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July 3, 2013

Chairwoman Anne M. Gobi
Joint Committee on Environment, Natural Resources and Agriculture
State House, Room 473F, Boston, MA 02133

Chairman Marc R. Pacheco
Joint Committee on Environment, Natural Resources and Agriculture
State House, Room 312B, Boston, MA 02133

Re: Testimony Supporting S.370, An Act Prohibiting Polystyrene Packaging

Dear Chairwoman Gobi, Chairman Pacheco, and Honorable Members of the Committee:

> *On June 11 of this year, the Sierra Club appeared before the Joint Committee on Public Health to provide testimony on H.2087, which would also ban the use of polystyrene for food packaging. Below is a copy of the testimony I provided to that committee.*

Thank you for the opportunity to offer our comments on H.2087, which would restrict the use of polystyrene, prohibiting its use for food containers.

The Sierra Club is the oldest and largest grassroots non-profit and non-partisan environmental organization in the country, with over 1.4 million members and supporters nationwide. Its chapter in Massachusetts has over 22,000 members throughout the state and a history of protecting the environment that spans more than forty years. We work to create healthy, vibrant communities through support of clean air and water; clean energy; recycling and waste-elimination; and the preservation of the Commonwealth's most treasured forests, parks and open spaces.

Polystyrene is one of the most widely used plastics. Its uses include protective packaging, food containers (often called "clamshells"), cups, bottles, trays, and tumblers. It is commonly used for food takeout including hot coffee. Polystyrene can be rigid or foamed. Expanded polystyrene is often erroneously referred to as Styrofoam™; a trademark owned by Dow Chemical, but in reality is not synonymous.[1]

Polystyrene differs from other food plastics in that it is made from dangerous chemicals such as styrene and benzene, which are likely or known carcinogens. It's now been shown that polystyrene is prone to breaking down and leeching dangerous toxins even at room temperature.

Public Contamination[2]
Because polystyrene products are so common, many people assume they are safe, and that a government agency, such as the Food and Drug Administration (FDA), would not allow a health- threatening product to be marketed to the public.[3] But the EPA National Human Adipose Tissue Survey for 1986 identified styrene residues in 100% of all samples of human

fat tissue taken in 1982 in the US. Styrene is used to make polystyrene plastic and is a contaminant in all polystyrene foam packages.[4] But the migration of styrene is nothing new. It was first documented in 1972,[5] and then again in 1976.[6]

A 1988 survey published by the Foundation for Advancements in Science and Education also found styrene in human fatty tissue with a frequency of 100% at levels from 8 to 350 nanograms/gram (ng/g). The 350 ng/g level is one third of levels known to cause neurotoxic symptoms.[7] It has been determined that expanded polystyrene drinking cups leach expanded polystyrene into the liquids they contain. The cups apparently lose weight during the time they are at use. The studies showed that tea with lemon produced the most marked change in the weight of the foam cup.[8]

Styrene has recently been placed on a list of likely carcinogens by US Health and Human Services. Studies have confirmed that styrene is toxic to workers who manufacture polystyrene. Studies also indicate that polystyrene containers may leach styrene when exposed to hot or oily/greasy foods or those containing beta-carotene, which is present in most vegetables. Although polystyrene is a solid at room temperature, it flows when heated. Polystyrene is also much more toxic than other plastics when burned and even more so at lower temperatures. Short-term exposure can cause eye and mucous membrane irritation, and gastrointestinal harm. Long-term exposure can cause headaches, depression, fatigue, weakness, and hearing loss. Some studies have shown that long-term exposure decreases birth rates, increases the risk for leukemia and lymphoma, and has devastating effects on the liver, kidney, and stomach. We cannot in good conscience support disposable polystyrene products when they require such hazardous chemicals and manufacturing processes.

Health Effects[9]
The fact that styrene can adversely affect humans in a number of ways raises serious public health and safety questions regarding its build-up in human tissue and the root cause of this build-up. According to a Foundation for Achievements in Science and Education fact sheet, long term exposure to small quantities of styrene can cause neurotoxic (fatigue, nervousness, difficulty sleeping), hematological (low platelet and hemoglobin values), cytogenetic (chromosomal and lymphatic abnormalities), and carcinogenic effects.[10] [11] In 1987, the International Agency for Research on Cancer, Lyon, France, reclassified styrene from a Groups 3 (not classifiable as to its carcinogenicity) to a Group 2B substance (possibly carcinogenic to humans).

