

MICROBEADS AND THE TOXICS USE REDUCTION ACT: PREVENTING POLLUTION AT ITS SOURCE

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Abstract: Microbead pollution presents a significant threat to human health and the environment. As a result, Congress enacted a national ban on microbeads in 2015. This ban is a drastic, reactionary measure that fails to address the continued threat posed by already existing pollution. In addition, the ban represents a continued preference for the command-and-control regulatory framework that failed to prevent microbead pollution in the first place. In contrast, pollution prevention, an alternative regulatory technique adopted by Congress as national policy in 1990, more efficiently prevents pollution by focusing on reducing pollution at its source. In 1989, Massachusetts became the first state to successfully implement a comprehensive pollution prevention statute and, as a result, achieved significant pollution reduction throughout the state. If it had applied to microbeads, the pollution prevention model, could have eliminated the need for a national ban and addressed the continued threat posed by already existing pollution.

INTRODUCTION

Every day we flush tiny pieces of plastic down our drains.¹ These plastic particles, used in cosmetics, are so small that they are able to travel unimpeded into our nation's oceans and rivers.² Results from a recent study indicate that approximately 269,000 tons of plastic particles are floating on the surface of our oceans.³ These plastics, more commonly known as microbeads, absorb toxic chemicals like sponges and can be up to a million times more toxic than the surrounding water.⁴ Fish and other aquatic organ-

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¹ CHELSEA ROCHMAN ET AL., SOC'Y FOR CONSERVATION BIOLOGY, SCIENTIFIC EVIDENCE SUPPORTS A BAN ON MICROBEADS 1, 1 (2015), https://conbio.org/images/content_policy/03.24.15_Microbead_Brief_Statement.pdf [<https://perma.cc/KWM9-W7VY>].

² See *id.* (“Microbeads are used in hundreds of products including cosmetics, sunscreen, body wash, toothpaste, skincare, and industrial and household cleaning products.”).

³ Marcus Eriksen et al., *Plastic Pollution in the World's Oceans: More Than 5 Trillion Plastic Pieces Weighing over 250,000 Tons Afloat at Sea*, PLOS ONE, Dec. 2014, at 1, 1, <http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0111913> [<https://perma.cc/3TZW-2ABJ>].

⁴ JENNIFER NALBONE, THE OFF. OF THE N.Y. ST. ATT'Y GEN., UNSEEN THREAT: HOW MICROBEADS HARM NEW YORK WATERS, WILDLIFE, HEALTH, AND ENVIRONMENT 1 (2014), <https://>

isms often mistake microbeads for food and ingest them, subsequently acting as a conduit for human exposure to toxic chemicals through the food chain.⁵ Once ingested, these chemicals accumulate in the bodies of animals and become concentrated, through bioaccumulation, as they pass up the food chain.⁶ Because these plastics persist in the environment for decades, microbeads are tiny ticking-time-bombs of toxic pollution that have the potential to harm human health and the environment for generations.⁷

Many laws and agencies regulate toxic chemicals and consumer products.⁸ At the federal level, the Consumer Products Safety Commission (“CPSC”), the Food and Drug Administration (“FDA”), and the Environmental Protection Agency (“EPA”) implement various statutory requirements by promulgating regulations that mandate labeling, reporting, testing, and even banning of toxic chemicals.⁹ These agencies and the statutes they enforce represent the traditional command-and-control regulatory framework.¹⁰ This framework is problematic, though, because it is inefficient, discourages innovation, and fails to incentivize continued pollution reductions.¹¹

ag.ny.gov/pdfs/Microbeads_Report_5_14_14.pdf [https://perma.cc/WLX8-5TQR]; *Plastic Microbeads: Ban The Bead!*, THE STORY OF STUFF PROJECT, <http://storyofstuff.org/plastic-microbeads-ban-the-bead> [https://perma.cc/S2HB-7KGH].

⁵ NALBONE, *supra* note 4, at 1 (reporting that microbeads “serve as a pathway for pollutants” when they enter our food chain by contaminating the food we eat).

⁶ *Id.* at 5.

⁷ See ROCHMAN ET AL., *supra* note 1, 1. Plastic microbeads typically do not biodegrade. *Id.* In the meantime, the microbeads already present in our waters will continue to absorb toxic chemicals and, subsequently, enter our food chain through the fish and aquatic organisms consumed by humans. *See id.*

⁸ See Tobias J. Gillett, *Lessons from Nutritional Labeling on the 20th Anniversary of the NLEA: Applying the History of Food Labeling to the Future of Household Chemical Labeling*, 37 WASH. U. J. L. & POL’Y 267, 286–305 (2011) (detailing federal statutes that regulate consumer products).

⁹ Federal Insecticide, Fungicide, and Rodenticide Act, 7 U.S.C. §§ 136–136y (2012); Federal Hazardous Substances Act, 15 U.S.C. §§ 1261–1278a (2012); Consumer Product Safety Act, 15 U.S.C. §§ 2051–2089 (2012); Toxic Substances Control Act, 15 U.S.C. §§ 2601–2629 (2012); Food Drug and Cosmetics Act, 21 U.S.C. §§ 301–399f (2012); Occupational Safety and Health Act, 29 U.S.C. §§ 651–678 (2012); Emergency Planning and Community Right-to-Know Act, 42 U.S.C. §§ 11001–11050 (2012).

¹⁰ See SHELDON M. NOVICK, ENVTL. L. INST., LAW OF ENVIRONMENTAL PROTECTION § 3:25 (2016) (stating that there are four steps to command and control regulation: (1) the government creates a regulation; (2) the government permits regulated activities; (3) the regulated entity complies with the requirements of the permit; (4) the government brings enforcement actions when there are violations).

¹¹ See David M. Driesen, *Is Emissions Trading an Economic Incentive Program?: Replacing the Command and Control/Economic Incentive Dichotomy*, 55 WASH. & LEE L. REV. 289, 296–97 (1998) (discussing the drawbacks of command-and-control regulation). Command and control regulation generates unnecessarily high compliance costs because the regulator specifies technologies and methods that must be used by companies to control pollution, rather than demand a certain level of pollution reduction. *Id.* As a result, “command and control regulation involves unnecessary expense and discourages innovation because the wrong decision maker decides how

Because microbeads are generally not harmful as used by consumers in products and their toxic properties only manifest during post-use interactions with toxic chemicals in the environment, microbeads have largely been left unregulated.¹² In 2015, Congress passed the Microbead-Free Waters Act (“MWA”), banning the use of microbeads in cosmetic products.¹³ This ban is reactionary and illustrates a continued preference for the inefficient command-and-control regulatory framework that failed to prevent microbead pollution in the first place.¹⁴ At the same time, this ban fails to adequately address the continued threat posed by already existing microbead pollution.¹⁵

In contrast to the command-and-control framework, which focuses on pollution management of toxic chemicals already being used and produced, pollution prevention statutes more efficiently reduce the risk of harm to humans and the environment by emphasizing a reduction in toxics usage at the source.¹⁶ Through this proactive approach and an alternative focus on overall usage reduction, the federal Pollution Prevention Act (“PPA”) and the Massachusetts Toxics Use Reduction Act (“TURA”) represent a different type of regulatory policy that focuses on preventing pollution before it happens.¹⁷ The TURA, which was the first statute of its kind, resulted in substantial reductions in the use of toxics in Massachusetts.¹⁸ Nevertheless,

to reduce emissions.” *Id.* at 297. Instead, when faced with a demand to reduce pollution, companies that are in a better place to understand the costs of compliance, could respond to this demand by working with the regulator to implement the most efficient methods and technologies. *Id.*

¹² See 21 U.S.C. § 362 (requiring labels for cosmetic products); 21 C.F.R. § 701.3 (2015) (mandating ingredient disclosure requirements for cosmetic products).

¹³ Microbead-free Waters Act, 21 U.S.C.A. § 331(ddd) (West Supp. 2016). The bill received widespread public support. See 161 CONG. REC. S8861-01 (2015) (Senator McConnell, citing support from the fishing, tourism, and culinary industries, urged the Senate to adopt a national ban of microbeads to protect our natural environment and human health from these “toxic plastics.”).

¹⁴ See NOVICK, *supra* note 10; Driesen, *supra* note 11, at 291.

¹⁵ See 21 U.S.C.A. § 331(ddd)(1); ROCHMAN ET AL., *supra* note 1, at 1; Driesen, *supra* note 11, at 296.

¹⁶ See Stephen M. Johnson, *From Reaction to Proaction: The 1990 Pollution Prevention Act*, 17 COLUM. J. ENVTL. L. 153, 154–55 (1992); Francine Laden & George M. Gray, *Toxics Use Reduction: Pro and Con*, 4 RISK: ISSUES HEALTH & SAFETY 213, 213 (1993).

¹⁷ See Johnson, *supra* note 16, at 170–75, 179; Laden & Gray, *supra* note 16, at 213. See generally Pollution Prevention Act, 42 U.S.C. §§ 13101–13109 (2012); Massachusetts Toxics Use Reduction Act, MASS. GEN. LAWS ch. 21I, §§ 1–23 (2015).

¹⁸ See THE OFF. OF TECH. ASSISTANCE & TECH., MASSACHUSETTS TOXICS USE REDUCTION PROGRAM: ANNUAL REPORT FY14, at 4 (2015), <http://www.mass.gov/eea/grants-and-tech-assistance/guidance-technical-assistance/agencies-and-divisions/ota/govs-report-fy14-final.pdf> [<https://perma.cc/YD7T-QDAQ>]; Laden & Gray, *supra* note 16, at 215; *Results to Date*, TURA DATA, <http://turadata.turi.org/Success/ResultsToDate.html> [<https://perma.cc/9R3V-K8AH>] (“[Toxics Use Reduction Act (“TURA”)] filers are generating [forty-three percent] less byproducts or waste per unit of product and have reduced releases of TRI reported on-site chemicals by [seventy-seven percent].”).

this powerful tool falls short because the TURA's scope fails to encompass consumer products and microbeads.¹⁹

This Note argues that current legislation reflecting the command-and-control regulatory framework is insufficient to protect human health and the environment from microbead pollution.²⁰ In contrast, the TURA, working in conjunction with command-and-control regulations, is the most efficient means of preventing pollution.²¹ If the TURA applied to consumer products, and therefore microbeads, it could have eliminated the need for a national ban.²² In addition, the TURA could have diminished the continued risk of harm to humans and the environment resulting from the large quantity of microbead pollution already existing in our oceans and rivers.²³

Part I of this Note introduces microbead pollution and its adverse effects on human health and the environment.²⁴ Part II details the mosaic of federal statutes and their state counterparts that represent the command-and-control regulatory framework of toxics and consumer products.²⁵ Part III proceeds to identify the inadequacies of command-and-control pollution regulation generally and as specifically applied to microbeads.²⁶ Part IV establishes pollution prevention as a more efficient alternative to the traditional command-and-control framework and details the benefits of the TURA.²⁷ Part V suggests that the TURA's regulatory approach, if it had applied to consumer products, would have been a more effective means of addressing microbead pollution, would have minimized the need for a national ban, and would have reduced the continued threat posed by existing pollution.²⁸

I. MICROBEAD POLLUTION

Microbeads, also known as microplastics, are tiny pieces of plastic, less than five millimeters in diameter, that are used in many consumer products.²⁹ Microbeads serve as exfoliants in everyday products like facial soaps, sun-

¹⁹ See MASS. GEN. LAWS ch. 21I, § 2. The TURA only applies to certain substances deemed to be hazardous or toxic, but specifically exempts many consumer products, such as food, drugs, and cosmetics. *Id.* Accordingly, the TURA exempts consumer products that may contain microbeads. *See id.*

²⁰ *See infra* notes 226–248 and accompanying text.

