UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

THE INSPECTOR GENERAL

January 6, 2021

MEMORANDUM

SUBJECT: Office of Research and Development Initiatives to Address Threats and Risks to Public Health and the Environment from Plastic Pollution Within the Waters of the United States
Report No. 21-N-0052

FROM: Sean W. O'Donnell

TO: Jennifer Orme-Zavaleta, Principal Deputy Assistant Administrator for Science and EPA Science Advisor
Office of Research and Development

The U.S. Environmental Protection Agency's Office of Inspector General initiated an audit to identify the extent to which the EPA's existing Clean Water Act programs and Office of Research and Development research initiatives address threats and risks to public health and the environment from plastic pollution within the waters of the United States. The project number for this audit is OA&E-FY19-0086. We performed our work within two EPA offices: the Office of Water, or OW, and the Office of Research and Development, or ORD.

This report contains our conclusions related to the ORD and closes our work on this aspect of the audit with no recommendations. We will issue a separate report on our findings related to the OW.

Background

Microplastics

Plastic debris in the aquatic environment presents a persistent and growing environmental problem. Worldwide, more than 29 million metric tons of plastic enter the environment each year.[1] Over time, in some cases over hundreds of years, plastic objects fragment into progressively smaller and more numerous particles without substantial chemical degredation. Particles smaller than 5 millimeters are defined as *microplastics* and account for approximately 90 percent of plastic in the ocean.

In 2017, the EPA convened a Microplastics Expert Workshop to identify and prioritize the scientific information needed to understand the risks posed by microplastics to human and ecological health.

[1] Palardy, Jim, "Science Study Shows That Nearly 80% of the Annual Plastic Flow Into the Environment Can Be Stopped Using Existing Technology," PEW Charitable Trusts, July 23, 2020.

EPA's ORD

The ORD primarily focuses on providing a scientific and technical foundation for the EPA to fulfill its statutory obligations and help Agency, state, and other partners address environmental and public health challenges. The ORD is composed of six national research programs, which aim to deliver a cleaner, safer, and healthier environment for all Americans. One of those research programs is the Safe and Sustainable Water Resources program, or SSWR.

By collaborating with EPA program offices, such as the OW, the ORD develops Strategic Research Action Plans, or StRAPs, for each national research program. Each program's StRAP outlines a four-year research strategy to advance the program's goals and the cross-Agency priorities identified in the EPA's Strategic Plan.

The 2019–2022 SSWR StRAP organizes the SSWR's activities into three interrelated research areas:

- Watersheds.
- Nutrients and harmful algal blooms.
- Water treatment and infrastructure.

Plastics research occurs under the "Watersheds" research area, specifically under StRAP Output 1.4:

> *Methods to identify and quantify micro/nanoplastics in environmental matrices*. Research will address plastic pollution in the aquatic environment by establishing reliable and reproducible methods for micro/nanoplastics collection, extraction, characterization, and quantification in sediment and surface water.

Scope and Methodology

We conducted this work from November 2019 to October 2020. While our overall audit, which is still ongoing, is being conducted in accordance with generally accepted government auditing standards, the work related to this report does not constitute an audit done in accordance with these standards. However, we did follow the OIG's quality control procedures for ensuring that the information in this report is accurate and supported.

This report addresses the ORD's research prioritization process for the SSWR StRAP. We did not evaluate other ORD-led StRAP development processes. To conduct our work, we met with ORD and OW managers and staff. We conducted interviews with scientists at the ORD's Atlantic Coastal Environmental Sciences Division laboratory in Narragansett, Rhode Island. We also spoke to researchers and staff at nongovernmental organizations and academic institutions. We analyzed ORD documents for information pertaining to microplastic research priorities.

Prior Report

On April 9, 2018, we issued Report No. 18-P-0151, *EPA's Safe and Sustainable Water Resources Research Program Is Delivering Timely and Relevant Data to the Office of Water*. We reported that ORD SSWR research products were relevant to the OW and were delivered in a timely fashion. We also reported that these products were used or will be used to protect America's waters. We issued no recommendations as a result of that audit.

Results

The EPA's research into plastics is in its early stages, and the ORD has not yet conducted enough research to determine risks to public health and the environment from plastic exposure. The 2019–2022 SSWR StRAP, issued in March 2020, was the first time the ORD included plastics as a research priority. Specifically, the StRAP states that the ORD will deliver recommendations for best practices and standardized methodologies to characterize micro/nanoplastics in sediment and surface water.

In June 2017, the ORD and the OW conducted a Microplastics Expert Workshop with participants from federal agencies, academic institutions, and nongovernmental organizations. The participants identified a broad range of research needs for determining the human health and environmental risks of microplastics, including:

- Establishing precise methods for analysis.
- Conducting research on sources, transport, fate, and distribution in the environment.
- Creating standardized toxicity tests.
- Creating methods and conducting research to characterize human exposure and impacts.

In January 2018, the ORD started developing SSWR StRAP research priorities by consulting with subject matter experts from the EPA, states, and tribes. This process involved several steps, including:

- Problem identification.
- Development of research outputs.
- Review and comment periods for EPA staff and stakeholders.

In April 2019, the ORD issued a draft SSWR StRAP, which identified microplastics as an area of concern for potential impacts to aquatic life and human health. The draft StRAP stated that:

> [R]esearch efforts are needed to better understand the exposure to and potential effects of micro/nano plastic pollution in the aquatic environment to inform CWA [Clean Water Act] regulatory programs and voluntary approaches. Standardized, reliable, reproducible, and environmentally representative methods are fundamental and of paramount importance for sample collection, extraction, characterization, and quantification. These methods will provide the foundation to investigate potential adverse health outcomes in humans and aquatic organisms exposed to micro/nanoplastics.

In the draft SSWR StRAP, the ORD identified three priority areas for microplastics research:

- Develop methods to determine the quantity of microplastics in the environment.
- Investigate the human health effects caused by drinking water containing microplastics.
- Determine the effects of microplastic exposure to aquatic species.

In the final SSWR StRAP, which was issued in March 2020, the OW and the ORD narrowed these three initial priority areas into one:

- Methods to identify and quantify microplastics and nanoplastics in environmental matrices (or "sampling methods").

According to OW and ORD senior leaders, the decision to narrow the microplastics priority area was necessary for two reasons: 1) sampling methods need to be established before the human health and environmental effects of microplastics exposure can be investigated, and 2) the ORD's resources were deployed to address other research needs in the 2019–2022 SSWR StRAP.

Conclusion

The 2019–2022 SSWR StRAP commits the ORD to deliver recommendations for best practices and standardized methodologies to characterize micro/nanoplastics in sediment and surface water. With these recommendations, the ORD can identify and prioritize the scientific information needed to understand the risks posed by microplastics to human health and the environment from plastic pollution within the waters of the United States. In 2021, the ORD and the OW plan to begin developing the next set of SSWR StRAP research priorities based on the OW's needs. This process will determine whether plastics continue to be a research priority.

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