

## **Prevention and protection against the entry of PCB and other pollutants from old paint coatings into the water bodies of the international Elbe river basin**

Polychlorinated biphenyls (PCBs) are synthetic, organic compounds that were produced and broadly used between the 1930ies and the 1970ies. PCBs were released into the environment during production and use at that time. Today the risk mainly results from improper handling of dangerous waste and contaminated sites. Due to their chronic toxicity, PCBs were banned worldwide by the Stockholm Convention on Persistent Organic Pollutants in 2001. As a result of their use over many decades, PCBs have spread everywhere and can also be detected in aquatic ecosystems. Even though the production of these substances is no longer allowed, PCB-contaminated sites and contaminated sediments still constitute a risk for water bodies and their users.

In Europe, PCB substances were frequently used as additives in paints, varnishes or hydraulic equipment. Due to their characteristics, they were used as fillings in transformers, capacitors and other equipment. Until the 1970ies, bridges, high pressure water tubes and other water engineering structures were frequently treated with anticorrosive agents and paints containing PCBs, with a PCB content of up to 10%, all over Europe. In Germany alone, approx. 85,000 t of PCB were used for different products in the past, mainly as softening agents and flame retardants in varnishes, paints, resins and joint sealants.

A recent event at the river Elbe proves that the relevance of PCB-contaminated sites or the significance of metal structures originally treated with PCB containing paint has been underestimated up to now. The refurbishment of the paintwork at a railway bridge across the Czech Elbe section in Ústí nad Labem in spring 2015 caused the entry of substances containing PCB into the Elbe. These refurbishment activities contributed substantially to the fact that total PCB values of more than 6,000 µg/kg were measured in the monthly composite samples in the suspended sediments at the German-Czech boarder profile monitoring site Schmilka/Hřensko. This value exceeds the environmental quality standards (Umweltqualitätsnormen, UQN) for individual PCB compounds established in the German Ordinance on the Protection of Surface Waters (Oberflächengewässerverordnung, OGewV) up to 50 times. As far as 500 km downstream, exceedances of the environmental quality standards were identified.

Such an increase of the PCB level in the suspended sediment of the Elbe river can have serious ecological impacts for the complete course of the river.

The refurbishment of surfaces of bridges and other structures near water bodies is of course not only relevant for the Elbe river in the Czech Republic but in a similar way also in Germany. The ICPER assumes that the know-how on the use of products containing PCB will decrease and that there will be the risk for many water bodies in the international river basin that hazardous substances are not always handled adequately taking into account the risk potential. This is why appropriate protection and prevention measures are of paramount importance.

In order to avoid the entry of refurbishment-related pollutants, particularly PCB and heavy metals from old paint coatings, into the water bodies, the following information should be observed:

## **Structures from which pollutants could enter the water bodies**

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These are all structures at or near water bodies, where pollutants contained in the old paint may enter the surface waters, the ground water, the soil or the sewage system during refurbishment works, such as:

- steel structures of hydro-engineering installations (weir gates, lock gates and small hydropower stations),
- staff walkways at hydro-engineering installations such as weirs, hydropower stations, locks and dam installations,
- railway, road and pedestrian bridges,
- utility line crossings (pipelines, power lines, etc.) above water bodies.

## **Brand names of old paints containing PCB**

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The composition of the PCB mixture in commercial products is different with respect to the individual degree of chlorination. Well-known brands are, among others:

- Arochlor (e.g. Arochlor 1016, 1221, 1232, 1242, 1248, 1254, 1260, 1268; MONSANTO company, USA),
- Clophen (e.g. Clophen A30, A40, A50, A60; Bayer company, Germany),
- Orophen (SOLVAY, East Germany),
- Delor (e.g. Delor 103, 105, 106; CHEMKO company, Czechoslovakia) (*in East Germany, Delor 106 was used under the name "PC-Lackfarbe RDV 100" or "AC II" respectively*).

## **Preparation and implementation of refurbishment projects**

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- Before removing the old paint coatings from the structures, it needs to be checked (if this is not known beforehand) if the old paint coatings contain substances that are harmful to the environment (e.g. PCB).
- If the old paint coatings of the structure contain pollutants, such as substances that may endanger the quality of surface waters or ground water, the regulations in force need to be adhered to. In particular
  - it is necessary to select such a procedure for removing the old paint coatings and to take such measures which avoid the entry of paint particles into the environment, particularly surface waters or the groundwater, the soil or the sewage systems,
  - the company carrying out the work needs to document the disposal of the old paint coatings and, if required, the material containing particles of the old paint coatings (e.g. blasting agents used) pursuant to the applicable regulations (confirming the disposal method and the quantity of the disposed material).