

SHORE STEWARDS NEWS

June 2008 Island County, Washington

Issue No. 44

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Flame Retardant Seals?



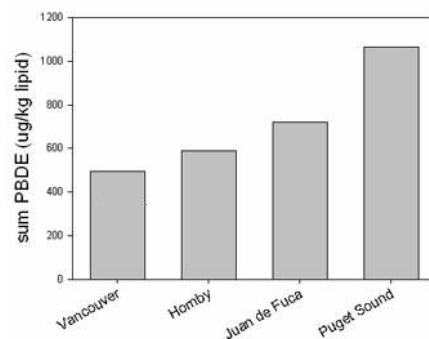
Photo by Kip Evans
from US EPA website

Polybrominated diphenyl ethers (PBDEs) are a suite of flame retardant chemicals which were first introduced in 1960. They are similar in both form and function to PCBs and were purpose-built to resist degradation from light and heat, and to resist fire.

Because of their chemical stability and fire retardant qualities they were quickly included in a dizzying list of products in our homes and businesses such as couches, mattresses, pillows, carpeting, upholstery, drapes, computers, televisions, wires and cables. They are also incorporated into airplanes, cars, and medical devices. And, like PCBs, PBDEs have been accumulating at a remarkably rapid rate in the bodies of herring, harbor seals, orcas, and humans.

In laboratory animals, PBDEs have been found to affect neurological development, thyroid hormone levels and immune function. The EPA states that exposure to high levels of PBDEs, in conjunction with ongoing exposure to legacy PCBs, could harm the health of seals and other wildlife in the Puget Sound – Strait of Georgia region.

PBDEs in harbour seals from BC and Washington



PBDE Levels in U.S. Wildlife & People are the Highest in the World

PBDEs truly seem to be everywhere. The compounds can be found even in arctic wildlife. But the highest levels occur in the US. One study, undertaken in 2003, compared PBDE levels in harbor seals from two sites in the greater Puget Sound area with levels in the animals living with our neighbors to the north in British Columbia. Harbor seals from the following four locations were sampled:

- the Fraser River estuary, Vancouver, BC;
- Hornby Island, Strait of Georgia, BC;
- Smith Island, eastern Juan de Fuca Strait, WA; and
- Gertrude Island, South Puget Sound, WA.

PBDE Levels in U.S. (Cont.)

In this study, PBDE contamination increased the further south the animals lived. Seals from Gertrude Island in Puget Sound were approximately twice as contaminated as the Canadian seals.

The level of contamination has been rising very rapidly over the last few decades. Harbor seal samples taken over time revealed that PBDE concentrations in harbor seals from Gertrude Island, the group with the highest level of contamination described in the study above, increased from 15 to 1064 micrograms of pollutant per kilogram of fat between 1984 and 2003. That's an increase of 1,500% in less than 10 years. That's not a typo, that's 1,500%.



From US EPA website

PBDEs bioaccumulate and biomagnify, meaning that living creatures tend to retain the compounds in their bodies and that the further up the food chain you go, the greater the level of contamination. Harbor seals are near the top of their food chain. Orcas are also at the top of their food chain and when researchers examine PBDE levels in orcas they see the same pattern of higher concentrations in Southern Puget Sound resident orcas than in B.C. orcas.

And the same pattern of concentration is revealed when we look down the food chain, as well. Pacific herring sampled in Puget Sound in 2004 had almost three times as much PBDE contamination as herring from the Southern Georgia Basin. Herring is a good fish to consider because it's what's for dinner for a lot of different marine creatures. Almost 20% of the harbor seal diet consists of herring. Herring juveniles and adults are also eaten by diving birds, as are many marine fish including Chinook and Coho salmon. Herring eggs are eaten by wading birds, shore birds, fish, and crabs. Even the tiny larvae that free-float immediately after hatching don't get a break - jellyfish eat them.

Although researchers don't have enough data to tell whether PBDEs are increasing in Pacific herring specifically, trend data from other West Coast fish studies show that unlike their chemical cousin PCBs, which have decreased in wildlife since they were banned in 1979, PBDEs are rapidly increasing in the marine food web.