²¹ *See Johnson, supra* note 16, at 181 (“pollution prevention will not eliminate the need for pollution control”).

²² *See infra* notes 226–248 and accompanying text.

²³ *See infra* notes 226–248 and accompanying text.

²⁴ *See infra* notes 29–45 and accompanying text.

²⁵ *See infra* notes 46–100 and accompanying text.

²⁶ *See infra* notes 101–138 and accompanying text.

²⁷ *See infra* notes 139–225 and accompanying text.

²⁸ *See infra* notes 226–248 and accompanying text.

²⁹ NALBONE, *supra* note 4, at 1; ROCHMAN ET AL., *supra* note 1, at 1.

screens, body washes, toothpastes, and household cleaning supplies.³⁰ Due to their small size, microbeads easily wash down household drains and enter waterways through the discharge of municipal sewage and liquid waste.³¹

Common plastics like polyethylene or polypropylene, polyethylene terephthalate, polymethyl methacrylate, and nylon are the typical materials used to manufacture microbeads.³² These plastics, by themselves, are generally non-toxic substances.³³ Once in oceans and rivers, however, these tiny pieces of plastic are difficult to remove and persist for decades, “acting as sponges for toxic chemical pollutants.”³⁴

Microbeads present a greater health risk than larger plastic debris because their higher surface-area-to-volume ratio facilitates increased toxic chemical absorption and their small size allows consumption by a wider range of organisms.³⁵ Because microbeads resemble aquatic food, fish and other organisms mistakenly consume microbeads.³⁶ Upon consumption,

³⁰ ROCHMAN ET AL., *supra* note 1; Amena H. Saiyid, *Plastic Microbeads in Waters Prompt Regulatory Efforts*, BLOOMBERG BNA (Sept. 23, 2015), <http://www.bna.com/plastic-microbeads-waters-n57982058641/> [<https://perma.cc/B2M2-2SY8>].

³¹ NALBONE, *supra* note 4, at 8; Rachel Doughty & Marcus Eriksen, *The Case for a Ban on Microplastics in Personal Care Products*, 27 TUL. ENVTL. L.J. 277, 278 (2014); Saiyid, *supra* note 30. Microbeads could be regulated under the Clean Water Act (“CWA”), which generally prohibits the discharge of any pollutant from a point source without a permit. Clean Water Act, 33 U.S.C. §§ 1311, 1342, 1362 (2012); *see* Doughty & Eriksen, *supra*, at 281–82 (discussing the application of the CWA to microbeads). The CWA’s specifically defines a pollutant to include discarded materials and refuse, which is a definition broad enough to include microbeads. *See* 33 U.S.C. § 1362(6). Discharges from households to sewers do not require a permit under the CWA, but Publically Owned Treatment Works (“POTWs”) that treat this liquid waste must obtain a permit. *See* 40 C.F.R. § 403.3(q) (2016) (defining a POTW as “a treatment works . . . which is owned by a State or municipality [that includes] any devices and systems used in the storage, treatment, recycling and reclamation of municipal sewage or industrial wastes of a liquid nature”); Doughty & Eriksen, *supra*, at 281–82. Nevertheless, little to no evidence of specific microbead permit enforcement pursuant to the CWA exists. *See* Doughty & Eriksen, *supra*. Many POTWs are unable to remove microbeads from the water without implementing costly retrofits. *Id.* As a result, microbeads pass unimpeded through POTWs and enter into waterbodies. *See* Saiyid, *supra* note 30.

³² *See Plastic Microbeads: Ban The Bead!*, *supra* note 4.

³³ *See* Emma L. Teuten et al., *Transport and Release of Chemicals from Plastics to the Environment and to Wildlife*, 364 PHIL. TRANSACTIONS OF THE ROYAL SOC’Y 2027, 2028 (2009), <http://rstb.royalsocietypublishing.org/content/royptb/364/1526/2027.full.pdf> [<https://perma.cc/4R3N-TDET>] (featured in a theme issue entitled, *Our Plastic Age*). Due to their large molecular size, microbead plastics are considered “biochemically inert” because they are unable to pass through cell membranes. *See id.*

³⁴ NALBONE, *supra* note 4, at 1.

³⁵ *See* David K. A. Barnes et al., *Accumulation and Fragmentation of Plastic Debris in Global Environments*, 364 PHIL. TRANSACTIONS OF THE ROYAL SOC’Y 1985, 1985 (2009), <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2873009/pdf/rstb20080205.pdf> [<https://perma.cc/2J84-MD22>] (featured in a theme issue entitled, *Our Plastic Age*).

³⁶ NALBONE, *supra* note 4, at 1; Nate Seltenrich, *New Link in the Food Chain? Marine Plastic Pollution and Seafood Safety*, 123 ENVTL. HEALTH & PERSPS. A34, A35 (2015), <http://ehp>.

microbeads can choke wildlife by clogging their feeding and digestive systems, causing them to starve.³⁷ Furthermore, once ingested, the toxic chemicals in microbeads can transfer into the body tissues of fish and other organisms that are frequently consumed by humans.³⁸

Microbeads absorb and concentrate toxic chemicals that have been introduced to the environment through various waste disposal systems.³⁹ For example, persistent organic pollutants, like dioxins, dichlorodiphenyltrichloroethane (“DDT”), and polychlorinated biphenyls (“PCBs”) can be found in plastic pollution at concentrations up to a million times more toxic than the surrounding water.⁴⁰ According to the Centers for Disease Control and Prevention, human exposure to DDT can cause cancer, tremors, and seizures.⁴¹ The EPA similarly concluded that PCBs can also lead to cancer, cause adverse immune and reproductive system effects, affect neurological activity, and disrupt the endocrine system in humans.⁴² Animal and human tests indicate that endocrine disruptors may contribute to an increased risk of breast and other hormonal cancers.⁴³ As a result, microbead pollution presents a significant risk to human health from exposure to toxic chemicals through consumption of aquatic organisms.⁴⁴ Although the plastics used to produce microbeads may not be harmful when present in consumer products, release of microbeads into the environment combined with their ability to absorb toxic chemicals creates tiny ticking-time-bombs of toxic contamination.⁴⁵

niehs.nih.gov/wp-content/uploads/123/2/ehp.123-A34.alt.pdf [https://perma.cc/88G7-SPGP]; Schneiderman, *supra* note 4, at 1.

³⁷ Barnes et al., *supra* note 35, at 1995. For example, microbeads have been found in the stomachs of corals, which are considered key environmental health indicators. Michelle L. White & Kevin B. Strychar, *Coral as Environmental BioIndicators: Ecological and Morphological Effects of Gasoline on Gorgonian Corals, Leptogorgia virgulata*, 3 INT’L J. BIOLOGY 63, 63 (2011), <http://www.ccsenet.org/journal/index.php/ijb/article/view/6695/6469> [https://perma.cc/QH38-3XWW]; Laura Clark, *Tiny Bits of Plastic May Be Clogging Up Corals*, SMITHSONIAN (Feb. 25, 2015), <http://www.smithsonianmag.com/smart-news/tiny-bits-plastic-may-be-clogging-coral-180954407/?no-ist> [https://perma.cc/TCH5-RUCM].

³⁸ NALBONE, *supra* note 4, at 1.

³⁹ Barnes et al., *supra* note 35, at 1995.

⁴⁰ *Id.*; Seltnerich, *supra* note 36, at A37; *Plastic Microbeads: Ban The Bead!*, *supra* note 4.

⁴¹ CTRS. FOR DISEASE CONTROL & PREVENTION, *DICHLORODIPHENYLTRICHLOROETHANE (DDT)* (2009), http://www.cdc.gov/biomonitoring/pdf/DDT_FactSheet.pdf [https://perma.cc/6NQU-B37X].

⁴² *Polychlorinated biphenyls (PCBs)(Arochlors)*, U.S. ENV’T L. PROT. AGENCY (Jan. 2000), <http://www3.epa.gov/epawaste/hazard/tsd/pcbs/pubs/effects.htm> [https://perma.cc/X2V6-HF2D].

⁴³ Sarah C. Dunagan et al., *Toxics Use Reduction in the Home: Lessons Learned from Household Exposure Studies*, 19 J. CLEANER PRODUCTION 438, 439 (2011), <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3079220/pdf/nihms220895.pdf> [https://perma.cc/B33Q-XNSQ].

⁴⁴ *See id.*

⁴⁵ *See id.*; Teuten et al., *supra* note 33, at 2028.

II. OVERVIEW OF COMMAND-AND-CONTROL REGULATION OF TOXICS AND CONSUMER PRODUCTS

Consumer products act as conduits through which microbeads pollute the environment because they absorb toxic waste released from other sources.⁴⁶ Generally, under command-and-control regulation, agencies promulgate regulations that set standards for pollution control and management, agencies then issue permits and set specific requirements for individual facilities, private entities operate their facilities within these minimum parameters, and agency enforcement actions are taken only when requirements are violated.⁴⁷ Before microbeads were banned by the federal government in 2015, with the enactment of the Microbead-Free Waters Act (“MWA”), they were largely unregulated under this framework because microbeads only become toxic once they are discharged into the environment.⁴⁸ The recent ban represents the sort of command-and-control regulation that failed to prevent microbead pollution in the first place.⁴⁹ Although it may prevent further accumulation, the ban fails to address the continued threat resulting from already existing microbead pollution.⁵⁰ Accordingly, microbead pollution illustrates the inadequacies of the traditional command-and-control regulation of toxic chemicals and consumer products.⁵¹

A. The Consumer Product Safety Commission

Pursuant to the Consumer Product Safety Act (“CPSA”), the Consumer Product Safety Commission (“CPSC”) possesses primary regulatory jurisdiction over household chemicals and regulates “consumer products.”⁵² A “consumer product” is any article, or component thereof, that is sold to consumers for household and personal use.⁵³ Through the CPSA, the CPSC promulgates consumer product safety standards, including labeling standards that require consumer products to be marked with clear and adequate warnings or instructions.⁵⁴ Prior to issuing a new regulation, the CPSA requires that the CPSC find that the regulation is “reasonably necessary to

⁴⁶ See ROCHMAN ET AL., *supra* note 1, at 1–2; Saiyid, *supra* note 30.

⁴⁷ *Id.*

⁴⁸ See Teuten et al., *supra* note 33, at 2028.

⁴⁹ See 21 U.S.C.A. § 331(ddd) (West Supp. 2016).

⁵⁰ *See id.*

⁵¹ *See id.*

⁵² 15 U.S.C. §§ 2051, 2052 (2012); see Gillett, *supra* note 8, at 286–88.

