contaminated wastes that may be contained in drums (including fluids). Such requirements include:

- All containers must be appropriately marked with a proper shipping name, UN number, label shown in **Figure 11**, and name and address of the packer, agent or consignor;
- Packaging must be UN approved and conform to specific packaging requirements specified for PCB-contaminated equipment. Containers must be capable of retaining at least 1.25 times the volume of the PCB-contaminated materials in the equipment. Packaging used is typically plastic lined UN approved drums. There must be sufficient absorbent material in the packaging to absorb at least 1.1 times the volume of liquid which is contained in the devices;
- For disposal of PCB-contaminated equipment that does not fit into UN approved 120-200L metal drums, for example transformers and larger circuit breakers, or in accordance with the appropriate ADR packing instructions, the equipment should be packaged in heavy duty plastic bags and heat-sealed. The plastic bags containing the equipment should be tied together on loading pallets and carried in cargo transport units fitted with a leak-proof metal tray to a height of at least 800mm and containing sufficient absorbent material capable of absorbing 1.1 times the volume of liquid;
- Liquids or solids contaminated with PCBs (e.g., rags, PPE) or small items of PCB-contaminated equipment should be:
 - Stored in 120-200L metal UN approved drums which are packed with absorbent material so that any leaks will be absorbed and hermetically sealed;
 - Small items of PCB-contaminated equipment should be wrapped in heavy duty plastic bags prior to storage in UN approved drums;
 - Small capacitors should be placed in the drum with the terminals upwards to prevent leaking; and
 - Stored so that an air space of 7 to 10 centimeters is left to allow for liquid expansion.

The decision to drain the equipment on site or transport the equipment without draining should be made on a case-by-case basis following an appropriate risk assessment. The option chosen must be demonstrated to pose the least environmental, health and safety risk with the rationale used in making the decision provided to the relevant Local Authority **prior** to commencement of equipment drainage/movement.

9.5 Loading the PCB-contaminated Waste

The vehicle and accompanying documentation should be inspected against the ADR code requirements, especially for:

- Cleanliness of the vehicle;
- Vehicle roadworthiness;
- Emergency equipment;
- Load securing measures;
- Placarding;
- Completeness of documentation.

The driver must be instructed as to precisely what is being loaded onto the vehicle.

The vehicle should be stabilised with the appropriate equipment (e.g., wheel chocks) and adequate warning signs erected in the area where loading takes place.

It is **not** appropriate to use a short-side flat-bed trailer or vehicle to transport a transformer that may contain fluid contaminated with PCBs. At a minimum for all PCB-contaminated wastes (and especially for transformers):

- Liquid-proof containers or trailers with a drip tray capable of storage of the fluid contents of the equipment being transported must be used. The sides of the trailer and container must be higher than the shipped materials, to ensure full coverage;
- There must be internal fixing points with adequate load bearing to fasten the equipment securely;
- There should be a completely open loading platform for unloading operations;
- Adequate weather-proofing must be provided, such as a tarpaulin (cover), to prevent water infiltration during transportation;
- For disposal of PCB-contaminated capacitors that do not fit into UN approved 120-200L metal drums the capacitors should be packaged in heavy duty plastic bags and heat-sealed. The capacitors should be tied together on loading pallets; and
- Liquids or solids contaminated with PCBs or small items of PCB-contaminated equipment should be packed as outlined in **Section 9.4**

Some waste disposal contractors may specify certain requirements to be met, for example:

- The capacitors must be externally short-circuited by means of a fixed wire. This wire needs to be in place during unloading to ensure potential-free capacitors;
- The capacitors should be tied together on loading pallets with correct (UN approved) warning labels; and
- Maximum dimensions of the capacitors are often specified.

9.6 Carriage of the PCB-contaminated waste

The driver of the vehicle, and other vehicle crew if employed, must be trained in accordance with ADR and must receive instruction from the carrier (usually the waste broker or the transport company contracted by the waste broker) on the nature of the load and the contents of the vehicle documentation.

