The Rapids

US EPA's Trash Free Waters Monthly Update

April 2022

epa.gov/trash-free-waters

Introduction

Hello all,

The Single-Use Material Decelerator (SUM'D) - a team of leading food service companies, NGOs, and technical experts - has recently updated their **Understanding Packaging (UP) Scorecard**. The UP Scorecard measures commonly used foodware and food packaging products using a standardized life cycle assessment methodology to offer companies – including concert and sports venues, restaurants, and other businesses – the first-ever, free, and comprehensive tool for making plastic-free, sustainable purchasing decisions. This innovative tool can be used to customize and compare products across six metrics: plastic pollution, chemicals of concern, climate, water use, sustainable sourcing, and recoverability.

The Global Plastics Action Network also recently released **Unlocking the Plastics Circular Economy: A Toolkit for Investment**. This report includes a series of case studies demonstrating how capital from a variety of sources is ensuring plastic waste is recovered and recycled.

Please continue to share any upcoming events with Layne Marshall (**marshall.layne@epa.gov**) so that the Trash Free Waters team can advertise these opportunities with all of you on the first Monday of each month.

Thanks,
Romell Nandi
US EPA
Trash Free Waters National Program Lead

EPA Announcements

Mobile Bay National Estuary Program Video Highlights TFW Efforts
The Mobile Bay National Estuary Program recently produced a video production titled "Altering the Course: A Journey Toward Trash Free Waters Along the Alabama Coast." This 7-minute video highlights the history of estuary-lead action on the local litter problem starting with a community cleanup held in 2011 and spurring the installation of numerous trash capture devices in the watershed.

LSU AgCenter Botanic Gardens Awarded EPA grant for Trash Abatement

Louisiana State University recently received $499,582 from the EPA's FY21 Gulf of Mexico Division (GMD) Healthy and Resilient Gulf RFA to carry out their "Multi-Pronged Approach to Trash Free Watersheds in Baton Rouge" project. This effort will help reduce and prevent surface trash on city streets by engaging and empowering communities and businesses to implement water-filling stations and replace unsustainable products. The official EPA news release announcing all GMD grant finalists is expected soon.

Funding Opportunities

FY22-FY23 Pollution Prevention Grant Program Funded by the Bipartisan Infrastructure Law (EPA-I-OCSPP-OPPT-FY2022-001)

EPA is announcing a grant competition to fund two-year Pollution Prevention assistance agreements for projects that provide technical assistance (e.g., information, training, tools) to businesses to help them develop and adopt source reduction practices (also known as "pollution prevention" or "P2"). P2 means reducing or eliminating pollutants from entering any waste stream or otherwise being released into the environment prior to recycling, treatment, or disposal. Estimate total program funding is $13,900,000. **The deadline for submissions is April 11.**

Bahamas Environmental Education Program (SBF50022GR0003)

The U.S. Embassy Nassau / Bureau of Western Hemisphere Affairs of the U.S. Department of State recently announced an open competition for non-profit organizations to submit applications to carry out a program to promote environmental education in the Bahamas including, but not limited to, Science, Technology, Engineering, Mathematics (STEM), environmental science, species conservation, renewable energy, or recycling/reuse/reduction/waste management. **The deadline for submissions is April 15.**

Michigan Recycling Market Development Grants

These Michigan-specific grants are designed to create new markets or expand existing markets and create supply chains for recycled materials. These grants will also commercialize technologies to replace materials with recycled content; to improve the quality, increase the quantity, and grow demand for utilizing recycled materials in manufacturing or other uses; and facilitate research and development of new uses for recycled materials. **The deadline for submissions is April 20.** A separate but related grant opportunity, Michigan Small Community Education Grants, has a rolling deadline for submissions.

