

OVERVIEW OF MICHIGAN'S SCREENING VALUES & MCLs Per- and polyfluoroalkyl substances (PFAS)

What is PFAS?

Per- and polyfluoroalkyl substances (PFAS) are a family of man-made chemicals, including PFOS, PFOA, PFBS, PFHxS, PFNA, and many others, that have been used in manufacturing and commercial products since the 1940s. Practical uses of PFAS include non-stick surfaces on cooking pans and food wrappers, waterproofing chemicals, foams used to fight fires, and in industries to keep fumes down for worker safety.

PFAS: An Emerging Contaminant

Although PFAS have been used since the 1940s, the science around PFAS is still in its early stages. We do not yet understand everything there is to know about how PFAS travel in the environment - where they go, how many there are, and the effects they may have on human health. However, we do know, based on U.S. Center for Disease Control and Prevention (CDC) studies, that almost everyone has some amount of several PFAS, as well as other industrial chemicals, in their bodies at any given time. These exposures result both from intentional use of these chemicals in products, as well as accidental releases. As a result of some accidental releases, PFAS has been found in drinking water, surface water, groundwater, air, and wild game.

Scientists in the fields of toxicology and epidemiology are working together to better understand the possible health effects of PFAS at all levels of exposure. Toxicologists study the effects of chemicals on living organisms. They often must rely on laboratory animal studies to predict possible health effects that may occur if a person were to be exposed to PFAS. Epidemiologists study people's health at the population level, looking for changes in rates of health effects that may be linked to that population's exposure to the chemical. In the case of PFAS, they are looking for relationships between known PFAS exposures and impacts on health. These two areas of science help inform what we know about the effects on human health following exposure to PFAS and other chemicals in our environment.

Given the level of concern PFAS is receiving at the national level and throughout the world, what we know about PFAS is increasing rapidly. State public health and regulatory officials use this evolving information to determine how best to protect the population from getting too much PFAS in their bodies. Decisions are based on the best science and data available at the time.

MPART: Michigan PFAS Action Response Team

Michigan is one of the national leaders when it comes to trying to better understand PFAS and ensure public health is protected. In 2017, the Michigan PFAS Action Response Team (MPART) was created by executive directive to investigate sources and locations of PFAS in Michigan and protect drinking water and public health. Since 2017, MPART has identified PFAS in several Michigan counties, cities, and towns. Its work continues today.

On February 4, 2019, Governor Gretchen Whitmer signed Executive Order 2019-3, making MPART an established, enduring organization. MPART continues to address the threat of PFAS contamination in Michigan, protect public health, and ensure the safety of Michigan's land, air, and water, while facilitating inter-agency coordination, increasing transparency, and requiring clear standards to ensure accountability.

Michigan's regulatory and public health professionals will continue to look to the best available science to make the decisions needed to protect public health. This has and will continue to result in frequently updated screening levels to ensure that we are all drinking the safest water possible.

Questions about topics in this document can be directed to the Michigan Department of Health and Human Services at 800-648-6942 or the Department of Environment, Great Lakes, and Energy at 800-662-9278. Updates regarding Michigan's PFAS response efforts can be found at Michigan.gov/PFASResponse.

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A Look At the Numbers

Multiple government agencies work to ensure that public health is protected when it comes to drinking water and contaminants. Some work to enforce regulations; others are focused on learning about where the contamination is coming from and where it has spread in the area; others assess who might be exposed and what that might mean for a community; and others ensure contaminant levels remain within acceptable limits based on the best available science of the time. These agencies use screening values, criteria, and rules in different ways to fulfill their obligations to protect public health.

The following pages lay out the various values the State of Michigan is using to ensure that we are all drinking the safest water possible.

It's important to note that public health drinking water screening levels and health-based values serve a different purpose than regulatory criteria. Whereas criteria are meant to be a hard stop – a red light at the intersection that applies to everyone equally; public health drinking water screening levels are like a blinking yellow light – meaning proceed with caution and consider the various factors on a case-by-case basis.

