Report to the Legislature on the Findings of the Synthetic Microfiber Working Group



January, 2020

Introduction

Microfibers are one of the most prevalent type of microplastics in the environment and have been found in surface water, soil, biota and atmospheric samples[1]. Researchers are looking into the sources of microfibers and their effect on human health and the environment. While there is much work to be done to gain a more complete understanding of the impacts, the legislature has directed the Department of Energy and Environmental Protection ("Department") to establish a working group to look at ways to create consumer awareness of this emerging issue and recommend practices to reduce or eliminate synthetic microfiber pollution.

The Department convened a working group, which had two in-person meetings in September and November of 2018. The following report is a result of the Department's thorough assessment of the input of the varied stakeholders and a review of the current research.

I. Establishment of the Working Group

During the 2018 session, the Connecticut legislature passed Public Act 18-181, ("PA 18-181") which required the Department to convene a working group to establish a consumer awareness and education program on synthetic microfiber pollution. PA 18-181 listed several organizations to be included in the working group including:

(1) The Sustainable Apparel Coalition

(2) the American Apparel and Footwear Association,

(3) the American Apparel and Producer's Network,

(4) Fashion Group International,

(5) the National Retail Federation,

[1] Hartline et al. 2016

(6) the Council of Fashion Designers of America,

(7) Fashion Business, Inc., and

(8) the Outdoor Industry Association.

The Department invited several other stakeholders with interest and expertise in synthetic microfiber pollution and water pollution. The list of working group members is indicated in Attachment A.

The working group met in Hartford on September 18th and November 14th, 2018. The meetings allowed for in-person participation or remote participation and were open to the public. The agendas and minutes are included as Attachment B. The Department established a website on synthetic microfiber pollution, which included a description of the issue, links to the PA 18-181, presentations given at the first meeting, and links to articles on synthetic microfiber pollution.

II. Developing a Consumer Awareness and Education Program

The working group discussed a number of ideas for creating a consumer awareness and education program. The components of this program include:

a. A description, in layman's terms, of how synthetic microfibers are shed from clothing and are dispersed into the state's waterways.

b. Best practices for consumers to eliminate and reduce the disbursement of microfibers from clothing into the waterways of the state,

c. Information on efforts that members of the apparel industry, including but not limited to, brand labels, are undertaking to reduce or eliminate synthetic microfiber pollution.

d. Other components of an awareness program.

a. How Synthetic Microfibers Are Shed from Clothing and Dispersed into the State's Waterways.

Working group members generally agreed that synthetic microfiber pollution is an emerging issue for which there is little general awareness on the part of the public. An effective approach to educating the public on this issue is to explain its relationship with the more publicized issue of plastics pollution in the ocean.

Members of the working group discussed both "long form" and "short form" strategies for reaching the public. Long form strategies would include traditional media such as newspaper and television stories publicizing research on synthetic microfiber pollution, especially if the research is conducted locally. Consumers could also learn about synthetic microfiber pollution through national media including television documentaries that provide more in-depth analysis and context. Short form strategies include social marketing campaigns and internet based communications designed to quickly capture attention, educate readers and provide simple, feasible solutions.

The working group agreed that any statement meant to educate the public about how synthetic microfibers end up in our waterways should be concise, informative and accurate while avoiding legalistic or scientifically confusing language. The statement should provide direction to the public on steps to take to reduce or eliminate their contribution of synthetic microfibers to the state's waterways. The group generally agreed that while it is important to mention that all clothing sheds fibers, synthetic fibers are of greater concern because of the potential impact of plastic microfibers on waterways including specifically aquatic and marine eco-systems. The consensus of the group was that while synthetic microfibers are shed constantly through normal

wear, use and laundering (washing and drying), and from sources other than clothing, the awareness campaign should focus on the washing of clothes because it is a known route for disbursement directly to waterways and ties in to steps consumers can take to reduce shedding. While the Public Act asked for a public awareness campaign for synthetic microfiber pollution, some working group members commented that there needs to be additional research focused on the impacts of natural fibers.

b. Best Practices for Reducing and Eliminating Synthetic Microfiber Pollution

The working group discussed various best management practices for the public to utilize to reduce its contribution of synthetic microfibers to waterways in Connecticut. The best management practices were divided into two foci: i) laundering techniques and ii) mechanical devices.

i. Laundering Techniques

The Department researched laundering techniques to lessen the amount of microfiber shedding. There was discussion in the group concerning whether or not these practices were effective. Some of the practices included:

- Using a liquid detergent instead of a powder,
- Avoid high pH detergents,
- Washing at a lower temperature,
- Washing for shorter cycles, and
- Washing less frequently,

Researchers from the University of Toronto, who participated in the working group, stated that it is not clear that the laundering techniques will reduce microfiber shedding. They believe further study is needed to determine if laundering practices are effective enough to be promoted to the public. The Department could not find any studies conclusively demonstrating the effectiveness of these techniques. More research is needed on these techniques.

The working group discussed the impact on shedding of different types of washing machines, i.e. front loading and top loading. While a University of California Santa Barbara study showed a top loading machine produced more shedding than a front loading machine, members of the group indicated this difference may be explained by the presence of a central agitator.

ii) Mechanical Devices

The working group discussed three technologies for removing synthetic microfibers from washing machine effluent; the Guppy Friend, the Cora Ball, and an external filter.