PBDEs in You and Me

Concerns about PBDEs don't stop at the edge of the sea, and they don't end with wildlife, either. PBDEs are present in our food, our house-dust, soils, sewage sludge, and not surprisingly, human breast-milk and body fat. Levels in North Americans are the highest in the world, with levels 20 to 40 times greater than our Swedish or Japanese counterparts.

The health concerns for humans are drawn from animal studies and include neurological effects, thyroid hormone effects, developmental effects, reproductive harm and some forms of cancer.

The Swedish were the first to detect rising levels of PBDEs in people because Sweden, like several other European countries, has a Breast Milk Monitoring Program.

PBDEs in You and Me (Cont.)

Researchers discovered a rapid rise in the PBDE levels from 1972 to 1997. In response, the Swedish government halted PBDE production. From 1998 to 2002, the PBDE levels in breast milk have decreased significantly in Swedes.

And Now for Some Good News

There are many forms of PBDEs which have been used in different applications and several of these have been phased out and/or banned in the US and abroad. The different forms are named for their chemical structure and the one's I'll describe here are the big three: penta, octa, and deca.

Penta was used in:

- flexible polyurethane foams in upholstery, carpets, mattresses, and pillows
- rigid foams in personal computers and television sets

Octa was used in:

- plastic (styrene) housing of computer monitors and televisions,
- circuit boards

US and European manufacturers voluntarily phased out production of both octa and penta-BDE mixes, which were believed to be the most harmful, by 2004.

Deca is still used in:

- high impact polystyrene plastic housings for electronic equipment
- polyethylene for wires, cables, pipes and textile coatings (upholstery and drapes)

Deca-BDE has a bulky structure and it was thought that its structure would keep it from being absorbed into the body.

However, recent studies show that it can be absorbed, that it is present in blood and breast milk samples from the general population, and that deca-BDE may be chemically altered, or debrominated, into more harmful forms. But how debromination happens, and the important details such as how fast this happens, what forms it takes, and how bad it is for you, are not yet understood.

In 2007, Washington State became the first state to prohibit the use of deca-BDE in household goods. As of 2008, deca is banned from mattresses and, if alternatives are found for it, deca will be banned from TVs, computers, upholstered furniture and other products in Washington State in 2011. The European Union banned deca-BDE in electronic equipment effective July 1, 2008.

This does not mean that products containing deca-BDE would be removed from our homes or businesses - only that new products would be manufactured without them. All of the existing PBDEs will continue to enter our environment and our bodies, but if production is discontinued we would expect to see falling levels over time just as we did when PCBs were banned and just as the Swedish did after they banned PBDEs.

What You Can Do

What can you do to minimize your exposure to the various forms of PBDEs in our environment and how can you protect our marine wildlife? The EPA recommends the following:

- **Consult fish advisories:** Check with local and state health agencies regarding health advisories related to fish.
- **Purchase products without PBDEs**
- **Clean often and thoughtfully:** Clean your house and office often and avoid stirring up dust while cleaning, avoid remodeling while pregnant, and use front entrance dust rugs.
- **Consult breast feeding and food recommendations:** Check with your state health organizations for the status of on-going breast feeding monitoring studies and recommendations for breast feeding (which is still preferable to bottle feeding). Check out the Washington Department of Health's PBDE Web Page <http://www.doh.wa.gov/ehp/oehas/pbde/pbde.htm> or contact Healthy Mothers, Healthy Babies Coalition <http://www.hmhbwa.org/>

For a list of PBDE free products, *The Green Guide*, an online publication owned and operated by National Geographic, has put together a list of manufacturers in a handy wallet-size. You can find it here: <http://www.thegreenguide.com/gg/pdf/pbdessc.pdf>.

You can also ask companies directly about PBDEs in their products.

According to the Oregon Department of Health Services, the best way to reduce PBDEs in the environment is to support policies and programs in your community that help reduce environmental pollution.

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