



August 4, 2025

Submitted via CalSAFER, <https://calsafer.dtsc.ca.gov/>

Office of Legislation and Regulatory Review
Department of Toxic Substances Control
P.O. Box 806
Sacramento, California 95812-0806

Re: Safer Consumer Products Regulations – Adding Microplastics to the Candidate Chemical List, DTSC reference number R-2023-05R

Dear Sir or Madam:

The organizations below welcome the opportunity to present comments on the Department of Toxic Substances Control (DTSC) Notice of Proposed Action¹ to add microplastics to the Candidate Chemical List. We oppose this proposed action for the reasons explained in the attached comments.

Sincerely,

American Chemistry Council
American Seed Trade Association
California Chamber of Commerce
California Retailers Association
National Association for PET Container Resources
National Association of Printing Ink Manufacturers
Personal Care Products Council
Plastics Industry Association
Plastic Pipe and Fittings Association
Plastics Pipe Institute
Plumbing Manufacturers International
PRINTING United Alliance
Styrene Information and Research Center
Synthetic Turf Council
The Vinyl Institute

Attachment

¹ DTSC, Notice of Proposed Action (NOPA) (June 20, 2025), <https://dtsc.ca.gov/wp-content/uploads/sites/31/2025/06/R-2023-05R-1.-Notice-of-Proposed-Action-NOPA.pdf>.

**Comments on the DTSC Proposal to Add
Microplastics to the Candidate Chemical List**

DTSC reference number R-2023-05R

August 4, 2025

Table of Contents

EXECUTIVE SUMMARY.....	1
DISCUSSION.....	2
1. Microplastics Do Not Qualify as a “Chemical”.....	2
a. Microplastics Are Mixtures, Not a Single Chemical.....	2
b. Microplastics Do Not Have a Particular Molecular Identity.....	5
2. Microplastics Are Mostly Not in Consumer Products.....	7
a. Candidate Chemicals Must Be in Consumer Products.....	7
b. Primary Microplastics Are Mostly Not in Consumer Products.....	8
c. Secondary Microplastics Are Not in Consumer Products.....	9
3. Microplastics Do Not Meet the Criteria for Candidate Chemicals.....	10
a. Criteria.....	10
b. Study Design Concerns.....	10
c. No Consideration of Adverse Impacts.....	13
4. Listing Microplastics as Candidate Chemicals Will Not Advance the Policy Goal of the Safer Consumer Products Regulations.....	15
a. Many Microplastics Are Not in Consumer Products.....	15
b. Alternatives Assessments for Microplastics Are Unlikely to Be Useful.....	16
5. DTSC Should Narrow the Proposed Definition of “Microplastics”.....	17
a. DTSC Should Exclude Secondary Microplastics.....	17
b. DTSC Should Add a Minimum Length for Microplastics.....	18
CONCLUSION.....	20

EXECUTIVE SUMMARY

Microplastics as proposed to be defined² do not qualify as a “chemical” as defined in 22 CCR § 69501.1(a)(20)(A), because they lack a “particular molecular identity,” as that term is defined in § 69501.1(a)(20)(B). As shown by actions of the U.S. Environmental Protection Agency under the Toxic Substances Control Act using virtually identical definitions, microplastics are mixtures of mixtures, not a single chemical. While they may share some physicochemical properties to some extent, that is not sufficient to classify them all as having the same “particular molecular identity.” Since they are not a “chemical,” they cannot be listed as a candidate chemical.

Many microplastics are not present in “consumer products” as that term is defined in 22 CCR § 69501.1(a)(24)(A) and in Health & Safety Code § 25251(b). Accordingly, they fall outside the scope of Health & Safety Code § 25253(a)(1), which requires DTSC to establish a process for evaluating chemicals of concern in consumer products, and 22 CCR § 69501(b)(1), which provides that the Safer Consumer Products regulations apply to consumer products placed into the stream of commerce in California.

Primary microplastics, those intentionally manufactured, include preproduction plastic pellets (nurdles). By definition, preproduction plastic pellets are industry products, not part of consumer products.

Primary microplastics also include microbeads. Federal and California law already prohibit the manufacture or introduction into interstate commerce of rinse-off cosmetics that contains microbeads. Assembly Bill 823, now before the California legislature, would ban plastic microbeads in cleaning products, leave-on cosmetics, and glitter, thus eliminating virtually all of the remaining uses of microbeads in consumer products.

Secondary microplastics, those generated by the fragmentation of larger plastics, are not contained in consumer products when they are sold or distributed in California. Instead, they are mostly created by use or by weathering after disposal of consumer products. Secondary microplastics are also, by definition, not in consumer products according to the DTSC Green Ribbon Panel.³

Microplastics do not meet the criteria for identification as a candidate chemical in 22 CCR § 69502.2. They do not meet the criteria in § 69502.2(a) because they are not included on any of the specified lists, and they are not one of the specified types of chemicals. They do not meet the criteria in § 69502.2(b) because DTSC has not presented reliable information to establish that they exhibit one or more hazard traits and/or environmental or toxicological endpoints. Further DTSC has not established that microplastics have the potential to contribute to or cause adverse impacts as required by § 69502.2(b)(1)(A).

² DTSC has proposed to define “microplastics” to mean “plastics that are less than 5 millimeters (mm) in their longest dimension, inclusive of those materials that are intentionally manufactured at those dimensions or are generated by the fragmentation of larger plastics.” The definition appears at <https://dtsc.ca.gov/wp-content/uploads/sites/31/2025/06/R-2023-05R-2.-Proposed-Regulatory-Text.pdf>. Further references to “microplastics” in these comments rely on that definition.

³ Green Ribbon Science Panel Background Document: Microplastics (2021), https://dtsc.ca.gov/wp-content/uploads/sites/31/2021/10/Fall-2021_GRSP-Background-Documents_accessible.pdf.

Listing microplastics as a candidate chemical would not advance the policy goal of Health & Safety Code § 25253.6 of ensuring the safety of consumer products sold in California. Listing microplastics would open the door to listing microplastics-product combinations, thus triggering the obligation of product manufacturers to conduct alternatives analyses and DTSC to consider regulations affecting microplastics in consumer products. However, microplastics are for the most part not susceptible to actions by product manufacturers to eliminate or minimize the presence of microplastics in the environment since product manufacturers do not add anything called “microplastics” to their products.

If DTSC wishes to proceed with the proposal notwithstanding these concerns, it should narrow its definition of “microplastics” by excluding primary production pellets and secondary microplastics while adding a minimum length and recognizing the difference between the micro and nano fractions.

DISCUSSION

1. Microplastics Are Not a Substance and Do Not Qualify as a “Chemical”

a. Microplastics Are Mixtures, not a Single Chemical

DTSC’s proposal to add microplastics to its Candidate Chemical List exceeds its authority under the Health and Safety Code. Section 25252(a) that authorizes DTSC to “establish a process to identify and prioritize those chemicals or chemical ingredients in consumer products that may be considered as being a chemical of concern[.]”⁴ The DTSC proposal would identify microplastics as a single candidate chemical. As pointed out previously by several commenters,⁵ microplastics are not a “substance” as defined by DTSC in this instance, nor are they a single chemical, and accordingly they cannot be a candidate chemical.