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PFAS Abbreviations

PFAS	Per- and polyfluoroalkyl substances
PFOA	Perfluorooctanoic Acid
PFOS	Perfluorooctane Sulfonate
PFNA	Perfluorononanoic Acid
PFHxA	Perfluorohexanoic Acid
PFHxS	Perfluorohexane Sulfonic Acid
PFBS	Perfluorobutane Sulfonic Acid
GenX™	GenX™

2001 – Michigan Surface Waters Sampled for PFAS

In 2001, staff of the Michigan Department of Environment, Great Lakes, and Energy (EGLE, then known as the Michigan Department of Environmental Quality or MDEQ) Water Resources Division, sampled surface water from rivers in different parts of the state for the presence of PFOA and PFOS. The sampling was conducted because PFAS had been found at elevated levels in water, fish, and wildlife in Minnesota and other areas of the country, indicating that these compounds might be emerging contaminants of concern. The results of the sampling in 2001 suggested that the levels of these two PFAS in Michigan surface waters were not a statewide concern.¹

¹ Aiello, C. 2005. Michigan Water Chemistry Monitoring Great Lakes Tributaries 2003 Report. MDEQ Staff Report #MI/DEQ/WB-05/058

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March 2014 – Rule 57 Water Quality Values (Surface Water)

The Michigan Department of Health and Human Services (MDHHS) and EGLE partnered under a project funded by the U.S. Environmental Protection Agency (U.S. EPA) Great Lakes Restoration Initiative in 2012. The goals of this project were to reassess some of the surface waters that were initially sampled in 2001, determine the extent of PFAS contamination throughout the state, and attempt to correlate surface water concentrations of PFAS with those found in fish tissue. Using this funding, EGLE collected water and fish from 11 sites in Michigan for PFAS testing. In addition, fish alone were collected from eight Great Lakes and inland sites.²

In 2014, using this data, EGLE developed their first PFAS surface water standards for Rule 57 Water Quality Values.

Although these waterbodies are delineated between drinking water and non-drinking water sources, these numbers take into account other variables than what is commonly used to determine drinking water standards and should not be used interchangeably with drinking water criteria. These numbers are developed for the purpose of calculating how much PFOS and PFOA an industry can discharge into the water and still be protective of humans, wildlife, and aquatic life.

EGLE Rule 57 Water Quality Values – Drinking Water and Non-Drinking Water

Type of PFAS	PFOA	PFOS
Human Non-Cancer Value – Drinking Water Waterbodies	420 ng/L (ppt)	11 ng/L (ppt)
Human Non-Cancer Value – Non-Drinking Water Waterbodies	12,000 ng/L (ppt)	12 ng/L (ppt)

Each value is reported in nanograms of the specific PFAS per liter of water (ng/L), which is the same as parts per trillion (ppt).

April 2015 – Rule 57 Water Quality Values (Aquatic Life)

EGLE released their aquatic life standards under their Rule 57 Water Quality Values for PFOS and PFOA in 2015.

- The Final Chronic Value is calculated to ensure that fish and amphibians living in the water are not harmed by the contaminant of concern, in this case PFOS and PFOA, despite long-term exposure, relative to their lifespan.
- The Aquatic Maximum Value is the highest amount of a contaminant of concern that fish and amphibians can be exposed to briefly without resulting in unacceptable effects.
- The Final Acute Value is the level of a contaminant of concern that is not expected to result in a die off of more than half of the fish or amphibians living in that water when exposed for 96 hours, except where a shorter time period is appropriate for certain species.

EGLE Rule 57 Water Quality Values – Aquatic Life

Type of PFAS	PFOA	PFOS
Final Chronic Value for Aquatic Life	880,000 ng/L (ppt)	140,000 ng/L (ppt)
Aquatic Maximum Value	7,700,000 ng/L (ppt)	780,000 ng/L (ppt)
Final Acute Value for Aquatic Life	15,000,000 ng/L (ppt)	1,600,000 ng/L (ppt)

Each value is reported in nanograms of the specific PFAS per liter of water (ng/L), which is the same as parts per trillion (ppt).

² https://www.michigan.gov/documents/mdch/MDCH_GL-00E01122-0_Final_Report_493494_7.pdf

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January 2018 – Residential and Nonresidential Drinking Water Criterion

On January 9, 2018, Michigan adopted the 2016 U.S. EPA Lifetime Health Advisories³ of 70 ppt for PFOS and PFOA as the enforceable environmental cleanup criterion for residential and nonresidential drinking water.⁴ These compounds are regulated under Part 201 of the Natural Resources and Environmental Protection Act (NREPA). Part 201 is Michigan's primary environmental cleanup program and provides the regulatory framework for most contaminated sites in the state.

Then EGLE director, Heidi Grether, stated "This new standard allows us to take regulatory enforcement actions, something we have not been able to do absent a state criterion. This means we will now have tools to mandate that a responsible party must conduct activities to address PFOA and PFOS contamination, thereby reducing risk to human health and the environment." Under this criterion, EGLE is able to issue violation notices and take legal action against responsible parties who don't comply with the state's environmental cleanup rules.