2022 Tribal EJ Small Grants Opportunity

The EJSG program awards grants that support community-driven projects designed to engage, educate, and empower communities to better understand local environmental and public health issues and develop strategies for addressing those issues, building consensus in the community, and setting community priorities. $1.6 million of American Rescue Plan (ARP) funds are now available to fund EJ Small Grants to federally recognized tribal governments to establish or modify public participation programs where fair treatment and meaningful participation priorities have been impacted by the COVID-19 pandemic. Several pre-application assistance calls and webinars are planned for April and May. **The deadline for submissions is April 20.**

The PADI AWARE Mission Hub Community Grants

The PADI AWARE Mission Hub Community Grants (Funding Cycle 0222) are open to funding ocean protection initiatives and projects that directly advance the PADI Blueprint for Ocean Action, in direct support of the United Nations Decade of Science for Sustainable Development. Marine debris is one of the five recommended project proposal categories. **The deadline for submissions is April 22.**

The Lawrence Foundation Common Grant

The mission of The Lawrence Foundation is support organizations that are working to solve pressing environmental, human services and other issues. The foundation makes grants to U.S.-based qualified charitable organizations. Grants typically range between $5,000 - $10,000. **The deadline for submissions is April 30.**

Environmental Research and Education Foundation General RFP

Pre-proposal topics must relate to sustainable solid waste management practices and pertain to the following topic areas: 1) Waste minimization, 2) Recycling, 3) Waste conversion to energy, biofuels, chemicals or other useful products, 4) Strategies to promote diversion to higher and better uses, and/or 5) Landfilling. Pre-proposals are required prior to submitting a full proposal. Previously awarded grants have ranged from $15,000 to over $500,000 with the average grant amount in recent years being $160,000. Typical project durations are about 2 years. **The deadline for submissions is May 1.**

National Estuary Program Coastal Watersheds Grant Program 2022

The National Estuary Program (NEP) Coastal Watersheds Grant (CWG) Program is a nationally competitive grants program designed to support projects that address urgent and challenging issues threatening the well-being of coastal and estuarine areas within 28 determined estuaries of national significance. Grant proposals should addresses the following urgent and challenging issues: Loss of key habitats; Recurring harmful algae blooms; Unusual or unexplained marine mammal mortalities; Proliferation or invasion of species; Flooding and coastal erosion; Impacts of nutrients and warmer water temperatures on aquatic life and coastal ecosystems; and Contaminants of emerging concern found in coastal and estuarine waters such as pharmaceuticals, personal care products, and microplastics. **Letters of Intent are due on May 27.**

West Virginia Litter Control Grant

The West Virginia Department of Environmental Protection's Litter Control Grant is a matching fund that assists municipalities and county government agencies with community cleanup and litter enforcement projects. Funding is provided for this grant through litter fines imposed on those who violate state litter laws. The maximum amount of funding for a grant is $5,000. **The deadline for submissions is May 31.**

Clif Family Foundation Operational Support Grant

These grants support daily operating costs. Address two or more of our funding priorities at the same time: Strengthen our food system, Enhance equitable community health outcomes, and Safeguard our environment and natural resources. Projects should also demonstrate strong community ties and operate within viable and clearly defined plans for positive change. **The deadline for submissions is June 1.**

Kentucky Waste Tire Collection Grant

Kentucky counties can now apply for $4,000 in waste tire recycling and removal grants through the Energy and Environment Cabinet's Division of Waste Management's (DWM) Waste Tire Trust Fund. "These grants can assist Kentucky counties in managing waste tires collected in litter cleanups or from other sources. **The deadline for submissions is June 7.**

Energize The Environment Grant Program

Quadratec is proud to offer a $3,500 environmental grant to an individual or group currently pursuing a program or initiative designed to benefit our environment. Some examples of this would be trail building or restoration projects, park beautification events, litter prevention initiatives, community environmental educational projects, and youth educational engagement events. Interested individuals or groups should submit a 1000-1600 word essay to grants@quadratec.com that paints a picture of who you or your

organization are, what drives and inspires you or your organization, what you or the organization are looking to accomplish, and how you plan to apply our grant to your project. **The deadline for submissions is June 30.**

Other opportunities...