The following documentation must accompany the load (the ADR code provides more detail):

- Transport document (detailing the load and containing other ADR information, such as the packaging group, the word 'WASTE' next to the proper shipping name, etc.);
- Container Packing Certificate (for large container shipments subsequently being loaded on to a ship);
- Instructions in Writing (Transport Emergency (TREM) card) NOTE: the TREM card must be provided in the language of the driver and crew.

9.7 Unloading PCB-contaminated Waste

This may occur at the waste transfer station in Ireland, awaiting later shipment abroad, or directly at the waste disposal location.

In a manner similar to the loading requirements, an inspection of the vehicle should take place before unloading commences and the same loading precautions, such as vehicle stability and warning signs, should be applied at unloading also. The unloading of the vehicle shall not take place if the inspection reveals deficiencies that may affect the safe unloading of the PCB-contaminated waste.

If any substances have leaked and been spilled in a vehicle or container, it may not be re-used until after it has been thoroughly cleaned and, if necessary, decontaminated. Any other goods and articles carried in the same vehicle or container shall be examined for possible contamination.

APPENDIX A: FURTHER INFORMATION AND REFERENCES

Management, disposal and decontamination of PCBs and PCB-contaminated equipment

[Ref. 1] PCB Transformers and Capacitors: From Management to Reclassification; May 2002; UNEP¹⁹ Chemicals

<http://www.pops.int/documents/guidance/nipsfinal/PCBtranscap.pdf>

[Ref. 2] Management Plan for Polychlorinated Biphenyls; August 2008; the EPA

<http://www.epa.ie/pubs/reports/waste/haz/Final%20PCB%20Management%20Plan%20board%20approved11.pdf>

[Ref. 3] Preparation of a National Environmentally Sound Management Plan for PCBs and PCB-Contaminated Equipment; March 2003; UNEP

<http://www.basel.int/Portals/4/Basel%20Convention/docs/pub/pcbManualE.pdf>

Description of PCB decontamination methods

[Ref. 4] 'Decontamination and Disposal of PCB Wastes' by L.E. Johnston, published in Environmental Health Perspectives Vol.60, pp.339-346, 1985, available for download on

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1568549/pdf/envhper00443-0328.pdf>

[Ref. 5] Deconstruction and Decontamination Technologies for PCBs and other POP Wastes under the Basel Convention, A Training Manual for Hazardous Waste Project Managers; October 2002, UNEP

<http://archive.basel.int/meetings/sbc/workdoc/TM-A.pdf>

[Ref. 6] Survey of Currently Available Non-Incineration PCB Destruction Technologies; 2002; UNEP

<https://clu-in.org/download/contaminantfocus/pcb/PCBdesteng.pdf>

[Ref. 7] Destruction and Decontamination Technologies for PCB and Other POPs Wastes Part III; 2001; UNEP

<http://archive.basel.int/pub/pcb3.pdf>

Hazardous waste management guidelines

[Ref. 8] Transfrontier Shipment of Waste Guidelines For Exporting Waste from, and Importing Waste to, the Republic of Ireland

https://www.dublincity.ie/sites/default/files/content/WaterWasteEnvironment/Waste/National_TFS_Office/Documents/TFSGuideforExportingImportingWaste.pdf

[Ref. 9] Waste Legislation, Envirocentre.ie, 20 September 2007

<http://www.envirocentre.ie/includes/documents/wasteSep2007.pdf>

¹⁹ United Nations Environment Programme (UNEP)

Electrical Safety

- [Ref. 10] Electro-technical council of Ireland (ETCI), ETCI electrical safety, <http://www.etcie.ie/safety/index.html>
- [Ref. 11] Health and Safety Authority, Introduction to Electrical Safety, <http://www.hsa.ie/eng/Topics/Electricity/>
- [Ref. 12] Health and Safety Executive (UK), Electrical Safety at work, <http://www.hse.gov.uk/electricity/index.htm>
- [Ref. 13] ESB Networks, Safety Recommendations, http://www.esb.ie/esbnetworks/en/safety-environment/safety_recommendations.jsp
- [Ref. 14] Health and Safety Executive (UK), electricity at work, safe working practices, HSG85, 2003.