A DTSC regulation, 22 CCR § 69501.1(a)(2)(A), has the following definition of “chemical”:

“Chemical” means either of the following:

1. An organic or inorganic substance of a particular molecular identity, including any combination of such substances occurring, in whole or in part, as a result of a chemical reaction or occurring in nature, and any element, ion or uncombined radical, and any degradate, metabolite, or reaction product of a substance with a particular molecular identity; or
2. A chemical ingredient, which means a substance comprising one or more substances described in subparagraph 1.

⁴ Health & Saf. Code., §§ 25252(a), 25252(a)(1).

⁵ A coalition of trade associations submitted comments on the previous DTSC proposal to add microplastics to the CCL whose arguments are incorporated by reference. Comments on the DTSC Proposed Addition of Microplastics to the Candidate Chemicals List, ID No. #12767. Submission date: July 27, 2023. ID#14685.

At base, DTSC regulations define the term “chemical” and “chemical ingredient” as a “substance.”⁶ In other words, the terms mean matter from which something is made. By contrast, according to DTSC, “microplastics” are “*plastics* that are less than 5 millimeters (mm) in their longest dimension, inclusive of those materials that are intentionally manufactured at those dimensions or are generated by the fragmentation of larger plastics.” In other words, *plastics* are the substance that microplastics are intentionally or unintentionally made from. Accordingly, microplastics, as defined by DTSC in the proposed regulation, fail to meet DTSC’s definition of a chemical—because they are not a substance—and therefore cannot be construed as a chemical or chemical ingredient.

To the extent DTSC construes “chemical or chemical ingredient” more broadly, that construction exceeds DTSC’s statutory authority. Although the term “chemical” is undefined by the Health and Safety Code, the term carries its ordinary meaning.⁷ In this context, the word “chemical” is used as a noun. Merriam-Webster’s Dictionary defines the term when used as a noun as “a substance obtained by a chemical process or producing a chemical effect”⁸ and the legislative history supports this conclusion. In 2008, the Legislature passed AB 1879 which authorized DTSC to regulate “chemical or chemical ingredients” to address “the danger of hazardous chemicals contained in consumer products.”⁹ “The bill provide[d] an open and transparent process for identifying and prioritizing the most dangerous chemicals and for determining what the department should do about these chemicals contained in products.” Thus, the legislature’s focus was chemicals from which something is made not part of a finished product or fragments of a finished product as DTSC has defined microplastics.

In the alternative, microplastics also do not meet either of the definitions for a chemical. Because there are no further clarifications that define a “chemical substance”, we must turn to other regulations that make have been informative. CA DTSC may have been referencing the definition of “chemical substance” in section 3(2)(A) of the Toxic Substances Control Act (TSCA), from which the above definition is clearly adapted:

Except as provided in subparagraph (B), the term “chemical substance” means any organic or inorganic substance of a particular molecular identity, including –

- (i) any combination of such substances occurring in whole or in part as a result of a chemical reaction or occurring in nature, and
- (ii) any element or uncombined radical.

Subparagraph (B) provides in part, “Such term does not include – (i) any mixture”

TSCA § 3(10) defines “mixture” to mean:

⁶ , 22 CCR § 69501.1(a)(2)(A),

⁷ Arnall v. Superior Court of L.A. Cnty., 118 Cal. Rptr. 3d 379, 382 (App. 2d Dist. 2010).

⁸ Available at <https://www.merriam-webster.com/dictionary/chemical> (last accessed July 30, 2025).

⁹ Bill Analysis, AB 1879 available at http://leginfo.ca.gov/pub/07-08/bill/asm/ab_1851-1900/ab_1879_cfa_20080830_154547_asm_floor.html (last accessed July 30, 2025).

any combination of two or more chemical substances if the combination does not occur in nature and is not, in whole or in part, the result of a chemical reaction

Given the derivation of the DTSC definition of “chemical” from the TSCA definition of “chemical substance,” the DTSC term “chemical” should be interpreted with reference to how the U.S. Environmental Protection Agency (EPA) interprets the term “chemical substance.”

Under TSCA, any single microplastic consists of a particular polymer, such as polyethylene, CAS No. 9002-88-4, and, typically, particular additives, such as specific colorants and specific antioxidants. Thus, a single microplastic particle is typically a mixture, rather than pure polymer, that is, rather than a single chemical substance. Microplastics as a group are a mixture of mixtures. The polymers in microplastics differ, their additives differ, and so do their physical and chemical properties. To regard all microplastics as a single chemical is to undermine the concept of a single chemical of meaning.

Under TSCA § 5(a)(1), it is illegal to manufacture a chemical substance that is not on the TSCA Inventory and that is not covered by an exemption, such as the exemption for research and development. The TSCA Inventory has no entry for microplastics. Instead, it has separate entries for particular polymers and particular additives.¹⁰ Nevertheless, EPA has raised no issue under TSCA for the intentional production of microplastics. EPA refers to microplastics as “plastic particles ranging in size from five millimeters to one nanometer; nanoplastics are plastic particles smaller than one micrometer.” See <https://www.epa.gov/plastics/impacts-plastic-pollution>. In other words, EPA regards them as particles (each with one or more chemical substances mixed together) rather than as a single chemical substance.

EPA’s approach to microplastics under TSCA is similar to that of the World Health Organization. It has described nano- and microplastics as “a heterogeneous mixture of particles and fibres of various shapes, sizes, polymer composition, surface chemistry and associated chemicals.”¹¹ That is not the description of a single chemical.

Similarly, microplastics do not meet the DTSC definition of “chemical”:

- They are not a combination of substances occurring as a result of a chemical reaction or occurring in nature. EPA refers to such substances as UVCBs (substances of unknown or variable composition, complex reaction products, or biological materials). Examples are particular petroleum process streams or particular proteins. See <https://www.epa.gov/sites/default/files/2015-05/documents/uvcb.pdf>.
- They are not an element, metabolite, or reaction product of a substance with a particular molecular identity.
- They are not a chemical ingredient in another substance.

¹⁰ In a handful of cases, EPA has included certain categories of chemical substances on the Inventory. One example is ceramic materials and wares, chemicals, CAS No. 66402-68-4. EPA had authority to do so because TSCA § 26(c) expressly authorized EPA to take action on categories of chemicals. In contrast, nothing in the California statute or regulations authorizes DTSC to list categories of chemicals as a single candidate chemical.

¹¹ WHO, Dietary and inhalation exposure to nano- and microplastic particles and potential implications for human health (2022), <https://www.who.int/publications/i/item/9789240054608>.

