CENTER FOR PUBLIC ENVIRONMENTAL OVERSIGHT
A project of the Pacific Studies Center
P.O. Box 998, Mountain View, CA 94042
Voice/Fax: 650-961-8918 <lsiegel@cpeo.org> http://www.cpeo.org

---

TO: Sara Latessa, NYS Department of Environmental Conservation—Division of Water by e-mail at EmergingContaminantsDOW@dec.ny.gov
FROM: Lenny Siegel, Executive Director, Center for Public Environmental Oversight
SUBJECT: Comments on the draft "Publicly Owned Treatment Works (POTWs) Permitting Strategy for Implementing Guidance Values for PFOA, PFOS, and 1,4-Dioxane."
DATE: March 11, 2024

Thank you for the opportunity to comment on the draft "**Publicly Owned Treatment Works (POTWs) Permitting Strategy for Implementing Guidance Values for PFOA, PFOS, and 1,4-Dioxane."** In general, this is a step in the right direction. *Industrial wastewater contaminated with PFAS has been flowing into Publicly Owned Treatment Works (POTWs) uncontrolled, for decades. This is a major pathway for the spread of PFAS in the environment, both through the liquid effluent and the land application of biosolids from the POTWs.*

New York State has significant experience addressing PFAS, particularly long-chain compounds such as PFOS and PFOA in groundwater, placing it in an excellent position to regulate PFAS in wastewater. However, as industrial producers and users of PFAS have been moving away from long-chain compounds, wastewater regulation must broaden to cover other compounds. There is growing evidence that PFAS in wastewater is dominated by short-chain and even non-targeted compounds. Many of these compounds are not easily removed from water by conventional treatment methods, such as carbon adsorption.

Three additional requirements are necessary:

1. **Monitoring**. Monitoring for PFAS should include the measurement of total organic fluorine, as well as targeted compounds. It appears that the bulk of PFAS discharged by industry at this time are not PFOA and PFOS. While we may never know the degree of toxicity of each PFAS compound, we do know that they are persistent, bioaccumulative,

and toxic at some level of exposure. Where monitoring detects non-targeted compounds, it should be designed to determine characteristics of those compounds, such as chain length, that may influence the effectiveness of treatment.

EPA's recently announced Method 1621 is a significant positive step. However, it only measures PFAS that are adsorbed to granular activated carbon. It states:

> Short-chain (less than 4 carbons) organofluorine compounds are poorly retained on GAC while long-chain (more than 8 carbons) hydrophobic organofluorine compounds readily adsorb to surfaces. These issues can cause low recoveries for these types of fluorinated compounds.[1]

Thus, it is important that regulators work with testing laboratories and academic researchers to develop better, scalable, cost-effective sampling technologies that measure non-adsorbed PFAS, and that wastewater monitoring systems be designed to allow to use of such technologies as they become available.

2. **Treatment**. Treatment technologies should be tuned to target the specific compounds found in the wastewater. At first this may be difficult, because not all compounds have proven removal, let alone destruction, technologies. So it's important that treatment systems also be modular, designed to be upgraded as better Best Management Practices are developed.

3. **Point of Use.** Pre-treatment should occur at the point of use within each industrial facility, and waste streams should be segregated. The mixing of other substances, even other PFAS, is likely to inhibit the removal of PFAS from waste streams. It is likely to be more efficient to treat wastewater that contains a limited number of hazardous substances. Furthermore, since leaks and spills are possible as wastewater moves downstream, point-of-use removal should reduce the likelihood of direct releases to groundwater and surface water.

This Permitting Strategy should be designed to prioritize semiconductor wafer fabrication, which is expanding in New York States. While other industries are likely to reduce their non-essential uses of PFAS, chipmakers insist that the use of a large, evolving collection of PFAS compounds is essential to their operations. On the positive side, the construction and expansion of semiconductor factories creates an opportunity for the cost-effective introduction of state-of-the-art monitoring and treatment systems.

While semiconductor manufacturers consider detailed information about their PFAS use to be confidential business information, they report that they have phased out PFOS and PFOA. In

---

[1] "Method 1621: Determination of Adsorbable Organic Fluorine (AOF) in Aqueous Matrices by Combustion Ion Chromatography," U.S. EPA Office of Water, January 2024, p. 1, https://www.epa.gov/system/files/documents/2024-01/method-1621-for-web-posting.pdf

fact, industry-sponsored academic studies show both the prevalence of non-targeted PFAS chemicals and the transformation of non-quite-forever PFAS in the production process.[2]

The U.S. Department of Commerce, in its first environmental review of semiconductor production, concluded: "Wastewater discharge from semiconductor manufacturing facilities presents the greatest risk for PFAS contamination of the environment."[3]

Furthermore, the industry seems to recognize its current shortcoming:

> Most PFAS are not regulated pollutants and therefore unless company specific provisions are in place, the wastewater from processes that use aqueous wet chemical formulations that contain PFAS would likely be discharged to the publicly owned treatment works without substantive removal of the PFAS.[4]

Finally, each operator of Publicly Owned Treatments Works should not be forced to re-invent PFAS industrial wastewater management. The Department of Environmental Conservation should create a quantitative **database** of PFAS found in chipmaking and other industrial wastewater, so as each POTW undertakes and requires both monitoring and pre-treatment it can benefit from the experience of others.

In summary, the use and release of PFAS in semiconductor manufacturing is a significant and growing environmental challenge, but government-supported facility construction and expansion create an opportunity to meet that challenge.

---

2 See Paige Jacob, Kristas Barzen-Hanson, and Damian Helbling, "Target and Nontarget Analysis of Per- and Polyfluoralkyl Substances in Wastewater from Electronics Fabrication Facilities," *Environmental Science & Technology,* February 16, 2021, p. 2353. https://pubs.acs.org/doi/10.1021/acs.est.0c06690 and Paige Jacob and Damian E. Helbling**,** "Exploring the Evolution of Organofluorine-Containing Compounds during Simulated Photolithography Experiments," *Environmental Science and Technolog**y,*** August, 2023**,** https://pubs.acs.org/doi/pdf/10.1021/acs.est.3c03410?download=true .

3 "Draft Programmatic Environmental Assessment (PEA) for Modernization and Internal Expansion of Existing Semiconductor Fabrication Facilities under the CHIPS Incentives Program," U.S. Department of Commerce CHIPS Program Office, December, 2023, p. B-7, https://www.nist.gov/system/files/documents/2023/12/26/CHIPS%20Modernization%20Draft%20PEA.pdf

4 "The Impact of a Potential PFAS Restriction on the Semiconductor Sector," SIA PFAS Consortium, April 2023, p. 90. The SIA PFAS Consortium is made up of chipmakers and their suppliers of equipment and materials. To sign up to receive their technical papers, go to https://www.semiconductors.org/pfas/