# Evaluation of PFAS in Influent, Effluent, and Residuals of Wastewater Treatment Plants (WWTPs) in Michigan

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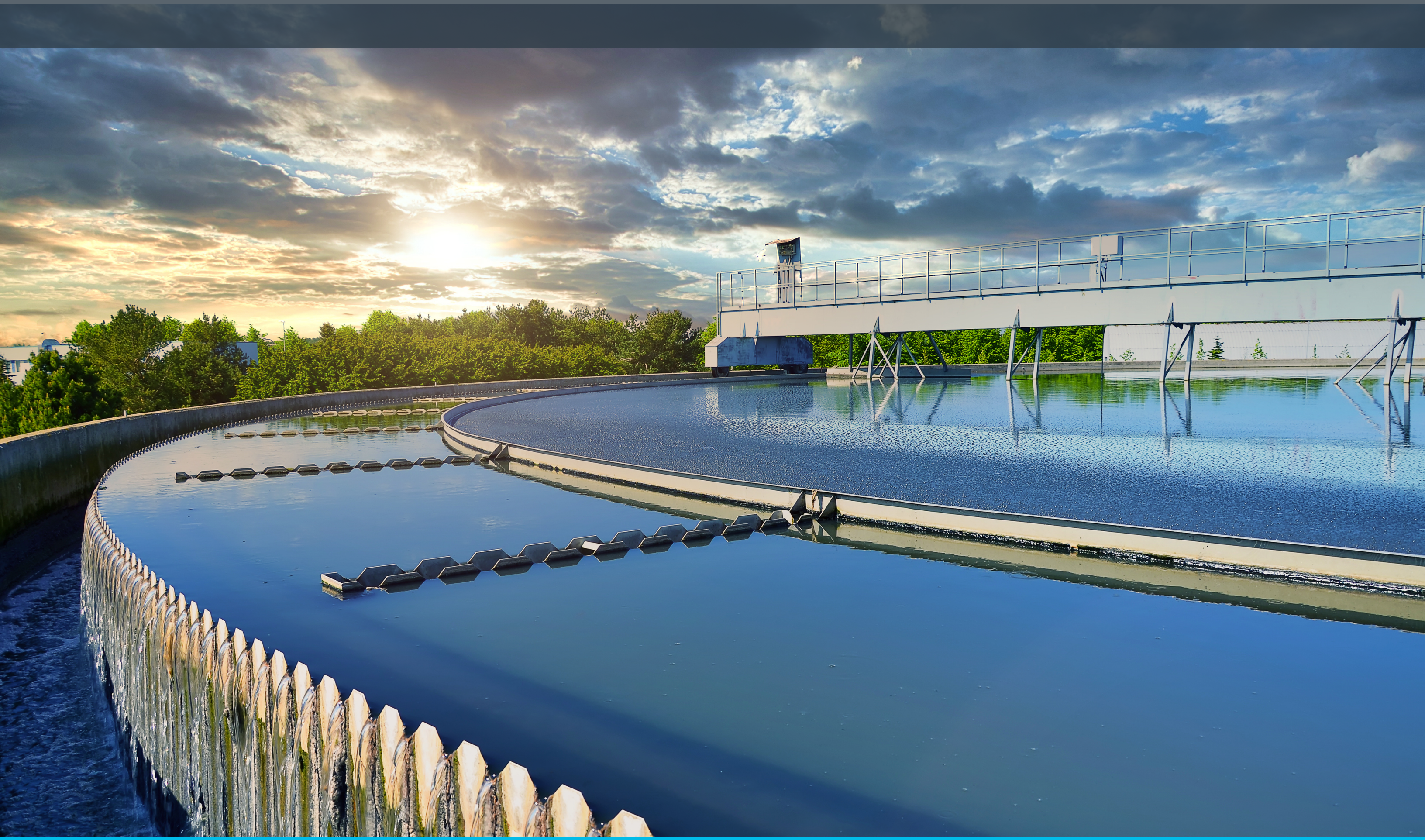

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# 1. Introduction

Per- and polyfluoroalkyl substances (PFAS) are an emerging contaminant class of human-made chemicals that were first developed in the late 1930s and started to be used in commercial products in the late 1940s and early 1950s. The term PFAS is attributed to a large class of chemicals composed of many families that have vastly different physical and chemical properties (Buck, 2011). A recent survey reported more than 4,700 PFAS identified (OECD, 2018). PFAS production increased as these chemicals were incorporated into components of inks, varnishes, waxes, firefighting foams, metal plating, cleaning solutions, coating formulations due to their unique chemical properties as lubricants, water, and oil repellents, paper, and textiles (Paul, 2009). Examples of industries using PFAS include automotive, aviation, aerospace and defense, biocides, cable and wiring, construction, electronics, energy, firefighting, food processing, household products, oil, and mining production, metal plating, medical articles, paper and packaging, semiconductors, textiles, leather goods, and apparel (OECD, 2013, UNEP, 2013).

Many PFAS are highly persistent, bioaccumulative, and toxic and have been detected ubiquitously throughout the environment. Some PFAS undergo partial biotic or abiotic degradation to stable PFAS end-compounds that are highly persistent in the environment (Wang, 2017). Perfluoroalkyl carboxylates (PFCAs) and perfluoroalkyl sulfonates (PFSAs) [collectively known as perfluoroalkyl acids (PFAAs)] are known to be resistant to degradation. Because of the strength of the carbon-fluorine bond, PFAAs are persistent and resistant to biological and thermal degradation; the transformation of PFAAs in Wastewater Treatment Plant (WWTP) processes is not known to occur. By comparison, polyfluorinated compounds, for which some, but not all, carbons are fluorinated, could undergo biotic and abiotic transformation into terminal PFAAs. As a result, these human-made chemicals are expected to be detected for decades in the environment.

Varying concentrations of perfluorooctane sulfonic acid (PFOS), perfluorooctanoic acid (PFOA), and other PFAS have been measured in surface waters in Michigan and biota worldwide in areas remote from known or suspected sources, including in Polar Regions where contamination could occur only through long-range environmental transport (Kannan, 2001; Giesy, 2001; Houde, 2011; Ye, 2008; Stahl, 2014; Custer, 2016; Williams, 2016).

Widespread use of fluorinated chemistry at various manufacturing and industrial facilities in conjunction with extreme resistance to degradation has resulted in the presence of PFAS in the environment and at WWTPs. While WWTPs are not the source of PFAS, they are a central point of collection and could serve as a key location to control and potentially mitigate their release into the environment. Effluents discharged from WWTPs and biosolids applied to the agricultural land for beneficial reuse have been identified as potential PFAS release pathways into the environment by the Interstate Technology and Regulatory Council (ITRC) (ITRC, 2017).

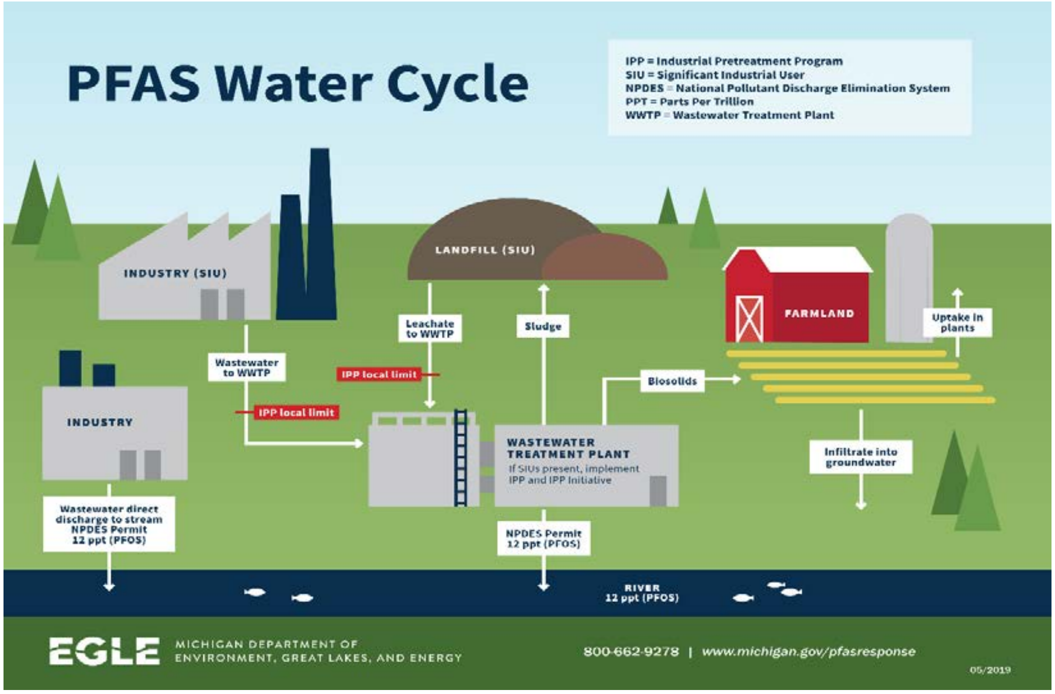
PFAS have been identified in WWTPs since the early 2000s during the 3M-sponsored Multi-City Study from Alabama, Tennessee, Georgia, and Florida. PFAS were also later identified in WWTPs from Minnesota, Iowa, California, Illinois, New York, Kentucky, Georgia, and Michigan (Boulanger, 2005; Higgins, 2005; Schultz, 2006; Sinclair, 2006; Loganathan, 2007; Sepulvado, 2011; Houtz, 2016). Some of the most frequently detected PFAS were PFAAs. This makes WWTPs important in managing and mitigating the environmental spread of PFAAs and a key participant in protecting both human and environmental health.

# 2. Background

As is often the case with PFAS, while the concept of evaluating the fate and transport seems straightforward, many unanticipated factors may impact both. An example of a PFAS water cycle conceptual infographic provided by the Michigan Department of Environment, Great Lakes, and Energy (EGLE) is presented in **Figure 1**. The occurrence of PFAS in WWTPs may be affected by (EGLE, 2020a):

- Geographical location.
- Rural or urban location.
- The type and number of industrial dischargers within the sewershed or acceptance of trucked waste at WWTPs.
- Past or ongoing PFAS releases into the groundwater or atmosphere that enter the WWTP during wet weather events or high groundwater periods via inflow and infiltration.

**Figure 1. PFAS Water Cycle (EGLE, 2020a)**




Due to the widespread use of PFAS in many industries and consumer products, industrial discharges are expected to be the primary sources of PFAS to WWTPs. Examples of industrial discharges that could be PFAS sources to WWTPs include (EGLE, 2020a):

- Electroplating & Metals Finishing Facilities
- Landfills
- Centralized Waste Management Facilities
- Airfields – Commercial, Private and Military
- Department of Defense (DoD) Facilities
- Fire Department Training Facilities
- Petroleum or Petrochemical Manufacturers and Storage Facilities
- Commercial Industrial Laundries
- Chemical Manufacturers
- Plastics Manufacturers
- Textile & Leather Facilities
- Paint Manufacturers
- Pulp & Paper Facilities

Analysis of archived biosolids samples (collected in 2001), which represented 94 WWTPs from 32 different US states and the District of Columbia, indicated that PFOS was the most abundant PFAS detected with an average concentration of 402 micrograms per kilogram (µg/kg) dry weight (Min: 308, Max: 618) followed by PFOA at 34 µg/kg dry weight (Min: 12, Max: 70) (Venkatesan, 2013). Solids concentrations from 20 United States WWTPs were also collected in 2004 and 2007. The mean concentration for PFOS was not statistically significantly different for the samples from 2004 and 2007 compared to those from 2001. However, the concentration range was more extensive, for PFOS between 7 to 2,600 µg/kg and PFOS between 4 to 200 µg/kg. PFOA concentrations were also similar for the biosolids samples collected in 2001 and 2004 and 2007, with a concentration range for the samples collected in 2004 and 2007 of 8 to 241 µg/kg. PFOS concentrations in the solids from WWTPs from Switzerland and Australia ranged from 5 to 2,440 µg/kg with a median and mean of 76.5 and 182 µg/kg, respectively (Alder, 2015; Gallen, 2016).

Sources of PFAS in WWTPs from Switzerland were identified from industries and products such as textile, carpet, paper coatings, aqueous film-forming foams (AFFFs), electroplating, and semiconductor industries (Alder, 2015). A strong correlation of PFAS with WWTPs that received industrial discharges was also observed in Germany, Thailand, and other countries (Kunacheva, 2011; Alder, 2015). As a result, there is evidence that PFAS can be correlated with industrial discharges, which resulted in EGLE focusing its study on the WWTPs that are part of the Industrial Pretreatment Program (IPP). The WWTPs required to implement an IPP were expected to be more heavily impacted by PFAS.

# 3. Industrial Pretreatment Program (IPP) in Michigan

The discharge of pollutants from industrial wastewaters to publicly owned treatment works (POTWs) is regulated in Michigan through the IPP. It should be noted that a POTW is a municipal WWTP along with its collection system (system of sanitary sewers that transport wastewater to the WWTP). For this document's purposes, we use the terms "WWTPs" and "POTWs" interchangeably. The IPP is a significant part of the Federal Clean Water Act’s (CWA) National Pollutant Discharge Elimination System (NPDES). In Michigan, municipalities act as IPP Control Authorities, even for WWTPs of less than five million gallons per day (MGD) in the design flow, meaning that IPP compliance and enforcement is implemented locally. The purpose of the IPP is to:

- Regulate the disposal of industrial wastewater into the sanitary wastewater collection system.
- Protect the physical structures and safety of operation and maintenance personnel of the wastewater collection and treatment system.
- Protect the health and safety of the public and the environment.
- Comply with pretreatment regulations as required under Federal General Pretreatment Regulations and Categorical Standards, state laws and regulations, and local sewer use ordinances.

Generally, industrial users are prohibited from discharging pollutants to WWTPs if these pollutants would:

- Pass through the WWTPs inadequately treated and/or
- Interfere with the operation or performance of the WWTPs, including the management of biosolids.

WWTPs establish site-specific technically-based local limits to achieve these goals.

Eight specific prohibitions apply to pollutants from industrial dischargers to WWTPs, most of which are not directly related to PFAS but provide context as to how industrial discharges are regulated under the IPP:

- Pollutants that create a fire or explosion hazard in the WWTP's sewer system or at the treatment plant.
- Pollutants that are corrosive, including any discharge with a pH lower than 5.0.
- Solid or viscous pollutants in amounts that would obstruct flow in the collection system and treatment plant, resulting in interference with operations.
- Any pollutant, including oxygen demanding pollutants, is released in a discharge at a flow rate and/or concentration, which would cause interference.
- Heat in amounts that would inhibit biological activity in the WWTP, resulting in interference.
- Pollutants resulting in toxic gases, vapors, or fumes in a quantity that may cause acute worker health and safety problems.
- Petroleum oil, non-biodegradable cutting oil, or products of mineral oil origin in amounts that will cause pass through or interference.
- Trucked or hauled pollutants, except at discharge points designated by the POTW.

## 3.1 Michigan IPP PFAS Initiative

The United States Environmental Protection Agency (USEPA) has classified PFAS as an emerging contaminant that is regulated by EGLE under Part 201, Environmental Remediation, and Part 31, Water Resources Protection, of the Natural Resources and Environmental Protection Act, Act 451 of 1994, as amended and their respective administrative rules, specifically Rule 299.44-299.50 (Generic Cleanup Criteria) and Rule 323.1057 (Rule 57) (Toxic Substances) of the Michigan Administrative Code. The Michigan Rule 57 Water Quality Standards are surface water criteria developed to protect humans, wildlife, and aquatic life. The applicable (most stringent) Water Quality Standards (WQS) for PFOS and PFOA are noncancer human values, as presented in **Table 1**. Due to limited studies and data on PFAS, only PFOA and PFOS have Rule 57 values established in 2011 and 2014.

**Table 1. Michigan Rule 57 Surface Water Values for PFOA and PFOS**

| PFAS | Human Noncancer Value (nondrinking water source) | Human Noncancer Value (drinking water source) | Final Chronic Value | Final Acute Value | Aquatic Maximum Value |
|---|---|---|---|---|---|
| PFOS[1] | 12 | 11 | 140,000 | 1,600,000 | 780,000 |
| PFOA[1] | 12,000 | 420 | 880,000 | 15,000,000 | 7,700,000 |

[1]Units are in nanograms per liter (ng/L) or parts per trillion (ppt). These units are considered equivalent.

Municipal NPDES Permits require permittees to prohibit discharges that cause their POTWs to pass through pollutants greater than WQS to surface waters. The permits further prohibit

NPDES permittees from accepting discharges that restrict, in whole or part, their management of biosolids.

In June 2017, EGLE identified a WWTP passing through PFOS received from an industrial user (i.e., chrome plater) discharging into their collection system. The effluent from the WWTP discharged to the Flint River was at concentrations far exceeding Michigan's WQS for PFOS of 12 ng/L. Downstream elevated levels of PFOS in fish caused the issuance of restrictive fish consumption advisories. In response, EGLE initiated the IPP PFAS Initiative in February 2018 to reduce and/or eliminate PFOA and PFOS from industrial sources that may pass through WWTPs and enter lakes and streams, potentially causing fish consumption advisories or contaminating public drinking water supplies. This effort is one part of a comprehensive, multi-media approach by the State of Michigan to address PFAS in the environment.

The IPP PFAS Initiative required all 95 WWTPs with IPPs to evaluate if PFOA and/or PFOS may be passing through their treatment systems to surface waters and reduce or eliminate any source(s) if found. The WWTPs were required to:

- Identify industrial users discharging to their system that were potential sources of PFOA and PFOS. Based on literature reviews and knowledge of Michigan, EGLE highlighted the following industrial categories as potential sources of PFOA and/or PFOS to WWTPs: metal finishers and electroplaters utilizing fume suppressants, tanneries, leather and fabric treaters, paper and packaging manufacturers, landfill leachate, centralized waste treaters, and sites where aqueous film-forming foam (AFFF) was used. WWTP staff was asked to evaluate these potential sources via surveys, records reviews, and industry staff interviews.
- Sample the effluent of those sources that were likely to have used PFOA and/or PFOS in the past or were currently using some type of PFAS-containing chemical in their processes.
- Sample the WWTP discharge (i.e., effluent) if sources were found to be discharging above a screening level, which EGLE recommended be set conservatively at the WQS for PFOA and PFOS.
- Require PFOA and PFOS reduction at confirmed sources through pollutant minimization plans, equipment/tank change out/cleanouts, product replacements, and treatment installation to remove PFOS before discharge (i.e., pretreatment).
- Recommend WWTPs develop technically-based local limits to determine PFOS and/or PFOA concentrations that can be discharged to the WWTP without passing through at levels exceeding WQS or interfering with the WWTP operation.
- Monitor the progress of industrial users reducing PFOA and PFOS.
- Submit reports and monitoring results as required by EGLE's Water Resources Division (WRD).

In September 2019, EGLE, WRD, published its Municipal NPDES Permitting Strategy for PFOA and PFOS. This permitting strategy is based on the IPP PFAS Initiative.

For WWTPs identified under the IPP PFAS Initiative as having sources of PFOA and PFOS, as NPDES permits are reissued, these will include:

1. PFOS and PFOA WWTP effluent monitoring requirements.
2. Specific analytical methods and quantification levels for PFOA and PFOS.
3. Option to request monitoring frequency reductions for PFOA and PFOS.
4. Pollutant Minimization and Source Evaluation Program for PFOA and PFOS and related reporting requirements for those WWTPs whose effluent exceeds WQS.

5. For WWTPs with IPPs and WWTPs without IPPs categorized as majors (i.e., design flows greater than one million gallons per day), even those where no sources have been found, as NPDES permits are reissued, these will include: PFOA and PFOS monitoring at least four times over the five-year permit cycle.

Also, NPDES Permits issued after October 1, 2021, may contain limits for PFOA and/or PFOS if a WWTP's calculated potential effluent quality exceeds WQS.

The complete NPDES PFAS Permitting Strategy for WWTPs may be found on the MPART Web page through the "Testing and Treatment" tab under "Wastewater Treatment Plants/Industrial Pretreatment Program," or at the following link:
Michigan.gov/egle/-/media/Project/Websites/egle/Documents/Programs/WRD/NPDES/Municipal-permitting-strategy-PFAS.pdf

## 3.2 Michigan IPP PFAS Initiative Results

PFOA and PFOS have been used for many products and industries, and higher PFOA or PFOS concentrations have been correlated with industrial discharges. As a result, out of approximately 400 WWTPs operating in Michigan, EGLE focused on the 95 WWTPs receiving industrial wastewater regulated under the IPP. The 95 WWTPs with IPPs were expected to have the highest PFOA or PFOS concentrations. All 95 WWTPs evaluated the potential for their industries to discharge PFOA or PFOS using surveys, interviews, records reviews, and other means. A total of 80 effluent sample locations from 75 WWTPs with IPPs were sampled, with five (5) of the WWTPs having two (2) separate effluent sample locations. A total of 54 influent sample locations from 47 WWTPs with IPPs were sampled from WWTPs that were determined to have PFOA and/or PFOS in their effluents, with three (3) WWTPs having two (2) separate influent sample locations and two (2) WWTPs having three (3) separate influent sample locations. The majority of the samples were collected after implementing the Michigan IPP PFAS Initiative in February 2018. However, PFAS samples were collected as early as August 2016 from WWTP #54, with additional facilities sampled in 2017, which will be discussed in more detail in **Section 3.5**. The current report presents the tabulated data for the IPP PFAS Initiative up to July 2020, with a total of seven (7) WWTPs discussed in **Section 3.5**, for which the data were updated up to January 2021. The 95 WWTPs evaluated during the Michigan IPP PFAS Initiative and additional 15 WWTPs without IPPs (i.e., Non-IPP WWTPs) that were also sampled for PFAS are presented in **Table 2** and **Figure 2**. The PFAS results for the Non-IPP WWTPs' will be discussed in **Section 3.7**. The PFOA and PFOS results from all the WWTP's influents and effluents are provided in **Table 3**.

## 3.3 PFOA and PFOS Influent IPP PFAS Initiative Results

The total number of WWTPs with PFOA and PFOS influent detections and detection frequency is provided in **Table 4**. The influent detection frequency was 76% for both PFOA and PFOS and as high as 81% for detecting either PFOA or PFOS. The influent concentrations for WWTPs with IPPs for PFOA and PFOS are presented in **Figures 3** and **4**, respectively. A statistical summary of the influent PFOA and PFOS minimum concentration, 25th, 50th, 75th percentiles, average, and maximum concentrations for all WWTPs and the statistical summary for three primary data sets: **Recent**, **Average**, and **Maximum** is presented in **Table 5**. The Recent dataset's statistical summary was obtained using recent results (up to July 2020) for the WWTPs, which were sampled multiple times. The statistical summary for the **Average** dataset was obtained using the average results for the WWTPs sampled multiple times up to July 2020 and a limited number of seven (7) WWTPs up to January 2021. Finally, the Maximum dataset's statistical summary was obtained using the maximum concentration ever recorded for each WWTP that was sampled multiple times. The WWTPs, which were only sampled once, used the same sample results for all three statistical datasets **Recent**, **Average**, and **Maximum**.

Industrially impacted WWTPs greatly influenced the average, 75th Percentile, and maximum concentrations resulting in a higher bias, especially for the **Maximum** dataset category compared to the other two categories. For example, the PFOS average concentrations for the **Maximum** dataset category were 96 nanograms per liter (ng/L) compared to the average concentrations of 25 ng/L and 29 ng/L for the **Recent Average** dataset categories, respectively. This indicates that a small number of industrially impacted WWTPs with very high concentrations could lead to a high biased average result even when many WWTPs are sampled.

The concentration ranges for PFOS were higher than those for PFOA. PFOS has a lower WQS than PFOA and was determined to be the regulatory driver for the WWTPs. PFOS was many times higher than those of PFOA in the influent samples. The influent concentrations are not representative of the effluent concentrations of the WWTPs. While the WQS are only applicable to the effluent concentrations, they were used to compare the influent concentrations. All of the PFOA concentrations were lower than even the most stringent WQS criterion of 420 ng/L. In contrast, 24 out of 41 WWTPs (58%) had PFOS influent concentrations above both WQS criteria of 11 and 12 ng/L.

**Table 4. Influent Detection Frequency for PFOA and PFOS in WWTPs[1]**

| PFAS | WWTPs Sampled | Total Non-Detect | Total Detections | Percent Detection |
|---|---|---|---|---|
| PFOA | 54 | 13 | 41 | 76% |
| PFOS | 54 | 13 | 41 | 76% |
| PFOA or PFOS | 54 | 10 | 44 | 81% |

[1]A total of 3 IPP WWTPs had 2 separate influents, and 2 IPP WWTPs had a total of 3 separate influents.

**Table 5. Statistical Summary for PFOA and PFOS Influent Concentrations in WWTPs[1]**

| | PFOA Recent | PFOA Average | PFOA Maximum | PFOS Recent | PFOS Average | PFOS Maximum |
|---|---|---|---|---|---|---|
| **Minimum** | 2 | 2 | 2 | 4 | 2 | 2 |
| **25th Percentile** | 4 | 4 | 5 | 6 | 7 | 8 |
| **50th Percentile** | 5 | 5 | 6 | 11 | 12 | 17 |
| **75th Percentile** | 8 | 9 | 12 | 20 | 30 | 55 |
| **Average** | 10 | 8 | 20 | 25 | 29 | 96 |
| **Maximum** | 71 | 52 | 330 | 204 | 356 | 1,200 |

[1]WWTPs with multiple results used the following data sets for statistical analysis: **Recent** = The most recent available data for each WWTP was used; **Average** = Average concentration of the entire dataset available for each WWTP was used, and **Maximum** = The highest recorded concentration for each WWTP was used. **Units**: ng/L or ppt.

**Figure 3. Influent PFOA Concentrations in WWTPs**

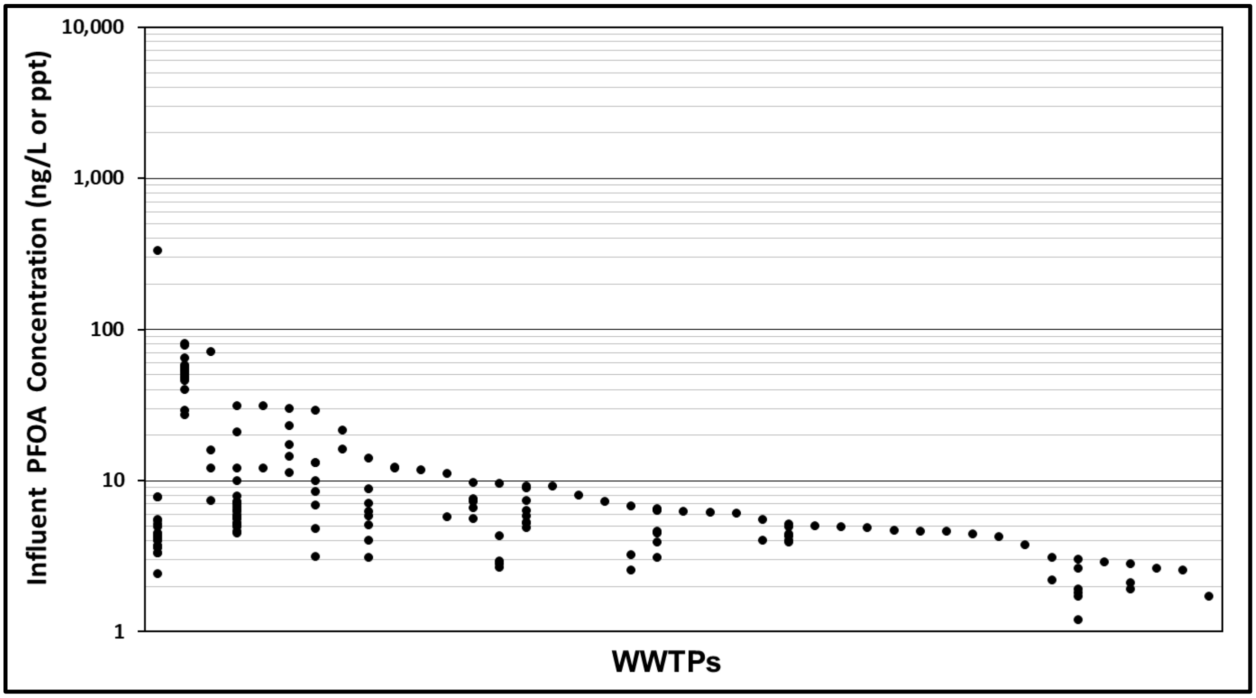
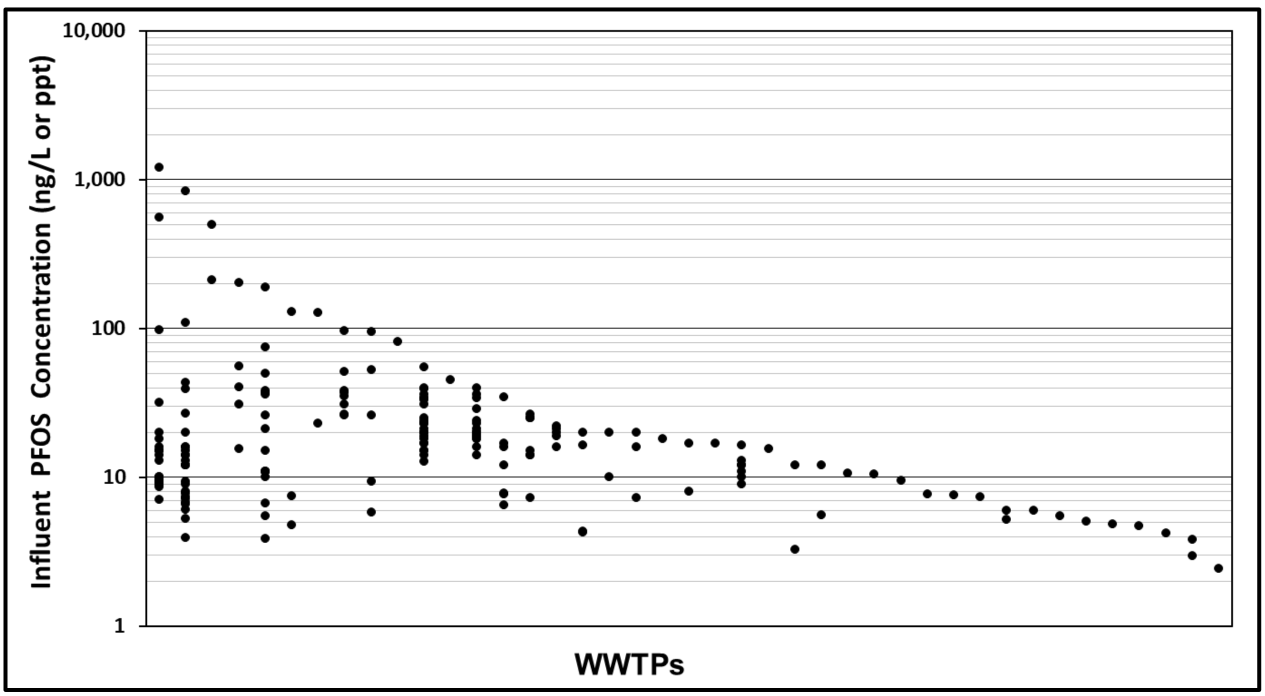



**Figure 4. Influent PFOS Concentrations in WWTPs**




## 3.4 PFOA and PFOS Effluent IPP PFAS Initiative Results

There are limited studies on many other PFAS, and only PFOA and PFOS have WQS standards established in 2011 and 2014, respectively. As a result, the IPP PFAS Initiative's focus was on PFOA and PFOS, emphasizing PFOS, which was identified as the regulatory driver. The total number of WWTPs with PFOA and PFOS effluent detections and detection frequency is provided in **Table 6**. The influent detection frequency for PFOA was 94%, PFOS was 88%, and finally 94% for detecting either PFOA or PFOS.

**Table 6. Effluent Detection Frequency for PFOA and PFOS in WWTPs[1]**

| PFAS | WWTPs Sampled | Total Non-Detect | Total Detections | Percent Detection |
|---|---|---|---|---|
| PFOA | 80 | 5 | 75 | 94% |
| PFOS | 80 | 10 | 70 | 88% |
| PFOA or PFOS | 80 | 5 | 75 | 94% |

[1]A total of 5 IPP WWTPs had 2 separate effluents. PFOA was detected in all these effluents.

Depending on the PFOS effluent concentrations, some WWTPs were required to sample multiple times, as presented in **Table 7**. A small number of WWTPs identified industrial discharges of PFOS that significantly impacted the WWTP effluent and sludge/biosolids. The effluent concentrations in these industrially impacted WWTPs resulted in effluent PFOS concentrations above 50 ng/L and as high as 4,800 ng/L. The industrially impacted WWTPs and EGLE are working together to reduce the PFOS concentrations in the industrial discharges to the WWTPs. As a result, some of the WWTPs had a significant drop in their effluent PFOS concentrations, which can be seen in the PFOS concentration ranges at those WWTPs presented in **Figure 6** and discussed in detail in **Section 3.5**.

**Table 7. Effluent Monitoring Frequency and Criteria for WWTPs[1]**

| Monitoring Frequency | Sources Present | PFOS Effluent > WQS | PFOS Effluent Data (ng/L) |
|---|---|---|---|
| Monthly | Yes | Yes | >50 |
| Quarterly | Yes | Yes | 13 to 50 |
| Twice Annual | Yes | No | ≤ 12 |
| Four times per 5-year Permit Cycle[2] | No | No | ≤ 12 |

[1]An industrial discharge was considered a source if the concentration of PFOS > 12 ng/L in the industrial effluent.
[2]WWTPs in the last category include locations that did not sample their effluent because industrial discharges were not associated with typical sources of PFOA and PFOS.

The effluent concentrations for WWTPs with IPPs for PFOA and PFOS are presented in **Figures 5** and **6**, respectively. A statistical summary of the effluent PFOA and PFOS minimum concentration, 25$^{th}$, 50$^{th}$, 75$^{th}$ percentiles, average, and maximum concentrations for all WWTPs is presented in **Table 8**. **Table 8** presents the statistical summary for three primary data sets: **Recent**, **Average,** and **Maximum**. The **Recent** dataset's statistical summary was obtained using recent results (up to July 2020) for the WWTPs, which were sampled multiple times. The statistical summary for the **Average** dataset was obtained using the average results for the WWTPs sampled multiple times up to July 2020. Finally, the **Maximum** dataset's statistical summary was obtained using the maximum concentration ever recorded for each WWTP that was sampled multiple times. The WWTPs, which were only sampled, used the same sample results for all three statistical datasets **Recent**, **Average**, and **Maximum**.

As stated previously, industrially impacted WWTPs greatly influenced the average, 75$^{th}$ Percentile, and maximum concentrations resulting in a higher bias, especially for the **Maximum** dataset category compared to the other two categories. For example, the PFOS average concentrations for the **Maximum** dataset category was 160 ng/L compared to the average concentrations of 15 ng/L and 16 ng/L for the **Recent** and **Average** dataset category, respectively. This indicates that a small number of industrially impacted WWTPs with very high concentrations could lead to an average high biased result even when many WWTPs are sampled.

The highest concentration and overall concentration ranges for PFOS were higher than those for PFOA. PFOS has a lower WQS than PFOA and was identified as the compound of primary interest at the WWTPs, with many of the results above the WQS criteria of 11 and 12 ng/L. Only one WWTP had a PFOA concentration higher than the most stringent WQS criterion of 420 ng/L during February through April 2019, with the highest PFOA concentration of 660 ng/L. However, additional sampling showed significantly lower concentrations with a sample from July 29, 2020, having a PFOA concentration of 37 ng/L. In contrast, 33 out of 70 PFOS detections in WWTPs (47%) from 80 WWTPs sampled had PFOS concentrations above both WQS criteria of 11 and 12 ng/L for at least one of the effluent samples, including those that were sampled multiple times.

**Table 8. Statistical Summary for PFOA and PFOS Effluent Concentrations in WWTPs[1]**

| | PFOA Recent | PFOA Average | PFOA Maximum | PFOS Recent | PFOS Average | PFOS Maximum |
|---|---|---|---|---|---|---|
| **Minimum** | 1 | 2 | 2 | 2 | 1 | 1 |
| **25th Percentile** | 6 | 5 | 7 | 5 | 5 | 5 |
| **50th Percentile** | 9 | 9 | 11 | 8 | 8 | 11 |
| **75th Percentile** | 15 | 13 | 20 | 15 | 16 | 30 |
| **Average** | 12 | 13 | 28 | 29 | 26 | 160 |
| **Maximum** | 82 | 124 | 660 | 440 | 371 | 4,800 |

[1]WWTPs with multiple results used the following data sets for statistical analysis: **Recent** = The most recent available data for each WWTP was used; **Average** = Average concentration of the entire dataset available for each WWTP was used, and **Maximum** = The highest recorded concentration for each WWTP was used. **Units**: ng/L or ppt.

**Figure 5. Effluent PFOA Concentrations in WWTPs**

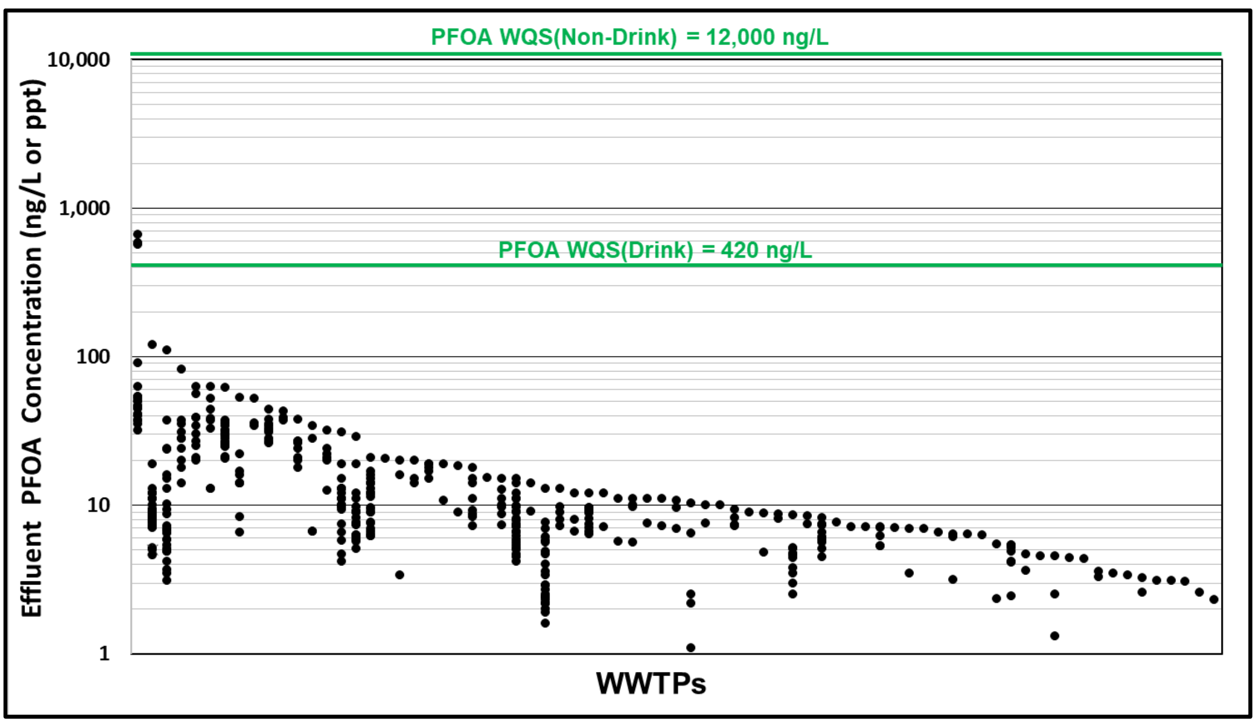
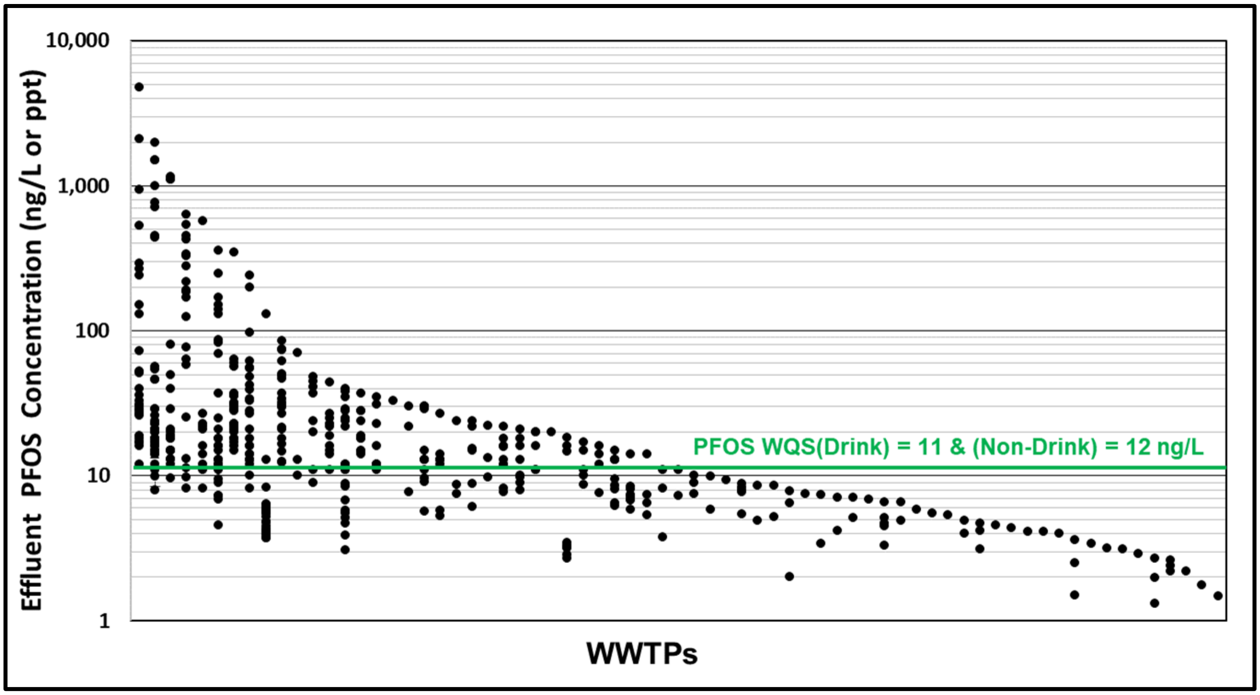


**Figure 6. Effluent PFOS Concentrations in WWTPs**




## 3.5 IPP Source Reduction

EGLE has worked closely with the WWTPs and industrial users to reduce the PFOS discharges to the WWTPs. The PFOA effluent concentrations were always below the WQS, except for one WWTP (i.e., WWTP #74) for a limited time from February through April 2019, where three results between 570 and 660 ng/L were above the PFOA WQS. However, after these higher detections, PFOA concentrations have ranged between 32 to 61 ng/L. As a result, PFOS was the main regulatory compound of interest and regulatory driver. For a subset of WWTPs, a total PFOS reduction between 88% to 99% was achieved through source reduction efforts (**Table 9**). Metal finishers (e.g., chrome platers) were identified as one of the main industrial dischargers that contributed the most significant mass of PFOS to the WWTPs. Some WWTPs have only one metal finisher discharging to the WWTP. As a result, in some instances, installing a single pretreatment system on the discharge from the one metal finisher resulted in a significant drop in the PFOS effluent concentrations at the WWTP.

Following source reduction actions, reductions in PFOA and PFOS concentrations in effluent and sludge/biosolids were measured at seven (7) WWTPs (i.e., #14, 49, 50, 53, 54, 57, and 92). PFOA and PFOS concentrations before and after source reduction actions were implemented are presented in **Figures 7** through **13**. Because PFOA was relatively low in the final effluent and well below the most stringent WQS criterion of 420 ng/L at all WWTPs, except for WWTP #74, it was not a pretreatment target. However, source reduction efforts for PFOS are also expected to result in decreasing concentrations for PFOA. Due to large differences in the PFOA and PFOS concentrations between the biosolids and effluent, the figures use two (2) Y-Axes, with the left Y-Axis representing concentrations for the effluent samples as ng/L and the right Y-axis representing biosolids concentrations as µg/Kg. Most WWTPs showed a significant drop in PFOS concentrations in the effluent after the source reduction efforts. The majority of the WWTPs presented in **Table 9** were land-applying biosolids. EGLE determined the biosolids from six (6) WWTPs (i.e., #14, #50, #54, #57, #69, and #92) were above the EGLE PFOS threshold of 150 µg/Kg for biosolids to be considered industrially impacted. The PFOS threshold value of 150 µg/Kg is not a risk-based number. As more information about the fate and transport of PFOS becomes available, including the field study results, the PFOS threshold will be reevaluated as necessary. EGLE temporarily rescinded authorization to land apply biosolids for WWTPs #14, #50, #54, and #57. WWTP #92 stopped land applying biosolids in 2018, and WWTP #69 has never land applied biosolids. After the source reduction implementation, the PFOS concentrations in the effluent dropped significantly, and many of these WWTPs did not frequently sample their sludge or biosolids.

Bronson WWTP (WWTP #14) initially sampled the influent and effluent for PFAS in May 2018, which identified a PFOS concentration of 12 ng/L in the influent and 150 ng/L in the effluent. The biosolids were first sampled for PFAS in August 2018 and identified a PFOS concentration of 970 µg/Kg. Additional effluent samples collected until December 2018 had PFOS concentrations ranging from 37 to 360 ng/L, with an additional biosolids sample collected in October 2018 with a PFOS concentration of 1,060 µg/Kg. Source reduction efforts were performed in November 2018. As a result, the effluent PFOS concentrations started to drop significantly in 2019, with a PFOS concentration of 4.5 ng/L reported in December 2020. An unusually high PFOS concentration in the biosolids was recorded in April 2019 as 6,500 µg/Kg. The biosolids were only sampled again in 2020, with PFOS concentrations ranging between 72 to 390 µg/Kg. In early 2020, the impacted biosolids were segregated into geotubes for dewatering and offsite disposal.

Howell WWTP (WWTP #49) initially sampled the influent in August 2018 and effluent in May 2018 for PFAS, which identified a PFOS concentration of 10 ng/L in the influent and 13 ng/L in the effluent. Source reduction efforts were made in August 2018, and the final treated solids were sampled once in November of 2018 and identified a PFOS concentration of 21 µg/Kg. The highest PFOS concentration of 130 ng/L in the effluent was recorded before the source reduction efforts. After source reduction implementation, the PFOS concentration in the effluent remained below the PFOS WQS of 12 ng/L, with a result of 4.8 ng/L reported in November 2020.

Ionia WWTP (WWTP #50) initially sampled the influent in October 2018 and effluent in May 2018 for PFAS, which identified a PFOS concentration of 499 ng/L in the influent and 280 ng/L in the effluent. The biosolids were first sampled in August 2018 and identified a PFOS concentration of 1,000 µg/Kg. Before the source reduction efforts, PFOS concentrations in the effluent ranged from 59 to 635 ng/L. The biosolids were sampled again in November 2018 and had a PFOS concentration of 983 µg/Kg. Source reduction efforts were implemented in May 2019, after which the effluent PFOS concentrations ranged between 8.16 and 169 ng/L in 2019 and below the detection limit of 6.04 ng/L in August 2020. The PFOS concentrations in the biosolids also declined to 120 µg/Kg in 2019, with a PFOS concentration of 81 µg/Kg in May 2020.

Kalamazoo WWTP (WWTP #53) initially sampled the influent and effluent for PFAS in May 2018, which identified a PFOS concentration of 38 ng/L in the influent and 38 ng/L in the effluent. The biosolids were sampled only once in October 2018 and identified a PFOS concentration of 6.5 µg/Kg. Source reduction efforts were first implemented in July 2018 by installing GAC on a discharge of contaminated groundwater. Additional source reduction was performed in August 2018 when the source for the drinking water for the City of Parchment was switched due to the PFAS impacts identified on the initial drinking water source. After source reduction efforts from July and August 2018, the effluent PFOS concentrations dropped below the PFOS WQS of 12 ng/L by August 2018 and remained below five (5) ng/L since September 2018.

KI Sawyer WWTP-Marquette Co. (WWTP #54) initially sampled the influent and effluent for PFAS in August 2016, which identified a PFOS concentration of 67 ng/L in the influent and 98 ng/L in the effluent. WWTP #54 is near and receives waste from a former Air Force Base. Initial sampling was conducted as part of ongoing environmental investigations at current and former Department of Defense (DoD) sites where aqueous film-forming foam (AFFF) containing PFAS was used for fire-fighting. The biosolids were sampled initially in August 2018 and identified a PFOS concentration of 78 µg/Kg. Source reduction efforts were implemented in December 2018, where a leaking tank of AFFF was repaired. Before the source reduction efforts, the highest PFOS concentration in the effluent was 240 ng/L. After source reduction efforts, the highest PFOS concentration in the effluent was 56 ng/L, with a result of 9.1 ng/L in December 2020. Multiple biosolids samples were collected with the highest PFOS concentration of 3,600 µg/Kg. The PFOS concentrations of more recent biosolids concentrations sampled in 2020 ranged between 85 to 160 µg/Kg.

Lapeer WWTP (WWTP #57) initially sampled the influent in September 2017 and effluent in May 2017 for PFAS, which identified a PFOS concentration of 560 ng/L in the influent and 440 ng/L in the effluent. Initial sampling in 2017 occurred as part of a PFOS source tracking investigation in the South Branch of the Flint River. The biosolids were initially sampled in August 2017 and identified a PFOS concentration of 2,100 µg/Kg. The highest PFOS concentration in the WWTP effluent before source reduction efforts was 2,000 ng/L PFAS reduction efforts were implemented in November 2017 to install granular activated carbon (GAC) at the industrial source. This treatment was later improved with a modified GAC treatment system designed for the specific industry. PFOS concentrations in the WWTP effluent dropped significantly after March 2018, with the highest concentration of 54 ng/L in May 2018 and 7.9 ng/L on January 14, 2021. Two separate biosolids streams were sampled from different storage locations. One set of samples was collected from the former digester tanks, including the sample collected in May 2018 from the drying bed, and are representative of the biosolids collected in 2017 (red triangles from **Figure 12**). PFOS concentrations from the first set of samples ranged from 1,680 to 2,100 ug/kg. The samples collected later in 2020 from the former digestors had PFOS concentrations ranged between 72 to 120 µg/Kg. The second set of biosolids samples were collected from the north and south storage tanks beginning November 2019 (brown diamonds from **Figure 12**). PFOS concentrations from the second set ranged between 83 and 160 µg/Kg. Please note that recent biosolids samples collected from both storage locations were similar.

Wixom WWTP (WWTP #92) initially sampled the influent in November 2017 and effluent in June 2017 for PFAS, which identified a PFOS concentration of 128 ng/L in the influent and 290 ng/L in the effluent. Source reduction efforts were implemented in October 2018. PFOS concentrations in the effluent before the source reduction implementation was as high as 4,900 ng/L. The PFOS concentrations in the effluent after the source reduction efforts ranged from 17 to 269 ng/L, with a PFOS concentration of 21 ng/L in November 2020. The biosolids were initially sampled from the storage tank for land application and the cake from the belt filter press in August 2018. They identified a PFOS concentration of 3,100 and 8,600 µg/Kg, respectively. Both locations were resampled in November 2018, and the PFOS concentrations were 2,150 and 1,200 µg/Kg, respectively. No other biosolids samples were collected as WWTP #92 ceased to perform land applications in 2018.

The highest PFOA concentrations in the biosolids for the seven (7) WWTPs where significant source reduction efforts were made were 25 µg/Kg for WWTP #54 and 11 µg/Kg for WWTP #69. The PFOA concentrations were significantly lower than those of PFOS in the biosolids for the same WWTPs of 387 and 160 µg/Kg, respectively. Source reduction implementation sometimes took a period of time, and some fluctuations in the PFOS concentrations were observed in the influent, effluent, and/or biosolids even after source reduction implementation. For WWTPs that collected a limited number of biosolids samples, sometimes only before the source reduction implementation or a very short time after it, the data does not show a significant drop in PFOS concentrations in the biosolids. However, based on the analytical data from WWTPs, where multiple samples were collected, the PFOS concentrations in the biosolids did drop significantly, like the concentrations in the effluent.