⁵³ 15 U.S.C. § 2052 (defining consumer product broadly based on how the product is used by the purchaser) The Consumer Product Safety Act definition of a “consumer product” excludes anything not customarily intended for consumer use. *Id.*

⁵⁴ *Id.* § 2056.

prevent or reduce an unreasonable risk of injury” from the product.⁵⁵ In addition, the CPSC must find that the labeling regulation is in the “public interest,” that any voluntary standards already adopted and implemented by the affected company are insufficient, that the expected benefits of the rule “bear a reasonable relationship to its costs,” and that the rule is the “least burdensome requirement” for reducing the risk of injury.⁵⁶ As a result, the CPSC may only issue consumer product labeling rules after conducting an extensive, individualized rulemaking process.⁵⁷ The CPSA also mandates reporting requirements and has the authority to ban a product.⁵⁸ For example, if a consumer product manufacturer knows that its product creates an unreasonable risk of serious injury or contains a defect that could create a “substantial product hazard,” the company must “immediately inform” the CPSC.⁵⁹

The Federal Hazardous Substances Act (“FHSA”) further authorizes the CPSC to regulate the labeling of hazardous substances intended for household use.⁶⁰ Under the FHSA, a hazardous substance is any chemical that is toxic, corrosive, an irritant, a strong sensitizer, or flammable.⁶¹ If the CPSC finds that a chemical is toxic because it has the capacity to produce personal injury or illness through ingestion, inhalation, or absorption through the body, the CPSC may by regulation declare that the chemical is a hazardous substance.⁶² The FHSA prohibits, *inter alia*, the sale of any “misbranded” hazardous substances.⁶³ The CPSC may find that a hazardous

⁵⁵ *Id.* Courts vary in their review of the “reasonably necessary” standard, but will generally balance a number of factors, including the nature and severity of the risk, the effect the standard would have on the cost and utility of the products, and the standard’s potential to reduce the severity of injury. Ethel R. Alston, Annotation, *When Is Product Safety Standard “Reasonably Necessary to Eliminate or Reduce an Unreasonable Risk of Injury” Under § 9(c)(2)(a) of Consumer Product Safety Act (15 U.S.C.A. § 2058(c)(2)(a))*, 47 A.L.R. Fed. 371 (2017).

⁵⁶ 15 U.S.C. § 2058. These requirements are not defined and courts generally apply a balancing test, weighing risk of injury, costs on implementation, and potential benefits of the standard. *See id.*; Alston, *supra* note 55.

⁵⁷ *See* 15 U.S.C. §§ 2056, 2058; Gillett, *supra* note 8, at 287.

⁵⁸ 15 U.S.C. §§ 2057, 2064(b).

⁵⁹ *Id.* § 2064. A “substantial product hazard” is defined as “a product defect which (because of the pattern of defect, the number of defective products distributed in commerce, the severity of the risk, or otherwise) creates a substantial risk of injury to the public.” *Id.* The term “immediate” is not defined, but a court will review when the defect was reported in light of the number of reported defects, the severity of the defect, and the other actions taken by the manufacturer before reporting the defect. *See* United States v. Spectrum Brands, Inc., No. 15-cv-371-wmc, 2016 WL 6835371, at *21 (W.D. Wis. Nov. 17, 2016).

⁶⁰ *See* 15 U.S.C. §§ 1261–1278a.

⁶¹ *Id.* § 1261(f). The definition of a “hazardous substance” does not include pesticides, food, drugs, cosmetics, certain fuels, tobacco products, or nuclear materials regulated under separate statute. *Id.*

⁶² *Id.* § 1261(g), 1262.

⁶³ *Id.* § 1263.

substance intended for household use is “misbranded” if its label fails to disclose certain information, including, but not limited to, the common name or the chemical name of the substance, warnings and cautionary signal words,⁶⁴ a statement of its primary hazard,⁶⁵ first aid treatment and storage instructions, and adequate instructions to protect children.⁶⁶ In addition, the FHSA grants the CPSC authority to ban a hazardous substance intended for household use if the labeling requirements are inadequate to protect public health or if the substance presents an imminent hazard.⁶⁷ Nevertheless, the extensive formal rule-making and notice procedures required by the FHSA limit the scope of the CPSC’s actual enforcement.⁶⁸

B. The Food and Drug Administration

Although the CPSC has primary regulatory authority over consumer products, the Food and Drug Administration (“FDA”) also promulgates labeling requirements for regulated consumer products.⁶⁹ The Food, Drug, and Cosmetic Act (“FD&C Act”)⁷⁰ prohibits the sale of any “misbranded” food, drug, device, tobacco product, or cosmetic and establishes labeling standards for each.⁷¹ The FD&C Act’s scope does not reach all household chemicals, but many of the products it does include directly expose humans to potentially hazardous chemicals.⁷² In addition, the FD&C Act, unlike the CPSA, does not require a finding of hazardousness before the FDA can regulate the product.⁷³

⁶⁴ *Id.* § 1261(p). Signal words include: “‘DANGER’ on substances which are extremely flammable, corrosive, or highly toxic [and] ‘WARNING’ or ‘CAUTION’ on all other hazardous substances” *Id.*

⁶⁵ *Id.* An affirmative statement of the substances’ primary hazard may include: “‘Flammable,’ ‘Combustible,’ ‘Vapor Harmful,’ ‘Causes Burns,’ ‘Absorbed Through Skin,’ or similar wording descriptive of the hazard.” *Id.*

⁶⁶ 15 U.S.C. § 1261(p) (2012).

⁶⁷ *See id.* § 1261(q). A banned hazardous substance is defined as a product intended for use by children or in the home that must be kept out of interstate commerce in order to protect the health and safety of the public. *Id.* If the product creates an imminent danger, it will be banned. *Id.* In order to ban a hazardous substance the Consumer Product Safety Commission (“CPSC”) must publish notice of the proposed ban in the Federal Register. *Id.* § 1262(f).

⁶⁸ Gillett, *supra* note 8, at 289 (summarizing consumer product labeling laws under the command-and-control framework); Rachael Rawlins, *Teething on Toxins: In Search of Regulatory Solutions for Toys and Cosmetics*, 20 *FORDHAM ENVTL. L. REV.* 1, 24–25 (2009) (discussing the procedural burdens of the Federal Hazardous Substances Act (“FHSA”). The CPSC must promulgate a rule in order to declare a substance a “hazardous substance” and must publish a proposed rule in the Federal Register in order to ban a substance. 15 U.S.C. § 1262.

⁶⁹ 21 U.S.C. § 393 (2012).

⁷⁰ *Id.* §§ 301–399f.

⁷¹ *Id.* § 331(a).

⁷² *See* Gillett, *supra* note 8, at 292 (discussing chemicals found in both household products and cosmetics).

⁷³ *See* 21 U.S.C. § 362; Gillett, *supra* note 8, at 293.

For example, cosmetics—substances intended to be applied to the human body—may be considered “misbranded” if the product’s label fails to state the name and place of business of the manufacturer, packer, or distributor and a statement of the product’s contents in terms of weight and count.⁷⁴ The FDA has promulgated further regulations that require the label list each ingredient from most prevalent to least, but specifically exempts certain ingredients like fragrances, flavors, and those protected as trade secrets.⁷⁵ In addition, a determination of whether or not a product’s label is “misleading” must account for representations made by the labeling and failures to reveal material facts in the light of such representations or use of the product.⁷⁶

C. The Environmental Protection Agency

The Environmental Protection Agency (EPA) also regulates toxic chemicals that may be used by consumers in the household.⁷⁷ The Toxic Substances Control Act (“TSCA”) primarily regulates chemicals at the pre-market stage, allowing EPA to require pre-manufacture notification of new chemicals,⁷⁸ set data collection and reporting requirements,⁷⁹ and establish production limitations.⁸⁰ Furthermore, the TSCA directs EPA to promulgate testing rules for new chemicals that it determines “may present an unreasonable risk of injury to health or the environment”⁸¹ Although the TSCA’s regulatory focus is primarily pre-manufacture, its broad scope includes many chemicals that are used in consumer products.⁸² The reporting data submitted to EPA by chemical manufacturers and importers is maintained in the TSCA Inventory, a public list of each “chemical substance that is manufactured or processed in the United States.”⁸³ Nevertheless, much of the data collected pursuant to the TSCA’s reporting requirements remains unavailable to the public due to confidentiality exceptions.⁸⁴ The TSCA’s

⁷⁴ 21 U.S.C. §§ 321, 362.

⁷⁵ 21 C.F.R. §§ 701.3, 720.8 (2015).

⁷⁶ 21 U.S.C. § 321.

⁷⁷ See 7 U.S.C. §§ 136–136y (2012); 15 U.S.C. §§ 2601–2629 (2012); 42 U.S.C. §§ 11001–11050 (2012).

⁷⁸ 15 U.S.C. § 2604(a)(1).

⁷⁹ *Id.* § 2607.

⁸⁰ *Id.* § 2605.

⁸¹ *Id.* § 2603. An unreasonable risk of injury to health is a “function of toxicity and exposure.” Chem. Mfrs. Ass’n v. U.S. Envtl. Prot. Agency, 859 F.2d 977, 988 (D.C. Cir. 1988). Thus, a testing rule is appropriate when “there is a more-than-theoretical basis for suspecting that some amount of exposure occurs and that the substance is sufficiently toxic at that exposure level” *Id.*

⁸² See 15 U.S.C. § 2601. The Toxic Substances Control Act broadly applies to chemicals in commerce. *Id.*

⁸³ *Id.* § 2607(b).

⁸⁴ See *id.* § 2613. Certain trade secret and other confidential information is not made public. *Id.* Health and safety data, however, are not subject to any disclosure prohibitions. *Id.*

provisions grant EPA broad authority to regulate the manufacture of toxic chemicals, but EPA must meet high evidentiary standards in order to take action, which has limited the scope of its enforcement.⁸⁵

EPA also has authority to regulate the labeling of household pesticides under the Federal Insecticide, Fungicide, and Rodenticide Act (“FIFRA”).⁸⁶ The FIFRA prohibits sale of unregistered or “misbranded” pesticides.⁸⁷ A pesticide will be considered “misbranded” if it does not have a label bearing an “ingredient statement,” a statement of the products use, the name and address of the producer, and the name or brand of the pesticide.⁸⁸ The “ingredient statement” must identify the name and percentage of each active ingredient and the total percentage of all inert ingredients in the pesticide.⁸⁹ In addition, certain pesticides that contain highly toxic chemicals must also bear labels with “skull and crossbones,” the word “poison,” and information for first aid treatment.⁹⁰

Additionally, through the Emergency Planning and Community Right-to-Know Act (“EPCRA”), EPA has issued regulations that mandate disclosure requirements for toxic chemicals.⁹¹ Subject to trade secret and other exemptions, the EPCRA requires companies to disclose release and transportation data for certain toxic chemicals.⁹² Companies must create annual reports for each listed chemical it uses or produces at or above threshold amounts.⁹³ EPA maintains this data in the Toxics Release Inventory (“TRI”)

⁸⁵ See Gillett, *supra* note 8, at 301. In order to promulgate a testing rule, Environmental Protection Agency (“EPA”) must first find that a substance constitutes an unreasonable risk to human health and the safety of the environment and that there is not enough data to determine the possible consequences of using the substance. 15 U.S.C. § 2603. The EPA must further determine that testing is necessary to determine the potential impact the substance could have on human health and the environment. *Id.*

⁸⁶ See 7 U.S.C. §§ 136–136y. A “pesticide” is “(1) any substance or mixture of substances intended for preventing, destroying, repelling, or mitigating any pest, (2) any substance or mixture of substances intended for use as a plant regulator, defoliant, or desiccant, and (3) any nitrogen stabilizer” *Id.* § 136.

⁸⁷ *Id.* § 136j(a).

⁸⁸ *Id.* § 136(q).

⁸⁹ *Id.* § 136(n).

⁹⁰ *Id.* § 136(q).

⁹¹ 42 U.S.C. §§ 11001–11050. The Emergency Planning and Community Right-to-Know Act has three primary functions: emergency planning, reporting, and enforcement. *Id.* §§ 11001–11005 (mandating emergency planning and notification requirements); *Id.* §§ 11021–11023 (mandating reporting requirements and creating the toxics release inventory); (mandating enforcement procedures and trade secret protection) *Id.* §§ 11041–11050.