Relevant Legislation

- The Waste Management Act 1996, (S.I. No. 10 of 1996) <http://www.irishstatutebook.ie/eli/1996/act/10/enacted/en/html>
- The Waste Management (Hazardous Waste) Regulations 1998 (S.I. No. 163 of 1998) <http://www.irishstatutebook.ie/eli/1998/si/163/made/en/print>
- Persistent Organic Pollutants Regulations 2010, S.I. No. 235 of 2010 <http://www.irishstatutebook.ie/2010/en/si/0235.html>
- Regulation (EC) No 850/2004 of the European Parliament and the Council of 29 April 2004 on persistent organic pollutants. <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32004R0850:EN:NOT>
- Council Directive 96/59/EC on the disposal of polychlorinated biphenyls and polychlorinated terphenyls (PCB/PCT) <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31996L0059:EN:HTML>
- The Waste Management (Shipments of Waste) Regulations 2007, S.I. No. 419 of 2007 <http://www.irishstatutebook.ie/2007/en/si/0419.html>
- The European Communities (Shipments of Hazardous Waste exclusively within Ireland) Regulations, S.I. No. 324 of 2011 <http://www.irishstatutebook.ie/2011/en/si/0324.html>
- Regulation (EC) No. 1013/2006 on Transfrontier Shipments of Waste <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2006:190:0001:0098:EN:PDF>
- The Waste Management (Registration of Brokers and Dealers) Regulations 2008, S.I. No. 113 of 2008 <http://www.irishstatutebook.ie/2008/en/si/0113.html>
- The Carriage of Dangerous Goods by Road Regulations 2007, S.I. No. 288 of 2007 <http://www.irishstatutebook.ie/2007/en/si/0288.html>

- European Waste Catalogue
<http://www.viron.ie/en/Publications/Environment/Waste/WEEE/FileDownload,1343,en.pdf>
- The Waste Framework Directive (2006/12/EC)
<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2006:114:0009:0021:en:PDF>

Relevant Agencies

Environmental Protection Agency contacts regarding PCBs:

National PCB Inventory

Chemicals Unit

Climate, Licensing Resource and Research Programme

EPA Regional Inspectorate

McCumiskey House, Richview, Clonskeagh Road, Dublin 14

e-mail: pcbs@epa.ie

www.pcbs.ie

Environmental Protection Agency

Headquarters

PO Box 3000

Johnstown Castle Estate

Co. Wexford

Ireland

Telephone: 053-9160600

Fax: 053-9160699

Lo Call: 1890 335599

www.epa.ie

Health and Safety Authority

Headquarters

The Metropolitan Building

James Joyce Street

Dublin 1

www.hsa.ie

Dublin City Council

National TFS Office

Eblana House

68-71 Marrowbone Lane

Dublin 8

Fax: (01) 411 3440

Email: nationaltfs@dublincity.ie

Administration Department

Tel: (01) 222 4411 or 222 4601 or 222 4634 or 222 4249

Technical Department

Tel: (01) 222 4374.

Tel: (01) 222 4235.

Tel: (01) 222 4467

http://www.dublincity.ie/WaterWasteEnvironment/Waste/National_TFS_Office/pages/nationaltfsoffice.aspx

APPENDIX B: HEALTH, SAFETY AND ENVIRONMENTAL CONSIDERATIONS

Health, safety and environmental plan

The waste management company hired to remove PCB-contaminated equipment from the owner's site should, in general, prepare a job/site specific health, safety and environmental plan. This plan, at minimum should cover:

- required health and safety training,
- precautions and hazard control measures and PPE required for their staff,
- electrical safety measures, and
- environmental safety measures associated with removal of the contaminated equipment and prevention and management of possible PCB spills during removal and transport.

However, it is recommended the owner of the PCB-contaminated equipment also prepares a health, safety and environmental plan which should cover:

- Health, safety and environmental requirements,
- PPE required for the site staff assisting the waste management company,
- Spill response plan;
- Provision of spill kits, etc.

