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The Use of PCB Compounds in Finland

1. Introduction

At the end of 1970 a review of the use of polychlorinated biphenyls, of their replacability, and of their occurrence in the environment was prepared in Finland. The summary also included proposals for measures to be taken to reduce the harmful effects caused by PCB substances in the environment.

2. The use of PCB compounds

In 1969 PCB compounds were used in Finland as follows:

1) high-efficiency and compact capacitors	200 tons
2) anticorrosive paints (chlorinated rubber paint and cyclo-rubber paint)	25 tons
3) lacquers	5 tons
4) glues	1.5 tons
5) joint compounds (polysulfide polymere based)	5 tons
6) transformers	5 tons
Total approx.	240 tons

In Finland, *capacitors* are manufactur Tampere by the cable factory of Nokia The paper used in capacitors as an el insulator is impregnated by PCB compo

During 1970, polychlorinated biphen far as it is known, were no longer add *anticorrosive paints*, neither were they add other *paints* or *lacquers*. PCB-compounds primarily been replaced with chlori paraffins. *Ships' priming paints*, which have producted in Finland, have never, so far is known, contained PCB-compounds only small amounts of these product imported to Finland. According to avi information, *printing colours* and *inks*, have been produced in Finland, have contained PCB substances. In 1969, *printing colours* used in Finland, approxi 7 per cent were imported.

During 1970, the use of PCB substa the production of *glues* has been aban Also, in the production of *joint com* PCB substances have been replaced chlorinated paraffins or other comp

In some *transformers* produced in F PCB substances have been used as heat

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rate liquids. Production of transformers of this type has been slight, and they have been used in factory halls, or in such places where extreme fire precautions have already been required. Transformers used outside do not contain PCB compounds. The *heat-transferring* liquids for transformers are usually refined from crude oil. Over 90 per cent of transformers used in Finland are home-produced.

Some *heat-radiators*, which have been produced previously, have contained chlorinated phenyls as heat-transferring liquids, but nowadays only crude-cotton oil has been used. Previously produced radiators have been sold in Sweden.

In Finland, PCB substances are not used as ingredients for *plastics*. When Finland starts producing raw materials for plastics, chlorinated diphenyls will not be used. Plastics, approved for use as packing material for foodstuffs, do not contain PCB substances, but no exact information is available on the composition of imported plastics.

Several years ago, PCB compounds were added to some natural and/or synthetic *rubber products*, but their use has been abandoned.

As far as it is known, the power transfer liquids, used in hydraulic equipment, are almost entirely refined from crude oil, and they probably do not contain PCB compounds, not even as minor ingredients. However, it is possible that in some hydraulic equipment, chlorinated biphenyls are used as a fire precaution measure.

Certain types of *carbonless copying papers* contain PCB compounds. The analyses of some samples have given the following results:

photostatic paper	6.7 mg PCB compounds/kg
bank receipt	13.000 "
library receipt	27.000 "
pad receipt	38.000 "

Copying papers of this type are mainly destroyed by burning after use. So copying papers may be one of the most important causes for the high levels of PCB compounds in the environment. When waste papers are reused in the manufacturing of cardboard etc., the new products may be contaminated by PCB's. In Finland. The use of papers containing PCB's has been about 1.5—2.0 tons per year, but the use has been stopped by now.

In Finland, the extent of the industrial use of polychlorinated biphenyls has most probably been investigated with accuracy. However, *industrial products containing* PCB compounds are being imported to Finland. It is suspected that polychlorinated biphenyls are present in capacitors, plastic and rubber products, paints, lacquers, and many other products of the chemical industry.

3. PCB compounds in the environment

The existence of PCB compounds in Finnish nature was confirmed for the first time in 1967. The investigation has been continued by the State Veterinary Medical Institute and the Finnish Game and Fisheries Research Institute as a part of an international research programme coordinated by OECD. PCB compounds have been found in the tissues of all examined pikes, mussels and starlings. The amounts do not differ considerably from those discovered in Sweden or Norway. PCB compounds are found slightly more in fish from the sea than from the inland waters. Fish caught in the mouth of the Kokemäenjoki River contain somewhat more polychlorinated biphenyls than fish from elsewhere in the Gulf of Bothnia.

Table 1: PCB residues in wildlife in Finland.

Species	PCB content in fresh tissues (mg/kg)
Mytilus edulis	0.003 — 0.042 non-polluted area
Enox lucius	0.001 — 0.009 non-polluted area
	0.023 — 0.033 polluted area
Sturnus vulgaris	0.004 — 0.68 non-polluted area
Clupea harengus	0.11 — 0.40 non-polluted area
Somateria mollissima	0.68 — 3.4 non-polluted area
Ringed seals, Gulf of Finland	x̄ 40.1 in fat
Eggs of osprey	0.4 — 6.6
Eggs of eagle owl	24.2 — 21.3

From a general viewpoint on the subject, it can be said that the amounts of PCB compounds in the fish and birds of the Baltic Sea area are higher than for example in the animals on the western coasts of Sweden and Norway; in addition, the amounts are higher in the

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southern Baltic Sea area than in the northern Baltic Sea area, Gulf of Finland, or Gulf of Bothnia. The PCB content in the tissues of Baltic seals can even be multiplied by ten if compared with the amounts discovered in England, Canada or Holland. More PCB compounds are usually found in starlings emigrating from Sweden or Finland than from those immigrating here.

4. The possibilities for reducing the use of PCB compounds and the expense thus involved

Soon after the harmful effects of polychlorinated biphenyls became generally known, Finnish industry reduced their use. During 1970, PCB substances were replaced in the production of lacquers, glues and joint compounds. In these cases the abandoning of PCB compounds hardly has caused considerable expenses.

In Finland, PCB substances will apparently be used for the production of transformers, but this only concerns such special transformers that are situated in places where, due to fire precautions, it is impossible to use transformers with normal crude oil.

As soon as the PCB content of self-copying bank forms and receipts was discovered in December 1971, their delivery to the Finnish market was stopped. Because the producer of this paper in England replaced PCB substances with other compounds as early as at the end of 1970, the forms which were used in Finland were from old supply. The abandoning of PCB substances in the production of automatic-copying forms hardly causes notable expenses.

At the moment, the most important use of PCB compounds in Finland is for high-efficiency and compact capacitors, which are manufactured only in one factory. A significant part of the production of high-efficiency Capacitors is exported to Canada. It is technically possible to replace the PCB compounds by other substances even in this field, but according to the information given by the producer, this would have led [illegible] difficulties in the competition in the international market.

5. Proposals for Improvements

1) Research should be started where by [illegible] use of sample tests, the occurrence of PC compounds in imported equipment a products of chemical industry would studied.
2) To the users of PCB substances and products which contain them, informatio should be given about the harmful effec of these substances. They should also warned against releasing them into t environment.
3) Arrangements should be done for t storing of unusable polychlorinated phenyls and products which contain PC compounds until it is possible to destro them without causing any harm. It has to b specially observed that PCB compound should not be treated in incinerators i capable to decompose the PCB compound completely. However, the disposal problem of PCB compounds as well as of other toxi substances has to be solved in its entirety
4) The use of PCB substances should allowed only in cases where the dischar of them into the environment can be pr vented and where it is impossible to repla them by other substances.

Furthermore, a new act has been proposed, pursuance of which

— the use, production and importation PCB substances or products which contai PCB compounds, could be allowed on with the permission of the Ministry Social Affairs and Health.
— on each transport container for PCB co pounds, as well as on any equipment product that contains PCB substances, there should be a warning label of the presence of PCB's and also a note that the produc can be disposed only in an officially appro ved way.

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