- Finally, they do not have a particular molecular identity.

b. Microplastics Do Not Have a Particular Molecular Identity

Microplastics as a whole also do not contain a particular molecular identity. Section 69501.1(a)(2)(B) defines “particular molecular identity” as a substance’s properties listed below:

“Molecular identity” means the substance’s properties listed below:

1. Agglomeration state;
2. Bulk density;
3. Chemical composition, including surface coating;
4. Crystal structure;
5. Dispersability;
6. Molecular structure;
7. Particle density;
8. Particle size, size distribution, and surface area;
9. Physical form and shape, at room temperature and pressure;
10. Physicochemical properties;
11. Porosity;
12. Solubility in water and biologically relevant fluids;
13. Surface charge; and
14. Surface reactivity.

These 14 properties are characteristics that may differentiate one chemical (or chemical substance) from another.

The listed properties in the definition of “particular molecular identity” cannot be stretched to classify all microplastics as having a single particular molecular identity. For example, the chemical substances making up microplastics have different molecular structures and different physicochemical properties. Grouping them as a single chemical would ignore the idea that there must be a “particular” identity based on the molecule or molecules of the chemical.

Nevertheless, while the DTSC’s Initial Statement of Reason (ISOR) acknowledges the broad category of microplastics can be subdivided into each unique polymer (i.e., different chemicals),¹² the Technical Document¹³ for the proposal asserts that microplastics are a single chemical because they do have a particular molecular identity:

Despite the structural heterogeneity and complexity of different plastic polymers, microplastics collectively meet the definition of “chemical”, because they are “organic or inorganic substances of a particular molecular identity.”

¹² ISOR. “Alternative 2: Narrow the definition of microplastics to specific polymers. Narrowing the scope of the microplastics definition would severely limit SCP’s ability to select priority products and would require significant staff resources to develop multiple rulemaking packages for *each polymer*.”

¹³ DTSC, Technical Document for the Proposal to Add Microplastics to the Candidate Chemicals List (June 20, 2025), <https://dtsc.ca.gov/wp-content/uploads/sites/31/2025/06/Technical-Document-for-the-Proposal-to-Add-Microplastics-to-the-Candidate-Chemicals-List.pdf>.

Significantly, the Technical Document does not identify what particular molecular identity is. The Technical Document does not even identify any of the properties listed in the definition of “molecular identity” that microplastics are asserted to share.

Instead, it asserts that microplastics as a group share some hazard traits. However, hazard traits are not included among the 14 aspects of “particular molecular identity.” Instead, hazard traits are considerations with respect to whether a chemical should be identified as a candidate chemical. See 22 CCR § 69502.2(b). They are not an aspect of “particular molecular identity.”

In the 2023 proposal¹⁴ (but not the 2025 Technical Document or any of the other materials related to the current proceeding), DTSC asserted that microplastics have a single “molecular identity” due to their “polymeric structure” and “size distribution.” Polymeric structure, however, is not one of the listed properties in DTSC’s regulation that defines chemical’s “molecular identity.” It is not part of “chemical composition” (property 3), which specifies the identity, arrangement, and ratio of the chemical elements making up a compound by way of chemical and atomic bonds.¹⁵

Chemical composition, which is often described using molecular formulas (e.g., H₂O), is unique to particular compounds; it is inapplicable to broad categories such as plastics of a particular particle size. “Polymeric structure” is not covered by “molecular structure” (property 6) either. Molecular structure refers to the location of the atoms, groups or ions relative to one another in a molecule, as well as the number and location of chemical bonds.¹⁶ Like chemical composition, molecular structure is specific to individual substances; it does not apply to broad descriptions such as “polymeric.”

The DTSC’s own Green Ribbon Science Panel recognized this dilemma. Its 2021 report on adding microplastics to the Candidate Chemicals List (CCL)¹⁷ declared:

“Microplastics” can encompass a wide range of substances, materials, and particle sizes. To add microplastics as a “chemical” for the purposes of SCP’s regulatory framework, it would be necessary to develop a definition around the particle size, polymer type, shape, and/or other properties and to identify one or more hazard traits and endpoints shared by all particles that meet this definition

While it may be possible to identify a plastic polymer as a Chemical of Concern, based on its potential to degrade and subsequently form microplastics, defining the polymer as a

¹⁴ DTSC, Proposal to Add Microplastics to the Candidate Chemicals List (2023), https://dtsc.ca.gov/wp-content/uploads/sites/31/2023/04/Background-Document-Proposal-to-Add-Microplastics-to-the-Candidate-Chemical-List_May272023.pdf (“The regulations specify that ‘molecular identity’ may be described in terms of a substance’s particle size, size distribution, and surface area. DTSC is basing its proposed definition for MPs (see below) on the polymeric structure and size distribution (< 5,000 microns) of MPs.”).

¹⁵ See, e.g., <https://byjus.com/chemistry/chemical-and-its-composition/>; <https://www.reagent.co.uk/blog/what-is-chemical-composition-in-chemistry/>; https://chem.libretexts.org/Courses/College_of_Marin/CHEM_114%3A_Introductory_Chemistry/06%3A_Chemical_Composition.

¹⁶ See, e.g., http://www.chem.ucla.edu/~harding/IGOC/M/molecular_structure.html.

¹⁷ Green Ribbon Science Panel Background Document: Microplastics (2021), https://dtsc.ca.gov/wp-content/uploads/sites/31/2021/10/Fall-2021_GRSP-Background-Document_accessible.pdf.

Candidate Chemical based solely on the hazard traits of its degradants could pose challenges.

Furthermore, to the extent that DTSC justifies its classification of microplastics as a single chemical on the assumption that microplastics have common physicochemical properties, the scientific evidence does not support that assumption. As noted in the 2022 WHO report on microplastics, “[t]he properties and composition of [microplastics] change during their lifecycle in the environment.” WHO described microplastics as having “various shapes, sizes, polymer composition, [and] surface chemistry”

A review of the CCL illustrates how DTSC has always – until now – interpreted the term “particular molecular identity.” The CCL, available at <https://dtsc.ca.gov/scp/candidate-chemicals-list/>, consist of 3,337 individual chemicals or closely related chemicals. Virtually all of them have CAS numbers. In a handful of cases, it includes a single chemical and closely related chemicals, e.g., perfluorononanoic acid (PFNA) and its salts.

In one case, DTSC has listed a chemical class – perfluoroalkyl and polyfluoroalkyl substances (PFAS). 22 CCR § 69511.5. EPA has also taken action on large groups of PFAS, based on common chemical structures and physicochemical properties.¹⁸ In contrast, microplastics vary significantly in their chemical structures and physicochemical properties. The PFAS example is not a precedent on which DTSC can rely in attempting to list microplastics as a single chemical.

In summary, microplastics do not have a single particular molecular identity. They do not qualify as a single chemical. Thus, they do not qualify as a candidate chemical.

2. Microplastics Are Mostly Not in Consumer Products and Therefore Do Not Present a Basis for Candidate Chemical Listing

a. Candidate Chemicals Must Be in Consumer Products

As noted, for DTSC to list microplastics as a candidate chemical, it must establish that they are present in consumer products.¹⁹ As shown below, however, with limited exceptions, microplastics are not “in consumer products.” Accordingly, they fall outside the scope of the Safer Consumer Products regulations and cannot be listed as a candidate chemical.