BEST PRACTICE GUIDANCE

Health and Safety

- All staff dealing with disposal and/or decontamination of PCB-contaminated equipment must:
 - have appropriate health and safety and operational training on dealing with chemical, physical and biological hazards associated with PCBs;
 - wear adequate protective clothing, i.e. one-piece chemical resistant suit, chemical resistant gloves, boots; and if deemed required face breathing mask;
- It must be ensured that the item of electrical equipment is not live - where capacitors are involved, all capacitors should be fully discharged in accordance with manufacturers recommendations;
- Adequate ventilation in the area where the PCB-contaminated equipment is located must be ensured;
- Personal decontamination materials should be present in all areas containing PCBs;
- Staff dealing with spills must take the following first-aid precautions:
 - if PCBs come into contact with eyes, immediately irrigate eyes with water for at least 15 minutes and obtain medical attention;

- if PCBs come into contact with skin, immediately remove any contaminated clothing and wash affected skin with soap and water;
- if swallowed, wash out mouth several times with clean water, drink water, and obtain medical attention; and
- if inhaled, move to a fresh air zone and obtain medical attention.

Electrical safety

Most of the equipment discussed in this guide is high voltage electrical equipment. While working with such equipment, there are significant health and safety risks associated with electricity.

It must be ensured that PCB-contaminated equipment is disconnected from the electricity supply, and in the case of capacitors, fully discharged in accordance with the manufacturer's instructions, before moving it to storage or transport vehicle, commencing decontamination, or disposal activities.

During any activities described in this guide, an appropriately qualified site electrician familiar with the equipment and the site's electrical network should be present and makes sure that it is safe to undertake whichever action is required (this includes sampling of oil, labelling, disconnecting/isolating from electrical network, moving the equipment, providing bunding, etc.).

Simple precautions to take when working near electricity

- Undertake a risk assessment for the planned work, and make sure the risk assessment covers electrical hazards.
- Always consult a competent person familiar with the electrical network before commencing work;
- Always ensure all equipment to be moved, or from which samples are to be taken, is disconnected/isolated from the electrical power supply before commencing work. In the case of capacitors, ensure not only that they are disconnected/isolated from the electrical power supply but also that they are fully discharged before commencing work.
- Learn how to recognise electrical wires. These may be live overhead power lines, electrical wiring in a workplace, or cables buried under the ground. **Take all necessary precautions when operating machinery, e.g. cranes, in the vicinity of electrical power lines.**
- Get an up-to-date map of the services in the area and use it.
- Work away from electrical wiring wherever possible; consult a competent person who should be able to advise on the best way to proceed.
- Ensure the work area has adequate lighting and ventilation.

- Do not enter a room where there is clear evidence of water build-up or water falling onto electrical equipment from roof space.
- Ensure that all access routes to emergency switches and distribution boards are kept clear.

For detailed information on electrical safety refer to links (Refs 10 to 14) provided in **Appendix A** of this guide.

Environmental considerations

- Spill cleanup kits should be present in all areas containing PCBs;
- Should any spillage of PCBs occur, this must be contained with absorbent materials, which should be placed in steel drums for subsequent disposal;
- Drained transformers may be stored as is, or may be placed inside a large container (over-pack drum) or heavy plastic “wrap” if leakage is a concern;
- Equipment and drums should be securely strapped to the pallets prior to movement.

Detailed information on Health, Safety and Environment is provided in Appendix A of the EPA’s Management Plan for Polychlorinated Biphenyls and [Ref. 1] section 6 of UNEP document ‘Transformers and Capacitors: From Management to Reclassification’. See [Ref. 1] and [Ref. 2] in **Appendix A** of this guide.