⁹² 42 U.S.C. § 11023. A facility does not need to report the specific identify of a chemical substance on trade secret grounds if it discloses its generic class or category and explains to EPA the confidential nature of the substance. See *id.*

⁹³ *Id.* In general, facilities with ten or more employees that manufacture or produce more than 25,000 pounds or use more than 10,000 pounds of listed substances must file annual reports. *Id.* § 11023(f).

and the data is available to the public.⁹⁴ Further, the EPCRA's provisions provide for citizen enforcement, allowing citizens to sue companies that fail to provide the requisite information.⁹⁵

D. The Commonwealth of Massachusetts

In addition to the federal framework of statutes and regulations, Massachusetts also regulates toxic chemicals in consumer products.⁹⁶ Similar to the CPSA and the FHSA, the Massachusetts Hazardous Substance Labeling Law (“HSL”) prohibits the sale of a “misbranded package of a hazardous substance” and authorizes the Massachusetts Department of Public Health (“DPH”) to promulgate consumer product labeling standards and ban hazardous substances.⁹⁷ The HSL substantially incorporates the federal definitions of “misbranded hazardous substance” and “banned hazardous substance.”⁹⁸ Furthermore, under the HSL regulations, any product in violation of the FHSA will correspondingly be considered in violation of the HSL.⁹⁹ The HSL differs from the FHSA in that it does not require that interested parties be given an adjudicatory hearing prior to banning a hazardous substance.¹⁰⁰

III. INADEQUACY OF COMMAND-AND-CONTROL REGULATION OF MICROBEADS

Despite the pervasive command-and-control regulatory framework governing the use of toxics, the need for a national ban of microbeads highlights the failure of the existing regulatory framework and indicates that it was insufficient to protect human health and the environment from microbead pollu-

⁹⁴ *Id.* § 11023(j); *Toxics Release Inventory Program*, U.S. ENVTL. PROT. AGENCY (Mar. 24, 2017), <http://www.epa.gov/toxics-release-inventory-tri-program/tri-listed-chemicals> [https://perma.cc/9MEL-T37M].

⁹⁵ *See* 42 U.S.C. § 11046(a).

⁹⁶ *See* MASS. GEN. LAWS ch. 111F, §§ 1–21 (2015); MASS. GEN. LAWS ch. 94B, §§ 1–10 (2015).

⁹⁷ *See* 15 U.S.C. §§ 1261–1278a, 2051–2089 (2012); MASS. GEN. LAWS ch. 94B, §§ 1–3. The FHSA and the Hazardous Substances Labelling Law have nearly identical definitions of misbranded hazardous substance. *Compare* 15 U.S.C. § 2061(p) (focusing on a misbranded substance), *with* MASS. GEN. LAWS ch. 94B, § 1 (focusing on a misbranded “package” of a substance).

⁹⁸ *See* 15 U.S.C. § 2061; MASS. GEN. LAWS ch. 94B, § 1; THOMAS B. MERRITT, MASSACHUSETTS PRACTICE SERIES: CONSUMER LAW § 7:83 (3d ed. 2016) (“definitions of such terms as ‘hazardous substance,’ ‘banned hazardous substance,’ ‘toxic,’ and ‘flammable . . . are substantially identical to the federal definitions”).

⁹⁹ *See* 105 MASS. CODE REGS. 650.006 (2017) (incorporating the Federal Hazardous Substances Act); MERRITT, *supra* note 98 (“Under regulations issued by the Commissioner of Public Health, products found to be in violation of the Federal Hazardous Substances Act are deemed to be in violation of Massachusetts law also.”).

¹⁰⁰ *Borden, Inc. v. Comm’r of Pub. Health*, 448 N.E.2d 367, 374 (Mass. 1983).

tion.¹⁰¹ In general, this top-down pollution control approach presents a number of environmental, economic, and administrative drawbacks.¹⁰² Command-and-control regulation tends to focus on a single medium (i.e. water, air, or consumer products) and distinct environmental issues within that medium.¹⁰³ Environmental media, however, are rarely segmented and pollution from one area often impacts others.¹⁰⁴ As a result, the federal government's segmented approach fails to account for cross-media impacts, like the ability of microbead pollution to move from consumer products to water and into the human food chain.¹⁰⁵ In addition, the command-and-control approach utilizes fixed measures of pollution, rather than promoting flexible standards that can achieve actual reductions in pollution.¹⁰⁶ Moreover, the command-and-control approach is economically inefficient.¹⁰⁷ Regulated industries spend millions of dollars in compliance expenses, investing their money in pollution control technology, rather than making proactive investments in production process improvements that could significantly reduce the quantity of toxics produced.¹⁰⁸ In addition to these general inadequacies, microbeads present unique challenges that remain unaddressed by the existing command-and-control framework and the national ban.¹⁰⁹

A. Testing and Reporting Statutes—TSCA and EPCRA

Pursuant to the Toxic Substances Control Act (“TSCA”), the Environmental Protection Agency (EPA) collects data and promulgates testing and reporting rules for regulated chemicals.¹¹⁰ These chemicals are listed in the TSCA Inventory, a comprehensive list of all chemicals used in the United States.¹¹¹ The vast majority of microbead plastics are grandfathered into the TSCA Inventory and therefore are assumed to be safe until proven danger-

¹⁰¹ See NALBONE, *supra* note 4, at 1; Johnson, *supra* note 16, at 153–54.

¹⁰² See JOEL TICKNER & YVE TORRIE, LOWELL CTR. FOR SUSTAINABLE PROD., PRESUMPTION OF SAFETY: LIMITS OF FEDERAL POLICIES ON TOXIC SUBSTANCES IN CONSUMER PRODUCTS 1, 3–8 (2008), http://www.sustainableproduction.org/downloads/UMassLowellConsumerProductBrief21508_000.pdf [<https://perma.cc/PFE4-KVXC>]; NOVICK, *supra* note 10; Johnson, *supra* note 16, at 154–55.

¹⁰³ See Johnson, *supra* note 16, at 154.

¹⁰⁴ See *id.*

¹⁰⁵ See NALBONE, *supra* note 4, at 1; Johnson, *supra* note 16, at 154.

¹⁰⁶ See Johnson, *supra* note 16, at 154–55.

¹⁰⁷ See *id.* at 155.

¹⁰⁸ See *id.* at 154–55.

¹⁰⁹ See 21 U.S.C.A. § 331(ddd) (West Supp. 2016) (banning microbeads, but failing to provide for a cleanup method for already existing pollution); Eriksen et al., *supra* note 3, at 1 (indicating that 268,940 tons of plastic particles are floating in our waters); Johnson, *supra* note 16, at 154–55.

¹¹⁰ See 15 U.S.C. §§ 2603, 2605, 2607 (2012).

¹¹¹ See *id.* § 2607(b)(1); Gillett, *supra* note 8, at 300.

ous and can be used without limitations.¹¹² As a result, it is unlikely that many common microbead plastics have undergone EPA testing.¹¹³ Even if the plastics had not been grandfathered in, EPA testing under the TSCA would be unlikely to account for the full human health and environmental harms of microbeads because much of microbeads' toxicity results from post-use interactions with toxic chemicals in the environment.¹¹⁴

EPA also mandates reporting requirements under the EPCRA.¹¹⁵ Pursuant to the EPCRA, companies must report information to EPA regarding the release of toxic chemicals.¹¹⁶ Maintained in the Toxics Use Reduction Inventory ("TRI"), this data allows the government and the public to be aware of the extent to which toxic chemicals are entering the environment.¹¹⁷ This information, though, is limited and only applies to releases, rather than disclosing total amounts of the substance being used.¹¹⁸ In addition, the EPCRA release reporting generally does not include consumer products.¹¹⁹ Thus, EPCRA does not account for potentially hazardous substances released into the environment through household drains.¹²⁰ Moreover, because EPCRA only applies to hazardous substances, even if it applied to consumer products, it would fail to account for the release of microbeads into the environment because microbead plastics are not hazardous until they interact with toxic chemicals in post-use cycles.¹²¹

¹¹² See TICKNER & TORRIE, *supra* note 102, at 6; Gillett, *supra* note 8, at 299. Chemicals on the market prior to 1977, when the Toxic Substances Control Act ("TSCA") came into effect, comprise nearly all of the chemicals currently on the market; these chemicals were grandfathered in to the TSCA and do not need to be listed on the TSCA Inventory. TICKNER & TORRIE, *supra* note 102, at 6. Polyethylene, a common plastic used to make micro-beads, has been one of the most ubiquitous plastics since its invention more than seventy-five years ago. See *Plastic Microbeads: Ban The Bead!*, *supra* note 4; *Polyethylene: Discovered by Accident 75 Years Ago*, ICIS (May 12, 2008), <http://www.icis.com/resources/news/2008/05/12/9122447/polyethylene-discovered-by-accident-75-years-ago/> [<https://perma.cc/H7H5-GUNH>].

¹¹³ See TICKNER & TORRIE, *supra* note 102, at 6.

¹¹⁴ See 15 U.S.C. § 2603; NALBONE, *supra* note 4, at 1; Gillett, *supra* note 8, at 299.

¹¹⁵ 42 U.S.C. § 11023.

¹¹⁶ *Id.* Under the Emergency Planning Community Right-to-Know Act, a release is defined as "any spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment . . . of any hazardous chemical . . ." *Id.* § 11049(8).

¹¹⁷ *Id.*; Laden & Gray, *supra* note 16, at 221.

¹¹⁸ See 42 U.S.C. § 11023.

¹¹⁹ See *id.* §§ 11021(e)(3), 11023.

¹²⁰ See *id.* §§ 11021(e)(3), 11023 (stating that only covered owners and operators of a facility must file toxic chemical release forms); *Toxics Release Inventory Program*, *supra* note 94 (omitting polyethylene, a common microbead plastic).

¹²¹ See 42 U.S.C. § 11023; *Toxics Release Inventory Program*, *supra* note 94.

B. Labeling Statutes

The consumer product labeling laws—the Consumer Protection Safety Act (“CPSA”), the Federal Hazardous Substances Act (“FHSA”), the Federal Insecticide Fungicide Rodenticide Act (“FIFRA”), and the Food Drug and Cosmetic Act (“FD&C Act”)—also fail to provide consumers with adequate protections.¹²² The CPSA and the FHSA require that labels on consumer products containing toxic chemicals bear the name of the chemical and safety information.¹²³ Neither of these statutes, however, apply to microbeads.¹²⁴ The CPSA definition of a “consumer product” and the FHSA definition of a “hazardous substance” exempt products regulated by the FD&C Act.¹²⁵ The FD&C Act and the FIFRA go further, requiring that products bear labels containing a list of ingredients.¹²⁶ The FIFRA, however, exempts microbeads as inert ingredients.¹²⁷ As a result, under the FD&C Act, only the FDA has authority to regulate the labeling of microbeads in consumer products.¹²⁸

Ingredient labeling requirements are meant to inform consumers about the product’s contents, allowing them to make informed decisions.¹²⁹ Generally, though, providing ingredient information on a product’s label is insufficient to fully inform consumers of the health and environmental risks associated with certain products.¹³⁰ Listing the name of the microbead plastic on the product’s ingredient label does not put consumers on notice of the potential harms to human health and the environment that arise after the

¹²² See 7 U.S.C. §§ 136–136y (2012); 15 U.S.C. §§ 1261–1278a (2012); 15 U.S.C. §§ 2051–2089 (2012); 21 U.S.C. §§ 301–399f (2012); see also *infra* notes 123–128 and accompanying text (discussing the inadequacies of consumer product labeling laws).

