



FACTS & FIGURES: POLYCHLORINATED BIPHENYLS (PCBs)

PCB OVERVIEW

- Widespread in the estuary, both geographically and in the food chain
- Released through accidental spills of PCB-containing fluids
- Bioaccumulative
- Similar to PBDE flame retardants in chemical structure and sublethal effects
- Sublethal effects on salmon
- Carcinogenic to humans
- Still used in electrical equipment
- Present in paints, caulks, and building products

WHAT ARE PCBs?

Polychlorinated biphenyls, or PCBs, are stable, flame-resistant chemicals that were manufactured for use in consumer products (lubricants, paints, pesticides, etc.) and as insulators and cooling compounds in electrical equipment. They come in 209 different chemical forms, or congeners, which vary in their degree of toxicity and carcinogenicity. The most toxic PCBs are structurally similar to dioxins, known carcinogens.

PCBs do not degrade readily or dissolve in water. Instead, they tend to accumulate in sediments and the body fat of living organisms. Over time, PCBs biomagnify up the food chain to top predators, including humans. The manufacture of PCBs was banned in the United States in 1979, but their use is still allowed in closed electrical equipment (transformers, capacitors, ballasts, etc.).

IMPACTS ON FISH & WILDLIFE & THE ENVIRONMENT

Exposure to PCBs can kill salmon outright. Sublethal effects include immune suppression (which increases disease-related mortality), hormone disruption, and reproductive alterations.

PCB concentrations in some juvenile salmon in the estuary are at or above the threshold level (2,400 nanograms per gram lipid) for health effects such as delayed mortality, biochemical alterations, and immune dysfunction.

IMPACTS ON HUMAN HEALTH

Possible health effects of PCB exposure in humans may include:

- Skin problems from direct contact
- Cancer
- Diabetes
- Liver disease
- Disruption of reproductive functions
- Neurobehavioral and developmental deficits in babies and children

Health effects may vary according to how someone is exposed, how long they are exposed, the specific PCB mixtures to which they are exposed, and a person's existing health conditions at the time of exposure.

SOURCES OF EXPOSURE

PCBs can be found in the air, soil, sediment, and water, and in fish, wildlife, and people. Their release into the environment is often unintentional, sometimes through spills and now as unexpected byproducts of industrial processes. Some PCB congeners are created inadvertently as a byproduct of some industrial processes. Current federal regulations allow for PCB presence in several current manufacturing processes.

There is increasing concern about the continued manufacture and distribution of PCB containing products and some of the unexpected pathways of transport and deposition. There also is a growing awareness that PCBs can be found in open applications such as paints, elastic sealants used in buildings, concrete aprons, and city streets. Current thinking is that cars concentrate PCBs out of the air and oil, and then deposit them in parking lots and along roadways where rain water washes them into soils or storm systems. Also, paint chipping off old buildings in Seattle was picked up by geese around the building. The geese feces deposited in the area now contain high levels of PCBs (200 ppb). In the Columbia River estuary, juvenile salmon are known to be exposed to PCBs through their prey, hatchery feed, river water, suspended sediment, and—at some sites—bed sediment.

PCBs IN THE ESTUARY

PCBs have been found in river water samples and in the tissue and stomach contents of juvenile salmon at sites throughout the Columbia River estuary, from just below Bonneville Dam to the mouth of the river near Astoria.

References

Lower Columbia River Estuary Partnership. 2007. *Lower Columbia River and Estuary Ecosystem Monitoring: Water Quality and Salmon Sampling Report*.
Rice and O'Keefe, 1995; U.S. Public Health Service, 1999; ATSDR, 2000b