The Safer Consumer Products regulations define the key term “consumer product” in 22 CCR § 69501.1(a)(24)(A) to mean “any of the following:

1. A ‘consumer product’ as defined in Health and Safety Code section 25251; or
2. When applicable, a component of an assembled ‘consumer product.’”

¹⁸ 40 C.F.R. §§ 721.9582 (certain perfluoroalkyl sulfonates), 721.10536 (long-chain perfluoroalkyl carboxylate chemical substances), § 721.11777 (per- and poly-fluoroalkyl chemical substances designated as inactive on the TSCA Inventory). In those regulations or related materials, EPA provided CAS numbers for virtually all of the PFAS subject to those regulations, indicating that it regarded them as groups of individual chemicals, not as a class.

¹⁹ Health & Safety Code § 25252(a)

Health and Safety Code § 25251(b) defines “consumer product” to mean “a product or part of the product that is used, brought, or leased for use by a person for any purposes.” In this case, “person” clearly is intended to refer to an individual consumer, not to a corporate entity.²⁰ The Consumer Product Safety Act has a definition which clearly limits the term “consumer product” to products intended for consumers.²¹

b. Primary Microplastics Are Mostly Not in Consumer Products

The 2023 DTSC proposal to add microplastics to the CCL clarified there are both primary and secondary microplastics:

Microplastics have been divided into two categories: primary and secondary. Plastic particles less than 5mm in diameter that are intentionally manufactured and used as ingredients in various products are considered primary microplastics (Arthur et al. 2015; Hwang et al. 2020). Secondary microplastics are generated through the mechanical or environmental degradation of plastic products (e.g., tire wear particles) and litter (Hwang et al. 2020).

Some primary microplastics are intentional components of consumer products. However, this is not true of all primary microplastics. One example is preproduction plastic, defined in Water Code § 13367(a) to include plastic resin pellets and powdered coloring for plastics. Preproduction plastic is the raw plastic resin materials that are molded into finished plastic products. Preproduction plastics are often produced in a resin pellet format, often called “nurdles.” These small pieces of plastic are produced in various shapes, colors, and plastic types. Preproduction plastic resins are also produced in powder, granule, and flake form.²² By its nature, preproduction plastic is not a consumer product; it is an industrial product. The pellets, made of raw resin, are melted down and used in the manufacturing of the plastic products that are used by consumers.²³ While spills of preproduction plastic may be a concern, they cannot be addressed through the Safer Consumer Products regulations because they are not “in consumer products.”

Another example of primary microplastics that are in consumer products are microbeads used in rinse-off cosmetics. Manufacture and distribution of rinse-off cosmetics containing microbeads

²⁰ Health & Safety Code § 19 defines “person” as follows: “‘Person’ means any person, firm, association, organization, partnership, business trust, corporation, limited liability company, or company.” However, § 19 is governed by § 5, which provides: “Unless the provision or the context otherwise requires, these definitions, rules of construction, and general provisions shall govern the construction of this code.” The context of a definition of “consumer product” requires that the term “person” be interpreted to refer to a consumer, not to a corporate entity. Otherwise, any industrial product would become a consumer product under that definition.

²¹ The Consumer Product Safety Act § 3(a)(5) defines “consumer product” in part to mean “any article, or component part thereof, produced or distributed (i) for sale to a consumer for use in or around a permanent or temporary household or residence, a school, in recreation, or otherwise, or (ii) for the personal use, consumption or enjoyment of a consumer in or around a permanent or temporary household or residence, a school, in recreation, or otherwise”

²² State Water Resources Control Board, Preproduction Plastic Debris Program, https://www.waterboards.ca.gov/water_issues/programs/stormwater/plasticdebris.shtml.

²³ National Oceanic and Atmospheric Administration, Marine Debris Program, <https://marinedebris.noaa.gov/pre-production-plastic-pellets>.

are banned nationally as well as in California.²⁴ Further, Assembly Bill 823,²⁵ now under consideration by the California Legislature,²⁶ would prohibit a person from selling, offering for sale, distributing, or offering for promotional purposes in this state a personal care product containing plastic glitter, or a personal care product in a non-rinse-off product or a cleaning product containing one ppm or more by weight of plastic microbeads that are used as an abrasive, starting in 2029. If enacted, as seems likely, the bill would ban virtually all remaining uses of primary microplastics in consumer products sold in California.

c. Secondary Microplastics Are Not in Consumer Products

Secondary microplastics are generated from end use of consumer products or from post-consumer products discarded as trash. Plastic fragments come from larger plastic items that could be intentionally or unintentionally littered or dumped in the environment. They can be moved by wind and storms, and travel into the ocean or lakes from rivers and streams. Through exposure to winds, waves, and the sun, these larger, more recognizable plastics can break into smaller and smaller pieces, eventually creating microplastics.²⁷

Secondary microplastics are not in consumer products. DTSC’s 2021 Green Ribbon Science Panel report on microplastics made this clear:

“By definition, secondary microplastics are not present in consumer products when they are sold or distributed in California.”²⁸

The Panel’s report also observed that “secondary microplastics make up a larger fraction of the microplastic particles released” into the environment. More specifically, the report stated:

It has been suggested that secondary microplastics account for between 70% and 80% of all the plastic in the oceans, while primary microplastics account for between 15% and 30% (Boucher and Friot 2017; European Parliament and Commission 2018).

In summary, preproduction plastics, such as nurdles, are not in consumer products. Intentional use of primary microplastics (microbeads) is currently banned in some consumer products and is likely to be banned soon in most other consumer products. Secondary microplastics, the “larger fraction” of microplastics in the environment, are not in consumer products either. Accordingly, most microplastics are not in consumer products, as required by the Health and Safety Code and the Safer Consumer Products regulations. For this reason, DTSC should not classify microplastics as a candidate chemical.

²⁴ See Microbead-Free Waters Act of 2015, Public Law 114-114 (2015), <https://www.govinfo.gov/content/pkg/PLAW-114publ114/pdf/PLAW-114publ114.pdf>; Cal. Public Resources Code § 42362.

²⁵ Available at <https://legiscan.com/CA/text/AB823/id/3245198/California-2025-AB823-Amended.html>.

²⁶ See <https://legiscan.com/CA/bill/AB823/2025>.

²⁷ National Oceanic and Atmospheric Administration, Marine Debris Program, <https://marinedebris.noaa.gov/pre-production-plastic-pellets>.

²⁸ Green Ribbon Science Panel Background Document: Microplastics (2021), https://dtsc.ca.gov/wp-content/uploads/sites/31/2021/10/Fall-2021_GRSP-Background-Document_accessible.pdf.

3. Microplastics Do Not Meet the Criteria for Candidate Chemicals

a. Criteria

Article 2 of the Safer Consumer Products regulations establish the criteria for listing a chemical as a candidate chemical. Microplastics do not meet those criteria. Thus, DTSC should not list microplastics as a candidate chemical.

Section 69502.2 establishes the criteria for listing a chemical as a candidate chemical. One criterion is that the chemical appears on specified lists – but microplastics do not appear on any of those lists. An alternative criterion is that the chemical is a specified type of chemical – but microplastics are not any of those types of chemicals.

