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Via: <https://www.regulations.gov>

National Oceanic and Atmospheric Administration
Marine Debris Program
Interagency Marine Debris Coordinating Committee

Re: Docket Number NOAA–NOS–2022–0061

The National Cotton Council (NCC) is the central organization of the United States cotton industry. Its members include producers, ginner, cottonseed processors and merchandizers, merchants, cooperatives, warehousemen, and textile manufacturers. A majority of the industry is concentrated in 17 cotton-producing states stretching from California to Virginia. U.S. cotton producers cultivate between 10 and 14 million acres of cotton with production averaging 12 to 20 million 480-lb bales annually. The downstream manufacturers of cotton apparel and home furnishings are located in virtually every state. Farms and businesses directly involved in the production, distribution and processing of cotton employ more than 115,000 workers and produce direct business revenue of more than \$22 billion. Annual cotton production is valued at more than \$5.5 billion at the farm gate, the point at which the producer markets the crop. Accounting for the ripple effect of cotton through the broader economy, direct and indirect employment surpasses 265,000 workers with economic activity of almost \$75 billion. In addition to the cotton fiber, cottonseed products are used for livestock feed and cottonseed oil is used as an ingredient in food products as well as being a premium cooking oil. We appreciate the opportunity to submit comments on microfiber pollution.

General Comments:

Pg. IV. "...chemically modified natural fibers such as cotton and wool."

- Dyes and finishes are not permanent modifications to the cotton fiber
- Dyes and finishes can be removed without altering the properties of the cotton fiber
- Dyes and finishes do not change the ability of cotton fiber to biodegrade in different environments

Pg. V. "exposure to microfibers may expose biota to toxic chemicals that may have been applied to the fibers as additives during textile production or pollutants that the fibers have absorbed from the environment."

- This is an issue with all fibers and is something that should be taken up with the chemical manufacturers
- The non-polar nature of synthetic fibers makes them more likely to adsorb non-polar solvents and chemicals from water

Pg. 1. "In the last 20 years alone, global fiber production, both synthetic and natural, has more than doubled."

- USDA reports show that cotton fiber production has increased about 30% (90M bales to 120M bales) since 2022.

Pg. 4. “however, like all **microfibers** used in textiles, they are often“

- This is a typo. Should be fibers and not microfibers.

Pg. 5. “While some recent studies suggest that chemical modification of fibers, including dyes and chemical treatments, may make microfibers more resistant to degradation in the environment, research on this is currently inconclusive (Belzagui et al., 2021; Park et al., 2004; Sait et al., 2021; Sørensen et al., 2020; Zambrano et al., 2020, 2021)”

- Zambrano’s research is not inconclusive and shows the biodegradation of dyed and finished cotton materials in different aquatic environments.
 - Impact of dyes and finishes on the aquatic biodegradability of cotton textile fibers and microfibers released on laundering clothes: Correlations between enzyme adsorption and activity and biodegradation rates [Marielis C.Zambrano^aJoel J.Pawlak^aJesseDaystar^{bc}MaryAnkeny^bRichard A.Venditti^a](#)
 - <https://doi.org/10.1016/j.marpolbul.2021.112030>
- Bleached cotton and cotton that has been dyed and finished with various materials has been shown to readily biodegrade in simulated compost environments.
 - *Soil biodegradation of cotton fabrics treated with common finishes* Soshana Smith. Mehmet Ozturk. Margaret Frey. Cellulose <https://doi.org/10.1007/s10570-020-03666-w>

Pg 5 Furthermore, previous studies suggest that modified natural and semi-synthetic materials may have a greater capacity to sorb and subsequently disperse chemical additives and hazardous contaminants in the environment when compared to synthetics (Ladewig et al., 2015; Saini et al., 2016).

- How can this be true given that both water and cellulose are polar molecules? Synthetics being nonpolar would attract nonpolar molecules in a polar suspension/solution (water)

Pg. 8 ECHA’s criteria for microplastics specifically excludes “biodegradable polymers,

Pg. 8 “ECHA also specifies... in all dimensions or” “for fibres, (have) a length of 3 nm = x = 15 mm and length to diameter ratio of >3.”

- A fiber length of 15mm would be caught up in filters where a fiber <5mm would pass through.

