The Need to Pre-Treat Chip Plant Wastewater for PFAS

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The discharge of PFAS wastes into sewage lines from semiconductor wafer fabrication plans is a serious environmental challenge. Industry representatives insist that PFAS are essential at various stages of production, and they say it will be years, if ever, before they find suitable substitutes.

So while other industries, prodded by a growing web of government regulations, are working to reduce or eliminate PFAS use, chipmakers plan to continue to pour their "forever chemical" wastes down the drain.

This is a significant issue because wastewater treatment facilities are not designed to remove PFAS. The Minnesota Center for Environmental Advocacy just released a report that concludes, "traditional treatment technologies are not able to remove PFAS substances because of the strength of their carbon fluorine bond. Even traditional incineration facilities do not generate high enough heat to break apart PFAS' signature bond." See https://www.mncenter.org/sites/default/files/permalinks/PFAS-report-MCEA-11-7-2023-final.pdf

Thus, wastewater treatment facilities release PFAS into surface waters, where they persist and bioaccumulate. Even in small amounts, they add to the environmental burden.

The presence of PFAS in regulated wastewater also suggests that some PFAS-contaminated wastes will leak or spill into groundwater or storm drains. So the careful monitoring of wastewater should provide clues on how to manage other waste streams. It should also help researchers target chemicals for which to seek alternatives.

The Minnesota report recommends, "Use pretreatment program to require industrial dischargers to use best management practices and treatment options to reduce and remove PFAS from industrial wastewater before it reaches municipal wastewater treatment plans."

In fact, factories are required to obtain wastewater discharge permits from publicly owned treatment works (POTWs, or sewage plants). These requirements begin in EPA regulations. See https://www.law.cornell.edu/cfr/text/40/403.5. They are supported by state and local requirements.

However, those rules are primarily designed to protect sewage plants – which are, in part, an amalgam of living organisms – from industrial wastes. Preventing contamination from reaching the environment is a secondary objective.

So those of us who want to minimize the continuing release of PFAS into the environment must insist that POTWs target PFAS in their discharge permitting process. This should go beyond the poster-child PFAS compounds, PFOS and PFOA, which are no longer used in chipmaking. They should regulate total organic fluorine, because all PFAS chemicals are persistent.

Until it's possible to actually destroy the PFAS found in wastewater – and there are several candidate technologies to do that – pre-treatment should be designed to remove all PFAS

compounds from the waste stream. When PFAS wastes are mixed with other wastes, it's harder to remove them from the liquid waste stream. So pre-treatment rules should require pre-treatment at the point of use, before mixing with other substances can inhibit removal.

These asks are achievable, because the local officials who run sewage plants want to clean their releases and are held accountable, through regional, state, or federal discharge permits, for their effluent. They can be allies in our campaign to protect the environment from semiconductor industry pollution.