**Table 9. Substantial PFOS Reduction at WWTPs with Exceedances**

| Municipal WWTP | Recent PFOS, Effluent* (ng/L) | PFOS Reduction (highest to most recent) | Actions Taken to Reduce PFOS |
|---|---|---|---|
| **Bronson WWTP** | 5 | 99% | Treatment (GAC) at source (1) |
| **Howell WWTP** | 5 | 96% | Treatment (GAC/Resin) at source (1) |
| **Ionia WWTP** | <6 | 99% | Treatment (GAC) at source (1) |
| **Kalamazoo WWTP** | 5 | 90% | Treatment (GAC) at source (2), change of water supply |
| **KI Sawyer WWTP** | 9 | 96% | Eliminated leak of AFFF |
| **Lapeer WWTP** | 8.2 | 99% | Treatment (GAC) at source (1) |
| **Wixom WWTP** | 34 | 99% | Treatment (GAC) at source (1) |

*Data received as of December 31, 2020

**Figure 7. Temporal PFOA and PFOS Effluent and Biosolids Concentrations in Bronson WWTP**

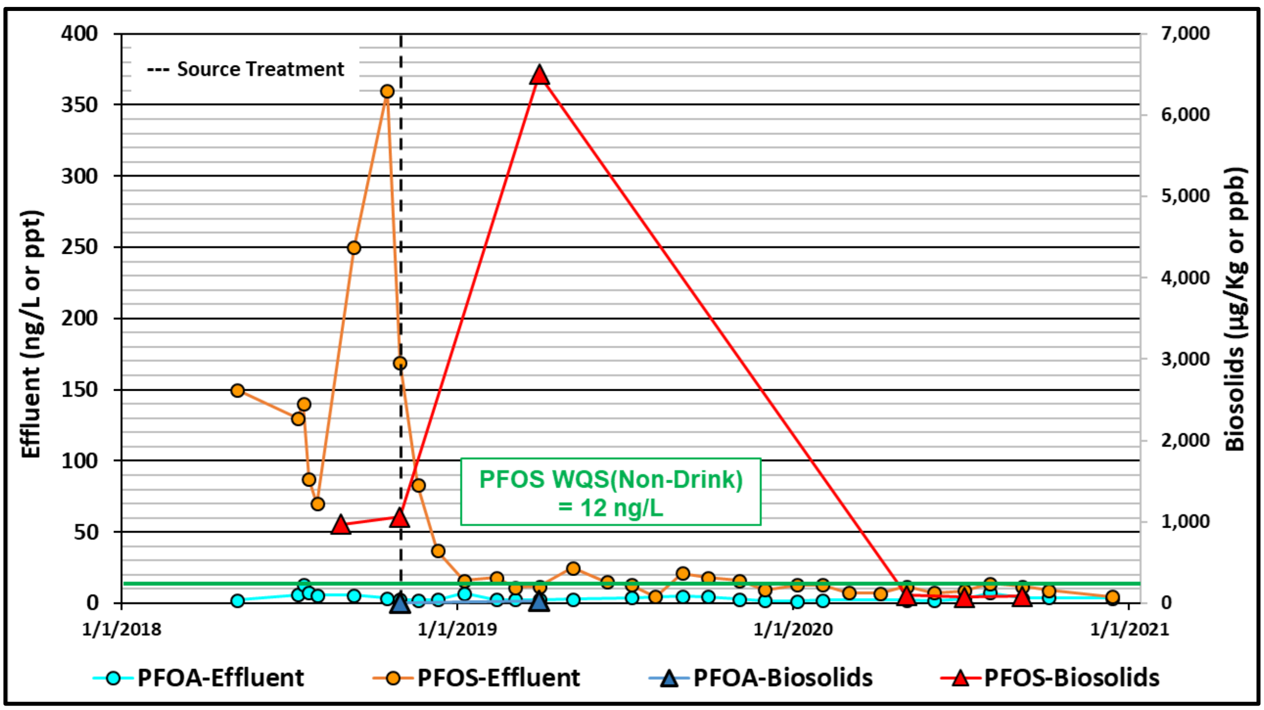


**Figure 8. Temporal PFOA and PFOS Effluent and Biosolids Concentrations in Howell WWTP**

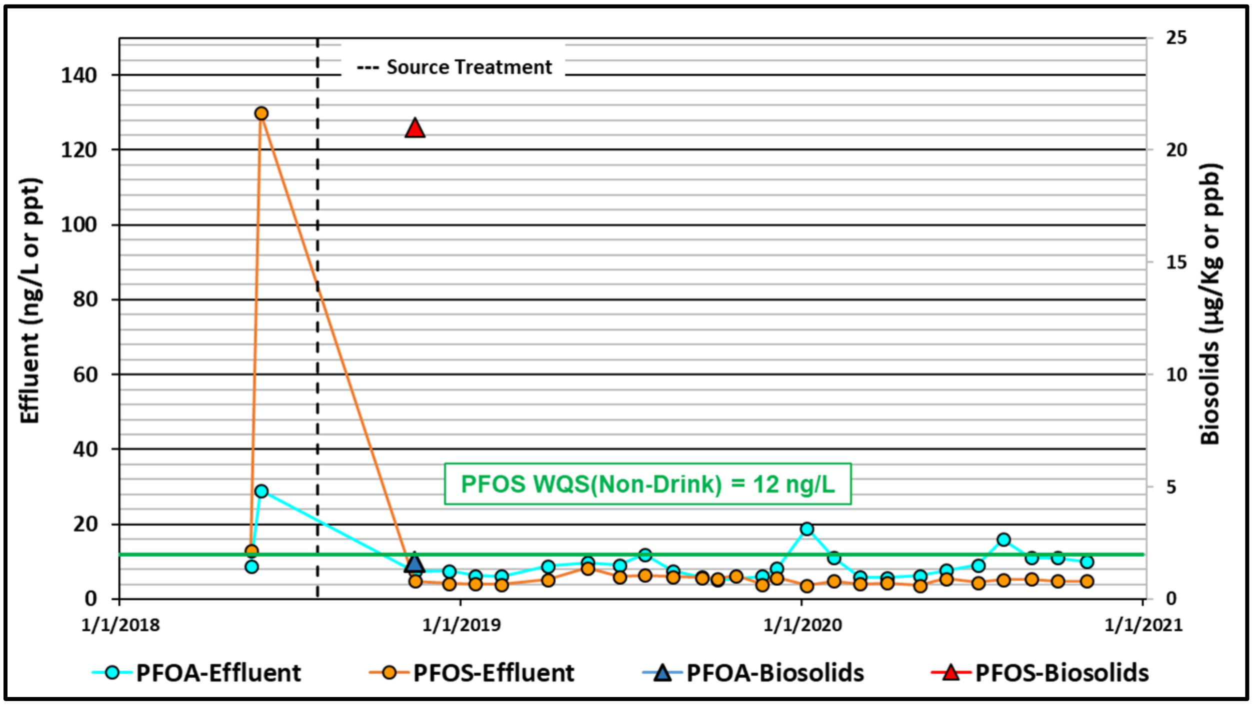



**Figure 9. Temporal PFOA and PFOS Effluent and Biosolids Concentrations in Ionia WWTP**

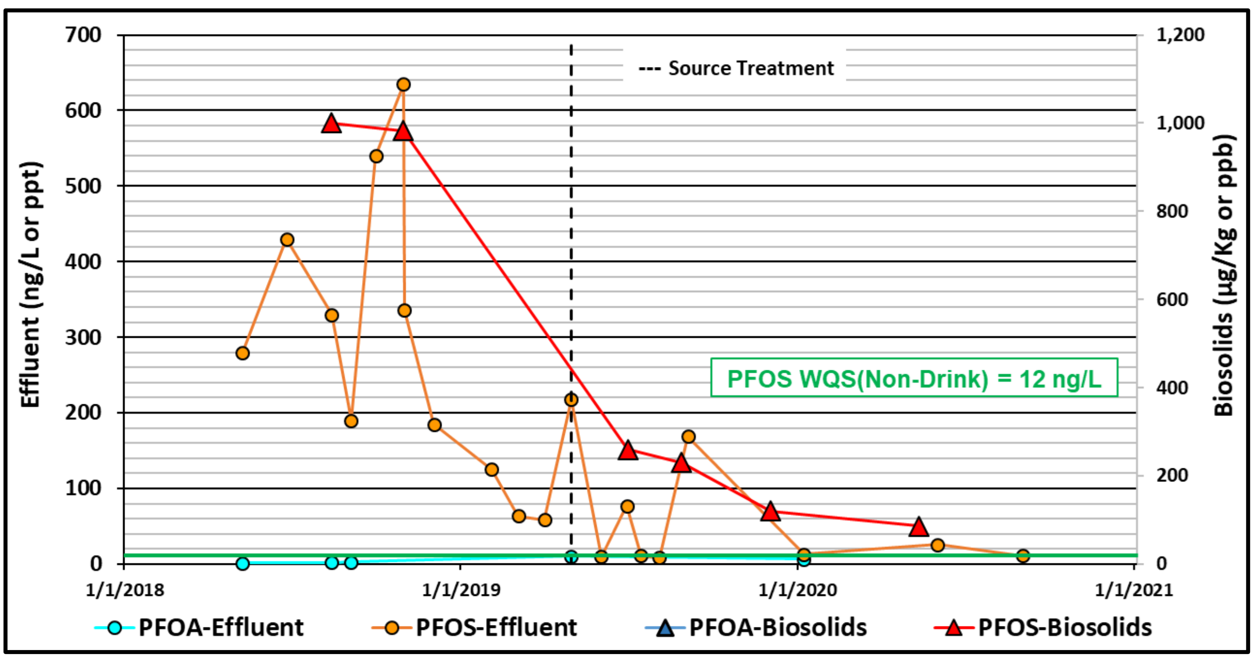


**Figure 10. Temporal PFOA and PFOS Effluent and Biosolids Concentrations in Kalamazoo WWTP**

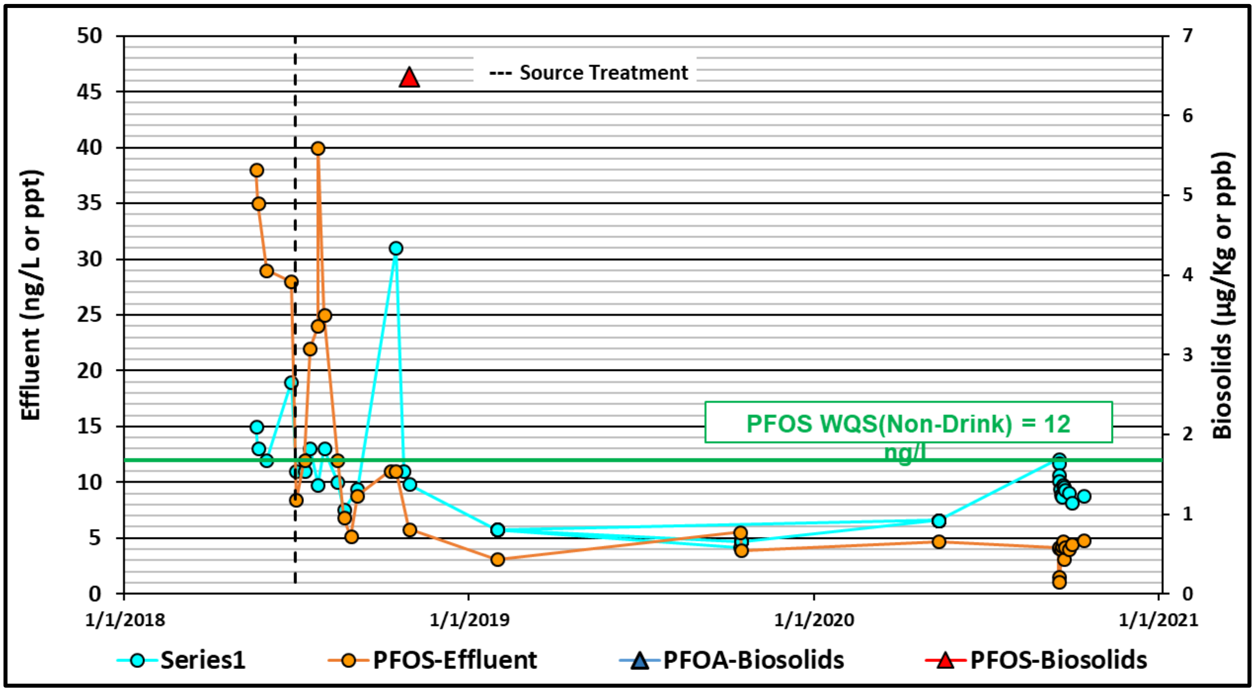



**Figure 11. Temporal PFOA and PFOS Effluent and Biosolids Concentrations in KI Sawyer WWTP**

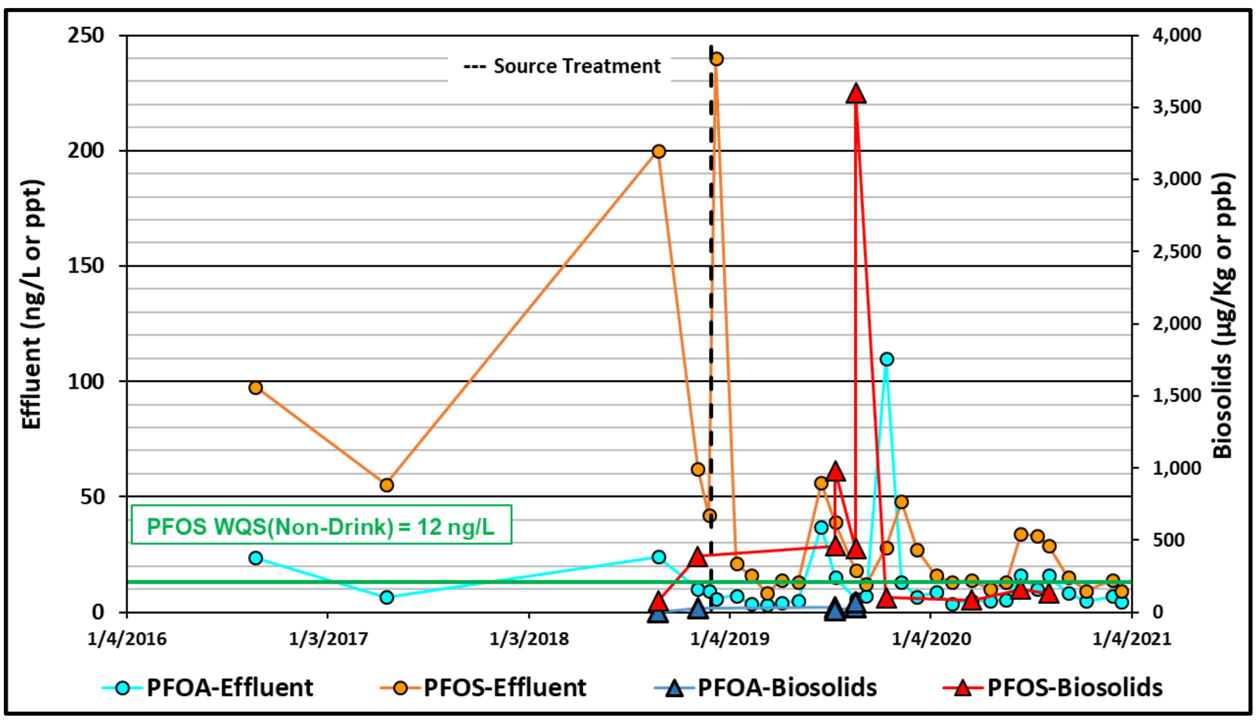


**Figure 12. Temporal PFOA and PFOS Effluent and Biosolids Concentrations in Lapeer WWTP**

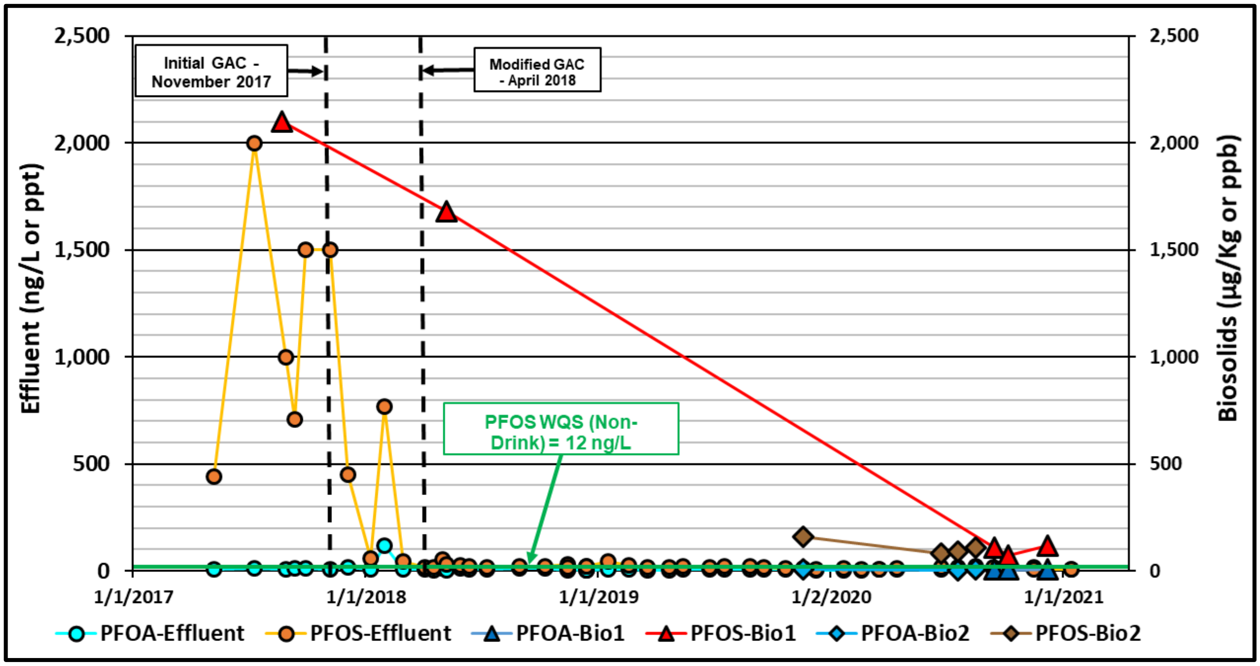
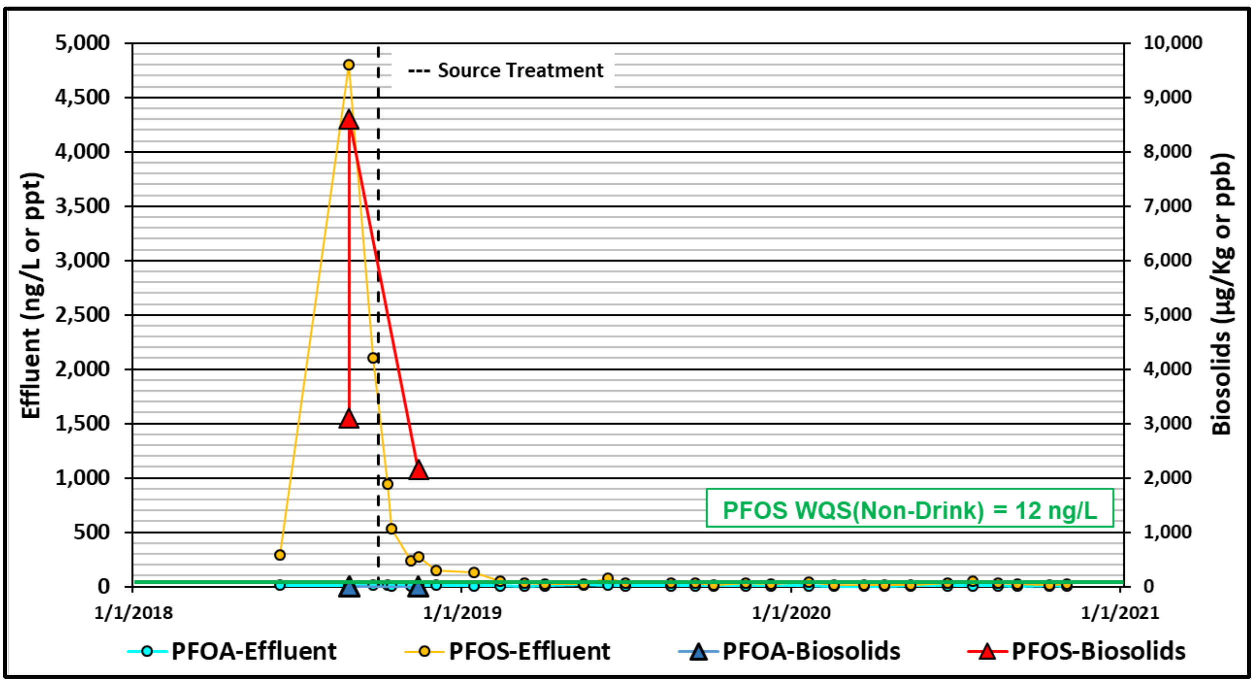



**Figure 13. Temporal PFOA and PFOS Effluent and Biosolids Concentrations in Wixom WWTP**



## 3.6 Non-IPP WWTP PFAS Investigation Results

A limited number of WWTPs that do not receive industrial discharges regulated under the IPP (i.e., Non-IPP WWTPs) were also sampled, with a total of 7 influent and 15 effluent samples collected. The sampling of Non-IPP WWTPs was done to document possible PFOS secondary sources within the sanitary sewer, to provide the study with WWTPs without any significant industrial discharges, and to evaluate specific treatment processes and their effect on PFAS fate and transport within WWTPs. The number of Non-IPP WWTPs sampled was significantly lower than those of IPP WWTPs, therefore comparing the two categories is limited. Since PFOA and PFOS have been strongly correlated to industrial discharges, the effluents from IPP WWTPs are expected to have higher PFOA and PFOS concentrations.

For non-IPP WWTPs, the effluent detection frequency was 100% for PFOA and PFOS, with lower detection frequencies in the influent for both PFOA and PFOS (**Table 10**). The higher detection frequency in the effluent could be attributed to WWTP processes and recirculation of treatment streams (i.e., Returned Activated Sludge (RAS), filtrate, or centrate) or possible degradation of other PFAS that are known to degrade to PFOA and PFOS partially, referred to as precursors (Schultz, 2006; Houtz, 2018).

**Table 10. Influent and Effluent Detection Frequency for PFOA and PFOS in Non-IPP WWTPs**

| PFAS | Sample Type | WWTPs Sampled | Total Non-Detect | Total Detections | Percent Detection |
|---|---|---|---|---|---|
| PFOA | Influent | 7 | 1 | 6 | 86% |
| | Effluent | 15 | 0 | 15 | 100% |
| PFOS | Influent | 7 | 2 | 5 | 71% |
| | Effluent | 15 | 0 | 15 | 100% |

The PFOA and PFOS results for the IPP and Non-IPP WWTPs influent and effluent samples are provided in **Figures 14**, **15**, **16**, and **17,** as well as **Table 3**. The highest PFOA and PFOS concentrations were present in the IPP WWTPs determined to have industrial users with elevated concentrations of PFOS in their discharge. However, some Non-IPP WWTPs had higher PFOA and PFOS influent or effluent concentrations than some of the IPP WWTPs. The Non-IPP WWTPs may still have industrial or commercial PFAS discharges that impact the WWTP. This indicates that PFOA and PFOS may be present in non-industrial or industrial (but not categorically regulated) wastewater, including discharges from contaminated sites.

Most of the PFOA and PFOS detections in the Non-IPP WWTPs ranged from 10 to 20 ng/L or lower. All the PFOS effluent concentrations for the Non-IPP WWTPs were below the PFOS WQS except for one WWTP, which also had the highest concentrations in both the influent and effluent samples. The source of PFOA and PFOS to this WWTP is potentially from infiltration into the sanitary sewer and contamination of the sanitary sewer from past releases of products that contained PFAS such as AFFF.

**Figure 14. Influent PFOA Concentrations in IPP and Non-IPP WWTPs**

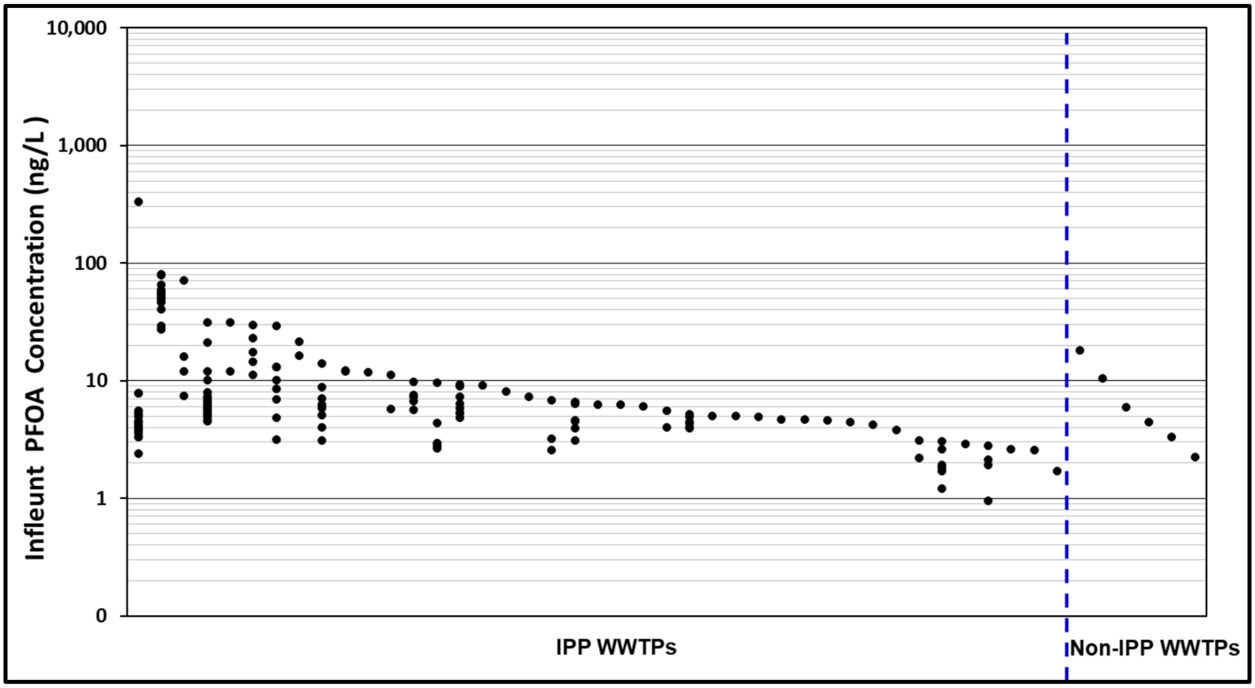



**Figure 15. Effluent PFOA Concentrations in IPP and Non-IPP WWTPs**

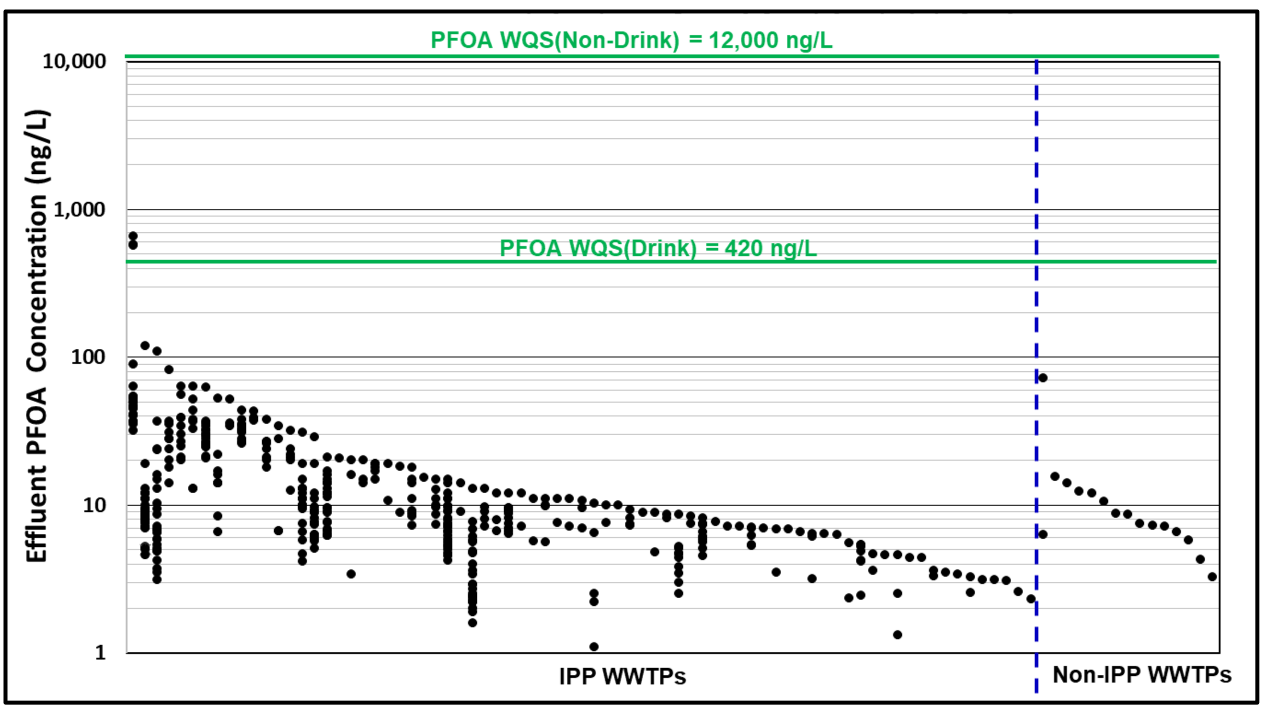


**Figure 16. Influent PFOS Concentrations in IPP and Non-IPP WWTPs**

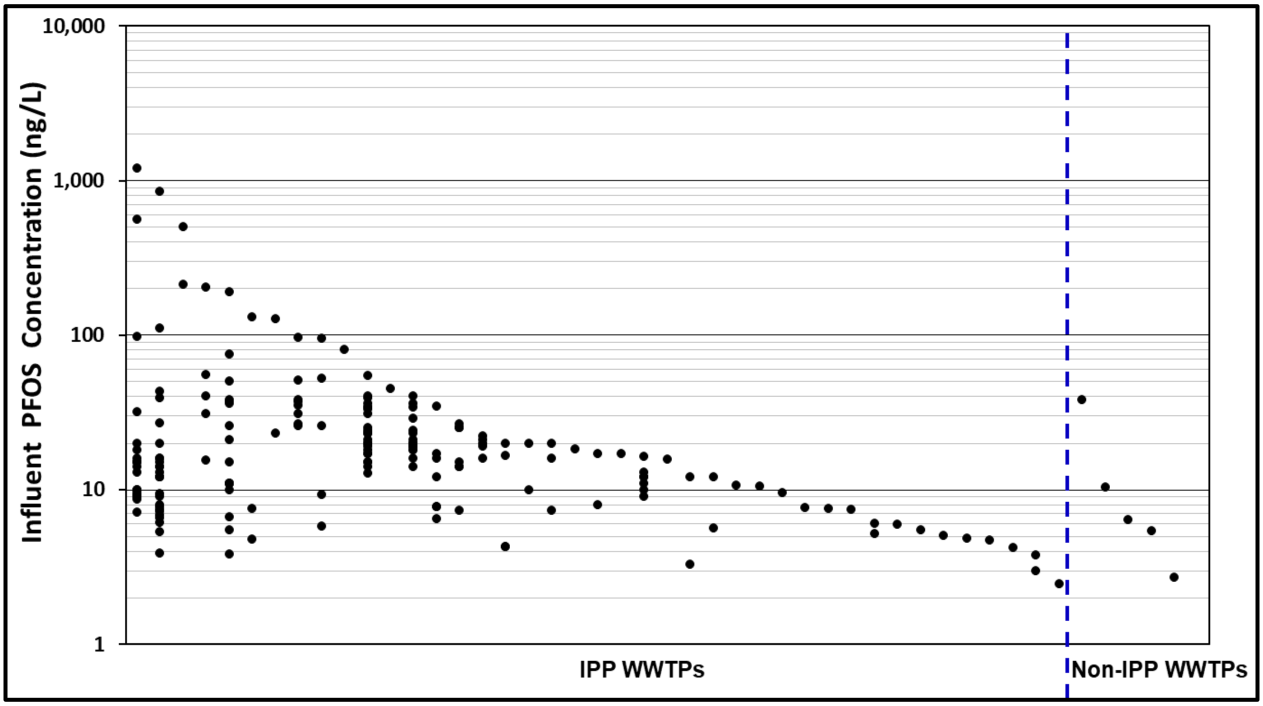
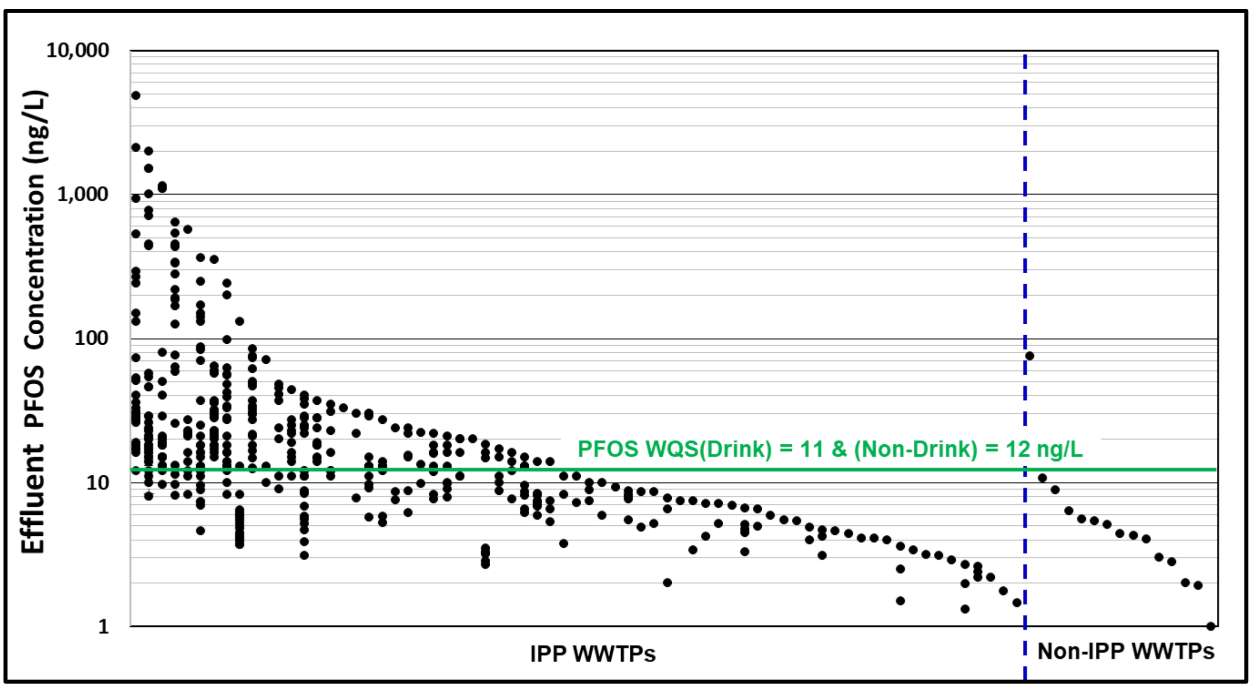



**Figure 17. Effluent PFOS Concentrations in IPP and Non-IPP WWTPs**



## 3.7 Industrial Sources Results

With the historical and widespread use of PFAS in many industries, industrial discharges are expected to be the primary sources of PFAS to WWTPs, as presented in **Section 2**. Potential sources of PFAS in WWTPs from Switzerland, Germany, and Thailand were identified from industrial discharges of textile, carpet, and paper coatings, AFFFs, electroplating, and semiconductor industries (Kunacheva, 2011; Alder, 2015). In Michigan, many of the IPP WWTPs were identified as having a higher likelihood of discharging PFAS because they accept industrial wastewaters. To address this potential issue, EGLE, WRD implemented the Michigan IPP PFAS Initiative. Under this initiative, WWTPs were asked to evaluate potential sources of PFAS via surveys, records reviews, and interviews with industry staff and to sample the effluent of those industries that were likely to have used PFOS and/or PFOA in the past or were currently using some type of PFAS containing chemical in their processes. Sources of PFAS identified by POTWs under the initiative were generally the industry types identified in previous studies and literature reviews. A detailed discussion of PFAS sources, including source effluent ranges, percentages of confirmed sources by type, and other observations and conclusions found by the IPP PFAS Initiative and related WRD efforts, can be found in the report titled, "Michigan Industrial Pretreatment Program (IPP) PFAS Initiative - Identified Industrial Sources of PFOS to Municipal Wastewater Treatment Plants" (EGLE, 2020b)

Approximately 2,000 samples from 574 industrial dischargers were reported to EGLE. Some industrial dischargers were sampled multiple times. A small number of industrial users installed additional pretreatment to reduce the PFOS concentrations discharging to the IPP WWTPs, as discussed in **Section 3.5**. The final effluent from the industrial facilities that installed additional pretreatment, which in many cases was granular activated carbon (GAC), showed a significant drop in PFOS concentrations when the final treated waste stream was sampled.

To summarize and correlate the PFOA and PFOS detections with various industrial discharges, the information for each Industrial User (IU), Significant Industrial User (SIU), and Categorical Industrial User (CIU) as described in the pretreatment regulations under Title 40 of the Code of Federal Regulations (CFR) 403 were compiled and evaluated. The industrial discharges were divided into two (2) main categories for better characterization and evaluation. The IUs and SIUs were combined into one category, and the CIU results were separated into a second category. While the WQS values of 420 and 12,000 ng/L for PFOA and 11 and 12 ng/L for PFOS are only applicable to the WWTP effluent concentrations, the WQS are used as a screening level for the industrial effluents.

### 3.7.1 CIU PFAS Evaluation

A total of 430 individual CIUs representing 18 different 40 CFR categories were evaluated for the need for PFAS sampling, out of which 310 CIUs were sampled with a total of 1,293 samples collected. A summary of PFAS results arranged by category is presented in **Table 11** and **Figures 18** and **19**. The total number of samples, minimum and maximum concentrations for PFOA and PFOS for all sampled CIU facilities, is presented in **Table 12**. A large portion of the CIUs evaluated and sampled were categories 413 (Electroplating) and 433 (Metal Finishing), a prevalent industry type in Michigan. EGLE identified these categories as one of the most likely potential sources of PFAS due to the historical use of PFOS-containing fume suppressants by chrome platers. The large number of CIUs sampled associated with categories 413 and 433 (82% of all CIUs) made it difficult to compare results with less represented categories. A total of 13 categories had ten (10) or fewer Michigan facilities, with five (5) or less of them sampled for PFAS. Seven categories had only one facility sampled. There were not enough facilities in these categories to establish any correlation with potential PFAS impacts. Also, most of the facilities sampled had low PFAS detections or were non-detect.

There were a few categories for which only a minimal number of samples were collected, likely due to a small number of industries in that category located in Michigan. However, the PFAS concentrations indicate that these CIUs may be a source of PFOS due to the high concentrations detected in their effluent and their potential use of products known to contain PFOS. It is recommended that more data from additional similar facilities be analyzed in the future for a better understanding. For example, category 419 (Petroleum Refining) had only one representative industry sampled multiple times, with the highest PFOA concentration of 710 ng/L and PFOS of 800 ng/L. A potential source of PFAS in the petroleum refining industry is AFFF, which was developed as a firefighting foam for Class B fires of flammable liquids, combustible liquids, petroleum greases, tars, oils, oil-based paints, solvents, lacquers, alcohols, and flammable gases. AFFFs have been used by the Department of Defense, airports, fire stations, and many industrial manufacturing facilities where Class B fires could occur. AFFF is a known product for which many formulations contain PFOA and PFOS, or other PFAS precursors known to degrade to PFOA and PFOS. AFFFs stored and used by industries where Class B fires could occur are often the source of PFAS at these facilities and not the raw materials and products manufactured at the facility. Other categories that may be PFAS sources for which few samples were collected that had high PFOA or PFOS concentrations were 430 (Pulp, Paper, and Paperboard), 442 (Transportation Equipment Cleaning), 446 (Paint Formulating), 463 (Plastics Molding and Forming), and 467 (Aluminum Forming).

Category 437 (Centralized Waste Treatment) had PFOA, or PFOS detected in all the samples (PFOA detection was 100% and PFOS detection was 93%), with 86% of the samples being above the PFOS WQS. Category 437 is considered a PFAS source based on the detection frequency for PFOA and PFOS and those above the PFOS WQS. Because centralized waste treaters typically accept wastewater from industries such as metal finishers, groundwater cleanups, and landfills, it is expected that centralized waste treatment will be a source of PFAS.

Two (2) categories, 413 (Electroplating) and 433 (Metal Finishing) were identified as the most prevalent PFOS source categories. The source of PFAS was determined to be from previously used fume suppressants that had very high PFOS concentrations. In general, facilities that never used the older generation of fume suppressants with high PFOS concentrations were found not to discharge PFOS. Current fume suppressants contain high concentrations of other PFAS, primarily 6:2 Fluorotelomer Sulfonic Acid (6:2 FTSA), as the main ingredient. For more information about currently-used fume suppressants, see the report titled “Targeted and Nontargeted Analysis of PFAS in Fume Suppressant Products at Chrome Plating Facilities” (EGLE, 2020c). The PFOS detection frequency for the sampled facilities was 33% and 66% for 433 and 413 categories, respectively. A total of 96% of the 413 categories were sampled, and 75% of the 433 categories.

Old fume suppressants that contained PFOS were most prevalent in chrome plating operations using hexavalent chromium. A detailed discussion about fume suppressant use based on the facility process type can be found in the *Identified Industrial Sources of PFOS to Municipal Wastewater Treatment Plants* (EGLE, 2020b). In conclusion, the two categories, 413 and 433, show very strong correlations of potentially being PFOS sources. Very few facilities of the concentrations exceeded the screening level for PFOA from **Categories 419**, **433**, and **437** (**Figure 18**). The regulatory driver was determined to be PFOS, with many of the CIU samples being above the screening level set at the WQS for PFOS (**Figure 19**).

## Table 11. CIU PFAS Summary Results[1]

| Category Description | 40 CFR Part | Total CIU | Number and (%) of CIU Sampled | PFOA Number and (%) of Detections | PFOA Minimum (Min) (ng/L) | PFOA Maximum (Max) (ng/L) | PFOS Number and (%) of Detections | PFOS Number and (%) of Sources (>WQS) | PFOS Minimum (Min) (ng/L) | PFOS Maximum (Max) (ng/L) |
|---|---|---|---|---|---|---|---|---|---|---|
| **Textile Mills** | **410** | 1 | 1 (100%) | 1 (100%) | 7 | 114 | 1 (100%) | 1 (100%) | 2 | 36 |
| **Electroplating** | **413** | 46 | 44 (96%) | 15 (34%) | 1.6 | 19 | 29 (66%) | 19 (66%) | 0.4 | 50,000 |
| **Organic Chemicals, Plastics, and Synthetic Fibers** | **414** | 8 | 4 (50%) | 2 (50%) | 3 | 7 | 2 (50%) | 0 (0%) | 4 | 5 |
| **Soap and Detergent Manufacturing** | **417** | 6 | 1 (17%) | 0 (0%) | --- | --- | 0 (0%) | 0 (0%) | --- | --- |
| **Petroleum Refining** | **419** | 1 | 1 (100%) | 1 (100%) | 4 | 710 | 1 (100%) | 1 (100%) | 7 | 800 |
| **Iron and Steel Manufacturing** | **420** | 12 | 8 (67%) | 3 (38%) | 1.9 | 43 | 2 (25%) | 0 (0%) | 1.4 | 4 |
| **Steam Electric Power Generating** | **423** | 7 | 1 (14%) | 0 (0%) | --- | --- | 0 (0%) | 0 (0%) | --- | --- |
| **Leather Tanning and Finishing** | **425** | 1 | 1 (100%) | 0 (0%) | --- | --- | 1 (100%) | 1 (100%) | 10.0 | 14 |
| **Pulp, Paper, and Paperboard** | **430** | 4 | 4 (100%) | 4 (100%) | 13 | 110 | 4 (100%) | 4 (100%) | 2 | 190 |
| **Metal Finishing** | **433** | 281 | 212 (75%) | 67 (32%) | 0.3 | 740 | 71 (33%) | 32 (15%) | 0.7 | 240,000 |
| **Centralized Waste Treatment** | **437** | 17 | 14 (82%) | 14 (100%) | 0.5 | 3,000 | 13 (93%) | 12 (86%) | 1.1 | 53,000 |
| **Pharmaceutical Manufacturing** | **439** | 16 | 5 (31%) | 0 (0%) | --- | --- | 1 (20%) | 0 (0%) | 3 | 3 |
| **Transportation Equipment Cleaning** | **442** | 8 | 3 (38%) | 3 (100%) | 33 | 280 | 2 (67%) | 1 (33%) | 11 | 640 |
| **Paint Formulating** | **446** | 1 | 1 (100%) | 1 (100%) | 20 | 56 | 1 (100%) | 1 (100%) | 60 | 120 |
| **Plastics Molding and Forming** | **463** | 5 | 2 (40%) | 1 (50%) | 16 | 16 | 2 (100%) | 1 (50%) | 3 | 61 |
| **Aluminum Forming** | **467** | 10 | 5 (50%) | 4 (80%) | 1.5 | 5 | 5 (100%) | 2 (40%) | 1.7 | 5,200 |
| **Copper Forming** | **468** | 4 | 2 (50%) | 0 (0%) | --- | --- | 0 (0%) | 0 (0%) | --- | --- |
| **Electrical and Electronic Components** | **469** | 2 | 1 (50%) | 1 (100%) | 23 | 23 | 1 (100%) | 0 (0%) | 10 | 10 |
| | **Total CIUs** | **430** | **310 (72%)** | | | | | | | |

[1]Units are in nanograms per liter (ng/L) or parts per trillion (ppt)

**Figure 18. PFOA Concentrations for Sampled 40 CFR Categories**

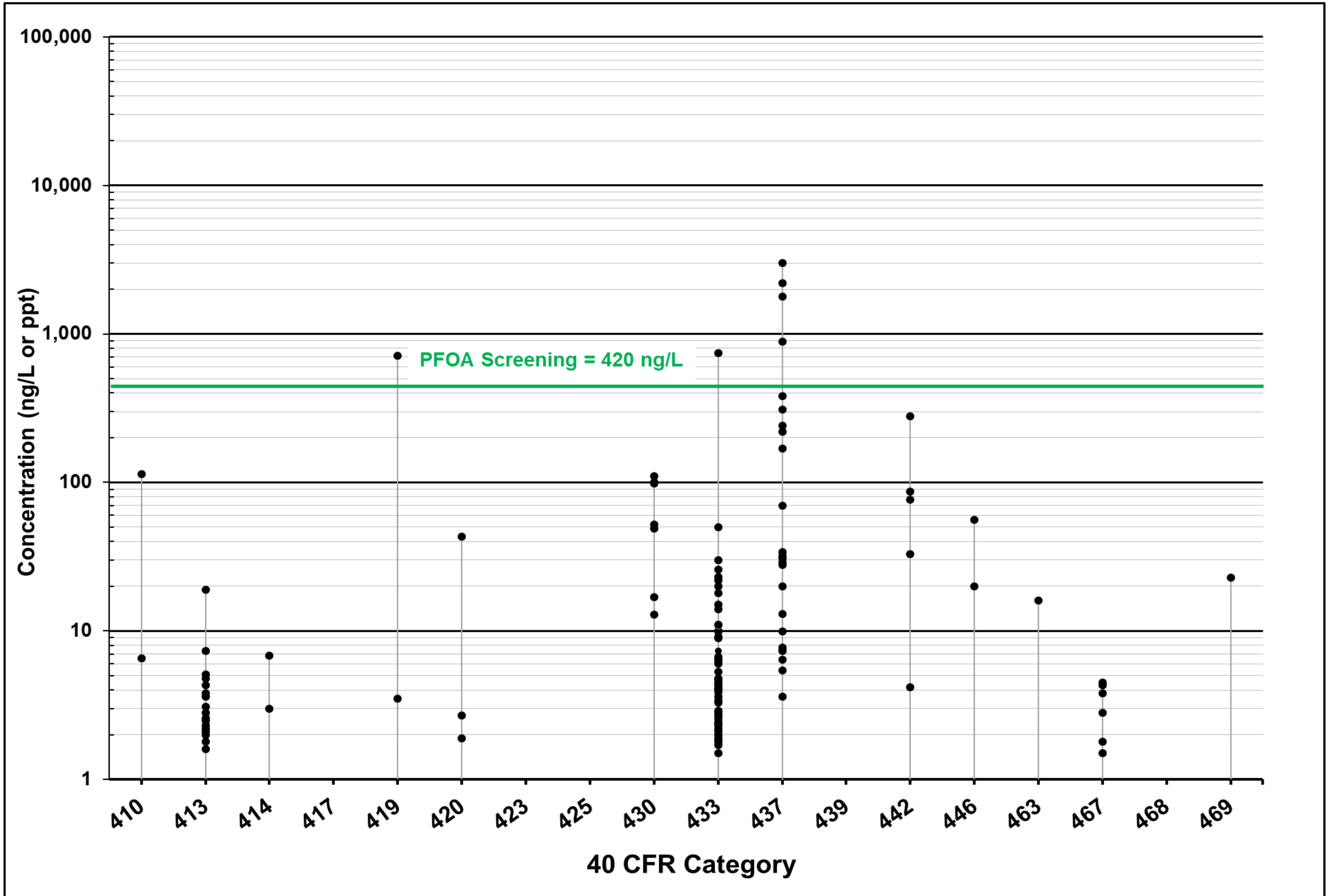
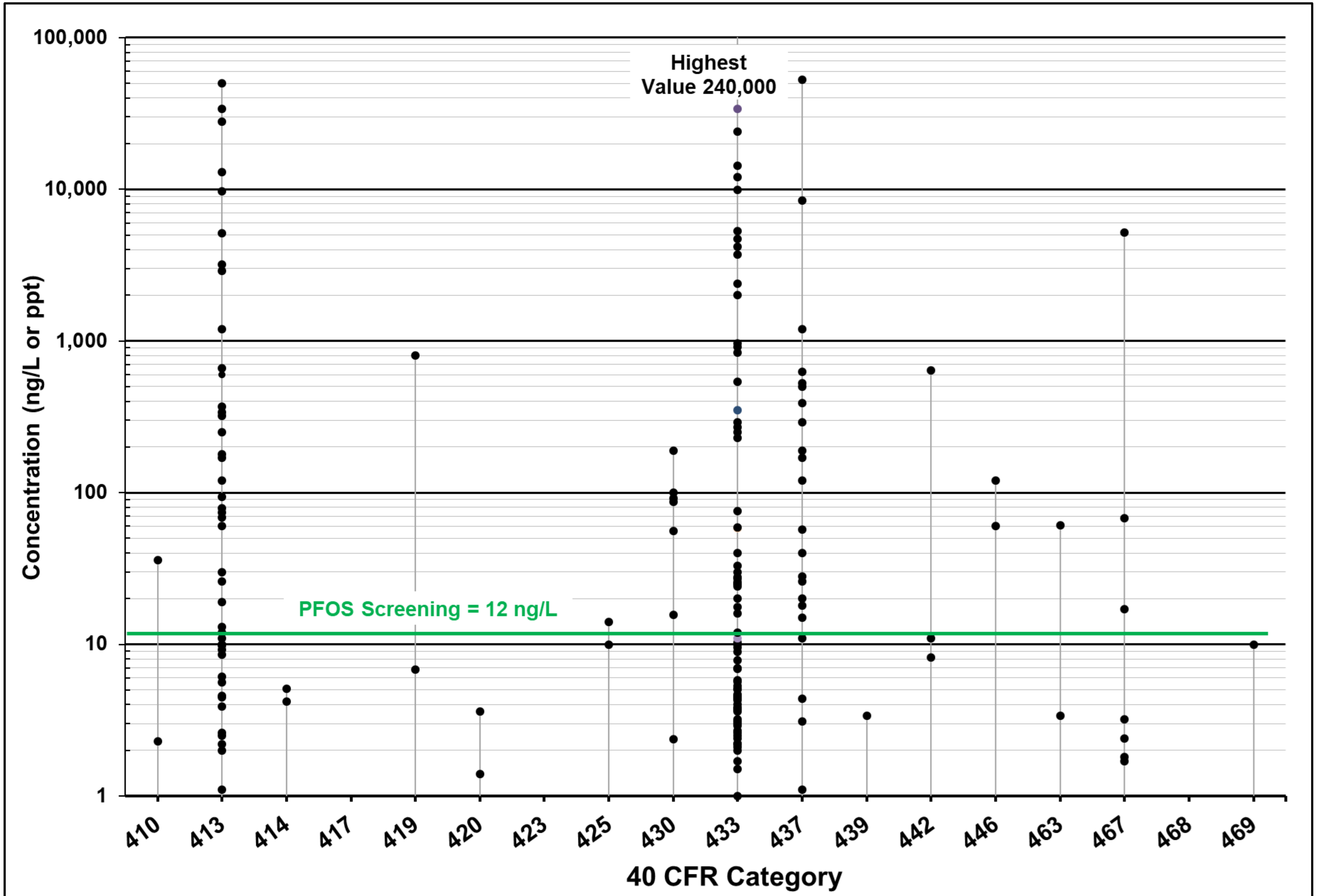


**Figure 19. PFOS Concentrations for Sampled 40 CFR Categories**



### 3.7.2 IU and SIU PFAS Evaluation

A total of 656 samples were collected from 256 individual IUs and SIUs representing seven (7) industry types. The summary of PFAS results for all IUs and SIUs sampled are presented in **Table 13** and **Figures 20** and **21**. The total number of samples, minimum and maximum concentrations for PFOA and PFOS for all sampled IU and SIU facilities, is presented in **Table 14**. The seven (7) IU and SIU industry types evaluated are presented below:

1. Chemical Manufacturing,
2. Paper Manufacturing, Packaging,
3. AFFF Residual Sewer,
4. Commercial Industrial Laundry Facilities,
5. Various Contaminated Sites,
6. Landfills, and
7. Miscellaneous Sources.