APPENDIX C: SUMMARY OF OTHER KEY REGULATORY REQUIREMENTS

Regulatory Topic	Key Regulatory Requirements and Considerations	Guidance Reference
Persistent Organic Pollutants	<p>The Persistent Organic Pollutants Regulations 2010, S.I. No. 235 of 2010 (POPs Regulations in further text) require that waste consisting of, containing or contaminated by PCBs, must be disposed of or recovered, without undue delay by either of the following treatment methods:</p> <ul style="list-style-type: none"> • R4 Recycling/reclamation of metals and metal compounds²⁰ • D9 Physico-chemical treatment, • D10 Incineration on land, <p>in such a way as to ensure that the Persistent Organic Pollutant (POP) content is destroyed or irreversibly transformed so that the remaining waste and releases do not exhibit the characteristics of POPs.</p> <p>Disposal or recovery operations that may lead to recovery, recycling, reclamation or re-use of PCBs are banned.</p> <p>The above key POPs requirements are particularly important in managing the disposal of PCBs and PCB-contaminated equipment.</p>	<p>Refer to Section 8 on PCBs disposal</p>
Health & Safety Considerations	<p>The relevant Health & Safety legislation in Ireland consists of:</p> <p>Safety, Health and Welfare at Work Act 2005, No. 10 of 2005 which provides for undertaking risk assessment of particular activities.</p> <p>Safety, Health and Welfare at Work (General Application) Regulations 2007, Part 2, Chapter 3 S.I. No. 299 of 2007 which is concerned with Personnel Protective Equipment (PPE).</p> <p>Safety, Health and Welfare at Work (Chemical Agents) Regulations 2001 (S.I. 619 of 2001) and associated 2010 Code of Practice - for the Safety, Health and Welfare at Work (Chemical Agents) Regulations 2001 which outlines occupational exposure limit values for PCBs.</p> <p>Under this Health & Safety legislation a holder of PCBs must:</p> <ul style="list-style-type: none"> • Before conducting any work on PCB-contaminated equipment carry out a risk assessment of the activity using HSA guidelines (required under the Safety, Health and Welfare at Work Act 2005); • Ensure that PPE, appropriate to the degree of hazard be worn at all times and comply with the Safety, Health and Welfare at Work (General Application) Regulations 2007 (Part 2, chapter 3). 	<p>Refer to Section 6 and Appendix B for more detail on specific Health & Safety advice.</p> <p>Refer to Section 4 on labelling and Section 8 on Storage.</p>

²⁰ Pre-treatment operations prior to destruction may be performed, provided that the PCB-containing waste that is isolated from the waste during the pre-treatment is subsequently disposed of using methods D9 or D10.

	<ul style="list-style-type: none"> Ensure that the Occupational Exposure Limit Values are not exceeded in situations where employees are handling PCBs and there is a risk of exposure by inhalation. 	
Transportation by Road	<p>The European Agreement Concerning the International Carriage of Dangerous Goods by Road (ADR) applies in Ireland. The Carriage of Dangerous Goods by Road Regulations (S.I. No. 288/289 of 2007) gives effect to the ADR requirements in Ireland.</p> <p>Under ADR, PCBs are considered Dangerous Goods for the purposes of road transport within Europe when the PCB concentration in a PCB-contaminated fluid exceeds 0.005% (50ppm).</p> <p>Key ADR requirements regarding PCB management include:</p> <ul style="list-style-type: none"> The requirement for the waste consignor (the waste producer or a third party contractually assigned by the waste consignor) to engage the services of a Dangerous Goods Safety Advisor (DGSA) and ensure that all ADR requirements for the PCB-contaminated waste/PCB-contaminated equipment are met; These requirements are very specific and relate to: <ul style="list-style-type: none"> packaging requirements; vehicle type restrictions and vehicle loading/unloading requirements; vehicle condition checks, vehicle placarding and driver training requirements; documentation requirements, most notably the need for a Transport Document and instructions in writing /Emergency card (the TREM card) <p>The ADR applies to any movement by road (accessible by the public) of PCB-contaminated waste or PCB-contaminated equipment from the site of origin to a temporary storage location, even over short distances.</p> <p>Reputable waste management contractors in Ireland, experienced in PCB-contaminated waste management, should be able to provide all the required ADR services on behalf of the waste producer/holder. It is the responsibility of the waste producer/holder to ensure their contractor is capable of undertaking the work.</p>	Refer to Section 9 on Transportation
Waste Management	<p>The relevant Waste Management Legislation in Ireland consists of:</p> <p>Waste Management Acts 1996 to 2008 - provide the framework for waste and hazardous waste management in Ireland. The transposition of EU Waste Directives is enacted for the most part through these Acts (and by Regulations issued under these Acts and the European Communities Acts).</p> <p>The Waste Management Act sets down the legal definition of waste which is something which a holder discards, intends to discard or is required to discard, and which must be identifiable from the list set out in the First Schedule to the Waste Management Act or in the List of Waste (previously the European Waste Catalogue (EWC)).</p> <p>European Communities (Shipment of Hazardous Waste exclusively within Ireland) Regulations 2011 (S.I. No.</p>	Refer to Section 8 on PCBs disposal and Section 7 on Decontamination. Also refer to Appendix B for environmental considerations and Appendix F for documentation examples.