7IMDC Call for Abstracts and Posters

The 7th International Marine Debris Conference (7IMDC), scheduled to take place September 18-23 in Busan, Republic of Korea, is accepting conference abstracts and posters. Successful abstract proposals will be offered a speaking time within the Technical Session to which the abstract is submitted, while successful poster proposals will be offered a space at the conference's poster event. Abstracts and posters will be evaluated on their technical merit as well as on their interest and relevance to the greater marine debris and plastic pollution community. **The deadline for submissions is April 29.**

Upcoming Events

US-French Summit on Plastics Pollution

April 5-6th

The Global Council for Science and Environment (GCSE), the Office for Science and Technology of the Embassy of France in the United States, and Long Island University invite you to join us for an international summit focused on the continued effort and opportunity for research institutions and universities to collaborate and support the long term data, research initiatives, actionable policy sets and future projects that leverage the value of sharing transboundary knowledge. This summit will feature distinguished scholars and leaders committed to curbing plastic pollution on local, national and global levels.

The Future of Ocean Plastics: Designing Diverse Collaboration Frameworks

April 5-7th

This workshop, designed by a team of Early Career Ocean Professionals (ECOPs) in support of the United Nations Decade of Ocean Science for Sustainable Development, aims to facilitate a knowledge exchange between ECOPs, experienced ocean professionals, and a diverse array of stakeholders within and beyond academia who are working on aspects of ocean plastic pollution. Each day we will explore one theme with a panel of experts followed by an interactive discussion with all participants. Themes include: Public & community engagement (art, documentaries and beyond); Innovative technologies to monitor and mitigate ocean plastics, and Policies and actions for a plastic-free ocean. The workshop sessions span multiple time zones across the globe.

Break Free From Plastic Youth Summit

April 8-10th

The Break Free From Plastic Youth Summit is bringing youth organizations together for a global virtual gathering to serve as a platform for youth to discuss revolutionary ideas, to learn about intersectional issues on plastic, and to band together to represent their generation's stance in the fight against climate change and plastic pollution. This summit is open to youth-led organizations, youth-focused organizations, and youth leaders and individuals.

EPA Small Business Innovation Research (SBIR) Sustainable Materials Technologies Webinar

April 13th (2-3:30PM ET)

EPA's Small Business Innovation Research (SBIR) program recently funded seven research projects for U.S. small businesses to help develop and commercialize innovative sustainable materials technologies. During this webinar, each company will give a short presentation on the design, application and impact of their technology and discuss progress toward making these innovations available in the marketplace. Several of these technologies focus on more sustainable food and beverage packaging.

Plastic Pollution and You: An Interdisciplinary Curriculum To Explore Our Role in Plastic Pollution

April 13th (4-5:30PM ET)

New York Sea Grant has finalized a new interdisciplinary curriculum focused on plastic pollution. This webinar will introduce teachers to some of its activities. Dr. Sherri (Sam) Mason, a leading researcher in the field of plastic pollution and Director of Sustainability at Penn State Erie, The Behrend College will discuss her work and demo the lesson that highlights it. New York Sea Grant will then lead demos of four other lessons from the curriculum.

Our Ocean - Palau 2022

April 13-14th, the Republic of Palau

Our Ocean will focus on six Areas of Action, convening partners from across the globe to identify solutions to manage marine resources, increase the ocean's resilience to climate change and safeguard its health for generations to come. One of the key actions is tackling marine pollution. This panel will focus on opportunities and approaches to stop pollution at its source as well as highlight the need for effective local management of coastal catchments.

Beyond Plastic Pollution Virtual Class- Spring 2022

April 13th - May 25th (Wednesday evenings from 7-9PM ET)

This in-depth seven-week online masterclass on all things plastic pollution-related is offered by the founder and President of Beyond Plastic Pollution, Judith Enck, via Bennington College's Center for the Advancement of Public Action. The class is open to anyone, from high school student to concerned community member. The cost of enrollment is $100. Space is limited so reserve a spot now if interested!

