

FACTS & FIGURES: POLYCYCLIC AROMATIC HYDROCARBON (PAHs)

PAH OVERVIEW

- Widespread in the estuary, both geographically and in the food chain
- Released through combustion or spill of gasoline, diesel fuel, and other petroleum products; electric power generation; refuse incineration; home heating; incomplete combustion of carbon-containing materials; production of coke, carbon black, coal tar, and asphalt; possible releases from marine pilings
- Persistent and bioaccumulative
- Metabolized by fish, birds, and people, but metabolites can be harmful
- High molecular weight PAHs more toxic and persistent than low molecular weight PAHs
- Range of health impacts on humans
- Widely used for fuel in developed countries

WHAT ARE PAHs?

Polycyclic aromatic hydrocarbons, or PAHs, are widespread organic contaminants that are released through the combustion or spill of gasoline, diesel fuel, and other petroleum products. They also are created through the incomplete combustion of carbon-containing materials such as wood, coal, and tobacco. PAHs are used in manufacturing dyes, insecticides, and solvents, and they are a constituent of the creosote found in railroad ties and marine pilings.

They are used mostly as agents in pharmaceuticals, agricultural products, photographic products, thermosetting plastics, lubricating materials, and other chemical industries. These contaminants include benzenes (gasoline) used to power automobiles, boats, leaf blowers, and lawn mowers; a group of contaminants (acenaphthene, anthracene, fluoranthene, fluorine, phenanthrene, and pyrene) used in the manufacture of dyes, plastics, pigments, pharmaceuticals and pesticides; and naphthalene (mothballs).

PAHs often attach to soil and sediment. They bioaccumulate in invertebrates but are metabolized by fish, birds, wildlife, and people. However, in the process, some metabolites can be more harmful than the original compounds and can generate mutations, be carcinogenic, or cause cell death.

PAHs fall into two groups, depending on their molecular weight. Low molecular weight PAHs are less toxic and less persistent than high molecular weight PAHs, and more likely to dissolve in water.

IMPACTS ON FISH & WILDLIFE & THE ENVIRONMENT

Exposure to PAHs can impair salmon growth, causes physical or developmental abnormalities, reduces disease resistance, and disrupts reproduction.

PAH concentrations in some juvenile salmon in the estuary are high enough (7,000 nanograms per gram wet weight) to be of concern. This level has been associated with altered immune system function, growth, blood chemistry, and fatty acid profiles.

IMPACTS ON HUMAN HEALTH

Effects from chronic or long-term exposure to PAHs include:

- Decreased immune function
- Cataracts
- Kidney and liver damage (e.g. jaundice)
- Breathing problems, asthma-like symptoms and lung function abnormalities
- Induced redness and skin inflammation
- Prematurity and low birth weight
- Developmental delay

SOURCES OF EXPOSURE

Common sources of PAHs are vehicle exhaust, coal tar, and municipal or industrial activities that involve combustion. In aquatic environments, marine pilings may also be a source of PAHs. High molecular weight PAHs enter rivers and streams through atmospheric deposition and stormwater runoff. Low molecular weight PAHs are more likely to enter the environment from incidental spills of gasoline and diesel fuel.

PAHs can be found in the soil, sediment, air, and water, and in invertebrate species. A major pathway for PAHs is stormwater. In the Columbia River estuary, juvenile salmon are exposed to PAHs through their prey and river water.

PAHs IN THE ESTUARY

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

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