¹²³ See 15 U.S.C. §§ 1261(p), 2056.

¹²⁴ *Id.* §§ 1261(p), 2052(5).

¹²⁵ *Id.* §§ 1261(p), 2052(5).

¹²⁶ See 7 U.S.C. § 136; 21 C.F.R. § 701.3 (2016).

¹²⁷ 40 C.F.R. § 152.25 (2015). An inert ingredient is “any substance (or group of similar substances) other than an active ingredient that is intentionally included in a pesticide product.” *Inert Ingredients Overview and Guidance*, U.S. ENVTL. PROT. AGENCY (Dec. 20, 2016), <https://www.epa.gov/pesticide-registration/inert-ingredients-overview-and-guidance> [<https://perma.cc/z8j9-vm8g>].

¹²⁸ See 21 U.S.C. § 362 (regulating cosmetics, which often contain microbeads); *supra* notes 110–127 and accompanying text (outlining the various consumer product labeling statutes).

¹²⁹ Gillett, *supra* note 8, at 338.

¹³⁰ See *id.* at 338–40. Exceptions for trade secrets and fragrances allow companies to hide the identity of certain chemicals that may be harmful to human health and the environment. See 21 C.F.R. §§ 701.3, 720.8; Robin E. Dodson et al., *Endocrine Disruptors and Asthma-Associated Chemicals in Consumer Products*, 120 ENVTL. HEALTH PERSPS. 935, 935 (2012); Gillett, *supra* note 8, at 339. Results from a study that independently tested the chemical compositions of several consumer products revealed that some chemicals whose identities had been masked as fragrances were actually endocrine disruptors. Dodson et al., *supra*, at 935. Furthermore, the same study also indicated that the chemicals listed on several products did not match the products’ actual chemical composition. See *id.*

product has been used.¹³¹ Moreover, consumers are unable to assess the full extent of microbead pollution by merely knowing a certain product contains microbeads.¹³² Accordingly, the ingredient labeling requirements of the FD&C Act are inadequate to protect human health and the environment from microbead pollution.¹³³

C. National Ban—Microbead-Free Waters Act

In response to the current legislation's failure to prevent microbead pollution, Congress enacted an additional command-and-control statute, the Microbead-Free Waters Act ("MWA"), which became law on December 28th, 2015.¹³⁴ The MWA amends the FD&C Act to prohibit the manufacture and sale of rinse-off cosmetics containing plastic microbeads.¹³⁵ Nevertheless, the microbead ban has a delayed effective date, allowing manufacturers to continue to produce and sell microbeads.¹³⁶ Moreover, because the ban does not mandate the removal of microbeads from oceans and rivers, it fails to address the extensive, already existing microbead pollution that will continue to absorb toxics and persist for decades.¹³⁷ Consequently, even with a national ban, the extensive command-and-control framework remains insufficient to prevent micro-bead pollution from harming human health and the environment.¹³⁸

IV. POLLUTION PREVENTION AND MICROBEADS

In contrast to the command-and-control framework, federal and state governments have recently begun implementing the pollution prevention regulatory approach.¹³⁹ Working in conjunction with the existing command-and-control framework and disclosure requirements, pollution prevention statutes can effectively reduce pollution and may diminish the need for additional

¹³¹ See NALBONE, *supra* note 4, at 1; Dodson et al., *supra* note 130, at 935.

¹³² See NALBONE, *supra* note 4, at 1; Eriksen et al., *supra* note 3.

¹³³ See NALBONE, *supra* note 4, at 1; Gillett, *supra* note 8, at 340.

¹³⁴ See Microbead-Free Waters Act, Pub. L. No. 114-114, 129 Stat. 3129 (2015) (codified as amended at 21 U.S.C.A. § 331(ddd)) (amending the Food, Drug, And Cosmetic Act to ban plastic microbeads in cosmetic products).

¹³⁵ See 21 U.S.C.A. § 331(ddd) (West Supp. 2016).

¹³⁶ See *id.* (banning manufacture of products with plastic microbeads after July 1, 2017 and banning sale of products with plastic microbeads after July 1, 2018).

¹³⁷ See *id.*; ROCHMAN ET AL., *supra* note 1, at 1; Dunagan et al., *supra* note 43, at 440; Eriksen et al., *supra* note 3, at 1. The Microbead-Free Waters Act merely bans future production of microbead products, but does not provide any means by which the existing pollution will be removed from oceans and rivers. See 21 U.S.C.A. § 331(ddd).

¹³⁸ See 21 U.S.C.A. § 331(ddd); NALBONE, *supra* note 4, at 1.

¹³⁹ Johnson, *supra* note 16, at 153; Laden & Gray, *supra* note 16, at 213.

command-and-control regulations.¹⁴⁰ Rather than attempting to manage and control pollution, pollution prevention statutes, like the federal Pollution Prevention Act (“PPA”) and the Massachusetts Toxics Use Reduction Act (“TURA”), focus on preventing pollution at its source through source reductions.¹⁴¹ In enacting the PPA, Congress found that, rather than waiting for a spill to occur, waste to be generated, or toxic chemicals to be produced and marketed to consumers, systematically reducing the use of toxics is “more desirable than waste management and pollution control.”¹⁴² Nevertheless, despite the effectiveness of the pollution prevention approach, however, neither the PPA nor the TURA apply to consumer products or microbeads.¹⁴³

A. *The Pollution Prevention Act of 1990*

Pollution prevention aims to reduce the risk of human exposure to toxic chemicals by reducing the overall use of toxics at the source.¹⁴⁴ Underlying the PPA is a national policy decision to target pollution before it becomes a problem.¹⁴⁵ In contrast with the command-and-control framework, which regulates waste after it has been created or remedies spills after they occur, reducing the overall amount of toxics in use efficiently minimizes the risk of human and environmental harm.¹⁴⁶ Under the PPA, source reductions are practices that reduce the quantity of pollutants entering a waste stream or released into the environment and any other practices that reduce hazards associated with the release of those harmful substances.¹⁴⁷

¹⁴⁰ See 42 U.S.C. §§ 13103, 13106 (2012); see Johnson, *supra* note 16, at 157, 181 (describing the benefits of pollution prevention); Laden & Gray, *supra* note 16, at 213 (describing how pollution prevention techniques effectively reduce the use of toxics); Robert W. Shavelson, *EPCRA, Citizen Suits and the Sixth Circuit’s Assault of the Public’s Right-to-Know*, Fall 1995, at 29, 29 (1995) (analyzing EPCRA and the effects of disseminating toxics usage information through reporting requirements).

¹⁴¹ See 42 U.S.C. §§ 13101–13109 (2012); MASS. GEN. LAWS ch. 21I, §§ 1–23 (2015); Johnson, *supra* note 16, at 153; Laden & Gray, *supra* note 16, at 213.

¹⁴² 42 U.S.C. § 13101(a); see Laden & Gray, *supra* note 16, at 218.

¹⁴³ See 42 U.S.C. § 13106 (indicating that the statute only applies to toxic chemicals); MASS. GEN. LAWS ch. 21I, § 2 (2015) (exempting consumer products from the definition of a “toxic or hazardous substance”).

¹⁴⁴ See 42 U.S.C. §§ 13101, 13103 (explaining that Environmental Protection Agency “single-medium program offices [have the] authority to review and advise such offices on their activities to promote a multi-media approach to source reduction”); Johnson, *supra* note 16, at 181 (explaining “pollution prevention will not eliminate the need for pollution control”).

¹⁴⁵ 42 U.S.C. § 13101 (declaring “pollution should be prevented or reduced at the source whenever feasible” and that such reduction offers “substantial savings in reduced raw material, pollution control, and liability costs as well as help protect the environment and reduce risks to worker health and safety”).

¹⁴⁶ See *id.* § 13101(a) (“Source reduction is fundamentally different and more desirable than waste management and pollution control.”).

¹⁴⁷ *Id.* § 13102(5).

The PPA directs EPA to implement a strategy to promote source reductions.¹⁴⁸ All facilities subject to Toxics Release Inventory (“TRI”) reporting requirements under the Emergency Planning and Community Right-to-Know Act (“EPCRA”) must report source reduction and recycling activity information for each TRI-listed chemical it uses or produces.¹⁴⁹ These source reduction reports must include the quantity of the chemicals produced and entering any the waste stream, the amount being recycled, the change from previous years, and a specific description of the source reduction practices and techniques being used.¹⁵⁰ To help companies comply with the PPA and to achieve pollution prevention goals, the EPA-managed Pollution Prevention Information Clearinghouse maintains publicly accessible reporting data, provides technical assistance to facilities, and conducts research.¹⁵¹ Despite the PPA’s broad scope, however, it does not apply to potentially harmful chemicals in consumer products.¹⁵²

B. *The Massachusetts Toxics Use Reduction Act of 1989*

Before Congress officially adopted pollution prevention as the national policy, Massachusetts enacted its own pollution prevention law a year earlier.¹⁵³ The first comprehensive pollution prevention law of its kind, the Toxics Use Reduction Act (“TURA”) combines the reporting requirements of the EPCRA and the source reduction approach of the PPA.¹⁵⁴ This synthesis of right-to-know concepts and pollution prevention planning, in combination with individualized administrative assistance from state government entities,

¹⁴⁸ *Id.* §§ 13103(b), 13106(a). Owners and operators of a facility required to file an annual report under EPCRA must also indicate source reduction and recycling information in that report. *Id.* § 13106(a).

¹⁴⁹ *Id.* §§ 13103(b), 13106(a).

¹⁵⁰ *Id.* § 13106(b).

¹⁵¹ See 42 U.S.C. § 13105 (2012); *Pollution Prevention Resources*, U.S. ENVTL. PROT. AGENCY (Jan. 21, 2016), <http://www.epa.gov/p2/pollution-prevention-resources#ppic> [<https://perma.cc/P37T-S6GA>].

¹⁵² See 42 U.S.C. § 11049. The Pollution Prevention Act only applies to toxic chemicals that fall under the Toxics Release Inventory (“TRI”) reporting requirements of the Emergency Planning and Community Right-to-know Act. See *id.* § 13106. Plastics used to make microbeads are not considered toxic so as to trigger TRI listing requirements. See *id.* § 11023; *Toxics Release Inventory Program*, *supra* note 94 (omitting polyethylene, a common microbead plastic, from the TRI list).

¹⁵³ See 42 U.S.C. § 13101 (2012); MASS. GEN. LAWS ch. 21I, §§ 1–23 (2015).