The last criterion is “chemicals that exhibit one or more hazard traits and/or environmental or toxicological endpoints by considering the following factors for which reliable information is available.”²⁹ The Technical Document asserts that microplastic have three common hazard traits: environmental persistence, mobility in environmental media, and particle size or fiber dimension. While some microplastics have those hazard traits, others do not. For example, biodegradable microplastics are unlikely to meet the “environmental persistence” or “mobility in environmental media” hazard traits.

b. Study Design Concerns

Under § 69502.2(b), the DTSC finding that microplastics have those hazard traits must be based on “reliable information.” The Safer Consumer Products regulations define that term in § 69501.1(a)(57)(B) to include the requirement that “the study design was appropriate to the hypothesis being tested, and sufficient to support the proposition(s) for which the study is presented to the Department.” As discussed below, there is ample reason for concern that the studies cited in the Technical Document do not have appropriate study designs.

The evidence cited for the environmental persistence hazard trait has significant limitations. Section 69405.3 explains the meaning of that hazard trait:

- (a) The environmental persistence hazard trait is defined as the propensity for a chemical substance to remain in the environment for a long time period subsequent to its release by resisting chemical and biological degradation.
- (b) Evidence for environmental persistence includes but is not limited to: the identification of a substance to be persistent by an authoritative organization; resistance to degradation in wastewater treatment processes; half-lives in marine, fresh or estuary water of greater than 40 to 60 days, in sediment of greater than 2

²⁹ 22 CCR § 69502.1. The Safer Consumer Products regulations apply only to “chemicals that exhibit a hazard trait and/or an environmental or toxicological endpoint and that are present in [consumer] products that are placed into the stream of commerce in California.”

months, in ambient air of greater than 2 days, or in soil of greater than 2 months; structural similarity to other persistent chemicals.

Persistence is not a single, fixed physical chemical property of a substance but represents the total sum of several dynamic processes. The intrinsic properties of a substance and the environmental conditions need to be considered in any study design and cannot be assessed in a single test under specific a single experimental condition. This is especially true when the study design used to evaluate a complex, polymeric substance was designed for water-soluble, mono-constituent substances.

In a recent review of persistence and the historical context of and relationship to biodegradability tests, Davenport et. al stated:

Current persistence assessments evolved around tests that were originally developed >15 years ago (and in most cases, >30 years ago) based on the scientific evidence at the time. Some tests, such as the ready biodegradability tests (RBTs), were not specifically developed for the purpose of screening for persistent substance, but to identify substances undergoing rapid and ultimate biodegradation under environmental conditions. These laboratory tests are mostly suitable for water-soluble, nonvolatile, and nonsorptive substances delivered as single constituents, not adequately reflecting the wide range of manufactured substances that find their way into the environment (including multi-constituent substances and polymers).

(Internal references omitted).³⁰ A number of biodegradation standards for plastic are referenced in California Public Code (PRC).^{31,32,33,34} A technical review by ECETOC details additional methods available from the International Standardisation Organisation (ISO) and other national/regional standardization bodies (Table 4A of the report) that were developed “specifically for the testing of plastics and as such are generally also applicable to solid, particulate polymers.”³⁵ Taken together, the criteria DTSC relies on cannot sufficiently reflect the factors that affect the rate(s) of biotic and abiotic transformations that lead to variability in substance half-life estimates necessary to determine whether a microplastic is or is not persistent.

One of the peer reviewers^{36,37} similarly observed that “the concept of ‘estimated half-lives’ seems misguided given that there are clearly physicochemical changes over time to the MPs and

³⁰ Davenport, R, et. al., (2022), Scientific concepts and methods for moving persistence assessments into the 21st century, *Integrated Environmental Assessment and Management*, 18:6, pp. 1454–1487. <https://doi.org/10.1002/ieam.4575>.

³¹ ASTM methods D5338 and D5988; EN17033; ISO23517; which require 90% carbon conversion.

³² PRC 42355. https://leginfo.legislature.ca.gov/faces/codes_displaySection.xhtml?lawCode=PRC§ionNum=42355.

³³ PRC 42356. https://leginfo.legislature.ca.gov/faces/codes_displaySection.xhtml?lawCode=PRC§ionNum=42356.

³⁴ PRC 42357. https://leginfo.legislature.ca.gov/faces/codes_displaySection.xhtml?lawCode=PRC§ionNum=42357.

³⁵ ECETOC. (2020). *Applicability of Analytical Tools, Test Methods and Models for Polymer Risk Assessment*. Technical Report No. 133-2. ISSN-2079-1526-133-2. <https://www.ecetoc.org/wp-content/uploads/2021/10/ECETOC-TR133-2.Polymers-Risk-Assessment.pdf>.

³⁶ Peer review comments appear in State Water Resources Control Board, Final Response to Request for Review of the Scientific Basis of Proposed Addition of Microplastics (MPS) to the Candidate Chemical List (ESPR Report), (Apr. 5, 2024), <https://dtsc.ca.gov/wp-content/uploads/sites/31/2025/06/R-2023-05R-7.-ESPR-Report.pdf>.

³⁷ In January 2024, the CalEPA Program received a request from DTSC request for external scientific peer

they will not be degraded in the same fashion as dissolved chemicals.” That peer reviewer suggested the need for more work on or abandonment of the assertion that microplastics have the environmental persistence hazard trait:

It is suggested to further adapt this terminology and/or line of argumentation, as (micro)plastics clearly have different properties which may have not been the intention of Cal. Code of Regs., tit. 22 § 69405.3.

Whether a microplastic will be persistent is based, in part, on its chemical structure.³⁸ Some microplastics are biodegradable and are not considered persistent, meaning that they do not have half-lives greater than those criteria.³⁹ While others may meet those criteria, DTSC has not established that all microplastics meet the environmental persistence hazard trait criteria.

Further, methods designed to assess persistence of chemicals cannot be used for microplastics because they were not developed for insoluble polymeric materials. Microplastics encompass so many polymers and natural materials that they must be tested for complete biodegradation according to well-established methods to determine which will be classified as persistent while others will not.⁴⁰ One of the peer reviewers noted this point:

However, the same authors also caution that the **available literature on plastics degradation is sparse and shows a wide range of numbers**. This is echoed by Ward and Reddy who wrote in 2020 that “the reality is that **what the public and legislators know about the environmental persistence of plastic goods is often not based on solid science**.”⁴¹ For example, the public believes polystyrene barely degrades in the environment, however the degradation of polystyrene by sunlight in the marine environment has recently been shown to occur much faster than previously thought The half-lives of common microplastics could be shorter than the numbers cited in the proposal and further research necessary to develop reliable information.

(Emphasis added.) The criteria proposed by DTSC to determine persistence are not appropriate (i.e., “out of the domain of applicability of an assay or a model”) for microplastics.⁴² These criteria were developed using a set of discrete bioavailable substances, mainly organochlorine chemistry. Since polymer chemistries were not used in their initial development, it is

review for proposal to list microplastics on the CCL. The review was conducted by three independent, neutral, and objective scientific experts. Information on the reviewers, including their expertise, can be found in the final ESPR Report.