The U.S. EPA still only has lifetime health advisory levels for those two individual PFAS in drinking water, PFOA and PFOS. The U.S. EPA has not set health advisory levels for other PFAS chemicals.⁵ Absent federal guidance, Michigan has moved ahead independently to address some other PFAS to ensure that the health of everyone in Michigan is being protected by the best science available today.

EGLE Residential and Nonresidential Drinking Water Criterion (Retired in August 2020)

Type of PFAS	PFOA + PFOS
Criterion Value	70 ng/L (ppt)

The criterion is reported in nanograms of the specific PFAS per liter of water (ng/L), which is the same as parts per trillion (ppt).

April 2019 – Michigan Public Health Drinking Water Screening Levels

The Michigan PFAS Action Response Team's Science Advisory Board's report, released on December 18, 2018, suggested that although currently a national advisory level, 70 ppt PFOA + PFOS in drinking water may actually be too high based on updated science.

As a result, MPART tasked the Michigan Department of Health and Human Services' (MDHHS)-led Human Health Workgroup (made up of representatives from MDHHS, EGLE, the Michigan Department of Natural Resources, and the Michigan Department of Agriculture and Rural Development) to develop public health drinking water screening levels for PFOA and PFOS. They also requested that the Workgroup undertake the development of levels for any other PFAS with robust enough data to further protect the health of Michigan's residents. A screening level is the amount of a chemical in drinking water or soil at which scientists have found there to be a small to no risk of health effects in the people who are exposed.

As such, the Michigan Public Health Drinking Water Screening Levels listed here were not developed to be a hard stop like legal criteria, such as EGLE's Residential and Nonresidential Drinking Water Criterion for PFOS and PFOA or the yet to-be-developed Maximum Contaminant Levels. The Michigan Public Health Drinking Water Screening Levels simply serve as a caution signal to the state's public health officials. These levels trigger a closer look at the area affected and the potentially exposed population to determine if further actions need to be taken to ensure that public health is protected, even if the total PFOA + PFOS is less than 70 ppt.

Using standard risk assessment methods (detailed in Michigan's *Understanding Risk: What's Behind the Numbers for Per- and polyfluoroalkyl substances (PFAS)*) and the best available science at the time, the Human Health Workgroup developed public health drinking water screening levels for the following PFAS:

- Perfluorooctanoic Acid (PFOA)
- Perfluorooctane Sulfonate (PFOS)
- Perfluorobutane Sulfonic Acid (PFBS)

³ https://www.epa.gov/sites/production/files/2016-06/documents/drinkingwaterhealthadvisories_pfoa_pfos_updated_5.31.16.pdf

⁴ https://www.michigan.gov/egle/0,9429,7-135-3308_3323-457220--,00.html

⁵ <https://www.epa.gov/sites/production/files/2018-03/documents/dwtable2018.pdf>

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- Perfluorohexane Sulfonic Acid (PFHxS)
- Perfluorononanoic Acid (PFNA)

Details regarding the development of these numbers have been documented in the MPART Human Health Workgroup's *Public Health Drinking Water Screening Levels for PFAS*⁶ report released on April 4, 2019.

These public health drinking water screening levels are not enforceable. There are many other factors that go into regulatory drinking water values that were not considered here but do factor into the development of the Maximum Contaminant Levels as discussed below.

In addition, consuming water that contains PFAS over the screening levels listed here does not mean that health effects will occur. These numbers were meant to represent the level at which scientists have found there to be a small to no risk of health effects in the people who are exposed, based on the science that was currently available at the time. These levels will be reviewed and reconsidered as science progresses.

Michigan Public Health Drinking Water Screening Levels

Type of PFAS	PFOA	PFOS	PFBS	PFHxS	PFNA
Screening level	9 ng/L (ppt)	8 ng/L (ppt)	1000 ng/L (ppt)	84 ng/L (ppt)	9 ng/L (ppt)

Each screening level is reported in nanograms of the specific PFAS per liter of water (ng/L), which is the same as parts per trillion (ppt).

June 2019 – Drinking Water Health-based Values

On March 26, 2019, Governor Gretchen Whitmer directed MPART to form a Science Advisory Workgroup to review existing and proposed public health drinking water levels from around the nation by the deadline of July 1, 2019. These values informed the EGLE rule-making process for appropriate Maximum Contaminant Levels (MCLs) for PFAS in Michigan.