Out of over 656 samples collected from IUs and SIUs from seven (7) distinct groups, only one sample was above the PFOA screening value. Many more samples were detected above the PFOS screening value. PFOA and PFOS were used more widely and at higher volumes in the past, and recent concentrations are therefore expected to be lower than those in the past. Due to its relative abundance and more stringent water quality standard in Michigan, PFOS was the regulatory driver when managing PFOA and PFOS impacts to WWTPs from industrial discharges.

The first two groups, Chemical Manufacturing, and Paper Manufacturing and Packaging are also listed as CIUs under **Categories 414** and **430**. For this study, IUs and SIUs are included that conduct similar activities but do not have the industrial processes that would require them to be regulated as CIUs. The concentrations were either similar or sometimes higher for the IU and SIU facilities than those categorized as CIUs. This may indicate that the regulated processes that require an industrial facility to be listed as a CIU may not significantly affect the potential PFAS use. A facility could be a PFAS source under these two general industrial categories regardless of whether they are listed as an SIU, IU, or CIU.

The AFFF Residual Sewer category represents IU and SIU discharges that are believed to be impacted by PFAS due to past release of AFFF and/or disposal in the sanitary sewer. The past releases of AFFF could impact various matrices (e.g. soil, groundwater, surface water runoff, or various wastewaters from the industrial facilities) that could infiltrate or discharge to the sewers. Due to the high concentrations of PFAS in AFFF, the sanitary sewer could become a PFAS residual source. Meaning that while the sewers are not a source of PFAS themselves, AFFF residues in the sewers or potential infiltration of contaminated groundwater to the sanitary sewers from past AFFF use may result in the ongoing release of PFAS within the sanitary sewer.

PFAS was detected in about 55% of the sampled Commercial Industrial Laundry Facility category, likely due to the use of PFAS as stain-resistant coatings on some materials and residues from industrial processes. PFOS concentrations above the screening value of 12 ng/L were detected at 42% of facilities; however, many facilities had low detections. Information from the IUs and SIUs indicates that PFAS detections are very dependent on each facility's type of materials, and that concentrations of PFAS could vary significantly from one facility to another.

A total of eight (8) different types under the Various Contaminated Sites category were identified as sources of PFOS. The number of facilities sampled under the Various Contaminated Sites category was low, with six (6) out of eight (8) types having less than six (6) facilities sampled. Many of the sites were associated with former sources identified under the CIU section (e.g., 413, 430, and 433 categories) or listed under other IU and SIU categories in **Table 13** (e.g., former landfills, impacted groundwater by AFFF). There was no apparent difference observed between the IU and SIU facilities under the Various Contaminated Sites category. However, the dataset sampled was not very large, and there was a wide range of concentrations observed.

Landfills were identified as a potential source of PFOS to WWTPs. PFOA and PFOS were detected in almost all the leachate samples, indicating a strong correlation between PFOA and PFOS detections and landfill leachate. However, the impact on the WWTPs will depend on the volume of leachate discharging to the WWTP and the PFOA and PFOS concentrations in the leachate. When the volume of leachate is low compared to the WWTP flow, even when PFAS are present in the leachate, the impact on the WWTP could be insignificant. Multiple facilities were above the PFOA screening value of 420 ng/L, with most of them being landfill leachate. Most of the facilities were above the PFOS screening value of 12 ng/L. No apparent difference was observed in the samples collected from Type 2 or 3, active or closed, or hazardous landfills. It is expected that landfills that receive industrial wastes will have higher PFAS concentrations in their leachate.

There were 123 Miscellaneous Sources composed of IU (50 samples), and SIU (73 samples) discharges sampled for PFOA and PFOS that were not classified due to limited information. All the results for IU samples were below the PFOA and PFOS screening values of 420 ng/L and 12 ng/l, respectively. The detection frequency for IU samples was 30% for PFOA and 32% for PFOS. The SIU samples had only one sample above the PFOS screening value, and all the samples were below the PFOA screening value. The detection frequency for the SIU samples was 37% for PFOA and 39% for PFOS. There was no significant difference in PFOA or PFOS detection frequency and overall concentration ranges observed between IUs and SIUs facilities. The detection of PFOA and PFOS in the wide variety of industrial discharges shows that PFOA and PFOS use was widespread. However, PFAS use was not typically in quantities that lead to discharge concentrations above the screening values that resulted in significant impacts to the WWTP effluents.

## Table 13. IU and SIU PFAS Summary Results[1]

| Industry/Category/Type | | Graph ID | Total Facilities Sampled | PFOA Number and (%) of Detections | PFOA Minimum (Min) (ng/L) | PFOA Maximum (Max) (ng/L) | PFOS Number and (%) of Detections | PFOS Number and (%) of Sources (>WQS) | PFOS Minimum (Min) (ng/L) | PFOS Maximum (Max) (ng/L) |
|---|---|---|---|---|---|---|---|---|---|---|
| **Chemical Manufacturing** | | | | | | | | | | |
| CIU | | **CHEM:C** | 4 | 1 (25%) | 3.0 | 3.0 | 1 (25%) | 1 (25%) | 4.2 | 4.2 |
| SIU | | **CHEM:S** | 12 | 3 (25%) | 2.5 | 1,100 | 4 (33%) | 3 (25%) | 5 | 4,600,000 |
| IU | | **CHEM:I** | 1 | 1 (100%) | 20 | 20 | 1 (100%) | 1 (100%) | 18 | 30 |
| **Paper Manufacturing, Packaging** | | | | | | | | | | |
| CIU | | PMFG:C | 4 | 4 (100%) | 12.9 | 110 | 4 (100%) | 4 (100%) | 2 | 190 |
| SIU | | PMFG:S | 8 | 3 (38%) | 3.8 | 89 | 4 (50%) | 4 (50%) | 2.1 | 210 |
| IU | | **PMFG:I** | 3 | 3 (100%) | 2.0 | 680 | 3 (100%) | 2 (67%) | 6.6 | 410 |
| **AFFF Residual Sewer** | | | | | | | | | | |
| SIU | | **AFFF-Sewer:S** | 3 | 3 (100%) | 3.5 | 140 | 3 (100%) | 3 (100%) | 5.1 | 3,500 |
| IU | | **AFFF-Sewer:I** | 2 | 2 (100%) | 42 | 410 | 2 (100%) | 2 (100%) | 4,700 | 45,000 |
| **Commercial Industrial Laundry Facilities** | | | | | | | | | | |
| SIU | | **LDRY:S** | 12 | 7 (58%) | 1.9 | 84 | 6 (50%) | 5 (42%) | 5.7 | 69 |
| **Contaminated Sites** | | | | | | | | | | |
| **AFFF Impacted Groundwater** | IU | **CONT-AFFF:I** | 1 | 0 (0%) | --- | --- | 1 (100%) | 1 (100%) | 82 | 456 |
| **Leather Tannery** | IU | **CONT-TAN:I** | 1 | 1 (100%) | 6.3 | 135 | 1 (100%) | 1 (100%) | 5.73 | 514 |
| **Former Landfills** | SIU | **CONT-LNDF:S** | 3 | 2 (67%) | 53 | 120 | 2 (67%) | 1 (33%) | 11 | 4,000 |
| | IU | **CONT-LNDF:I** | 3 | 1 (33%) | 4 | 4 | 2 (67%) | 1 (33%) | 10 | 18 |
| **Former Metal Finishers** | SIU | **CONT-MF:S** | 8 | 5 (63%) | 2.0 | 15 | 6 (75%) | 4 (50%) | 1.6 | 8,000 |
| | IU | **CONT-MF:I** | 3 | 2 (67%) | 2.1 | 2.9 | 1 (33%) | 1 (33%) | 23 | 32 |
| **Miscellaneous Sources** | SIU | **CONT-MISC:S** | 1 | 1 (100%) | 4.6 | 4.6 | 1 (100%) | 0 (0%) | 7.2 | 7.2 |
| | IU | **CONT-MISC:I** | 7 | 6 (86%) | 1.3 | 58 | 6 (86%) | 4 (57%) | 2.1 | 37.51 |
| **Mixed Manufacturing** | SIU | **CONT-MMF:S** | 1 | 1 (100%) | 20 | 30 | 1 (100%) | 1 (100%) | 270 | 430 |
| | IU | **CONT-MMF:I** | 3 | 2 (67%) | 1.9 | 2,280 | 2 (67%) | 2 (67%) | 1.9 | 34,000 |
| **Paint Manufacturing** | SIU | **CONT-PAINT:S** | 1 | 1 (100%) | 74 | 74 | 1 (100%) | 1 (100%) | 4.0 | 6,047 |
| | IU | **CONT-PAINT:I** | 1 | 1 (100%) | 32 | 120 | 1 (100%) | 1 (100%) | 360 | 2,900 |
| **Former Paper Manufacturing** | SIU | **CONT-PMFG:S** | 2 | 2 (100%) | 0.4 | 27 | 1 (50%) | 1 (50%) | 0.5 | 140 |
| | IU | **CONT-PMFG:I** | 1 | 1 (100%) | 6 | 12 | 1 (100%) | 1 (100%) | 10 | 28.2 |

## Table 13. IU and SIU PFAS Summary Results[1]

| Industry/Category/Type | | Graph ID | Total Facilities Sampled | PFOA Number and (%) of Detections | PFOA Minimum (Min) (ng/L) | PFOA Maximum (Max) (ng/L) | PFOS Number and (%) of Detections | PFOS Number and (%) of Sources (>WQS) | PFOS Minimum (Min) (ng/L) | PFOS Maximum (Max) (ng/L) |
|---|---|---|---|---|---|---|---|---|---|---|
| **Landfills** | | | | | | | | | | |
| **Hazardous Waste Landfill** | SIU | **LNDF-HAZ:S** | 1 | 1 (100%) | 1.6 | 40 | 1 (100%) | 1 (100%) | 7.0 | 60 |
| **Type II Sanitary – Active** | SIU | **LNDF-T2-ACT:S** | 22 | 22 (100%) | 2.3 | 43,425 | 22 (100%) | 22 (100%) | 8.5 | 5,000 |
| | IU | **LNDF-T2-ACT:I** | 3 | 3 (100%) | 330 | 1,500 | 3 (100%) | 3 (100%) | 50 | 240 |
| **Type II Sanitary – Closed** | SIU | **LNDF-T2-CLS:S** | 13 | 13 (100%) | 5.0 | 2,660 | 12 (92%) | 11 (85%) | 6.4 | 641 |
| | IU | **LNDF-T2-CLS:I** | 10 | 10 (100%) | 4.3 | 2,000 | 10 (100%) | 9 (90%) | 9.3 | 460 |
| **Type III Sanitary - Active** | SIU | **LNDF-T3-ACT:S** | 3 | 2 (67%) | 26 | 58 | 3 (100%) | 1 (33%) | 3.79 | 100 |
| **Type III Sanitary – Closed** | SIU | **LNDF-T3-CLS:S** | 3 | 3 (100%) | 4.3 | 53 | 3 (100%) | 2 (67%) | 6.0 | 4,000 |
| | IU | **LNDF-T3-CLS:I** | 1 | 1 (100%) | 200 | 410 | 1 (100%) | 1 (100%) | 13 | 61 |
| **Miscellaneous Sources** | | | | | | | | | | |
| SIU | | **MISC:S** | 73 | 27 (37%) | 1.3 | 120 | 19 (26%) | 1 (1%) | 0.98 | 85 |
| IU | | **MISC:I** | 50 | 15 (30%) | 1.8 | 710 | 16 (32%) | 0 (0%) | 2 | 10 |

[1]Units are in nanograms per liter (ng/L) or parts per trillion (ppt)

**Figure 20. PFOA Concentrations for IU and SIU Sample Types**

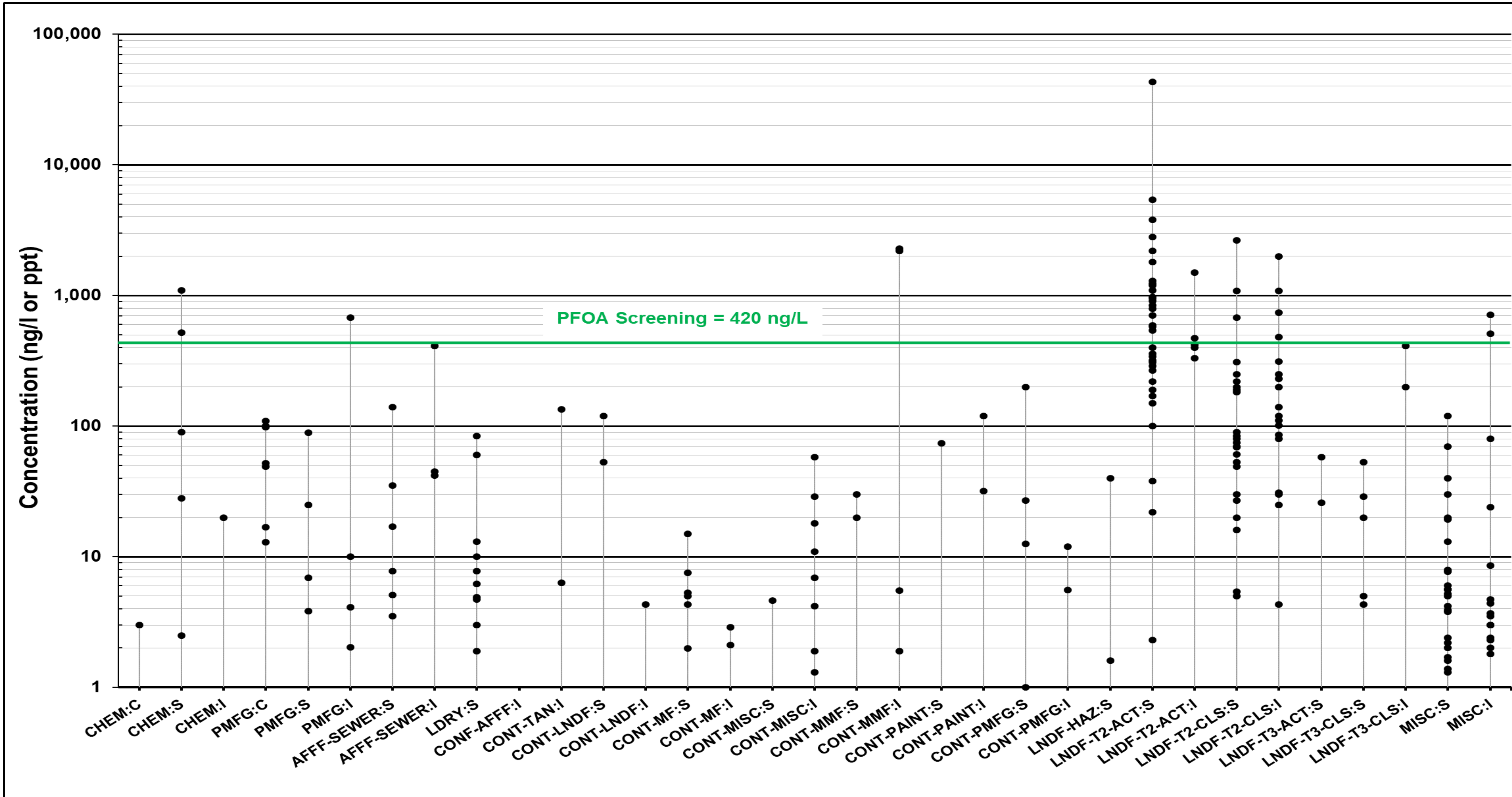
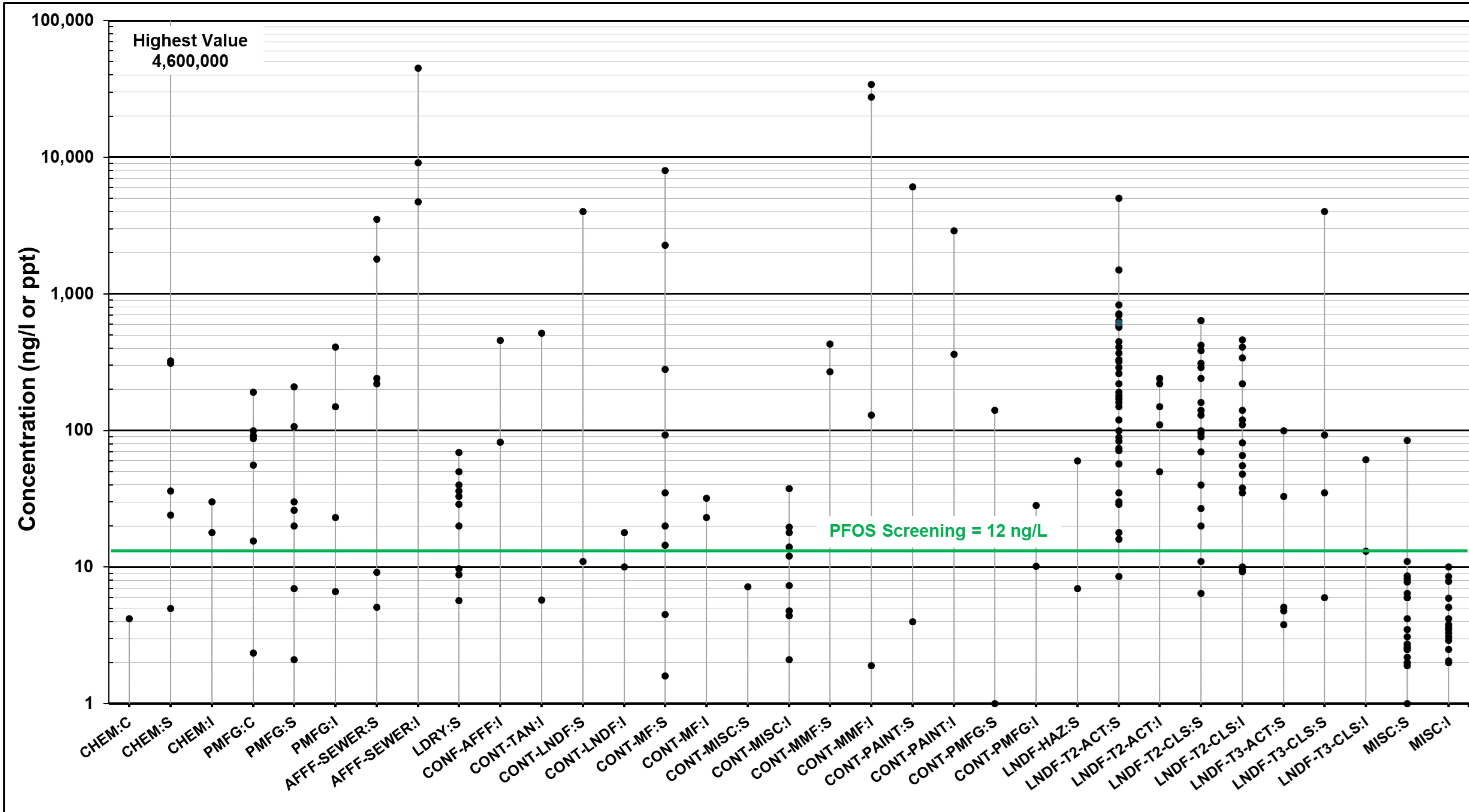


**Figure 21. PFOS Concentrations for IU and SIU Sample Types**



### 3.7.3 PFAS Industrial Sources Summary

PFOA and PFOS were detected in about 40% of all CIUs, and 55% of SIUs and IUs sampled. It should be noted that specific industries were targeted based on a literature review on PFOA and PFOS sources. There was a wide range of concentrations, even within the same category of industrial discharges. Few products have been identified to date that could be the source of PFOA and PFOS in industrial discharges. AFFF and fume suppressants used by metal finishers are two products that have been identified as PFOA and PFOS sources. However, PFOS was identified as the primary regulatory driver that impacted multiple WWTPs with PFOS concentrations in the effluent above the PFOS WQS. PFOS sources are often related to past industrial activities when higher concentrations of PFOS were present in products, and there were significantly fewer regulatory criteria and analysis capabilities. AFFF usage and storage have resulted in releases at facilities where there was a potential of Class B fires during various manufacturing processes. Other identified sources have been in paper manufacturing coatings, tanneries, and commercial laundries, where PFOA and PFOS have been used as stain-resistant coatings for various materials.

As mentioned above, PFOS was identified as the driver from a regulatory point of view in Michigan, with many IU, SIU, and CIU discharges exceeding the PFOS WQS of 12 ng/L. A total of 36% of the IUs and SIUs and 24% of the CIUs had discharges above the PFOS WQS of 12 ng/L, used as source screening criteria under the IPP PFAS Initiative.

Another classification system used for industry sectors is the North American Industry Classification System (NAICS). NAICS was developed by the United States Office of Management and Budget and is used to classify business establishments, replacing the Standard Industrial Classification (SIC) system in 1998. Each NAICS Sector (2-digit) was divided into Subsectors (3-digit), Industry Groups (4-digit), and Industries by 5-digit and 6-digit codes. A review of the NAICS codes was performed. There was a weak correlation between the NAICS codes' descriptions and those under the 40 CFR categories or information about the facilities. The NAICS codes provided by the industrial facility many times represented historical processes performed at a facility and did not correctly describe current operations. However, a couple of NACIS codes appear to correlate well with the 40 CFR categories as facility descriptions, as presented in **Table 15** below. Category 413 for electroplaters was more closely correlated with the NAICS code 332813, and category 433 was correlated with NACIS code 332812 for metal finishers. The industry group 5622 – Waste Treatment and Disposal, which has various 6-digit NAICS industries such as 562211, 562212, and 562219, were correlated well with Category 437 or facilities listed as Type 2 or 3 sanitary landfills.

**Table 15. Industrial Discharges for NAICS, IU, SIU, and CIU 40 CFR Categories**

| NAICS (6-Digit) | NAICS Industry Description | 40 CFR Category / IU & SIU Type | 40 CFR Category / IU & SIU Type Description |
|---|---|---|---|
| 332812 | Metal Coating, Engraving (except Jewelry and Silverware), and Allied Services to Manufacturers | 433 | Metal Finishing |
| 332813 | Electroplating, Plating, Polishing, Anodizing, and Coloring | 413 | Electroplating |
| 562211 | Hazardous waste treatment and disposal | 437 / Landfills | Centralized Waste Treatment / Type 2 and 3 Landfills |
| 562212 | Solid waste landfill | Landfills | Type 2 and 3 Landfills |
| 562219 | Other nonhazardous waste disposals | 437 / Landfills | Centralized Waste Treatment / Type 2 Landfills |

# 4. Statewide PFAS Assessment of 42 WWTPs

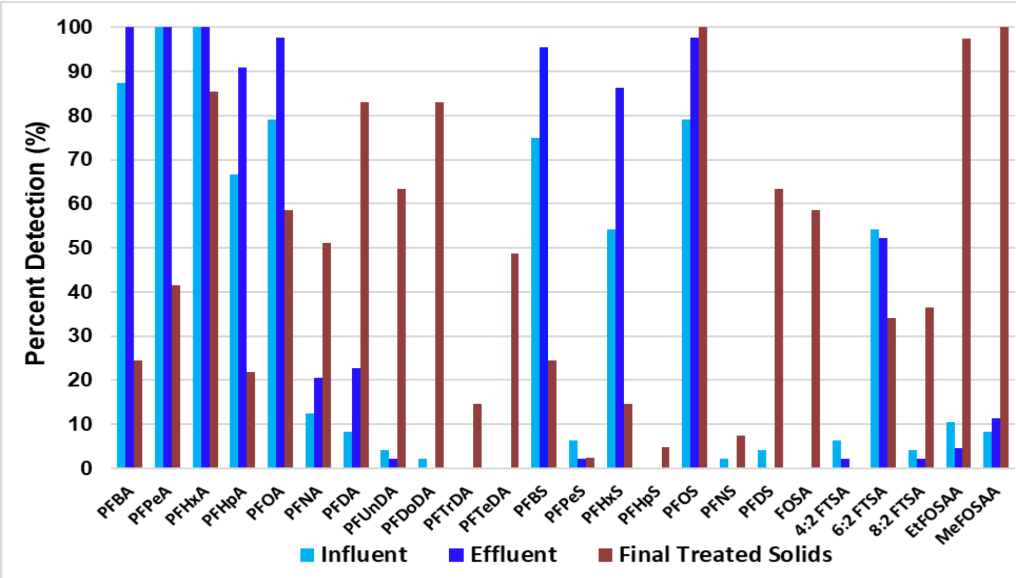
In the fall of 2018, EGLE's WRD launched a second statewide PFAS initiative with the assessment of 42 municipal WWTPs to better understand the occurrence of PFAS by sampling the influent, effluent, and associated residuals (i.e., final treated solids such as sludge or biosolids). The influent and effluent samples were collected as grab samples at a short time after one another, and the hydraulic retention time was not considered. At select WWTPs, additional aqueous and solid samples from various treatment processes were collected further to evaluate the fate of PFAS within the WWTPs.

The study included the 20 largest WWTPs in Michigan and an additional 22 WWTPs based on USEPA's 2012 Clean Water Needs Survey List. The additional 22 WWTPs were selected from three (3) main groups based on flows of 0.2 to 0.4 million gallons per day (MGD), 0.5 to 3 MGD, and 3 to 9 MGD with various treatment processes. The 42 WWTPs sampled during the study are presented in **Table 16,** and the locations are presented in **Figure 22**. The 134 aqueous sample locations are presented in **Table 17** with the PFAS results in **Table 18**. A total of 20 sludge and biosolids samples with very low solids percentage (i.e., ~5% or lower) were centrifuged, and the aqueous portion was analyzed separately for these solids. The 71 solids sample locations are presented in **Table 19** with the PFAS results in **Table 20**. The summary for PFOA, PFOS, and Total PFAS for the influent, effluent, and final treated solids are presented in **Table 21**.

The study assessed the occurrence of 24 PFAS presented in **Table 22**, which was the minimum analyte list recommended by EGLE for analysis at all PFAS sites in 2018. This statewide PFAS sampling study provides a robust evaluation of potential additional PFAS impacts, beyond PFOA and PFOS, to the WWTPs in Michigan.

PFAS was detected in all 134 aqueous samples and 69 out of 71 solids samples. The only two solids samples where PFAS were non-detect were ash samples from two (2) WWTPs that process final solids through a furnace. The percent detection for all 24 PFAS for the influent, effluent, and final treated solids for all 42 WWTPs is presented in **Figure 23**. The high detection frequency of many PFAS in the WWTP samples indicates that PFAS are likely to present in many industrial, commercial, or even residential discharges.

## Figure 23. Percent Detection of PFAS for 42 WWTPs Assessment




## Table 22. PFAS Analyte List - Statewide PFAS Assessment of 42 WWTPs

| PFAS Name | Carbon Chain length (C#) | Acronym | CAS # |
|---|---|---|---|
| Perfluorobutanoic Acid[1] | C4 | PFBA | 375-22-4 |
| Perfluoropentanoic Acid[1] | C5 | PFPeA | 2706-90-3 |
| Perfluorohexanoic Acid[1] | C6 | PFHxA | 307-24-4 |
| Perfluoroheptanoic Acid[1] | C7 | PFHpA | 375-85-9 |
| Perfluorooctanoic Acid[1] | C8 | PFOA | 335-67-1 |
| Perfluorononanoic Acid[1] | C9 | PFNA | 375-95-1 |
| Perfluorodecanoic Acid[1] | C10 | PFDA | 335-76-2 |
| Perfluoroundecanoic Acid[1] | C11 | PFUnDA | 2058-94-8 |
| Perfluorododecanoic Acid[1] | C12 | PFDoDA | 307-55-1 |
| Perfluorotridecanoic Acid[1] | C13 | PFTrDA | 72629-94-8 |
| Perfluorotetradecanoic Acid[1] | C14 | PFTeDA | 376-06-7 |
| Perfluorobutane Sulfonic Acid[2] | C4 | PFBS | 375-73-5 |
| Perfluoropentane Sulfonic Acid[2] | C5 | PFPeS | 2706-91-4 |
| Perfluorohexane Sulfonic Acid[2] | C6 | PFHxS | 355-46-4 |
| Perfluoroheptane Sulfonic Acid[2] | C7 | PFHpS | 375-92-8 |
| Perfluorooctane Sulfonic Acid[2] | C8 | PFOS | 1763-23-1 |
| Perfluorononane Sulfonic Acid[2] | C9 | PFNS | 474511-07-4 |
| Perfluorodecane Sulfonic Acid[2] | C10 | PFDS | 335-77-3 |

**Table 22. PFAS Analyte List - Statewide PFAS Assessment of 42 WWTPs**

| PFAS Name | Carbon Chain length (C#) | Acronym | CAS # |
|---|---|---|---|
| Perfluorooctane Sulfonamide[3] | C8 | FOSA | 754-91-6 |
| 4:2 Fluorotelomer Sulfonic Acid[4] | C4 | 4:2 FTSA | 757124-72-4 |
| 6:2 Fluorotelomer Sulfonic Acid[4] | C6 | 6:2 FTSA | 27619-97-2 |
| 8:2 Fluorotelomer Sulfonic Acid[4] | C8 | 8:2 FTSA | 39108-34-4 |
| N-Ethyl Perfluorooctane Sulfonamidoacetic Acid[5] | C8 | EtFOSAA | 2991-50-6 |
| N-Methyl Perfluorooctane Sulfonamidoacetic Acid[6] | C8 | MeFOSAA | 2355-31-9 |

[1]Perfluoroalkyl Carboxylic Acids (PFCAs) Family is composed of the following PFAS: PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFNA, PFDA, PFUnDA, PFDoDA, PFTrDA, PFTeDA

[2]Perfluoroalkane Sulfonic Acids (PFSAs) Family is composed of the following PFAS: PFBS, PFPeS, PFHxS, PFHpS, PFOS, PFNS, PFDS

[3]Perfluoroalkane Sulfonamides (FASAs) Family is composed of the following PFAS: FOSA

[4](n:2) Fluorotelomer Sulfonic Acids (FTSAs) Family is composed of the following PFAS: 4:2 FTSA, 6:2 FTSA, 8:2 FTSA

[5]N-Ethyl Perfluoroalkane Sulfonamidoacetic Acids (EtFASAAs) Family is composed of the following PFAS: EtFOSAA

[6]N-Methyl Perfluoroalkane Sulfonamidoacetic Acids (MeFASAAs) Family is composed of the following PFAS: MeFOSAA

The list of 24 PFAS included 6 PFAS families Perfluoroalkyl Carboxylic Acids (PFCAs), Perfluoroalkane Sulfonic Acids (PFSAs), Perfluoroalkane Sulfonamides (FASAs), Fluorotelomer Sulfonic Acids (FTSAs), N-Ethyl Perfluoroalkane Sulfonamidoacetic Acids (EtFASAAs), and N-Methyl Perfluoroalkane Sulfonamidoacetic Acids (MeFASAAs). Four (4) of these families (i.e., FASA, FTSA, EtFASAA, and MeFASAA) are referred to as precursors because they could undergo a partial abiotic, biotic transformation in the environment to highly stable and persistent end products such as compounds from the PFCA and PFSA families. The FASA, EtFASAA, and MeFASAA families transform to PFSAs. The FTSA family transforms into PFCAs.

PFAS that contains a shorter carbon chain length is referred to as short-chain. Those PFAS with longer carbon chain lengths are referred to as long-chain. A total of eight (8) short-chain PFAS and 16 long-chain PFAS were analyzed as part of the 24 PFAS. All three (3) PFAS analyzed from the FASA, EtFASAA, and MeFASAA families were long-chain. There were seven (7) long-chain compounds in the PFCA family and one (1) long-chain compound in the FTSA family. PFAS with a carbon chain length of eight (C8) or longer from the PFCA and FTSA families is considered long-chain. For the PFSA family, a carbon chain length of six (C6) or longer is considered long-chain. The short-chain PFAS from various PFAS families were more frequently detected in the aqueous samples (e.g., influent and effluent). The long-chain PFAS were detected more frequently in the solids samples (i.e., sludge or biosolids), which indicates a higher affinity to the solids for long-chain compounds.

The PFOA and PFOS concentrations in both the influent and effluent samples at the 42 WWTPs are presented in **Figures 24** and **25**, respectively. A total of 36 out of 42 effluent PFOA concentrations were higher than the influent, indicating the possible transformation of precursors and/or, at least in part, the recirculation of various treatment streams (e.g., waste activated sludge, centrate, filtrate) during WWTP operations. A total of 19 out of 42 effluent PFOS concentrations were higher than the influent, with a total of 24 effluent concentrations being within +/- 5 ng/L of the influent concentration. PFOS is known to adsorb to solids more strongly than PFOA, and the detection frequency of PFOS was also higher than PFOA in the solids, as presented in **Figure 23**. Similar to PFOA, the increase in PFOS concentrations in the effluent or accumulation in the solids could be due to possible transformation of precursors or could be attributed to the recirculation of various treatment streams (e.g., waste activated sludge, centrate, filtrate) during WWTP operations.  Also, some variability would be expected since grab samples were collected to minimize the potential for cross-contamination.

All of the PFOA concentrations in both the influent and effluent samples were well below the PFOA WQS of 420 ng/L.  However, 15 influent and 14 effluent samples had PFOS concentrations above the PFOS WQS of 12 ng/L.  As a result, PFOS was the main driver for regulatory compliance applied to the final effluent.  The PFAS concentrations for all 24 compounds were also plotted as a box plot, including color-coding for each PFAS family, increasing chain length from left to right.  The box plots also included whiskers for the minimum and maximum concentrations and $25^{th}$, $50^{th}$, and $75^{th}$ percentiles, including the mean concentrations (**Figure 26**).

**Figure 24. PFOA Influent and Effluent Concentrations for the 42 WWTPs Assessment**

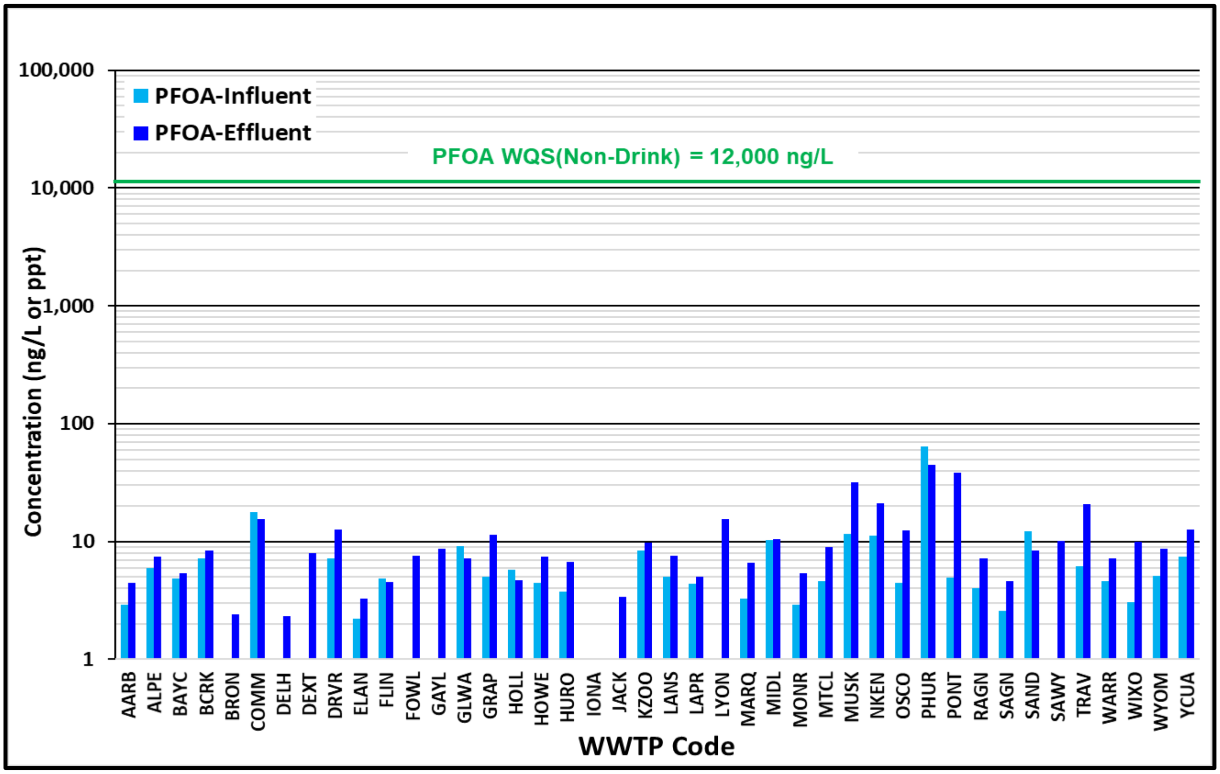



**Figure 25. PFOS Influent and Effluent Concentrations for the 42 WWTPs Assessment**

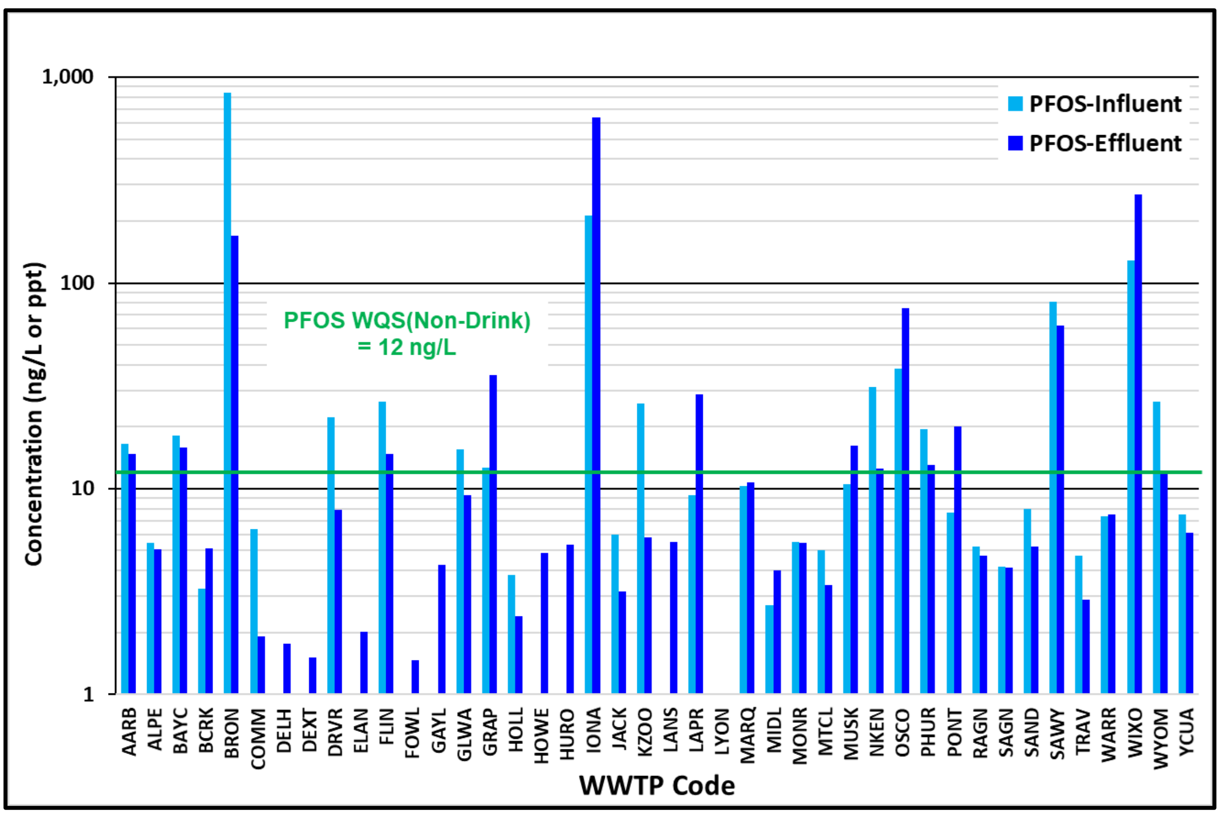
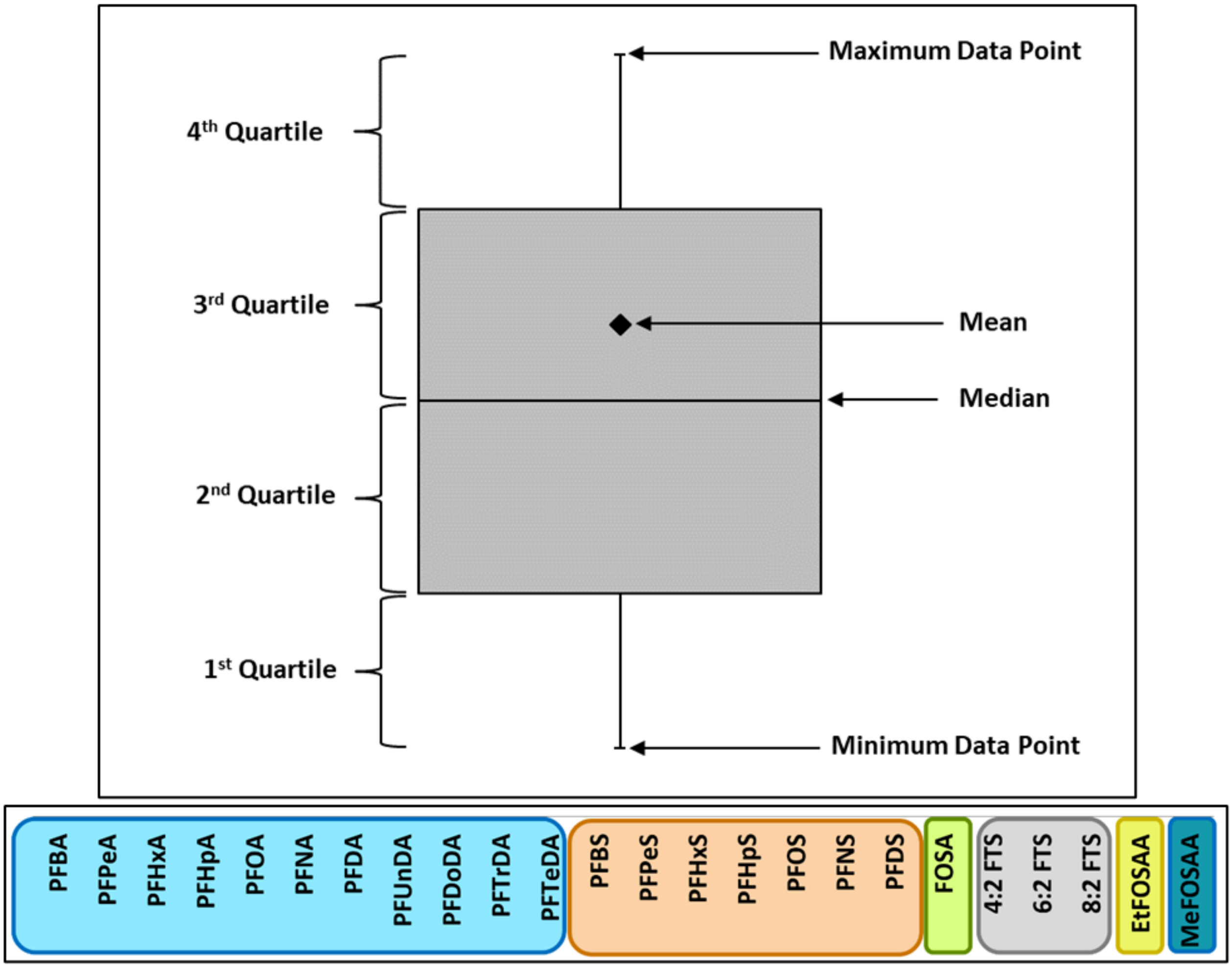


**Figure 26.  Legend for Box Plot Figures with PFAS Analyte List Grouped by Families**




The box and dot plot graphs for the influent are presented in **Figures 27** and **28,** with the effluent presented in **Figures 29** and **30**, and the final treated solids (sludge and biosolids) presented in **Figures 31** and **32**.  A wide range of concentrations was detected for most PFAS in influent, effluent, and final treated solids, which resulted in high biased mean concentrations.  A total of 45 final treated solids samples were collected from 40 WWTPs.  There were no final treated solids samples collected from two (2) WWTPs.  Some of the final treated solids were collected from WWTPs that never have land-applied biosolids and have always utilized a landfill for disposal.  However, the results for final treated solids from WWTPs currently land applying biosolids or that have land applied in the past, and WWTPs that have never land applied were presented to show current and potential biosolids concentrations.  An extra sample of the final treated solids was collected from five (5) WWTPs, with one of the samples being pellets from WWTP #38. The remaining four (4) samples taken from storage tanks or drying beds may not be representative of solids being generated currently at the WWTP were as follows: an alkaline stabilized solids sample from a sludge cell of unknown age at WWTP #77; alkaline stabilized biosolids between two to six months old from WWTP #56; a drying bed solids sample from WWTP #52, which has not performed any land application in last two years; and aerobically stabilized biosolids six months old from a storage tank from WWTP #92.

The final treated solids average PFOS concentration for all 45 samples was 184 µg/kg, while the median concentration was 13 µg/kg (**Figure 33**). PFOS was detected in 43 out of 45 final treated solids samples. The detection limit of one (1) µg/kg was used for the two facilities that were non-detect in the average and median calculations. A total of seven (7) final treated solids samples from six (6) WWTPs were above the 150 µg/kg threshold that EGLE has chosen for characterizing e biosolids as “industrially impacted” (EGLE, 2020a). The threshold value of 150 µg/kg is not a risk-based number. It is a threshold to identify biosolids that contain significantly higher PFOS concentrations than those found in typical non-impacted biosolids. These seven (7) samples were from six (6) small to mid-sized POTWs with a flow of 0.2 to 3.8 MGD and all of which identified elevated discharges of PFOS to their collection system from industrial sources. As WWTPs with high PFOS concentrations are identified and source reductions are implemented, it is expected that lower concentrations in solids on average will be observed in Michigan WWTPs moving forward. For example, by removing the seven (7) industrially impacted samples, the recalculated average biosolids concentration lowers to 18 from 184 µg/kg, and the median lowers to 11 from 13 µg/kg (**Figures 33** and **34**).

An analysis of archived biosolids samples (collected in 2001) by USEPA represents 94 wastewater treatment facilities from 32 different states, and the District of Columbia sampled for 13 PFAS. The study identified PFOS as the most abundant PFAS analyte detected with an average concentration of 402 µg/kg dry weight (minimum: 308 and maximum: 618 µg/kg) followed by PFOA at 34 µg/kg dry weight (minimum: 12 and maximum: 70 µg/kg) (Venkatesana and Halden, 2013). The PFOS concentrations in the final treated solids (i.e., sludge or biosolids) identified during the 2018 EGLE’s Statewide PFAS Initiative were similar to the concentration ranges reported in the literature for WWTPs that receive industrial discharges from Switzerland (Alder, 2015), Australia (Gallen, 2016), and parts of the United States (Higgins, 2005) (**Figure 35**). The concentrations were significantly higher than those reported in WWTPs from Kenya (Chirikona , 2015), where only one (1) out of nine (9) WWTPs had some industrial discharges. The results indicate that PFOS concentrations are strongly correlated with industrial discharges and many times with chrome or metal finishers. Many WWTPs that reported high concentrations of PFOS received industrial discharges from chrome platers or metal finishers at many WWTPs sampled from other countries. Many of those industries currently use fume suppressants with high 6:2 FTSA concentrations, while many of the fume suppressants used before 2015 had high PFOS concentrations.

