The Problem with Flame Retardants
By Eve Harris

When a friend recently recounted how she struggled to find the right mattress for her preschool daughter, I was half listening. Fire safety? Toxic chemicals? She said it would be shipped from Southern California and although she was discreet about the price, I later learned that in California a legal mattress free of toxic flame retardants could cost quite a lot. Here are some of the other things I learned:

Which toxins are in mattresses?
The chemicals under the most scrutiny are man-made, polybrominated diphenyl ethers, known collectively as PBDEs. Three different commercial formulations, known as tetra-, penta- and decaBDE were used in consumer products in the US beginning in the 1970s. PBDEs are not chemically bound to the products they are used in and thus are prone to leaching into the environment, where they persist. Like other persistent organic toxins, they have an affinity for fats. *(EPA factsheet[1])*

People encounter PBDEs in building materials, carpets, textiles, electronics, flooring, mattresses, foam furniture, and high temperature plastics like those used for TVs and computers. The most abundant type is decaBDE, which is ubiquitous in buildings and vehicles of all types.

What's the Danger?
California is the only state with a *furniture* flammability standard. To meet that standard, pentaBDE was added to furniture foam for more than 20 years. Citing environmental concerns, California banned penta and octa-PBDEs in 2003 -- the first state to prohibit their use -- but decaPBDE was not prohibited. The state maintains stringent flammability requirements for furniture and mattresses. *(Blum, 2008)*

The Environmental Protection Agency (EPA) has categorized decaBDE as a possible human carcinogen and more than 100 peer-reviewed publications characterize PBDEs as toxic to neural, reproductive and thyroid function in animal studies. Studies published in 2008 indicate they can cause endocrine disruption in vitro, including one study that used a human breast cancer cell line. *(Mercado-Feliciano, 2008)*

No federal standards or guidelines have been set for PBDEs. The EPA acknowledges no "treatment" is currently available to remediate them from the environment. (*EPA factsheet*) The European Union prohibited use of pentaBDE and octaBDE in 2003. (*EU directive 2003/11/EC*)

High and growing exposure in Northern California
In the fall of 2002, researchers from the Environmental Working Group collected 22 fish from six of the most commonly eaten species at 10 locations around San Francisco Bay. Every sample contained seven different PBDEs, and in levels much higher than in fish from Europe, Japan and other parts of the U.S. Compared to

archived samples from 1997, levels had more than doubled in halibut and more than tripled in striped bass. (*EWG, 2002*)

The California EPA looked at banked blood samples collected in the 1960s from San Francisco Bay Area women and found the level of PBDEs was below measurable. When the same researchers looked at levels from 1997-2002, they found PBDE levels in the blood of San Francisco Bay Area women were 3 - 10 times higher than Europeans'. "Increasing body burdens," they wrote, "pose a potential public health threat to future generations." *(Petreas, 2003)*

A study of breast fatty tissue samples from 23 California women found average PBDEs at "the highest human levels reported to date." *(She, 2002)* And a California EPA researcher has observed that the levels found in breast milk are not only high, but persistent. (*Hooper, 2007*)

Exposure Begins at Home

With the exception of breast milk, food is not considered to be the major source of human PBDE contamination. Rather, many researchers suspect that contaminated dust conveys PBDEs. Samples collected from household vacuum cleaner bags in Davis, California, were all highly contaminated. (*Hwang, 2008*)

In 2006 staff from a California environmental CBO, after training from the Silent Spring Institute, collected air and dust samples both inside and outside 40 homes in Richmond, CA and 10 homes in Bolinas, CA. Levels of PBDEs in the house dust were substantially higher than previously reported in the United Kingdom; Germany; Ottawa, Canada; Cape Cod or Boston, MA; or Washington D.C. (*Zota; unpublished abstract presented October 15, 2007 at the 17th Annual Meeting of the International Society of Exposure Analysis*)

How that dust gets into human tissues has been unclear, but researchers recently hypothesized that eating oily finger foods such as chips with unwashed hands could result in inadvertently consuming PBDEs. The toxins may also be absorbed directly into the body via the skin. *(Stapleton, 2008)* Young children, and in particular, toddlers, are among those most likely to receive high exposure because they're in contact with house dust through floor activities and hand-to-mouth behaviors. (*Fischer, 2006*)

Biophysical Chemist Arlene Blum has immersed herself in evaluating the costs and benefits of exposure to fire retardant chemicals. Her conclusion? Fire may not be the bigger hazard. Well-meaning but inappropriate fire safety regulations have placed Californians in a bind, and it's time to reassess the value of adding these chemicals to consumer products.