Pg. 11 “Either (i) a particle of any composition with a continuous polymer surface coating of any thickness, or (ii) a particle of any composition with a polymer content of greater than or equal to 1% by mass.”

- Zambrano demonstrates that the finishes do not completely coat the fabric surface leaving voids for the microbes to make their way in and digest the fiber
 - impact of dyes and finishes on the aquatic biodegradability of cotton textile fibers and microfibers released on laundering clothes: Correlations between enzyme adsorption and activity and biodegradation rates [Marielis C.Zambrano^aJoel J.Pawlak^aJesseDaystar^{bc}MaryAnkeny^bRichard A.Venditti^a](#)
 - <https://doi.org/10.1016/j.marpolbul.2021.112030>

- These coatings do not change the chemical composition of cotton fiber. Cotton is still a recognizable food source for microbes and therefore does not remain in the environment for generations like synthetic fibers.

Pg. 12 “polymers that are derived in nature that have not been chemically modified (other than by hydrolysis).”

Definition of hydrolysis: Hydrolysis involves the reaction of an organic chemical with water to form two or more new substances and usually means the [cleavage](#) of chemical bonds by the addition of water. Dr. James G. Speight, in [Environmental Organic Chemistry for Engineers](#), 2017

Pg. 12 “Chemical additives used in the production of textiles include toxic compounds, such as bisphenols, azo dyes, polyfluorinated alkyl compounds (PFAS), and formaldehyde (Athey & Erdle, 2021; Ladewig et al., 2015; Lacasse & Baumann, 2004). Although research on the toxicity of modified natural fibers is limited, early research suggested that leachates and the fibers themselves pose a risk to aquatic organisms (Carney-Almroth et al., 2021; Kim et al., 2021; Mateos-Cárdenas et al., 2021).”

- Bisphenols and azo dyes have been on RSL’s for many years.
- PFAS is primarily used on synthetics
- We think that the cellulose fibers degrade and the leachates and finishes themselves could be an issue, but the dyed/finished cellulose will degrade similarly as non-modified cellulose. Thus the finish could be an issue but it is not a natural fiber issue as it decomposes.
- Bisphenols are a polyester issue <https://www.hohenstein.us/en-us/news/topics/bpa-in-socks>
- Formaldehyde is not a persistent chemical and breaks down quickly

Pg. 15 There are standards characterizing microfibers and their definition. Check for these and include definitions from ISO, ATCC and other standard bodies.

Pg.16 cellulose and natural polymers are not plastics and the California definition seems to suggest cellulose is plastic.

- **Merriam Webster Definition of *plastic***
- **1:** a plastic substance *specifically* : any of numerous organic synthetic or processed materials that are mostly thermoplastic or thermosetting polymers of high molecular weight and that can be made into objects, films, or filaments

Pg. 18 “Nonwovens are a category of textiles that are typically used in many disposable products such as wet wipes, diapers, surgical masks and gowns, and feminine sanitary products, as well as geotextile products (Kwon et al., 2021).”

- What chemicals are used in the production of toilet paper, tissues, and paper towels? What types of binders are used? Dyes?
- Fibers used in toilette tissue would also be characterized as a microfiber. These fibers use dyes finishes and chemistry and represent an average of around [~85 rolls](#) of toilette tissue per person in the US being flushed each year. The primary source of cellulose microfibers in aquatic systems is likely to be from toilet tissue. The report should include pulp/paper microfibers or focus on synthetic microfibers alone.

Pg. 18 “It is estimated that discarded cigarette filters may release 0.3 million tons of microfibers to the aquatic environment annually (Belzagui et al., 2021). This is comparable to the estimated 0.28 million tons of microfiber emitted from clothes laundering (Belzagui et al., 2020).”

- Would an FTIR and Raman be able to differentiate between cotton, rayon, pulp and acetate?

Pg. 36-37. “In most cases, chemical additives are not chemically bound to the polymer matrix and can therefore leach from the material (Bridson, 2021). Knowledge of the leachability and toxicity of the many chemical additives associated with microfibers is limited (Sridharan et al., 2022).”

- There is not much known on the toxicity of chemical additives related to microfibers but this committee is taking the stance that they are all toxic and focusing more on that issue than the fact that the petroleum-based fibers will persist in the environment while the natural fibers will degrade.

