Polychlorinated biphenyls

Polychlorinated biphenyls (PCBs) are synthetic substances produced commercially in Europe from 1929 until the mid-1980s and used both in 'closed' applications, such as insulators and cooling fluids in transformers, dielectric fluid in capacitors and as hydraulic fluids, and for 'open' uses, such as grouting, and sealants and as plasticisers in paints. Production in Europe was stopped in the mid-1980s, but may still be continuing in other parts of the world.

What is the problem?

PCBs are toxic and, since they are hydrophobic, bioconcentrate particularly in fatty tissues. They can adversely affect reproduction, and may affect immune systems so as to make disease epidemics worse. The higher levels of the food web, especially fish-eating birds and marine mammals can be particularly affected. It is estimated that some 700 000 tonnes of PCBs have been produced, of which 30% (at least 200 000 tonnes) may have been released to the environment. The main remaining sources of PCB releases are PCB-containing units, waste disposal, re-mobilisation of PCB-containing sediments and, to an unknown extent, formation as by-products in various thermal and chemical processes. The most toxic PCBs are those with a planar structure which have similar chemical properties to dioxins and furans.

What has been done?

OSPAR specifically targeted pollution from PCBs requiring that all PCBs and hazardous PCB substitutes are phased out and destroyed in an environmentally safe manner. Within the EU the main uses of PCBs in products have been banned since 1986 and disposal has been targeted. An EU strategy addresses 'uncontrolled PCB applications' which are not covered by the ban, *i.e.* large volumes with very low concentrations of PCBs, or products with a small volume of PCBs, non-industrial wastes, and 'historic pollutions'. EU waste legislation addressing PCBs includes the restriction of use of hazardous substances in electrical and electronic equipment and the mandatory segregation of PCB-containing components in waste electrical and electronic equipment to ensure their adequate disposal. Requirements on the phase-out and destruction of PCBs, similar to those in place under OSPAR, are set out under the UNECE POP Protocol and the UNEP Stockholm POP Convention with targets for phase-out of use of equipment containing PCBs by 2025 and treatment and elimination by 2028.

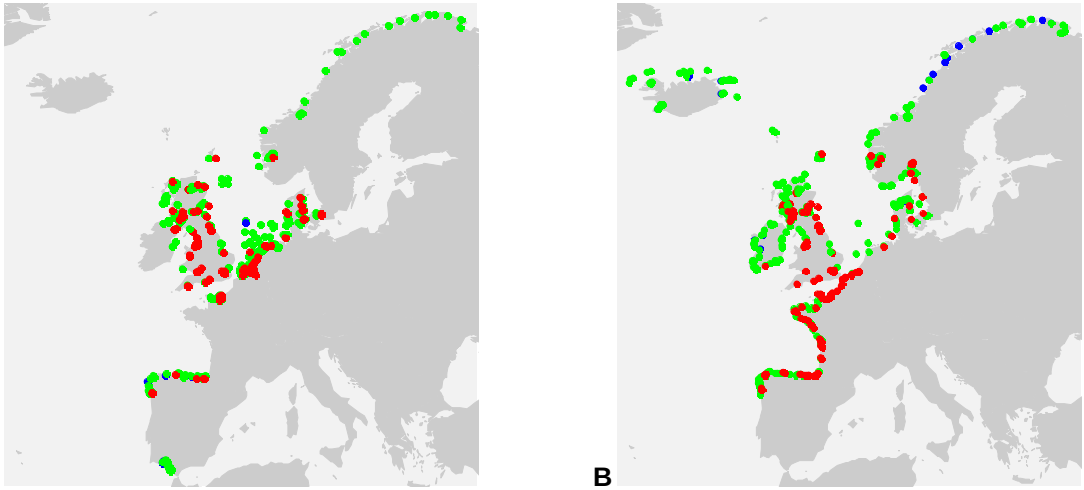
Did it work?

Substantial reductions in releases and good progress on the phase-out of remaining stocks have been achieved in the period 1998 – 2005 supporting a movement towards the cessation target for PCBs. Releases of PCBs to air and water continue. Emissions to air from large point sources show a substantial downward trend. No trend information is available for discharges to water. Yet, the treatment and elimination of remaining stocks and so-called uncontrolled applications will provide a continued source for releases to the environment in the next years before their phase-out has been completed. More efforts are needed to address remaining releases of PCBs within the EU framework, especially concerning unintended production.