¹⁵⁴ See 2 ST. ENVTL. L. § 19:30; THE OFF. OF TECH. ASSISTANCE & TECH., *supra* note 18, at 4. Compare 42 U.S.C. § 11023 (mandating reporting requirements under the EPCRA), and *id.* §§ 13101, 13103, 13106 (establishing pollution prevention techniques and adopting pollution prevention policy), with MASS. GEN. LAWS ch. 21I, §§ 10, 11 (detailing the TURA’s reporting requirements and use reduction techniques).

allowed the TURA to achieve ambitious toxics use reduction goals.¹⁵⁵ The TURA defines toxics use reductions as in-plant changes in production processes or raw materials that reduce the use of hazardous substances in order to reduce risk to human health and the environment.¹⁵⁶

The TURA approach is grounded in the idea that the most efficient way to prevent toxic pollution is to reduce the overall amount of toxics in use.¹⁵⁷ This approach reflects a preference for the regulatory hierarchy of pollution prevention, which aims to prevent pollution at the source, recycle pollution that cannot be prevented, and treat pollution that cannot be prevented or recycled.¹⁵⁸ The TURA seeks to reduce the use of toxics through a dual-handed approach that combines mandatory reporting and planning with voluntary implementation.¹⁵⁹ Pursuant to the TURA's mandatory requirements, Massachusetts companies must prepare toxics use reduction plans, submit annual toxic and hazardous substance reports, and pay a fee for toxics usage and program funding.¹⁶⁰ Actually reducing the use of toxics by implementing reduction plans is not mandatory; companies need only make a good faith effort to reduce toxic use, and must report their reduction progress.¹⁶¹ As a result of extensive collaboration between industry and environmental groups, the TURA represents a balance of the public's right to be free from toxic contamination and businesses' right to seek profit in a free market enterprise.¹⁶²

1. Administration

In order to implement the TURA, four new government entities were created: the Toxics Use Reduction Institute ("TURI"); the Office of Technical Assistance ("OTA"); an enforcement office in the Department of Environmental Protection ("DEP"); and an Advisory Council in the Executive Office of Environmental Affairs.¹⁶³ These entities are funded by the fees companies pay to be able to use toxics.¹⁶⁴

¹⁵⁵ See MASS. GEN. LAWS ch. 21I, §§ 10, 11, 13. The goal of the Toxics Use Reduction Act ("TURA") was to reduce the use of toxics in Massachusetts by fifty percent within ten years. *Id.* § 13. Reported data indicates, that as of 2013, the TURA has resulted in a forty-eight percent decrease in toxic chemical use. See *Results to Date*, *supra* note 18.

¹⁵⁶ MASS. GEN. LAWS ch. 21I, § 2.

¹⁵⁷ See Laden & Gray, *supra* note 16, at 213, 214.

¹⁵⁸ See 42 U.S.C. § 13101(b). Under this model, release of pollutants into the environment is the last resort. *Id.*

¹⁵⁹ See MASS. GEN. LAWS ch. 21I, §§ 10, 11; Laden & Gray, *supra* note 16, at 216.

¹⁶⁰ MASS. GEN. LAWS ch. 21I, §§ 10, 11, 19(c).

¹⁶¹ See *id.* §§ 10, 11; Laden & Gray, *supra* note 16, at 216.

¹⁶² See THE OFF. OF TECH. ASSISTANCE & TECH., *supra* note 18, at 4 (2015); Email from Rick Reibstein, Lecturer, Env'tl. L. and Pol'y, B.U. & Harv. Extension & Summer Sch. to author (Oct. 8, 2015, 9:31 AM EST) (on file with author).

¹⁶³ See MASS. GEN. LAWS ch. 21I, §§ 3, 4, 6, 7.

¹⁶⁴ *Id.* § 19(c).

The TURI is an educational, research, and policy institute that performs research and offers information on how to reduce the use of toxics and prevent pollution.¹⁶⁵ Located at the University of Massachusetts-Lowell, the TURI is responsible for (1) conducting evaluations of toxics use reduction progress, (2) educating Toxics Use Reduction Planners (“TURPs”), (3) collecting and managing toxics use data from company reports, (4) providing technical support to community businesses and organizations, and (5) re-searching new toxics use reduction methodologies and technologies.¹⁶⁶ This information is used to measure the reductions achieved and to help facilities implement reduction techniques.¹⁶⁷

The OTA is a non-regulatory agency that provides individualized, on-site assistance to toxics users and advises companies on how to reduce their use of toxics.¹⁶⁸ Importantly, the assistance provided by the OTA is confidential and free, thus incentivizing companies to seek assistance.¹⁶⁹ The OTA’s trained engineers use their expertise to help companies complete plans for toxic use reduction and assist them in identifying toxic use reduction solutions.¹⁷⁰ The broad scope of the OTA’s authority allows its officers to offer tailored advice to companies that want to reduce their use of toxics.¹⁷¹ The OTA’s officers help companies reduce use of toxics by identifying inefficiencies in their manufacturing, production, and use processes, suggesting non-toxic alternatives, and applying new technologies.¹⁷²

The enforcement office in the DEP is responsible for ensuring compliance with the mandatory reporting and planning provisions of the TURA.¹⁷³ The DEP inspectors respond to petitions from Massachusetts residents that wish to review a company’s use reduction plans and ensure that companies

¹⁶⁵ See *id.* § 6; *The Toxics Use Reduction Institute*, THE EXEC. OFF. OF ENERGY & ENVTL. AFF., <http://www.mass.gov/eea/waste-mgmt-recycling/toxics/toxic-use-reduction/toxics-use-reduction-institute/> [<https://perma.cc/2QSU-MDBB>]; *About, TOXICS USE REDUCTION INST.*, <http://www.turi.org/About> [<https://perma.cc/CG84-ST3F>].

¹⁶⁶ See MASS. GEN. LAWS ch. 21I, § 6; *About, supra* note 165.

¹⁶⁷ See MASS. GEN. LAWS ch. 21I, § 6; *About, supra* note 165.

¹⁶⁸ See MASS. GEN. LAWS ch. 21I, § 7; *Office of Technical Assistance and Technology*, THE EXEC. OFF. OF ENERGY & ENVTL. AFF., <http://www.mass.gov/eea/grants-and-tech-assistance/guidance-technical-assistance/agencies-and-divisions/ota/> [<https://perma.cc/Y2XB-CXW4>].

¹⁶⁹ See MASS. GEN. LAWS ch. 21I, § 7; *Office of Technical Assistance and Technology, supra* note 168.

¹⁷⁰ See MASS. GEN. LAWS ch. 21I, § 7 (2015); *Office of Technical Assistance and Technology, supra* note 168.

¹⁷¹ See MASS. GEN. LAWS ch. 21I, § 7; *Office of Technical Assistance and Technology, supra* note 168.

¹⁷² See MASS. GEN. LAWS ch. 21I, § 7; *Office of Technical Assistance and Technology, supra* note 168.

¹⁷³ *Toxics Use Reduction Act (TURA) Program Overview*, THE EXEC. OFF. OF ENERGY & ENVTL. AFF., <http://www.mass.gov/eea/agencies/massdep/toxics/tur/toxics-use-reduction-act-tura-program-overview.html> [<https://perma.cc/WV43-KCEQ>].

satisfy each element of their toxic use reduction plans.¹⁷⁴ The TURA Administrative Council, located in the Executive Office of Environmental Affairs, is the governing body responsible for program policy oversight.¹⁷⁵ The Administrative Council determines whether or not to list or de-list chemicals, maintains a the chemical reporting list, designates higher and lower hazard substances, and sets reporting fees.¹⁷⁶

2. Reporting and Planning Requirements

In order for TURA's mandatory toxics usage reporting and use reduction planning requirements to apply to a company, the company must be a "large quantity toxic user" that manufactures, produces, or otherwise uses a "toxic or hazardous substance" at a facility.¹⁷⁷ The definitions of "Large quantity toxics user"¹⁷⁸ and "Toxic or hazardous substance,"¹⁷⁹ are based on threshold quantities and chemical listings and correspond with the standards set out pursuant to the EPCRA.¹⁸⁰ Accordingly, the TURA substantially incorporates the EPCRA.¹⁸¹

¹⁷⁴ MASS. GEN. LAWS ch. 21I, § 18(b) ("Any ten residents living within ten miles of a facility required to prepare a toxics use reduction plan may petition the department for the department to examine the plan, the plan summary and any required back up data and determine their adequacy."); *Toxics Use Reduction Act (TURA) Program Overview*, *supra* note 173 (describing the DEP's review of toxics use reduction plans).

¹⁷⁵ See MASS. GEN. LAWS ch. 21I, § 4; *The Administrative Council on Toxics Use Reduction*, THE EXEC. OFF. OF ENERGY & ENVTL. AFF., <http://www.mass.gov/eea/grants-and-tech-assistance/guidance-technical-assistance/agencies-and-divisions/ota/business-assistance/administrative-council-on-toxics-use-reduction.html> [<https://perma.cc/63YW-W8A5>].

¹⁷⁶ MASS. GEN. LAWS ch. 21I, §§ 2, 4, 9A (2015); *The Administrative Council on Toxics Use Reduction*, *supra* note 175. Designation of a chemical as either a "lower" or "higher" hazardous substance, reduces or increases, respectively, the threshold amount at which companies will have to report and create use reduction plans for the substance. MASS. GEN. LAWS ch. 21I, §§ 2, 9A.

¹⁷⁷ See MASS. GEN. LAWS ch. 21I, § 10 ("Each large quantity toxics user shall provide to the department for each facility an annual report for each toxic or hazardous substance manufactured, processed, or otherwise used at that facility in amounts equal to or exceeding the applicable threshold amounts."); *id.* § 11 ("Large quantity toxics users shall . . . prepare and complete a toxics use reduction plan for each facility for which they are required to file a report in that year.").

¹⁷⁸ *Id.* § 2. A "Large quantity toxic[s] user" is "any toxics user who manufactures, processes or otherwise uses" toxic or hazardous substances in an amount that is the same as or greater than the applicable threshold. *Id.* The threshold amount for producers and manufacturers of toxic substances is twenty five thousand pounds per year or one thousand pounds per year for a higher hazard substance. *Id.* § 9A. For toxics users that otherwise use a toxic or hazardous substance, the threshold amount is ten thousand pounds per year or one thousand pounds per year for a higher hazard substance. *Id.*

¹⁷⁹ *Id.* § 2. A Toxic or hazardous substance, subject to certain exceptions, is statutorily defined as "a substance in a gaseous, liquid, solid or other form which is identified on the toxic or hazardous substance list established pursuant to section 9 . . ." *Id.*

¹⁸⁰ See 42 U.S.C. § 11023 (2012) (establishing a toxic chemical list pursuant to the EPCRA); MASS. GEN. LAWS ch. 21I, § 9 (establishing the TURA toxic substance list based on federal designations); MASS. GEN. LAWS ch. 21I, § 9A (establishing the threshold amounts within the state

Pursuant to the TURA's reporting requirements, companies subject to the TURA must provide the DEP with an annual report that identifies each toxic that is used by the company during the year.¹⁸² Each report must comply with the reporting regulations and procedures of the EPCRA and include the total quantities of toxics used in each production process, the reduction of toxic byproducts and emissions, and the various techniques used to achieve the reductions.¹⁸³ Under the EPCRA, facilities are only required to disclose information about the *release* of toxic chemicals; TURA goes further and requires companies to disclose their total quantities of *toxics usage*.¹⁸⁴ The reported data is available to the public on the TURA website and is sortable by community, company, chemical, and the identification number assigned to each chemical.¹⁸⁵ As a result, the TURA reporting database offers greater transparency regarding the use of toxics in Massachusetts, thereby subjecting companies to increased public scrutiny.¹⁸⁶

Pursuant to the TURA's mandatory use reduction planning requirements, companies covered by the TURA must prepare bi-annual toxics use reduction plans for each facility that they operate, detailing how the company plans to implement reduction techniques.¹⁸⁷ These techniques include

relative to the federal threshold amount); 40 C.F.R. § 370.10 (2015) (establishing a federal threshold level of ten thousand pounds).

¹⁸¹ See 42 U.S.C. § 11023; MASS. GEN. LAWS ch. 21I, § 9; 40 C.F.R. § 370.10.

¹⁸² See MASS. GEN. LAWS ch. 21I, § 10; *Frequently Asked Questions About TURA, TOXICS USE REDUCTION INST.*, <http://turadata.turi.org/WhatIsTURA/FAQ.html> [<https://perma.cc/HYQ3-FVAG>].