³⁸ Kim JR, et al. (2023). Exploring structure-activity relationships for polymer biodegradability by microorganisms. *Sci Total Environ*. Sep 10;890:164338. doi: 10.1016/j.scitotenv.2023.164338. Epub 2023 May 19. PMID: 37211122.

³⁹ Bher A, et al. (2022). Biodegradation of Biodegradable Polymers in Mesophilic Aerobic Environments. *Int J Mol Sci*. Oct 12;23(20):12165. doi: 10.3390/ijms232012165. PMID: 36293023.

⁴⁰ As an example, poly(3-hydroxybutyrate-co-3-hydroxyvalerate) (PHBV) was found to biodegrade in freshwater, marine and activated sludge using a modified OECD 301/310 protocol. McDonough, KNR, et al. (2017). Assessing the biodegradability of microparticles disposed down the drain, *Chemosphere*, 175: 452-58.

⁴¹ Ward CP, Reddy CM. Opinion: We need better data about the environmental persistence of plastic goods. *Proc Natl Acad Sci U S A*. 2020 Jun 30;117(26):14618-14621. doi: 10.1073/pnas.2008009117.

⁴² Albright III, V and Y. Chai. (2021). Knowledge Gaps in Polymer Biodegradation Research. *Environ. Sci. Technol*. 55, 17, 11476–11488, <https://pubs.acs.org/doi/10.1021/acs.est.1c00994>.

scientifically inappropriate to use the proposed criteria in this instance. In addition to being out of domain, there are a number of practical considerations unique to microplastics and polymers. The biodegradation criteria that are used to define persistence must be technically feasible, focus on the most relevant compartment pathways for degradation, and adapted to polymers. Persistence in one compartment does not mean a substance will accumulate in the environment overall; a holistic assessment should be used to determine whether there is accumulation.^{43, 44}

As for the mobility in environmental media hazard trait, one of the peer reviewers cautioned that:

it is relevant to point out that this heterogeneity [of microplastics] can potentially impact some of the conclusions and subsequent actions taken as a result of this current review process, especially pertaining to the mobility of MPs.⁴⁵

In summary, it is far from clear that DTSC has presented “reliable information” to support a finding that microplastics present any of the listed hazard traits.

c. No Consideration of Adverse Impacts

Even assuming that microplastics do have the hazard traits identified in the Technical Document, that is not sufficient for DTSC to list microplastics as a candidate chemical. The three hazard traits identified by DTSC are all exposure-based traits. See 22 CCR Chapter 54, Article 5 (“Exposure Potential Hazard Traits”), which lists all three of the hazard traits claimed by DTSC for microplastics. But exposure potential is not sufficient to qualify a chemical as candidate chemical. Section 69502.2(b)(1)(A) requires DTSC to evaluate the potential for adverse impacts as well. It provides:

The Department **shall evaluate the potential for the chemical to contribute to or cause adverse impacts**, considering one or more of the following factors:

1. The chemical’s hazard trait(s) and/or environmental or toxicological endpoint(s);
2. The chemical’s aggregate effects;
3. The chemical’s cumulative effects with other chemicals with the same or similar hazard trait(s) and/or environmental or toxicological endpoint(s);
4. The chemical’s physicochemical properties;
5. The chemical’s environmental fate;
6. The human populations, and/or aquatic, avian, or terrestrial animal or plant organisms for which the chemical(s) has/have the potential to contribute to or cause adverse impacts; and/or
7. The potential for the chemical to degrade, form reaction products, or metabolize into another chemical that exhibits one or more hazard traits and/or environmental or toxicological endpoints.

⁴³ Redman, A, et al. Moving persistence assessments into the 21st century: A role for weight-of-evidence and overall persistence. *Integr Environ Assess Manag.* 2022 Jun;18(4):868-887. doi: 10.1002/ieam.4548.

⁴⁴ Moshood TD, et al. (2022). Sustainability of biodegradable plastics: New problem or solution to solve the global plastic pollution? *Current Research in Green and Sustainable Chemistry.* 5:100273. <https://doi.org/10.1016/j.crgsc.2022.100273>.

⁴⁵ ESPR Report. (2024).

(Emphasis added.) Yet the Technical Document has no discussion of adverse impacts, such as microplastics having toxicological hazard traits, environmental hazard traits, or physical hazard traits. The Technical Document is noteworthy for its avoidance of any evidence of actual adverse impacts from exposure to microplastics. Instead, it makes vague, unsupported statements such as “there is an emerging body of evidence suggesting that some of these exposures have the potential to be harmful.”

In the introduction to the peer review of its microplastics proposal, DTSC acknowledged:

The SCP regulations require DTSC to make the following determinations to list a product as a Priority Product:

- There must be potential public and/or aquatic, avian, or terrestrial animal or plant organism exposure to the Candidate Chemical(s) in the product; and
- There must be the potential for one or more exposures to contribute to or cause **significant or widespread adverse impacts.**⁴⁶

(Emphasis added.) Yet the charge questions to the peer reviewers addressed only exposure-based hazard traits and did not mention the potential for adverse impacts:

- Does the reliable evidence cited confirm that MPs meet the environmental persistence hazard trait described in Cal. Code of Regs., tit. 22 § 69405.3?
- Does the reliable evidence cited confirm that MPs meet the environmental mobility hazard trait described in Cal. Code of Regs., tit. 22, § 69405.6?
- Does the reliable evidence cited confirm that MPs meet the environmental particle size or fiber dimension hazard trait described in Cal. Code of Reg., tit. 22, § 69405.7?
- Does the available reliable evidence cited suggest that there is potential exposure of humans and animals to MPs?

As a result, the peer reviewers had nothing substantive to say about adverse impacts of exposure to microplastics. One of the peer reviewers conceded:

Microplastics are undoubtedly present in a variety of media to which humans are exposed. However, sampling methods, quality control measures, and analyses vary between laboratories. Consequently, there are limitations with respect to the quality and comparability of data; and uncertainty whether these concentrations pose a significant health risk.⁴⁷

The 2021 Green Science Panel report provided insight as to why there is such limited evidence of actual adverse impact from microplastics:

Due to **extreme variability in the physical and chemical properties, compositions, and concentrations of microplastic particles**, it is a major challenge to understand their toxicity and the risks they may pose to humans and the environment (Smith et al. 2018a;

⁴⁶ ESPR Report. (2024).

⁴⁷ *Id.*

Koelmans et al. 2019). Another challenge is that **many microplastics studies do not use environmentally relevant conditions**, and is a major data gap when informing risk assessment and management decisions (Koelmans et al. 2021).