**Figure 27. Influent PFAS Detection Frequency and Concentrations for 42 WWTPs – Box Plot**

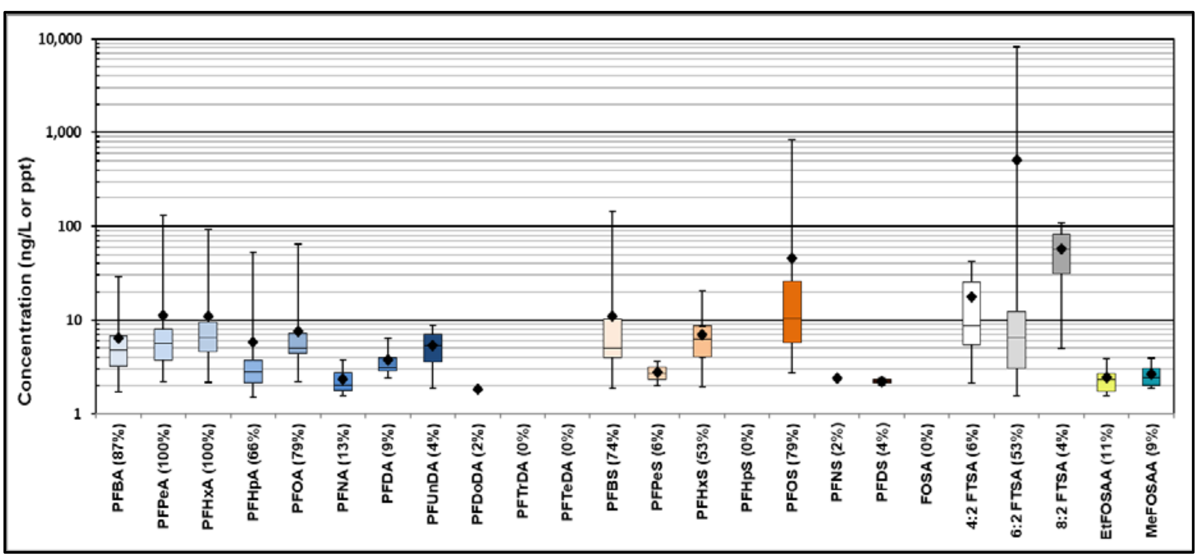


**Figure 28. Influent PFAS Detection Frequency and Concentrations for 42 WWTPs – Dot Plot**

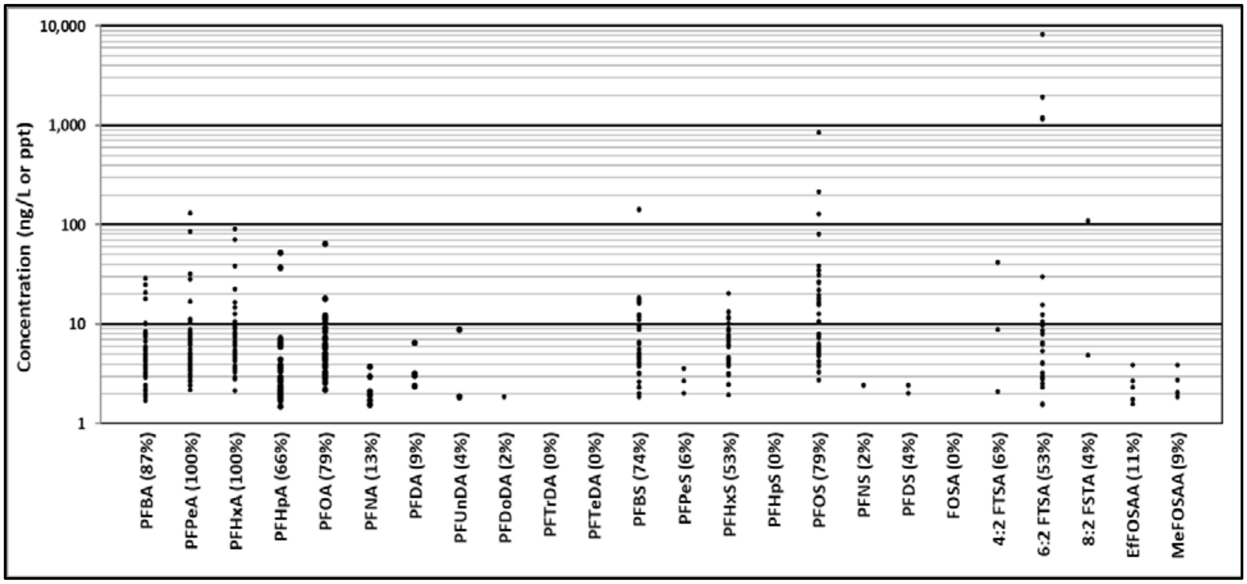



**Figure 29. Effluent PFAS Detection Frequency and Concentrations for 42 WWTPs – Box Plot**

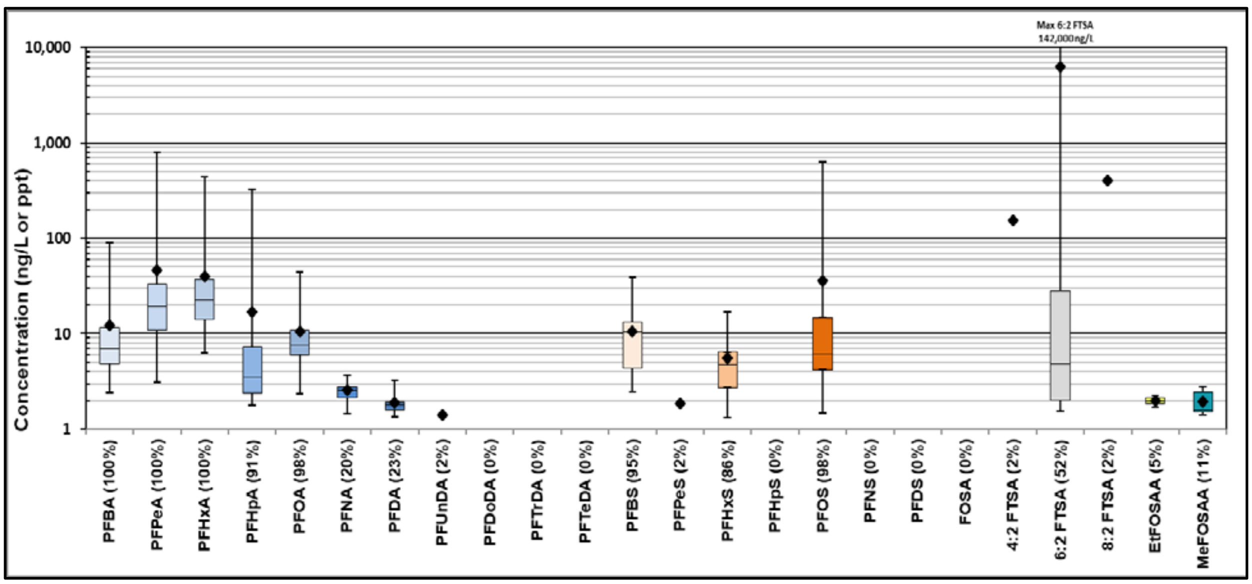


**Figure 30. Effluent PFAS Detection Frequency and Concentrations for 42 WWTPs – Box Plot**

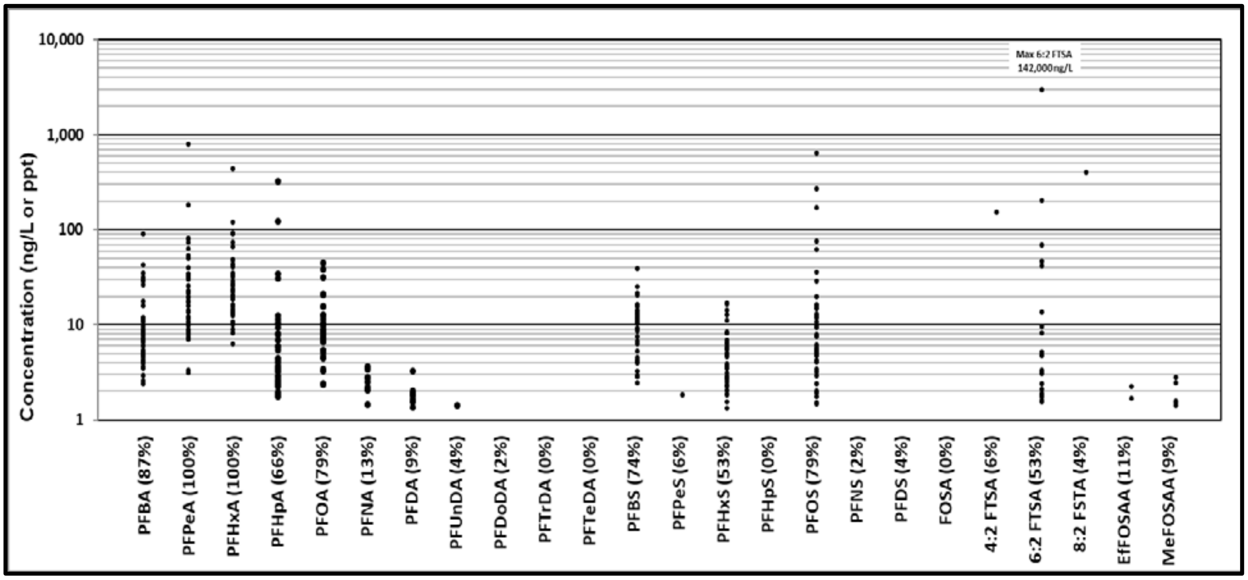



**Figure 31. Final Treated Solids (Sludge and Biosolids) PFAS Detection Frequency and Concentrations for 42 WWTPs – Box Plot**

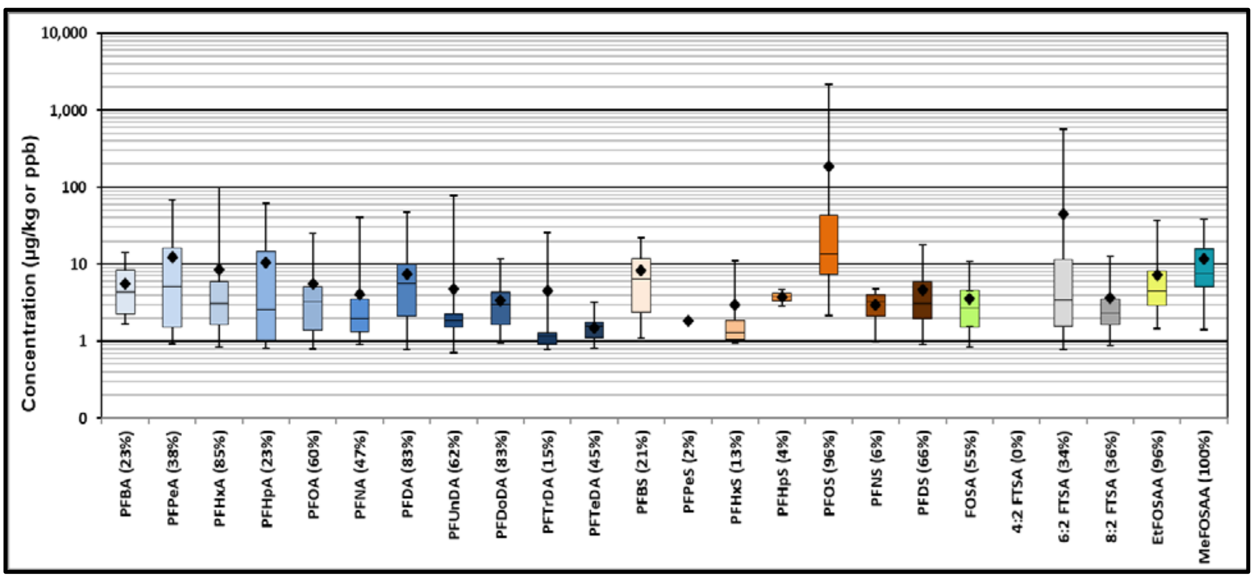


**Figure 32. Final Treated Solids (Sludge and Biosolids) PFAS Concentrations for 42 WWTPs – Dot Plot**

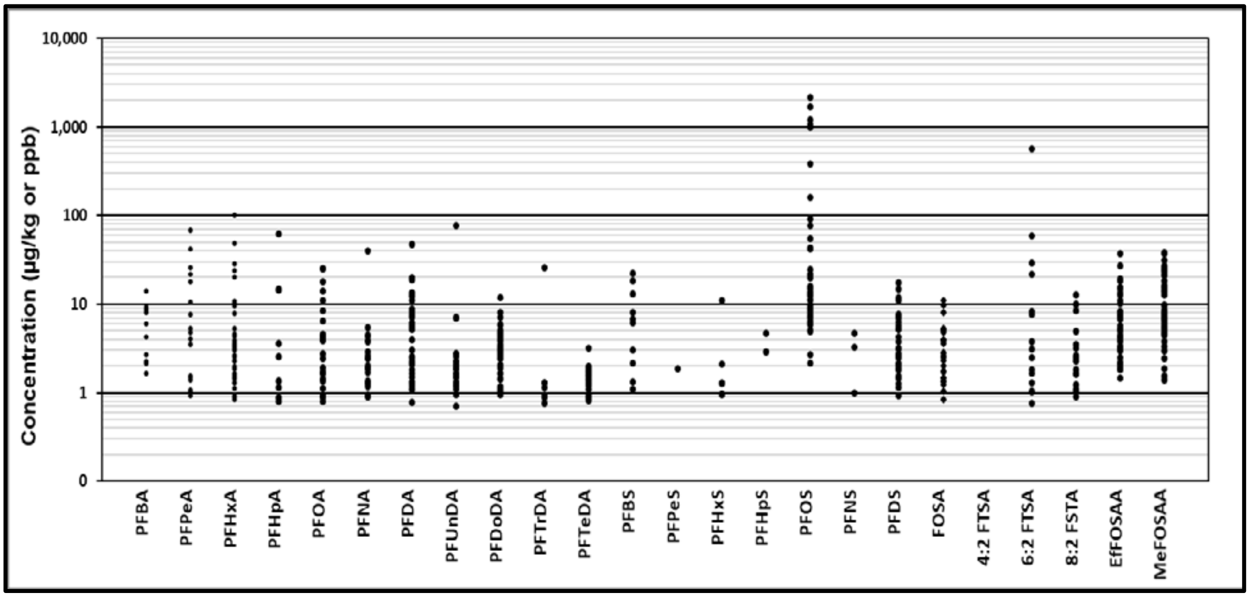



**Figure 33. Final Treated Solids (Sludge and Biosolids) PFOS Concentrations for 42 WWTPs**

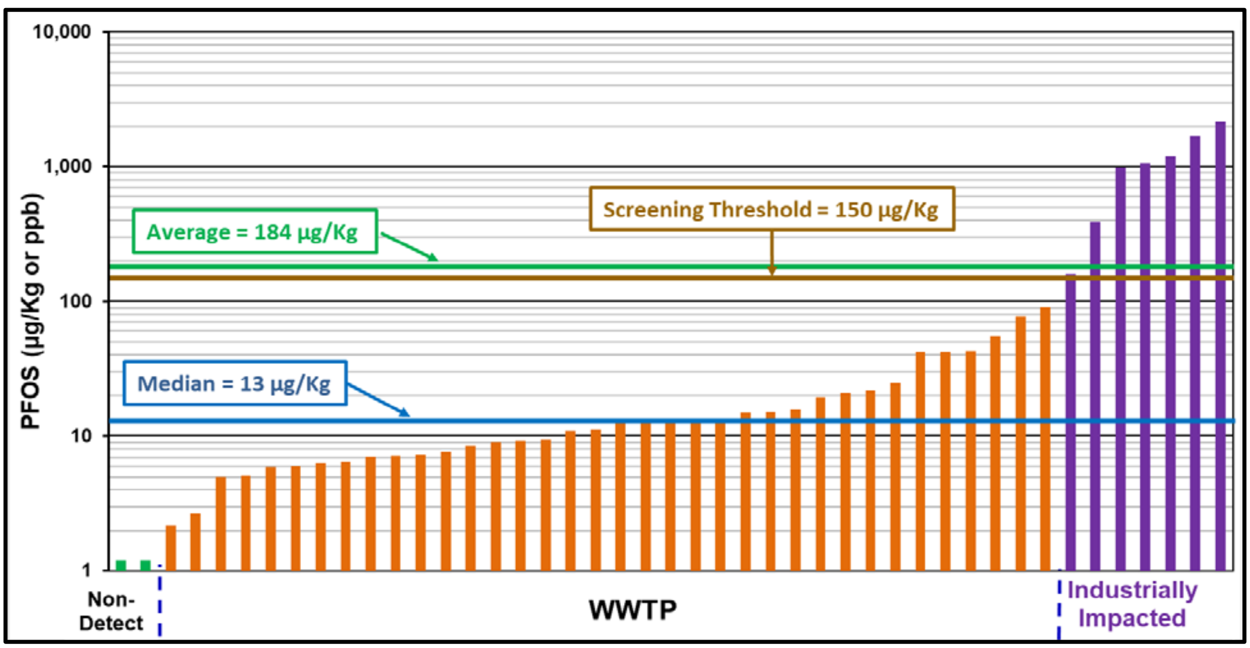


**Figure 34. Final Treated Solids (Sludge and Biosolids) Excluding Industrially Impacted PFOS Concentrations for 42 WWTPs**

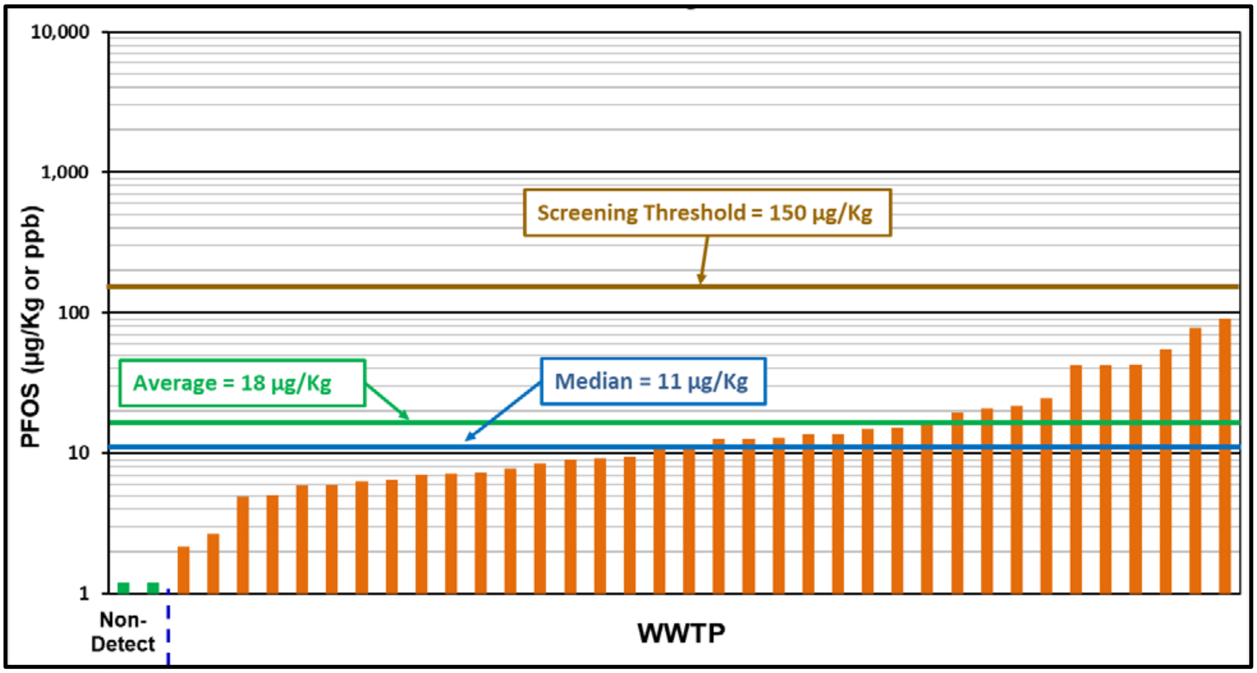
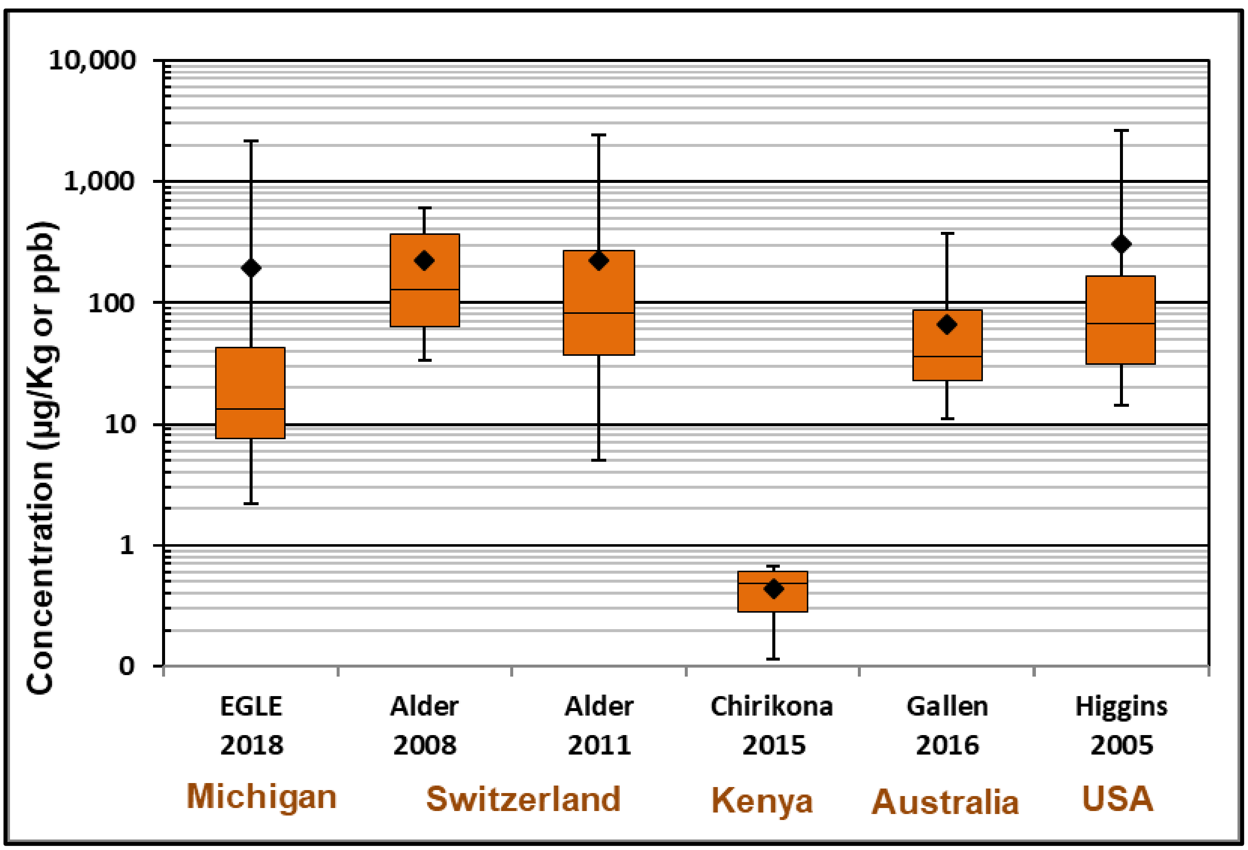



**Figure 35. Final Treated Solids (Biosolids/Sludge) PFOS Concentrations from Michigan and Biosolids Published Literature Values**



## 4.1 Solid and Aqueous Partition Evaluation

At select WWTPs, additional solids samples with very low solids percentage (i.e., ~5% or lower) from various treatment processes were collected to evaluate the PFAS partition into the aqueous and solid phase. A total of 20 sludge and biosolids samples were centrifuged, and the aqueous and solid portions were analyzed separately. The current partition evaluation was also used to guide the sampling and reporting of PFAS results (especially PFOA and PFOS) for solids with low solids percentage. Representative results for alkaline, anaerobically, and aerobically digested stabilized biosolids are provided in **Figures 36**, **37**, and **38**, respectively. The affinity of long-chain PFAS compounds to solids observed earlier and presented in **Figure 23** was also observed in the 20 samples. The short-chain compounds were more strongly associated with the aqueous phase, while the long-chain compounds were strongly associated with the solid phase, where the highest percentage of long-chain was detected. In some instances, the concentrations of the short-chain compounds were below the detection limit in the solid phase but still detected in the aqueous phase, which indicates that analyzing only the solid phase may show the absence of short-chain compounds, but they could still be present. The main reason for the difference of detections in the solid and aqueous phases is that the detection limits for solids are in low µg/Kg or ppb that is significantly higher than the aqueous detection limit phase is low ng/L or ppt. For the long-chain PFAS, especially PFOS, analyzing only the solid phase without the aqueous phase would report most of the mass present in the whole solids samples. As a result, the following recommendations were provided for Michigan's Biosolids and Sludge PFAS Sampling Guidance: "*All biosolids and sludge samples, including those with low solids content, should be analyzed as solids and reported on a dry weight basis. This dry weight basis reporting requirement should be specified on the chain-of-custody sent to the laboratory. Biosolids and sludge samples with a high aqueous content can be centrifuged, and only the solids portion of the sample can be analyzed as a solid. If density differences preclude centrifugation from separating representative solids, a representative well-mixed subsample may be mixed with a drying agent and treated like a soil by the laboratory.*"

**Figure 36. Aqueous and Solid PFAS Concentrations for Alkaline Stabilized Solids at WWTPs #4(a), #77(b), and #74(c)**

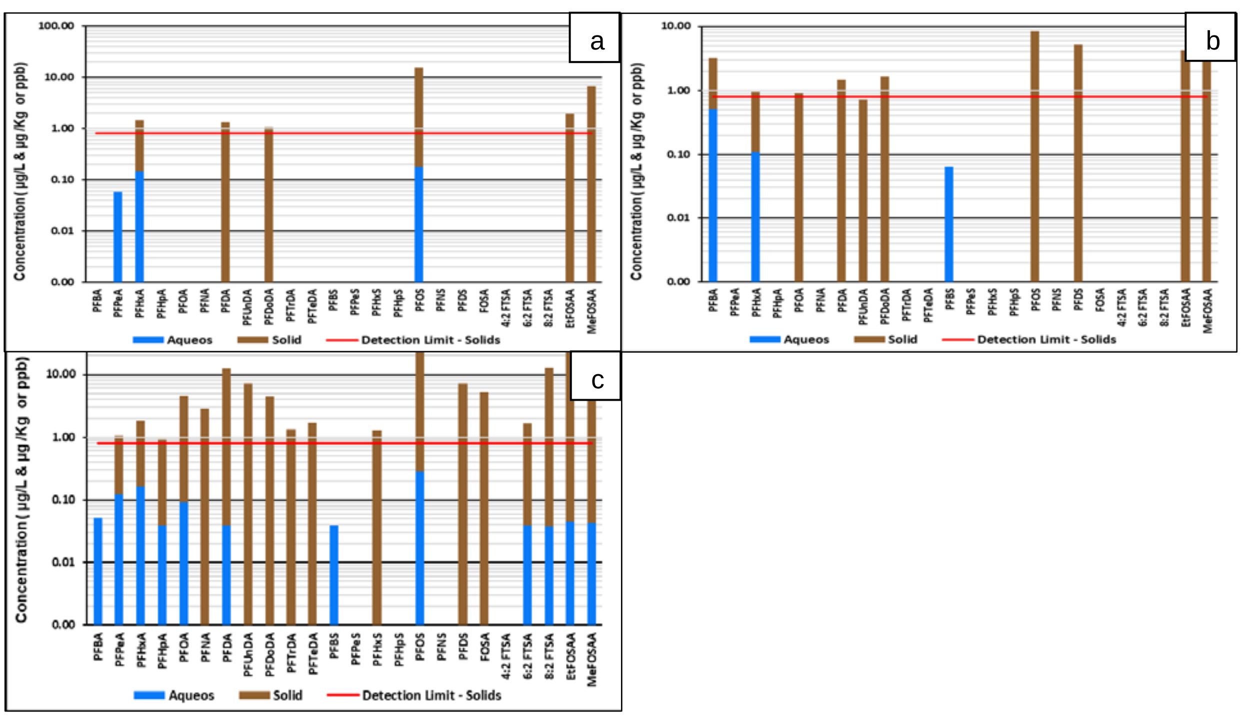


**Figure 37. Aqueous and Solid PFAS Concentrations for Anaerobic Digested Solids at WWTPs #81(a), #50(b), and #52(c)**

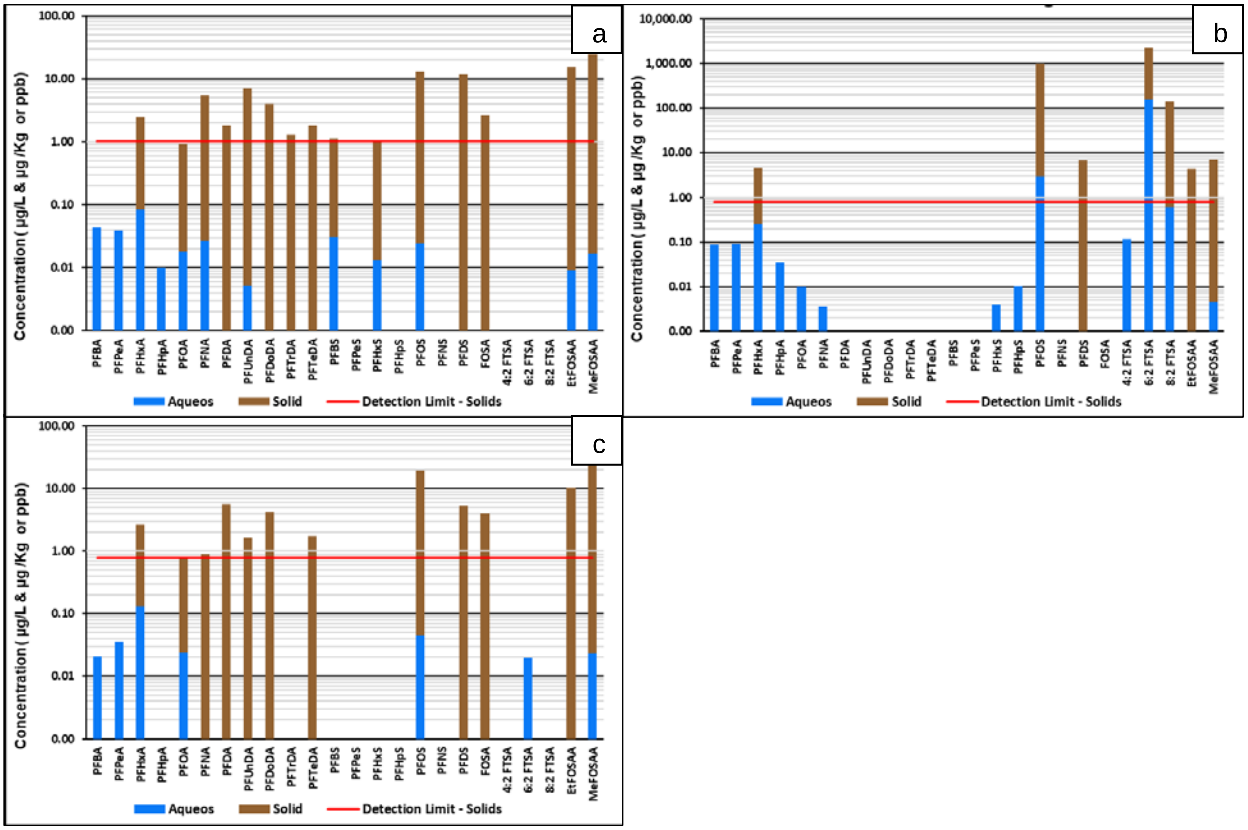
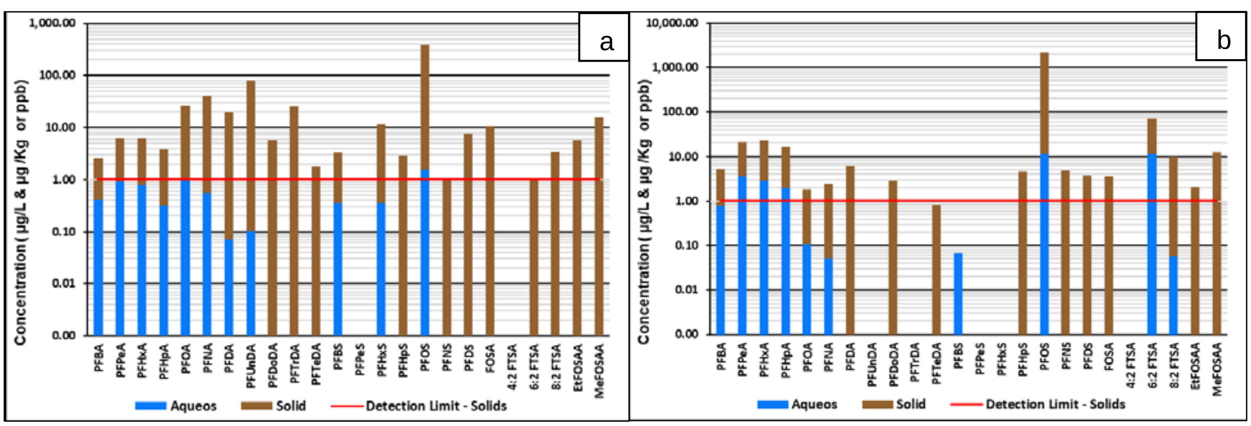



**Figure 38. Aqueous and Solid PFAS Concentrations for Aerobically Digested Solids at WWTPs #54(a) and #92(b)**



## 4.2 Treatment Process Evaluation

At select WWTPs, additional aqueous and solids samples were collected from various treatment processes to evaluate any potential trends between treatment processes and PFAS concentrations. The aqueous and solids samples between two different treatment process stages at five (5) WWTPs are provided in **Figures 39** through **43**. The primary purpose of collecting the samples was to evaluate potential trends in PFAS concentrations for both the aqueous and solid process treatment flows. The aqueous results for the aerobic and alkaline digestion solids samples were the aqueous phase of solids samples with a low solids percentage (i.e., <5%) discussed in **Section 4.1**. A trend was observed of increasing PFAS concentrations for most of the PFAS in all the WWTPs, further down the treatment process for both the aqueous and solids treatment process flows. An increase in PFOA and PFOS concentrations in the effluent than the influent was observed in many WWTPs. While the increase in the concentrations could at least partially result from expected fluctuations in concentrations over time, the fact that higher concentrations in the effluent than the influent was observed for multiple compounds at various WWTPs may indicate that regular fluctuations do not fully explain the increase in concentrations further down the treatment process. The increase further down the treatment process for both the aqueous and solid phases was observed between the primary and secondary treatment processes (**Figure 39**), secondary treatment vs. aerobic digestion (**Figures 40** and **43**), primary and secondary treatment vs. alkaline digestion (**Figures 41** and **42**).

The higher concentrations further down the treatment process could be attributed to WWTP processes and recirculation of treatment streams (i.e., Returned Activated Sludge (RAS), filtrate or centrate) or possible degradation of other PFAS that are known to partially degrade to PFCAs and PFSAs (i.e., PFOA and PFOS), referred to as precursors (Schultz, 2006; Houtz, 2018). The same trend of increasing PFAS concentrations further down the treatment process for both aqueous and solid treatment process flows was also reported for a study of 19 WWTPs from Australia (Coggan, 2019).

**Figure 39. Aqueous(a) and Solid(b) PFAS Concentrations for Primary and Secondary Treatment Processes at GLWA WRRF (WWTP #38)**

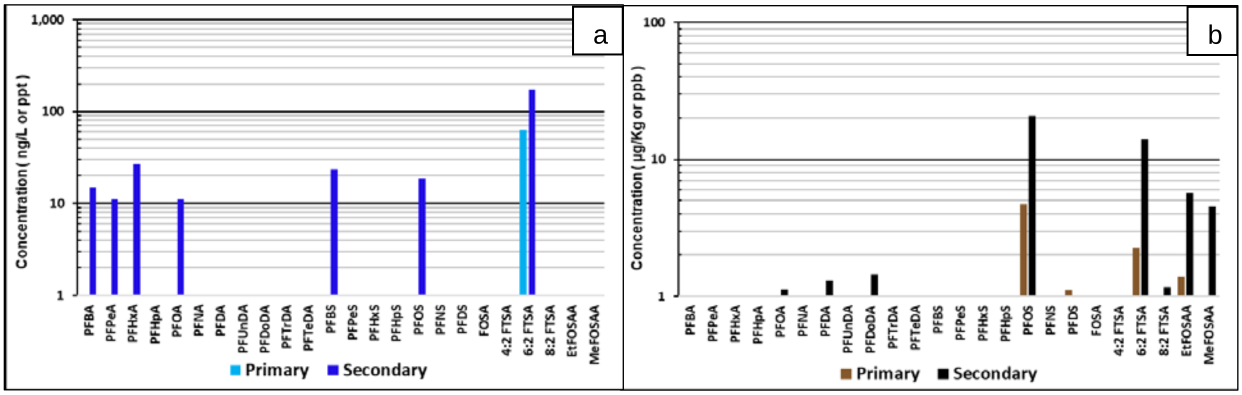



**Figure 40. Aqueous(a) and Solid(b) PFAS Concentrations for Secondary and Aerobic Digestion Treatment Processes at KI Sawyer WWTP-Marquette Co. (WWTP #54)**

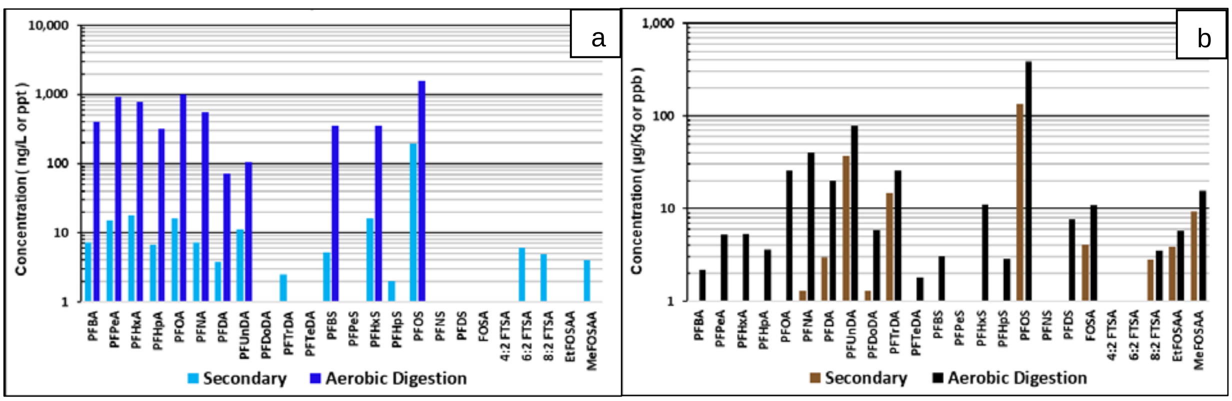


**Figure 41. Aqueous(a) and Solid(b) PFAS Concentrations for Primary & Secondary and Alkaline Digestion Treatment Processes at Port Huron WWTP (WWTP #74)**

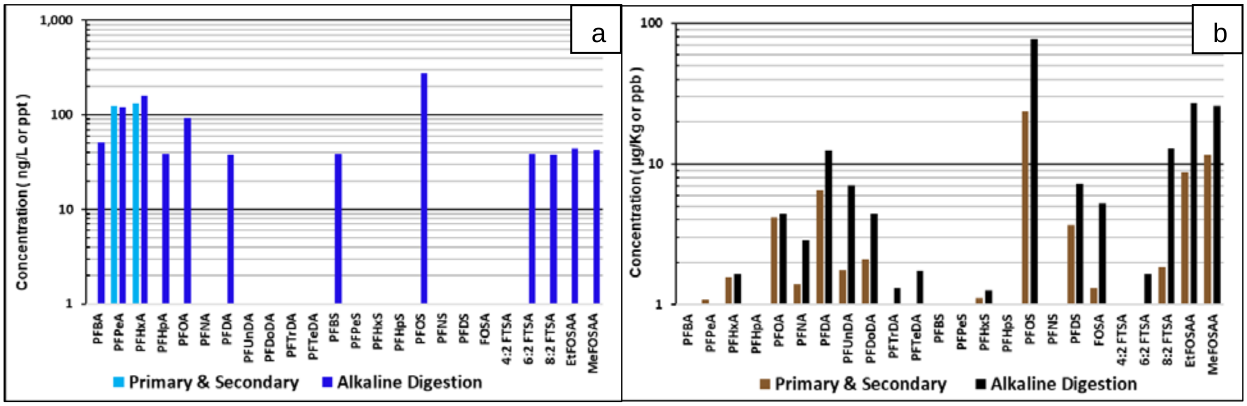



**Figure 42. Aqueous(a) and Solid(b) PFAS Concentrations for Primary & Secondary and Alkaline Digestion Treatment Processes at S. Huron Valley UA WWTP (WWTP #77)**

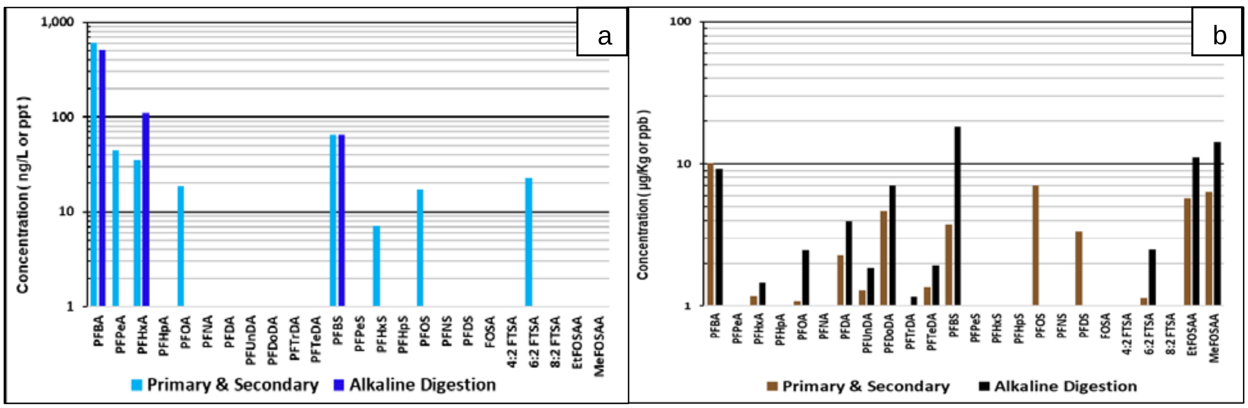
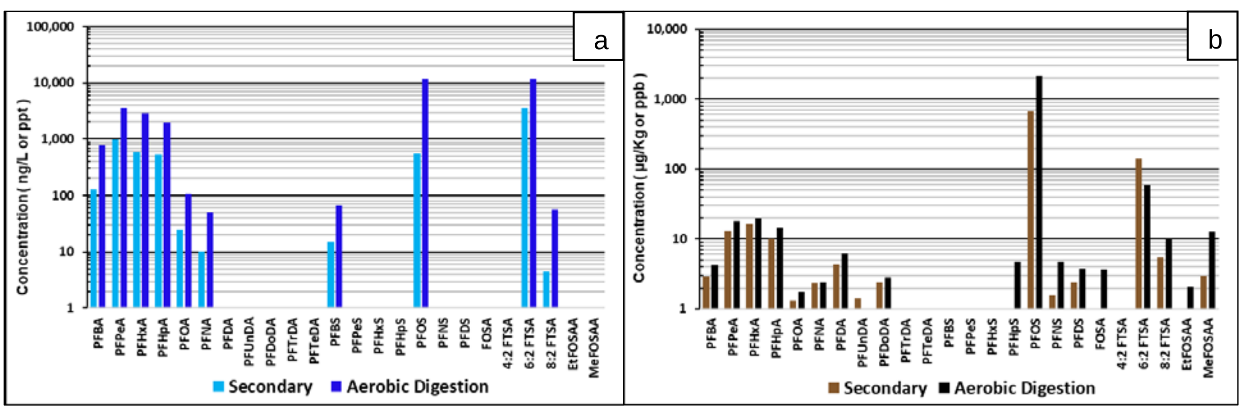



**Figure 43. Aqueous(a) and Solid(b) PFAS Concentrations for Secondary and Aerobic Digestion Treatment Processes at Wixom WWTP (WWTP #92)**



## 4.3 Evaluation of PFAS Fate Within WWTPs

Influent, effluent and final treated solids were collected at all 42 WWTPs; however, at select WWTPs, additional aqueous and solid grab samples from various treatment processes were collected further to evaluate the fate of PFAS within the WWTPs. Since the samples were collected as grabs, small differences in the concentrations could be due to typical fluctuations in the PFAS concentrations. **Section 4.1** and **4.2** provided a discussion about some of these additional samples. To better understand the fate of PFAS within WWTPs, a process flow diagram (PFD) for eight (8) WWTPs is provided in **Figures 44** through **51,** along with the results of all aqueous and solid samples collected from each WWTP. The focus of the evaluation was on PFOA and PFOS, as well as total PFAS concentrations. For a limited number of solids samples with a low solid percentage (i.e., < 5%), the aqueous and solid portions were analyzed separately with some of the results discussed in **Section 4.1**. The flows of various waste streams were not available; thus, a mass balance could not be performed. The aqueous concentrations are reported as ng/L or parts per trillion (ppt), and solids concentration are reported as µg/Kg or parts per billion (ppb), with 1,000 ppt being equal to one (1) ppb.

A total of six (6) aqueous samples and two (2) solids samples were collected from Bay City WWTP (WWTP #7). The aqueous and solid portions were analyzed separately for the influent on the screw press solids sample. The total PFAS, PFOA, and PFOS concentrations were very similar in all the aqueous samples for the influent, primary treatment, trickling filters, secondary clarifiers, and spent granular activated carbon (GAC) filter effluents and ranged between 69 to 76, 5 to 6, and 16 to 18 ng/L, respectively. The GAC was 16 years old and installed to remove PCBs. It has been exhausted and was not expected to remove PFAS. Results indicated that no significant removal of PFAS, including PFOA and PFOS, occurred within the aqueous treatment process flow. The total PFAS, PFOA, and PFOS concentrations in the filtrate from the screw press had 60, 4, and 6 ng/L, respectively. These concentrations were within the same range as the rest of the aqueous samples and the aqueous portion of the solid's influent to the screw press except for PFOS, which was 44 ng/L in the aqueous portion of the solids for the screw press. There were not enough samples to understand if these differences can be attributed to PFAS fluctuations in the concentrations or other factors. The concentrations in both of the solid's samples before and after screw press were very similar for total PFAS at 16 and 19 µg/Kg. PFOA was non-detect in both samples, and PFOS was 7 and 9 µg/Kg. There was no PFAS removal observed within the aqueous treatment process flow. The PFOS concentration of 9 µg/Kg in the final treated solids was well below EGLE's industrially-impacted 150 µg/Kg threshold. The effluent PFOS concentration of 16 ng/L was above the PFOS WQS of 12 ng/L, with a PFOS concentration of 22 ng/L collected in June 2019.

Three (3) aqueous samples and three (3) solids samples were collected from Downriver WWTP (WWTP #27). The total PFAS and PFOA concentrations were very similar in the influent and effluent at 84 and 7 ng/L and 88 and 13 ng/L, respectively. The PFOS concentration of 8 ng/L in the effluent was lower than that of 22 ng/L in the influent. Other than possible fluctuations in the PFOS concentrations in the WWTP, the decrease in the effluent is at least partially because PFOS has a higher affinity to the solids accumulated during primary and secondary treatment. The PFAS concentrations in the centrate from the centrifuge were within the same range as in the influent and effluent. The total PFAS, PFOA, and PFOS concentrations increased in the solids further down the treatment process flow with higher concentrations in the secondary treatment sludge of 72, 2, and 41 µg/Kg compared to the primary treatment sludge of 46, non-detect (<0.903), and 28 µg/Kg, respectively. The PFOS concentrations in both sludge samples were higher than PFOA since PFOS has a higher affinity to solids. The final treated solids, a combination of both primary and secondary treatment sludge, as dewatered, had the same PFAS range with total PFAS, PFOA, and PFOS concentrations of 82, 4, and 43 µg/Kg, respectively. The PFOS concentration of 43 µg/Kg in the final treated solids was well below

EGLE's industrially-impacted 150 µg/Kg threshold. The effluent PFOS concentration of 8 ng/L was below the PFOS WQS of 12 ng/L, with a concentration of 21 ng/L collected in January 2020.

A total of 10 aqueous samples and six (6) solids samples were collected from GLWA WRRF (WWTP #38). A total of two (2) aqueous samples were analyzed for the aqueous phase of solids samples with low solid content for the primary and secondary treatment sludges. Solids samples also included the ash from an incinerator that operates at 1,300 $^{0}$F and generates pellets from the sludge. The aqueous PFAS concentrations in the effluent were within the same range but slightly higher than those in the influent. The typical fluctuations in the PFAS concentrations and the recirculating waste streams, such as return activated sludge, would explain the slightly higher PFAS concentrations in the effluent. Like in other WWTPs, high concentrations were observed in the secondary treatment sludge in both the solids and aqueous samples compared to those in the primary treatment sludge. The concentration after the blending of both the primary and secondary sludge was within the ranges expected from mixing both sludge streams. The PFOS concentrations in the ash were non-detect (<0.870 µg/Kg), with 7 µg/Kg in the cake from the belt filter press, and pellets were 9 µg/Kg. These concentrations were well below EGLE's industrially-impacted threshold of 150 µg/Kg. The effluent PFOS concentration of 9 ng/L was below the PFOS WQS of 12 ng/L, with a concentration of 28 ng/L collected in January 2020.

Three (3) aqueous samples and three (3) solids samples were collected from Grand Rapids WRRF (WWTP #40). The Total PFAS, PFOA, and PFOS concentrations of 403, 11, and 36 ng/L were higher in the effluent than the influent concentrations of 72, 5, and 13 ng/L, respectively. The only other aqueous sample collected at WWTP #40 was the centrate from the centrifuge from the dewaters primary and secondary treatment sludges. The Total PFAS concentration in the centrate effluent was higher than the WWTP effluent with a concentration of 619 ng/L compared to 403 ng/L. The concentrations for PFOA and PFOS in the centrate effluent of 8 and 27 ng/L were above the influent but slightly lower than that of the WWTP effluent concentrations of 11 and 36 ng/L, respectively. There were not enough samples collected from the WWTP to fully understand the fate of PFAS within the WWTP. However, the large difference between the WWTP effluent and influent concentrations indicates that potential fluctuations in the influent to the WWTP could not fully explain the difference in concentrations. Like other WWTPs in this study, there was an accumulation of PFAS in the primary and secondary treatment sludge with Total PFAS, PFOA, and PFOS concentrations of 162, 8, and 26 and 155, 4, 44 µg/Kg, respectively. The primary and secondary treatment sludge concentration was within the same range, with PFOS being slightly higher in the secondary treatment sludge. The final dewatered sludge was composed of both primary and secondary treated sludges and had concentrations of Total PFAS, PFOA, and PFOS of 74,1, and 22 µg/Kg. This indicates that there may be significant fluctuations in the PFAS concentrations. However, the recirculation of centrate and return activated sludge (RAS) may also contribute to the higher concentrations in the effluent than the influent. The PFOS concentration of 22 µg/Kg in the final treated solids was well below EGLE's industrially-impacted 150 µg/Kg threshold. The effluent PFOS concentration of 36 ng/L was above the PFOS WQS of 12 ng/L, with a concentration of 16 ng/L collected in February 2020.

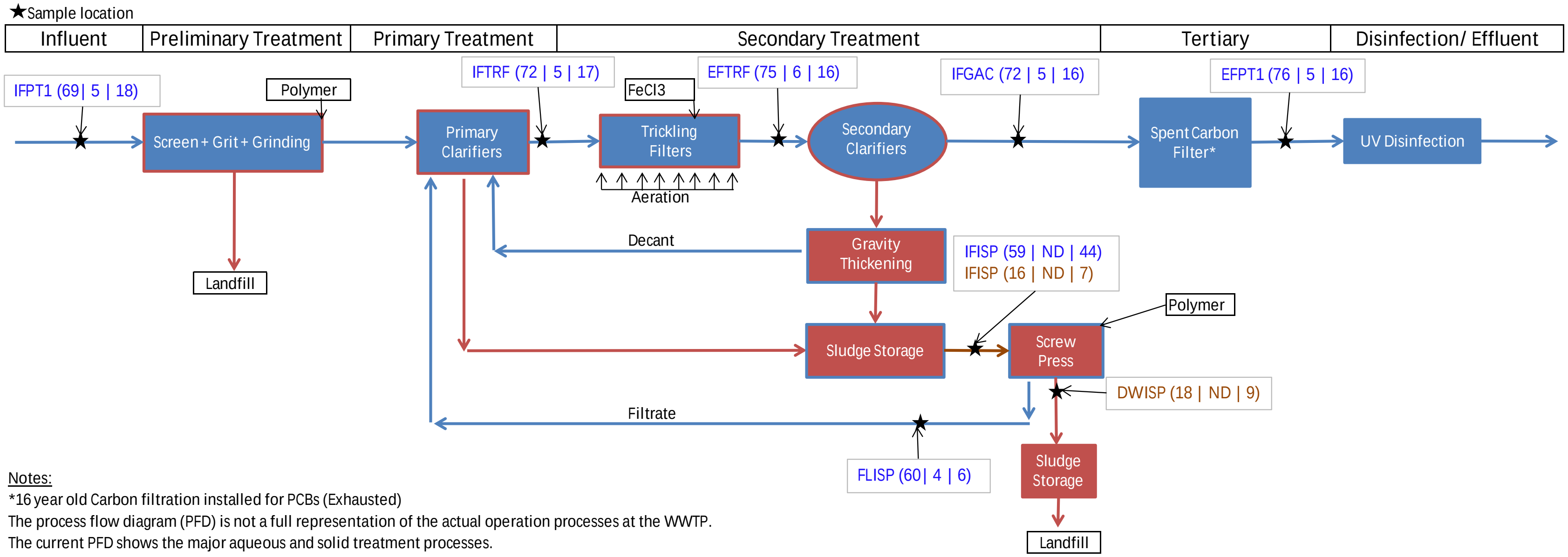
A total of two (2) aqueous samples and three (3) solids samples were collected from Kalamazoo WWTP (WWTP #53). The Total PFAS and PFOA concentrations in the influent of 83 and 8 ng/L were similar to the effluent concentrations of 86 and 10 ng/L, respectively. The concentration of PFOS in the effluent was 6 ng/L compared to the influent concentration of 26 ng/L. The reduction of PFOS from the influent to the effluent could be explained by the affinity of PFOS to the solids and the accumulation of PFOS in the sludge. Like the other WWTPs in this study, increased PFAS concentrations were detected in the solids. The PFOS increased further along in the treatment process with higher concentrations in the secondary treatment sludge than those in the primary treatment sludge. The PFAS concentrations in the dewatered cake, which included primary and secondary treatment sludges, were within the concentrations expected from the mixing of both sludge treatment processes. The PFOS concentration in all three sludge solids was well below EGLE's industrially-impacted 150 µg/Kg threshold. The effluent PFOS concentration before the sand filters and disinfection of 6 ng/L was below the PFOS WQS of 12 ng/L, with a concentration of 4.84 ng/L collected on October 2020.

