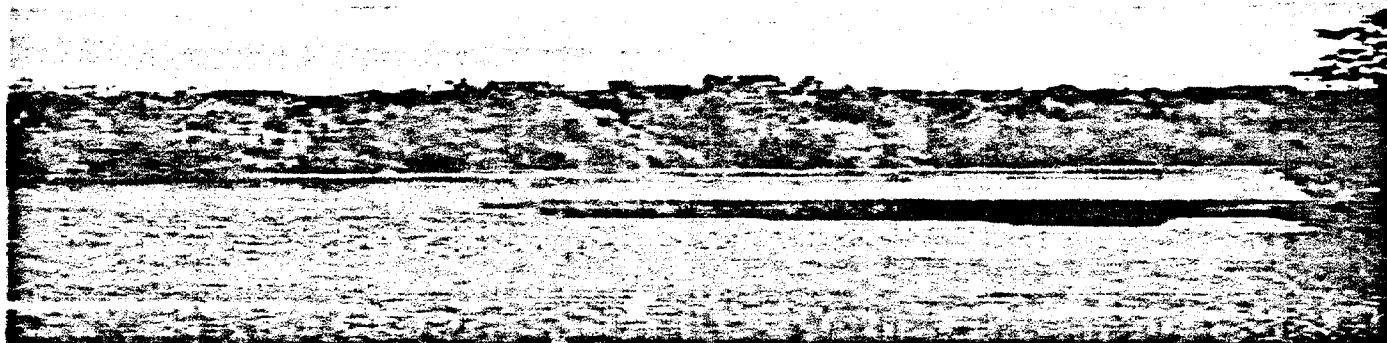


PCB's 101 - A Primer



PCBs or polychlorinated biphenyls are a group of chemicals consisting of 209 individual compounds. PCBs were widely used as a fire preventive and insulator because of their ability to withstand exceptionally high temperatures.

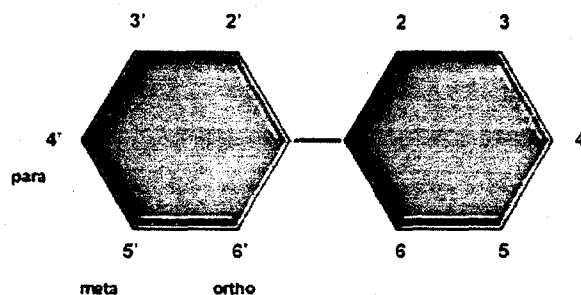
PCBs were banned by EPA in 1979, and are classified as probable human carcinogens by numerous national and international health-protective organizations, such as the EPA, the Agency for Toxic Substances and Disease Registry (an arm of the U.S. Public Health Service) and the World Health Organization. Research also links PCB exposure to reduced ability to fight infections, low birth weight, and learning problems.

PCBs and Health

PCBs build up (bioaccumulate) in the environment, increasing in concentration as they move up the food chain. This is of special concern in areas where fish are exposed to PCB contamination and may be eaten by people or wildlife (as in the Hudson River). At the Hudson River PCBs site, the best way humans can reduce their risk of exposure to PCBs is by following the state's health advisories for consumption of fish from the river. For more information on Hudson River health advisories and on PCBs and human health risks, please visit our website at www.epa.gov/hudson.

PCB Chemistry

There are 209 varieties of PCBs, known individually as *congeners*. A congener may have between 1 and 10 chlorine atoms, which may be located at various positions on the PCB molecule (see illustration on reverse).



Structure of Polychlorinated Biphenyl (PCB) Molecule

As you can see, the chlorine atoms fall into three separate position categories, known as *para*, *meta* and *ortho*. PCB congeners are often categorized according to how many chlorine atoms are present on the molecule, such as:

<i>monochlorobiphenyl</i>	:	1	<i>hexachlorobiphenyl</i>	:	6
<i>dichlorobiphenyl</i>	:	2	<i>heptachlorobiphenyl</i>	:	7
<i>trichlorobiphenyl</i>	:	3	<i>octachlorobiphenyl</i>	:	8
<i>tetrachlorobiphenyl</i>	:	4	<i>nonachlorobiphenyl</i>	:	9
<i>pentachlorobiphenyl</i>	:	5	<i>decachlorobiphenyl</i>	:	10

Using What We Know

Through the use of congener-specific analysis, we can “fingerprint” PCBs in water and sediment. This analysis allows us to see distinct PCB patterns or signatures in the environment through which we can identify the general area in which the source of PCBs is located, the original PCB mixture, and how the PCBs may have changed over time. Use of PCB “fingerprinting” in EPA’s Hudson River PCBs Reassessment allowed us to see that PCBs from the historic sediments of the Thompson Island Pool can be traced in the water of the Hudson River all the way to Kingston, New York, a distance of 100 river miles.

Is The River Cleaning Itself?

PCBs may undergo *dechlorination*, which is the process of removing chlorine atoms from a PCB molecule while leaving the main molecular structure intact. In the Hudson, this natural process is done by bacteria living in the river sediments, and only affects the outer chlorine atoms, or those in the meta and para positions. In most instances dechlorination of a PCB molecule simply yields a different PCB molecule. EPA Reassessment studies have confirmed that while dechlorination is taking place in the upper Hudson river, it is merely changing one kind of PCB into another. So the river is not “cleaning itself.”