The Guppy Friend is described by its manufacturer as a "washing bag" that filters microfibers from washing machine effluent. The clothing is placed into a mesh bag and then into the washing machine. The fibers are then removed from the bag after washing and placed in the trash. The bag also is designed to limit the amount of shedding by protecting the clothing from agitation in the washing machine. The Guppy Friend is available through retailers for between $30 and $40. The bag reduces the dispersal of microfibers of the clothing washed in it by roughly 80%.

The group did not have any objections to promoting the use of the Guppy Friend as a practice for consumers to reduce their contribution of microfibers to waterways.

The Cora Ball, sold online by the Rozalia Project, is a sphere that is placed in the washing machine and catches microfibers on its ridged surface, which are then clumped together and removed by the user. The Cora Ball removes about 30% of available microfibers and costs about $30.

The working group discussed the Cora Ball and there were no objections to promoting its use to the consumer as a step they can take to reduce microfiber pollution.

There are external washing machine filters available to the public. They are marketed as a means of maintaining a septic system as well as reducing microfiber releases to the environment. The filters remove 80% - 89% of microfibers but must be maintained by the user. The filter essentially works as a lint trap for the washing machine akin to a lint trap in the dryer. These filters are the most effective technology, removing the majority of microfibers from washing effluent and the cost ranges from $100 and up. Examples of external filters include Lint-LUV-R Filters and the Filtrol 160.

The working group discussed the external filters and there were no objections to supporting the use of external filters as a step consumers can take reduce to microfiber pollution.

In supporting their strategy, working group members and their respective organizations do not officially endorse any products listed within the document, rather, they offer these products as examples of innovative, publicly-available technologies with a demonstrated ability to reduce microfiber pollution.

iii) Efforts of members of the Apparel Industry, including brand labels, are taking to reduce microfibers

The apparel industry was represented in the working group by the American Apparel and Footwear Association (AAFA), the Outdoor Industry Association (OIA) and Patagonia. REI participated remotely and through email correspondence with the Department.

The industry representatives in the working group indicated they are engaged in a number of initiatives regarding microfiber pollution. These initiatives include:

- **Supporting Research**. REI, MEC, Arcteryx, and Patagonia have partnered with the Bren School at the University of California Santa Barbara to study how synthetic microfibers enter the environment and their impact on eco-systems. REI has partnered with the Vancouver Aquarium on a similar study. AAFA indicated they "have held environmental-focused and microfiber-specific meetings for members to bring in researchers and brands to talk about their work on microfibers."

- **Promoting Technologies that Reduce Microfiber Pollution.** Patagonia indicated they offer the Guppy Friend washing bag for sale in their stores and online. They also promote the external washing machine filters.

- **Product Re-engineering**

Manufacturers indicated there is preliminary research going on to identify or develop potentially viable alternative fiber compositions.

- **Establishing Testing Standards for Shedding**

Patagonia indicated they are involved in establishing a standard testing protocol to measure shedding of microfibers in the washing machine. Currently there is no standard testing protocol for determining the amount of shedding of microfibers. Establishing a standard for shedding would allow the industry to identify and label low-shedding garments. Consumers could use this information to guide their purchasing.

- **Product Brand Labels**

The Department is not aware of any manufacturer that is currently labeling or supporting the labeling of garments to inform the consumer about microfiber shedding. The AAFA and Patagonia indicated they did not support labeling but rather informing their customers through their website and in-store conversations.

iv) Other Components of a Consumer Awareness and Education Program

The working group discussed a number of strategies to create a public awareness and education program on synthetic microfibers, including:

1. Developing a K-12 Curriculum

The working group supported including synthetic microfibers as a part of a larger curriculum on plastics in the ocean. There are a number of initiatives offering lessons on plastics including Project Wet, a national curriculum based on water issues. The working group heard from Sue Quincy, DEEP Environmental Education Specialist, about how curricula are developed. She shared several current projects in which a discussion of microfiber pollution would be a logical fit. The first step in developing a curriculum is identifying the potential funding to support it.

The working group supported including a section on microfiber pollution in current efforts to develop classroom activities and lessons on the larger issue of plastic pollution in the ocean.

2. Social Marketing Campaign

The working group discussed how a social marketing campaign could help create awareness on synthetic microfiber pollution. There are many ways to reach a consumer. Some

are more detailed such as documentaries and news accounts, however, the group saw value in a social marketing campaign that could engage the consumer briefly and frequently and entice him/her to learn more or leave an image that may encourage further action at a later point. While individual organizations could produce unique social media campaigns best suited to their brand, the overarching messages could be coordinated among various stakeholders to provide a consistent product.

3. Working with Mystic and Norwalk Aquariums to Develop Educational Displays

The Mystic and Norwalk Aquariums, in partnership with the University of Connecticut and other state universities, provide an opportunity to conduct original research on synthetic microfibers, promote that research to their patrons, and develop displays and exhibits that incorporate synthetic microfiber information with existing research and outreach. The working group supported the work of the aquariums and other nature and science centers in creating awareness about microfiber pollution for its visitors.