(Emphasis added.) Similarly, last year the Food and Drug Administration (FDA) found no evidence of risk from microplastics in food, while noting data limitations:

The presence of environmentally derived microplastics and nanoplastics in food alone does not indicate a risk and does not violate FDA regulations unless it creates a health concern. While many studies have reported the presence of microplastics in several foods, including salt, seafood, sugar, beer, bottled water, honey, milk, and tea, **current scientific evidence does not demonstrate that the levels of microplastics or nanoplastics detected in foods pose a risk to human health**. Additionally, because there are no standardized methods for how to detect, quantify, or characterize microplastics and nanoplastics, **many of the scientific studies have used methods of variable, questionable, and/or limited accuracy and specificity**.⁴⁸

(Emphasis added.)

In summary, DTSC has not presented reliable information that microplastics have the three exposure-based hazard traits identified in the Technical Document as required by § 69502.2(b). In addition, DTSC has not presented reliable information to support a finding that microplastics have an adverse impact as required by § 69502.2(b)(1)(A). According, DTSC should not list microplastics as candidate chemicals.

4. **Listing Microplastics as Candidate Chemicals Will Not Advance the Policy Goal of the Safer Consumer Products Regulations**

Listing microplastics as a candidate chemical would not advance the policy goal of Health & Safety Code § 25253.6 of ensuring the safety of consumer products sold in California.

a. **Many Microplastics Are Not in Consumer Products**

As discussed in section 2 of these comments, secondary microplastics (estimated to be 70-80% of microplastics in the environment) and some primary microplastics (such as preproduction plastic) are not even in consumer products. Other primary microplastics are likely to be eliminated from consumer products in the coming years.

To the extent that microplastics are not or will not be in consumer products, there would be nothing for manufacturers to assess in conducting alternatives analyses or for DTSC to regulate. Thus, for most microplastics, there is no point in adding microplastics to the Candidate Chemicals List.

⁴⁸ FDA, Microplastics and Nanoplastics in Foods (July 24, 2024), https://www.fda.gov/food/environmental-contaminants-food/microplastics-and-nanoplastics-foods?utm_medium=email&utm_source=govdelivery.

b. Alternatives Assessments for Microplastics Are Unlikely to Be Useful

The Technical Document correctly, but misleadingly, states that listing microplastics as candidate chemicals would impose no new requirements:

Adding MPs to the CC List will not create any new regulatory requirements or any new regulated entities.

Listing of microplastics would have real-world consequences, however. The Technical Document further notes that:

Adding MPs to the CC List will allow DTSC to evaluate product-chemical combinations that contain MPs or that may release MPs **for the purpose of identifying potential Priority Products.**

[Emphasis added]. In addition, listing microplastics as candidate chemicals would enable DTSC to identify specific Priority Products containing microplastics under § 69503.2(b). That, in turn, would require responsible entities to conduct alternatives analyses under § 69505.1(b). In the alternative, DTSC would be able to recognize one or more study identifying an alternative.

Under § 69501(a)(60), the term “responsible entity” includes a manufacturer, importer, assembler, or retailer. Importers, assemblers, and retailers would have no ability to make any changes to Priority Products containing microplastics. Accordingly, the responsibility for making alternatives assessments would fall entirely on product manufacturers or in certain instances, DTSC, where it is proposing to move more directly to the regulatory phase, while proposing an alternative.

Yet, conducting alternatives assessments even for the remaining products containing primary microplastics would be problematic. This was recognized by a peer reviewer of the proposal:

What seems eventually challenging for manufacturers in this instance is to conduct an “Alternatives Analysis to evaluate possible safer alternatives to the Chemical(s) of Concern” in products which contain MPs. This is largely because of the heterogeneity of MPs which can be in products, and the lack of clear and directed evidence of which specific physicochemical properties consistently cause hazards [M]uch of the published literature uses model materials with varying degrees of environmental realism. While this certainly does not mean that there is no harm caused by MPs, conducting a comparison between “MPs” and another alternative chemical seems challenging and not specifically binding given the variable outcomes of such an assessment

[G]iven the diversity of MPs and the current status of scientific literature, it seems challenging to weigh alternatives against the risks MPs pose. In particular, to adopt a Priority Product listing, MPs exposure from the product must be shown (in most cases, clearly easy), but also “there must be the potential for one or more exposures to

contribute to or cause significant or widespread adverse impacts”, which may be rather more challenging to eventually prove.

The underlying motivation for this proposed action is concern about exposure to microplastics. The Notice of Proposed Action asserts:

Because microplastics are mobile in the environment, they are found in virtually all ecosystems, as well as in drinking water, household dust and indoor air. As a result, human and ecological exposure to microplastics is widespread.

Yet 70-80% of microplastics in the environment are secondary microplastics, largely resulting from product use, degradation, and plastic trash. Product manufacturers have no ability to control the creation of secondary microplastics, other than to make products or their packaging out of glass, metal, or other non-plastic materials – which is likely to be unrealistic.

The Green Ribbon Science Panel report acknowledged the inability of product manufacturers to eliminate or reduce secondary microplastics:

Even if secondary microplastics make up a larger fraction of the microplastic particles released, primary microplastics may be a better fit for the SCP regulatory framework.

While simply listing microplastics as a candidate chemical would not directly impose new regulatory requirements, there is little value in such a listing if the steps that would follow a listing are unlikely to lead to product-level reformulation or safer substitution in order to advance the goal of ensuring the safety of consumer products in California.

5. DTSC Should Narrow the Proposed Definition of “Microplastics”

If DTSC decides to pursue listing microplastics as a candidate chemical, it should add a minimum dimension and exclude secondary microplastics from the definition.

a. DTSC Should Exclude Secondary Microplastics

Most definitions of “microplastics” do not differentiate between primary and secondary microplastics. That makes sense, since the definitions focus on microplastics already in the environment.

The DTSC definition, however, should make that distinction. DTSC is addressing microplastics solely to prevent microplastics from entering the environment from a consumer product. Secondary microplastics are, by definition, not in a consumer product and cannot be feasibly identified, tracked, or substituted at the product level. Any alternatives analysis or DTSC regulation microplastics would thus be limited to addressing primary microplastics that are in a consumer product. Since that is the purpose of addressing microplastics under the Safer Consumer Products regulations, the definition used in those regulations should be limited to primary microplastics. As noted above, the Green Ribbon Science Panel report appeared to recommend limiting DTSC’s focus to primary microplastics:

Even if secondary microplastics make up a larger fraction of the microplastic particles released, primary microplastics may be a better fit for the SCP regulatory framework.

b. DTCS Should Add a Minimum Length for Microplastics and Recognize a Technically Feasible Size Limit

DTSC has proposed to define “microplastics” to mean:

plastics that are less than 5 millimeters (mm) in their longest dimension, inclusive of those materials that are intentionally manufactured at those dimensions or are generated by the fragmentation of larger plastics.

DTSC should recognize the subcategories of microplastics (5m to- ≥ 1 micrometer (μm)) and nanometer ($< 1 \mu\text{m}$ to > 1 nanometer), which inherently includes a minimum length for of 1 nanometer (nm) for consistency with other definitions of the term, as well as practical reasons.

