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DEPARTMENT OF
ENVIRONMENT, GREAT LAKES, AND ENERGY
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VIA ELECTRONIC SUBMISSION

United States Environmental Protection Agency
Office of Pollution Prevention and Toxics
EPA Docket Center (ORD Docket)
Document Control Office (7407M)
1200 Pennsylvania Avenue, NW
Washington, DC 20460-0001

Dear Sir or Madam:

SUBJECT: Docket ID No. EPA-HQ-TRI-2019-0375

The Michigan PFAS Action Response Team's (MPART) Air Quality and Human Health Workgroups reviewed the United States Environmental Protection Agency's (USEPA) advance notice of proposed rulemaking (ANPRM) (*Federal Register* / Vol. 84, No. 233 / Wednesday, December 4, 2019 / Proposed Rules, pages 66369-66373) (*FR*). The USEPA is soliciting input as it considers proposing a future rule on adding certain per- and polyfluoroalkyl substances (PFAS) to the list of toxic chemicals subject to reporting under section 313 of the Emergency Planning and Community Right-to-Know Act (EPCRA) and section 6607 of the Pollution Prevention Act (PPA). The USEPA states in the *FR* 66371 that there are approximately 600 PFAS manufactured and/or imported in use in the United States and is seeking comment on which of those 600 should be evaluated for addition to the EPCRA section 313 list of toxic chemicals.

The USEPA bases its chemical listing decision on the hazard or toxicity of the chemical, not on the risk of the chemical; i.e., toxicity plus potential exposures related to that chemical. The USEPA is requesting comment on *which* specific PFAS should be evaluated for listing, *how* to list them, and *what* would be the appropriate reporting thresholds given their persistence and bioaccumulation potential.

Michigan continues to implement a statewide effort investigating PFAS contamination to the environment through MPART (www.Michigan.gov/PFASResponse). Currently 76 contaminated sites have been identified in Michigan, and MPART has sampled several inland lakes in Michigan away from any known source and has detected PFAS. MPART welcomes the USEPA's ANPRM to add PFAS to the Toxics Release Inventory (TRI) and appreciates the opportunity to provide comments. Much is still unknown about these chemicals, and this potential rulemaking, if finalized, would provide much needed information on the release of PFAS to the environment from businesses and manufacturers.

1. USEFULNESS OF TRI REPORTING INFORMATION

A primary criterion for the inclusion of PFAS in the TRI is whether it will result in useful information to stakeholders. Today there is very little information available to states and local units of government about PFAS use by industry apart from PFAS-containing aqueous fire-fighting foams (AFFF) in fire-fighting activities and PFAS-containing fume suppressants used in

the chrome plating sector. This means the discovery of PFAS release and environmental contamination is typically found by blind collection of samples for chemical analysis. The very high cost of these activities and the serious concerns posed by the presence of PFAS in drinking water and the environment means any information provided about PFAS uses by industry via the TRI would be extremely helpful to states and local units of government concerned with protecting their residents from exposure to these chemicals.

The recent signing on December 20, 2019, of the National Defense Authorization Act (NDAA) demonstrates national recognition of the hazards associated with PFAS. The NDAA section 7321 provides precedence by already requiring the reporting of 160 PFAS under section 313 of the EPCRA.

2. PFAS AND EPCRA SECTION 313(d)(2) CRITERIA FOR ACUTE, CHRONIC, AND ENVIRONMENTAL EFFECTS

The ANPRM specifies that to add a chemical to the TRI, the USEPA must demonstrate that at least one of the section 313(d)(2) criteria are met. Both epidemiologic and animal studies support the acute (A) and long-term (B) human health effects of PFAS.