California's 2nd Annual Virtual Statewide Conference on Illegal Dumping

April 19th (12-3PM ET)

The 2nd Annual Virtual Statewide Conference on Illegal Dumping seeks to elevate and disseminate best practices for addressing illegal dumping throughout the State of California. The Conference is centered around The Three E's Strategy (Education, Eradication, Enforcement) for Urban, Suburban, and Rural communities. Each day of the Conference will feature a deep dive into one of The Three E's (Education, Eradication, Enforcement). These areas of focus will feature a series of speakers and presentations from experts in the field, who will highlight best practices for addressing illegal dumping.

Webinar: True Source Control for MS4 Programs

April 20th (12:30-2PM ET)

Please join us for the first in a series of webinars exploring the topic of True Source Control as a tool for MS4 stormwater programs. This first webinar will define True Source Control as a unique solution to some of the most vexing problems for stormwater quality, provide a research segment on a True Source Control project, overview a recent True Source Control success story, and provide an opportunity for question and answer with an expert panel including representatives from EPA, the National Municipal Stormwater Alliance, the California Stormwater Quality Association, and others.

EarthX 2022

April 20-24th, Dallas, TX
EarthX is an international, nonprofit environmental forum whose purpose is to educate and inspire people to action towards a more sustainable future. We assemble and connect citizens, educators, students, businesses, nonprofits, and global leaders to explore sustainable solutions for today's most pressing challenges. More details to come.

Earth Day!
April 22nd

The Gulf of Mexico Conference 2022
April 25-28th
The Gulf of Mexico Conference (GoMCon) combines the annual Gulf of Mexico Alliance (GOMA) All Hands Meeting, the annual Gulf of Mexico Oil Spill and Ecosystems Science (GoMOSES) Conference, and the triannual State of the Gulf Summit. This conference seeks to promote the integration of science and management into decision-making. GoMCon will feature a wide variety of session themes including citizen science and education, water quality and quantity, and emerging issues including marine debris.

Virtual Salish Sea Ecosystem Conference 2022
April 26-27th
The theme of this year's Salish Sea Ecosystem Conference is "Honoring our Ancestors: Visions for Future Generations and the Salish Sea." The conference typically attracts about 1,500 participants and has become the premier scientific research and policy gathering in the Pacific Northwest. Conference presentations and discussions will serve as a platform to build shared policies, practices and procedures necessary to guide future actions for protecting and restoring the Salish Sea and its watersheds.

Creating a Circular Economy in Hawaii
April 27th (6-7:30 PM ET)
This webinar is being hosted by Think BIG. It will offer participants with insight on the principles and practices of circular economics and provide an overview of how it can lead to a more sustainable Hawaii. Expert panelists from the National Stewardship Action Council, ReGen Villages, and Hawaii Federated Industries will be present.

Save the dates for future months...

WasteExpo
May 9-12th, Las Vegas, NV
Whether you are from the private sector, a small, medium or large public sector waste management company, organics management, or food waste management company, or a manufacturer or supplier from the U.S. or abroad, count on WasteExpo to bring the entire industry together under one roof. 2022 conference tracks include: Operations, Fleet & Safety, Recycling & Landfill, Business Insights & Policy, and Tech & Innovation.

Texas Partners in Litter Prevention Trash Summit 2022
May 11th (9-11AM ET)
The Partners in Litter Prevention will bring TX stakeholders together for another annual summit via Zoom to discuss trash prevention and research. An in-person field day may be offered the day after the summit to train attendees on different trash survey methods and the Texas Litter Database.

Circularity 22

May 17-19th, Atlanta, GA

As the leading convening of professionals building the circular economy, Circularity 22 offers thought-provoking keynotes, informative breakouts, a solutions-oriented expo and engaging networking opportunities. The goal of this conference is to encourage moving beyond individual action to catalyze systems change and accelerate the circular economy. Tracks include next-gen products and packaging, bio-based solutions, policy and infrastructure, and more.