4. Point of Sale Information

Retailers that sell garments containing synthetic fibers have the opportunity to educate their customers through personal interactions and point of sale information. Patagonia indicated they engage customers in this conversation in their retail stores and provide the Guppy Friend for sale. Other manufacturers of fleece and synthetic garments have a similar opportunity to interact with their customers.

5. Mailers to Connecticut Sewer Customers

As sewer use bills are already being sent to consumers across Connecticut, the addition of a short statement on microfibers would have wide reach for nominal cost.

III. Recommendations for Legislation

It is only relatively recently that researchers detected synthetic microfibers in the ocean and state waterways[2]. Further research has determined that these microfibers come from a variety of sources in different amounts. The science is clear that one route of this pollution is through the shedding of fibers when laundering clothing. Impacts to human health and ecosystems are still largely unknown. Research will eventually direct the appropriate actions. The discussions of the working group made it clear that the time is now to increase consumer awareness and take actions to reduce synthetic microfiber pollution where possible.

PA 18-181 asks the Department, through this report, to make recommendations for legislation concerning, a) a consumer education and awareness campaign and b) the reduction of microfibers in the state's waterways. While the Department does not have any specific legislative recommendations at this time, the following legislative concepts are proposed for further consideration.

a) Creating a Consumer Education and Awareness Campaign

While there are existing educational programs for creating awareness about the issue of plastics in the ocean, there is currently little information specifically about synthetic microfiber pollution. Much of what was discussed in the working group could be implemented without legislation, such as curriculum development associated with Project Wet, Mystic and Norwalk Aquariums exhibits, and social media campaigns. Publicizing the research conducted by UCONN, Southern Connecticut State University and other in state institutions will create consumer awareness without the need for legislation.

[2] Browne, 2011

The legislature may want to look at point of sale information. Currently Patagonia is the only manufacturer that the Department is aware of that is educating its customers at the point of sale. The information provided to customers should inform them about the shedding of microfibers and the steps they can take to reduce microfibers from being released to our state waterways.

New funding sources are needed for research and public education campaigns. In the spirit of stewardship, manufacturers can contribute financially to further research, especially pertaining to Connecticut waterways and Long Island Sound, promote that research, develop curricula, and provide point of sale information to the customers.

b) Reduction of Microfibers in the State

Consumers, clothing manufacturers, and washing machine manufacturers should all play a role in reducing or eliminating synthetic microfiber pollution. Addressing this problem should start with pollution prevention as the highest priority while also looking at strategies for preventing microfibers from reaching our state's watercourses.

The working group agreed that trying to capture microfibers at wastewater treatment plants (Publicly Owned Treatment Works or POTW) was not economically or technologically practical. The science is clear that while most of the microfibers are contained in the sludge, some are released through the treated effluent into adjacent streams and rivers. Currently, no technology exists at POTWs for filtering out these microfibers. Eliminating the microfibers closer to the point of generation would ultimately be more effective.

Consumers – Consumers can wash clothes only as needed, select higher quality garments that shed less, and use existing technologies such as the Guppy Friend, Cora Ball and

external filters. Consumers need to be made aware of the issue of microfiber pollution and given information that can inform their choices in purchasing and caring for their clothing.

Clothing Manufacturers – Clothing manufacturers can continue supporting research that includes developing a standard testing protocol for determining shedding rates, identifying lower shedding fabrics, investigating environmentally safe additives to clothing to decrease or eliminate shedding, and providing point of sale information to the consumer.

Clothing manufacturers can identify textile production methods that result in less shedding.

Appliance Manufacturers – Once the consumer has been made aware of the problem, and has taken steps to reduce microfiber pollution, and the clothing manufacturer has taken steps to lessen shedding from clothing, there is still a need to capture the remaining microfibers released. Neither of the preliminary steps will result in an immediate and complete elimination of microfiber pollution. The final best chance to remove microfibers is through an internal filter in the washing machine. Although most commercially available washing machines do not have an integrated filter, the technology exists. Appliance manufacturers should consider offering an option for an internal filter on a washing machine that captures microfibers. If the awareness campaign is successful, consumers may create a demand for such a washing machine and an internal filter may become a standard feature.

Attachment A

Synthetic Microfiber Working Group Members

Dr. Vincent Breslin
Professor of Environment, Geography and Marine Sciences
Southern Connecticut State University

Louis W. Burch
Connecticut Program Director
Citizens Campaign for the Environment

Edward A. Gribbin
Senior Advisor
Alvanon

Sidney J. Holbrook
Executive Director
Greater New Haven Water Pollution Control Authority

Kristen Kern
Government Relations Representative
American Apparel and Footwear Association

Bill Lucey
Sound Keeper
Connecticut Fund for the Environment/Save the Sound

Andrew Pappas
Policy Advisor
Outdoor Industry Association

Dr. Evan J. Ward
Professor of Marine Sciences
University of Connecticut

Timnit Kefela
PhD Student
Bren School, University of California Santa Barbara

Stephanie Karba
Environmental Researcher
Patagonia

Demi Fox
Northeast Regional Coordinator
NOAA Marine Debris Program/Freestone Environmental Services

Dr. Christina Stringer
Environmental Analyst,
New England Interstate Water Pollution Control Commission

Alicea Charamut
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Connecticut River Conservancy

Lisa Erdle
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Margret Miner
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David Sutherland
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Elissa Foster
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Sarah Pierce
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MaryEllen Mateleska
Director of Education and Conservation
Mystic Aquarium

Ted Kennedy Jr.
State Senator
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Jason Krumholz
Sr. Environmental Scientist
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Hardy Poole
Vice President, Regulatory and Technical Affairs
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Sarah Edwards
Director
Eunomia Research and Consulting Inc.

