Chesapeake Bay Program
SCIENTIFIC AND TECHNICAL ADVISORY COMMITTEE
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April 18, 2016

RE: STAC Microbeads/Microplastics Review

Thomas McLain Middleton, Chair, Chesapeake Bay Commission
60 West Street
Suite 406
Annapolis, MD 21401

Cc: CBP Management Board; Citizens Advisory Committee; Local Government Advisory Committee; CBP Toxic Contaminants Workgroup.

Dear Chairman Middleton,

Please see the attached STAC review report entitled, "Technical Review of Microbeads/Microplastics in the Chesapeake Bay." This report provides a summary of the Chesapeake Bay Commission (CBC) requested STAC-sponsored technical review of microbeads/microplastics in the Chesapeake Bay.

At your request, the review panel was originally tasked to write a report describing the scientific evidence regarding plastic microbeads (synthetic plastic particles that are roughly 5µm to 1mm in size) as it relates to microplastic (synthetic plastic less than 5 mm in size) contamination, in general, and in the Chesapeake Bay, in particular. As the panel's review progressed, their scope and charge evolved. This evolution was due in part to the December 2015 signing of the federal Microbead-Free Waters Act. In its report, the review panel addressed questions regarding the fate and transport of microbeads, their potential impact in the environment, the availability of removal and treatment technologies, and the potential urgency of the microbead/microplastics issue in the Bay watershed.

The panel found the impact of microbeads/microplastics is geographically widespread. Documented contamination includes fresh, estuarine and marine surface waters and sediments. Of great concern is the ability of microbeads, and plastic debris in general, to accumulate chemical contaminants (e.g., persistent organic pollutants, algal toxins, and metals) from the surrounding water. Although there is insufficient information regarding impacts from microbeads, specifically on aquatic organisms, at this time, the scientific literature regarding impacts from microplastic in general is growing and can inform how different types of microplastic debris, including microbeads, may affect wildlife. While physical impacts have been documented, primarily in laboratory settings, of potentially greater concern is the ability of synthetic plastic microbeads, both with and without sorbed contaminants, to serve as pollution

vectors to aquatic organisms. This may occur through the leaching of contaminants into the environment, thus exposing wildlife through water, particulate matter, or food chain pathways, or by transfer to an animal upon ingestion. Though the science of measuring the ecological impact of microplastic on wildlife is still in its infancy, the panel found evidence that microplastic debris can harm an individual organism at ecologically relevant concentrations. They also found that microplastic debris has been detected in seafood for human consumption.

With respect to the availability of microbeads/microplastics removal and treatment technologies, the panel found that during the wastewater treatment process, a large portion of microbeads in the size range of 20-500 µm can be removed from the liquid stream, with more effective removal of other size fractions depending upon the specific technologies employed. However, microplastics removed via wastewater treatment are likely to be reintroduced into terrestrial systems when the wastewater solids are applied to land. Recent studies have found microplastics in local watersheds of the Chesapeake Bay, and without plans for future mitigation, contamination will likely increase.

After President Obama signed the Microbead-Free Waters Act (the Act) in December 2015, the panel sought to better understand how the Act addressed the sizes of microbeads/microplastics of interest to the panel. While the panel commended the federal action and agreed that it was a step in the right direction, they raised several technical concerns regarding the scope of the legislation relative to the larger issue of microplastics contamination, and the potential consequences of a lack of technical clarity and accuracy of terms in this and subsequent legislation/policies. First, microbeads are only a subset of the larger problem of microplastics contamination. Second, the title of the Act "Microbead-Free" could lead one to believe that the elimination of microbeads in rinse-off products is a complete solution to microbead pollution, when in fact rinse-off products are only one source of many. Third, the Act highlighted the need for clear definitions and standardized terms such as biodegradability, plastics, and microplastics if legislation is to offer effective solutions and protections. For example, Illinois defined plastics as “a synthetic material that retained their defined shapes during life cycle and after disposal”; this definition leaves a significant loophole for any microbeads that degrade even slightly during their life cycle.

As a result of the limitations of the Act to completely address concerns about microplastics in the environment, the panel is now working to develop and publish a policy brief in an appropriate vehicle (e.g., and journal such as Environmental Science & Technology) that puts a ‘gold standard’ on definitions such as biodegradability, plastics, etc. The purpose of this piece is to explain that a lack of clear definitions/terminology may limit the environmental effectiveness of legislation. The review panel is excited to continue this work and to potentially impact future federal and/or state legislation in this area. STAC is supportive of this activity.

On behalf of STAC, thank you again for the opportunity to conduct this review, and we look forward to working with you closely on this, and other activities in the future. This review illuminated the importance of two potential interactions between STAC and the CBC: the recognition and communication of science that is ripe for policy (STAC to CBC), and for science

and technical needs in policy issues to maximize effectiveness (CBC to STAC). We are committed to continued interaction between CBC and STAC to further strengthen the effectiveness of restoration efforts for the Chesapeake Bay.

Please direct any questions you may have about this report and its recommendations to Natalie Gardner, Chesapeake Bay Program's Scientific and Technical Advisory Committee Coordinator, or Denice Wardrop at Pennsylvania State University.

Sincerely,

Brian Benham
Vice Chair, Chesapeake Bay Program's Scientific and Technical Advisory Committee