Re|Focus Sustainability & Recycling Summit

May 23-25th, Cincinnati, OH

Hosted by the Plastics Industry Association, the Refocus Sustainability and Recycling Summit addresses the real-world challenges you face as your company pushes recycled content and sustainable manufacturing from goals and promises to action.

Capitol Hill Ocean Week

June 7-9th ,Washington, D.C. and virtual

Capitol Hill Ocean Week (CHOW), convened by the National Marine Sanctuary Foundation, is a multi-day conference that convenes policymakers, scientists, managers, business leaders, conservationists, educators, students, and members of the public to engage in dialogue and debate on significant issues that impact our ocean and Great Lakes and to propose innovative policies and partnerships to address these issues. CHOW 2022 is open to the public and free to attendees. This year's conference will focus on climate change impacts to our ocean, coasts, and Great Lakes and the communities that rely on them.

Plastic Waste Free World North America Conference and Expo

June 8-9th, Atlanta, GA

The Plastic Waste Free World Conference & Expo is an international conference and exhibition for companies looking for new technologies, materials, and solutions to help realize their plastic waste targets and source the latest innovations driving the new circular economy. The event typically attracts major manufacturers, brand owners, retailers, materials experts, circular economy experts, government organizations, NGOs, the recycling industry, and the plastics sector to engage in discussions that will help reduce waste plastic in the environment. Conference tracks include: 1) Eliminating Waste Plastics, 2) Retail and Consumer Goods Packaging, and 3) Fashion and Textiles.

UN Ocean Conference 2022

June 27th - July 1st, Lisbon, Portugal

The Ocean Conference, co-hosted by the Governments of Kenya and Portugal, will mobilize action around science-based innovative solutions aimed at starting a new chapter of global ocean action. Solutions for a sustainably managed ocean involve green technology and innovative uses of marine resources. They also include addressing the threats to health, ecology, economy and governance of the ocean - acidification, marine litter and pollution, illegal, unreported and unregulated fishing, and the loss of habitats and biodiversity.

National Working Waterfront Network Conference

July 19th - 21st, Boston, Massachusetts

The National Working Waterfront Network's Conference is the only national event that brings together people from across North America to connect with one another and showcase initiatives that protect and promote working waterfronts. The purpose of this conference is to unite stakeholders and initiate innovative, successful, and timely solutions to waterfront and waterway issues. Working waterfronts include waterfront lands, waterfront infrastructure, and waterways that are used for water-dependent activities, such as ports, marinas, small recreational boat harbors, and fishing docks.

International Conference on Plastic Recycling and Waste Management

July 21st - 22nd, Rome, Italy

International Conference on Plastic Recycling and Waste Management aims to bring together leading academic scientists, researchers and research scholars to exchange and share their experiences and research results on all aspects of Plastic Recycling and Waste Management. It also provides a premier interdisciplinary platform for researchers, practitioners and educators to present and discuss the most recent innovations, trends, and concerns as well as practical challenges encountered and solutions adopted in the fields of Plastic Recycling and Waste Management.

In case you missed it...

The Global Plastics Treaty: What You Need to Know

Originally hosted on March 16 by the Plastic Pollution Coalition, this webinar provided expert perspectives on the need and opportunity to negotiate a bold and binding global commitment to address plastic pollution and offered participants an overview of UNEA 5.2.

Recent Legislation

Recycling and Composting Accountability Act

This bill was introduced in early March by Senators Tom Carper and John Boozman. It calls for the EPA to prepare a report describing the capability of the U.S. to implement a national residential composting strategy. The bill would also require compiling data, including the quantification of annual recycling and composting rates and the number of community curbside recycling and composting programs, as well as providing an inventory of public and private materials recovery facilities.

Recycling Infrastructure and Accessibility Act

The Recycling Infrastructure and Accessibility Act was also introduced in early March. This bill would direct the EPA to create a recycling infrastructure pilot program to provide grants for projects which make recycling services more accessible to rural and disadvantaged communities.