Attachment B

September 18th Microfiber Pollution Working Group Notes:

- Welcome: Tom Metzner, DEEP
- Background on the Law: Senator. Ted Kennedy Jr.

Sen Kennedy discussed inspiration behind the law establishing this working group.
Key points included:

- interest in protecting Long Island Sound and Estuary
- understanding the causes of microfiber pollution
- a charge of the working group is to develop a public education campaign – what ordinary consumers can do
- to understand what industry is currently doing on microfiber pollution
- come up with a series of recommendations for the legislature
- Discussion in Connecticut has impact on national understanding of this issue ("national public policy ramifications")

- Introductions by each member here including remote

- Introduction & welcome by Rob Klee (Commissioner at DEEP)
  Key points in Commissioner Klee's remarks:
  -Protecting our land and water
  -Thank you to academia, industry, environmental advocates
  -Impressive group on this topic
  -Importance of Connecticut's contribution to national dialogue
  Commitment to clean Long Island Sound
  -concern about and plastics, including but not limited to microfibers and impact on waterways
  - sense of urgency around this issue (plastics in our oceans)
  -impact on aquatic wildlife – ingesting plastic
  -Wants to hear discussion from the group about what POTWs, government and consumers can do to help with microfiber pollution. What is at the forefront of the science?

- Overview: Tom Metzner, DEEP
  Focus on what the law, PA 18-181, requires us to do
  -Convene a group for the purpose of developing a consumer education campaign on synthetic microfiber pollution
  -consumer oriented information that explains the process how microfibers are shed and get into the waterways.
  -best practices for reducing /eliminating microfiber pollution
  Efforts of the industry to address microfiber pollution
  -labeling
  -all opinions should be included in the report

-strive for consensus
-opportunities for voluntary agreements.
-ideas for legislation
-Two primary assumptions:
Stewardship – the principle that those that have caused the pollution should bear the primary responsibility for its correction
Precautionary principle – that even without scientific certainty, there is enough information to proceed.

- 1st Presentation: Timmit Kefala, PhD Student, Bren School-UC Santa Barbara:
    - A common source of microfiber is our clothing
    - Most of us wear synthetic clothing
    - 80% of polyester consumed is used in apparel
    - Microfibers are less than 5mm in length
    - Between .19 and 1.7 metric tons of microfibers entering our oceans annually
    - Increasingly ubiquitous in the environment, ocean, rivers, lakes, sediment, in organisms, soil, artic ice, sewage sludge.
    - The action of washing clothes releases microfibers but the type of machine, and the age of the machine can impact the amount released.
    - Microfibers can be released to atmosphere by drying clothes, or to a POTW through waste water. Most settles in sludge but some is released through effluent.
    - Largest amount of microfiber is in biosolids which may be incinerated or land applied.
    - Land applied microfibers can be conveyed to water through run off and atmospheric transport.
    - Washing of clothing is not the only route of transport of microfibers into the environment. Also present in carpet, furniture, and cigarettes. More study needed.
    - Microfibers can attach to heavy metals and other pollutants in effluent.
    - Microfibers in soil can effect symbiotic relationship between plants and microbes that support them.
    - Recent study shows microfibers decrease microbial activity more research needed on the impacts of microfiber on soils.
    - Areas for further research include
        - Global material flow analysis and hot spot identification
        - Microfiber behavior in different waste water treatment matrices
        - Effect on microfibers on plant microbe interactions

  Question from Sen Kennedy – any suggestions for the group on best practices for removing microfibers – low hanging fruit or best bang for the buck? Industry initiatives
  Timnit- information to consumers on frequency of washing. Installation of filters on washing machines, industry is trying to understand material flow and emission sources.
  Sid Holbrook – any research on fate of microfibers in waste water treatment plants?
  Timnit – There has been research on microplastics. Microfibers are emerging as dominant source of microplastics with phasing out of microbeads.