Four (4) aqueous samples and four (4) solids samples were collected from Port Huron WWTP (WWTP #74). A total of two (2) aqueous samples were analyzed as the aqueous portion of solid samples with low solid content for the gravity thickened combined primary and secondary treatment sludges and from the final biosolids storage tank. The aqueous PFOA and PFOS concentrations in the effluent of 45 and 13 ng/L were within the same range but lower than those in the influent of 65 and 20 ng/L, respectively. There was an accumulation of PFOA and PFOS in the final alkaline stabilized biosolids from the final storage tank with 92 and 277 ng/L concentrations, respectively. Decant from the final biosolids storage tank is recirculated within the WWTP, but the flow is much lower than the influent flow to the WWTP. However, if the decant discharge is not continuous and done as batches, there could be an effect on the PFAS concentrations in aqueous treatment train for short periods. The difference between the gravity thickened sludges and that from the final rotary drum after polymer and line addition for Total PFAS, PFOA, and PFOS of 72, 4, and 24 µg/Kg compared to 53, 3, and 21 µg/Kg can be most likely attributed to typical fluctuations in the PFAS concentrations. However, the concentrations from the final biosolids storage tank that was 2 months old were higher for Total PFAS of 196 µg/Kg and PFOS at 78 µg/Kg with PFOA being similar at 4 µg/Kg. These differences may not be the result of typical fluctuations in the PFAS concentrations. Still, the degradation of precursors and residence time allows PFAS with higher affinity for solids, such as PFOS, to accumulate further to the solids. The PFOS concentrations in the final biosolids of 78 µg/Kg were below the industrially-impacted 150 µg/Kg threshold. The effluent PFOS concentration of 13 ng/L was just above the PFOS WQS of 12 ng/L, with a concentration of 21 ng/L collected in July 2020.

A total of five (5) aqueous samples and three (3) solids samples were collected from S. Huron Valley UA WWTP (WWTP #77). A total of two (2) aqueous samples were analyzed as the aqueous portion of solid samples with low solid content for the gravity thickened combined primary and secondary treatment sludges and from the recent alkaline biosolids. The aqueous PFOA and PFOS concentrations in the effluent of 7 and 5 ng/L were within the same range but higher than those in the influent of 4 and non-detect (i.e., < 2) ng/L, respectively. The Total PFAS concentration in the effluent of 102 ng/L was significantly higher than those in the influent of 18 ng/L. The concentrations were also higher in the aqueous phases of the solids, and cell decants from the sludge cells with a Total PFAS range between 685 and 818 ng/L, PFOA at 19 ng/L, and PFOS at 17 ng/L. Due to matrix interference, the detection limit for PFOA and PFOS in the alkaline stabilized biosolids was 70 ng/L, and both compounds were non-detect. There was an accumulation of PFAS in the solids similar to the rest of WWTP with Total PFAS, PFOA, and PFOS concentrations of 50, 1, and 7 µg/Kg in the gravity thickened combined primary and secondary sludge as well as in the final recently stabilized biosolids of 32, 1, and 8 µg/Kg, respectively. Some differences were observed in the recently stabilized biosolids and the 24-hour old stabilized biosolids, which is most likely attributed to the typical fluctuations in the PFAS concentrations. Still, more data is needed to understand the variation in PFAS concentrations further. The increase in PFAS in the solid and aqueous concentrations at the WWTP could not be solely attributed to typical fluctuations in PFAS concentrations and is most likely due to the degradation of precursors and recirculation of various waste streams. The PFOS concentrations in the final biosolids of 8 µg/Kg were below the industrially-impacted 150 µg/Kg threshold. The effluent PFOS concentration of 5 ng/L was below the PFOS WQS of 12 ng/L, with a concentration of 7.4 ng/L collected in October 2019.

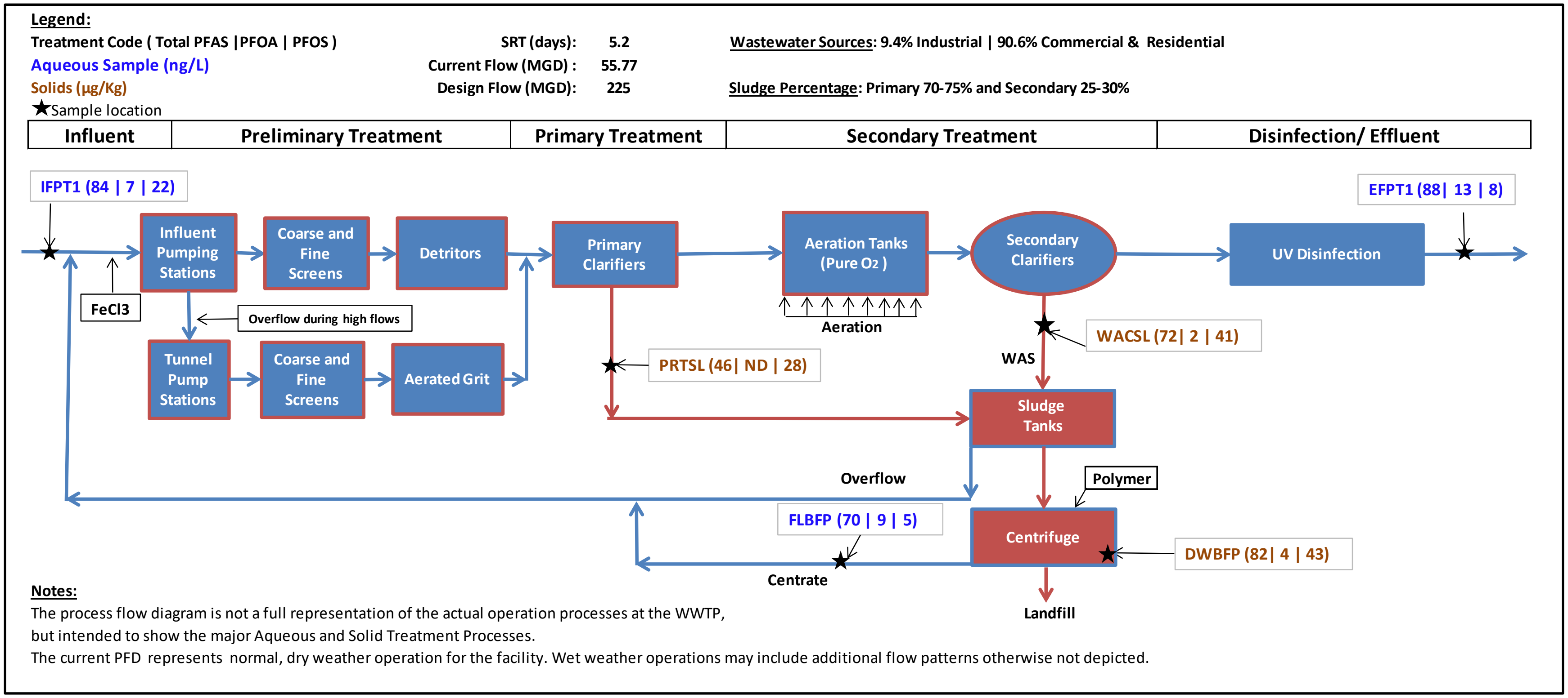
A total of seven (7) aqueous samples and three (3) solids samples were collected from Wixom WWTP (WWTP #92). A total of three (3) aqueous samples were analyzed as the aqueous phases of solids samples with low solid content for the waste activated sludge right from the effluent and biological storage and a sludge tank that was six (6) months old. The six (6) months-old biosolids storage tanks were aerobically digested biosolids. The Total PFAS, PFOA, and PFOS concentrations from the secondary treatment clarifier were within the same range as the final UV disinfected effluent with concentrations of 4,712, 9, and 218 ng/L compared to 4,950, 10, and 269 ng/L, respectively. However, these aqueous samples further down the treatment process were significantly higher than those in the influent, especially for Total PFAS and PFOS, with influent concentrations for Total PFAS, PFOA, and PFOS of 2,329, 3, and 128 ng/L, respectively. The aqueous concentrations in the waste activated sludge, influent to the screw press, and the filtrate from the screw press were significantly higher than those of the influent. The Total PFAS, PFOA, and PFOS concentrations in the filtrate were 13,754, 29, and 8,080 ng/L, respectively. A high accumulation of Total PFAS, PFOA, and PFOS in the solids was observed with ranges between 877 to 1,510 µg/Kg, 1 to 5 µg/Kg, and 666 to 1,200 µg/Kg, respectively. As a result, the most likely reason for these increases in the aqueous concentrations could be partially attributed to the recirculation of waste streams in the WWTP. The increase was even higher in the six (6) months old aerobically stabilized biosolids collected from the storage tank with Total PFAS, PFOA, and PFOS concentrations of 32,663, 108, and 11,700 ng/L in the aqueous portion and 2,324, 2, and 2,150 µg/Kg in the solids phase. The PFOA concentration in the solids was similar between the recent sludge and aerobically digested biosolids. There is not enough information to fully understand the higher concentrations in the old aerobically stabilized biosolids. Still, it is most likely due to multiple reasons such as recent source reduction efforts, degradation of precursors, and longer residence time that could have facilitated more accumulation in the solids for long-chain PFAS such as PFOS. The PFOS concentrations in the recently treated solids and old biosolids were well above the 150 µg/Kg industrially-impacted threshold, with PFOS concentrations of 1,200 and 2,150 µg/Kg, respectively. The effluent PFOS concentration of 269 ng/L was above the PFOS WQS of 12 ng/L, with a concentration of 27 ng/L collected in November 2020. The significant decrease in the PFOS concentrations in the effluent results from source reduction efforts taken at the WWTP and removing the digestion treatment process that most likely reduced the PFAS concentrations in recirculated waste streams further down the treatment process.

## Figure 44. PFAS Results and Process Flow Diagram for Bay City WWTP

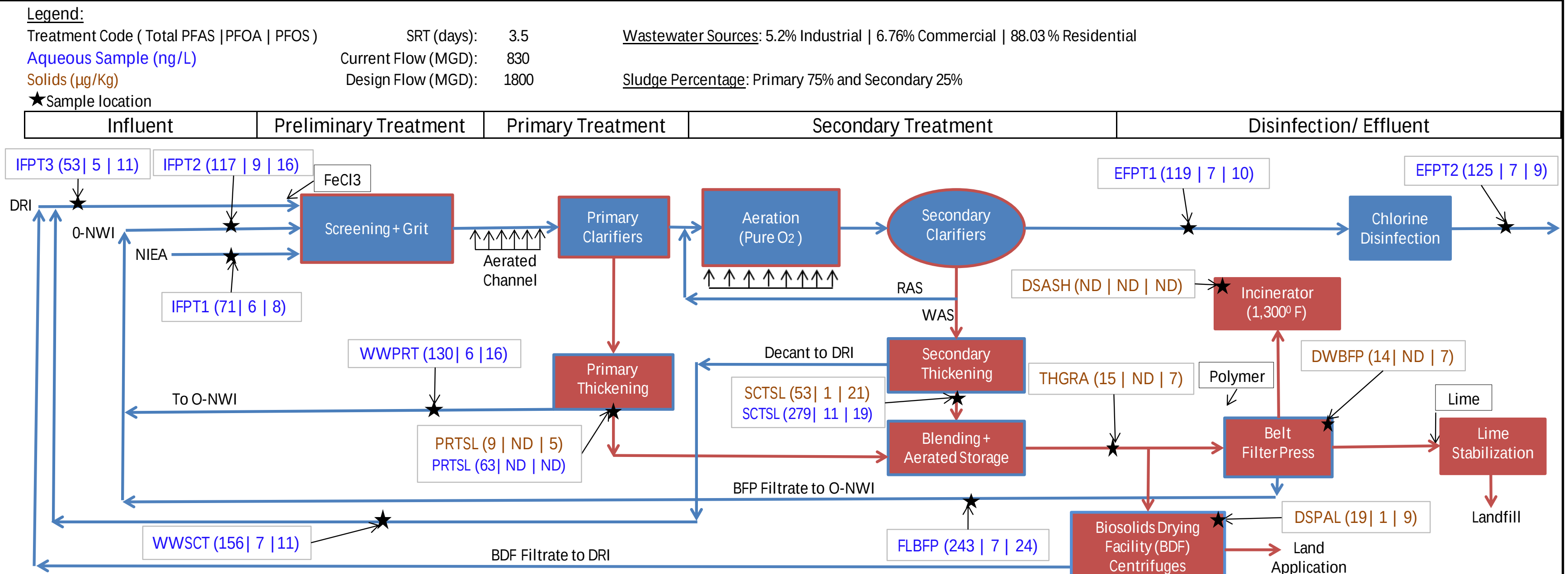



Notes:
*16 year old Carbon filtration installed for PCBs (Exhausted)
The process flow diagram (PFD) is not a full representation of the actual operation processes at the WWTP.
The current PFD shows the major aqueous and solid treatment processes.
The current PFD represents normal, dry weather operation for the facility. Wet weather operations may include additional flow patterns otherwise not depicted.

## Figure 45. PFAS Results and Process Flow Diagram for Downriver WWTP

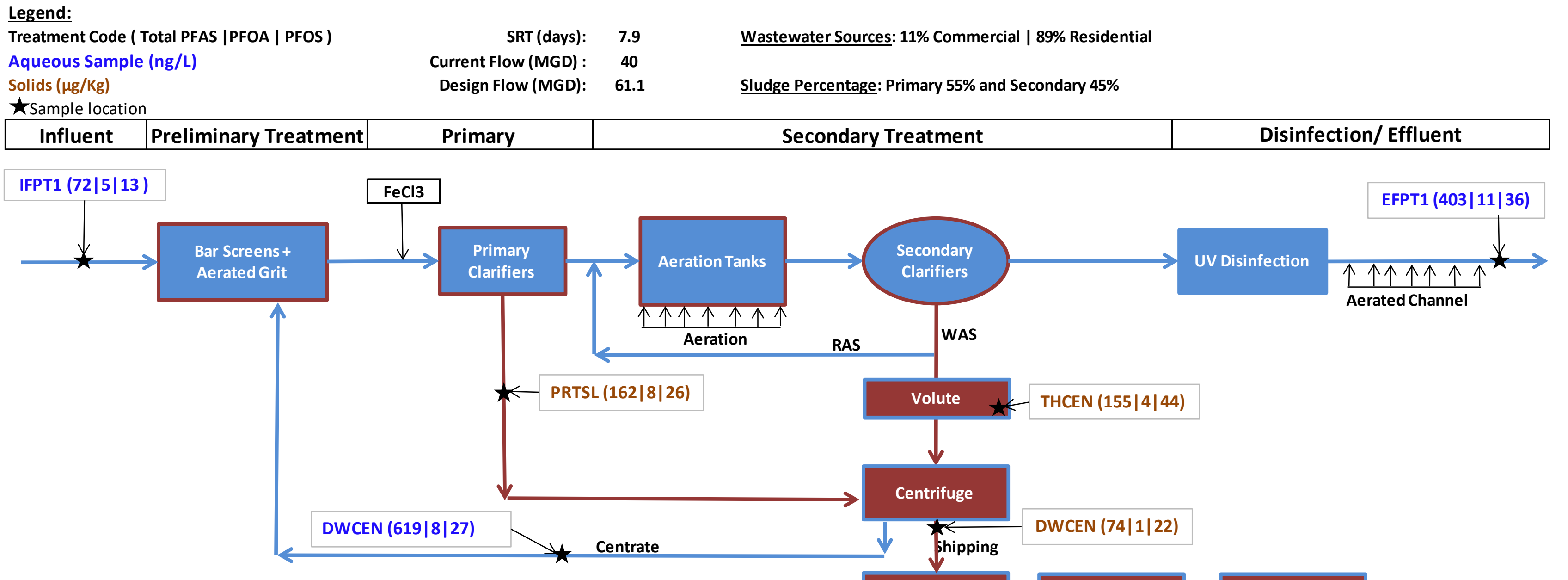


## Figure 46. PFAS Results and Process Flow Diagram for GLWA WRRF



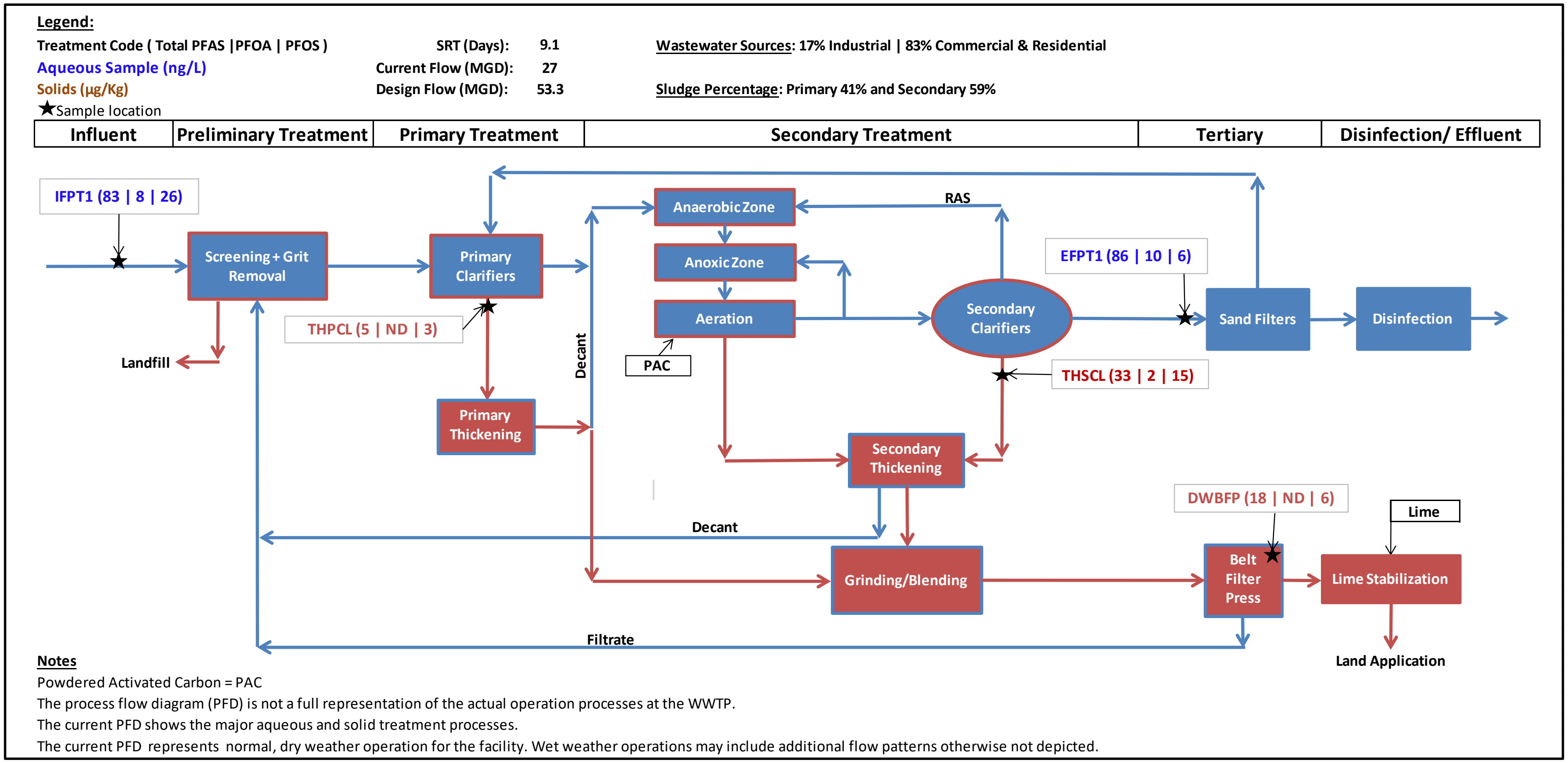

Notes:
Incinerator operating temperature 1,300⁰ (F)
The process flow diagram (PFD) is not a full representation of the actual operation processes at the WWTP.
The current PFD shows the major aqueous and solid treatment processes.
The current PFD represents normal, dry weather operation for the facility. Wet weather operations may include additional flow patterns otherwise not depicted.

## Figure 47. PFAS Results and Process Flow Diagram for Grand Rapids WRRF

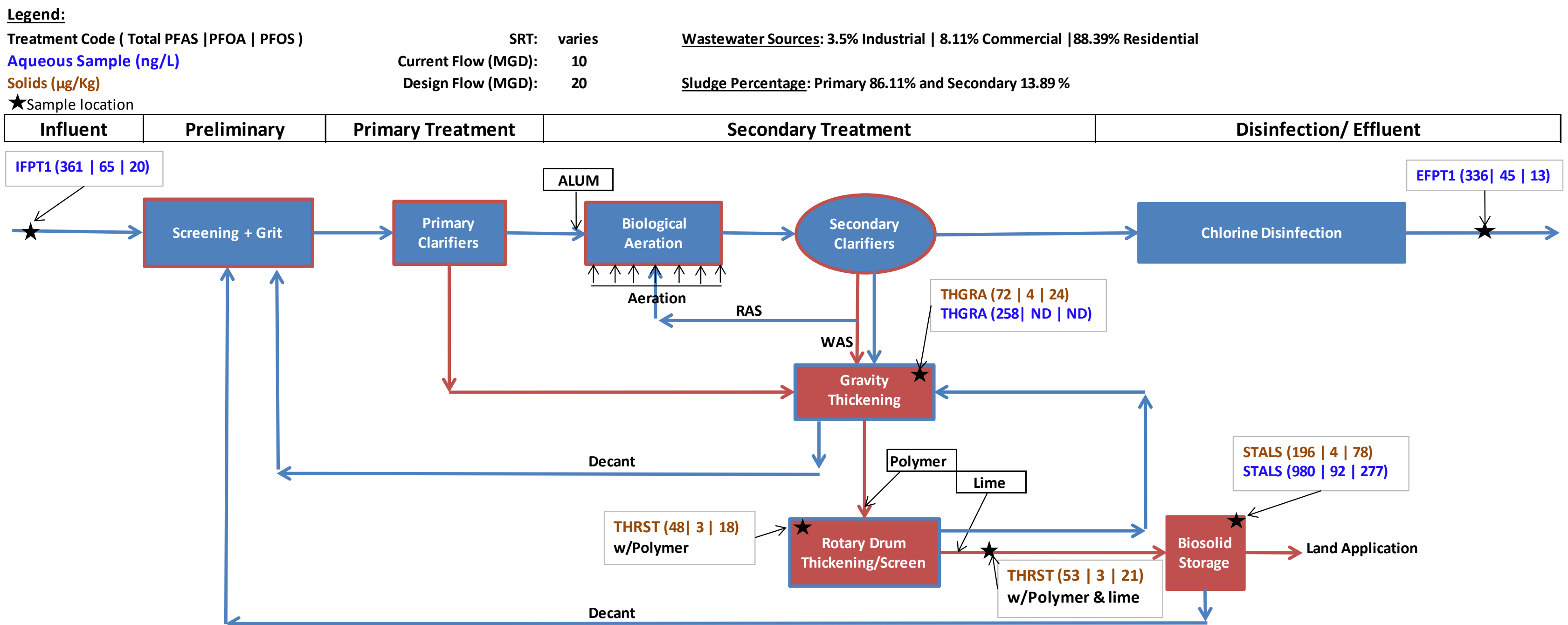



**Notes:**
The process flow diagram (PFD) is not a full representation of the actual operation processes at the WWTP.
The current PFD shows the major aqueous and solid treatment processes.
The current PFD represents normal, dry weather operation for the facility. Wet weather operations may include additional flow patterns otherwise not depicted.

## Figure 48. PFAS Results and Process Flow Diagram for Kalamazoo WWTP



## Figure 49. PFAS Results and Process Flow Diagram for Port Huron WWTP




**Notes**

Biosolids estimated storage of two months

The process flow diagram (PFD) is not a full representation of the actual operation processes at the WWTP.

The current PFD shows the major aqueous and solid treatment processes.

The current PFD represents normal, dry weather operation for the facility. Wet weather operations may include additional flow patterns otherwise not depicted.

## Figure 50. PFAS Results and Process Flow Diagram for S Huron Valley UA WWTP

**Legend:**

Treatment Code ( Total PFAS |PFOA| PFOS )

Aqueous Sample (ng/L)

Solids (µg/Kg)

★Sample location

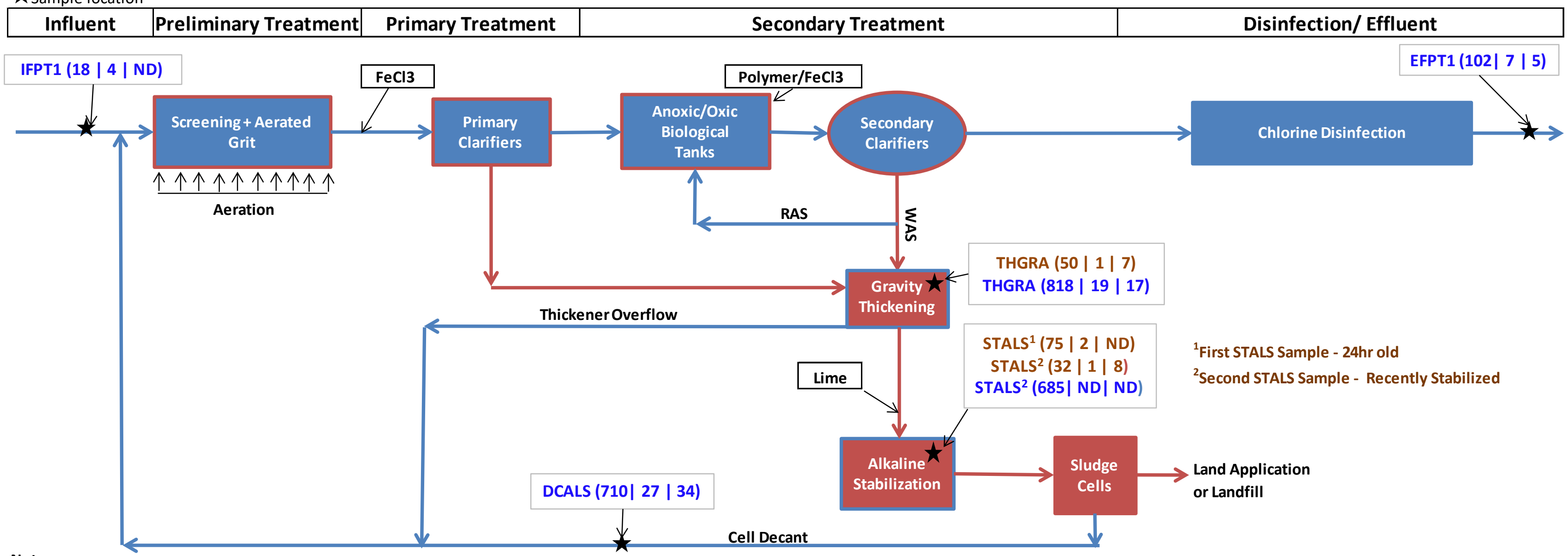
SRT: 11 days

Current Flow : 9.57

Design Flow: 24

Wastewater Sources: 9% Industrial | 14% Commercial | 77% Residential

Sludge Percentage: Primary 39% and Secondary 61 %




**Notes**

*EQ Basin indicated in 2011 NOT on field form

*Aerated grit chamber indicated in plant documentation

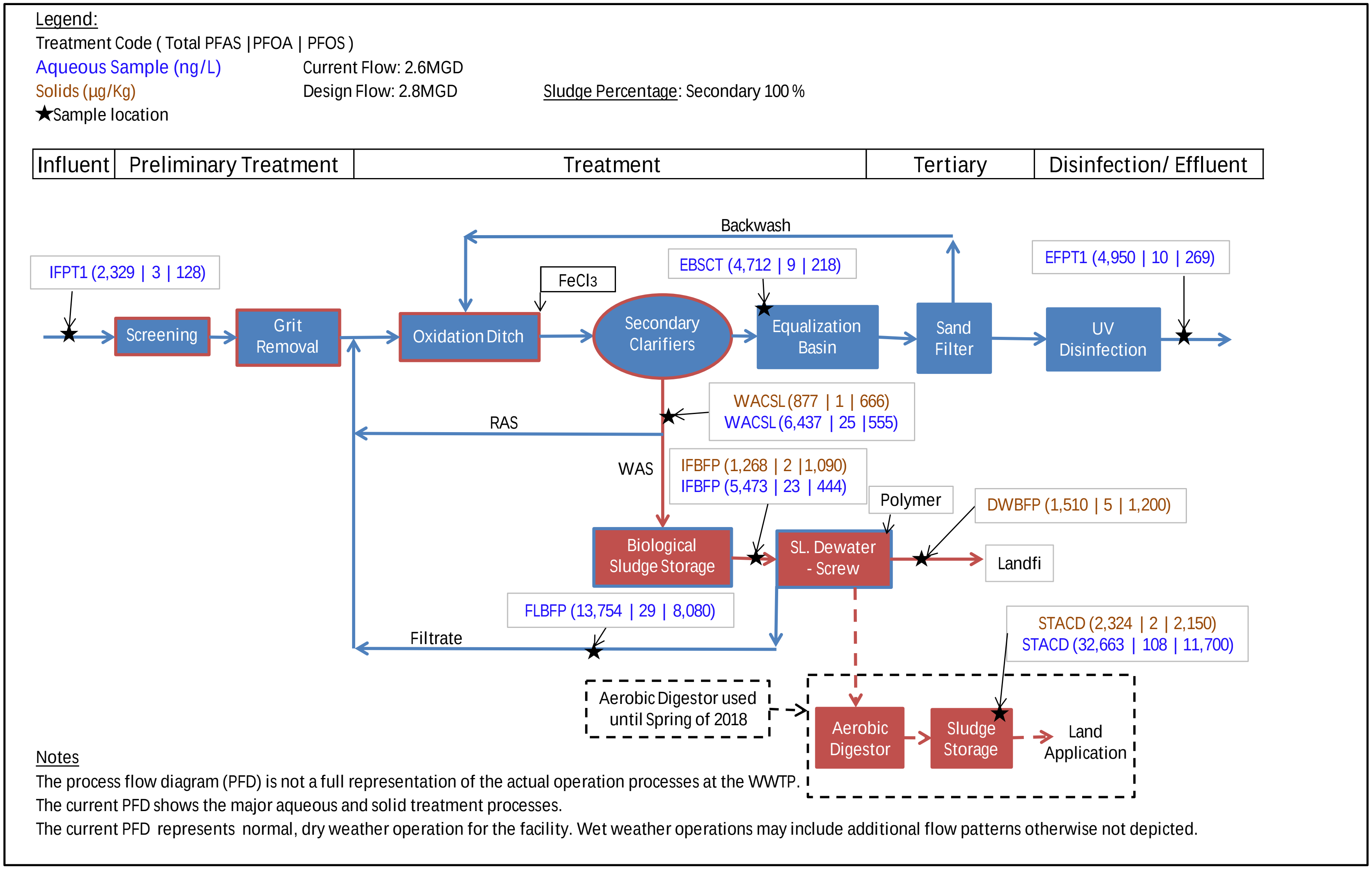
Landfill has not occurred since 2017

The process flow diagram (PFD) is not a full representation of the actual operation processes at the WWTP.

The current PFD shows the major aqueous and solid treatment processes.

The current PFD represents normal, dry weather operation for the facility. Wet weather operations may include additional flow patterns otherwise not depicted.

## Figure 51. PFAS Results and Process Flow Diagram for Wixom WWTP



# 5. Discussion and Conclusions

PFAS is a large class of chemicals composed of many families with vastly different physical and chemical properties, which were developed in the late 1930s and started to be used in commercial products in the late 1940s and early 1950s. Widespread use of PFAS in various manufacturing and industrial facilities in conjunction with extreme resistance to degradation has resulted in the presence of PFAS in the environment and at WWTPs. While WWTPs are not the source of PFAS, they are a central point of collection. Effluents discharged from WWTPs and biosolids applied to the agricultural land for beneficial reuse have been identified as potential PFAS release pathways into the environment. PFAS have been identified in WWTPs since the early 2000s in Alabama, Tennessee, Georgia, and Florida. PFAS were also later identified in WWTPs from Minnesota, Iowa, California, Illinois, New York, Kentucky, Georgia, and Michigan.

Analysis of archived biosolids samples collected in 2001, which represented 94 WWTPs from 32 different US states and the District of Columbia, were analyzed for a total of 13 PFAS and identified that PFOS and PFOA had the highest and second-highest average concentrations of 402 and 34 µg/kg, respectively. Sources of PFAS in WWTPs from Switzerland were identified from industries and products such as textile, carpet, paper coatings, aqueous film-forming foams (AFFFs), electroplating, and semiconductor industries. A strong correlation of PFAS with WWTPs that received industrial discharges was also observed in Germany, Thailand, and other countries.

Because PFAS was correlated with industrial discharges in research publications, EGLE focused on the WWTPs that are part of the Industrial Pretreatment Program (IPP) (i.e., IPP WWTPs). The WWTPs required to implement an IPP were expected to be more heavily impacted by PFAS. Due to limited studies and data on PFAS, only PFOA and PFOS have Water Quality Standards (WQS), established in 2011 and 2014, respectively. EGLE's focus was to screen, monitor, and reduce PFOA and PFOS impacts to the WWTPs and ultimately reduce the concentrations in the effluent and final treated solids, including biosolids.

## 5.1 Conclusions from the Michigan IPP PFAS Initiative

EGLE is working closely with the WWTPs and industrial users to reduce the PFOS discharges to the WWTPs. In many cases, the reduction efforts for PFOS also reduce PFOA concentrations. While source reduction efforts have been conducted at multiple industrial facilities whose discharges affect multiple WWTPs, a detailed discussion is provided for the source reduction efforts at seven (7) WWTPs in **Section 3.5**. A PFOS reduction between 90 to 99 % in the effluent (**Table 7**) with a significant drop in PFOS concentrations in the final treated solids was achieved through source reduction efforts being implemented by only one industrial source for most of the WWTPs (**Figures 7** through **13**). The significant and rapid drop in PFOS concentrations at WWTPs following source reduction indicates that the source reduction approach is highly effective. Treating PFOS at WWTPs is likely to be difficult and costly because sanitary sewage is a complex waste stream, larger flows would have to be treated, and treatment technologies are not yet sufficiently developed. The current remedial technologies that have been used in limited cases for water treatment with a less complex matrix (e.g., drinking water or contaminated groundwater) are costly. However, a limited number of pilot tests are currently being conducted for PFAS removal from wastewater and final treated solids.

As part of source reduction efforts, WWTPs with IPPs implemented a sampling screening program to identify the sources of PFOA and PFOS to the WWTP, including targeted sampling of IU, SIU, and CIU facilities. A total of 431 individual CIUs representing 18 different 40 CFR categories were evaluated for the need for PFAS sampling, out of which 310 CIUs were sampled with a total of 1,293 samples collected. A total of 656 samples were collected from 256 individual IUs and SIUs representing seven (7) industry types. While the WQS of 420 ng/L for PFOA and 12 ng/L for PFOS are only applicable to discharges to surface waters of the state, the WQS was used by the IPP WWTPs as a screening tool for the industrial effluents to categorize industrial sources of PFOA and PFOS. A detailed discussion is provided in **Section 3.7**.

While there were multiple industrial dischargers identified to be significant sources of PFOS to IPP WWTPs in Michigan, a high number of facilities under Categories 413 – Electroplating and 433 – Metal Finishing that used fume suppressants in the past, which contained high PFOS concentrations, showed high detection frequency and PFOS concentrations in their discharges to the IPP WWTPs. Old fume suppressants that contained PFOS were most prevalent in chrome plating operations using hexavalent chromium. Facilities that never used the older generation of fume suppressants with high PFOS concentrations were found not to be discharging PFOS. Current fume suppressants contain high concentrations of other PFAS, primarily 6:2 Fluorotelomer Sulfonic Acid (6:2 FTSA), as the main ingredient. Another category that had several facilities sampled and showed a high detection frequency and PFOS concentrations in their discharges to the IPP WWTPs was Category 437 – Centralized Waste Treatment. Also, landfills were identified as PFAS sources to WWTPs. The actual PFOS impact to the WWTPs from the industrial discharge depended on the size of the WWTP and what percentage of the total flow was attributed to the industrial discharge.

## 5.2 Conclusions from the Statewide PFAS Assessment of 42 WWTPs

In the fall of 2018, EGLE launched a second statewide PFAS initiative with the assessment of 42 municipal WWTPs to better understand the occurrence of 24 PFAS by sampling the influent, effluent, and associated residuals (i.e., final treated solids such as sludge or biosolids). At select WWTPs, additional aqueous and solid samples from various treatment processes were collected to further evaluate the fate of PFAS within the WWTPs. The study included the 20 largest WWTPs in Michigan and an additional 22 WWTPs selected from three (3) main groups based on flows of 0.2 to 0.4 million gallons per day (MGD), 0.5 to 3 MGD, and 3 to 9 MGD with various treatment processes. A detailed discussion is provided in **Section 4**. A total of 134 aqueous and 71 solids samples were collected during this study.

PFAS was detected in all 134 aqueous samples and 69 out of 71 solids samples. The only two solids samples where PFAS were non-detect were ash samples from two (2) WWTPs that processes the final solids through a furnace. The high detection frequency of many PFAS in the WWTP samples indicates that PFAS are likely to be present in many industrial, commercial, or even residential discharges. The short-chain PFAS from various PFAS families were more frequently detected in the aqueous samples (e.g., influent and effluent). The long-chain PFAS were detected more frequently in the solids samples (e.g., sludge or biosolids), which indicates a higher affinity to the solids for long-chain compounds. A total of 36 out of 42 effluent PFOA concentrations were higher than the influent, indicating the possible transformation of precursors and, at least in part, the recirculation of various treatment streams (e.g., waste activated sludge, centrate, filtrate) during WWTP operations. A total of 19 out of 42 effluent PFOS concentrations were higher than the influent, with a total of 24 effluent concentrations being within +/- 5 ng/L of the influent concentration. PFOS is known to adsorb to solids more strongly than PFOA, and the detection frequency of PFOS was also higher than PFOA in the solids. Like PFOA, the increase in PFOS concentrations in the effluent or accumulation in the solids could be due to possible transformation of precursors or could be attributed to the recirculation of various treatment streams (e.g., waste activated sludge, centrate, filtrate) during WWTP operations. Also, some variability would be expected since grab samples were collected to minimize the potential for cross-contamination.

All the PFOA concentrations in both the influent and effluent samples were well below the lowest PFOA WQS for drinking water sources of 420 ng/L. However, 15 influent and 14 effluent samples had PFOS concentrations above the PFOS both the WQS as the drinking water source of 11 ng/L or non-drinking water source of 12 ng/L. As a result, PFOS was the main driver for regulatory compliance applied to the final effluent. PFOS was detected in 43 out of 45 final treated solids samples and had an average PFOS concentration of 184 µg/kg, while the median concentration was 13 µg/kg. A total of seven (7) final treated solids samples from six (6) WWTPs were above the 150 µg/kg threshold that EGLE has chosen for characterizing biosolids as “industrially impacted.” The threshold value of 150 µg/kg is not a risk-based number. When removing the seven (7) industrially impacted samples, the recalculated average biosolids PFOS concentration lowers to 18 from 184 µg/kg, and the median lowers to 11 from 13 µg/kg. The PFOS concentrations in the final treated solids (e.g., sludge or biosolids) identified during the study were like the concentration ranges reported in the literature for WWTPs that receive industrial discharges from Switzerland, Australia, and parts of the United States in the past.

A total of 20 sludge and biosolids (e.g., alkaline, anaerobically, and aerobically digested) samples with very low solids percentage (i.e., ~5% or lower) were centrifuged, and the aqueous portion was analyzed separately for these solids. A detailed discussion of the PFAS partition study is presented in **Section 4.1**. The short-chain compounds were more strongly associated with the aqueous phase, while the long-chain compounds were strongly associated with the solid phase, where the highest percentage of long-chain compounds were detected. In some instances, the concentrations of the short-chain compounds were below the detection limit in the solid phase but still detected in the aqueous phase, which indicates that analyzing only the solid phase may show the absence of short-chain compounds, but they could still be present. For the long-chain PFAS, especially PFOS, analyzing only the solid phase without the aqueous phase would report most of the mass present in the whole solids’ samples.

At select WWTPs, additional aqueous and solids samples were collected from various treatment processes to evaluate potential trends between treatment processes and PFAS concentrations. The aqueous and solids samples between two different treatment process stages at five (5) WWTPs are discussed in detail in **Section 4.2**. The primary purpose of collecting the samples was to evaluate potential trends in PFAS concentrations for both the aqueous and solid process treatment flows. The study showed increasing PFAS concentrations further down the treatment process for both aqueous, and solids treatment process flows for most of the PFAS in all the WWTPs. While the increase in the concentrations could at least partially result from expected fluctuations in concentrations over time, the fact that higher concentrations in the effluent than the influent were observed for multiple compounds at various WWTPs may indicate that regular fluctuations do not fully explain these increases. The increases further down the treatment process for both the aqueous and solid phases were observed between the 1) primary and secondary treatment processes, 2) secondary treatment and aerobic digestion, and 3) primary and secondary treatment and alkaline digestion. The higher concentrations further down the treatment process could be attributed to WWTP processes and recirculation of treatment streams (i.e., Returned Activated Sludge (RAS), filtrate or centrate) or possible degradation of other PFAS that are known to partially degrade to PFCAs and PFSAs (i.e., PFOA and PFOS), referred to as precursors (Schultz, 2006; Houtz, 2018). The same trend of increasing PFAS concentrations further down the treatment process for both aqueous and solid treatment process flows was also reported in a study of nineteen (19) WWTPs from Australia.

At select WWTPs, additional aqueous and solid grab samples from various treatment processes were collected to further evaluate the fate of PFAS within the WWTPs with detailed results discussed in **Section 4.3**. Since the samples were collected as grabs, small differences in the concentrations could be due to typical fluctuations in the PFAS concentrations. To better understand the fate of PFAS within WWTPs, a process flow diagram (PFD) for eight (8) WWTPs is provided in **Figures 44** through **51**, along with the results of all aqueous and solid samples collected from each WWTP. The evaluation showed that wastewater treatment processes could not remove PFAS such as PFOA and PFOS, which passes through the WWTP, accumulates in the final treated solids, and is recirculated within the WWTP through various treatment streams.

## 5.3 Conclusions from the Combination of Data from the IPP Initiative and Statewide WWTP Assessment

A comprehensive evaluation of PFAS impacts and sources to the WWTPs in Michigan was obtained through the implementation of the two sampling programs, the Michigan IPP PFAS Initiative and Statewide PFAS Assessment of 42 WWTPs. A total of 95 WWTP effluents and 61 influents were sampled for PFAS. The detection frequency of PFOA and PFOS in 54 influents of IPP WWTPs was 76% for both compounds. The concentration ranges in the influents for PFOA were between 2 to 330 ng/L and for PFOS were between 2 to 1,200 ng/L. The detection frequency in 80 effluents of IPP WWTPs was 94% for PFOA and 88% for PFOS. The concentration ranges in the effluents for PFOA were between 1 to 660 ng/L, and for PFOS were between 1 to 4,800 ng/L.

PFAS has also been widely used in many consumer products, therefore PFAS detection in WWTPs that are not part of the IPP (i.e., Non-IPP WWTPs) was also expected. Further, PFAS could be used in various products used by industries and commercial facilities that are not required to be monitored under the IPP. As a result, a limited number of Non-IPP WWTPs were also sampled, with a total of 7 influent and 15 effluent samples collected. The detection frequency in 7 influents of Non-IPP WWTPs was 86% for PFOA and 71% for PFOS. The detection frequency in 15 effluents of Non-IPP WWTPs was 100% for both PFOA and PFOS. Most of the PFOA and PFOS detections in the Non-IPP WWTPs ranged from 10 to 20 ng/L or lower. All the effluent PFOS concentrations for the Non-IPP WWTPs were below the PFOS WQS, except for the Oscoda Township WWTP (WWTP #107), which had the highest concentrations for Non-IPP WWTPs in both the influent and effluent samples. PFOA and PFOS have been identified within various parts of the sanitary sewer system. Historical AFFF releases are believed to be the main source of PFOS in the effluent.

While the number of Non-IPP WWTPs evaluated was lower than the IPP WWTPs, based on this initial dataset, it shows higher potential for IPP WWTPs to be more significantly impacted by PFOA, especially PFOS, than Non-IPP WWTPs. This conclusion supports the findings reported in the published research literature that show correlations between IPP WWTPs and PFAS detections.

PFOS has a lower WQS of 11 and 12 ng/L than PFOA of 420 and 12,000 ng/L for surface water bodies used as a drinking water source or not used as a drinking water source, respectively. The effluent concentration ranges for PFOS were higher than those for PFOA, with many of the results above the WQS of 12 ng/L. Only one WWTP had an effluent PFOA concentration higher than the most stringent WQS of 420 ng/L during February through April 2019, with the highest effluent PFOA concentration of 660 ng/L. However, additional sampling showed significantly lower concentrations with a sample from July 29, 2020, having a PFOA concentration of 37 ng/L. In contrast, 33 out of 70 PFOS detections in WWTPs (47%) from 80 WWTPs sampled had PFOS concentrations above both WQS of 11 and 12 ng/L for at least one of the effluent samples collected from the 70 WWTPs, including those that were sampled multiple times. As a result, PFOS was identified as the regulatory driver.

## 5.4 EGLE Ongoing Efforts and Planned Next Steps

The WWTPs with industrially impacted biosolids and EGLE will continue to work together to reduce the PFOS concentrations in the industrial discharges and other sources to the WWTPs. EGLE has a municipal PFAS permitting strategy which requires effluent sampling for PFOS and PFOA at all WWTPs with a design flow of 1 million gallons per day or greater and all WWTPs with IPPs. In 2021, EGLE is proposing to implement an interim strategy that will require sampling of final treated solids (biosolids) before land application. Also, in 2021, EGLE will perform resampling of a limited number of IPP and Non-IPP WWTPs to assess source reduction efforts and to monitor PFAS concentrations at the WWTPs. These efforts are expected to result in an overall reduction in PFAS concentrations to the WWTPs, and especially PFOS, resulting in effluent PFOS concentrations below the WQS and lower PFOS concentrations in the final treated solids, including biosolids.