On April 11, 2019, MPART named three environmental and health experts⁷ to serve as the State's independent Science Advisory Workgroup:

- Dr. David Savitz – Professor of Epidemiology, Brown University
- Mr. Kevin Cox – Managing Toxicologist, NSF International
- Dr. Jamie DeWitt – Associate Professor in the Department of Pharmacology & Toxicology of the Brody School of Medicine at East Carolina University.

Using a process detailed in the Michigan Science Advisory Workgroup's *Health-based Drinking Water Value Recommendations for PFAS in Michigan* report⁸ and best available science, the Science Advisory Workgroup recommended Michigan use the following health-based values for the development of PFAS MCLs. The MCLs will be used to regulate and enforce PFAS levels in drinking water in Michigan.

Drinking Water Health-based Values

Type of PFAS	PFOA	PFOS	PFNA	PFHxA	PFHxS	PFBS	GenX
Health-based values	8 ng/L (ppt)	16 ng/L (ppt)	6 ng/L (ppt)	400,000 ng/L (ppt)	51 ng/L (ppt)	420 ng/L (ppt)	370 ng/L (ppt)

Each value is reported in nanograms of the specific PFAS per liter of water (ng/L), which is the same as parts per trillion (ppt).

⁶ https://www.michigan.gov/documents/pfasresponse/MDHHS_Public_Health_Drinking_Water_Screening_Levels_for_PFAS_651683_7.pdf

⁷ https://www.michigan.gov/egle/0,9429,7-135-3308_3323-494996--,00.html

⁸ https://www.michigan.gov/documents/pfasresponse/Health-Based_Drinking_Water_Value_Recommendations_for_PFAS_in_Michigan_Report_659258_7.pdf

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August 2020 – Maximum Contaminant Levels (MCLs)

Similar to the Residential and Nonresidential Drinking Water Criterion, MCLs are also legally enforceable. Generally, MCLs for contaminants in drinking water are set by the U.S. EPA and are adopted at the state-level. Per the U.S. EPA, these primary standards are meant to protect public health by limiting the levels of contaminants in drinking water.⁹ However, the U.S. EPA has not yet established MCLs for any PFAS. In absence of federal rule-making, states must individually determine if they wish to set legally enforceable MCLs and treatment techniques for PFAS that apply to public water systems. Michigan was one of the first states in the nation to undertake the development of MCLs for PFAS to ensure these contaminants are limited in drinking water with the goal of protecting public health.

The MPART Science Advisory Workgroup's health-based value recommendations were used to inform EGLE's rule-making process for PFAS MCLs in Michigan. Once an MCL becomes a rule, municipal drinking water suppliers are required to take actions to assure that their drinking water levels do not exceed those levels.

Michigan Maximum Contaminant Levels (MCLs) (August 2020)

Type of PFAS	PFOA	PFOS	PFNA	PFHxA	PFHxS	PFBS	GenX (HFPO-DA)
Health-based values	8 ng/L (ppt)	16 ng/L (ppt)	6 ng/L (ppt)	400,000 ng/L (ppt)	51 ng/L (ppt)	420 ng/L (ppt)	370 ng/L (ppt)

All of the levels and numbers discussed here serve the purpose of protecting public health, but MCLs are also set to ensure that water can still be delivered and is affordable for the consumer. These MCLs were finalized and adopted by the State in August of 2020.

The drinking water criterion first established in January 2018 were also updated at this time. These compounds are regulated under Part 201 of the Natural Resources and Environmental Protection Act (NREPA). Part 201 is Michigan's primary environmental cleanup program and provides the regulatory framework for most contaminated sites in the state.

EGLE Residential and Nonresidential Drinking Water Criterion (August 2020)

Type of PFAS	PFOA	PFOS
Criterion Value	8 ng/L (ppt)	16 ng/L (ppt)

Each value is reported in nanograms of the specific PFAS per liter of water (ng/L), which is the same as parts per trillion (ppt).

December 2020 – Residential and Nonresidential Drinking Water Cleanup Criteria

On December 21, 2020, EGLE updated its cleanup criteria for groundwater used as drinking water to include five additional PFAS, bringing the total number of PFAS regulated in groundwater to seven.

These compounds are regulated under Part 201 of the Natural Resources and Environmental Protection Act (NREPA). Part 201 is Michigan's primary environmental cleanup program and provides the regulatory framework for most contaminated sites in the state.

EGLE Residential and Nonresidential Drinking Water Cleanup Criterion (December 2020)

Type of PFAS	PFNA	PFHxA	PFHxS	PFBS	GenX (HFPO-DA)
Health-based values	6 ng/L (ppt)	400,000 ng/L (ppt)	51 ng/L (ppt)	420 ng/L (ppt)	370 ng/L (ppt)

Each value is reported in nanograms of the specific PFAS per liter of water (ng/L), which is the same as parts per trillion (ppt).