324 of 2011) – these regulations revoke the Waste Management (Movement of Hazardous Waste) Regulations 1998 (S.I. No. 147 of 1998). The purpose of these Regulations is to streamline the administration of the legislation on the shipments of hazardous waste exclusively within Ireland so as to provide a better and more consistent level of implementation generally. In line with the external TFS system of control for shipments of waste from Ireland they provide for the designation of Dublin City Council as the sole competent authority responsible for the implementation of article 33 of the Waste Shipments Regulation (EC) No. 1013/2006 (the TFS Regulation) with effect from 1 July 2011. This has the effect of linking both systems and facilitating better management controls on shipments of hazardous waste. In addition the internal tracking system is an electronic system - as opposed to a paper-based system which applied up to the commencement of these Regulations.

Waste Management (Licensing) Regulations 2004 (S.I. No. 395 of 2004) and the Waste Management (Licensing) (Amendment) Regulations 2010 (S.I. No. 350 of 2010) provide for the system of licensing by the EPA of waste recovery and disposal activities.

Waste Management (Shipments of Waste) Regulations 2007 (S.I. No. 419 of 2007) implement the EU Regulation 1013/2006 on Shipment of Wastes and nominate Dublin City Council as sole competent authority in respect of the export into, import from and transit of waste through Ireland.

Waste Management (Facility Permit & Registration) Regulations 2007 (S.I. No. 821 of 2007) and associated amendment regulations **Waste Management (Facility Permit and Registration) (Amendment) Regulations 2008 (S.I. No. 86 of 2008)** provide for the issuing and enforcement of waste facility permits and certificates of registration for prescribed waste management activities.

Waste Management (Collection Permit) Regulations 2007 (S.I. No. 820 of 2007) and associated amendment regulations **Waste Management (Collection Permit) (Amendment) Regulations 2008 (S.I. No. 87 of 2008)** provide for the issuing and enforcement of waste collection permits on a regional basis by certain designated Local Authorities.

Waste Management (Registration of Brokers and Dealers) Regulations 2008 (S.I. No. 113 of 2008) require any individual or business that arranges the collecting, recycling, recovery or disposal of waste on behalf of another party to register as a waste broker with the National TFS Office (NTFSO).

Under Waste Management legislation in Ireland a holder of PCB-contaminated waste must:

- Ensure that this waste is managed and transported by a licensed hazardous waste contractor;
- Is exported for disposal by a company registered as a broker or dealer with the NTFSO;
- Is disposed of at a licensed hazardous waste facility;
- Ensure that the appropriate paperwork is used, recorded and copies sent to the EPA including WTF, TFS forms and disposal certificates.

APPENDIX D: LABORATORIES PERFORMING TESTING FOR PCBs TO STANDARD METHOD “IEC 61619”

At the time of publication of this guide, the three laboratories listed below confirmed their ability to offer testing in accordance with analytical method IEC 61619. This should be independently verified prior to sampling/analysis. It is the responsibility of the equipment holder to ensure the laboratory chosen is competent to carry out such testing. A holder may also wish to seek the analysis of their equipment via other laboratories providing the contract laboratory carries out the PCB analysis according to the requirements of the IEC method. Results of analysis should indicate the PCB concentration to circa 1ppm (1mg/kg).

Company	Address	Contact No.	Email
PowerPoint Engineering Limited (Agents for TJ/H2b Analytical Services in the UK who complete the testing)	National Enterprise Park (Unit B6), Portlaoise Interchange, Portlaoise, Co. Laois, Ireland	Tel: +353(0)57 8662162 Fax: +353(0)57 8662164	info@powerpoint.ie
T.E.Laboratories	Industrial Estate Tullow, Tullow, Co. Carlow, Ireland	Tel: +353 (0) 59 9152881 Fax: +353 (0) 59 9152886	info@tellab.ie
Alcontrol	Unit 18a, Rosemount Business Park, Ballycoolin, Dublin 11.	Tel: +353 (0) 1 882 9893 Fax: +353 (0) 1 882 9895	

Please Note: European Commission Decision 2001/68/EC stipulates that only testing in accordance with standard IEC 61619 is acceptable for verifying the PCB-contamination status of equipment.