¹⁸³ See MASS. GEN. LAWS ch. 21I, § 10; *Frequently Asked Questions About TURA*, *supra* note 182.

¹⁸⁴ See 42 U.S.C. §§ 11023, 11049 (defining release of as hazardous substance as as “spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment”); MASS. GEN. LAWS ch. 21I, § 10(B) (detailing the information that must be included in the report including the total quantity of toxics in use at a facility). Each report must include:

The information required to be submitted under regulations promulgated pursuant to section 313 of [Emergency Planning Community Right-to-Know Act] The quantities of the toxic or hazardous substance at the facility which are: manufactured; processed; otherwise used; generated as byproduct prior to any handling, transfer, treatment or release; and shipped as or in product from the facility.

MASS. GEN. LAWS ch. 21I, § 10(B).

¹⁸⁵ See *TURA Reports, TOXICS USE REDUCTION INST.*, <http://turadata.turi.org/report.php> [<https://perma.cc/96YA-78D6>]. As a result, residents can use the TURA data to make informed decisions regarding where to live and what companies to use. See *id.*

¹⁸⁶ See 42 U.S.C. § 11023; MASS. GEN. LAWS ch. 21I, § 10; Laden & Gray, *supra* note 16, at 221.

¹⁸⁷ See MASS. GEN. LAWS ch. 21I, § 11 (2015); *Frequently Asked Questions About TURA*, *supra* note 182. Toxics use reduction techniques include:

1. Input substitution, which refers to replacing a toxic or hazardous substance or raw material used in a production unit with a non-toxic or less toxic substance;
2. Prod-

substituting toxic chemical inputs for non-toxic alternatives, reformatting a product to make the end result less toxic, replacing existing production equipment with less hazardous and more efficient technologies, and implementing recycling processes.¹⁸⁸ Each plan must include a statement of facility-wide management policies for toxics use reductions; goals for two-and five-year reductions; a description of scope and objectives; a technical and economic evaluation of technologies and procedures for potential reductions; an analysis of current and projected toxic use, byproduct generation, and emissions; an identification and feasibility analysis of various types of technologies, procedures, or training programs; and a schedule for implementation for each technology, procedure, and training program.¹⁸⁹ In addition, a TURP must certify each plan.¹⁹⁰ TURPs are toxics use reduction experts and consultants, educated by the TURI.¹⁹¹ TURPs are either employed internally, providing in-house assistance to regulated businesses, or as external consultants.¹⁹² As a result, the TURA has created a body of toxics use reduction experts within the businesses regulated by the TURA.¹⁹³

3. Implementation

Although the TURA mandates planning and reporting requirements, it does not actually require companies covered by the TURA to reduce their

uct reformulation, which refers to substituting for an existing end-product an end-product which is non-toxic or less toxic upon use, release or disposal; 3. Production unit redesign or modification, which refers to developing and using production units of a different design than those currently used; 4. Production unit modernization, which refers to upgrading or replacing existing production unit equipment and methods with other equipment and methods based on the same production unit; 5. Improved operation and maintenance of production unit equipment and methods which refers to modifying or adding to existing equipment or methods including, but not limited to, such techniques as improved housekeeping practices, system adjustments, product and process inspections, or production unit control equipment or methods; or 6. Recycling, reuse, or extended use of toxics by using equipment or methods which become an integral part of the production unit of concern, including but not limited to filtration and other closed loop methods.

MASS. GEN. LAWS ch. 21I, § 2.

¹⁸⁸ MASS. GEN. LAWS ch. 21I, § 11; *Frequently Asked Questions About TURA*, *supra* note 182.

¹⁸⁹ MASS. GEN. LAWS ch. 21I, § 11.

¹⁹⁰ *Id.* § 12.

¹⁹¹ *Id.*

¹⁹² *Id.*

¹⁹³ *Id.*

use of toxics by any amount.¹⁹⁴ Nevertheless, the TURA has successfully achieved significant reductions in the use of toxics in Massachusetts.¹⁹⁵

Despite the TURA's voluntary nature, many Massachusetts companies choose to implement toxics use reduction techniques.¹⁹⁶ Economic and societal incentives, backed by educational programs and governmental assistance, are the primary drivers of expanding toxics use reduction participation.¹⁹⁷ Companies that reduce their use of toxics can save money in regulatory compliance fees by minimizing waste disposal, treatment, and transportation costs.¹⁹⁸ With the assistance of the OTA, companies can effectively reduce overall production costs by identifying process inefficiencies and alternatives.¹⁹⁹ In addition, by reducing the overall amount of toxic chemicals used at their facilities, companies can effectively reduce liability that could result from spills and other workplace accidents.²⁰⁰ Moreover, the public nature of the toxics use data gives residents a complete picture of local toxics usage.²⁰¹ This information allows residents to make informed decisions regarding the companies they support and the towns they live in.²⁰² As a result, companies that reduce the risk of human and environmental harm from toxics exposure may experience increased customer loyalty, happier employees, and business goodwill.²⁰³ Thus, the success of the TU-

¹⁹⁴ *Id.* § 11; Laden & Gray, *supra* note 16, at 216; *Toxics Use Reduction Act (TURA) Program Overview*, *supra* note 173.

¹⁹⁵ *See Results to Date*, *supra* note 18 (detailing the overall level of reduction achieved to date).

¹⁹⁶ *See id.*

¹⁹⁷ *See id.* (detailing level of overall reduction achieved to date).

¹⁹⁸ *See TOXICS USE REDUCTION INST., AUTO BODY SHOP SAVES MONEY BY ELIMINATING SOLVENT 1, 2* (2008), <http://www.mass.gov/eea/docs/eea/ota/912-auto-center-case-study.pdf> [[https://perma.cc/WRJ2-2N3V](https://perma.cc WRJ2-2N3V)] (describing one company's elimination of compliance fees for shipping and disposing hazardous waste due to its successful implementation of the TURA).

¹⁹⁹ *See MASS. GEN. LAWS* ch. 21I, § 2 (2015).

²⁰⁰ *See* 42 U.S.C. § 13101(a)(2) (2012) (stating that changes in production and operation "offer industry substantial savings in reduced raw material, pollution control, and liability costs").

²⁰¹ *See TURA Reports*, *supra* note 185.

²⁰² *See id.* The public can view the data and see the amount of toxic chemicals being used and released by companies or in communities. *Id.*

²⁰³ *See BROCK BIRKENFELD ET AL., INT'L SOC'Y OF SUSTAINABILITY PROF., QUANTIFYING THE HIDDEN BENEFITS OF HIGH-PERFORMANCE BUILDING 4-5* (2011), <https://www.sustainabilityprofessionals.org/system/files/Valuing%20Green%20Building.pdf> [<https://perma.cc/HD5X-VB7C>] (stating that green building can result in the creation business goodwill and brand equity); Sheila Bonini, *The Business of Sustainability: McKinsey Global Survey Results*, MCKINSEY & CO., <http://www.mckinsey.com/business-functions/sustainability-and-resource-productivity/our-insights/the-business-of-sustainability-mckinsey-global-survey-results> [<https://perma.cc/N7G2-H9M9>] (indicating that developing green products can help companies retain and motivate employees and contribute to long-term value creation); Mark Whitman, *Intangible Assets, Sustainability and Value Creation*, SUSTAINABLE BUS. TOOLKIT, <http://www.sustainablebusiness toolkit.com/intangible-assets-sustainability-and-value-creation/> [<https://perma.cc/QC8L-P4DY>] (stating that human capi-

RA's voluntary approach reflects the legislation's basic assumption that a lack of information is the greatest obstacle to pollution prevention.²⁰⁴ Therefore, when feasible alternatives exist, companies will choose to implement non-toxic substitutions.²⁰⁵

4. Substantial Toxics Use Reductions Achieved

912 Auto Center, a Massachusetts auto body shop, is subject to the TURA's mandatory reporting and planning requirements.²⁰⁶ When 912 Auto Body moved from Mattapan to Dorchester, it decided to attempt to become more environmentally friendly.²⁰⁷ Previously, 912 Auto Center struggled with the use and disposal of highly toxic solvents used in its car cleaning process.²⁰⁸ With assistance from the Boston Public Health Commission, 912 Auto Center was able to reduce overall operational costs, create a more pleasant working environment, and streamline one of its primary business processes.²⁰⁹

For example, 912 Auto Center replaced its solvent-based car painting system with a new water-based system.²¹⁰ This conversion eliminated the use of toxic chemicals that created safety hazards, such as flammability and high aquatic toxicity, and posed health risks, such as neurological toxicity, eye and skin irritation, endocrine disruption, and carcinogenicity.²¹¹ As a result, 912 Auto Center minimized its risk of causing environmental harm and created a safer workplace for its employees.²¹² Moreover, the new water-based system resulted in an annual savings of nearly three thousand five hundred dollars due to reduced material costs and costs associated with toxic waste disposal compliance.²¹³ In addition, because the water-based system "performed better" and was "easier to use," 912 Auto Center experienced increased productivity.²¹⁴

The Brittany Dyeing and Printing Corporation ("Brittany") is another example of a Massachusetts company that successfully implemented toxics

tal, relationship capital, and brand capital are intangible assets that can be obtained by implementing sustainable business practices).

²⁰⁴ See Johnson, *supra* note 16, at 192 ("[the] greatest obstacle to pollution prevention is the lack of adequate information about pollution prevention opportunities").

²⁰⁵ *Id.* (TURA's planning requirements may be "sufficient to achieve the congressional goal of encouraging widespread pollution prevention").

²⁰⁶ See TOXICS USE REDUCTION INST., *supra* note 198, at 1–2.

²⁰⁷ *Id.*

²⁰⁸ *Id.*

²⁰⁹ *Id.*

²¹⁰ *Id.*

²¹¹ *Id.*

²¹² *Id.*

²¹³ *Id.*

²¹⁴ *Id.*

use reduction techniques pursuant to the TURA.²¹⁵ Brittany is a fabric printing, dyeing, finishing, and rotary screen engraving company, located in Bedford, Massachusetts.²¹⁶ By implementing toxics use reduction techniques, Brittany achieved savings on energy costs, reductions in waste production, and increases in overall productivity.²¹⁷ With the assistance of a four hundred twenty five thousand dollar grant from the United States Department of Energy, the company successfully implemented a new technology that substituted air for water in its fabric finishing process.²¹⁸ As a result of this change, Brittany expected to reduce overall energy consumption and air emissions by over sixty percent, increase production capability by over one-hundred percent, reduce wastewater discharge by approximately eighty percent, and cut overall water use by sixty-five percent.²¹⁹ These changes not only served the environment, but they also contributed to an annual savings of one hundred fifty thousand dollars.²²⁰

912 Auto Center and Brittany are just two examples of the many companies that adopted pollution prevention strategies by implementing toxics use reduction techniques pursuant to the TURA.²²¹ Their success stories are representative of the economic and environmental benefits that can be obtained through the TURA.²²² Since 1990, the TURA has resulted in a forty-eight percent decrease in toxics usage across Massachusetts.²²³ In addition, companies are generating seventy-seven percent less byproduct and waste per unit of product and have reduced releases of TRI chemicals by ninety-one percent.²²⁴ Nevertheless, the TURA's definition of "toxic or hazardous substance" exempts consumer products and, therefore, does not apply to products containing microbeads.²²⁵

²¹⁵ OFF. OF TECH. ASSISTANCE, THE EXEC. OFF. OF ENVTL. AFF., CASE STUDY NO. 51: TOXICS USE REDUCTION CASE STUDY: BRITTANY DYEING AND PRINTING IMPLEMENTS INNOVATIVE TEXTILE FINISHING PROCESS THAT SAVES ENERGY, INCREASES PRODUCTIVITY, AND REDUCES WASTE 1 (1999), <http://www.mass.gov/eea/docs/eea/ota/case-studies/brittany-dyeing-and-printing-case-study.pdf> [https://perma.cc/HW3R-MP2X].