⁹ <https://www.epa.gov/ground-water-and-drinking-water/national-primary-drinking-water-regulations>

Variations in Levels

As mentioned previously, it is important to remember that MCLs and public health drinking water screening levels serve different roles.

Whereas MCLs and criteria are meant to be a hard stop – a red light at the intersection – that apply to everyone equally, public health drinking water screening levels are a blinking yellow light – meaning proceed with caution and consider the various factors on a case-by-case basis.

MCLs can include technological and economic considerations, while public health screening levels do not. This can result in lower public health screening level values and may prompt public health actions even when regulations are being met.

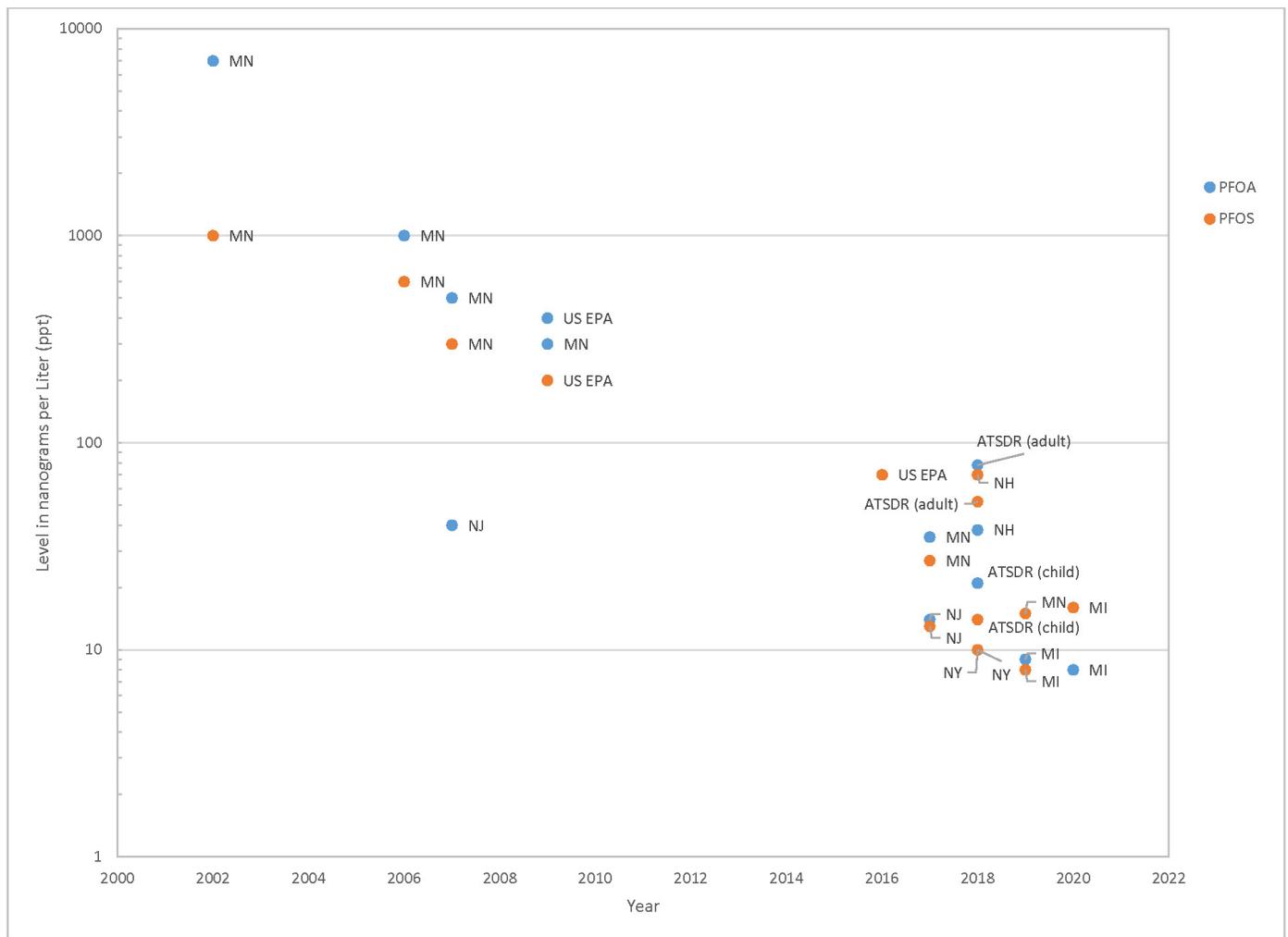
In all cases, regulatory and public health officials are always looking to the best available science and considering updates based upon that. Michigan is not alone in this effort.