The Technical Document claims that DTSC’s proposed definition “is consistent with the California State Water Resources Control Board’s definition for MPs in drinking water.” That is not accurate, in that the Board’s definition⁴⁹ includes a 1 nm minimum length for microplastics:

‘Microplastics in Drinking Water’ are defined as solid polymeric materials to which chemical additives or other substances may have been added, which are particles which have at least three dimensions that are **greater than 1 nm** and less than 5,000 micrometers (μm). Polymers that are derived in nature that have not been chemically modified (other than by hydrolysis) are excluded.

(Emphasis added, footnotes omitted.) Similarly, EPA includes a 1 nm lower limit on microplastics:

EPA researchers define microplastics, or MPs, as plastic particles ranging in size from 5 millimeters (mm), which is about the size of a pencil eraser, to 1 nanometer (nm).⁵⁰

Microplastics are plastic particles ranging in size from five millimeters to one nanometer; nanoplastics are plastic particles smaller than one micrometer.⁵¹

The WHO quoted the following definition of “microplastic,” among others:

a material consisting of solid polymer-containing particles, to which additives or other substances may have been added, and in which $\geq 1\%$ w/w of particles have (i) all dimensions $1 \text{ nm} \leq x \leq 5 \text{ mm}$ ⁵²

⁴⁹ State Water Resources Board, Definition of ‘Microplastics in Drinking Water’ (June 16, 2020), https://www.waterboards.ca.gov/board_decisions/adopted_orders/resolutions/2020/rs2020_0021.pdf.

⁵⁰ EPA, Microplastics Research, <https://www.epa.gov/water-research/microplastics-research>.

⁵¹ EPA, Impacts of Plastic Pollution, <https://www.epa.gov/plastics/impacts-plastic-pollution>

⁵² WHO, Dietary and inhalation exposure to nano- and microplastic particles and potential implications for human health (2022), <https://www.who.int/publications/i/item/9789240054608>.

Other state definitions also include a 1 nm minimum dimension. For example, the Illinois EPA described microplastics and plastic particles of larger or smaller dimensions in this way:

Microplastics are generally defined as plastic particles between 1 nanometer (nm) and 5 million nm (or 5 millimeters [mm]) in size. Particles larger than 5 mm are often referred to as macroplastics while particles less than 1 nm are considered nanoplastics, a subgroup of microplastics.⁵³

The Illinois EPA's commentary on its definitions indicates one reason why size limitations in a definition are important:

Size is the only common parameter for microplastics since chemical composition and shape can differ extensively. The type of material the plastic is made from and method used to make the different types of plastic polymers results in a variety of additives, colorants, and other toxicants in a single piece of plastic. Plastic particles can take on countless shapes given their versatility of use: fibers, films, foams, beads or spheres, pellets, and fragments. The shape of secondary microplastics is influenced by the material it is made from, type of weathering, and time spent in the natural environment.⁵⁴

Besides consistency with other definitions, DTSC should adopt a minimum size limitation for practical purposes. Current detection methodologies do not allow for the detection of all materials covered in the DSTC proposal due to the wide range of materials (e.g., sizes, forms, composition and other properties), sample types/matrices, and the potentially very small amounts (e.g. in the case of coating). The ability to detect and measure microplastics is especially important as DTSC will need to demonstrate presence in the environment and actual exposure for any future listing.

There are a number of scientific issues regarding measuring microplastics at lower sizes (e.g., 1 nm). Scientifically, when a polymer's size is in the 1 nm range, it raises the question of "molecular particles." Since a carbon-to-carbon bond is approximately 0.15 nm long, a chain of ~7 carbon atoms (~1 nm) could be considered a microplastic under the proposed definition. Molecules of this size are unlikely to behave in a chemically, environmentally (e.g., biodegradation), or toxicologically similar manner as larger particles. This poses an issue for any regulatory decision predicated on these other properties.

Exposure and concentration measurements may also be confounded by a definition that lacks necessary specificity. Accurately measuring and detecting microplastics smaller than 1 μm represents a technological challenge with today's technology and is acknowledged by the EU who implemented a 100 nm lower size limit in its recent regulatory action.^{55,56} The technological limitations of microplastic quantification can lead to inaccuracies when researchers

⁵³ Illinois Environmental Protection Agency, <https://epa.illinois.gov/topics/water-quality/microplastics.html>.

⁵⁴ Id.

⁵⁵ The EU includes a lower size limit of 100 nanometers (nm) for enforcement purposes for technological and practical purposes. EU Commission Regulation (EU) 2023/2055

⁵⁶ It is unclear what technology is accurate and robust enough to consistently quantify plastic particles at the 100nm size.

attempt to quantify smaller particles to demonstrate presence in the environment or for the purpose of conducting an exposure assessment, or product manufacturers conduct alternatives assessments.

DTSC should recognize a technically feasible lower size limit based on current high-throughput technologies. Currently, reliable methods are incapable of reliably detecting microplastics smaller than 5-10 μm , a limitation acknowledged by the broader scientific community.⁵⁷ Similar to the concept of Best Available Technology (BAT), DTSC could define the requirements necessary for a technology or method to be considered a BAT.

DTSC stated that a lower limit is not necessary in its microplastic definition because listing microplastics on the CCL does not create any new regulatory obligations; size limitations would be discussed when microplastics are listed with a priority product. The ability to arbitrarily restrict/include different sized microplastics in a future regulation with no pre-defined criteria creates a situation where manufactures are left to guess what preemptive actions they may take to reformulate or improve the circularity of their formulas or products.

CONCLUSION

DTSC should not list microplastics as a candidate chemical for several reasons.

Microplastics are not a substance nor are they a chemical; instead, they are mixtures of mixtures. As a group, microplastics lack a particular molecular identity and are not considered UVCBs.

Most microplastics are not in consumer products, a requirement for action under the Safer Consumer Products regulations. Many primary microplastics are banned from consumer products or are likely to be banned in the coming years. Other primary microplastics, such as preproduction plastics, are industrial products rather than consumer products. Secondary products are formed in the environment, generally after disposal. They are not in consumer products either.

Microplastics do not meet the criteria for listing as a candidate chemical. DTSC has not provided reliable information to establish that microplastics as a whole present exposure-based hazard traits. DTSC has not even tried to establish that microplastics may cause adverse effects, as required by the Safer Consumer Products regulations.

If microplastics were to be added to the Candidate Chemicals List, the next step would be for DTSC to identify product-chemical combinations for microplastics. Thereafter, product manufacturers would have to conduct alternatives analyses and/or DTSC would have to adopt restrictions on microplastics. However, conducting alternatives analyses for most microplastics would be challenging and unlikely to be useful, and DTSC would likely have little or nothing to regulate.

⁵⁷ See, e.g., Frias JPGL, Roisin Nash. (2019). Microplastics: Finding a consensus on the definition. *Marine Pollution Bulletin*. 138:145-147. <https://doi.org/10.1016/j.marpolbul.2018.11.022>; Draft ASTM WK72349. "Realistically, the lower limit of a microplastic is 5-10 μm when determined by this test method."

If DTSC does proceed to list microplastics as a candidate chemical, it should narrow its proposed definition to exclude secondary microplastics and to add a minimum length of 1 nanometer or larger.