The Microplastics Breakdown

MICROPLASTICS IN AIR TRANSPORT

Airborne Microplastics: A Review of Current Perspectives and Environmental Implications

Yaowei Li, Tim Jones, M. Santosh, Pengju Liu, Mengyuan Zhang, Liang Xu, Weijun Li, Jing Lu, Cheng-Xue Yang, Daizhou Zhang, Xiaolei Feng, Kelly Béru Bé

This literature review focused on airborne microplastics (MPs) and was intended to give an overview of the advantages and disadvantages of current airborne MPs collection techniques, extraction methods and identification, and lay a foundation for future studies. The authors found that there are substantial research gaps in the quantification of airborne MPs and the exploration of toxicity mechanisms of inhalable MPs. They also identified the establishment of accredited methods as an urgent challenge for a better understanding on airborne MPs and their environmental and health effects. As one of the constituents in many aerosols, they recommended that airborne MPs should be treated as a recognized pollutant for long-

term monitoring, and the factors that specifically affect airborne MPs could be better addressed by means of the characterization of individual MPs. Another significant finding of this review was that standardized methods for the identification and classification of airborne MPs are needed to allow meaningful comparisons of global data between different research groups. Furthermore, they observed that the analysis of airborne MPs is currently a complex process involving multiple factors-- MPs cannot be satisfactorily identified by direct analysis with almost any single analytical technique on its own. Additionally, the methods of collection and preparation of MPs have significant impacts on the result.

Do We Inhale Aerosolized Microplastics on The Beach? (Online Poster)

Lambert Silke, Vercauteren Maaike, Van Landuyt Josefien, Liu Zixia, Diopere Eveline, Boon Nico, Janssen Colin R.and Asselman Jana

This online poster described the goal of this study as investigating the possible presence of micro- and nanoplastics in sea spray aerosols and study the influence of different polymer types and sizes on this process. They hypothesized that if micro- or nanoplastic particles were capable of being part of sea spray aerosols, the plastics from the ocean could be transferred to the air and then terrestrial environments. The study employed a simulation of the aerosolization process at sea; air bubbles bursting at the surface of the water was created on a small scale. The water was spiked with a known concentration of MPs. Aerosols were created and the MPs present in these aerosols were collected onto a filter and particle concentrations were counted. Different size classes and different types of MPs were tested. The results indicated that only the small MP particles seem to be incorporated into the aerosol, but the bigger particles will not be introduced in the air via sea spray aerosols. The authors concluded that the size of the plastics has an impact on the aerosolization. They suggested that further experiments with particles in wider size ranges (100 nm-5µm) would be able to provide more information on the size-thresholds for aerosolization.

MICROPLASTICS IN THE AQUATIC ENVIRONMENT

Assessment, Characterization, and Quantification of Microplastics from River Sediments

Baskaran Maheswaran, Natchimuthu Karmegam, Mysoon Al-Ansari, Ramasamy Subbaiya, Latifah Al-Humaid, Joseph Sebastin Raj, Muthusamy Govarthanan

The goal of this study was to isolate, quantify, and characterize the MP pollutants in sediment samples from 14 sites in South India. Samples were collected in January 2021; approximately 1 kg of sediment from each location. Microfragments were found to be the predominant shape of MPs at all of the locations, followed be microfilms, microfibers and microfoams. The most prevalent MP polymers that were isolated from the MPs in this study were: polyamides, polypropylene, PVC, polystyrene, and PET. More than 40% of MPs were less than 1 mm in size; significantly lower, the authors noted, than the percentage reported in similar existing studies. The authors observed that certain factors could affect the concentration and types of MPs in sediments, namely, seasonal changes, size of the MPs and the disturbance of water flow could play a leading role in the spatio-temporal variation of MPs in river sediments, land-use patterns, population and urbanization activities. They also pointed to the occurrence of clay particles as having a considerable influence on MPs concentration in river sediments.