- 2nd Presentation: Lisa Erdle (and Chelsea Rochman), PhD Student, University of Toronto: Science to inform solutions
    - Increasing attention & concern on microfibers
    - 190 million tonnes (metric) released per year from textiles
    - Diverse wildlife are contaminated by microfiber – can be transferred from prey to predators
    - Most microplastics in fish in Great lakes are microfibers.
    - Studies link microfiber pollution and washing machines
    - POTWs are major pathway for microfibers
    - Also trying to understand the effects of other fibers including cotton
    - Unknown impact on human health but microfibers found in human food
    - Testing two different devices from washing machines, one filter and one internal device designed to capture microfibers.
    - Proposed mitigation solutions are effective at reducing microfibers
    - Question & Answers with Lisa
    - Tom Metzner question - Between the clothes itself, the washing machine, and the POTW, which is the most logical point of intervention?
    - Lisa – POTWs are a difficult one – major block to water flow to filter out microfiber. Material scientists are looking at shedding on clothing. The washing machines are the low hanging fruit and we have existing devices that can capture it at that level,
    - Question – Are plastics going from the gut in fish into the flesh?
    - Lisa – Yes, there is some work going on with that right now.
    - Question from Bob K. Deputy Commissioner at DEEP – Any emerging science on other contaminants such as flame retardants, repellants, and stain resistance
    - Lisa – we are currently studying that.
    - Dr. Ward – How is the microfiber getting into the fish if the fish are not bottom feeders?
    - Lisa – Through predation or just through the water column – Other research is showing higher concentrations of microfibers in bottom feeding fish.
    - Iliana – Is there any difference in shedding using different detergents?
    - Lisa – Washing behavior does make a difference. Some evidence concerning detergents and top loading and front loading machines have different rates of shedding. There is evidence that consumer behavior can impact the amount of shedding.
    - Sen Kennedy – Did I understand correctly that you found about 5000 microfibers per liter in washing machine waste water?
    - Lisa – yes, about 200,000 microfibers per load.
    - Sen Kennedy – Should we add representation from washing machine manufacturers to the working group to get their recommendations?
    - Lisa – Washing machines in Japan have a filter built in and they remove most of the microfibers.

BREAK

Group Discussion of Content for Public Awareness Campaign:
Tom M – How do we get this message to the public in a way they can understand?
What are the points of emphasis for the general public?
Demi F. Most important is to convey to the public that there are things they can do to help. Try to convey a positive message.
Sarah E. – Be careful not to dissuade people from buying certain garments. Other fabrics can have environmental impacts.
Lou B. – Can't assume the public is paying attention to this issue so we need to provide background but not get too technical or scientific. Put it in terms that average person can understand.
Margret M. – Use visual representations of microfibers, for example in fish, as a way to present the problem in a relatable way to the public. Interested in washing machine filters as something people can do.
Dr. Ward – While we are not finding a lot of microfibers in shellfish currently, we need to inform the public now to get ahead of this problem. Visuals are a good idea but challenging because microfibers are small. There are videos of microfibers inside a living oyster that are interesting.
David S. – What are the pivot points? It seems washing machines are one. Are washing machine manufacturers aware of this problem? Can they provide information to customers concerning washing practices and lessening shedding? Also apparel manufacturers are another pivot point where their customers can learn about this issue.
Elissa F. – We (Patagonia) are a recognized brand and we have been communicating with our customers about this issue, including washing options, available filters. Patagonia is looking at standardized test methods to determine which clothes shed more. Washing machine industry is aware of this problem.
Lou B. - People want to hear compelling information such as 80% of the fish that come to market have plastic particles. A social marketing campaign such as invasive species. Simple targeted messages with simple steps you can take.
Bill L. – Important to breakdown the plastics problem and categorize it. Start with the bigger pieces of plastic, the visuals of whales and sea turtles ingesting plastic or tangled in it, then get down to micro beads, then microfibers. Use cartoons to show microfibers. Another visual is a ball of microfibers from trawling until you get enough to see like dryer lint. Be careful not to be too alarmist on microfibers in fish because you may alienate a potential ally in the commercial fishing industry.
Tom M. – What depth of information are we trying to deliver? Information can come in short hits and visuals or through a movie.
Elissa F. – Use a blog for longer form information. They also reach their customers through the sale of "Guppy Friend" which is a bag you put in your washing machine to trap fibers. Store staff work with customers on microfiber and the use of the bag. There has been some backlash from customers who want Patagonia to do more to correct this issue. The bags cost $15 and last about 50 loads. The customers seem to understand why they are using the bags and how to properly use them.
Tom M – question for Elissa concerning washing machines having filters in Japan. How much does the filter add to the cost of the machine?