The following pages demonstrate how PFAS health-based values, screening levels, and promulgated standards have changed over a relatively short amount of time across a selection of states and federal agencies that have developed them. Additional information can be found in this overview's companion document, *Understanding Risk: What's Behind the Numbers for Per- and polyfluoroalkyl substances (PFAS)*.

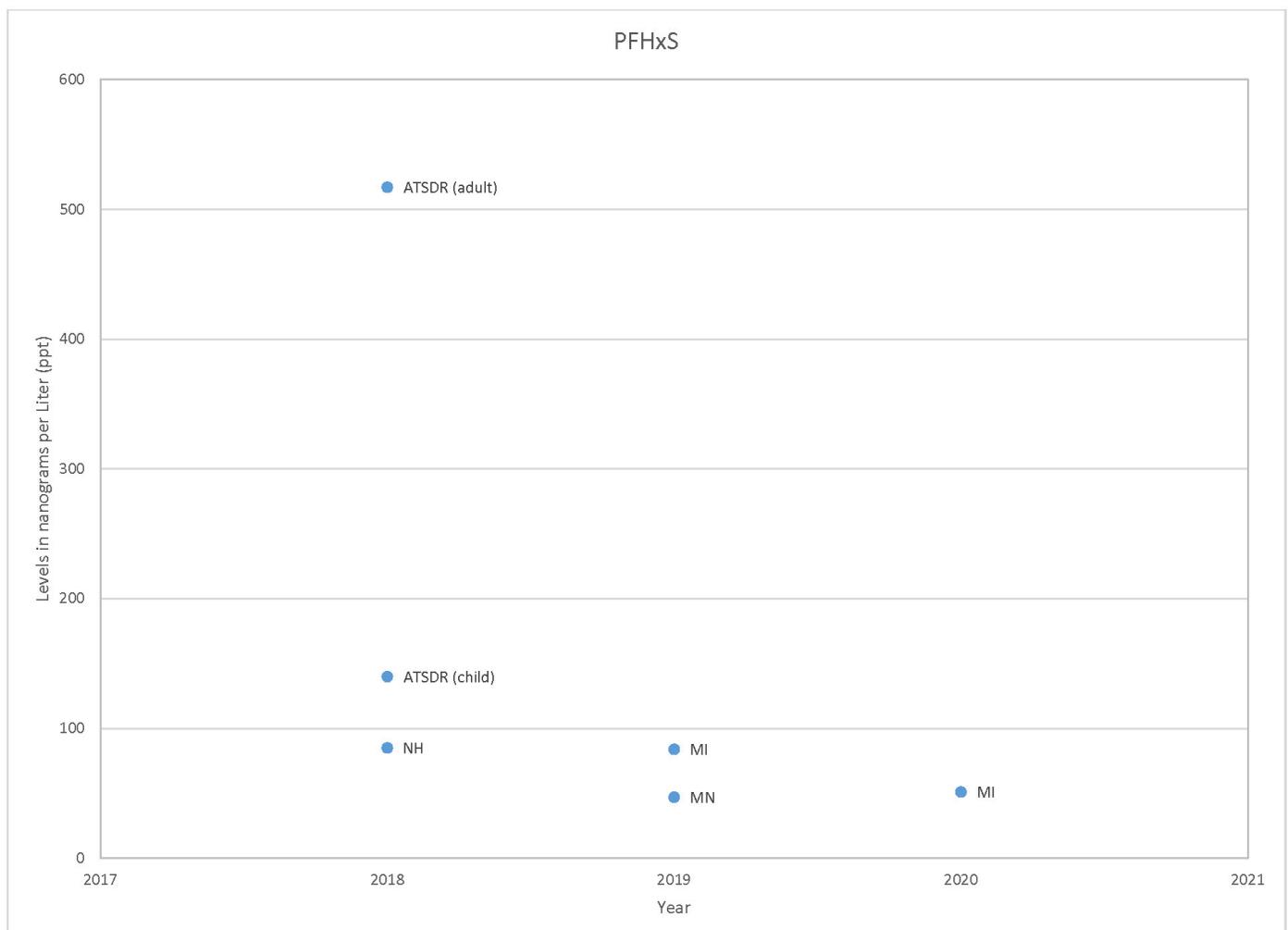
The numbers plotted in the figures on the following pages are a selection of the multiple screening levels, health-based values, and regulatory standards developed by various states and federal agencies over time. They do not include the agencies that group multiple PFAS into a single value. This should not be considered an exhaustive list of all PFAS drinking water values available. Updated and additional values will likely become available.