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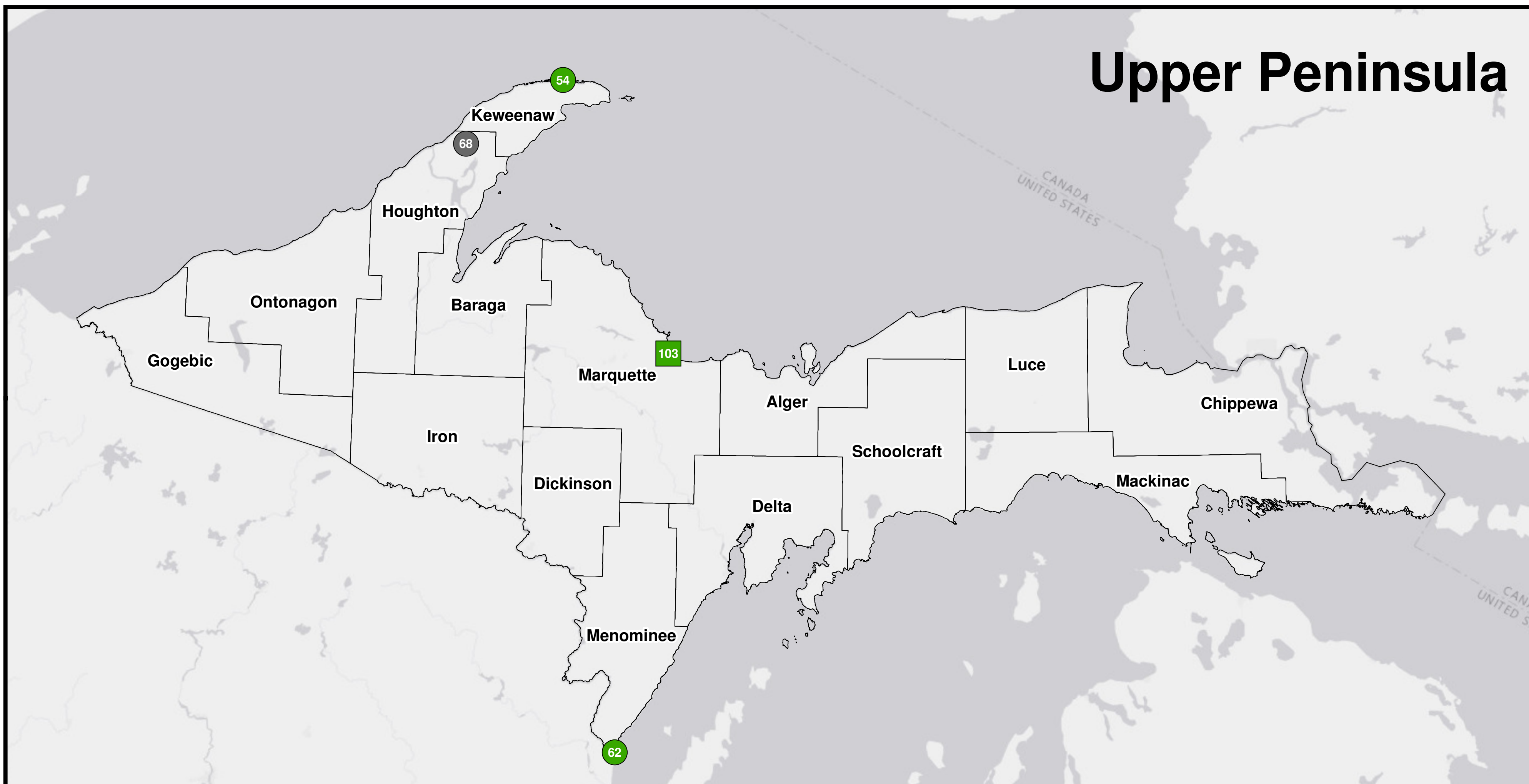
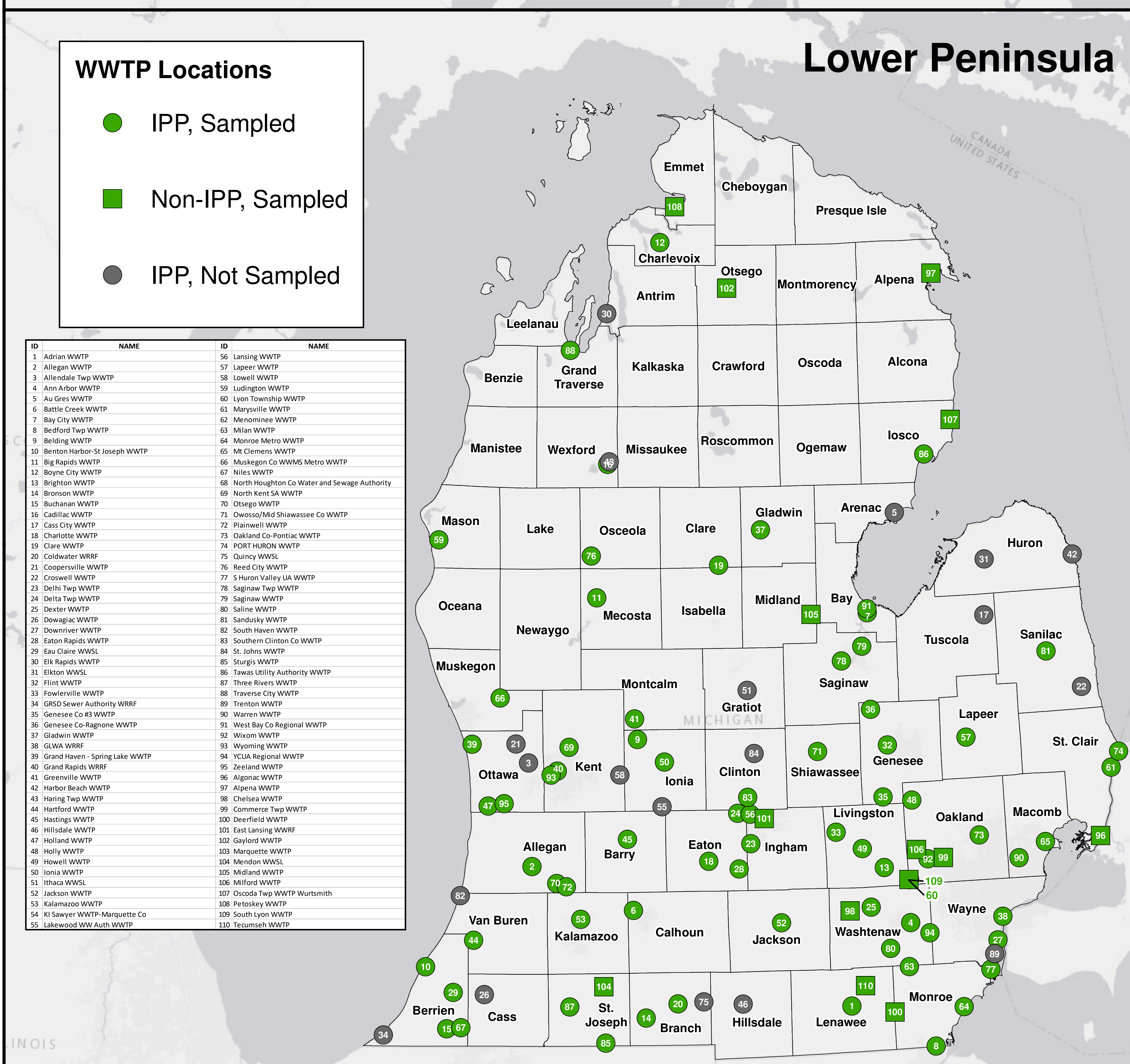
# Figures




| ID | NAME | ID | NAME |
|---|---|---|---|
| 1 | Adrian WWTP | 56 | Lansing WWTP |
| 2 | Allegan WWTP | 57 | Lapeer WWTP |
| 3 | Allendale Twp WWTP | 58 | Lowell WWTP |
| 4 | Ann Arbor WWTP | 59 | Ludington WWTP |
| 5 | Au Gres WWTP | 60 | Lyon Township WWTP |
| 6 | Battle Creek WWTP | 61 | Marysville WWTP |
| 7 | Bay City WWTP | 62 | Menominee WWTP |
| 8 | Bedford Twp WWTP | 63 | Milan WWTP |
| 9 | Belding WWTP | 64 | Monroe Metro WWTP |
| 10 | Benton Harbor-St Joseph WWTP | 65 | Mt Clemens WWTP |
| 11 | Big Rapids WWTP | 66 | Muskegon Co WWMS Metro WWTP |
| 12 | Boyne City WWTP | 67 | Niles WWTP |
| 13 | Brighton WWTP | 68 | North Houghton Co Water and Sewage Authority |
| 14 | Bronson WWTP | 69 | North Kent SA WWTP |
| 15 | Buchanan WWTP | 70 | Otsego WWTP |
| 16 | Cadillac WWTP | 71 | Owosso/Mid Shiawassee Co WWTP |
| 17 | Cass City WWTP | 72 | Plainwell WWTP |
| 18 | Charlotte WWTP | 73 | Oakland Co-Pontiac WWTP |
| 19 | Clare WWTP | 74 | PORT HURON WWTP |
| 20 | Coldwater WRRF | 75 | Quincy WWSL |
| 21 | Coopersville WWTP | 76 | Reed City WWTP |
| 22 | Croswell WWTP | 77 | S Huron Valley UA WWTP |
| 23 | Delhi Twp WWTP | 78 | Saginaw Twp WWTP |
| 24 | Delta Twp WWTP | 79 | Saginaw WWTP |
| 25 | Dexter WWTP | 80 | Saline WWTP |
| 26 | Dowagiac WWTP | 81 | Sandusky WWTP |
| 27 | Downriver WWTP | 82 | South Haven WWTP |
| 28 | Eaton Rapids WWTP | 83 | Southern Clinton Co WWTP |
| 29 | Eau Claire WWSL | 84 | St. Johns WWTP |
| 30 | Elk Rapids WWTP | 85 | Sturgis WWTP |
| 31 | Elkton WWSL | 86 | Tawas Utility Authority WWTP |
| 32 | Flint WWTP | 87 | Three Rivers WWTP |
| 33 | Fowlerville WWTP | 88 | Traverse City WWTP |
| 34 | GRSD Sewer Authority WRRF | 89 | Trenton WWTP |
| 35 | Genesee Co #3 WWTP | 90 | Warren WWTP |
| 36 | Genesee Co-Ragnone WWTP | 91 | West Bay Co Regional WWTP |
| 37 | Gladwin WWTP | 92 | Wixom WWTP |
| 38 | GLWA WRRF | 93 | Wyoming WWTP |
| 39 | Grand Haven - Spring Lake WWTP | 94 | YCUA Regional WWTP |
| 40 | Grand Rapids WRRF | 95 | Zeeland WWTP |
| 41 | Greenville WWTP | 96 | Algonac WWTP |
| 42 | Harbor Beach WWTP | 97 | Alpena WWTP |
| 43 | Haring Twp WWTP | 98 | Chelsea WWTP |
| 44 | Hartford WWTP | 99 | Commerce Twp WWTP |
| 45 | Hastings WWTP | 100 | Deerfield WWTP |
| 46 | Hillsdale WWTP | 101 | East Lansing WWRF |
| 47 | Holland WWTP | 102 | Gaylord WWTP |
| 48 | Holly WWTP | 103 | Marquette WWTP |
| 49 | Howell WWTP | 104 | Mendon WWSL |
| 50 | Ionia WWTP | 105 | Midland WWTP |
| 51 | Ithaca WWSL | 106 | Milford WWTP |
| 52 | Jackson WWTP | 107 | Oscoda Twp WWTP Wurtsmith |
| 53 | Kalamazoo WWTP | 108 | Petoskey WWTP |
| 54 | KI Sawyer WWTP-Marquette Co | 109 | South Lyon WWTP |
| 55 | Lakewood WW Auth WWTP | 110 | Tecumseh WWTP |

EGLE

Drawn: JS 12/4/2020

Approved: DB 12/4/2020

Project #: 60588767

Michigan Counties

0 25 50 100 Miles

N

**FIGURE 2**

LOCATIONS OF WASTEWATER TREATMENT PLANTS EVALUATED

MICHIGAN IPP PFAS INITIATIVE

Source: ESRI USA Topo Maps

G:\GrandRapids\DCS\GIS\ArcMap_GeoDB_Projects\ENV\GIS_Data\GIS\Biosolids_MDEQ\MXD\WWTP\Biosolids_WWTP_2020_Locations_IPP.mxd

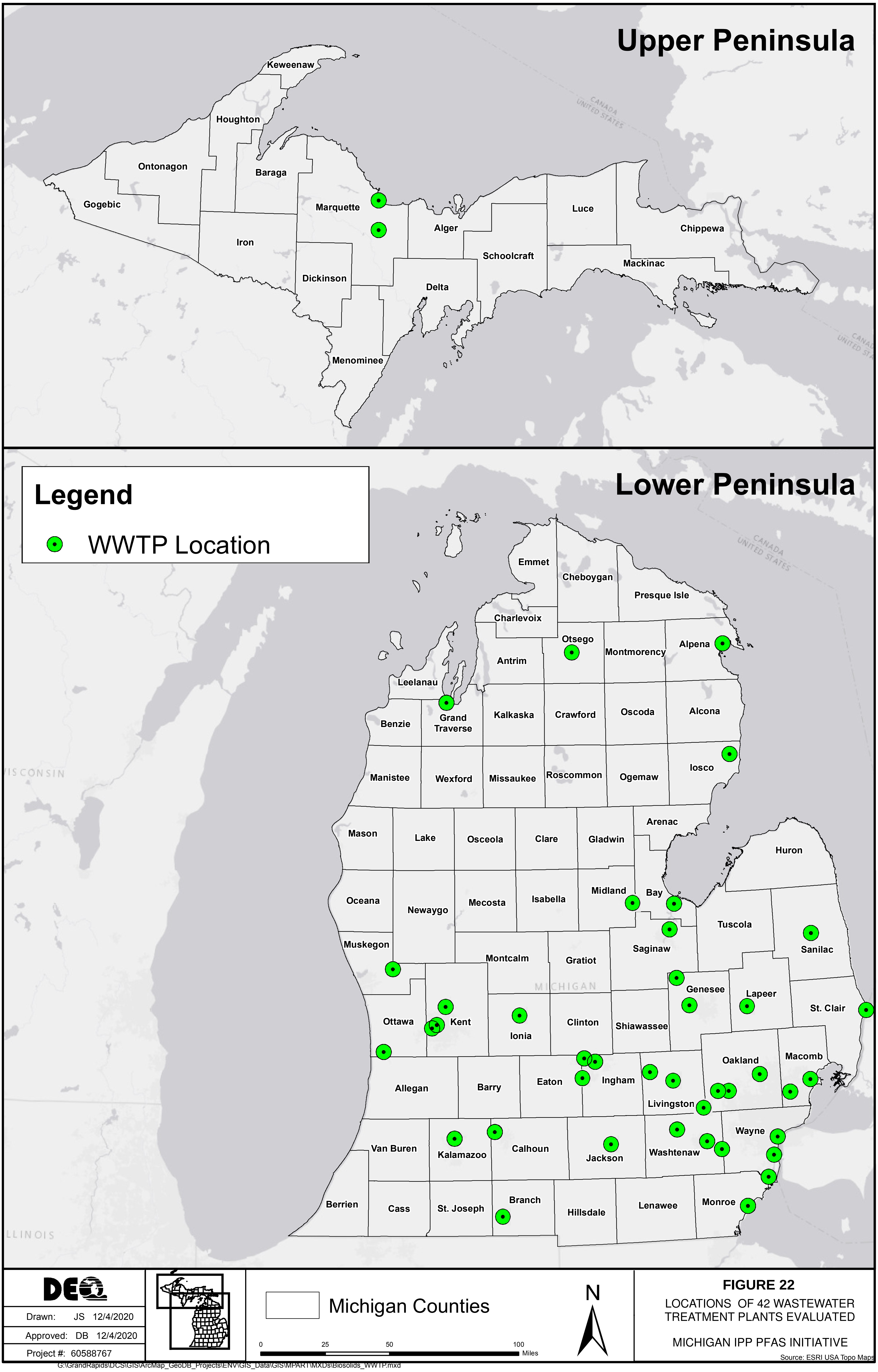



**FIGURE 22**

LOCATIONS OF 42 WASTEWATER TREATMENT PLANTS EVALUATED

MICHIGAN IPP PFAS INITIATIVE

# Tables

# Table 2
## Wastewater Treatment Plants Evaluated
## Michigan IPP PFAS Initiative

| WWTP Nr. | WWTP Code | WWTP Name | Sampled for PFAS? (Yes/No) | IPP? (Yes/No) | Permit # | Address |
|---|---|---|---|---|---|---|
| 1 | ADRI | Adrian WWTP | Yes | Yes | MI0022152 | 1001 Oakwood Rd, Adrian, MI 49221 |
| 2 | ALGN | Allegan WWTP | Yes | Yes | MI0020532 | 350 North St, Allegan, MI 49010 |
| 3 | ALLE | Allendale Twp WWTP | No | Yes | MI0057679 | 11624 40th Avenue, Allendale, MI 49401 |
| 4 | AARB | Ann Arbor WWTP | Yes | Yes | MI0022217 | 49 Dixboro Road, Ann Arbor, MI 48105 |
| 5 | AUGR | Au Gres WWTP | No | Yes | MI0058794 | 2750 South Street, AuGres, MI 48703 |
| 6 | BCRK | Battle Creek WWTP | Yes | Yes | MI0022276 | 2000 RIVER RD W, BATTLE CREEK, MI 49037 |
| 7 | BAYC | Bay City WWTP | Yes | Yes | MI0022284 | 2905 N Water St, Bay City, MI 48708 |
| 8 | BEDF | Bedford Twp WWTP | Yes | Yes | MI0020761 | 335 Lavoy Road, Erie, MI 48133 |
| 9 | BELD | Belding WWTP | Yes | Yes | MI0020851 | 1500 Wells Street, Belding, MI 48809 |
| 10 | BHSJ | Benton Harbor-St Joseph WWTP | Yes | Yes | MI0022322 | 269 ANCHORS WAY, Saint Joseph, MI 49085 |
| 11 | BRAP | Big Rapids WWTP | Yes | Yes | MI0022381 | 531 River Street, Big Rapids, MI 49307 |
| 12 | BOYN | Boyne City WWTP | Yes | Yes | MI0021474 | 1261 Lagoon Drive, Boyne City, MI 49712 |
| 13 | BRIT | Brighton WWTP | Yes | Yes | MI0020877 | 6570 Hamburg Rd, Brighton, MI 48116 |
| 14 | BRON | Bronson WWTP | Yes | Yes | MI0020729 | 408 Mill Street, Bronson, MI 49028 |
| 15 | BUCH | Buchanan WWTP | Yes | Yes | MI0022489 | 502 River Street, Buchanan, MI 49107 |
| 16 | CADI | Cadillac WWTP | Yes | Yes | MI0020257 | 1121 Plett Rd., Cadillac, MI 49601 |
| 17 | CASS | Cass City WWTP | No | Yes | MI0022594 | 3998 Doerr Road, Cass City, MI 48726 |
| 18 | CHAR | Charlotte WWTP | Yes | Yes | MI0020788 | 1005 PAINE DR, CHARLOTTE, MI 48813 |
| 19 | CLAR | Clare WWTP | Yes | Yes | MI0020176 | 11175 South Eberhart, Clare, MI 48617 |
| 20 | COLD | Coldwater WRRF | Yes | Yes | MI0020117 | 100 Jay St., Coldwater, MI 49036 |
| 21 | COOP | Coopersville WWTP | No | Yes | MI0022730 | 5497 GARFIELD ST, COOPERSVILLE, MI 49404 |
| 22 | CROS | Croswell WWTP | No | Yes | MI0021083 | 5580 Lancaster, Croswell, MI 48422 |
| 23 | DELH | Delhi Twp WWTP | Yes | Yes | MI0022781 | 5961 McCue, Holt, MI 48842 |
| 24 | DELT | Delta Twp WWTP | Yes | Yes | MI0022799 | 7000 West Willow Highway, Lansing, MI 48917 |
| 25 | DEXT | Dexter WWTP | Yes | Yes | MI0022829 | 8360 Huron St., Dexter, MI 48130 |
| 26 | DOWG | Dowagiac WWTP | No | Yes | MI0022837 | 29250 M62 West, Dowagiac, MI 49047 |
| 27 | DRVR | Downriver WWTP | Yes | Yes | MI0021156 | 797 CENTRAL ST, WYANDOTTE, MI 48192 |
| 28 | EATN | Eaton Rapids WWTP | Yes | Yes | MI0022861 | 301 Market St., Eaton Rapids, MI 48827 |
| 29 | EAUC | Eau Claire WWSL | Yes | Yes | MI0058687 | Between 6890 Old Pipestone Road and 6860 Hochberger Road, Eau Claire MI 49111 |
| 30 | ELKR | Elk Rapids WWTP | No | Yes | MI0059296 | 8228 Herman Road, Elk Rapids, MI 49629 |

# Table 2
## Wastewater Treatment Plants Evaluated
## Michigan IPP PFAS Initiative

| WWTP Nr. | WWTP Code | WWTP Name | Sampled for PFAS? (Yes/No) | IPP? (Yes/No) | Permit # | Address |
|---|---|---|---|---|---|---|
| 31 | ELKT | Elkton WWSL | No | Yes | MI0057466 | Ewald and Richardson Road, Elkton, MI 48731 |
| 32 | FLIN | Flint WWTP | Yes | Yes | MI0022926 | G4652 Beecher Road, Flint, MI 48532 |
| 33 | FOWL | Fowlerville WWTP | Yes | Yes | MI0020664 | 8610 West Grand River, Fowlerville, MI 48836 |
| 34 | GRSD | GRSD Sewer Authority WRRF | No | Yes | MI0027987 | 10831 Kruger Road, New Buffalo, MI 49117 |
| 35 | GENE | Genesee Co #3 WWTP | Yes | Yes | MI0022993 | 6450 Silver Lake Rd, Linden, MI 48451 |
| 36 | RAGN | Genesee Co-Ragnone WWTP | Yes | Yes | MI0022977 | 9290 Farrand Road, Montrose, MI 48457 |
| 37 | GLAD | Gladwin WWTP | Yes | Yes | MI0023001 | 501 Chatterton Avenue, Gladwin, MI 48624 |
| 38 | GLWA | GLWA WRRF | Yes | Yes | MI0022802 | 9300 W JEFFERSON AVE, DETROIT, MI 48209 |
| 39 | GHSL | Grand Haven - Spring Lake WWTP | Yes | Yes | MI0021245 | 1525 WASHINGTON AVE, GRAND HAVEN, MI 49417 |
| 40 | GRAP | Grand Rapids WRRF | Yes | Yes | MI0026069 | 1300 MARKET AVE SW, GRAND RAPIDS, MI 49503 |
| 41 | GREE | Greenville WWTP | Yes | Yes | MI0020397 | 205 East Fairplains Street, Greenville, MI 48838 |
| 42 | HARB | Harbor Beach WWTP | No | Yes | MI0020672 | 861 South Lake Shore Road, Harbor Beach, MI 48441 |
| 43 | HARI | Haring Twp WWTP | No | Yes | MI0059076 | 9494 East 34 Road, Cadillac, MI 49601 |
| 44 | HART | Hartford WWTP | Yes | Yes | MI0023094 | 66460 56th Avenue, Hartford, MI 49057 |
| 45 | HAST | Hastings WWTP | Yes | Yes | MI0020575 | 225 N CASS ST, HASTINGS, MI 49058 |
| 46 | HILL | Hillsdale WWTP | No | Yes | MI0022136 | 101 Galloway, Hillsdale, MI 49242 |
| 47 | HOLL | Holland WWTP | Yes | Yes | MI0023108 | 42 S River Ave, Holland, MI 49423 |
| 48 | HLLY | Holly WWTP | Yes | Yes | MI0020184 | 402 AIRPORT DR, HOLLY, MI 48442 |
| 49 | HOWE | Howell WWTP | Yes | Yes | MI0021113 | 1191 S MICHIGAN AVE, HOWELL, MI 48843 |
| 50 | IONA | Ionia WWTP | Yes | Yes | MI0021041 | 720 Wells Street, Ionia, MI 48846 |
| 51 | ITHA | Ithaca WWSL | No | Yes | MI0056928 | 129 W Emerson, Ithaca, MI 48847 |
| 52 | JACK | Jackson WWTP | Yes | Yes | MI0023256 | 2995 Lansing Avenue, Jackson, MI 49202 |
| 53 | KZOO | Kalamazoo WWTP | Yes | Yes | MI0023299 | 1415 North Harrison, Kalamazoo, MI 49007 |
| 54 | SAWY | KI Sawyer WWTP-Marquette Co | Yes | Yes | MI0021423 | 1080 M-94, Gwinn, MI 49841 |
| 55 | LKWD | Lakewood WW Auth WWTP | No | Yes | MI0042978 | 13751 Harwood Road, Lake Odessa, MI 48849 |
| 56 | LANS | Lansing WWTP | Yes | Yes | MI0023400 | 1625 Sunset Avenue, Lansing, MI 48917 |
| 57 | LAPR | Lapeer WWTP | Yes | Yes | MI0020460 | 1264 Industrial Drive, Lapeer, MI 48446 |
| 58 | LOWE | Lowell WWTP | No | Yes | MI0020311 | 300 Bowes Road, Lowell, MI 49331 |
| 59 | LUDG | Ludington WWTP | Yes | Yes | MI0021334 | 5160 W 6th St, Ludington, MI 49431 |
| 60 | LYON | Lyon Township WWTP | Yes | Yes | GW1810078 | 53656 Ten Mile Road, New Hudson, MI 48178 |
| 61 | MARY | Marysville WWTP | Yes | Yes | MI0020656 | 980 E Huron Blvd, Marysville, MI 48040 |

# Table 2
## Wastewater Treatment Plants Evaluated
## Michigan IPP PFAS Initiative

| WWTP Nr. | WWTP Code | WWTP Name | Sampled for PFAS? (Yes/No) | IPP? (Yes/No) | Permit # | Address |
|---|---|---|---|---|---|---|
| 62 | MENO | Menominee WWTP | Yes | Yes | MI0025631 | 1301 5th Ave., Menominee, MI 49858 |
| 63 | MILN | Milan WWTP | Yes | Yes | MI0021571 | 75 Gump Lake Road, Milan, MI 48160 |
| 64 | MONR | Monroe Metro WWTP | Yes | Yes | MI0028401 | 2205 East Front Street, Monroe, MI 48161 |
| 65 | MTCL | Mt Clemens WWTP | Yes | Yes | MI0023647 | 1750 Clara Street, Mount Clemens, MI 48043 |
| 66 | MUSK | Muskegon Co WWMS Metro WWTP | Yes | Yes | MI0027391 | 698 N. Maple Island Road, Muskegon, MI 49442 |
| 67 | NILE | Niles WWTP | Yes | Yes | MI0023701 | 21 Marmont Street, Niles, MI 49120 |
| 68 | HOUG | North Houghton Co Water and Sewage Authority | No | Yes | MI0043982 | 25880 Red Jacket Road, Calumet, MI 49913 |
| 69 | NKEN | North Kent SA WWTP | Yes | Yes | MI0057419 | 4775 Coit Avenue NE, Grand Rapids, MI 49525 |
| 70 | OTSE | Otsego WWTP | Yes | Yes | MI0060260 | 210 North Grant Street, Otsego, MI 49078 |
| 71 | OWOS | Owosso/Mid Shiawassee Co WWTP | Yes | Yes | MI0023752 | 1410 Chippewa Trail, Owosso, MI 48867 |
| 72 | PLAI | Plainwell WWTP | Yes | Yes | MI0020494 | 129 Fairlane St., Plainwell, MI 4908 |
| 73 | PONT | Oakland Co-Pontiac WWTP | Yes | Yes | MI0023825 | 155 N OPDYKE RD, PONTIAC, MI 48342 |
| 74 | PHUR | Port Huron WWTP | Yes | Yes | MI0023833 | 100 Merchant Street, Port Huron, MI 48060 |
| 75 | QUIN | Quincy WWSL | No | Yes | MI0055751 | 1073 East Chicago Rd., Quincy, MI 49082 |
| 76 | REED | Reed City WWTP | Yes | Yes | MI0020036 | 700 Commerce Drive, Reed City, MI 49677 |
| 77 | HURO | S Huron Valley UA WWTP | Yes | Yes | MI0043800 | 34001 W JEFFERSON AVE, BROWNSTWN TWP, MI 48173 |
| 78 | SGTW | Saginaw Twp WWTP | Yes | Yes | MI0023973 | 2406 VETERANS MEMORIAL PKWY, SAGINAW, MI 48601 |
| 79 | SAGN | Saginaw WWTP | Yes | Yes | MI0025577 | 2406 VETERANS MEMORIAL PKWY, SAGINAW, MI 48601 |
| 80 | SALN | Saline WWTP | Yes | Yes | MI0024023 | 247 Monroe Street, Saline, MI 48176 |
| 81 | SAND | Sandusky WWTP | Yes | Yes | MI0020222 | 103 South Campbell Street, Sandusky, MI 48471 |
| 82 | SHAV | South Haven WWTP | No | Yes | MI0020320 | 625 East Wells Street, South Haven, MI 49090 |
| 83 | SCLN | Southern Clinton Co WWTP | Yes | Yes | MI0021008 | 3671 West Herbison Road, DeWitt, MI 48820 |
| 84 | STJN | St. Johns WWTP | No | Yes | MI0026468 | 950 N. US 27, Saint Johns, MI 48879 |
| 85 | STUR | Sturgis WWTP | Yes | Yes | MI0020451 | 2101 TREATMENT PLANT RD, STURGIS, MI 49091 |
| 86 | TAWS | Tawas Utility Authority WWTP | Yes | Yes | MI0021091 | 810 West Franklin Street, East Tawas, MI 48730 |
| 87 | TRIV | Three Rivers WWTP | Yes | Yes | MI0020991 | 409 Wolf Road, Three Rivers, MI 49093 |
| 88 | TRAV | Traverse City WWTP | Yes | Yes | MI0027481 | 606 Hannah Avenue, Traverse City, MI 49686 |
| 89 | TREN | Trenton WWTP | No | Yes | MI0021164 | 1801 Van Horn, Trenton MI 48183 |

# Table 2
## Wastewater Treatment Plants Evaluated
## Michigan IPP PFAS Initiative

| WWTP Nr. | WWTP Code | WWTP Name | Sampled for PFAS? (Yes/No) | IPP? (Yes/No) | Permit # | Address |
|---|---|---|---|---|---|---|
| 90 | WARR | Warren WWTP | Yes | Yes | MI0024295 | 32360 Warkop Ave, Warren, MI 48093 |
| 91 | WBAY | West Bay Co Regional WWTP | Yes | Yes | MI0042439 | 3933 Patterson Road, Bay City, MI 48706 |
| 92 | WIXO | Wixom WWTP | Yes | Yes | MI0024384 | 2059 Charms Road, Wixom, MI 48393 |
| 93 | WYOM | Wyoming WWTP | Yes | Yes | MI0024392 | 2350 Ivanrest Ave, Wyoming, MI 49418 |
| 94 | YCUA | YCUA Regional WWTP | Yes | Yes | MI0042676 | 2777 STATE ST, YPSILANTI, MI 48198 |
| 95 | ZEEL | Zeeland WWTP | Yes | Yes | MI0020524 | 350 Rich Ave., Zeeland, MI 49464 |
| 96 | ALGO | Algonac WWTP | Yes | No | MI0020389 | 451 STATE ST, ALGONAC, MI 48001 |
| 97 | ALPE | Alpena WWTP | Yes | No | MI0022195 | 210 Harbor Drive, Alpena, MI 49707 |
| 98 | CHEL | Chelsea WWTP | Yes | No | MI0020737 | 680 McKinley Street, Chelsea, MI 48118 |
| 99 | COMM | Commerce Twp WWTP | Yes | No | MI0025071 | 649 Welch Road, Commerce Township, MI 48390 |
| 100 | DEER | Deerfield WWTP | Yes | No | MIG570216 | 20899 Taft Rd., Deerfield, MI 49238 |
| 101 | ELAN | East Lansing WWRF | Yes | No | MI0022853 | 1700 TROWBRIDGE RD, EAST LANSING, MI 48823 |
| 102 | GAYL | Gaylord WWTP | Yes | No | GW1810128 | 500 East Seventh Street, Gaylord, MI 49735 |
| 103 | MARQ | Marquette WWTP | Yes | No | MI0023531 | 300 W. Baraga, Marquette, MI 49855 |
| 104 | MEND | Mendon WWSL | Yes | No | MIG580101 | Kirby Rd., Mendon, MI 49072 |
| 105 | MIDL | Midland WWTP | Yes | No | MI0023582 | 2125 Austin, Midland, MI 48642 |
| 106 | MILF | Milford WWTP | Yes | No | MI0023604 | 1000 GENERAL MOTORS RD, MILFORD, MI 48381 |
| 107 | OSCO | Oscoda Twp WWTP Wurtsmith | Yes | No | MI0055778 | 2998 Hunt, Oscoda, MI 48750 |
| 108 | PETO | Petoskey WWTP | Yes | No | MI0023787 | 1000 West Lake Street, Petoskey, MI 49770 |
| 109 | SLYN | South Lyon WWTP | Yes | No | MI0020273 | 23500 N. Dixboro Rd, South Lyon, MI 48178 |
| 110 | TECU | Tecumseh WWTP | Yes | No | MI0020583 | 710 E. Chicago Blvd., Tecumseh, MI 49286 |

# Table 3

WWTPs PFAS Results
Michigan IPP PFAS Initiative

| Nr. | WWTP Nr. | WWTP Code | WWTP Name | Sample Type | Sample Date | PFOA (ng/L) | PFOS (ng/L) |
|---|---|---|---|---|---|---|---|
| 1 | 1 | ADRI | Adrian WWTP | Effluent-1 | 7/31/2018 | **3.6** | **7.1** |
| 2 | 1 | ADRI | Adrian WWTP | Effluent-1 | 10/24/2019 | **3.3** | **4.2** |
| 3 | 2 | ALGN | Allegan WWTP | Effluent-1 | 5/14/2019 | **6.9** | ND |
| 4 | 4 | AARB | Ann Arbor WWTP | Effluent-1 | 11/2/2018 | **5.1** | **16** |
| 5 | 4 | AARB | Ann Arbor WWTP | Effluent-1 | 11/2/2018 | **4.42** | **14.8** |
| 6 | 4 | AARB | Ann Arbor WWTP | Effluent-1 | 2/6/2019 | **2.5** | **2.7** |
| 7 | 4 | AARB | Ann Arbor WWTP | Effluent-1 | 4/10/2019 | **3.8** | ND |
| 8 | 4 | AARB | Ann Arbor WWTP | Effluent-1 | 7/10/2019 | **8.62** | **18.3** |
| 9 | 4 | AARB | Ann Arbor WWTP | Effluent-1 | 8/27/2019 | **5.20** | **3.30** |
| 10 | 4 | AARB | Ann Arbor WWTP | Effluent-1 | 8/28/2019 | **4.64** | **3.18** |
| 11 | 4 | AARB | Ann Arbor WWTP | Effluent-1 | 8/29/2019 | **4.74** | **2.84** |
| 12 | 4 | AARB | Ann Arbor WWTP | Effluent-1 | 10/8/2019 | **3.46** | **3.48** |
| 13 | 4 | AARB | Ann Arbor WWTP | Effluent-1 | 1/14/2020 | **3.0** | **3.2** |
| 14 | 4 | AARB | Ann Arbor WWTP | Influent-1 | 11/2/2018 | **4.3** | **20** |
| 15 | 4 | AARB | Ann Arbor WWTP | Influent-1 | 11/2/2018 | **2.91** | **16.5** |
| 16 | 4 | AARB | Ann Arbor WWTP | Influent-1 | 2/5/2019 | ND | ND |
| 17 | 4 | AARB | Ann Arbor WWTP | Influent-1 | 4/9/2019 | ND | ND |
| 18 | 4 | AARB | Ann Arbor WWTP | Influent-1 | 7/9/2019 | **9.52** | **4.26** |
| 19 | 4 | AARB | Ann Arbor WWTP | Influent-1 | 8/28/2019 | **2.65** | ND |
| 20 | 4 | AARB | Ann Arbor WWTP | Influent-1 | 10/8/2019 | ND | ND |
| 21 | 4 | AARB | Ann Arbor WWTP | Influent-1 | 1/14/2020 | **2.8** | **4.3** |
| 22 | 6 | BCRK | Battle Creek WWTP | Effluent-1 | 5/8/2018 | ND | ND |
| 23 | 6 | BCRK | Battle Creek WWTP | Effluent-1 | 9/18/2018 | ND | ND |
| 24 | 6 | BCRK | Battle Creek WWTP | Effluent-1 | 10/31/2018 | **8.43** | **5.14** |
| 25 | 6 | BCRK | Battle Creek WWTP | Effluent-1 | 4/30/2019 | **7.5** | **7.1** |
| 26 | 6 | BCRK | Battle Creek WWTP | Effluent-1 | 10/24/2019 | ND | ND |
| 27 | 6 | BCRK | Battle Creek WWTP | Influent-1 | 5/8/2018 | ND | **12** |
| 28 | 6 | BCRK | Battle Creek WWTP | Influent-1 | 9/17/2018 | ND | ND |
| 29 | 6 | BCRK | Battle Creek WWTP | Influent-1 | 10/31/2018 | **7.25** | **3.28** |
| 30 | 6 | BCRK | Battle Creek WWTP | Influent-1 | 10/23/2019 | ND | ND |
| 31 | 7 | BAYC | Bay City WWTP | Effluent-1 | 11/8/2018 | **2.46** | **11.89** |
| 32 | 7 | BAYC | Bay City WWTP | Effluent-1 | 11/19/2018 | **5.39** | **15.8** |
| 33 | 7 | BAYC | Bay City WWTP | Effluent-1 | 2/14/2019 | **4.15** | **16.0** |
| 34 | 7 | BAYC | Bay City WWTP | Effluent-1 | 3/14/2019 | ND | **7.71** |
| 35 | 7 | BAYC | Bay City WWTP | Effluent-1 | 6/12/2019 | ND | **12** |
| 36 | 7 | BAYC | Bay City WWTP | Effluent-1 | 7/30/2019 | **5.4** | **13** |
| 37 | 7 | BAYC | Bay City WWTP | Effluent-1 | 7/30/2019 | **5.2** | **8.2** |
| 38 | 7 | BAYC | Bay City WWTP | Effluent-1 | 10/30/2019 | **4.2** | **22** |
| 39 | 7 | BAYC | Bay City WWTP | Effluent-1 | 11/12/2019 | **4.9** | **18** |
| 40 | 7 | BAYC | Bay City WWTP | Effluent-2 | 2/14/2019 | **4.39** | **7.74** |
| 41 | 7 | BAYC | Bay City WWTP | Effluent-2 | 3/14/2019 | ND | **30.29** |
| 42 | 7 | BAYC | Bay City WWTP | Effluent-2 | 6/12/2019 | ND | **22** |
| 43 | 7 | BAYC | Bay City WWTP | Influent-1 | 11/19/2018 | **4.87** | **18.2** |
| 44 | 8 | BEDF | Bedford Twp WWTP | Effluent-1 | 10/16/2019 | **11** | **4.0** |
| 45 | 8 | BEDF | Bedford Twp WWTP | Effluent-1 | 12/10/2019 | **5.7** | **4.9** |
| 46 | 9 | BELD | Belding WWTP | Effluent-1 | 5/9/2018 | **24** | **6.9** |
| 47 | 9 | BELD | Belding WWTP | Effluent-1 | 7/31/2018 | **38** | **14** |
| 48 | 9 | BELD | Belding WWTP | Effluent-1 | 3/7/2019 | **27** | **8.4** |
| 49 | 9 | BELD | Belding WWTP | Effluent-1 | 5/21/2019 | **27** | **6.8** |

# Table 3

WWTPs PFAS Results
Michigan IPP PFAS Initiative

| Nr. | WWTP Nr. | WWTP Code | WWTP Name | Sample Type | Sample Date | PFOA (ng/L) | PFOS (ng/L) |
|---|---|---|---|---|---|---|---|
| 50 | 9 | BELD | Belding WWTP | Effluent-1 | 7/25/2019 | **21** | **7.2** |
| 51 | 9 | BELD | Belding WWTP | Effluent-1 | 10/9/2019 | **18** | **8.1** |
| 52 | 9 | BELD | Belding WWTP | Effluent-1 | 11/8/2019 | **20** | **7.4** |
| 53 | 9 | BELD | Belding WWTP | Effluent-1 | 2/5/2020 | **26** | **5.9** |
| 54 | 9 | BELD | Belding WWTP | Influent-1 | 7/31/2018 | ND | ND |
| 55 | 10 | BHSJ | Benton Harbor - St. Joseph WWTP | Effluent-1 | 10/11/2018 | **6.1** | **8.2** |
| 56 | 10 | BHSJ | Benton Harbor - St. Joseph WWTP | Effluent-1 | 11/20/2018 | **3.17** | **3.78** |
| 57 | 10 | BHSJ | Benton Harbor - St. Joseph WWTP | Effluent-1 | 8/29/2019 | **6.4** | **11** |
| 58 | 11 | BRAP | Big Rapids WWTP | Effluent-1 | 8/13/2019 | ND | ND |
| 59 | 12 | BOYN | Boyne City WWTP | Effluent-1 | 7/26/2017 | **6.3** | **4.1** |
| 60 | 13 | BRIT | Brighton WWTP | Effluent-1 | 3/20/2019 | **19** | **11** |
| 61 | 13 | BRIT | Brighton WWTP | Effluent-1 | 5/15/2019 | **17.9** | **16.1** |
| 62 | 13 | BRIT | Brighton WWTP | Effluent-1 | 8/16/2019 | **19** | **20** |
| 63 | 13 | BRIT | Brighton WWTP | Effluent-1 | 11/14/2019 | **17** | **20** |
| 64 | 13 | BRIT | Brighton WWTP | Effluent-1 | 2/13/2020 | **15** | **11** |
| 65 | 13 | BRIT | Brighton WWTP | Influent-1 | 8/16/2019 | **1.7** | **9.5** |
| 66 | 13 | BRIT | Brighton WWTP | Influent-1 | 2/13/2020 | ND | ND |
| 67 | 14 | BRON | Bronson WWTP | Effluent-1 | 5/7/2018 | **2.2** | **150** |
| 68 | 14 | BRON | Bronson WWTP | Effluent-1 | 7/12/2018 | **6.1** | **130** |
| 69 | 14 | BRON | Bronson WWTP | Effluent-1 | 7/18/2018 | **13** | **140** |
| 70 | 14 | BRON | Bronson WWTP | Effluent-1 | 7/24/2018 | **7.7** | **87** |
| 71 | 14 | BRON | Bronson WWTP | Effluent-1 | 8/2/2018 | **5.6** | **70** |
| 72 | 14 | BRON | Bronson WWTP | Effluent-1 | 9/11/2018 | **5.8** | **250** |
| 73 | 14 | BRON | Bronson WWTP | Effluent-1 | 10/17/2018 | **3.6** | **360** |
| 74 | 14 | BRON | Bronson WWTP | Effluent-1 | 10/31/2018 | **2.40** | **169** |
| 75 | 14 | BRON | Bronson WWTP | Effluent-1 | 11/20/2018 | **2.3** | **83** |
| 76 | 14 | BRON | Bronson WWTP | Effluent-1 | 12/11/2018 | **2.5** | **37** |
| 77 | 14 | BRON | Bronson WWTP | Effluent-1 | 1/9/2019 | **6.9** | **16** |
| 78 | 14 | BRON | Bronson WWTP | Effluent-1 | 2/13/2019 | **2.4** | **18** |
| 79 | 14 | BRON | Bronson WWTP | Effluent-1 | 3/5/2019 | **2.7** | **11** |
| 80 | 14 | BRON | Bronson WWTP | Effluent-1 | 4/1/2019 | **2.4** | **12** |
| 81 | 14 | BRON | Bronson WWTP | Effluent-1 | 5/7/2019 | **2.9** | **25** |
| 82 | 14 | BRON | Bronson WWTP | Effluent-1 | 6/13/2019 | ND | **15** |
| 83 | 14 | BRON | Bronson WWTP | Effluent-1 | 7/10/2019 | **4.0** | **13** |
| 84 | 14 | BRON | Bronson WWTP | Effluent-1 | 8/5/2019 | ND | **4.6** |
| 85 | 14 | BRON | Bronson WWTP | Effluent-1 | 9/3/2019 | **4.9** | **21** |
| 86 | 14 | BRON | Bronson WWTP | Effluent-1 | 10/1/2019 | **4.7** | **18** |
| 87 | 14 | BRON | Bronson WWTP | Effluent-1 | 11/4/2019 | **2.9** | **16** |
| 88 | 14 | BRON | Bronson WWTP | Effluent-1 | 12/2/2019 | **2.0** | **9.5** |
| 89 | 14 | BRON | Bronson WWTP | Effluent-1 | 1/6/2020 | **1.6** | **13** |
| 90 | 14 | BRON | Bronson WWTP | Effluent-1 | 2/3/2020 | **2.2** | **13** |
| 91 | 14 | BRON | Bronson WWTP | Effluent-1 | 3/2/2020 | ND | **7.3** |
| 92 | 14 | BRON | Bronson WWTP | Effluent-1 | 4/6/2020 | ND | **6.9** |
| 93 | 14 | BRON | Bronson WWTP | Effluent-1 | 5/4/2020 | **2.2** | **12** |
| 94 | 14 | BRON | Bronson WWTP | Effluent-1 | 6/3/2020 | **1.9** | **7.3** |
| 95 | 14 | BRON | Bronson WWTP | Effluent-1 | 7/6/2020 | **3.4** | **8.9** |
| 96 | 14 | BRON | Bronson WWTP | Effluent-1 | 8/3/2020 | **7.3** | **14** |
| 97 | 14 | BRON | Bronson WWTP | Effluent-1 | 9/7/2020 | **3.5** | **12** |
| 98 | 14 | BRON | Bronson WWTP | Effluent-1 | 10/6/2020 | **4.0** | **9.2** |

# Table 3

WWTPs PFAS Results
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| Nr. | WWTP Nr. | WWTP Code | WWTP Name | Sample Type | Sample Date | PFOA (ng/L) | PFOS (ng/L) |
|---|---|---|---|---|---|---|---|
| 99 | 14 | BRON | Bronson WWTP | Effluent-1 | 11/9/2020 | **9.1** | **10** |
| 100 | 14 | BRON | Bronson WWTP | Effluent-1 | 12/14/2020 | **3.7** | **4.5** |
| 101 | 14 | BRON | Bronson WWTP | Influent-1 | 5/7/2018 | ND | **12** |
| 102 | 14 | BRON | Bronson WWTP | Influent-1 | 7/12/2018 | ND | **12** |
| 103 | 14 | BRON | Bronson WWTP | Influent-1 | 7/18/2018 | ND | **16** |
| 104 | 14 | BRON | Bronson WWTP | Influent-1 | 7/24/2018 | ND | **8.0** |
| 105 | 14 | BRON | Bronson WWTP | Influent-1 | 8/2/2018 | ND | **14** |
| 106 | 14 | BRON | Bronson WWTP | Influent-1 | 10/31/2018 | ND | **843** |
| 107 | 14 | BRON | Bronson WWTP | Influent-1 | 12/11/2018 | ND | **39** |
| 108 | 14 | BRON | Bronson WWTP | Influent-1 | 1/9/2019 | **1.2** | **3.9** |
| 109 | 14 | BRON | Bronson WWTP | Influent-1 | 2/13/2019 | ND | **27** |
| 110 | 14 | BRON | Bronson WWTP | Influent-1 | 3/5/2019 | ND | **7.2** |
| 111 | 14 | BRON | Bronson WWTP | Influent-1 | 4/1/2019 | ND | **6.1** |
| 112 | 14 | BRON | Bronson WWTP | Influent-1 | 5/7/2019 | ND | **12** |
| 113 | 14 | BRON | Bronson WWTP | Influent-1 | 6/13/2019 | ND | **43** |
| 114 | 14 | BRON | Bronson WWTP | Influent-1 | 7/10/2019 | **3.0** | **13** |
| 115 | 14 | BRON | Bronson WWTP | Influent-1 | 8/5/2019 | **2.6** | **7.8** |
| 116 | 14 | BRON | Bronson WWTP | Influent-1 | 9/3/2019 | ND | **15** |
| 117 | 14 | BRON | Bronson WWTP | Influent-1 | 10/1/2019 | ND | **110** |
| 118 | 14 | BRON | Bronson WWTP | Influent-1 | 11/4/2019 | ND | **14** |
| 119 | 14 | BRON | Bronson WWTP | Influent-1 | 12/2/2019 | ND | **7.4** |
| 120 | 14 | BRON | Bronson WWTP | Influent-1 | 1/6/2020 | ND | **9.4** |
| 121 | 14 | BRON | Bronson WWTP | Influent-1 | 2/3/2020 | ND | **6.8** |
| 122 | 14 | BRON | Bronson WWTP | Influent-1 | 3/2/2020 | ND | **5.3** |
| 123 | 14 | BRON | Bronson WWTP | Influent-1 | 4/6/2020 | **1.9** | **9.0** |
| 124 | 14 | BRON | Bronson WWTP | Influent-1 | 5/4/2020 | ND | **6.6** |
| 125 | 14 | BRON | Bronson WWTP | Influent-1 | 6/3/2020 | **1.8** | **16** |
| 126 | 14 | BRON | Bronson WWTP | Influent-1 | 7/6/2020 | **1.7** | **20** |
| 127 | 14 | BRON | Bronson WWTP | Influent-1 | 8/3/2020 | **2.3** | **28** |
| 128 | 14 | BRON | Bronson WWTP | Influent-1 | 9/7/2020 | **2.3** | **64** |
| 129 | 14 | BRON | Bronson WWTP | Influent-1 | 10/6/2020 | ND | **61** |
| 130 | 15 | BUCH | Buchanan WWTP | Effluent-1 | 11/9/2018 | **35.5** | ND |
| 131 | 15 | BUCH | Buchanan WWTP | Effluent-1 | 1/24/2019 | **34.3** | ND |
| 132 | 15 | BUCH | Buchanan WWTP | Effluent-1 | 10/16/2019 | **52** | ND |
| 133 | 16 | CADI | Cadillac WWTP | Effluent-1 | 11/5/2018 | **20** | **6.5** |
| 134 | 16 | CADI | Cadillac WWTP | Effluent-1 | 6/4/2019 | **16** | **7.8** |
| 135 | 16 | CADI | Cadillac WWTP | Effluent-1 | 10/22/2019 | **3.4** | **2.0** |
| 136 | 18 | CHAR | Charlotte WWTP | Effluent-1 | 7/12/2018 | **2.3** | **5.4** |
| 137 | 18 | CHAR | Charlotte WWTP | Effluent-1 | 2/28/2019 | ND | ND |
| 138 | 18 | CHAR | Charlotte WWTP | Effluent-1 | 6/6/2019 | ND | ND |
| 139 | 18 | CHAR | Charlotte WWTP | Effluent-1 | 10/14/2019 | ND | ND |
| 140 | 19 | CLAR | Clare WWTP | Effluent-1 | 6/20/2018 | **8.1** | **10** |
| 141 | 19 | CLAR | Clare WWTP | Effluent-1 | 6/6/2019 | ND | **8.9** |
| 142 | 19 | CLAR | Clare WWTP | Effluent-1 | 10/31/2019 | **8.7** | **7.5** |
| 143 | 19 | CLAR | Clare WWTP | Influent-1 | 9/20/2018 | **8.0** | **45** |
| 144 | 20 | COLD | Coldwater WRRF | Effluent-1 | 5/14/2019 | ND | ND |
| 145 | 20 | COLD | Coldwater WRRF | Effluent-1 | 10/3/2019 | **2.60** | ND |
| 146 | 23 | DELH | Delhi Twp WWTP | Effluent-1 | 11/1/2018 | **2.33** | **1.76** |
| 147 | 23 | DELH | Delhi Twp WWTP | Effluent-1 | 8/28/2019 | **5.5** | ND |

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| Nr. | WWTP Nr. | WWTP Code | WWTP Name | Sample Type | Sample Date | PFOA (ng/L) | PFOS (ng/L) |
|---|---|---|---|---|---|---|---|
| 148 | 23 | DELH | Delhi Twp WWTP | Influent-1 | 11/1/2018 | ND | ND |
| 149 | 23 | DELH | Delhi Twp WWTP | Influent-1 | 8/28/2019 | ND | ND |
| 150 | 24 | DELT | Delta Twp WWTP | Effluent-1 | 7/15/2019 | ND | **24** |
| 151 | 24 | DELT | Delta Twp WWTP | Effluent-1 | 11/5/2019 | **3.26** | **8.66** |
| 152 | 24 | DELT | Delta Twp WWTP | Effluent-1 | 1/28/2020 | **2.57** | **7.51** |
| 153 | 25 | DEXT | Dexter WWTP | Effluent-1 | 8/14/2018 | **12** | **3.6** |
| 154 | 25 | DEXT | Dexter WWTP | Effluent-1 | 11/2/2018 | **7.97** | **1.51** |
| 155 | 25 | DEXT | Dexter WWTP | Effluent-1 | 5/30/2019 | ND | ND |
| 156 | 25 | DEXT | Dexter WWTP | Effluent-1 | 11/25/2019 | **6.7** | **2.5** |
| 157 | 25 | DEXT | Dexter WWTP | Influent-1 | 11/2/2018 | ND | ND |
| 158 | 27 | DRVR | Downriver WWTP | Effluent-1 | 7/24/2018 | **10** | **9.0** |
| 159 | 27 | DRVR | Downriver WWTP | Effluent-1 | 11/12/2018 | **15** | **10** |
| 160 | 27 | DRVR | Downriver WWTP | Effluent-1 | 11/20/2018 | **12.7** | **7.93** |
| 161 | 27 | DRVR | Downriver WWTP | Effluent-1 | 4/2/2019 | **11** | **9.8** |
| 162 | 27 | DRVR | Downriver WWTP | Effluent-1 | 7/24/2019 | **8.7** | **13** |
| 163 | 27 | DRVR | Downriver WWTP | Effluent-1 | 9/11/2019 | **9.7** | **16** |
| 164 | 27 | DRVR | Downriver WWTP | Effluent-1 | 10/15/2019 | **7.4** | **18** |
| 165 | 27 | DRVR | Downriver WWTP | Effluent-1 | 1/9/2020 | **9.7** | **21** |
| 166 | 27 | DRVR | Downriver WWTP | Influent-1 | 9/19/2018 | **5.6** | **21** |
| 167 | 27 | DRVR | Downriver WWTP | Influent-1 | 11/20/2018 | **7.20** | **22.2** |
| 168 | 27 | DRVR | Downriver WWTP | Influent-1 | 4/2/2019 | **7.5** | **20** |
| 169 | 27 | DRVR | Downriver WWTP | Influent-1 | 7/24/2019 | **6.6** | **19** |
| 170 | 27 | DRVR | Downriver WWTP | Influent-1 | 1/9/2020 | **9.7** | **16** |
| 171 | 28 | EATN | Eaton Rapids WWTP | Effluent-1 | 10/4/2017 | **4.4** | **2.2** |
| 172 | 29 | EAUC | Eau Claire WWSL | Effluent-1 | 10/11/2018 | **8.9** | **4.4** |
| 173 | 32 | FLIN | Flint WWTP | Effluent-1 | 5/9/2017 | **7.5** | **28** |
| 174 | 32 | FLIN | Flint WWTP | Effluent-1 | 10/31/2017 | **7.4** | **19** |
| 175 | 32 | FLIN | Flint WWTP | Effluent-1 | 6/18/2018 | **6.1** | **24** |
| 176 | 32 | FLIN | Flint WWTP | Effluent-1 | 11/5/2018 | **4.50** | **14.8** |
| 177 | 32 | FLIN | Flint WWTP | Effluent-1 | 11/13/2018 | **5.6** | **15** |
| 178 | 32 | FLIN | Flint WWTP | Effluent-1 | 2/18/2019 | **5.1** | **14** |
| 179 | 32 | FLIN | Flint WWTP | Effluent-1 | 4/8/2019 | **6.6** | **18** |
| 180 | 32 | FLIN | Flint WWTP | Effluent-1 | 7/2/2019 | **7.4** | **28** |
| 181 | 32 | FLIN | Flint WWTP | Effluent-1 | 10/7/2019 | **8.2** | **37** |
| 182 | 32 | FLIN | Flint WWTP | Effluent-1 | 1/7/2020 | **5.9** | **18** |
| 183 | 32 | FLIN | Flint WWTP | Influent-1 | 10/31/2017 | **6.3** | **26** |
| 184 | 32 | FLIN | Flint WWTP | Influent-1 | 11/5/2018 | **4.83** | **26.6** |
| 185 | 32 | FLIN | Flint WWTP | Influent-1 | 11/13/2018 | **5.2** | **37** |
| 186 | 32 | FLIN | Flint WWTP | Influent-1 | 2/18/2019 | **5.3** | **35** |
| 187 | 32 | FLIN | Flint WWTP | Influent-1 | 4/8/2019 | **8.9** | **31** |
| 188 | 32 | FLIN | Flint WWTP | Influent-1 | 7/2/2019 | **7.3** | **51** |
| 189 | 32 | FLIN | Flint WWTP | Influent-1 | 10/7/2019 | **9.2** | **96** |
| 190 | 32 | FLIN | Flint WWTP | Influent-1 | 1/7/2020 | **5.8** | **38** |
| 191 | 32 | FLIN | Flint WWTP | Influent-2 | 11/5/2018 | **6.35** | **34.8** |
| 192 | 32 | FLIN | Flint WWTP | Influent-2 | 11/13/2018 | **3.9** | **7.7** |
| 193 | 32 | FLIN | Flint WWTP | Influent-2 | 2/18/2019 | **3.1** | **6.5** |
| 194 | 32 | FLIN | Flint WWTP | Influent-2 | 4/8/2019 | **6.5** | **16** |
| 195 | 32 | FLIN | Flint WWTP | Influent-2 | 7/2/2019 | **4.6** | **12** |
| 196 | 32 | FLIN | Flint WWTP | Influent-2 | 10/7/2019 | **6.4** | **17** |
| 197 | 32 | FLIN | Flint WWTP | Influent-2 | 1/7/2020 | **4.5** | **7.8** |