According to data reported to EMEP the total emissions of PCBs to air reduced by 75% over the period 1998 – 2006. EMEP model results suggests an overall decrease of CB-153 deposition of around 60 – 75% in the five OSPAR Regions. Data reported by Contracting Parties on riverine inputs and direct discharges under the OSPAR RID Study are too patchy for assessment. The few reported data however indicate that releases to water still continue. Data on dredged material dumped suggest that loads of PCBs continue within dredged sediments.

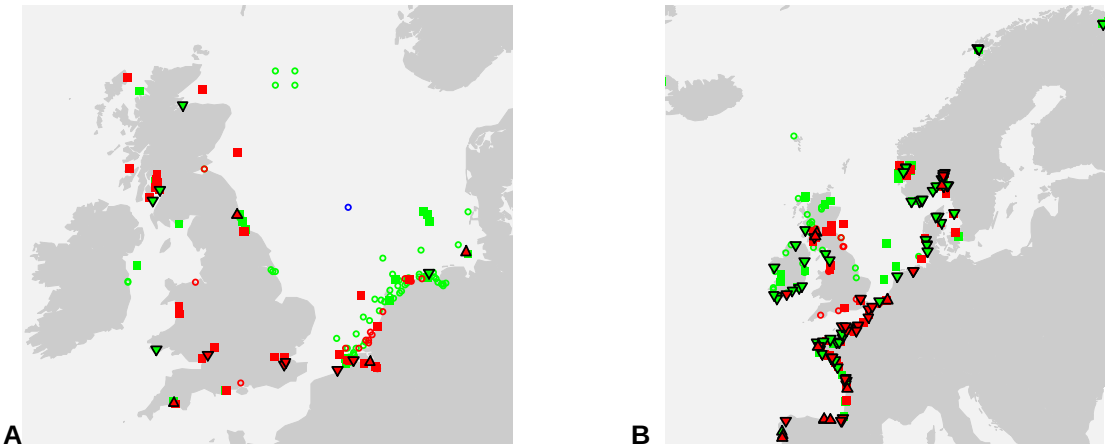
How does this affect the quality status?

OSPAR environmental monitoring has concentrated on a set of 7 PCB congeners, which cover the range of toxicological properties of the group. In the maps below the assessment results for the target group of congeners of PCBs *i.e.* the ICES 7 CBs (CB congeners 28, 52, 101, 118, 138, 153, 180) have been aggregated to simplify their presentation. There are few locations where the concentrations of the target CB congeners in biota are close to zero. These are mainly in northern Norway. However at many stations remote from industrial activity concentrations are not yet at levels close to zero, including parts of northern Norway in Region I, northern Scotland and offshore locations in the North Sea (Region II) and some sites on the north coast of Spain (Region IV). In the Arctic, PCBs are among contaminants detected in highest concentration. Furthermore, in Regions II, III (Celtic Seas) and IV there are widespread locations where the concentrations of at least one CB congeners in fish and shellfish pose a risk of pollution effects, particularly around the coasts of the Bay of Biscay and the English Channel, in more populated and industrialised UK estuaries, and in scattered locations in Denmark, Germany and southern Norway. The pattern of contamination in sediments is very similar to that for biota. Thus PCBs may still be causing adverse biological effects over large parts of the Convention area. Observed concentrations of PCBs in blubber of stranded porpoises around the UK suggest a link between contamination of animals and their susceptibility to infectious diseases and associated death. PCB concentrations are decreasing at a high proportion of the fish/shellfish stations, particularly along the continental coast of the North Sea, the west of the UK, and Ireland. A small number of stations showed increasing trends.



A **B**

Status of PCB concentrations in (A) sediments and (B) biota: zero (blue), acceptable (green), and unacceptable (red)



A **B**

Temporal trends of PCB concentrations in sediment (A) and in biota (B): downward ▽, upward △, insufficient data for trend assessment ○

Electronic navigator to OSPAR publication sources (publication number):

- Status and trend of marine chemical pollution (395/2009)
- Towards the cessation target (354/2008)
- Trends and concentrations in marine sediments and biota (390/2009)
- Trends in atmospheric concentrations and deposition (447/2009)
- Background Document for PCBs (134/2001) (as updated)