Elissa F. – Not aware of how much additional cost but the filters were not built to remove microfiber. They were installed in washing machines in Japan because many Japanese don't have dryers and line dry their clothes. It wasn't meant to filter microfibers but it has this added benefit. Decades ago we used to have filters on washing machines in America. It is a doable technology.
Sarah E – Wanted to point out that we looked at labeling for the European commission. If there was a standard in place for measuring the rate of shedding, then labels could inform the consumer by being listed as ""high emission" or "low emission". Washing machines could be labeled to inform the consumer if they had filters to keep microfibers out of the environment.
Margret M – questioning whether we want to stay away from telling consumers about microfibers in shellfish. (Previously suggested that telling consumers could alienate commercial fisherman)
Alicea C. – Excellent social marketing campaign used in Chesapeake Bay Campaign on crabs and fertilizer run off. Simple message and effective with visual.
Tom M. – Is there a foundation of the science that we can agree to?
Kristen K. – Don't want to get ahead of the science. Our recommendations focus on washing behaviors. There are filters and methods that consumers can pursue to make measureable, meaningful change. Information is updated regularly and need a website that can update with changes. We acknowledge that there are microfibers in the water but there are gaps in knowledge but we (clothing) is a part of it.
Dr Evan W – part of our messaging is that microfibers come from various sources, not just clothing. We also shouldn't shy away from saying there are microfibers in seafood but put it in context – you're also eating microfibers in sea salt or in your coffee from the shedding that occurs outside of washing such as removing your clothes. Describe all the sources of microfibers and routes of exposure.
Tom M. - Should microfiber pollution be a subset of the plastics in the ocean discussion or should it stand alone as a distinct topic?
Vincent B. It helps and hurts to be included with larger plastics issue. Helps because there is a track record on plastics in the ocean and people have some understanding of it. Hurts because there are already preconceived notions that people may have. This microfiber pollution has been going on for 50 years, we just have a more recent awareness of the problem.
Kristen K. – Sees the connection with the larger plastics issue but the solutions are different. – With larger plastics issue it may surround banning a product such as plastic bags or straws or encouraging people not to use them, but with clothes you focus on washing behavior, not avoiding purchasing.
Edward G. (on the phone) – younger consumers are demanding more environmentally friendly products including clothing. Need to educate our members (clothing manufacturers) to stop it if possible (shredding) or at least mitigate it.
Lisa E. I think starting with a discussion of the larger issue of plastics is a great place to start but keep in mind that microfibers are the largest source of plastics in the ocean.
Senator Kennedy – I wanted to get back to our charge and that is to establish a public education program about microfibers, including but not limited to labels. One of the things we would like to see from this group is industry led initiatives, perhaps overseen by DEEP similar to what's been done with other chemicals or products such as paint or neonics. Instead of banning, work with industry to reduce without the heavy hand of government. Legislature is poised to develop

legislation on labeling or filters but would prefer industry lead voluntary initiatives. Consumer education campaign should focus on things people can do now to reduce microfiber pollution.
Vincent B – This can't just be about Connecticut. Need to work with other northeast states that can also contribute pollution to Long Island Sound.
Kristen K – Specific to labels, industry already has a number of labels that are already on our garments, and there is a question as to how effective a label would be.
Elissa F. – also unsure how effective labels would be. There are other synthetic microfibers such as nylon and acrylic. We also don't know the effect of natural fibers. The City of Vancouver waste water treatment plant did a study and 32% of what they thought were synthetic fibers were synthetic fibers. The remaining 68% were natural fibers. We want to do more studies to determine impact of cotton – maybe switching to cotton isn't the best answer. With a better understanding of the problem, a label could be helpful but we would like to focus on preventative measures. Cotton could transfer other harmful chemicals.
Sid H. – Wanted to echo the remarks of Sen Kennedy in that if industry doesn't come forward with a solution then the legislature may have to act. Similar to mercury so we took legislative steps to eliminate mercury from coming to our plants. It's been very effective. I don't really support labeling but perhaps some public information at the point of sale.
Sen Kennedy – Would treatment plants be open to providing information to the public through inserts in their bills?
Sid H. – Speaking only for New Haven we would be open to that and think that is an excellent idea.
Sen Kennedy – bill inserts are one idea that is free. What are some of the other ideas we can use to educate the public?
Demi F. – Blog posts and documentaries are another way to educate the public. Also short concise messages that include humor and a hashtag work for younger audiences.
Margret M. – Sooner or later we will need one or two brochure sized handouts. Labels could be positive such as EPA's Best Buy program which may be more acceptable to the industry.

November 14th Microfiber Pollution Working Group Notes:

- Welcome: Tom Metzner, DEEP
    - Want to look at the law and its requirements and see what the group can agree upon addressing each requirement.
- Introductions by each member
- Discussion of Requirements in Public Act 18-181

a. " consumer oriented information that explains the process by which such microfibers are shed from clothing and are dispersed in the state's waterways"

- Tom: We want to highlight the concerns members of the working group have on the statements in the draft of how microfibers get into the waterways.
    - This is meant for the lay-person, it has to be simple enough for them to understand but we want to be scientifically accurate.
- Tom: What is the size of a microfiber (or microplastic)?--> There isn't a common, standard size that all parties agree on

    - Dr. Ward & Dr. Breslin: <5 millimeters in length and <10 microns in diameter
    - David Sutherland: don't put it in scientific terms for the general public, put it in terms of something a lay person would understand (smaller than a strand of hair, etc.)
    - Lisa Erdle: This is a definition for control, not logical effect.
    - Consensus: Definitions for people involved vs. regular people (lay-persons) are different. There is a place for a scientific and legal definition and a common one, which can be useful in educating the public.
- Demi Fox and Lisa Erdle: There are many sources of microfiber pollution, but we know that laundering and washing machines contribute to it and we can focus on that now
    - Sarah Pierce: AHAM does not agree with targeting washing machines
    - Miriam Diamond: We know the most about washing machines; there are other sources but we don't know enough about them (e.g., microfibers in the air)
- Stephanie Karba: The apparel industry is working really hard in order to create a standardized test method so that we can actually quantify using the same method company to company.

