



Marine Environmental Research Institute

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Members, Board of Environmental Protection
State of Maine
17 State House Station
Augusta, Maine 04333-0017

Re: Support for the proposed rule to designate and restrict uses of Bisphenol-A

Dear BEP Board Members:

I am a marine toxicologist and director of the Marine Environmental Research Institute (MERI). The principal focus of MERI's research for the past two decades has been a series of region-wide studies on the impacts of chemical pollutants in the Northwest Atlantic marine ecosystem. The studies have documented levels and effects of hundreds of toxic contaminants in tissues of seals and commercially important fish stocks, including legacy chemicals (PCBs, DDTs) and emerging contaminants such as the brominated flame retardants (BFRs), polybrominated biphenyl ethers (PBDEs), and perfluorinated chemicals (PFCs). Like BPA, these chemicals have been used in consumer and household products over four decades and have become widespread contaminants in the global environment. Like BPA, many of these compounds are known to cause cancers, endocrine disruption, and reproductive and neurodevelopmental effects in animals and people.

Our oceans are the final sink for thousands of persistent chemical pollutants, including chemicals that we use in our homes and offices. Given the important link between oceans and human health, it is critical to consider the impacts of these toxic compounds on marine life as well as human health.

The plastic monomer and plasticizer **bisphenol A (BPA) is one of the highest volume chemicals produced worldwide**, with over six billion pounds produced each year. BPA is used in the production of polycarbonate plastics, epoxy resins used to line metal cans, and in many plastic consumer products, including toys, water pipes, drinking containers, eyeglass lenses, sports safety equipment, dental monomers, medical equipment and tubing, and consumer electronics. BPA has been shown to leach from food and beverage containers, and some dental sealants and composites under normal conditions of use.

As a result of its high-volume use, BPA is widespread in the environment and people are universally exposed to this chemical through multiple pathways. The potential for exposure to this chemical from polycarbonate food/beverage containers is well documented (Vandenburg et al 2007, Li et al 2010, Nam et al 2010). As the polymer structure breaks down, a process speeded by heat, BPA monomers are released, contaminating the contents. This process can also be accelerated dramatically, indeed by over 5000 times by the presence of some amines.

Although not bioaccumulative, **relatively high blood levels of BPA are found in people**, suggesting that there are other exposure sources as yet unaccounted for. Studies have measured BPA human serum, urine, amniotic fluid, follicular fluid, placental tissue, and umbilical cord blood. In some cases, the levels of total BPA (free and conjugated) in human blood and other fluids are higher than levels that alter cell function in *in vitro* studies.

Two of the most potent BPA monomers are found at low levels in breast milk proteins (Maia et al 2010), implying that infants may be at high risk for exposure to these highly toxic compounds.

Plastic baby bottles are found to increase their rate of BPA release around 3 times after six months of use and the rate increases dramatically when the bottles are exposed to temperatures in excess of 80°C (Nam et al 2010).

The adverse health effects of BPA, including neurodevelopmental effects, are well documented in experimental studies. A recent study by Hajszan and Leranath (2010) indicated that BPA prevents synapse-formation in the developing brain in response to sex-hormones, and concluded that a loss of this magnitude may have significant consequences, potentially causing cognitive decline, depression and schizophrenia. Adverse effects have also been recently shown on placental development (Mørck et al 2010).

Recent finding: BPA significantly contaminates seawater

I would like to alert BEP Board members to a recently-released study (attached) indicating that BPA is significantly contaminating seawater. Saido et al (2010) analyzed sand and seawater from more than 200 sites in 20 countries. Their findings were reported in March, 2010, at the American Chemical Society meeting in San Francisco. All samples collected contained what Saido described as "significant" amounts of BPA, ranging from 0.01 parts per million (ppm) to 50 ppm. They concluded that BPA was being released into ocean water from the biodegradation of polycarbonate containers and epoxy resin coatings and paints. Saido stated, **“This new finding clearly demonstrates that BPA emissions...do reach the ocean. Recent studies have shown that mollusks, crustaceans and amphibians could be affected by BPA, even in low concentrations.”**

Recent finding: Alkylphenols, chemicals similar to BPA, implicated in lobster shell disease

There have been massive die-offs of lobsters in the Long Island Sound and Southern New England over the past decade, with shell disease being a major contributor. **Findings of a recent study suggest that alkylphenols, chemicals with a similar structure to BPA, may be linked with the onset of lobster shell disease.** Last week, Hans Laufer, a research professor in the Department of Molecular and Cellular Biology at the University of Connecticut, presented findings of his three-year study on the effects of alkylphenols on lobsters (attached). He reported that even moderate levels of the chemicals can double the amount of time it takes for a lobster to molt its shell and create a new hard shell. Prior to the creation of the hard shell, the lobster's thin skin is more vulnerable to pathogens, such as the bacteria that cause shell disease. Laufer stated, “Alkylphenols have phenomenal juvenile hormone activity. Juvenile hormone controls things like growth, reproduction metamorphosis, and development.”

The potential of BPA to harm humans and wildlife warrants its designation as a priority chemical and to its restriction in Maine and elsewhere. With more than 3,000 miles of coastline and the largest lobster industry of any state, Maine needs to be aware that the impacts of BPA and related alkylphenol chemicals on the marine environment could be devastating. **Perhaps lobsters should be considered a “vulnerable population.”**

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