APPENDIX E: LIST OF WASTE CONTRACTORS HANDLING HAZARDOUS WASTE IN IRELAND

At the time of publication of this guide, five waste management companies licensed for hazardous waste management were identified and are listed in the table below. *The EPA does not recommend any one of the companies listed in the table.* A holder may wish to seek the assistance from other providers from outside the State.

Company name	Licence or Permit Reg. No.	Contact Phone Number	e-mail address	Website address
Eco-Safe Systems	W0054-02	+353(0)1 6239135	services@ecosafesystems.ie	www.ecosafesystems.ie
ENVA (Portlaoise)	W0184-01	+353(0)57 8678600	portlaoise@enva.ie	www.enva.ie
Indaver Ireland	W0036-02	+353(0)1 2804534	info@indaver.ie	www.indaver.ie
Rilta Environmental	W0192-01	+ 353(0)1 4018000	info@rilta.ie	www.rialta.ie
Veolia (Fermoy)	W0040-01	+353(0)25 42944	info@veolia.ie	www.veolia.ie

Please Note: The organisations referred to above were appropriately licenced at the time of publication of this guide. The holder of PCB-contaminated equipment/waste should verify that the organisation chosen for the management of this waste is appropriately licenced before contracting that organisation.

Shipments of Hazardous Waste Exclusively within Ireland Regulations 2011
Waste Transfer Form (WTF) for shipments of hazardous waste transported within the State (NOT to be used for shipments into or out of the State)



NATIONAL OFFICE



WTF Summary

WTF Number: [REDACTED]

Status: Active

Notifier Name: [REDACTED]

Notifier Address

Address Line 1: [REDACTED]

Address Line 2: [REDACTED]

Address Line 3:

Address Line 4:

County: [REDACTED]

Country: Ireland

Consignee: [REDACTED]

Notifier - Carrier Part

Date Shipped: [REDACTED] 2012

Quantity Shipped

Tonnes:

m3:

Waste Generator (if Different from Notifier):

Type of Collections: Single Collection

EWC Codes: 16 02 09* Transformers and capacitors containing PCBs

Comment: Responsible Person: [REDACTED]

Waste Description: UN 3432 WASTE POLYCHLORINATED BIPHENYLS, SOLID MARINE POLLUTANT

ANNEX IA

Notification document for transboundary movements/shipments of waste

1. Exporter — notifier Registration No: Name: Address: Contact person: Tel.: Fax: E-mail:	3. Notification No: Notification concerning A. (i) Individual shipment: <input type="checkbox"/> (ii) Multiple shipments: <input type="checkbox"/> B. (i) Disposal ⁽¹⁾ : <input type="checkbox"/> (ii) Recovery: <input type="checkbox"/> C. Pre-consented recovery facility ⁽²⁾ ⁽³⁾ Yes <input type="checkbox"/> No <input type="checkbox"/>
2. Importer — consignee Registration No: Name: Address: Contact person: Tel.: Fax: E-mail:	4. Total intended number of shipments: 5. Total intended quantity ⁽⁴⁾: Tonnes (Mg): m ³ : 6. Intended period of time for shipment(s) ⁽⁴⁾: First departure: Last departure: 7. Packaging type(s) ⁽⁵⁾: Special handling requirements ⁽⁶⁾: Yes <input type="checkbox"/> No <input type="checkbox"/>
8. Intended carrier(s) Registration No: Name ⁽⁷⁾ : Address: Contact person: Tel.: Fax: E-mail: Means of transport ⁽⁸⁾ :	11. Disposal/recovery operation(s) ⁽²⁾ D-code/R-code ⁽⁹⁾ : Technology employed ⁽⁶⁾ : Reason for export ⁽¹⁾ ⁽⁶⁾ : 12. Designation and composition of the waste ⁽⁶⁾:
9. Waste generator(s)—producer(s) ⁽¹⁾ ⁽⁷⁾ ⁽⁸⁾ Registration No: Name: Address: Contact person: Tel.: Fax: E-mail: Site and process of generation ⁽⁶⁾	13. Physical characteristics ⁽⁵⁾: 14. Waste identification (fill in relevant codes) (i) Basel Annex VIII (or IX if applicable): (ii) OECD code (if different from (i)): (iii) EC list of wastes: (iv) National code in country of export: (v) National code in country of import: (vi) Other (specify): (vii) Y-code: (viii) H-code ⁽⁵⁾ : (ix) UN class ⁽⁵⁾ : (x) UN number: (xi) UN shipping name: (xii) Customs code(s) (HS):
10. Disposal facility ⁽²⁾: <input type="checkbox"/> or recovery facility ⁽²⁾: <input type="checkbox"/> Registration No: Name: Address: Contact person: Tel.: Fax: E-mail: Actual site of disposal/recovery:	