Trophic Transfer of Microplastics in a Model Freshwater Microcosm; Lack of a Consumer Avoidance Response

Alicia Mateos-Cárdenas, Aran von der Geest Moroney, Frank N.A.M. van Pelt, John O'Halloran, Marcel A. K. Jansen

This study investigated the transfer of MPs from freshwater plants to invertebrates. 108 adult *Gammarus duebeni* amphipods (a type of shrimplike crustacean) were selected and individually placed in separate 100 mL beakers filled with aerated, dechlorinated and filtered 100 mL tap water for 24 hours. The authors reported that they were not fed during this time period to ensure that all individuals had a similar level of

starvation as well as to allow for gut clearance. The organisms were then exposed to two categories of conditions for 96 hours: 1) feeding (organisms were fed a single duckweed colony); and 2) a feeding-choice (these amphipods were offered a choice of feeding between two duckweed colonies). The organisms were fed duckweed without MPs or with adsorbed polyethylene (PE) MPs or polystyrene (PS) MPs. Both kinds of tests showed feeds on plant biomass unrelated to the presence of MPs, which the authors concluded demonstrated a lack of avoidance of MPs. A total of 13 of the 72 amphipods exposed to MPs were found to have accumulated MPs in their digestive tracts at the end of the tests: 11 (30.56%) of which belonged to PE-duckweed feeding group and the remaining 2 (5.56%) belonged to PS-duckweed feeding group. No apparent acute negative effect on the amphipods' weight or survival was observed. The study also demonstrated that the selected species of duckweed, L. minor, can externally adsorb 1 μm PS and 10–45 μm PE MPs; MPs adsorbed to plant tissue stayed there even when plant tissues were dried. This result suggested to the authors that L. minor can be a vector of MPs in the freshwater food chain.

MICROPLASTICS AND REMOVAL BY WASTEWATER TREATMENT PLANTS

Evaluation of Conventional Wastewater Treatment Plants Efficiency to Remove Microplastics in Terms of Abundance, Size, Shape, and Type: A Systematic Review and Meta-Analysis

Nahid Azizi, Simin Nasseri, Ramin Nabizadeh Nodehi, Neamat Jaafarzadeh, Meghdad Pirsaheb

This review focused on the scientific literature on the removal of MPs by wastewater treatment plants published up to October 27, 2020. In the reviewed studies, the average number of MPs was found to vary from 983 per liter at the influent to 29 per liter at the tertiary treatment effluent and there was a wide range at each treatment step. However, MPs abundance was found to have decreased with each additional treatment step, and it was highest and lowest in influent and tertiary treatment step, respectively. Fiber, particle, and fragment had the highest percentage in all treatment steps, and their average abundance was reported to be 57%, 41%, and 28%, respectively. The authors observed that the origin of the high abundance of fibers was implied to be the connection of the laundry machines and textile industries to the WWTPs. Sampling methods (e.g., simple or composite, mesh size of sieves), extraction methods (digestion method and salt used for density separation), identification methods, and the sampling location were found to influence the quantity of MPs. Additionally, climate and seasonal conditions were also identified as factors. The abundance of MPs in the final effluent was dependent on process types in different treatment steps, despite the number of MPs in the influent. The review results suggested that biological reactors are capable of MP removal by degradation through biological processes or transferring to the secondary sludge via the adsorption of these particles into biological flocs. These flocs are assembled of extracellular polymeric substances (EPS), which are secreted by microorganisms. They have viscous properties that facilitate capturing the MPs and separating them from the effluent of the primary treatment step. The review results indicated that in general, other steps do not significantly decrease the number of MPs from the wastewater. MPs shape was identified as influencing settling behavior; for example, spherical MPs can settle more rapidly than others. Note however that the authors also reported that MP shape did not affect the removal efficiency of MPs in WWTPs.

