

Identification of PBDEs in Sediments and Biota near a Municipal Waste Facility in Juneau, Alaska (421)

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What is a PBDE? Polybrominated biphenyl ethers (PBDEs) are used as chemical flame-retardants in consumer goods such as clothing, plastics, and computer parts. These chemicals are found in detectable quantities in and around landfills, and are known to leach out into surrounding environments. PBDEs present a potential for bioaccumulation.

Have I been exposed to PBDEs? Sources of PBDEs exist within any municipality regardless of size. Municipal solid waste landfills are one potential source of PBDE contamination. Approximately three million tons of electronic waste was estimated to be disposed in U.S. landfills in 1997. Treated paper and textiles as well as plastics, polymers and printed circuit boards may release PBDE and provide a steady stream of PBDE contaminated landfill leachate.

The municipal waste facility in Juneau, AK is neither lined nor does it restrict dumping of personal electronic items. PBDE pollution originating from landfill leachate can be immobilized in soil but erosion processes move the PBDE into watery environments where it may persist and/or deposit onto the bottom sediments. The Juneau facility surrounded by several productive salmon streams and bordered by a large estuary that serves as a bird refuge, and is located next to Gastineau Channel. Bioaccumulation of PBDEs in marine environments is of particular concern since many sedentary bottom dwelling species can efficiently concentrate these chemicals and are also themselves part of very complex marine food webs. Many commercially important fish and shellfish species can contain high levels of accumulated PBDEs.

Do PBDEs affect people? Recent evidence shows that PBDE effects may be linked to interactions of these chemicals on thyroid hormone regulation. In vertebrates including humans, developmental regulation is controlled by thyroid hormones. Rats exposed to PBDEs demonstrate lowered circulating thyroid hormones compared to non-treated controls.

The Study: Dr. Lisa Hoferkamp and Dr. Sherry Tamone from the University of Alaska Southeast are working to identify PBDE levels in sediments and invertebrates (crustaceans, bivalve mollusks, snails) from the area immediately surrounding the Juneau municipal waste facility. The primary objective of this project is to measure PBDEs levels in sediment samples and in tissue samples of organisms inhabiting estuarine habitats near a landfill in Southeast Alaska and to compare these levels to those from samples obtained from a more pristine estuarine habitat.

The study has focused on 12 specific brominated diphenyl ethers out of the 209 possible. These 12 have been identified in several previous studies involving sediments and biota. Organisms sampled include but are not limited to vertebrates (rock sole), and invertebrates (crustaceans, bivalve mollusks, snails). The results from this project will be important as an initial assessment of the presence of PBDEs in sediments and their accumulation into the tissues of organisms near Alaskan waters. Further research is needed to assess the physiological consequences of PBDEs on organisms and potential disruptions to important food webs.