Many of the acute human health effects of exposure to PFAS are also seen after long-term (chronic) exposure to PFAS. Long-term human health effects have been associated with PFAS exposure as determined by the C8 Science Panel (http://www.c8sciencepanel.org/prob_link.html). A more detailed summary of epidemiological evaluations can be found in the Toxicological Profile for Perfluoroalkyls by ATSDR (2018). ATSDR (2018) stated that the following health effects are associated with PFAS exposure:

- Hepatic effects - Increases in serum enzymes and decreases in serum bilirubin, observed in studies of PFOA, PFOS, and PFHxS, are suggestive of liver damage. In addition, the results of epidemiology studies of PFOA, PFOS, PFNA, and PFDeA suggest a link between perfluoroalkyl exposure and increases in serum lipid levels, particularly total cholesterol and LDL cholesterol.

- Cardiovascular effects - There is suggestive epidemiological evidence for an association between serum PFOA and PFOS and pregnancy-induced hypertension and/or pre-eclampsia.

- Endocrine effects - Epidemiology studies provide suggestive evidence of a link between serum PFOA and PFOS and an increased risk of thyroid disease.

- Immune effects - Evidence is suggestive of a link between serum PFOA, PFOS, PFHxS, and PFDeA levels and decreased antibody responses to vaccines. A possible link between serum PFOA levels and increased risk of asthma diagnosis has also been found. Furthermore, perfluorinated compounds are well-documented immunotoxicants that cause persistent alteration of immune function if exposure occurs during gestation.

- Reproductive effects - A suggestive link between serum PFOA and PFOS levels and an increased risk of decreased fertility has been found.

- Developmental effects - Evidence is suggestive of a link between serum PFOA and PFOS and small decreases in birth weight; the decrease in birth weight is <20 g (0.7 ounces) per 1 ng/mL increase in blood PFOA or PFOS level.

Serum perfluoroalkyl levels in humans serve as a biomarker of exposure but do not always translate easily into dose levels or duration of exposure. Most of the epidemiology studies provided a single serum perfluoroalkyl concentration, which has been shown to be a reliable biomarker of recent exposure; however, it does not provide information on historical exposure. Animal data are more commonly used to extrapolate risk to humans because of methodological uncertainties in the epidemiologic database. Still, only a small number of PFAS have a robust toxicological database that includes studies such as two-generation reproductive, neurobehavioral developmental, chronic exposure, and immunotoxicologic. Even fewer PFAS have physiologically-based pharmacokinetic (PBPK) modeling necessary to extrapolate data from animals to humans.

Few PFAS have USEPA hazard assessments and/or toxicity data. In 2016 the USEPA-derived drinking water Health Advisories (HA) for PFOS and PFOA (EPA 822-R-16-002 and EPA 822-R-16-003) of 70 ppt, each. The USEPA also recommended the HA level of 70 ppt be applied to the combined concentrations of PFOA and PFOS when they co-occur.

MPART agrees with the USEPA that the combined exposure to both PFOS and PFOA would have additive effects and should be evaluated as a group. More recently, MPART received a report from the Michigan Science Advisory Workgroup (MSAWG, 2019) which re-evaluated the toxicity information for various PFAS and derived health-based toxicity values (equivalent to RfDs) and drinking water health-based values (HBVs), which are equivalent to the USEPA's HAs. Based on Michigan-specific analysis and drinking water exposure scenarios, the MSAWG derived a toxicity value for PFOS at 2.9 ng/kg/day (2.9E-6 mg/kg/day), which is almost 10 times lower than the USEPA's RfD for PFOS derived in 2016 (i.e., 2E-5 mg/kg/day; EPA 822-R-16-002). The MSAWG also derived toxicity values for six other PFAS that indicate that at least some of the other PFAS are as toxic as PFOS. The MSAWG derived health-based values (HBVs) for seven PFAS (table below):

Specific PFAS	Drinking Water Health-Based Value
PFOA	8 ng/L (ppt)
PFOS	16 ng/L (ppt)
PFHxS	51 ng/L (ppt)
PFNA	6 ng/L (ppt)
PFBS	420 ng/L (ppt)
GenX	370 ng/L (ppt)
PFHxA	400,000 ng/L (ppt)

Furthermore, because of the similarity of toxicity of some PFAS, the MSAWG stated that there is scientific agreement that the long-chain PFAS (eight carbons and above for carboxylates and six carbons and above for sulfonates) have similar toxicity. Based on the similarity in toxicity for the long-chain PFAS, the MSAWG recommends use of the HBV for PFNA (6 ng/L [ppt]) as a screening level for all other long-chain PFAS included on the USEPA Method 537.1 analyte list for which the MSAWG did not develop an individual HBV. Other states have derived similar toxicity values and drinking water values for various PFAS (Environmental Council of the States

[ECOS]; https://www.ecos.org/pfas/; and Association of State Drinking Water Administrators [ASDWA], https://www.asdwa.org/pfas/).