b. "best practices for consumers to eliminate and reduce the disbursement of microfibers from clothing into the waterways of the state"
- Miriam Diamond: Textiles over time—newer textiles have a shedding rate less than older textiles (clothing)
    - Moving toward more durable clothing
- Demi Fox: Keep it simple for the public in the public education campaign
- Bill Lucey: We can say something like clothes shed plastic fibers, some you can see and some you can't, and these can end up in oceans and waterways like the Long Island Sound
- There isn't enough evidence (according to the University of Toronto team) to say that any laundering practices (other than washing less frequently) would reduce the amount of microfibers
    - However, we can say that the use of filters can help reduce amount of microfibers released in washing machine effluent
- Senator Kennedy: Mermaids public education campaign example
- Technology
    - Cora Ball about 30% removal, Guppy Friend (about 90% removal) & External Filters→ (Filtrol 160—most effective)
        - Easy solutions for people to just want to do something

--BREAK--

c. "information on efforts that members of the apparel industry, including, but not limited to, brand labels, are undertaking to reduce or eliminate microfibers in clothing"
- Kristen Kern: AAFA is gathering information and data to find out the best practices they can tell their consumers

        - Right now, they need more information
    - Steph Karba: Apparel industry is working to find a standardized and quantified shedding rate (OIA) so that they can use to company to company
        - Bringing researchers and brands together
        - Not a definition of durability, but a measurement to use and for consumers to infer durability
        - Beginning stages; timeline is in the process of being created
    - There are several organizations claiming that they have a solution (e.g., an additive on the clothing) and they're testing it (Patagonia)

d. Other components of a consumer education and awareness program including funding
    - Consumer awareness part: telling consumers about the problem, what they can do about it and what is being done by the industry
    - Sue Quincy: cost approximately $20,000-30,000 (for the educational component)
        - Human impact on environment already part of the curriculum, students taught "how to think" not "what to think"
        - Integrate into plastics issue
    - Lisa Erdle: Supports this idea
        - Students go through a water sample and find the amount of microfibers in it
    - Demi Fox: NOAA's Marine Debris Program hosts two grant competitions each year; announcements are typically published in August
        - Removal FFO: every year
        - Research FFO: every other year
        - Prevention (through Education and Outreach) FFO: every other year
        - UK social media campaign—What's in my wash? #What'sinMyWash
            - Consumers could share what their clothing's made out of—gets people to pay attention to the issue
    - Funding discussion—funding is always hard to get (esp. in the U.S. vs the E.U.)
        - Dr. Ward: hard to get funding for a new topic like microfiber pollution
    - Dr. Breslin: we don't know about the amount of microfibers in the Sound
        - Lack of local research

i. K-12 Curriculum

ii. Working with Mystic and Norwalk Aquariums on exhibits, research and promotion of research

- Mary Ellen Mateleska—Mystic Aquarium:
    - Plastics pollution education and exhibition→ both macro and microplastic prevention
    - Working with 22 other aquariums around the country on a campaign on plastic pollution
        - Tracking behavioral change on 1 consistent message

- Undergraduate research from all over the country; students present information at the aquarium during its busiest days
- Social media campaigns from Mystic Aquarium:
  - Facebook, Instagram, Twitter
  - Consistent message
  - Easy to access for consumers

iii. Social media campaign

iv. Tie in to plastics in the ocean issue

Break – 10:15 – 10:30

III. Continuation of discussion of above

IV. Recommendations for report – Education, reengineering, filtration

- Statement
- Technologies
- Dr. Ward: An opportunity to mention the K-12 education and we'd be able to see if it is effective in the future.
- Bill Lucey: This is a long-term project; can't just have a few meetings
  - Imperative to have a way to monitor the effectiveness of the campaign
  - Quite a bit of sampling and research
- POTWs and WWTPs→ examine phosphorus and microfibers and the sludge

V. Next Steps, Timeline, Goals 11:45 – 12:00—Tom Metzner:

- We need to know what everyone agrees on and can agree on
- Some outreach component should be developed (like the Mermaids public education campaign or the CT DEEP fertilizer campaign)
- Conference call after draft of the report

12:00 - adjourn

Attachment C - Statements

The Department offered each working group member the opportunity to provide a one page position paper on the report. The American Apparel & Footwear Association (AAFA) and the Association of Home Appliance Manufacturers provided the following statements.

Statement from the American Apparel & Footwear Association

The American Apparel & Footwear Association (AAFA) is the national trade association representing apparel, footwear and other sewn products companies, and their suppliers, which compete in the global market. Representing more than 1,000 world famous name brands, we are the trusted public policy and political voice of the apparel and footwear industry, its management and shareholders, its nearly four million U.S. workers, and its contribution of more than $400 billion in annual U.S. retail sales.

We appreciate the opportunity to include our recommendations to the legislature. First, we want to address the proposal of adding products labels to garments or textile products to inform consumers about microfibers. According to researchers who participated in the working group, at the moment, there are no proven actions that consumers can take to address microfiber release. In the absence of scientifically-supported actions that consumers can take to address the issue, a label on products will cause more harm than good. The label will spread fear by leading consumers to believe that (1) there is a health or environmental hazard, (2) it is being caused solely by the purchase and washing of apparel products, and (3) there is nothing that they can do about it.