MICROPLASTICS FROM TIRE WEAR

Potential Policy Instruments and Measures Against Microplastics from Tyre and Road Wear: Mapping and Prioritisation

Mikael Johannesson and Delilah Lithner

The report was described as being produced within the framework of a commission from the Swedish Government, received by the Swedish National Road and Transport Research Institute (VTI) in December 2017 to develop and disseminate knowledge about MPs from road traffic. Potential policy instruments and

measures against MPs from tire and road wear were identified and prioritized for in-depth investigation or knowledge building. The policy instruments were categorized under four sub-objective 1) to reduce emissions, 2) to reduce spread 3) to reduce effects and persistence, and 4) to increase knowledge generally. A total of 58 policy instruments and measures have been described and ranked based on assessed priority. The positive and negative effects associated with each of the instruments and measures were also described. The authors observed that since there is insufficient knowledge on the impacts of microplastics from tire and road wear, the risks, and thereby the need for action, could not be assessed. The report included the acknowledgement that there is not enough available knowledge about the environmental concentrations, exposure and effects to assess the risks for the environment and human health, which means that it has also not been possible to assess the need for action. However, the authors pointed out, as emissions of MPs from tire and road wear are significant and increasing with the increasing road traffic; as the particles are probably persistent in the environment; and as the particles and any hazardous substances they contain may have negative impacts on organisms, the authors still felt that there is justification for implementation of preventative measures aimed at reducing MP pollution caused by tire and road wear. The report included the recommendation that before any decision is made to implement a policy instrument, or combination of instruments, all relevant aspects need to be considered and an impact assessment should be carried out. This process should include evaluation of effectiveness, cost-effectiveness, feasibility, implementation time, any interactions with other policy instruments, all positive and negative side effects, and any other significant factors that may influence the assessment.

METHODS FOR MICROPLASTICS IN DRINKING WATER

Monitoring Microplastics in Drinking Water: An Interlaboratory Study to Inform Effective Methods for Quantifying and Characterizing Microplastics

Hannah De Frond, Leah Thornton Hampton, Syd Kotar, Kristine Gesulga, Cindy Matuch, Wenjian Lao, Stephen B.Weisberg, Charles S.Wong, Chelsea M. Rochman

This interlaboratory MP method evaluation study was conducted to support California's Senate Bill 1422, which required the development of state-approved standardized methods for quantifying and characterizing MPs in drinking water. Twenty-two laboratories from 6 countries evaluated the performance of widely used methods: sample extraction via filtering/sieving, optical microscopy, FTIR spectroscopy, and Raman spectroscopy. Three spiked samples of simulated clean water and a laboratory blank were sent to each laboratory with a prescribed standard operating procedure for particle extraction, quantification, and characterization. The samples contained known amounts of microparticles within four size fractions, four polymer types (PE, PS, PVC, and PET), and six colors (clear, white, green, blue, red, and orange). They also included false positives (natural hair, fibers, and shells) that may be mistaken for MPs. FTIR and Raman spectroscopy were found to have accurately identified MPs by polymer type for 95% and 91% of particles analyzed, respectively. Per particle, FTIR spectroscopy required the longest time for analysis. The results indicated that method performance was highly dependent on particle size, with good recovery for particles >50 μm. Both FTIR and Raman spectroscopy were found to be effective at identifying MP particles and differentiating from non-plastics but there were performance differences based on particle size. FTIR could accurately identify polymer types for particles in size fractions above 20 μm whereas Raman did so for particles in size fractions above 1 μm. This size issue was identified as a concern for sampling drinking water systems as they typically filter down to 20 μm, and the primary target is smaller particles. However, the data provided in this study was found to have quantified that bias and allowed for the application of correction factors. Standardized measures to minimize laboratory particle contamination was identified as a way to reduce variation in particle counts among labs. Time and associated costs for all stages of microplastic sample analysis were described as barriers to cost-effective monitoring, requiring new approaches for automation and incorporation of tiered monitoring that uses less expensive methodologies for screening level questions.

If you'd like to see your posting in this email, please email Marshall.Layne@epa.gov with any suggestions!

EPA Trash Free Waters Program | nandi.romell@epa.gov | epa.gov/trash-free-waters