Although there is evidence that styrene causes cancer in animals, it has not yet been proven to cause cancer in humans. Styrene primarily exhibits its toxicity to humans as a neurotoxin by attacking the central and peripheral nervous systems. The accumulation of these highly lipid-soluble (fat-soluble) materials in the lipid-rich tissues of the brain, spinal cord, and peripheral nerves is correlated with acute or chronic functional impairment of the nervous system.[12]

For example, women exposed to low concentrations of styrene vapors in the workplace are known to have a variety of neurotoxic and menstrual problems. A Russian study of 110 women exposed to styrene vapors at levels about 5 mg/m3 demonstrated menstrual disorders, particularly perturbations of the menstrual cycle and hypermenorrhea syndrome. Styrene-exposed women often suffered from metabolic disturbances occurring during pregnancy.[13]

Sources of Styrene[14]
There are several reasons why styrene-based cups could be a source of contamination. First, the styrene monomer (vinyl benzene), a colorless or yellowish oily liquid, is the feedstock in the manufacture of polystyrene. Since the manufacturing process is not 100% efficient, polystyrene contains some residual styrene. Second, styrene is soluble in oil and ethanol[15] [16] [17] [18] -- substances commonly found in foods and alcoholic beverages. For

instance, red wine will instantly dissolve the monomer. A 1985 Cuban study noted migration of monomers from low and high density polyethylene into milk, yogurt, and alcohol solutions.[19] This means that ingestion can take place by using polystyrene cups to drink beer, wine, mixed drinks or perhaps even coffee with cream.

Most interesting is the degradation of food that contains vitamin A (beta-carotene). Even at room temperatures, vitamin A will decompose and produce m-xylene, toluene, and 2,6-dimethylnaphthalene. Toluene will aggressively dissolve polystyrene. This renders polystyrene as an unsuitable package for containing any products that contain vitamin A.[20]

Expanded polystyrene is a particular hazard to marine life. Because it is light and floats, it is an abundant and highly visible form of litter that can be carried into waterways and oceans. As it fragments, it can be ingested by animals accidentally and kill them since they cannot digest it. On land or water, it will have an indefinite life and poses a permanent danger to humans and wildlife.

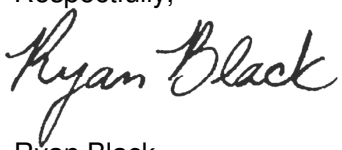
Given that polystyrene is so hazardous, it is alarming that it is so difficult to dispose of. Although rigid polystyrene is sometimes collected in curbside programs, it is not actually recycled and becomes trash. Foamed polystyrene is bulky and low value, so it is expensive to dispose of. It is no wonder that the recycling rate is low compared to traditional and/or natural products.

There are readily available substitutes for these containers which are non-toxic and less harmful to the environment. Those alternatives include highly recyclable aluminum, and renewable and biodegradable materials. As the costs are within the same range as polystyrene, a ban will not have a significant negative impact on business costs.

In North America, polystyrene is typically made from natural gas. Single-use packaging is not the highest and best use of our non-renewable energy resources. The relative cost of polystyrene remains low due to the harmful extraction process known as hydrofracking. Use of polystyrene for packaging supports hydrofracking.

Polystyrene represents a serious issue that faces our communities, the Commonwealth, the United States, and the world. Banning the use of polystyrene is an important and easily implemented step towards meaningful change. The Sierra Club has long been committed to minimizing the negative environmental impact of human activity and because H.2087 would significantly reduce such impact we hope that this bill receives a favorable review by the committee and the state legislature as a whole. We strongly believe that enacting this bill is a crucial step in protecting the health of the resident of the Commonwealth.

Respectfully,



Ryan Black
Director
Massachusetts Sierra Club

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[1] Dow Chemical Corporation, “There's No Such thing as a Styrofoam™ Cup,” http://building.dow.com/media/trademark.htm retrieved 5/23/2013
[2] Mike Ewall, “Public Contamination,” EJNet, republished by permission
[3] "Are Styrene Food and Beverage Containers A Health Hazard?," Institute for Local Self-Reliance, Washington, DC, August 15, 1990.
[4] Brian Lipsett, "Areas of Expertise Pertaining to McDonald's Corp.."

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[9] Mike Ewall, “Health Effects”, EJNet, republished by permission
[10] "Are Styrene Food and Beverage Containers A Health Hazard?," Institute for Local Self-Reliance, Washington, DC, August 15, 1990.
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