

---

January, 2011

**ETAD POSITION ON THE PRESENCE**  
**OF TRACES OF PCBs IN SOME ORGANIC PIGMENTS**

Polychlorinated biphenyls comprise a class of 209 individual organic compounds (congeners) with 1 to 10 chlorine atoms attached to biphenyl, which is a molecule composed of two benzene rings. The chemical formula for PCBs is  $C_{12}H_{10-x}Cl_x$ . Toxic effects such as endocrine disruption and neurotoxicity are also associated with compounds within the group.

PCBs were manufactured and sold as mixtures of several congeners under a variety of trade names. These were widely used as dielectric fluids in transformers, capacitors, and coolants.

Due to PCB's toxicity and classification as a persistent organic pollutant, PCB production was banned by the United States Congress in 1979 and by the Stockholm Convention on Persistent Organic Pollutants in 2001.

The use of PCBs as a raw material or chemical intermediate has been banned in the EU since 1985 (85/467/EEC, 6<sup>th</sup> amendment to Directive 76/769/EEC).

However trace quantities of PCBs may be inadvertently generated in some chemical processes. Measurements by ETAD companies as well as by authorities have shown that such traces may be found in some organic pigments.

It is not possible to assign even an average value of PCB or its congener composition to specific pigments structures (using for example the C.I. Generic name as the descriptor). The amount and congener pattern is

manufacturing process-dependent. Data on inadvertently generated PCB in a specific product can consequently only be obtained from the manufacturer directly.

Crucial parameters that influence the presence of trace quantities of PCB include the quality and impurity profile of the raw materials and intermediates used as well as the processing conditions.

The pigments most likely to show trace PCB contamination are those that

- Contain chlorine as part of their molecular structure
- Use chlorine-containing raw materials
- Use chlorine-containing aromatic solvents in their synthesis.

Although there are minute traces of inadvertently generated PCBs in some pigments (usually less than 5 ppm), and values up to 20 ppm have occasionally been measured, there is no evidence, despite many decades of use and repeated testing, that these pigments pose any risk to human health or the environment. The REACH dossiers for the phase 1 substances, among which are some pigments which meet the criteria shown above for potential trace PCB contamination, confirm also this contention.

The ETAD member companies have committed themselves under the ETAD Code of Ethics to obey the laws of the countries in which they market their products.

## **Regulatory Situation**

### **European Union**

Council Directive 89/677/EEC of 21<sup>st</sup> December 1989 amending for the eighth time Directive 76/769/EEC on the approximation of the laws, regulations and administrative provisions of the member states relating to restrictions on the marketing and use of certain dangerous substances and preparations reviewed the content of PCB/PCT in preparations (including waste oils) and set a limit of 50 ppm.

## **Council of Europe**

Resolution AP 89/1 on the use of colorants in plastic materials coming into contact with food states that the content of extractable polychlorinated biphenyls should not exceed 25 ppm when expressed as decachlorobiphenyl.

## **France**

The Brochure 1227 „Materiaux au contact des denrées alimentaires, produits de nettoyage de ces matériaux,, Edition July 2002 (The so-called French Positive List) as well as a not yet in force proposal gives purity criteria for colorants and sets a limit of 25 ppm for extractable PCBs.

## **USA**

EPA issued regulations under TSCA (40 CFR § 761.20) to prohibit manufacture, processing, and the commercial distribution of any product containing an annual average of 25 ppm PCB (with a maximum concentration at any time set a 50 ppm). The agency also required manufacturers or importers of products and processes associated with inadvertently produced PCBs to report any individual PCB congener concentrations greater than 2 ppm in such products or processes. In the US the monochlorobiphenyls and dichlorobiphenyls are regulated, but there is a discounting factor for reporting purposes.

## **Canada**

Environment Canada has recently reassessed its PCB regulations, with the purpose of improving the protection of Canada environment and the health of Canadians by minimising the risks posed by the use, storage and release of polychlorinated biphenyls (SOR/2008-273 came into force on September 5, 2008)

Part 2, section 11 states:

- (1) A person may manufacture, export, import, offer for sale, sell, process and use a colouring pigment containing PCBs produced incidentally if the concentration of the PCBs is less than 50 mg/kg.
- (2) Despite subsection (1), the annual average concentration of PCBs produced incidentally in colouring pigment that a person may

manufacture, export, import, offer for sale, sell, process and use shall not exceed 25 mg/kg.

## **Global**

The Stockholm Convention on Persistent Organic Pollutants (entered into force 2004). Polychlorinated biphenyls are a class of compounds in Annex A of this convention and as such are targeted for elimination in production and use. The convention also realises that PCBs may be generated inadvertently in certain chemical reactions and that BAT (Best Available Technique) should be used to reduce their formation and release to a minimum.

## **Exposure**

Determinations of the PCB content in organic pigments are usually carried out by first dissolving the pigment in a suitable solvent (e.g sulphuric acid), which after subsequent transfer into an organic solvent and suitable work-up permits the total quantity of PCB to be measured. ETAD also knows that determinations have been carried by extracting the PCBs in a suitable sample by, for example, Soxhlet extraction. Here only the “surface” PCBs are determined and the aggregate/agglomerate structure of the pigment sample plays a determining role. In general dissolution of the pigment crystals leads to higher and more reproducible values than solvent extraction. From this we would conclude that PCBs are present both on the surface and in the solid pigment matrix. This incorporated PCB is unlikely to lead either to human or environmental exposure. Additionally pigments are used to colour paints, inks and plastics and are themselves incorporated into a further matrix making release improbable – until both polymeric matrix and the pigments degrade.

A potential source of exposure comes from the presence of inadvertently generated PCBs in the wastewater of a manufacturing plant. PCBs are highly water insoluble. It is thus likely that any PCBs will preferentially absorb onto any suspended particles and be removed by filtration in the manufacturers’ wastewater treatment plant. However ETAD does not possess any data in this area.

The presence of 3,3'-dichlorobiphenyl (PCB 11) has been detected in effluents of publically owned treatments works in the USA (ref. Pollution Prevention and Management strategies for polychlorinated biphenyls in the New York/New Jersey Harbor).

The effluent of a few New York and New Jersey public wastewater treatment facilities has been found to contain 100 – 340 ng/L of PCB 11. Attempts to identify the source of this PCB congener have been inconclusive. While there may have been some amount of PCB 11 in the New York Harbor area there is no information which justifies the conclusion that all or even a predominant source of this PCB congener is associated with pigments.

## **Conclusions**

ETAD accepts that some pigments may contain trace amounts of inadvertently generated PCBs. However the data available to date shows that the traces in their members' products do not constitute a hazard to human health or the environment.

The ETAD member companies use best available techniques to ensure that the generation of PCBs is kept to an absolute minimum and that their products meet the regulatory limits.