In addition to the human health effects, PFAS also meet the environmental effects criterion of section 313(d)(2)(C). PFAS chemicals are stable in environmental media because they are resistant to environmental degradation processes, such as hydrolysis, photolysis, and biodegradation. Because of their persistence, PFAS chemicals can be transported long distances in soil, air, or water as evidenced by their occurrence in environmental media and biota, including in polar bears[1], ocean-going birds, and fish found in remote areas as far as Arctic and Antarctic regions[2]. It is also evident from field studies that PFAS chemicals from contaminated environmental media accumulate in the food webs in the parts per billion (ppb) range, which is an order of magnitude higher than the HBVs.

PFAS are not only persistent; PFAS are extraordinarily persistent and known to be resistant to almost all existing destruction technologies. While assessment of a single PFAS chemical may show it breaks down (i.e., is not persistent), in the case of PFAS, it is known there are PFAS precursors that can transform into more toxic PFAS. Therefore, from the standpoint of evaluating whether a chemical meets the section 313(d)(2) criteria, it is indisputable that PFAS as a class are persistent due to the uniquely strong carbon-fluorine bond.

Further, there is much uncertainty with remediation and destruction of PFAS. Incomplete thermal oxidation of PFAS compounds has been shown to create products of incomplete combustion. Additionally, insufficient research has been conducted on ensuring that remediation methods, including granular activated carbon regeneration, evaporators, and air strippers, are not merely transferring the PFAS from one media to another.

In summary, due to PFAS' persistence, bioaccumulation, known impacts on human health, cost difficulty in remediating/destroying these chemicals; PFAS more than adequately meet the condition of "significant adverse effect" under EPCRA section 313(d)(2)(C).

3. LISTING PFAS INDIVIDUALLY OR AS CHEMICAL CATEGORIES

The USEPA is also requesting comment on which specific PFAS should be evaluated for listing and how to list them.

Given the robust experiences as a society with substituting one toxic chemical for another with similar structure and attributes, only to find it, too, is toxic, an approach of listing only specific PFAS may not provide adequate protection.

Because little information is known for the estimated 5,000 PFAS and listing each individually may miss numerous chemicals, it is recommended that the major PFAS classes be listed

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[1] Smithwick M, Norstrom RJ, Mabury SA, Solomon K, Evans TJ, Stirling I, Taylor MK, Muir DC. Temporal trends of perfluoroalkyl contaminants in polar bears (Ursus maritimus) from two locations in the North American Arctic, 1972-2002. Environ Sci Technol. 2006 Feb 15;40(4):1139-43.

[2] Zhao Z, Xie Z, Möller A, Sturm R, Tang J, Zhang G, Ebinghaus R. Distribution and long-range transport of polyfluoroalkyl substances in the Arctic, Atlantic Ocean and Antarctic coast. Environ Pollut. 2012 Nov;170:71-7. doi: 10.1016/j.envpol.2012.06.004. Epub 2012 Jul 5.

according to the Interstate Technology and Regulatory Council (ITRC). Listing them by classes should also capture any new PFAS used to replace those in current use as they should also fall into one of the classes. The listing by classes should be conducted to capture all PFAS and to determine threshold determinations and then the individual PFAS should also be reported. Reporting of the compounds should be individual to allow for human health assessment and for compiling information regarding emissions/releases to the specific location.

If any of the 600 PFAS substances manufactured and/or imported in use in the United States fall into one of the classes below, they should be listed. In addition, if any of the 600 include one fully fluorinated carbon and are cyclic compounds, they should also be included. Currently the cyclic compounds are not included in the ITRC classes.