²¹⁶ *Id.*

²¹⁷ *Id.*

²¹⁸ *Id.*

²¹⁹ *Id.*

²²⁰ *Id.*

²²¹ *Id.*; Case Studies, TOXICS USE REDUCTION INST., http://www.turi.org/TURI_Publications/Case_Studies [https://perma.cc/J6XQ-CL2V]. Over 1300 Massachusetts companies have participated since 1990. *Results to Date*, *supra* note 18.

²²² OFF. OF TECH. ASSISTANCE, *supra* note 215, at 1; TOXICS USE REDUCTION INST., *supra* note 198, at 1.

²²³ *Results to Date*, *supra* note 18.

²²⁴ *Id.*

²²⁵ MASS. GEN. LAWS ch. 21I, § 2 (2015); Dunagan et al., *supra* note 43, at 439; Dodson et al., *supra* note 130, at 935.

V. APPLYING THE TOXICS USE REDUCTION ACT TO MICROBEADS

The current command-and-control legislative framework failed to protect human health and the environment from microbead pollution because it focuses on back-end, single-medium regulation.²²⁶ In contrast, microbead pollution requires a multi-media, flexible approach due to the attenuated connection between microbeads entering the environment through consumer products, their subsequent absorption of toxic chemicals in the environment, and the eventual transfer of those toxic chemicals from aquatic organisms to humans through consumption.²²⁷ Moreover, the decision to ban microbeads highlights the severity of their harmful effects, while at the same time exhibiting a continued preference for the same type of command-and-control regulation that failed to prevent microbead pollution in the first place.²²⁸ Although the national ban will prevent additional microbeads from entering the environment, the ability of plastics to persist in the environment means that already existing microbead pollution poses an unaddressed and continued threat.²²⁹

Pollution prevention statutes, like the Toxics Use Reduction Act (“TURA”), could have better addressed microbead and other multidimensional types of pollution because, rather than trying to control a single medium of pollution, pollution prevention statutes encourage companies to implement multi-media, environmentally conscious changes.²³⁰ The TURA’s pollution prevention approach, which has successfully reduced the use of toxics in Massachusetts, is a powerful legislative tool.²³¹ The legislation, however, falls short because it does not apply to consumer products or microbeads.²³² If the TURA had included microbeads, its unique approach could have prevented microbead pollution before it occurred.²³³ In addition, the TURA could have minimized the need for a national ban and diminished the continued threat of future exposure to already existing microbead pollution.²³⁴

If the TURA’s release reporting requirements had applied to microbeads, consumers may have voluntarily chosen to avoid using microbead-containing products.²³⁵ The labeling requirements of the command-and-control frame-

²²⁶ See NALBONE, *supra* note 4, at 1

²²⁷ *See id.*

²²⁸ See 21 U.S.C.A. § 331(ddd) (West Supp. 2016); ROCHMAN ET AL., *supra* note 1, at 1.

²²⁹ See 21 U.S.C.A. § 331(ddd); Eriksen et al., *supra* note 3, at 1.

²³⁰ See Driesen, *supra* note 11, at 296; Laden & Gray, *supra* note 16, at 213.

²³¹ *TURA Reports*, *supra* note 185.

²³² See MASS. GEN. LAWS ch. 21I, §§ 2, 10, 11; *TURA Reports*, *supra* note 185.

²³³ See MASS. GEN. LAWS ch. 21I, §§ 2, 10, 11; Johnson, *supra* note 16, at 157.

²³⁴ See 21 U.S.C.A. § 331(ddd); MASS. GEN. LAWS ch. 21I, §§ 10, 11; Eriksen et al., *supra* note 3, at 1.

²³⁵ Norm Borin et al., *Consumer Effects of Environmental Impact in Product Labeling*, 28 J. OF CONSUMER MARKETING 76, 76–79 (2011); Ulf J. J. Hahnel et al., *The Power of Putting a*

work combined with the TURA's use and release data could have fully depicted the ubiquitous nature of microbead pollution and allowed the public to make a more informed decision regarding which consumer products to use.²³⁶ The existing labeling regulations require microbead-containing consumer products to list microbead plastics as an ingredient, but no regulations mandate reporting when and in what quantity these plastics enter the environment.²³⁷ If microbeads were included under the TURA's reporting requirements, the public could instead search the online database that tracks toxics to see the total amounts of microbeads being used and released into the environment by individual companies.²³⁸ By making public the extent of microbead pollution while also identifying the products that contain microbeads, this combined disclosure could have resulted in greater consumer awareness of the human health and environmental consequences of microbead pollution.²³⁹ Thus, because microbeads primarily enter the environment through consumer products, more fully informed consumers could have better prevented microbead pollution by avoiding microbead-containing products.²⁴⁰

If the TURA's toxics use reduction planning requirements had applied to microbeads, companies may have voluntarily removed microbeads from their products.²⁴¹ Plastic microbeads, when acting as exfoliates, are non-essential ingredients in many cosmetic products.²⁴² Alternative, non-harmful, biodegradable items, such as oatmeal, sea salt, almonds, and apricot pits, have similar abrasive properties and could replace plastic microbeads.²⁴³ Under the TURA, Massachusetts companies could have leveraged generous funding from federal and state grants, assistance from the Office of Technical Assistance ("OTA"), and educational information from the Toxics Use Reduction Institute ("TURI") to identify additional cost effective microbead alternatives and implement change.²⁴⁴ Therefore, by forcing companies to make a good

Label on It: Green Labels Weigh Heavier Than Contradicting Product Information for Consumers' Purchase Decisions and Post-Purchase Behavior, 6 FRONTIERS IN PSYCHOL. 1392, 1392–95 (2015).

²³⁶ See MASS. GEN. LAWS ch. 21I, § 10; Gillett, *supra* note 8, at 286–305; *TURA Reports*, *supra* note 185.

²³⁷ See 15 U.S.C. §§ 1261(p), 2056 (2012).

²³⁸ See MASS. GEN. LAWS ch. 21I, § 10; *TURA Reports*, *supra* note 185.

²³⁹ See MASS. GEN. LAWS ch. 21I, § 10; Gillett, *supra* note 8, at 338; *supra* notes 122–133 and accompanying text.

²⁴⁰ See ROCHMAN ET AL., *supra* note 1, at 1; Hahnel et al., *supra* note 235, at 1392.

²⁴¹ See MASS. GEN. LAWS ch. 21I, §§ 2, 11; TOXICS USE REDUCTION INST., *supra* note 198, at 1–2.

²⁴² NALBONE, *supra* note 4, at 1, 6.

²⁴³ See *id.*; Saiyid, *supra* note 30.

²⁴⁴ See MASS. GEN. LAWS ch. 21I, §§ 6, 7 (describing the functions of the TURI and the OTA); OFF. OF TECH. ASSISTANCE, *supra* note 215, at 1 (discussing a company's successful implementation of toxics use reduction techniques facilitated by a federal grant); *About*, *supra* note

faith effort to reduce their use of toxics, while also providing funding and planning assistance, the TURA could have resulted in companies voluntarily choosing to remove microbeads due to the availability of less harmful alternatives and the potential for increased customer value resulting from a more environmentally friendly product.²⁴⁵

More generally, the assistance provided pursuant to the TURA would also allow consumer product companies to identify other inefficient uses of toxic chemicals in their production processes and product formulations.²⁴⁶ Accordingly, if the TURA's toxics use reduction approach applied to consumer products and microbeads, it could save companies money in compliance and production costs.²⁴⁷ Moreover, by making their products safer for humans and the environment overall, companies may experience increased long-term value creation.²⁴⁸

CONCLUSION

In response to pervasive microbead pollution resulting from the inadequate regulation of microbeads under the traditional command-and-control regulatory framework, Congress banned the use of microbeads in 2015. A ban, however, is yet another command-and-control regulation. Despite the adoption of pollution prevention as the new national policy in 1990 through the Pollution Prevention Act ("PPA"), this legislative action represents a continued preference for the regulatory framework that failed to prevent microbead pollution in the first place. Similar to the labeling, testing, and reporting requirements that unsuccessfully attempted to control microbead pollution, the national ban fails to address the continued threat posed by microbeads that already exist in oceans and rivers. Existing pollution, which will persist in the environment for decades, continues to accumulate toxicity through post-use interactions in with toxic chemicals, providing a conduit for human exposure through the food chain.

165; *Office of Technical Assistance and Technology*, *supra* note 168 (discussing the OTA and its functions).

²⁴⁵ See MASS. GEN. LAWS ch. 21I, §§ 2, 11; TOXICS USE REDUCTION INST., *supra* note 198, at 1–2; OFF. OF TECH. ASSISTANCE, *supra* note 215, at 1–2; Hahnel et al., *supra* note 235, at 1392.

²⁴⁶ See MASS. GEN. LAWS ch. 21I, § 2; OFF. OF TECH. ASSISTANCE, *supra* note 215, at 1–2; *About*, *supra* note 165; *Office of Technical Assistance and Technology*, *supra* note 168.

²⁴⁷ See MASS. GEN. LAWS ch. 21I, § 2; OFF. OF TECH. ASSISTANCE, *supra* note 215, at 1–2; *About*, *supra* note 165; *Office of Technical Assistance and Technology*, *supra* note 168.

²⁴⁸ See BIRKENFELD ET AL., *supra* note 203, at 4–5 (stating that green building can result in creation business goodwill and brand equity); Bonini, *supra* note 203 (indicating that developing green products can help companies retain and motivate employees and contribute to long-term value creation); Whitman, *supra* note 203 (discussing how implementing sustainable businesses practices can build valuable intangible assets).

Pollution prevention, in contrast to the pollution control and management approach of the command-and-control framework, seeks to reduce the overall use of harmful substances at the source, rather than waiting for the manufacture and use of toxic chemicals or for pollution to occur. The Toxics Use Reduction Act (“TURA”) is a comprehensive state pollution prevention statute that encourages toxics users to reduce the total amount of toxic chemicals they manufacture, produce, and use through mandatory reporting and planning requirements. Voluntary implementation, made in good faith, supplement these mandatory requirements. Despite the TURA’s voluntary implementation requirements, it has resulted in widespread participation and significant reductions in the use of toxic chemicals in Massachusetts. Nevertheless, the TURA’s scope does not include consumer products or microbeads. If the TURA had applied to microbeads, it could have minimized the need for a national ban and diminished the continued threat of already existing microbead pollution.

The TURA’s planning provisions would require companies that use microbeads to consider, in good faith, substituting harmful microbeads with less harmful alternatives. Due to the existence of microbead alternatives and substitutions, companies that implement the TURA could completely eliminate the use of microbeads in their products. In addition, with assistance from state agencies and funding through grants, consumer product companies could identify other production process inefficiencies and technology alternatives related to toxic use, and reduce overall costs. These savings could translate into additional incentives for substituting microbeads with alternatives that are less harmful to human health and the environment. Due to the public nature of the TURA’s toxics use reporting information, residents of Massachusetts would be able to make informed buying decisions regarding microbeads. Accordingly, if the TURA had applied to microbeads, companies and consumers may have voluntarily opted to avoid microbeads, thereby minimizing the need for a national ban and diminishing the threat posed by cumulative microbead pollution.