# Table 3

WWTPs PFAS Results
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| Nr. | WWTP Nr. | WWTP Code | WWTP Name | Sample Type | Sample Date | PFOA (ng/L) | PFOS (ng/L) |
|---|---|---|---|---|---|---|---|
| 198 | 32 | FLIN | Flint WWTP | Influent-3 | 11/5/2018 | **4.41** | **16.4** |
| 199 | 32 | FLIN | Flint WWTP | Influent-3 | 11/13/2018 | **4.3** | **9.0** |
| 200 | 32 | FLIN | Flint WWTP | Influent-3 | 2/18/2019 | **3.9** | **12** |
| 201 | 32 | FLIN | Flint WWTP | Influent-3 | 4/8/2019 | **4.3** | **11** |
| 202 | 32 | FLIN | Flint WWTP | Influent-3 | 7/2/2019 | **4.9** | **12** |
| 203 | 32 | FLIN | Flint WWTP | Influent-3 | 10/7/2019 | **5.1** | **13** |
| 204 | 32 | FLIN | Flint WWTP | Influent-3 | 1/7/2020 | **4.0** | **10** |
| 205 | 33 | FOWL | Fowlerville WWTP | Effluent-1 | 6/14/2018 | **10** | ND |
| 206 | 33 | FOWL | Fowlerville WWTP | Effluent-1 | 11/13/2018 | **7.6** | **1.47** |
| 207 | 33 | FOWL | Fowlerville WWTP | Influent-1 | 11/13/2018 | ND | ND |
| 208 | 35 | GENE | Genesee Co #3 WWTP | Effluent-1 | 6/27/2018 | **9.8** | **4.2** |
| 209 | 35 | GENE | Genesee Co #3 WWTP | Effluent-1 | 8/24/2018 | **10** | **3.1** |
| 210 | 35 | GENE | Genesee Co #3 WWTP | Effluent-1 | 3/13/2019 | **5.6** | ND |
| 211 | 35 | GENE | Genesee Co #3 WWTP | Effluent-1 | 10/17/2019 | **11** | **4.7** |
| 212 | 35 | GENE | Genesee Co #3 WWTP | Influent-1 | 8/23/2018 | **2.6** | ND |
| 213 | 36 | RAGN | Genesee Co-Ragnone WWTP | Effluent-1 | 4/11/2017 | **7.4** | **5.1** |
| 214 | 36 | RAGN | Genesee Co-Ragnone WWTP | Effluent-1 | 5/9/2017 | **7.4** | **3.3** |
| 215 | 36 | RAGN | Genesee Co-Ragnone WWTP | Effluent-1 | 5/9/2017 | **8.2** | **6.6** |
| 216 | 36 | RAGN | Genesee Co-Ragnone WWTP | Effluent-1 | 11/5/2018 | **7.23** | **4.72** |
| 217 | 36 | RAGN | Genesee Co-Ragnone WWTP | Effluent-1 | 5/16/2019 | ND | ND |
| 218 | 36 | RAGN | Genesee Co-Ragnone WWTP | Effluent-1 | 10/17/2019 | **9.3** | **4.5** |
| 219 | 36 | RAGN | Genesee Co-Ragnone WWTP | Influent-1 | 4/11/2017 | **5.5** | **6.0** |
| 220 | 36 | RAGN | Genesee Co-Ragnone WWTP | Influent-1 | 11/5/2018 | **4.00** | **5.22** |
| 221 | 37 | GLAD | Gladwin WWTP | Effluent-1 | 8/15/2017 | **7.7** | **5.9** |
| 222 | 38 | GLWA | GLWA WRRF (Detroit) | Effluent-1 | 4/17/2018 | **7.5** | **15** |
| 223 | 38 | GLWA | GLWA WRRF (Detroit) | Effluent-1 | 9/14/2018 | **12** | **13** |
| 224 | 38 | GLWA | GLWA WRRF (Detroit) | Effluent-1 | 10/16/2018 | **9.6** | **13** |
| 225 | 38 | GLWA | GLWA WRRF (Detroit) | Effluent-1 | 11/16/2018 | **6.70** | **9.68** |
| 226 | 38 | GLWA | GLWA WRRF (Detroit) | Effluent-1 | 1/3/2019 | **7.0** | **9.1** |
| 227 | 38 | GLWA | GLWA WRRF (Detroit) | Effluent-1 | 4/3/2019 | **9.6** | **13** |
| 228 | 38 | GLWA | GLWA WRRF (Detroit) | Effluent-1 | 4/16/2019 | **9.2** | **11** |
| 229 | 38 | GLWA | GLWA WRRF (Detroit) | Effluent-1 | 7/2/2019 | **6.4** | **5.7** |
| 230 | 38 | GLWA | GLWA WRRF (Detroit) | Effluent-1 | 10/7/2019 | **8.8** | **30** |
| 231 | 38 | GLWA | GLWA WRRF (Detroit) | Effluent-1 | 11/26/2019 | **9.1** | **29** |
| 232 | 38 | GLWA | GLWA WRRF (Detroit) | Effluent-1 | 1/9/2020 | **8.1** | **30** |
| 233 | 38 | GLWA | GLWA WRRF (Detroit) | Effluent-2 | 11/16/2018 | **7.18** | **9.31** |
| 234 | 38 | GLWA | GLWA WRRF (Detroit) | Influent-1 | 11/16/2018 | **6.02** | **7.54** |
| 235 | 38 | GLWA | GLWA WRRF (Detroit) | Influent-2 | 11/16/2018 | **9.10** | **15.6** |
| 236 | 38 | GLWA | GLWA WRRF (Detroit) | Influent-3 | 11/16/2018 | **4.64** | **10.7** |
| 237 | 39 | GHSL | Grand Haven - Spring Lake WWTP | Effluent-1 | 8/8/2018 | **6.91** | **5.87** |
| 238 | 39 | GHSL | Grand Haven - Spring Lake WWTP | Effluent-1 | 5/5/2019 | **3.49** | **9.94** |
| 239 | 39 | GHSL | Grand Haven - Spring Lake WWTP | Effluent-1 | 10/29/2019 | ND | ND |
| 240 | 40 | GRAP | Grand Rapids WRRF | Effluent-1 | 9/12/2018 | **17** | **60** |
| 241 | 40 | GRAP | Grand Rapids WRRF | Effluent-1 | 10/29/2018 | **11.4** | **35.6** |
| 242 | 40 | GRAP | Grand Rapids WRRF | Effluent-1 | 11/19/2018 | **7.6** | **36** |
| 243 | 40 | GRAP | Grand Rapids WRRF | Effluent-1 | 11/20/2018 | **12** | **31** |
| 244 | 40 | GRAP | Grand Rapids WRRF | Effluent-1 | 11/21/2018 | **13** | **28** |
| 245 | 40 | GRAP | Grand Rapids WRRF | Effluent-1 | 12/10/2018 | **6.4** | **20** |
| 246 | 40 | GRAP | Grand Rapids WRRF | Effluent-1 | 12/11/2018 | **14** | **36** |

# Table 3
WWTPs PFAS Results
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| Nr. | WWTP Nr. | WWTP Code | WWTP Name | Sample Type | Sample Date | PFOA (ng/L) | PFOS (ng/L) |
|---|---|---|---|---|---|---|---|
| 247 | 40 | GRAP | Grand Rapids WRRF | Effluent-1 | 12/12/2018 | **14** | **64** |
| 248 | 40 | GRAP | Grand Rapids WRRF | Effluent-1 | 12/13/2018 | **14** | **30** |
| 249 | 40 | GRAP | Grand Rapids WRRF | Effluent-1 | 12/14/2018 | **12** | **29** |
| 250 | 40 | GRAP | Grand Rapids WRRF | Effluent-1 | 1/14/2019 | **7.7** | **21** |
| 251 | 40 | GRAP | Grand Rapids WRRF | Effluent-1 | 2/1/2019 | **6.2** | **36** |
| 252 | 40 | GRAP | Grand Rapids WRRF | Effluent-1 | 3/1/2019 | **15** | **32** |
| 253 | 40 | GRAP | Grand Rapids WRRF | Effluent-1 | 4/3/2019 | **16** | **57** |
| 254 | 40 | GRAP | Grand Rapids WRRF | Effluent-1 | 5/3/2019 | **9.6** | **23** |
| 255 | 40 | GRAP | Grand Rapids WRRF | Effluent-1 | 6/10/2019 | **6.2** | **22** |
| 256 | 40 | GRAP | Grand Rapids WRRF | Effluent-1 | 7/3/2019 | **12** | **23** |
| 257 | 40 | GRAP | Grand Rapids WRRF | Effluent-1 | 8/1/2019 | **21** | **350** |
| 258 | 40 | GRAP | Grand Rapids WRRF | Effluent-1 | 9/9/2019 | **6.7** | **37** |
| 259 | 40 | GRAP | Grand Rapids WRRF | Effluent-1 | 10/14/2019 | **12** | **18** |
| 260 | 40 | GRAP | Grand Rapids WRRF | Effluent-1 | 11/4/2019 | **9.0** | **17** |
| 261 | 40 | GRAP | Grand Rapids WRRF | Effluent-1 | 12/2/2019 | **8.9** | **18** |
| 262 | 40 | GRAP | Grand Rapids WRRF | Effluent-1 | 1/2/2020 | **9.5** | **15** |
| 263 | 40 | GRAP | Grand Rapids WRRF | Effluent-1 | 2/3/2020 | **6.9** | **16** |
| 264 | 40 | GRAP | Grand Rapids WRRF | Influent-1 | 5/10/2018 | **6.2** | **55** |
| 265 | 40 | GRAP | Grand Rapids WRRF | Influent-1 | 9/12/2018 | **7.1** | **36** |
| 266 | 40 | GRAP | Grand Rapids WRRF | Influent-1 | 10/29/2018 | **5.06** | **12.7** |
| 267 | 40 | GRAP | Grand Rapids WRRF | Influent-1 | 11/19/2018 | **5.2** | **18** |
| 268 | 40 | GRAP | Grand Rapids WRRF | Influent-1 | 11/20/2018 | **10** | **17** |
| 269 | 40 | GRAP | Grand Rapids WRRF | Influent-1 | 11/21/2018 | **5.2** | **15** |
| 270 | 40 | GRAP | Grand Rapids WRRF | Influent-1 | 12/10/2018 | **5.9** | **34** |
| 271 | 40 | GRAP | Grand Rapids WRRF | Influent-1 | 12/11/2018 | **7.2** | **20** |
| 272 | 40 | GRAP | Grand Rapids WRRF | Influent-1 | 12/12/2018 | **5.7** | **23** |
| 273 | 40 | GRAP | Grand Rapids WRRF | Influent-1 | 12/13/2018 | **31** | **33** |
| 274 | 40 | GRAP | Grand Rapids WRRF | Influent-1 | 12/14/2018 | **5.1** | **20** |
| 275 | 40 | GRAP | Grand Rapids WRRF | Influent-1 | 1/14/2019 | **12** | **39** |
| 276 | 40 | GRAP | Grand Rapids WRRF | Influent-1 | 2/1/2019 | **4.6** | **15** |
| 277 | 40 | GRAP | Grand Rapids WRRF | Influent-1 | 3/1/2019 | **5.6** | **19** |
| 278 | 40 | GRAP | Grand Rapids WRRF | Influent-1 | 4/3/2019 | **5.7** | **25** |
| 279 | 40 | GRAP | Grand Rapids WRRF | Influent-1 | 5/3/2019 | **7.1** | **17** |
| 280 | 40 | GRAP | Grand Rapids WRRF | Influent-1 | 6/10/2019 | **21** | **31** |
| 281 | 40 | GRAP | Grand Rapids WRRF | Influent-1 | 7/3/2019 | **6.7** | **20** |
| 282 | 40 | GRAP | Grand Rapids WRRF | Influent-1 | 8/1/2019 | **7.9** | **24** |
| 283 | 40 | GRAP | Grand Rapids WRRF | Influent-1 | 9/9/2019 | **6.4** | **40** |
| 284 | 40 | GRAP | Grand Rapids WRRF | Influent-1 | 10/14/2019 | **6.9** | **34** |
| 285 | 40 | GRAP | Grand Rapids WRRF | Influent-1 | 11/4/2019 | **5.6** | **23** |
| 286 | 40 | GRAP | Grand Rapids WRRF | Influent-1 | 12/2/2019 | **4.5** | **23** |
| 287 | 40 | GRAP | Grand Rapids WRRF | Influent-1 | 1/2/2020 | **5.8** | **14** |
| 288 | 40 | GRAP | Grand Rapids WRRF | Influent-1 | 2/3/2020 | **4.9** | **21** |
| 289 | 41 | GREE | Greenville WWTP | Effluent-1 | 8/21/2018 | **3.1** | **3.1** |
| 290 | 41 | GREE | Greenville WWTP | Effluent-1 | 6/27/2019 | ND | ND |
| 291 | 44 | HART | Hartford WWTP | Effluent-1 | 6/21/2018 | **3.5** | **4.0** |
| 292 | 45 | HAST | Hastings WWTP | Effluent-1 | 3/28/2018 | **19** | **4.9** |
| 293 | 45 | HAST | Hastings WWTP | Effluent-1 | 10/22/2019 | **10.79** | **8.60** |
| 294 | 47 | HOLL | Holland WWTP | Effluent-1 | 8/6/2018 | ND | **2.61** |
| 295 | 47 | HOLL | Holland WWTP | Effluent-1 | 10/30/2018 | **3.61** | **2.19** |
| 296 | 47 | HOLL | Holland WWTP | Effluent-1 | 10/30/2018 | **4.67** | **2.41** |

# Table 3

WWTPs PFAS Results
Michigan IPP PFAS Initiative

| Nr. | WWTP Nr. | WWTP Code | WWTP Name | Sample Type | Sample Date | PFOA (ng/L) | PFOS (ng/L) |
|---|---|---|---|---|---|---|---|
| 297 | 47 | HOLL | Holland WWTP | Effluent-1 | 4/11/2019 | ND | ND |
| 298 | 47 | HOLL | Holland WWTP | Effluent-1 | 10/7/2019 | ND | ND |
| 299 | 47 | HOLL | Holland WWTP | Effluent-2 | 10/30/2018 | **3.07** | ND |
| 300 | 47 | HOLL | Holland WWTP | Influent-1 | 8/6/2018 | **6.73** | ND |
| 301 | 47 | HOLL | Holland WWTP | Influent-1 | 8/7/2018 | **2.55** | **2.44** |
| 302 | 47 | HOLL | Holland WWTP | Influent-1 | 10/30/2018 | ND | ND |
| 303 | 47 | HOLL | Holland WWTP | Influent-1 | 10/30/2018 | **3.20** | ND |
| 304 | 47 | HOLL | Holland WWTP | Influent-2 | 8/7/2018 | **11.13** | **2.96** |
| 305 | 47 | HOLL | Holland WWTP | Influent-2 | 10/30/2018 | **5.73** | **3.79** |
| 306 | 48 | HLLY | Holly WWTP | Effluent-1 | 5/7/2018 | **7.0** | **4.6** |
| 307 | 49 | HOWE | Howell WWTP | Effluent-1 | 5/22/2018 | **8.9** | **13** |
| 308 | 49 | HOWE | Howell WWTP | Effluent-1 | 6/1/2018 | **29** | **130** |
| 309 | 49 | HOWE | Howell WWTP | Effluent-1 | 8/28/2018 | ND | ND |
| 310 | 49 | HOWE | Howell WWTP | Effluent-1 | 8/28/2018 | ND | ND |
| 311 | 49 | HOWE | Howell WWTP | Effluent-1 | 9/19/2018 | ND | ND |
| 312 | 49 | HOWE | Howell WWTP | Effluent-1 | 10/29/2018 | ND | ND |
| 313 | 49 | HOWE | Howell WWTP | Effluent-1 | 11/13/2018 | **7.39** | **4.87** |
| 314 | 49 | HOWE | Howell WWTP | Effluent-1 | 11/13/2018 | ND | ND |
| 315 | 49 | HOWE | Howell WWTP | Effluent-1 | 12/20/2018 | **7.5** | **4.2** |
| 316 | 49 | HOWE | Howell WWTP | Effluent-1 | 1/17/2019 | **6.3** | **4.1** |
| 317 | 49 | HOWE | Howell WWTP | Effluent-1 | 2/14/2019 | **6.2** | **4.0** |
| 318 | 49 | HOWE | Howell WWTP | Effluent-1 | 4/5/2019 | **8.9** | **5.2** |
| 319 | 49 | HOWE | Howell WWTP | Effluent-1 | 5/17/2019 | **9.7** | **8.3** |
| 320 | 49 | HOWE | Howell WWTP | Effluent-1 | 6/20/2019 | **9.1** | **6.0** |
| 321 | 49 | HOWE | Howell WWTP | Effluent-1 | 7/17/2019 | **12** | **6.4** |
| 322 | 49 | HOWE | Howell WWTP | Effluent-1 | 8/16/2019 | **7.5** | **6.0** |
| 323 | 49 | HOWE | Howell WWTP | Effluent-1 | 9/17/2019 | **5.9** | **5.8** |
| 324 | 49 | HOWE | Howell WWTP | Effluent-1 | 10/3/2019 | **5.1** | **5.5** |
| 325 | 49 | HOWE | Howell WWTP | Effluent-1 | 10/23/2019 | ND | **6.3** |
| 326 | 49 | HOWE | Howell WWTP | Effluent-1 | 11/20/2019 | **6.2** | **3.9** |
| 327 | 49 | HOWE | Howell WWTP | Effluent-1 | 12/6/2019 | **8.2** | **5.8** |
| 328 | 49 | HOWE | Howell WWTP | Effluent-1 | 1/7/2020 | **19** | **3.7** |
| 329 | 49 | HOWE | Howell WWTP | Effluent-1 | 2/5/2020 | **11** | **4.8** |
| 330 | 49 | HOWE | Howell WWTP | Effluent-1 | 3/4/2020 | **5.9** | **4.1** |
| 331 | 49 | HOWE | Howell WWTP | Effluent-1 | 4/2/2020 | **5.7** | **4.3** |
| 332 | 49 | HOWE | Howell WWTP | Effluent-1 | 5/7/2020 | **6.3** | **3.7** |
| 333 | 49 | HOWE | Howell WWTP | Effluent-1 | 6/4/2020 | **7.7** | **5.5** |
| 334 | 49 | HOWE | Howell WWTP | Effluent-1 | 7/8/2020 | **9.1** | **4.5** |
| 335 | 49 | HOWE | Howell WWTP | Effluent-1 | 8/4/2020 | **16** | **5.2** |
| 336 | 49 | HOWE | Howell WWTP | Effluent-1 | 9/3/2020 | **11** | **5.3** |
| 337 | 49 | HOWE | Howell WWTP | Effluent-1 | 10/1/2020 | **11** | **4.9** |
| 338 | 49 | HOWE | Howell WWTP | Effluent-1 | 11/2/2020 | **10** | **4.8** |
| 339 | 49 | HOWE | Howell WWTP | Influent-1 | 8/28/2018 | ND | **10** |
| 340 | 49 | HOWE | Howell WWTP | Influent-1 | 8/28/2018 | ND | **20** |
| 341 | 49 | HOWE | Howell WWTP | Influent-1 | 11/13/2018 | **4.42** | ND |
| 342 | 49 | HOWE | Howell WWTP | Influent-1 | 11/13/2018 | ND | ND |
| 343 | 50 | IONA | Ionia WWTP | Effluent-1 | 5/9/2018 | **1.1** | **280** |
| 344 | 50 | IONA | Ionia WWTP | Effluent-1 | 6/26/2018 | ND | **430** |
| 345 | 50 | IONA | Ionia WWTP | Effluent-1 | 8/14/2018 | **2.2** | **330** |
| 346 | 50 | IONA | Ionia WWTP | Effluent-1 | 9/4/2018 | **2.5** | **190** |

# Table 3
WWTPs PFAS Results
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| Nr. | WWTP Nr. | WWTP Code | WWTP Name | Sample Type | Sample Date | PFOA (ng/L) | PFOS (ng/L) |
|---|---|---|---|---|---|---|---|
| 347 | 50 | IONA | Ionia WWTP | Effluent-1 | 10/1/2018 | ND | **540** |
| 348 | 50 | IONA | Ionia WWTP | Effluent-1 | 10/31/2018 | ND | **451.83** |
| 349 | 50 | IONA | Ionia WWTP | Effluent-1 | 10/31/2018 | ND | **635** |
| 350 | 50 | IONA | Ionia WWTP | Effluent-1 | 11/1/2018 | ND | **335.73** |
| 351 | 50 | IONA | Ionia WWTP | Effluent-1 | 12/3/2018 | ND | **185.10** |
| 352 | 50 | IONA | Ionia WWTP | Effluent-1 | 1/2/2019 | ND | ND |
| 353 | 50 | IONA | Ionia WWTP | Effluent-1 | 2/4/2019 | ND | **125.09** |
| 354 | 50 | IONA | Ionia WWTP | Effluent-1 | 3/5/2019 | ND | **63.35** |
| 355 | 50 | IONA | Ionia WWTP | Effluent-1 | 4/2/2019 | ND | **58.71** |
| 356 | 50 | IONA | Ionia WWTP | Effluent-1 | 5/1/2019 | **10.25** | **217.43** |
| 357 | 50 | IONA | Ionia WWTP | Effluent-1 | 6/3/2019 | ND | **9.71** |
| 358 | 50 | IONA | Ionia WWTP | Effluent-1 | 7/1/2019 | ND | **76.83** |
| 359 | 50 | IONA | Ionia WWTP | Effluent-1 | 7/16/2019 | ND | **11.28** |
| 360 | 50 | IONA | Ionia WWTP | Effluent-1 | 8/5/2019 | ND | **8.16** |
| 361 | 50 | IONA | Ionia WWTP | Effluent-1 | 9/5/2019 | ND | **168.85** |
| 362 | 50 | IONA | Ionia WWTP | Effluent-1 | 10/1/2019 | ND | ND |
| 363 | 50 | IONA | Ionia WWTP | Effluent-1 | 11/1/2019 | ND | ND |
| 364 | 50 | IONA | Ionia WWTP | Effluent-1 | 12/1/2019 | ND | ND |
| 365 | 50 | IONA | Ionia WWTP | Effluent-1 | 1/9/2020 | **6.45** | **13.18** |
| 366 | 50 | IONA | Ionia WWTP | Effluent-1 | 2/3/2020 | ND | ND |
| 367 | 50 | IONA | Ionia WWTP | Effluent-1 | 3/9/2020 | ND | ND |
| 368 | 50 | IONA | Ionia WWTP | Effluent-1 | 4/4/2020 | ND | ND |
| 369 | 50 | IONA | Ionia WWTP | Effluent-1 | 5/6/2020 | ND | ND |
| 370 | 50 | IONA | Ionia WWTP | Effluent-1 | 6/2/2020 | ND | **25.48** |
| 371 | 50 | IONA | Ionia WWTP | Effluent-1 | 7/8/2020 | ND | ND |
| 372 | 50 | IONA | Ionia WWTP | Effluent-1 | 8/5/2020 | ND | ND |
| 373 | 50 | IONA | Ionia WWTP | Effluent-1 | 9/3/2020 | ND | **11.23** |
| 374 | 50 | IONA | Ionia WWTP | Effluent-1 | 10/5/2020 | ND | ND |
| 375 | 50 | IONA | Ionia WWTP | Effluent-1 | 11/2/2020 | ND | ND |
| 376 | 50 | IONA | Ionia WWTP | Effluent-1 | 12/3/2020 | ND | ND |
| 377 | 50 | IONA | Ionia WWTP | Influent-1 | 10/31/2018 | ND | **499.36** |
| 378 | 50 | IONA | Ionia WWTP | Influent-1 | 10/31/2018 | ND | **213** |
| 379 | 50 | IONA | Ionia WWTP | Influent-1 | 10/1/2019 | ND | ND |
| 380 | 52 | JACK | Jackson WWTP | Effluent-1 | 8/28/2018 | ND | ND |
| 381 | 52 | JACK | Jackson WWTP | Effluent-1 | 11/5/2018 | **3.38** | **3.17** |
| 382 | 52 | JACK | Jackson WWTP | Effluent-1 | 5/16/2019 | ND | ND |
| 383 | 52 | JACK | Jackson WWTP | Effluent-1 | 9/16/2019 | ND | ND |
| 384 | 52 | JACK | Jackson WWTP | Influent-1 | 11/5/2018 | ND | **5.98** |
| 385 | 53 | KZOO | Kalamazoo WWTP | Effluent-1 | 5/21/2018 | **15** | **38** |
| 386 | 53 | KZOO | Kalamazoo WWTP | Effluent-1 | 5/23/2018 | **13** | **35** |
| 387 | 53 | KZOO | Kalamazoo WWTP | Effluent-1 | 6/1/2018 | **12** | **29** |
| 388 | 53 | KZOO | Kalamazoo WWTP | Effluent-1 | 6/27/2018 | **19** | **28** |
| 389 | 53 | KZOO | Kalamazoo WWTP | Effluent-1 | 7/2/2018 | **11** | **8.4** |
| 390 | 53 | KZOO | Kalamazoo WWTP | Effluent-1 | 7/11/2018 | **11** | **12** |
| 391 | 53 | KZOO | Kalamazoo WWTP | Effluent-1 | 7/17/2018 | **13** | **22** |
| 392 | 53 | KZOO | Kalamazoo WWTP | Effluent-1 | 7/25/2018 | **9.8** | **24** |
| 393 | 53 | KZOO | Kalamazoo WWTP | Effluent-1 | 7/25/2018 | ND | **40** |
| 394 | 53 | KZOO | Kalamazoo WWTP | Effluent-1 | 8/1/2018 | **13** | **25** |
| 395 | 53 | KZOO | Kalamazoo WWTP | Effluent-1 | 8/7/2018 | ND | ND |
| 396 | 53 | KZOO | Kalamazoo WWTP | Effluent-1 | 8/15/2018 | **10** | **12** |

# Table 3

WWTPs PFAS Results
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| Nr. | WWTP Nr. | WWTP Code | WWTP Name | Sample Type | Sample Date | PFOA (ng/L) | PFOS (ng/L) |
|---|---|---|---|---|---|---|---|
| 397 | 53 | KZOO | Kalamazoo WWTP | Effluent-1 | 8/22/2018 | **7.5** | **6.8** |
| 398 | 53 | KZOO | Kalamazoo WWTP | Effluent-1 | 8/29/2018 | ND | ND |
| 399 | 53 | KZOO | Kalamazoo WWTP | Effluent-1 | 8/29/2018 | ND | ND |
| 400 | 53 | KZOO | Kalamazoo WWTP | Effluent-1 | 8/29/2018 | ND | **5.15** |
| 401 | 53 | KZOO | Kalamazoo WWTP | Effluent-1 | 9/5/2018 | **9.4** | **8.8** |
| 402 | 53 | KZOO | Kalamazoo WWTP | Effluent-1 | 9/12/2018 | ND | ND |
| 403 | 53 | KZOO | Kalamazoo WWTP | Effluent-1 | 9/18/2018 | ND | ND |
| 404 | 53 | KZOO | Kalamazoo WWTP | Effluent-1 | 9/26/2018 | ND | ND |
| 405 | 53 | KZOO | Kalamazoo WWTP | Effluent-1 | 10/3/2018 | ND | ND |
| 406 | 53 | KZOO | Kalamazoo WWTP | Effluent-1 | 10/10/2018 | ND | **11** |
| 407 | 53 | KZOO | Kalamazoo WWTP | Effluent-1 | 10/16/2018 | **31** | **11** |
| 408 | 53 | KZOO | Kalamazoo WWTP | Effluent-1 | 10/24/2018 | **11** | ND |
| 409 | 53 | KZOO | Kalamazoo WWTP | Effluent-1 | 10/30/2018 | **9.81** | **5.79** |
| 410 | 53 | KZOO | Kalamazoo WWTP | Effluent-1 | 10/31/2018 | ND | ND |
| 411 | 53 | KZOO | Kalamazoo WWTP | Effluent-1 | 11/15/2018 | ND | ND |
| 412 | 53 | KZOO | Kalamazoo WWTP | Effluent-1 | 11/21/2018 | ND | ND |
| 413 | 53 | KZOO | Kalamazoo WWTP | Effluent-1 | 11/28/2018 | ND | ND |
| 414 | 53 | KZOO | Kalamazoo WWTP | Effluent-1 | 12/5/2018 | ND | ND |
| 415 | 53 | KZOO | Kalamazoo WWTP | Effluent-1 | 12/12/2018 | ND | ND |
| 416 | 53 | KZOO | Kalamazoo WWTP | Effluent-1 | 12/19/2018 | ND | ND |
| 417 | 53 | KZOO | Kalamazoo WWTP | Effluent-1 | 12/27/2018 | ND | ND |
| 418 | 53 | KZOO | Kalamazoo WWTP | Effluent-1 | 1/31/2019 | **5.77** | **3.09** |
| 419 | 53 | KZOO | Kalamazoo WWTP | Effluent-1 | 10/16/2019 | **4.16** | **5.53** |
| 420 | 53 | KZOO | Kalamazoo WWTP | Effluent-1 | 10/17/2019 | **4.69** | **3.89** |
| 421 | 53 | KZOO | Kalamazoo WWTP | Effluent-1 | 5/13/2020 | **6.60** | **4.68** |
| 422 | 53 | KZOO | Kalamazoo WWTP | Effluent-1 | 9/17/2020 | **12.1** | **4.1** |
| 423 | 53 | KZOO | Kalamazoo WWTP | Effluent-1 | 9/17/2020 | **11.7** | **1.54** |
| 424 | 53 | KZOO | Kalamazoo WWTP | Effluent-1 | 9/18/2020 | **10.6** | **4.17** |
| 425 | 53 | KZOO | Kalamazoo WWTP | Effluent-1 | 9/18/2020 | **10.1** | **1.04** |
| 426 | 53 | KZOO | Kalamazoo WWTP | Effluent-1 | 9/19/2020 | **9.42** | ND |
| 427 | 53 | KZOO | Kalamazoo WWTP | Effluent-1 | 9/20/2020 | **8.88** | **3.97** |
| 428 | 53 | KZOO | Kalamazoo WWTP | Effluent-1 | 9/21/2020 | **8.66** | **4.26** |
| 429 | 53 | KZOO | Kalamazoo WWTP | Effluent-1 | 9/22/2020 | **9.75** | **4.75** |
| 430 | 53 | KZOO | Kalamazoo WWTP | Effluent-1 | 9/23/2020 | **9.61** | **3.11** |
| 431 | 53 | KZOO | Kalamazoo WWTP | Effluent-1 | 9/24/2020 | **9.28** | **4.15** |
| 432 | 53 | KZOO | Kalamazoo WWTP | Effluent-1 | 9/28/2020 | **9.03** | **3.96** |
| 433 | 53 | KZOO | Kalamazoo WWTP | Effluent-1 | 10/1/2020 | **8.12** | **4.46** |
| 434 | 53 | KZOO | Kalamazoo WWTP | Effluent-1 | 10/14/2020 | **8.74** | **4.84** |
| 435 | 53 | KZOO | Kalamazoo WWTP | Effluent-2 | 6/27/2018 | **10** | **20** |
| 436 | 53 | KZOO | Kalamazoo WWTP | Influent-1 | 5/20/2018 | **10** | **38** |
| 437 | 53 | KZOO | Kalamazoo WWTP | Influent-1 | 5/22/2018 | **13** | **37** |
| 438 | 53 | KZOO | Kalamazoo WWTP | Influent-1 | 5/31/2018 | ND | **50** |
| 439 | 53 | KZOO | Kalamazoo WWTP | Influent-1 | 6/26/2018 | ND | ND |
| 440 | 53 | KZOO | Kalamazoo WWTP | Influent-1 | 7/2/2018 | ND | **15** |
| 441 | 53 | KZOO | Kalamazoo WWTP | Influent-1 | 7/10/2018 | ND | **11** |
| 442 | 53 | KZOO | Kalamazoo WWTP | Influent-1 | 7/16/2018 | ND | **36** |
| 443 | 53 | KZOO | Kalamazoo WWTP | Influent-1 | 7/24/2018 | ND | ND |
| 444 | 53 | KZOO | Kalamazoo WWTP | Influent-1 | 7/31/2018 | ND | **190** |
| 445 | 53 | KZOO | Kalamazoo WWTP | Influent-1 | 8/7/2018 | ND | ND |

# Table 3

WWTPs PFAS Results
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| Nr. | WWTP Nr. | WWTP Code | WWTP Name | Sample Type | Sample Date | PFOA (ng/L) | PFOS (ng/L) |
|---|---|---|---|---|---|---|---|
| 446 | 53 | KZOO | Kalamazoo WWTP | Influent-1 | 8/14/2018 | ND | ND |
| 447 | 53 | KZOO | Kalamazoo WWTP | Influent-1 | 8/21/2018 | ND | ND |
| 448 | 53 | KZOO | Kalamazoo WWTP | Influent-1 | 8/28/2018 | **29** | **21** |
| 449 | 53 | KZOO | Kalamazoo WWTP | Influent-1 | 9/4/2018 | ND | ND |
| 450 | 53 | KZOO | Kalamazoo WWTP | Influent-1 | 9/11/2018 | ND | ND |
| 451 | 53 | KZOO | Kalamazoo WWTP | Influent-1 | 9/18/2018 | ND | **75** |
| 452 | 53 | KZOO | Kalamazoo WWTP | Influent-1 | 9/25/2018 | ND | ND |
| 453 | 53 | KZOO | Kalamazoo WWTP | Influent-1 | 10/2/2018 | ND | **11** |
| 454 | 53 | KZOO | Kalamazoo WWTP | Influent-1 | 10/10/2018 | **13** | **11** |
| 455 | 53 | KZOO | Kalamazoo WWTP | Influent-1 | 10/16/2018 | ND | **11** |
| 456 | 53 | KZOO | Kalamazoo WWTP | Influent-1 | 10/23/2018 | ND | ND |
| 457 | 53 | KZOO | Kalamazoo WWTP | Influent-1 | 10/30/2018 | **8.43** | **26.0** |
| 458 | 53 | KZOO | Kalamazoo WWTP | Influent-1 | 10/30/2018 | ND | ND |
| 459 | 53 | KZOO | Kalamazoo WWTP | Influent-1 | 11/6/2018 | ND | ND |
| 460 | 53 | KZOO | Kalamazoo WWTP | Influent-1 | 11/14/2018 | ND | ND |
| 461 | 53 | KZOO | Kalamazoo WWTP | Influent-1 | 11/20/2018 | ND | ND |
| 462 | 53 | KZOO | Kalamazoo WWTP | Influent-1 | 11/27/2018 | ND | ND |
| 463 | 53 | KZOO | Kalamazoo WWTP | Influent-1 | 12/4/2018 | ND | **10.0** |
| 464 | 53 | KZOO | Kalamazoo WWTP | Influent-1 | 12/11/2018 | ND | **11** |
| 465 | 53 | KZOO | Kalamazoo WWTP | Influent-1 | 12/18/2018 | ND | ND |
| 466 | 53 | KZOO | Kalamazoo WWTP | Influent-1 | 12/26/2018 | ND | ND |
| 467 | 53 | KZOO | Kalamazoo WWTP | Influent-1 | 1/30/2019 | **6.89** | **3.84** |
| 468 | 53 | KZOO | Kalamazoo WWTP | Influent-1 | 10/16/2019 | **3.15** | **5.47** |
| 469 | 53 | KZOO | Kalamazoo WWTP | Influent-1 | 5/12/2020 | **4.82** | **6.65** |
| 470 | 53 | KZOO | Kalamazoo WWTP | Influent-1 | 9/16/2020 | **10.4** | **3.33** |
| 471 | 53 | KZOO | Kalamazoo WWTP | Influent-1 | 9/16/2020 | **12.0** | **6.31** |
| 472 | 53 | KZOO | Kalamazoo WWTP | Influent-1 | 9/17/2020 | **7.20** | **5.79** |
| 473 | 53 | KZOO | Kalamazoo WWTP | Influent-1 | 9/17/2020 | **5.84** | **3.12** |
| 474 | 53 | KZOO | Kalamazoo WWTP | Influent-1 | 9/18/2020 | **20.0** | **9.53** |
| 475 | 53 | KZOO | Kalamazoo WWTP | Influent-1 | 9/19/2020 | **7.06** | **7.41** |
| 476 | 53 | KZOO | Kalamazoo WWTP | Influent-1 | 9/20/2020 | **4.91** | **2.73** |
| 477 | 53 | KZOO | Kalamazoo WWTP | Influent-1 | 9/21/2020 | **3.67** | **8.04** |
| 478 | 53 | KZOO | Kalamazoo WWTP | Influent-1 | 9/22/2020 | **7.04** | **8.29** |
| 479 | 53 | KZOO | Kalamazoo WWTP | Influent-1 | 9/23/2020 | **5.68** | **9.02** |
| 480 | 53 | KZOO | Kalamazoo WWTP | Influent-1 | 10/13/2020 | **8.27** | **10.4** |
| 481 | 53 | KZOO | Kalamazoo WWTP | Influent-2 | 10/16/2019 | **4.21** | **4.86** |
| 482 | 54 | SAWY | KI Sawyer WWTP - Marquette Co | Effluent-1 | 8/24/2016 | **23.6** | **97.7** |
| 483 | 54 | SAWY | KI Sawyer WWTP - Marquette Co | Effluent-1 | 4/19/2017 | **6.50** | **55.3** |
| 484 | 54 | SAWY | KI Sawyer WWTP - Marquette Co | Effluent-1 | 8/27/2018 | **24** | **200** |
| 485 | 54 | SAWY | KI Sawyer WWTP - Marquette Co | Effluent-1 | 11/7/2018 | **10.2** | **62.0** |
| 486 | 54 | SAWY | KI Sawyer WWTP - Marquette Co | Effluent-1 | 11/27/2018 | **9.4** | **42** |
| 487 | 54 | SAWY | KI Sawyer WWTP - Marquette Co | Effluent-1 | 12/10/2018 | **5.9** | **240** |
| 488 | 54 | SAWY | KI Sawyer WWTP - Marquette Co | Effluent-1 | 1/16/2019 | **7.2** | **21** |
| 489 | 54 | SAWY | KI Sawyer WWTP - Marquette Co | Effluent-1 | 2/12/2019 | **3.5** | **16** |
| 490 | 54 | SAWY | KI Sawyer WWTP - Marquette Co | Effluent-1 | 3/13/2019 | **3.1** | **8.2** |
| 491 | 54 | SAWY | KI Sawyer WWTP - Marquette Co | Effluent-1 | 4/8/2019 | **4.2** | **14** |
| 492 | 54 | SAWY | KI Sawyer WWTP - Marquette Co | Effluent-1 | 5/8/2019 | **4.9** | **13** |
| 493 | 54 | SAWY | KI Sawyer WWTP - Marquette Co | Effluent-1 | 6/19/2019 | **37** | **56** |
| 494 | 54 | SAWY | KI Sawyer WWTP - Marquette Co | Effluent-1 | 7/15/2019 | **15** | **39** |

# Table 3

WWTPs PFAS Results
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| Nr. | WWTP Nr. | WWTP Code | WWTP Name | Sample Type | Sample Date | PFOA (ng/L) | PFOS (ng/L) |
|---|---|---|---|---|---|---|---|
| 495 | 54 | SAWY | KI Sawyer WWTP - Marquette Co | Effluent-1 | 8/21/2019 | **5.9** | **18** |
| 496 | 54 | SAWY | KI Sawyer WWTP - Marquette Co | Effluent-1 | 9/9/2019 | **6.9** | **12** |
| 497 | 54 | SAWY | KI Sawyer WWTP - Marquette Co | Effluent-1 | 10/15/2019 | **110** | **28** |
| 498 | 54 | SAWY | KI Sawyer WWTP - Marquette Co | Effluent-1 | 11/12/2019 | **13** | **48** |
| 499 | 54 | SAWY | KI Sawyer WWTP - Marquette Co | Effluent-1 | 12/10/2019 | **6.8** | **27** |
| 500 | 54 | SAWY | KI Sawyer WWTP - Marquette Co | Effluent-1 | 1/14/2020 | **8.7** | **16** |
| 501 | 54 | SAWY | KI Sawyer WWTP - Marquette Co | Effluent-1 | 2/12/2020 | **3.7** | **13** |
| 502 | 54 | SAWY | KI Sawyer WWTP - Marquette Co | Effluent-1 | 3/18/2020 | **5.1** | **14** |
| 503 | 54 | SAWY | KI Sawyer WWTP - Marquette Co | Effluent-1 | 4/21/2020 | **4.9** | **10** |
| 504 | 54 | SAWY | KI Sawyer WWTP - Marquette Co | Effluent-1 | 5/20/2020 | **5.4** | **13** |
| 505 | 54 | SAWY | KI Sawyer WWTP - Marquette Co | Effluent-1 | 6/16/2020 | **16** | **34** |
| 506 | 54 | SAWY | KI Sawyer WWTP - Marquette Co | Effluent-1 | 7/16/2020 | **10** | **33** |
| 507 | 54 | SAWY | KI Sawyer WWTP - Marquette Co | Effluent-1 | 8/6/2020 | **16** | **29** |
| 508 | 54 | SAWY | KI Sawyer WWTP - Marquette Co | Effluent-1 | 9/10/2020 | **8.3** | **15** |
| 509 | 54 | SAWY | KI Sawyer WWTP - Marquette Co | Effluent-1 | 10/13/2020 | **4.8** | **9.3** |
| 510 | 54 | SAWY | KI Sawyer WWTP - Marquette Co | Effluent-1 | 11/30/2020 | **6.9** | **14** |
| 511 | 54 | SAWY | KI Sawyer WWTP - Marquette Co | Effluent-1 | 12/16/2020 | **4.5** | **9.1** |
| 512 | 54 | SAWY | KI Sawyer WWTP - Marquette Co | Influent-1 | 8/24/2016 | ND | ND |
| 513 | 54 | SAWY | KI Sawyer WWTP - Marquette Co | Influent-1 | 4/19/2017 | **0.944** | **52.6** |
| 514 | 54 | SAWY | KI Sawyer WWTP - Marquette Co | Influent-1 | 8/27/2018 | **2.8** | **26** |
| 515 | 54 | SAWY | KI Sawyer WWTP - Marquette Co | Influent-1 | 11/7/2018 | ND | **5.77** |
| 516 | 54 | SAWY | KI Sawyer WWTP - Marquette Co | Influent-1 | 11/27/2018 | **1.9** | **95** |
| 517 | 54 | SAWY | KI Sawyer WWTP - Marquette Co | Influent-1 | 6/19/2019 | **2.1** | **9.3** |
| 518 | 54 | SAWY | KI Sawyer WWTP - Marquette Co | Influent-1 | 5/20/2020 | ND | ND |
| 519 | 54 | SAWY | KI Sawyer WWTP - Marquette Co | Influent-1 | 9/10/2020 | **1.1** | **5.4** |
| 520 | 54 | SAWY | KI Sawyer WWTP - Marquette Co | Influent-1 | 10/13/2020 | **46** | **210** |
| 521 | 54 | SAWY | KI Sawyer WWTP - Marquette Co | Influent-2 | 11/7/2018 | ND | **81.0** |
| 522 | 56 | LANS | Lansing WWTP | Effluent-1 | 7/27/2018 | ND | ND |
| 523 | 56 | LANS | Lansing WWTP | Effluent-1 | 11/1/2018 | **7.58** | **5.51** |
| 524 | 56 | LANS | Lansing WWTP | Effluent-1 | 5/22/2019 | **11** | ND |
| 525 | 56 | LANS | Lansing WWTP | Effluent-1 | 9/5/2019 | ND | ND |
| 526 | 56 | LANS | Lansing WWTP | Influent-1 | 11/1/2018 | **4.98** | ND |
| 527 | 57 | LAPR | Lapeer WWTP | Effluent-1 | 5/9/2017 | **6.4** | **440** |
| 528 | 57 | LAPR | Lapeer WWTP | Effluent-1 | 7/11/2017 | **12** | **2000** |
| 529 | 57 | LAPR | Lapeer WWTP | Effluent-1 | 8/30/2017 | **9.4** | **1000** |
| 530 | 57 | LAPR | Lapeer WWTP | Effluent-1 | 9/13/2017 | **11** | **710** |
| 531 | 57 | LAPR | Lapeer WWTP | Effluent-1 | 9/29/2017 | **12** | **1500** |
| 532 | 57 | LAPR | Lapeer WWTP | Effluent-1 | 11/7/2017 | **9.3** | **1500** |
| 533 | 57 | LAPR | Lapeer WWTP | Effluent-1 | 12/5/2017 | **19** | **450** |
| 534 | 57 | LAPR | Lapeer WWTP | Effluent-1 | 1/9/2018 | **7.0** | **57** |
| 535 | 57 | LAPR | Lapeer WWTP | Effluent-1 | 2/1/2018 | **120** | **770** |
| 536 | 57 | LAPR | Lapeer WWTP | Effluent-1 | 3/1/2018 | **9.4** | **46** |
| 537 | 57 | LAPR | Lapeer WWTP | Effluent-1 | 4/5/2018 | **8.4** | **18** |
| 538 | 57 | LAPR | Lapeer WWTP | Effluent-1 | 4/19/2018 | **5.4** | **15** |
| 539 | 57 | LAPR | Lapeer WWTP | Effluent-1 | 5/3/2018 | **13** | **54** |

# Table 3

WWTPs PFAS Results
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| Nr. | WWTP Nr. | WWTP Code | WWTP Name | Sample Type | Sample Date | PFOA (ng/L) | PFOS (ng/L) |
|---|---|---|---|---|---|---|---|
| 540 | 57 | LAPR | Lapeer WWTP | Effluent-1 | 5/9/2018 | **5.03** | **28.7** |
| 541 | 57 | LAPR | Lapeer WWTP | Effluent-1 | 5/31/2018 | **11** | **26** |
| 542 | 57 | LAPR | Lapeer WWTP | Effluent-1 | 6/14/2018 | **10** | **20** |
| 543 | 57 | LAPR | Lapeer WWTP | Effluent-1 | 7/11/2018 | **7.5** | **18** |
| 544 | 57 | LAPR | Lapeer WWTP | Effluent-1 | 8/31/2018 | **11** | **23** |
| 545 | 57 | LAPR | Lapeer WWTP | Effluent-1 | 10/10/2018 | **12** | **23** |
| 546 | 57 | LAPR | Lapeer WWTP | Effluent-1 | 11/15/2018 | **4.0** | **29** |
| 547 | 57 | LAPR | Lapeer WWTP | Effluent-1 | 11/16/2018 | **7.8** | **16** |
| 548 | 57 | LAPR | Lapeer WWTP | Effluent-1 | 12/14/2018 | **5.0** | **21** |
| 549 | 57 | LAPR | Lapeer WWTP | Effluent-1 | 12/14/2018 | **5.0** | **21** |
| 550 | 57 | LAPR | Lapeer WWTP | Effluent-1 | 1/17/2019 | **7.1** | **46** |
| 551 | 57 | LAPR | Lapeer WWTP | Effluent-1 | 2/20/2019 | **8.0** | **24** |
| 552 | 57 | LAPR | Lapeer WWTP | Effluent-1 | 3/20/2019 | **5.2** | **17** |
| 553 | 57 | LAPR | Lapeer WWTP | Effluent-1 | 4/24/2019 | **5.1** | **16** |
| 554 | 57 | LAPR | Lapeer WWTP | Effluent-1 | 5/15/2019 | **9.1** | **20** |
| 555 | 57 | LAPR | Lapeer WWTP | Effluent-1 | 6/26/2019 | **8.8** | **18** |
| 556 | 57 | LAPR | Lapeer WWTP | Effluent-1 | 7/19/2019 | **7.9** | **21** |
| 557 | 57 | LAPR | Lapeer WWTP | Effluent-1 | 8/28/2019 | **7.7** | **20** |
| 558 | 57 | LAPR | Lapeer WWTP | Effluent-1 | 9/20/2019 | **7.1** | **15** |
| 559 | 57 | LAPR | Lapeer WWTP | Effluent-1 | 10/24/2019 | **8.7** | **14** |
| 560 | 57 | LAPR | Lapeer WWTP | Effluent-1 | 10/24/2019 | **8.7** | **14** |
| 561 | 57 | LAPR | Lapeer WWTP | Effluent-1 | 11/21/2019 | **7.1** | **14** |
| 562 | 57 | LAPR | Lapeer WWTP | Effluent-1 | 12/11/2019 | **5.4** | **9.9** |
| 563 | 57 | LAPR | Lapeer WWTP | Effluent-1 | 1/23/2020 | **5.0** | **11** |
| 564 | 57 | LAPR | Lapeer WWTP | Effluent-1 | 2/20/2020 | **4.6** | **8.0** |
| 565 | 57 | LAPR | Lapeer WWTP | Effluent-1 | 3/19/2020 | **5.7** | **8.4** |
| 566 | 57 | LAPR | Lapeer WWTP | Effluent-1 | 4/16/2020 | **8.2** | **12** |
| 567 | 57 | LAPR | Lapeer WWTP | Effluent-1 | 5/21/2020 | ND | ND |
| 568 | 57 | LAPR | Lapeer WWTP | Effluent-1 | 6/24/2020 | **8.2** | **17** |
| 569 | 57 | LAPR | Lapeer WWTP | Effluent-1 | 7/21/2020 | **8.4** | **15** |
| 570 | 57 | LAPR | Lapeer WWTP | Effluent-1 | 8/18/2020 | **8.7** | **22** |
| 571 | 57 | LAPR | Lapeer WWTP | Effluent-1 | 9/14/2020 | **7.7** | **15** |
| 572 | 57 | LAPR | Lapeer WWTP | Effluent-1 | 10/8/2020 | **8.4** | **17** |
| 573 | 57 | LAPR | Lapeer WWTP | Effluent-1 | 11/17/2020 | **18** | **9.2** |
| 574 | 57 | LAPR | Lapeer WWTP | Effluent-1 | 1/14/2021 | **6.5** | **7.9** |
| 575 | 57 | LAPR | Lapeer WWTP | Influent-1 | 9/12/2017 | **4.3** | **560** |
| 576 | 57 | LAPR | Lapeer WWTP | Influent-1 | 2/1/2018 | **330** | **1200** |
| 577 | 57 | LAPR | Lapeer WWTP | Influent-1 | 3/1/2018 | **4.2** | **8.6** |
| 578 | 57 | LAPR | Lapeer WWTP | Influent-1 | 4/5/2018 | **3.7** | **10** |
| 579 | 57 | LAPR | Lapeer WWTP | Influent-1 | 12/13/2018 | **4.4** | **9.3** |
| 580 | 57 | LAPR | Lapeer WWTP | Influent-1 | 12/13/2018 | **4.4** | **9.3** |
| 581 | 57 | LAPR | Lapeer WWTP | Influent-1 | 1/16/2019 | **4.0** | **98** |
| 582 | 57 | LAPR | Lapeer WWTP | Influent-1 | 2/19/2019 | **3.6** | **32** |
| 583 | 57 | LAPR | Lapeer WWTP | Influent-1 | 3/19/2019 | **4.4** | **13** |
| 584 | 57 | LAPR | Lapeer WWTP | Influent-1 | 4/26/2019 | **5.1** | **18** |
| 585 | 57 | LAPR | Lapeer WWTP | Influent-1 | 5/14/2019 | **5.4** | **9.1** |
| 586 | 57 | LAPR | Lapeer WWTP | Influent-1 | 6/25/2019 | **5.5** | **15** |
| 587 | 57 | LAPR | Lapeer WWTP | Influent-1 | 7/18/2019 | **4.9** | **14** |
| 588 | 57 | LAPR | Lapeer WWTP | Influent-1 | 8/28/2019 | **4.5** | **10** |