ITRC classes should be utilized as identified in: https://pfas-1.itrcweb.org/wp-content/uploads/2017/10/pfas_fact_sheet_naming_conventions_11_13_17.pdf

1. Perfluoroalkyl acids (PFAAs)
2. Perfluoroalkane sulfonamides (FASAs)
3. Fluorotelomer alcohols (FTOHs)
4. Fluorotelomer sulfonic acids (FTSAs)
5. Fluorotelomer carboxylic acids (FTCAs)
6. Perfluoroalkane sulfonamide substances (including perfluoroalkane sulfonamide ethanols (FASEs), n-alkyl perfluoroalkane sulfonamide ethanols (MeFASEs, EtFASEs, BuFASEs)
7. Perfluoroalkane sulfonamide acetic acids (FASAAs)
8. N-alkyl perfluoroalkane sulfonamide acetic acids (MeFASAAs, EtFASAAs, BuFASAAs)

Because the cyclic compounds are not included in the ITRC classes, the information identified in Buck *et al*. (2011)[3] should be considered. In addition to the commonly recognized groups of PFAS with an established general terminology as in Buck *et al*. (2011), new groups of PFAS have been identified. These new groups fulfil the common definition of PFAS (i.e., they contain at least one perfluoroalkyl moiety; Buck *et al*., 2011) and include:

1. hydrofluorocarbons (HFCs) with a general structure of $C_nF_{2n+1}C_mH_{2m+1}$, hydrofluoroethers (HFEs) with a general structure of $C_nF_{2n+1}OC_mH_{2m+1}$, and hydrofluoroolefins (HFOs) with a general structure of $C_nF_{2n+1}C_mH_{2m-1}$,
2. perfluoroalkyl alkenes (C_nF_{2n}) and their derivatives,
3. perfluoroalkyl ketones ($C_nF_{2n+1}C(O)C_mF_{2m+1}$), semi-fluorinated ketones ($C_nF_{2n+1}C(O)C_mH_{2m+1}$), and their derivatives,
4. side-chain fluorinated aromatics (C_nF_{2n+1}−aromatic ring(s)), and
5. others such as perfluoroalkyl alcohols ($C_nF_{2n+1}OH$), silanes ($C_nF_{2n+1}Si$−), and amines (C_nF_{2n+1}−N−)

The USEPA should provide detailed guidance and training support to facilities on understanding the classes and where the specific compounds may be used in the various sectors required to

[3] Buck, R., Franklin,J., Berger, U., Conder, J., Cousins, I., de Voogt, P., Jensen,A., Kannan, K., Mabury, S., van Leeuwen, S. Perfluoroalkyl and polyfluoroalkyl substances in the environment: terminology, classification, and origins. Integrated Environmental Assessment and Management. 2011.Vol. 7, No. 4, pp. 513-541.

report. Such guidance should also assist facilities in what types of formulated inputs used in their industry are likely to contain PFAS and techniques for working with suppliers to gather the information necessary to complete their required reporting. MPART and assistance partners would also add to this education effort.

While the TRI program has been primarily focused on manufacturing and its ancillary processes, PFAS substances are also used by commercial facilities as part of formulated products, independent of the presence of a manufacturing process. The USEPA should add additional sectors (NAICS codes) specific to PFAS to those already required to report to TRI under the NDAA. Beginning January 1, 2020, the NDAA requires TRI reporting of 160 PFAS by July 2021. Specifically, states need more information about additional potential users of PFAS formulations, such as airports (NAICS 488119), carpet and upholstery cleaning (NAICS 561740), floor covering stores, post-manufacturing stain resistance formulations (NAICS 442210), and car washes (NAICS 811192). Facilities utilizing burn off ovens to remove Teflon coatings from racks/parts should also be included.

4. PFAS REPORTING THRESHOLDS

PFAS have been specifically formulated to be extremely persistent; many are also known to be toxic at micro levels and some are bioaccumulative. Therefore, the USEPA must establish reporting thresholds that correlate with the levels at which states are addressing contamination.