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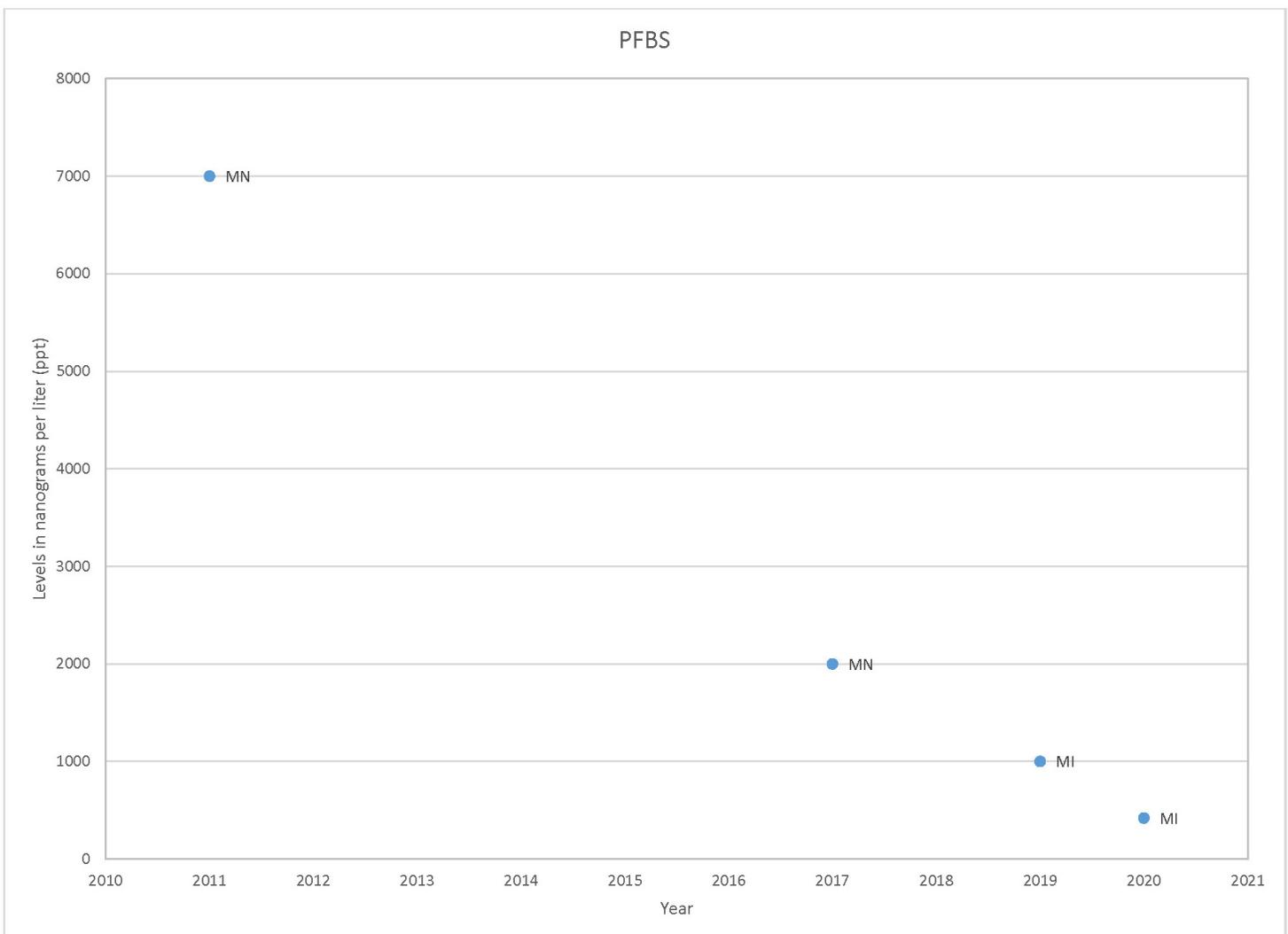
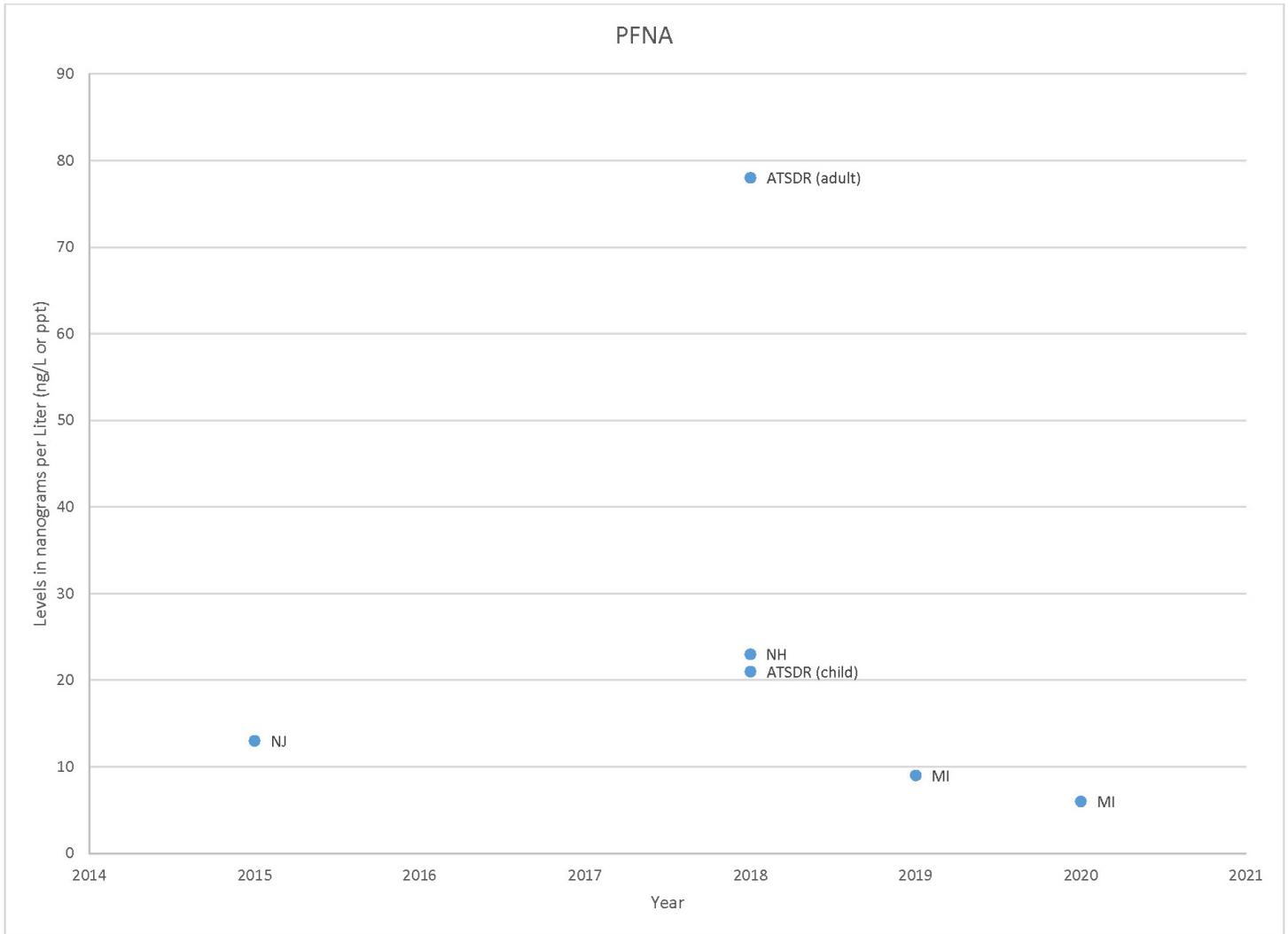
PFOS & PFOA



PFHxS



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Learn More...

[Quick Guide to Michigan's Screening Levels and MCLs for PFAS](#)

This document provides a high level overview of the timeline and background of Michigan's public health screening values and development of the Maximum Contaminant Levels (MCLs).

[Understanding the Risk: What's Behind the Numbers \(PFAS\)](#)

This document provides a breakdown and explanation of all the considerations that go into the development of public health screening levels and regulatory criteria. In addition, there are graphics that show state and federal values and their considerations for each.

Questions?

Questions about the Public Health Drinking Water Screening Levels or drinking water filters can be directed to the Michigan Department of Health and Human Services at 800-648-6942.

Questions about the development of criteria and MCLs can be directed to the Department of Environment, Great Lakes, and Energy at 800-662-9278.

Updates regarding Michigan's PFAS response efforts can be found at Michigan.gov/PFASResponse.