15. (a) Countries/States concerned, (b) code No of competent authorities where applicable, (c) specific points of exit or entry (border crossing or port)					
State of export — dispatch		State(s) of transit (entry and exit)			State of import — destination
(a)					
(b)					
(c)					
16. Customs offices of entry and/or exit and/or export (European Community):					
Entry:		Exit:		Export:	
17. Exporter's — notifier's/generator's — producer's ⁽¹⁾ declaration:					
I certify that the information is complete and correct to my best knowledge. I also certify that legally enforceable written contractual obligations have been entered into and that any applicable insurance or other financial guarantee is or shall be in force covering the transboundary movement.					18. Number of annexes attached
Exporter's — notifier's name:		Date:	Signature:		
Generator's — producer's name:		Date:	Signature:		
FOR USE BY COMPETENT AUTHORITIES					
19. Acknowledgement from the relevant competent authority of countries of import — destination/transit ⁽¹⁾/export — dispatch ⁽²⁾:			20. Written consent ⁽¹⁾ ⁽²⁾ to the movement provided by the competent authority of (country):		
Country:			Consent given on:		
Notification received on:			Consent valid from:	until:	
Acknowledgement sent on:			Specific conditions: No: <input type="checkbox"/>	If Yes, see block 21 ⁽³⁾ : <input type="checkbox"/>	
Name of competent authority:			Name of competent authority:		
Stamp and/or signature:			Stamp and/or signature:		
21. Specific conditions on consenting to the movement or reasons for objecting					

⁽¹⁾ Required by the Basel Convention.⁽²⁾ In the case of an R12/R13 or D13-D15 operation, also attach corresponding information on any subsequent R12/R13 or D13-D15 facilities and on the subsequent R1-R11 or D1-D12 facility(ies) when required.⁽³⁾ To be completed for movements within the OECD area and only if B(ii) applies.⁽⁴⁾ Attach detailed list if multiple shipments.⁽⁵⁾ See list of abbreviations and codes on the next page.⁽⁶⁾ Attach details if necessary.⁽⁷⁾ Attach list if more than one.⁽⁸⁾ If required by national legislation.⁽⁹⁾ If applicable under the OECD Decision.

APPENDIX G: COMPANIES THAT OFFER PCB DECONTAMINATION SERVICES ABROAD

Contact details, at the time of publication of this guide, for two companies located in Europe that provide PCB decontamination services are provided in the table below. The EPA does not recommend or endorse these or any other company for decontamination of PCB-contaminated transformers. It is important to note that there may be other suitable companies in Europe that also provide PCB decontamination services.

The companies listed in this section usually work with local partners (waste management companies, see table in Section 4 of this guide), who organise export and re-import. See **Appendix E** for a list of licensed hazardous waste management companies in Ireland.

European companies that provide PCB Decontamination	
Orion Address: De Steven 25, 9206 AX, Drachten, the Netherlands Tel: +31 (0)512 - 53 25 15 Fax: +31 (0) 512 - 54 11 30 E-mail: info@orionun2315.nl http://www.orionun2315.nl/v2/en/index.php	EnviroRecycling Address: Kanalstr. 25, 44147 Dortmund, Germany Tel.: +49 231 9982 100 Fax +49 231 9982 202 E-mail: info@envio-group.com http://www.envio-recycling.com/en