Second, we would like to express support for a method of consumer education that was discussed at length with the working group. The Greater New Haven Water Pollution Control Authority was included in the discussion of including information on microfibers in mailers already being sent to residents in their jurisdiction. This idea was suggested by Senator Kennedy and supported by the working group as a low-cost, effective means of distributing information. As sewer use bills are already being sent to consumers across Connecticut, the addition of a short statement on microfibers would have wide reach for nominal cost. Additionally, the working group has already created a draft statement that can be used for this purpose.

Lastly, we propose a legislative approach to microfiber release. The discussions of the working group made it clear that it is necessary to assess the environmental and health impacts of microfibers. As such, the legislature may want to look at researching the health impact and scope

of microfiber release in Connecticut waterways and water treatment facilities. Similar to California SB 1422, research should be conducted at the state level as a first step in the process to understand microfiber shed, especially pertaining to Connecticut waterways and Long Island Sound. Consumers, clothing manufacturers, and washing machine manufacturers should all assess the role they play in addressing synthetic microfiber pollution. The group agreed that all clothing sheds fibers, which is supported by current research. Before efforts can be made to address microfiber release, it is important to understand the impacts of both natural and synthetic fibers.

HOME APPLIANCE MANUFACTURING INDUSTRY VIEWS ON THE CONNECTICUT SYNTHETIC MICROFIBERS WORKING GROUP

Introduction

AHAM believes that the issue of Microfiber pollution is multi-faceted issue that involves the textile manufacturing process, apparel production and the manufacture of other consumer goods that utilize fibrous materials. AHAM believes that any effort to curb microfiber pollution will have to consider sound scientific evidence, accurate and factually based information and most importantly examine all modes in order for Connecticut DEEP and the legislature to consider consumer awareness and education campaigns.

The Connecticut Microfiber Working Group should not focus solely on shedding of microfibers during laundering. DEEP must consider the entirety of the textile and apparel supply chain, which includes the extrusion of fibers, manufacturing of yarn, cutting and sewing of fabrics and apparel production. Furthermore, the Working Group has largely ignored consumer practice; industries like AHAM cannot account for the usage habits, wash practices and habits, and waste water treatment methods that each consumer engages in and is exposed to in their communities.

Laundering Practices

The Working Group and an outside research organization have discussed the varying impacts of Top Load (Horizontal Axes or HA) and Front Load (Vertical Axes or VA) washers on microfiber shedding. As pointed out in the "Microfiber Pollution and the apparel industry" research paper by University of California, Santa Barbara (UCSB), the effects will vary by the technology of the washer and its interactions with the type of textiles/garments. While UCSB's research was done on only two washers (one HA and one VA), there are many variations in technologies within these categories (i.e., impeller-less VA, high spin speed HA), and each of the technologies offer unique benefits and value to consumers. UCSB's research, which focused on jackets from one manufacturer, showed a high level of interaction between garment type and washer technology. UCSB's research also showed a high degree of variation between size and weight of microfiber shedding for different jacket materials that were tested indicating that a conclusion cannot be drawn for one technology over another. User preference and wash conditions such as wash cycle selection, water temperature, detergent usage are a few other uncontrollable factors that may have an impact, yet without extensive testing, there is no verifiable evidence that recommending certain consumer practices would have any bearing on microfiber shedding.

Aftermarket Washing Machine Filters

The Working Group in its report recommends consumer use of washing machine filters. These aftermarket filters are known to trap microfibers prior to the washing machine effluent flushing into a waste water treatment facility. The UCSB study noted that detergents were not used in the study due to a concern over the potential for clogs. The aftermarket filter manufacturers who are recommended by the Working Group have stated on their websites that if consumers use detergents and fabric softeners in their filters on their washing machines, it is likely to clog the filters. This leads to frequent cleaning (including in water) by the consumer. Appliance manufacturers are familiar with this issue as some older model washers were often equipped with filters. The filters could clog easily in the presence of detergent and softener, requiring frequent cleaning (often with water). Consumer feedback has shown that a filter needing frequent maintenance is not a desirable feature and consumer habit of washing filters negates the impact filters would have on microfiber polluting the waterways. Filters in washing machines for microfibers are neither practical nor impactful for the task at hand.

Conclusion

AHAM believes that mitigating microfiber pollution will require a systemic approach that all sources of shedding be examined and remedial measures identified. If the Working Group insists on moving forward with a consumer education campaign, awareness of microfiber shedding during purchase/selection, awareness on usage and durability, awareness of maintenance and cleaning/washing impact of shedding as well as data-driven efforts to reduce shedding through interactions of washing machines, detergents and textiles be included.

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AHAM represents manufacturers of major, portable and floor care home appliances, and suppliers to the industry. AHAM's more than 150 members employ tens of thousands of people in the U.S. and produce more than 95% of the household appliances shipped for sale within the U.S. The factory shipment value of these products is more than $30 billion annually. The home appliance industry, through its products and innovation, is essential to U.S. consumer lifestyle, health, safety and convenience. Through its technology, employees and productivity, the industry contributes significantly to U.S. jobs and economic security. Home appliances also are a success story in terms of energy efficiency and environmental protection. New appliances often represent the most effective choice a consumer can make to reduce home energy use and costs.