Very little PFAS needs to be present in a water body to cause an impairment that limits human use of that resource (both drinking water and fish consumption). PFAS are very mobile and easily move from the location of discharge and/or emissions to the wider environment. In 2014 Michigan developed a Water Quality Standard (WQS) Rule 57 Human Noncancer Values (HNV) for PFOS for surface waters. The HNV for nondrinking water is 12 ppt, and the HNV for drinking water is 11 ppt. The PFOS is set very low because it is highly bioaccumulative. For example, the concentration of PFOS in fish is 1,000 times the concentration in water.

Because of the toxicity of these chemicals, a very low threshold should be set. As we learn more about these chemicals, a threshold like the dioxin threshold of 0.1 gram/year may be necessary. Unlike other well-known persistent, bioaccumulative and toxic (PBT) contaminants (e.g., dioxins and PCBs), drinking water is an important exposure route for PFAS. Low levels in drinking water can overwhelm exposures from other expected sources (e.g., food, consumer products, etc.) typical in the general population.

For example, it would only require a facility release 0.8899 gram (<1 gram) of PFAS to cause an exceedance in a water body, assuming the water body was 10 acres and 2 meters in depth. In Michigan, a chrome plater using PFAS unintentionally released PFAS onto their roof (from air pollution control devices) into their stormwater and to a wastewater treatment plant that was a source of PFAS to a large watershed covering 576,000 acres used by the public for recreation and fishing. Fish levels exceeded the “do not eat” advisory due to PFOS concentrations (www.Michigan.gov/EatSafeFish). Reductions were achieved by switching to a non-PFOS containing PFAS and with a major overhaul of all tanks in the facility. However, this took time, as even when the company stopped using PFOS after approximately 2.5 years, they were still releasing levels at 28,000 ppt PFOS. Other PFAS (6:2 FtS) continued to be released at high concentrations until granular activated carbon controls were installed.

The state Rule 57 WQS provided the regulatory driver to control the release of PFAS from the facility after the environment was impaired. Had the facility been required to report to the TRI at a low reporting threshold, identification of the release could have been made sooner, allowing steps to be taken to limit or eliminate the release, thereby protecting the environment and public health.

Based on the bioaccumulation and toxicity data available today, MPART recommends a reporting threshold of <1 gram per year for the PFAS classes identified above.

We recognize these approaches will involve including new types of businesses to the inventory; however, these steps are necessary to protect the environment and human health due to widespread PFAS use, toxicity, and persistence. We also recognize the challenge this reporting would present, particularly to smaller facilities, so the USEPA could consider flexible approaches to what affected facilities would report, such as the following:

- Should information not be readily available from suppliers, reporting the presence of a PFAS compound or one identified as being within one of the classes above.
- Reporting the presence and/or amount in supplied formulated products or manufacturing aids *without* requiring facilities to parse and report amounts going to various media releases or through other management methods.

Even when non-specific data is reported, the information generated would allow MPART and local regulators and assistance providers to engage with the new reporting facilities to gather additional further information from suppliers, seek safer substitutes, or identify techniques to minimize release of PFAS substances. Lastly, this information could aid in identifying potential PFAS contamination near the facilities.

Thank you for your consideration of our request to add additional PFAS to the TRI at a low enough threshold to sufficiently protect humans and wildlife. Such an expanded rule will provide essential information to the states and local units of government to better understand sources and releases of PFAS to the environment.

If you have any questions, please contact me at 517-290-2943 or SliverS@Michigan.gov; or you may contact Ms. Joy Taylor Morgan, Air Quality Division (AQD), at 517-284-6765; TaylorJ1@Michigan.gov; or Michigan Department of Environment, Great Lakes, and Energy (EGLE), AQD, P.O. Box 30260, Lansing, Michigan 48909-7760.

Sincerely,

Steve Sliver, Executive Director
Michigan PFAS Action Response Team
517-290-2943

cc: Ms. Liesl Eichler Clark, Director, EGLE
Mr. Aaron B. Keatley, Chief Deputy Director, EGLE
PFAS Technical Workgroup