Pg. 37. “Other chemicals of concern that are frequently used in textile production include bisphenols (including bisphenol A) and benzophenones (Xue et al., 2017).”

- Need to determine where and when these chemicals are used. Bisphenol A is the rubber coating on slip resistant socks and Benzophenones are used in UV protectant clothing.

Pg 38. “Once in the environment, microfibers may also provide a substrate for the adsorption of other harmful pollutants from their surrounding environment, including polychlorinated biphenyls, heavy metals, and pesticides (Browne et al., 2011; Teuten et al., 2007).”

- Do not think this is true because both water and cellulose are polar molecules. Synthetics being nonpolar would attract nonpolar molecules in a polar suspension/solution (water)

Pg. 53. “Common spectroscopy techniques include Raman spectroscopy and Fourier-transform infrared (FTIR) spectroscopy... Approximately 98% of studies that employ spectroscopic techniques for identifying polymer composition of microfibers use FTIR or Raman spectroscopy (Athey & Erdle, 2021).”

- Can these methods reliably differentiate between several types of cellulose fiber ie. cotton, pulp, rayon, acetate? We cannot use FTIR to differentiate between these fibers in our laboratory.

Pg. 54. “Because of the technical challenges in analyzing microfibers, (i.e., incorrect library matches between similar materials such as rayon and cotton, low signal intensity of natural fibers, signal interference by chemical additives and dyes), it is recommended that researchers use multiple lines of evidence (i.e., surface morphology) to support the spectral identification of fibers (Athey & Erdle, 2021; Munno et al., 2020)”

- Admission of difficulty in differentiating these fibers. As pulp is not mentioned, it probably has not been considered.

Pg 57. “In order to ensure that standard methods for researching microplastics include all types of microfibers as defined in this report, **the methods would need to utilize a standard definition of “microplastics” that is inclusive of modified natural, semi-synthetic, and synthetic materials.**”

- A natural fiber cannot be defined as a microplastic. Merriam Webster defines a plastic as: any of numerous organic synthetic or processed materials that are mostly

thermoplastic or thermosetting polymers of high molecular weight and that can be made into objects, films, or filaments

- Even if the cotton fiber has a finish applied, the fiber will still biodegrade in the environment as demonstrated by Zambrano et.al. and by Smith et.al. The finishes may need to have their own designation but natural fibers have been shown, repeatedly...to degrade in natural environments.

Pg. 59. This is an interesting focus..."Some researchers in the textile industry are working to develop more biodegradable fibers, which might be a less harmful alternative to non-biodegradable synthetic fibers."

- Cotton is natural, but not considered by this group to be biodegradable...when research clearly shows that it is biodegradable. Would these new fibers be more degradable than cotton which already exists? These fibers would also need to have dyes and finishes applied. Perhaps focus should be placed on the chemical industry to develop more biodegradable dyes and finishes?

Pg. 65. "Some educational campaigns have recommended that consumers use natural fiber textiles as an alternative to synthetics, but based on existing research, it is not yet clear that natural fibers (most of which are chemically modified for use in apparel) are a less harmful alternative to synthetics. Therefore, this guidance should be avoided until there is more research available."

- Natural fibers do not persist in the environment whereas petroleum-based fibers do. There is an enormous amount of peer-reviewed data to demonstrate that fact.
- Most of the finishes applied to cotton are not durable to laundering. Fabric softeners, the most commonly applied finish in textile applications, are not durable to home laundering. The emulsifiers that are used in these formulations are non-toxic and readily biodegradable.
 - Biodegradation and Ecotoxicity of Branched Alcohol Ethoxylates: Application of the Target Lipid Model and Implications for Environmental Classification Gail E. Bragin^{1†} · Craig Warren Davis^{1†} · Ming H. Kung² · Barbara A. Kelley¹ · Cary A. Sutherland¹ · Mark A. Lampi¹ Received: 17 April 2019 / Revised: 26 September 2019 / Accepted: 27 September 2019 © 2019 The Authors. Journal of Surfactants and Detergents published by Wiley Periodicals, Inc. on behalf of American Oil Chemists' Society

Regards,

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