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| Nr. | WWTP Nr. | WWTP Code | WWTP Name | Sample Type | Sample Date | PFOA (ng/L) | PFOS (ng/L) |
|---|---|---|---|---|---|---|---|
| 589 | 57 | LAPR | Lapeer WWTP | Influent-1 | 9/19/2019 | **3.6** | ND |
| 590 | 57 | LAPR | Lapeer WWTP | Influent-1 | 10/24/2019 | **7.8** | **15** |
| 591 | 57 | LAPR | Lapeer WWTP | Influent-1 | 10/24/2019 | **7.8** | **15** |
| 592 | 57 | LAPR | Lapeer WWTP | Influent-1 | 11/20/2019 | **3.7** | **9.3** |
| 593 | 57 | LAPR | Lapeer WWTP | Influent-1 | 12/10/2019 | **4.0** | **9.8** |
| 594 | 57 | LAPR | Lapeer WWTP | Influent-1 | 1/22/2020 | **4.3** | **7.1** |
| 595 | 57 | LAPR | Lapeer WWTP | Influent-1 | 2/19/2020 | **4.3** | **10** |
| 596 | 57 | LAPR | Lapeer WWTP | Influent-1 | 3/18/2020 | ND | ND |
| 597 | 57 | LAPR | Lapeer WWTP | Influent-1 | 4/15/2020 | **3.3** | **16** |
| 598 | 57 | LAPR | Lapeer WWTP | Influent-1 | 5/21/2020 | ND | ND |
| 599 | 57 | LAPR | Lapeer WWTP | Influent-1 | 6/24/2020 | **3.3** | **8.9** |
| 600 | 57 | LAPR | Lapeer WWTP | Influent-1 | 7/21/2020 | **2.4** | **20** |
| 601 | 57 | LAPR | Lapeer WWTP | Influent-1 | 8/18/2020 | **3.6** | **21** |
| 602 | 57 | LAPR | Lapeer WWTP | Influent-1 | 9/14/2020 | **5.5** | **19** |
| 603 | 57 | LAPR | Lapeer WWTP | Influent-1 | 10/7/2020 | **3.4** | **6.5** |
| 604 | 57 | LAPR | Lapeer WWTP | Influent-1 | 11/16/2020 | **3.3** | **10** |
| 605 | 57 | LAPR | Lapeer WWTP | Influent-1 | 1/13/2021 | **3.1** | **6.5** |
| 606 | 59 | LUDG | Ludington WWTP | Effluent-1 | 10/29/2018 | **4.82** | **4.92** |
| 607 | 59 | LUDG | Ludington WWTP | Effluent-1 | 6/20/2019 | **8.88** | **6.57** |
| 608 | 59 | LUDG | Ludington WWTP | Effluent-1 | 12/19/2019 | ND | ND |
| 609 | 60 | LYON | Lyon Township WWTP | Effluent-1 | 11/13/2018 | **15.4** | ND |
| 610 | 60 | LYON | Lyon Township WWTP | Influent-1 | 11/13/2018 | ND | ND |
| 611 | 61 | MARY | Marysville WWTP | Effluent-1 | 6/21/2018 | **20** | **14** |
| 612 | 61 | MARY | Marysville WWTP | Effluent-1 | 9/6/2018 | **21** | **23** |
| 613 | 61 | MARY | Marysville WWTP | Effluent-1 | 12/3/2018 | **34** | **16** |
| 614 | 61 | MARY | Marysville WWTP | Effluent-1 | 1/15/2019 | **30** | **8.2** |
| 615 | 61 | MARY | Marysville WWTP | Effluent-1 | 1/28/2019 | **27** | **12** |
| 616 | 61 | MARY | Marysville WWTP | Effluent-1 | 4/10/2019 | **63** | **21** |
| 617 | 61 | MARY | Marysville WWTP | Effluent-1 | 7/10/2019 | **56** | **570** |
| 618 | 61 | MARY | Marysville WWTP | Effluent-1 | 7/22/2019 | **25** | **27** |
| 619 | 61 | MARY | Marysville WWTP | Effluent-1 | 10/9/2019 | **39** | **22** |
| 620 | 61 | MARY | Marysville WWTP | Effluent-1 | 1/21/2020 | **39** | **11** |
| 621 | 62 | MENO | Menominee WWTP | Effluent-1 | 9/20/2017 | **82** | **13** |
| 622 | 62 | MENO | Menominee WWTP | Effluent-1 | 1/9/2019 | **28** | **6.5** |
| 623 | 62 | MENO | Menominee WWTP | Effluent-1 | 5/15/2019 | **18** | ND |
| 624 | 62 | MENO | Menominee WWTP | Effluent-1 | 7/31/2019 | **28.0** | **12.9** |
| 625 | 62 | MENO | Menominee WWTP | Effluent-1 | 8/21/2019 | **37** | **13** |
| 626 | 62 | MENO | Menominee WWTP | Effluent-1 | 8/21/2019 | **35** | **15** |
| 627 | 62 | MENO | Menominee WWTP | Effluent-1 | 11/6/2019 | **20** | **9.5** |
| 628 | 62 | MENO | Menominee WWTP | Effluent-1 | 11/29/2019 | **31** | **6.2** |
| 629 | 62 | MENO | Menominee WWTP | Effluent-1 | 12/2/2019 | **14** | **8.6** |
| 630 | 62 | MENO | Menominee WWTP | Effluent-1 | 1/14/2020 | **24** | **8.1** |
| 631 | 62 | MENO | Menominee WWTP | Influent-1 | 11/28/2018 | **12** | **5.6** |
| 632 | 62 | MENO | Menominee WWTP | Influent-1 | 8/21/2019 | **31** | **12** |
| 633 | 63 | MILN | Milan WWTP | Effluent-1 | 10/16/2018 | **7.19** | **7.27** |
| 634 | 63 | MILN | Milan WWTP | Effluent-1 | 5/21/2019 | ND | ND |
| 635 | 63 | MILN | Milan WWTP | Effluent-1 | 10/29/2019 | **12** | **11** |
| 636 | 64 | MONR | Monroe Metro WWTP | Effluent-1 | 9/4/2018 | **7.0** | **8.0** |
| 637 | 64 | MONR | Monroe Metro WWTP | Effluent-1 | 10/1/2018 | **7.1** | **8.3** |

# Table 3
WWTPs PFAS Results
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| Nr. | WWTP Nr. | WWTP Code | WWTP Name | Sample Type | Sample Date | PFOA (ng/L) | PFOS (ng/L) |
|---|---|---|---|---|---|---|---|
| 638 | 64 | MONR | Monroe Metro WWTP | Effluent-1 | 11/20/2018 | **5.35** | **5.46** |
| 639 | 64 | MONR | Monroe Metro WWTP | Effluent-1 | 5/16/2019 | **5.3** | **7.7** |
| 640 | 64 | MONR | Monroe Metro WWTP | Effluent-1 | 10/24/2019 | **6.2** | **8.8** |
| 641 | 64 | MONR | Monroe Metro WWTP | Influent-1 | 11/20/2018 | **2.89** | **5.5** |
| 642 | 65 | MTCL | Mt Clemens WWTP | Effluent-1 | 10/26/2017 | **14** | **7.4** |
| 643 | 65 | MTCL | Mt Clemens WWTP | Effluent-1 | 11/15/2018 | **9.03** | **3.40** |
| 644 | 65 | MTCL | Mt Clemens WWTP | Influent-1 | 11/15/2018 | **4.60** | **5.02** |
| 645 | 66 | MUSK | Muskegon Co WWTMS Metro WWTP | Effluent-1 | 4/3/2018 | **28** | **11** |
| 646 | 66 | MUSK | Muskegon Co WWTMS Metro WWTP | Effluent-1 | 7/10/2018 | **35** | **19** |
| 647 | 66 | MUSK | Muskegon Co WWTMS Metro WWTP | Effluent-1 | 8/30/2018 | **44** | **44** |
| 648 | 66 | MUSK | Muskegon Co WWTMS Metro WWTP | Effluent-1 | 10/15/2018 | **38** | **22** |
| 649 | 66 | MUSK | Muskegon Co WWTMS Metro WWTP | Effluent-1 | 10/30/2018 | **31.7** | **16.2** |
| 650 | 66 | MUSK | Muskegon Co WWTMS Metro WWTP | Effluent-1 | 1/23/2019 | **34** | **25** |
| 651 | 66 | MUSK | Muskegon Co WWTMS Metro WWTP | Effluent-1 | 4/16/2019 | **26** | **15** |
| 652 | 66 | MUSK | Muskegon Co WWTMS Metro WWTP | Effluent-1 | 8/1/2019 | **31** | **23** |
| 653 | 66 | MUSK | Muskegon Co WWTMS Metro WWTP | Effluent-1 | 10/25/2019 | **33** | **27** |
| 654 | 66 | MUSK | Muskegon Co WWTMS Metro WWTP | Effluent-1 | 2/10/2020 | **27** | **14** |
| 655 | 66 | MUSK | Muskegon Co WWTMS Metro WWTP | Influent-1 | 10/30/2018 | **11.7** | **10.5** |
| 656 | 67 | NILE | Niles WWTP | Effluent-1 | 1/8/2019 | ND | ND |
| 657 | 67 | NILE | Niles WWTP | Influent-1 | 1/8/2019 | ND | ND |
| 658 | 69 | NKEN | North Kent SA WWTP | Effluent-1 | 6/4/2018 | **25** | **27** |
| 659 | 69 | NKEN | North Kent SA WWTP | Effluent-1 | 7/11/2018 | **26.6** | **20.8** |
| 660 | 69 | NKEN | North Kent SA WWTP | Effluent-1 | 9/11/2018 | **37.0** | **37.0** |
| 661 | 69 | NKEN | North Kent SA WWTP | Effluent-1 | 10/11/2018 | **25.0** | **18.2** |
| 662 | 69 | NKEN | North Kent SA WWTP | Effluent-1 | 10/29/2018 | **21.2** | **12.5** |
| 663 | 69 | NKEN | North Kent SA WWTP | Effluent-1 | 11/9/2018 | **30.1** | **12.4** |
| 664 | 69 | NKEN | North Kent SA WWTP | Effluent-1 | 12/11/2018 | **25.6** | **33.9** |
| 665 | 69 | NKEN | North Kent SA WWTP | Effluent-1 | 1/7/2019 | **25.4** | **29.6** |
| 666 | 69 | NKEN | North Kent SA WWTP | Effluent-1 | 2/11/2019 | **26.1** | **46.6** |
| 667 | 69 | NKEN | North Kent SA WWTP | Effluent-1 | 3/19/2019 | **29.3** | **32.2** |
| 668 | 69 | NKEN | North Kent SA WWTP | Effluent-1 | 4/11/2019 | **30.0** | **75.2** |
| 669 | 69 | NKEN | North Kent SA WWTP | Effluent-1 | 5/8/2019 | **32.0** | **50.2** |
| 670 | 69 | NKEN | North Kent SA WWTP | Effluent-1 | 6/13/2019 | **27.9** | **48.9** |
| 671 | 69 | NKEN | North Kent SA WWTP | Effluent-1 | 7/9/2019 | **20.7** | **30.7** |
| 672 | 69 | NKEN | North Kent SA WWTP | Effluent-1 | 8/1/2019 | **26.5** | **85.2** |
| 673 | 69 | NKEN | North Kent SA WWTP | Effluent-1 | 9/4/2019 | **24.7** | **61.6** |
| 674 | 69 | NKEN | North Kent SA WWTP | Effluent-1 | 10/2/2019 | **25.5** | **14.8** |
| 675 | 69 | NKEN | North Kent SA WWTP | Effluent-1 | 11/6/2019 | **62.3** | **21.4** |
| 676 | 69 | NKEN | North Kent SA WWTP | Effluent-1 | 12/2/2019 | **34.3** | **16.5** |
| 677 | 69 | NKEN | North Kent SA WWTP | Effluent-1 | 1/7/2020 | **32.1** | **30.2** |
| 678 | 69 | NKEN | North Kent SA WWTP | Effluent-1 | 2/6/2020 | **35.6** | **73.3** |
| 679 | 69 | NKEN | North Kent SA WWTP | Influent-1 | 7/11/2018 | **14.4** | **15.5** |
| 680 | 69 | NKEN | North Kent SA WWTP | Influent-1 | 10/29/2018 | **11.2** | **31.1** |
| 681 | 69 | NKEN | North Kent SA WWTP | Influent-1 | 5/8/2019 | **17.2** | **40.5** |
| 682 | 69 | NKEN | North Kent SA WWTP | Influent-1 | 12/2/2019 | **29.7** | **55.6** |
| 683 | 69 | NKEN | North Kent SA WWTP | Influent-1 | 2/6/2020 | **22.9** | **204** |
| 684 | 70 | OTSE | Otsego WWTP | Effluent-1 | 11/9/2018 | ND | ND |
| 685 | 70 | OTSE | Otsego WWTP | Effluent-1 | 5/15/2019 | ND | ND |

# Table 3

WWTPs PFAS Results
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| Nr. | WWTP Nr. | WWTP Code | WWTP Name | Sample Type | Sample Date | PFOA (ng/L) | PFOS (ng/L) |
|---|---|---|---|---|---|---|---|
| 686 | 70 | OTSE | Otsego WWTP | Influent-1 | 8/17/2018 | ND | ND |
| 687 | 71 | OWOS | Owosso - Mid Shiawassee Co WWTP | Effluent-1 | 1/22/2019 | **2.5** | **2.7** |
| 688 | 71 | OWOS | Owosso - Mid Shiawassee Co WWTP | Effluent-1 | 5/15/2019 | **4.57** | **1.98** |
| 689 | 71 | OWOS | Owosso - Mid Shiawassee Co WWTP | Effluent-1 | 10/15/2019 | **1.32** | **1.32** |
| 690 | 72 | PLAI | Plainwell WWTP | Effluent-1 | 5/15/2019 | ND | ND |
| 691 | 73 | PONT | Pontiac WWTP - Oakland Co. | Effluent-1 | 10/26/2017 | **13** | **9.0** |
| 692 | 73 | PONT | Pontiac WWTP - Oakland Co. | Effluent-1 | 11/6/2018 | **44** | **37** |
| 693 | 73 | PONT | Pontiac WWTP - Oakland Co. | Effluent-1 | 11/14/2018 | **38.1** | **20** |
| 694 | 73 | PONT | Pontiac WWTP - Oakland Co. | Effluent-1 | 2/27/2019 | **33** | **24** |
| 695 | 73 | PONT | Pontiac WWTP - Oakland Co. | Effluent-1 | 5/17/2019 | **37** | **41** |
| 696 | 73 | PONT | Pontiac WWTP - Oakland Co. | Effluent-1 | 8/9/2019 | **52** | **48** |
| 697 | 73 | PONT | Pontiac WWTP - Oakland Co. | Effluent-1 | 10/2/2019 | **63** | **45** |
| 698 | 73 | PONT | Pontiac WWTP - Oakland Co. | Effluent-1 | 1/15/2020 | **13** | **11** |
| 699 | 73 | PONT | Pontiac WWTP - Oakland Co. | Influent-1 | 11/14/2018 | **4.94** | **7.68** |
| 700 | 74 | PHUR | Port Huron WWTP | Effluent-1 | 6/11/2018 | **40** | **40** |
| 701 | 74 | PHUR | Port Huron WWTP | Effluent-1 | 8/27/2018 | **50** | **50** |
| 702 | 74 | PHUR | Port Huron WWTP | Effluent-1 | 11/12/2018 | **90** | **80** |
| 703 | 74 | PHUR | Port Huron WWTP | Effluent-1 | 11/15/2018 | **44.8** | **13.1** |
| 704 | 74 | PHUR | Port Huron WWTP | Effluent-1 | 12/10/2018 | **50** | **20** |
| 705 | 74 | PHUR | Port Huron WWTP | Effluent-1 | 2/19/2019 | **570** | **1,150** |
| 706 | 74 | PHUR | Port Huron WWTP | Effluent-1 | 3/19/2019 | **660** | **1100** |
| 707 | 74 | PHUR | Port Huron WWTP | Effluent-1 | 4/24/2019 | **580** | **1100** |
| 708 | 74 | PHUR | Port Huron WWTP | Effluent-1 | 5/8/2019 | **63** | **15** |
| 709 | 74 | PHUR | Port Huron WWTP | Effluent-1 | 6/27/2019 | **47** | **19** |
| 710 | 74 | PHUR | Port Huron WWTP | Effluent-1 | 7/24/2019 | **41** | **18** |
| 711 | 74 | PHUR | Port Huron WWTP | Effluent-1 | 8/15/2019 | **35** | **19** |
| 712 | 74 | PHUR | Port Huron WWTP | Effluent-1 | 9/10/2019 | **32** | **18** |
| 713 | 74 | PHUR | Port Huron WWTP | Effluent-1 | 10/9/2019 | **53** | **29** |
| 714 | 74 | PHUR | Port Huron WWTP | Effluent-1 | 11/25/2019 | **54** | **15** |
| 715 | 74 | PHUR | Port Huron WWTP | Effluent-1 | 12/3/2019 | **53** | **15** |
| 716 | 74 | PHUR | Port Huron WWTP | Effluent-1 | 1/7/2020 | **46** | **12** |
| 717 | 74 | PHUR | Port Huron WWTP | Effluent-1 | 3/25/2020 | **46** | **9.7** |
| 718 | 74 | PHUR | Port Huron WWTP | Effluent-1 | 4/8/2020 | **45** | **13** |
| 719 | 74 | PHUR | Port Huron WWTP | Effluent-1 | 5/21/2020 | **54** | **15** |
| 720 | 74 | PHUR | Port Huron WWTP | Effluent-1 | 6/9/2020 | **37** | **15** |
| 721 | 74 | PHUR | Port Huron WWTP | Effluent-1 | 7/28/2020 | **37** | **21** |
| 722 | 74 | PHUR | Port Huron WWTP | Influent-1 | 6/11/2018 | **40** | **40** |
| 723 | 74 | PHUR | Port Huron WWTP | Influent-1 | 11/15/2018 | **64.6** | **19.5** |
| 724 | 74 | PHUR | Port Huron WWTP | Influent-1 | 3/19/2019 | **52** | **36** |
| 725 | 74 | PHUR | Port Huron WWTP | Influent-1 | 3/19/2019 | **53** | **21** |
| 726 | 74 | PHUR | Port Huron WWTP | Influent-1 | 4/24/2019 | **78** | **18** |
| 727 | 74 | PHUR | Port Huron WWTP | Influent-1 | 5/8/2019 | **80** | **20** |
| 728 | 74 | PHUR | Port Huron WWTP | Influent-1 | 6/27/2019 | **48** | **24** |
| 729 | 74 | PHUR | Port Huron WWTP | Influent-1 | 7/24/2019 | **50** | **19** |
| 730 | 74 | PHUR | Port Huron WWTP | Influent-1 | 8/15/2019 | **29** | **23** |
| 731 | 74 | PHUR | Port Huron WWTP | Influent-1 | 9/10/2019 | **27** | **18** |
| 732 | 74 | PHUR | Port Huron WWTP | Influent-1 | 10/9/2019 | **56** | **34** |
| 733 | 74 | PHUR | Port Huron WWTP | Influent-1 | 11/25/2019 | **57** | **16** |
| 734 | 74 | PHUR | Port Huron WWTP | Influent-1 | 12/3/2019 | **54** | **20** |

# Table 3

WWTPs PFAS Results
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| Nr. | WWTP Nr. | WWTP Code | WWTP Name | Sample Type | Sample Date | PFOA (ng/L) | PFOS (ng/L) |
|---|---|---|---|---|---|---|---|
| 735 | 74 | PHUR | Port Huron WWTP | Influent-1 | 1/7/2020 | **47** | **20** |
| 736 | 74 | PHUR | Port Huron WWTP | Influent-1 | 3/25/2020 | **46** | **19** |
| 737 | 74 | PHUR | Port Huron WWTP | Influent-1 | 4/8/2020 | **58** | **19** |
| 738 | 74 | PHUR | Port Huron WWTP | Influent-1 | 5/21/2020 | **55** | **14** |
| 739 | 74 | PHUR | Port Huron WWTP | Influent-1 | 6/9/2020 | **48** | **29** |
| 740 | 76 | REED | Reed City | Effluent-1 | 8/24/2018 | ND | ND |
| 741 | 76 | REED | Reed City | Effluent-1 | 6/6/2019 | ND | ND |
| 742 | 76 | REED | Reed City WWTP | Effluent-1 | 12/2/2019 | ND | ND |
| 743 | 77 | HURO | S Huron Valley UA WWTP | Effluent-1 | 11/20/2018 | **6.69** | **5.33** |
| 744 | 77 | HURO | S Huron Valley UA WWTP | Effluent-1 | 3/26/2019 | ND | ND |
| 745 | 77 | HURO | S Huron Valley UA WWTP | Effluent-1 | 5/10/2019 | **28** | **14** |
| 746 | 77 | HURO | S Huron Valley UA WWTP | Effluent-1 | 7/11/2019 | **34** | **6.5** |
| 747 | 77 | HURO | S Huron Valley UA WWTP | Effluent-1 | 10/4/2019 | **6.7** | **7.4** |
| 748 | 77 | HURO | S Huron Valley UA WWTP | Influent-1 | 11/20/2018 | **3.76** | ND |
| 749 | 78 | SGTW | Saginaw Twp WWTP | Effluent-1 | 8/20/2018 | **18.3** | **8.60** |
| 750 | 78 | SGTW | Saginaw Twp WWTP | Effluent-1 | 6/4/2019 | ND | ND |
| 751 | 78 | SGTW | Saginaw Twp WWTP | Effluent-1 | 12/4/2019 | **8.9** | **5.2** |
| 752 | 78 | SGTW | Saginaw Twp WWTP | Influent-1 | 6/4/2019 | ND | ND |
| 753 | 79 | SAGN | Saginaw WWTP | Effluent-1 | 11/19/2018 | **4.58** | **4.13** |
| 754 | 79 | SAGN | Saginaw WWTP | Influent-1 | 11/19/2018 | **2.56** | **4.19** |
| 755 | 80 | SALN | Saline WWTP | Effluent-1 | 7/31/2018 | **6.4** | **33** |
| 756 | 80 | SALN | Saline WWTP | Effluent-1 | 4/26/2019 | ND | ND |
| 757 | 80 | SALN | Saline WWTP | Effluent-1 | 5/3/2019 | ND | ND |
| 758 | 80 | SALN | Saline WWTP | Effluent-1 | 5/8/2019 | ND | ND |
| 759 | 80 | SALN | Saline WWTP | Effluent-1 | 5/9/2019 | ND | ND |
| 760 | 80 | SALN | Saline WWTP | Effluent-1 | 5/13/2019 | ND | ND |
| 761 | 80 | SALN | Saline WWTP | Effluent-1 | 5/14/2019 | ND | ND |
| 762 | 80 | SALN | Saline WWTP | Effluent-1 | 8/1/2019 | ND | ND |
| 763 | 80 | SALN | Saline WWTP | Effluent-1 | 12/17/2019 | ND | ND |
| 764 | 80 | SALN | Saline WWTP | Influent-1 | 4/26/2019 | ND | ND |
| 765 | 80 | SALN | Saline WWTP | Influent-1 | 5/3/2019 | ND | ND |
| 766 | 80 | SALN | Saline WWTP | Influent-1 | 5/8/2019 | ND | ND |
| 767 | 80 | SALN | Saline WWTP | Influent-1 | 5/9/2019 | ND | ND |
| 768 | 80 | SALN | Saline WWTP | Influent-1 | 5/13/2019 | ND | ND |
| 769 | 80 | SALN | Saline WWTP | Influent-1 | 5/14/2019 | ND | ND |
| 770 | 81 | SAND | Sandusky WWTP | Effluent-1 | 6/28/2017 | **14** | **27** |
| 771 | 81 | SAND | Sandusky WWTP | Effluent-1 | 9/20/2017 | **17** | **13** |
| 772 | 81 | SAND | Sandusky WWTP | Effluent-1 | 10/29/2018 | **6.59** | ND |
| 773 | 81 | SAND | Sandusky WWTP | Effluent-1 | 11/16/2018 | **8.39** | **5.26** |
| 774 | 81 | SAND | Sandusky WWTP | Effluent-1 | 2/19/2019 | **16** | **5.8** |
| 775 | 81 | SAND | Sandusky WWTP | Effluent-1 | 4/23/2019 | **14** | **13** |
| 776 | 81 | SAND | Sandusky WWTP | Effluent-1 | 7/19/2019 | **53** | **14** |
| 777 | 81 | SAND | Sandusky WWTP | Effluent-1 | 10/24/2019 | **22** | **12** |
| 778 | 81 | SAND | Sandusky WWTP | Effluent-1 | 1/15/2020 | **14** | **13** |
| 779 | 81 | SAND | Sandusky WWTP | Influent-1 | 11/16/2018 | **12.2** | **7.98** |
| 780 | 81 | SAND | Sandusky WWTP | Influent-1 | 1/15/2020 | **12** | **17** |
| 781 | 83 | SCLN | Southern Clinton Co WWTP | Effluent-1 | 3/1/2019 | **20** | **10** |
| 782 | 83 | SCLN | Southern Clinton Co WWTP | Effluent-1 | 5/21/2019 | **14** | **13** |
| 783 | 83 | SCLN | Southern Clinton Co WWTP | Effluent-1 | 8/29/2019 | **15** | **71** |
| 784 | 83 | SCLN | Southern Clinton Co WWTP | Effluent-1 | 9/13/2019 | ND | ND |

# Table 3

WWTPs PFAS Results
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| Nr. | WWTP Nr. | WWTP Code | WWTP Name | Sample Type | Sample Date | PFOA (ng/L) | PFOS (ng/L) |
|---|---|---|---|---|---|---|---|
| 785 | 83 | SCLN | Southern Clinton Co WWTP | Effluent-1 | 11/6/2019 | ND | ND |
| 786 | 83 | SCLN | Southern Clinton Co WWTP | Effluent-1 | 12/27/2019 | ND | ND |
| 787 | 83 | SCLN | Southern Clinton Co WWTP | Effluent-1 | 1/22/2020 | ND | ND |
| 788 | 83 | SCLN | Southern Clinton Co WWTP | Effluent-1 | 2/21/2020 | ND | ND |
| 789 | 83 | SCLN | Southern Clinton Co WWTP | Influent-1 | 8/29/2019 | ND | ND |
| 790 | 83 | SCLN | Southern Clinton Co WWTP | Influent-1 | 9/13/2019 | ND | ND |
| 791 | 83 | SCLN | Southern Clinton Co WWTP | Influent-1 | 11/6/2019 | ND | ND |
| 792 | 83 | SCLN | Southern Clinton Co WWTP | Influent-1 | 12/27/2019 | ND | ND |
| 793 | 83 | SCLN | Southern Clinton Co WWTP | Influent-1 | 1/22/2020 | ND | ND |
| 794 | 83 | SCLN | Southern Clinton Co WWTP | Influent-1 | 2/21/2020 | ND | ND |
| 795 | 85 | STUR | Sturgis WWTP | Effluent-1 | 10/11/2018 | **3.1** | **3.4** |
| 796 | 86 | TAWS | Tawas Utility Authority WWTP | Effluent-1 | 9/19/2018 | **9.0** | **17** |
| 797 | 86 | TAWS | Tawas Utility Authority WWTP | Effluent-1 | 1/15/2019 | **7.2** | **8.7** |
| 798 | 86 | TAWS | Tawas Utility Authority WWTP | Effluent-1 | 6/6/2019 | **13** | **15** |
| 799 | 86 | TAWS | Tawas Utility Authority WWTP | Effluent-1 | 8/6/2019 | **9.7** | **11** |
| 800 | 86 | TAWS | Tawas Utility Authority WWTP | Effluent-1 | 10/22/2019 | **8.0** | **10** |
| 801 | 86 | TAWS | Tawas Utility Authority WWTP | Influent-1 | 9/19/2018 | **6.2** | **17** |
| 802 | 87 | TRIV | Three Rivers WWTP | Effluent-1 | 9/13/2018 | **37.36** | **9.76** |
| 803 | 87 | TRIV | Three Rivers WWTP | Effluent-1 | 6/7/2019 | **38.81** | **22.33** |
| 804 | 87 | TRIV | Three Rivers WWTP | Effluent-1 | 9/13/2019 | **42.78** | **13.32** |
| 805 | 87 | TRIV | Three Rivers WWTP | Influent-1 | 8/2/2018 | **21.44** | **7.39** |
| 806 | 87 | TRIV | Three Rivers WWTP | Influent-1 | 9/13/2018 | **16.08** | ND |
| 807 | 87 | TRIV | Three Rivers WWTP | Influent-1 | 6/7/2019 | ND | ND |
| 808 | 88 | TRAV | Traverse City WWTP | Effluent-1 | 11/8/2018 | **20.7** | **2.90** |
| 809 | 88 | TRAV | Traverse City WWTP | Influent-1 | 11/8/2018 | **6.17** | **4.73** |
| 810 | 90 | WARR | Warren WWTP | Effluent-1 | 10/26/2017 | **11** | **14** |
| 811 | 90 | WARR | Warren WWTP | Effluent-1 | 9/14/2018 | ND | ND |
| 812 | 90 | WARR | Warren WWTP | Effluent-1 | 11/15/2018 | **7.21** | **7.64** |
| 813 | 90 | WARR | Warren WWTP | Effluent-1 | 11/29/2018 | ND | ND |
| 814 | 90 | WARR | Warren WWTP | Effluent-1 | 2/14/2019 | ND | ND |
| 815 | 90 | WARR | Warren WWTP | Effluent-1 | 5/24/2019 | ND | ND |
| 816 | 90 | WARR | Warren WWTP | Effluent-1 | 9/16/2019 | ND | **16** |
| 817 | 90 | WARR | Warren WWTP | Effluent-1 | 11/15/2019 | ND | **12** |
| 818 | 90 | WARR | Warren WWTP | Effluent-1 | 1/29/2020 | ND | ND |
| 819 | 90 | WARR | Warren WWTP | Effluent-2 | 11/15/2018 | **7.19** | **7.48** |
| 820 | 90 | WARR | Warren WWTP | Influent-1 | 11/15/2018 | **4.61** | **7.31** |
| 821 | 90 | WARR | Warren WWTP | Influent-1 | 11/29/2018 | ND | **20** |
| 822 | 90 | WARR | Warren WWTP | Influent-1 | 2/14/2019 | ND | ND |
| 823 | 90 | WARR | Warren WWTP | Influent-1 | 5/24/2019 | ND | ND |
| 824 | 90 | WARR | Warren WWTP | Influent-1 | 9/16/2019 | ND | **16** |
| 825 | 90 | WARR | Warren WWTP | Influent-1 | 11/15/2019 | ND | ND |
| 826 | 90 | WARR | Warren WWTP | Influent-1 | 1/29/2020 | ND | ND |
| 827 | 91 | WBAY | West Bay Co Regional WWTP | Effluent-1 | 8/23/2018 | **6.6** | **6.9** |
| 828 | 92 | WIXO | Wixom WWTP | Effluent-1 | 6/14/2018 | **9.7** | **290** |
| 829 | 92 | WIXO | Wixom WWTP | Effluent-1 | 8/29/2018 | **12** | **4800** |
| 830 | 92 | WIXO | Wixom WWTP | Effluent-1 | 9/25/2018 | **14** | **2,100** |
| 831 | 92 | WIXO | Wixom WWTP | Effluent-1 | 10/11/2018 | **11** | **940** |

# Table 3

WWTPs PFAS Results
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| Nr. | WWTP Nr. | WWTP Code | WWTP Name | Sample Type | Sample Date | PFOA (ng/L) | PFOS (ng/L) |
|---|---|---|---|---|---|---|---|
| 832 | 92 | WIXO | Wixom WWTP | Effluent-1 | 10/15/2018 | **7.1** | **530** |
| 833 | 92 | WIXO | Wixom WWTP | Effluent-1 | 11/6/2018 | **6.2** | **240** |
| 834 | 92 | WIXO | Wixom WWTP | Effluent-1 | 11/14/2018 | **9.89** | **269** |
| 835 | 92 | WIXO | Wixom WWTP | Effluent-1 | 12/4/2018 | **9.8** | **150** |
| 836 | 92 | WIXO | Wixom WWTP | Effluent-1 | 1/15/2019 | **7.2** | **130** |
| 837 | 92 | WIXO | Wixom WWTP | Effluent-1 | 2/13/2019 | **7.4** | **53** |
| 838 | 92 | WIXO | Wixom WWTP | Effluent-1 | 3/12/2019 | **4.5** | **30** |
| 839 | 92 | WIXO | Wixom WWTP | Effluent-1 | 4/3/2019 | **5.2** | **19** |
| 840 | 92 | WIXO | Wixom WWTP | Effluent-1 | 5/17/2019 | **15** | **27** |
| 841 | 92 | WIXO | Wixom WWTP | Effluent-1 | 6/12/2019 | **11** | **73** |
| 842 | 92 | WIXO | Wixom WWTP | Effluent-1 | 7/2/2019 | **9.1** | **31** |
| 843 | 92 | WIXO | Wixom WWTP | Effluent-1 | 8/21/2019 | **7.9** | **36** |
| 844 | 92 | WIXO | Wixom WWTP | Effluent-1 | 9/17/2019 | **6.7** | **33** |
| 845 | 92 | WIXO | Wixom WWTP | Effluent-1 | 10/8/2019 | **5.6** | **17** |
| 846 | 92 | WIXO | Wixom WWTP | Effluent-1 | 11/12/2019 | **5.9** | **28** |
| 847 | 92 | WIXO | Wixom WWTP | Effluent-1 | 12/10/2019 | **6.6** | **26** |
| 848 | 92 | WIXO | Wixom WWTP | Effluent-1 | 1/21/2020 | **7.5** | **40** |
| 849 | 92 | WIXO | Wixom WWTP | Effluent-1 | 2/18/2020 | **4.2** | **18** |
| 850 | 92 | WIXO | Wixom WWTP | Effluent-1 | 3/23/2020 | **5.0** | **16** |
| 851 | 92 | WIXO | Wixom WWTP | Effluent-1 | 4/14/2020 | **4.7** | **12** |
| 852 | 92 | WIXO | Wixom WWTP | Effluent-1 | 5/13/2020 | **9.0** | **17** |
| 853 | 92 | WIXO | Wixom WWTP | Effluent-1 | 6/23/2020 | **5.4** | **29** |
| 854 | 92 | WIXO | Wixom WWTP | Effluent-1 | 7/21/2020 | **8.1** | **51** |
| 855 | 92 | WIXO | Wixom WWTP | Effluent-1 | 8/18/2020 | **5.8** | **31** |
| 856 | 92 | WIXO | Wixom WWTP | Effluent-1 | 9/9/2020 | **4.8** | **24** |
| 857 | 92 | WIXO | Wixom WWTP | Effluent-1 | 10/15/2020 | **5.5** | **16** |
| 858 | 92 | WIXO | Wixom WWTP | Effluent-1 | 11/3/2020 | **4.0** | **21** |
| 859 | 92 | WIXO | Wixom WWTP | Effluent-1 | 11/5/2020 | **3.8** | **27** |
| 860 | 92 | WIXO | Wixom WWTP | Influent-1 | 11/14/2018 | **3.07** | **128** |
| 861 | 92 | WIXO | Wixom WWTP | Influent-1 | 3/12/2019 | **2.2** | **23** |
| 862 | 92 | WIXO | Wixom WWTP | Influent-1 | 5/17/2019 | ND | ND |
| 863 | 93 | WYOM | Wyoming WWTP | Effluent-1 | 5/7/2018 | **14** | **12** |
| 864 | 93 | WYOM | Wyoming WWTP | Effluent-1 | 9/26/2018 | **11** | **12** |
| 865 | 93 | WYOM | Wyoming WWTP | Effluent-1 | 10/29/2018 | **8.74** | **12** |
| 866 | 93 | WYOM | Wyoming WWTP | Effluent-1 | 3/14/2019 | **15** | **35** |
| 867 | 93 | WYOM | Wyoming WWTP | Effluent-1 | 6/18/2019 | **9.2** | **23** |
| 868 | 93 | WYOM | Wyoming WWTP | Effluent-1 | 9/19/2019 | **8.4** | **16** |
| 869 | 93 | WYOM | Wyoming WWTP | Effluent-1 | 11/19/2019 | **7.3** | **11** |
| 870 | 93 | WYOM | Wyoming WWTP | Effluent-1 | 1/9/2020 | **18** | **31** |
| 871 | 93 | WYOM | Wyoming WWTP | Influent-1 | 5/7/2018 | **14** | **25** |
| 872 | 93 | WYOM | Wyoming WWTP | Influent-1 | 9/26/2018 | **6.2** | **25** |
| 873 | 93 | WYOM | Wyoming WWTP | Influent-1 | 10/29/2018 | **5.08** | **26.4** |
| 874 | 93 | WYOM | Wyoming WWTP | Influent-1 | 3/14/2019 | **8.8** | **25** |
| 875 | 93 | WYOM | Wyoming WWTP | Influent-1 | 6/18/2019 | **3.1** | **14** |
| 876 | 93 | WYOM | Wyoming WWTP | Influent-1 | 9/19/2019 | **5.8** | **7.3** |

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WWTPs PFAS Results
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| Nr. | WWTP Nr. | WWTP Code | WWTP Name | Sample Type | Sample Date | PFOA (ng/L) | PFOS (ng/L) |
|---|---|---|---|---|---|---|---|
| 877 | 93 | WYOM | Wyoming WWTP | Influent-1 | 11/19/2019 | **4.0** | **15** |
| 878 | 93 | WYOM | Wyoming WWTP | Influent-1 | 1/9/2020 | **7.0** | **14** |
| 879 | 94 | YCUA | YCUA Regional WWTP | Effluent-1 | 8/16/2018 | **21** | **8.8** |
| 880 | 94 | YCUA | YCUA Regional WWTP | Effluent-1 | 11/2/2018 | **24** | **22** |
| 881 | 94 | YCUA | YCUA Regional WWTP | Effluent-1 | 11/2/2018 | **12.6** | **6.12** |
| 882 | 94 | YCUA | YCUA Regional WWTP | Effluent-1 | 5/15/2019 | **20.1** | **15.4** |
| 883 | 94 | YCUA | YCUA Regional WWTP | Effluent-1 | 8/5/2019 | **22** | **15** |
| 884 | 94 | YCUA | YCUA Regional WWTP | Effluent-1 | 10/11/2019 | **32** | **24** |
| 885 | 94 | YCUA | YCUA Regional WWTP | Influent-1 | 8/15/2018 | **12** | **4.8** |
| 886 | 94 | YCUA | YCUA Regional WWTP | Influent-1 | 11/2/2018 | **7.39** | **7.51** |
| 887 | 94 | YCUA | YCUA Regional WWTP | Influent-1 | 5/14/2019 | **15.9** | ND |
| 888 | 94 | YCUA | YCUA Regional WWTP | Influent-1 | 10/10/2019 | **71** | **130** |
| 889 | 95 | ZEEL | Zeeland WWTP | Effluent-1 | 4/24/2018 | **9.6** | **3.8** |
| 890 | 95 | ZEEL | Zeeland WWTP | Effluent-1 | 5/8/2019 | **10.71** | **6.85** |
| 891 | 95 | ZEEL | Zeeland WWTP | Effluent-1 | 11/18/2019 | **6.98** | ND |
| 892 | 96 | ALGO | Algonac WWTP | Effluent-1 | 7/19/2017 | **8.6** | **5.6** |
| 893 | 97 | ALPE | Alpena WWTP | Effluent-1 | 11/9/2018 | **7.49** | **5.07** |
| 894 | 97 | ALPE | Alpena WWTP | Influent-1 | 11/9/2018 | **5.94** | **5.44** |
| 895 | 98 | CHEL | Chelsea WWTP | Effluent-1 | 3/20/2019 | **4.3** | **1.0** |
| 896 | 99 | COMM | Commerce Twp WWTP | Effluent-1 | 11/14/2018 | **15.5** | **1.92** |
| 897 | 99 | COMM | Commerce Twp WWTP | Influent-1 | 11/14/2018 | **17.9** | **6.38** |
| 898 | 100 | DEER | Deerfield WWTP | Effluent-1 | 7/31/2018 | **5.8** | **5.4** |
| 899 | 101 | ELAN | East Lansing WWRF | Effluent-1 | 11/1/2018 | **3.28** | **2.01** |
| 900 | 101 | ELAN | East Lansing WWRF | Influent-1 | 11/1/2018 | **2.21** | ND |
| 901 | 102 | GAYL | Gaylord WWTP | Effluent-1 | 11/8/2018 | **8.72** | **4.26** |
| 902 | 102 | GAYL | Gaylord WWTP | Influent-1 | 11/8/2018 | ND | ND |
| 903 | 103 | MARQ | Marquette WWTP | Effluent-1 | 11/7/2018 | **6.56** | **10.7** |
| 904 | 103 | MARQ | Marquette WWTP | Influent-1 | 11/7/2018 | **3.27** | **10.3** |
| 905 | 104 | MEND | Mendon WWSL | Effluent-1 | 10/3/2019 | **7.24** | **6.37** |
| 906 | 105 | MIDL | Midland WWTP | Effluent-1 | 11/19/2018 | **10.5** | **4.03** |
| 907 | 105 | MIDL | Midland WWTP | Influent-1 | 11/19/2018 | **10.3** | **2.72** |
| 908 | 106 | MILF | Milford WWTP | Effluent-1 | 8/14/2018 | **12** | **3.0** |
| 909 | 107 | OSCO | Oscoda Twp WWTP Wurtsmith | Effluent-1 | 11/9/2018 | **12.4** | **75.8** |
| 910 | 107 | OSCO | Oscoda Twp WWTP Wurtsmith | Influent-1 | 11/9/2018 | **4.42** | **38.2** |
| 911 | 108 | PETO | Petoskey WWTP | Effluent-1 | 8/27/2018 | **7.2** | **8.9** |
| 912 | 109 | SLYN | South Lyon WWTP | Effluent-1 | 8/14/2018 | **72** | **4.4** |
| 913 | 109 | SLYN | South Lyon WWTP | Effluent-1 | 3/20/2019 | **6.3** | **0.99** |
| 914 | 110 | TECU | Tecumseh WWTP | Effluent-1 | 7/31/2018 | **14** | **2.8** |

**Notes:**

ND = Non-Detect (Typical detection limits were between 2-10 ng/L)

# Table 12

CIU PFAS Results
Michigan IPP PFAS Initiative

| Nr. | WWTP Nr. | WWTP Code | WWTP Name | 40 CFR Category | No. of Samples | PFOA (ng/L) | | PFOS (ng/L) | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Minimum (Min) | Maximum (Max) | Minimum (Min) | Maximu m (Max) |
| 1 | 1 | ADRI | Adrian WWTP | 414 | 1 | ND | ND | ND | ND |
| 2 | 1 | ADRI | Adrian WWTP | 433 | 1 | ND | ND | ND | ND |
| 3 | 4 | AARB | Ann Arbor WWTP | 469 | 1 | 22.9 | 22.9 | 10 | 10 |
| 4 | 5 | AUGR | Au Gres WWTP | 433 | 1 | ND | ND | ND | ND |
| 5 | 6 | BCRK | Battle Creek WWTP | 430 | 4 | 48.82 | 98 | 56 | 100 |
| 6 | 6 | BCRK | Battle Creek WWTP | 430 | 4 | 51.88 | 100 | 87 | 92 |
| 7 | 6 | BCRK | Battle Creek WWTP | 433 | 2 | ND | ND | ND | ND |
| 8 | 9 | BELD | Belding WWTP | 433 | 1 | ND | ND | ND | ND |
| 9 | 9 | BELD | Belding WWTP | 468 | 1 | ND | ND | ND | ND |
| 10 | 10 | BHSJ | Benton Harbor-St Joseph WWTP | 413 | 1 | ND | ND | ND | ND |
| 11 | 10 | BHSJ | Benton Harbor-St Joseph WWTP | 433 | 2 | ND | ND | ND | ND |
| 12 | 10 | BHSJ | Benton Harbor-St Joseph WWTP | 433 | 2 | ND | ND | 5.31 | 5.31 |
| 13 | 10 | BHSJ | Benton Harbor-St Joseph WWTP | 433 | 2 | ND | ND | 5.07 | 27.65 |
| 14 | 11 | BRAP | Big Rapids WWTP | 433 | 1 | ND | ND | ND | ND |
| 15 | 13 | BRIT | Brighton WWTP | 433 | 1 | ND | ND | ND | ND |
| 16 | 14 | BRON | Bronson WWTP | 433 | 19 | 0.25 | 4.3 | 4 | 240,000 |
| 17 | 17 | CASS | Cass City WWTP | 433 | 1 | 0.86 | 0.86 | ND | ND |
| 18 | 18 | CHAR | Charlotte WWTP | 433 | 5 | ND | ND | ND | ND |
| 19 | 18 | CHAR | Charlotte WWTP | 433 | 6 | ND | ND | ND | ND |
| 20 | 19 | CLAR | Clare WWTP | 433 | 2 | ND | ND | ND | ND |
| 21 | 24 | DELT | Delta Twp WWTP | 433 | 1 | ND | ND | ND | ND |
| 22 | 25 | DEXT | Dexter WWTP | 433 | 2 | 10.9 | 15 | 17.6 | 33 |
| 23 | 27 | DRVR | Downriver WWTP | 420 | 1 | ND | ND | ND | ND |
| 24 | 27 | DRVR | Downriver WWTP | 420 | 1 | ND | ND | ND | ND |
| 25 | 27 | DRVR | Downriver WWTP | 433 | 1 | 4.8 | 4.8 | 4.7 | 4.7 |
| 26 | 27 | DRVR | Downriver WWTP | 433 | 1 | ND | ND | 2.7 | 2.7 |
| 27 | 27 | DRVR | Downriver WWTP | 433 | 1 | 3.4 | 3.4 | 5.7 | 5.7 |
| 28 | 27 | DRVR | Downriver WWTP | 433 | 2 | 22 | 23 | ND | ND |
| 29 | 27 | DRVR | Downriver WWTP | 433 | 1 | ND | ND | ND | ND |
| 30 | 27 | DRVR | Downriver WWTP | 433 | 1 | ND | ND | ND | ND |
| 31 | 27 | DRVR | Downriver WWTP | 433 | 4 | 2.4 | 3.9 | 840 | 3700 |
| 32 | 27 | DRVR | Downriver WWTP | 433 | 1 | ND | ND | ND | ND |
| 33 | 27 | DRVR | Downriver WWTP | 468 | 1 | ND | ND | ND | ND |
| 34 | 29 | EAUC | Eau Claire WWSL | 433 | 1 | ND | ND | ND | ND |
| 35 | 31 | ELKT | Elkton WWSL | 433 | 2 | ND | ND | ND | ND |
| 36 | 32 | FLIN | Flint WWTP | 433 | 1 | 4.8 | 4.8 | 2 | 2 |
| 37 | 32 | FLIN | Flint WWTP | 433 | 1 | 2.3 | 2.3 | ND | ND |
| 38 | 34 | GRSD | GRSD Sewer Authority WRRF | 433 | 1 | ND | ND | ND | ND |
| 39 | 35 | GENE | Genesee Co #3 WWTP | 433 | 1 | ND | ND | ND | ND |
| 40 | 35 | GENE | Genesee Co #3 WWTP | 433 | 1 | ND | ND | ND | ND |
| 41 | 36 | RAGN | Genesee Co-Ragnone WWTP | 433 | 1 | ND | ND | ND | ND |
| 42 | 36 | RAGN | Genesee Co-Ragnone WWTP | 433 | 1 | 10 | 10 | ND | ND |
| 43 | 36 | RAGN | Genesee Co-Ragnone WWTP | 433 | 1 | ND | ND | ND | ND |
| 44 | 38 | GLWA | GLWA WRRF | 413 | 2 | ND | ND | ND | ND |
| 45 | 38 | GLWA | GLWA WRRF | 413 | 1 | ND | ND | ND | ND |
| 46 | 38 | GLWA | GLWA WRRF | 413 | 1 | ND | ND | ND | ND |
| 47 | 38 | GLWA | GLWA WRRF | 413 | 6 | ND | ND | 6.1 | 69 |
| 48 | 38 | GLWA | GLWA WRRF | 413 | 5 | ND | ND | 9.8 | 180 |
| 49 | 38 | GLWA | GLWA WRRF | 413 | 16 | 4.3 | 4.3 | 12 | 50,000 |
| 50 | 38 | GLWA | GLWA WRRF | 413 | 1 | ND | ND | ND | ND |
| 51 | 38 | GLWA | GLWA WRRF | 413 | 9 | ND | ND | 19 | 9,750 |
| 52 | 38 | GLWA | GLWA WRRF | 413 | 4 | ND | ND | 2.2 | 370 |
| 53 | 38 | GLWA | GLWA WRRF | 413 | 2 | ND | ND | ND | ND |
| 54 | 38 | GLWA | GLWA WRRF | 413 | 1 | ND | ND | ND | ND |
| 55 | 38 | GLWA | GLWA WRRF | 413 | 1 | ND | ND | 10 | 10 |
| 56 | 38 | GLWA | GLWA WRRF | 413 | 1 | ND | ND | ND | ND |
| 57 | 38 | GLWA | GLWA WRRF | 413 | 6 | ND | ND | 13 | 30 |
| 58 | 38 | GLWA | GLWA WRRF | 413 | 1 | ND | ND | 94 | 94 |
| 59 | 38 | GLWA | GLWA WRRF | 413 | 2 | ND | ND | ND | ND |
| 60 | 38 | GLWA | GLWA WRRF | 413 | 1 | ND | ND | ND | ND |
| 61 | 38 | GLWA | GLWA WRRF | 413 | 1 | ND | ND | ND | ND |
| 62 | 38 | GLWA | GLWA WRRF | 413 | 1 | ND | ND | ND | ND |
| 63 | 38 | GLWA | GLWA WRRF | 413 | 6 | 2 | 5.1 | 4.6 | 60 |
| 64 | 38 | GLWA | GLWA WRRF | 414 | 1 | ND | ND | ND | ND |
| 65 | 38 | GLWA | GLWA WRRF | 419 | 42 | 3.5 | 710 | 6.8 | 800 |
| 66 | 38 | GLWA | GLWA WRRF | 420 | 1 | ND | ND | ND | ND |
| 67 | 38 | GLWA | GLWA WRRF | 420 | 1 | 43 | 43 | ND | ND |
| 68 | 38 | GLWA | GLWA WRRF | 420 | 2 | ND | ND | ND | ND |
| 69 | 38 | GLWA | GLWA WRRF | 420 | 1 | ND | ND | ND | ND |
| 70 | 38 | GLWA | GLWA WRRF | 425 | 3 | ND | ND | 10 | 14 |
| 71 | 38 | GLWA | GLWA WRRF | 433 | 5 | 1.87 | 7.3 | 58.2 | 350 |
| 72 | 38 | GLWA | GLWA WRRF | 433 | 1 | ND | ND | ND | ND |

# Table 12

CIU PFAS Results
Michigan IPP PFAS Initiative

| Nr. | WWTP Nr. | WWTP Code | WWTP Name | 40 CFR Category | No. of Samples | PFOA (ng/L) | | PFOS (ng/L) | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Minimum (Min) | Maximum (Max) | Minimum (Min) | Maximum (Max) |
| 73 | 38 | GLWA | GLWA WRRF | 433 | 1 | ND | ND | ND | ND |
| 74 | 38 | GLWA | GLWA WRRF | 433 | 1 | ND | ND | ND | ND |
| 75 | 38 | GLWA | GLWA WRRF | 433 | 1 | ND | ND | ND | ND |
| 76 | 38 | GLWA | GLWA WRRF | 433 | 2 | ND | ND | 11 | 11 |
| 77 | 38 | GLWA | GLWA WRRF | 433 | 4 | ND | ND | 27 | 250 |
| 78 | 38 | GLWA | GLWA WRRF | 433 | 4 | ND | ND | 25 | 230 |
| 79 | 38 | GLWA | GLWA WRRF | 433 | 1 | ND | ND | 20 | 20 |
| 80 | 38 | GLWA | GLWA WRRF | 433 | 1 | ND | ND | ND | ND |
| 81 | 38 | GLWA | GLWA WRRF | 433 | 2 | ND | ND | ND | ND |
| 82 | 38 | GLWA | GLWA WRRF | 433 | 2 | 20 | 20 | ND | ND |
| 83 | 38 | GLWA | GLWA WRRF | 433 | 1 | ND | ND | ND | ND |
| 84 | 38 | GLWA | GLWA WRRF | 433 | 1 | ND | ND | ND | ND |
| 85 | 38 | GLWA | GLWA WRRF | 433 | 2 | ND | ND | 10 | 10 |
| 86 | 38 | GLWA | GLWA WRRF | 433 | 1 | ND | ND | ND | ND |
| 87 | 38 | GLWA | GLWA WRRF | 433 | 8 | ND | ND | ND | ND |
| 88 | 38 | GLWA | GLWA WRRF | 433 | 1 | ND | ND | ND | ND |
| 89 | 38 | GLWA | GLWA WRRF | 433 | 1 | ND | ND | ND | ND |
| 90 | 38 | GLWA | GLWA WRRF | 433 | 1 | ND | ND | ND | ND |
| 91 | 38 | GLWA | GLWA WRRF | 433 | 1 | ND | ND | ND | ND |
| 92 | 38 | GLWA | GLWA WRRF | 433 | 1 | ND | ND | ND | ND |
| 93 | 38 | GLWA | GLWA WRRF | 433 | 1 | ND | ND | ND | ND |
| 94 | 38 | GLWA | GLWA WRRF | 433 | 8 | 2.8 | 30 | 2.5 | 230 |
| 95 | 38 | GLWA | GLWA WRRF | 433 | 1 | ND | ND | ND | ND |
| 96 | 38 | GLWA | GLWA WRRF | 433 | 1 | ND | ND | 10 | 10 |
| 97 | 38 | GLWA | GLWA WRRF | 433 | 1 | ND | ND | ND | ND |
| 98 | 38 | GLWA | GLWA WRRF | 433 | 2 | 14 | 14 | ND | ND |
| 99 | 38 | GLWA | GLWA WRRF | 433 | 11 | ND | ND | ND | ND |
| 100 | 38 | GLWA | GLWA WRRF | 433 | 2 | ND | ND | ND | ND |
| 101 | 38 | GLWA | GLWA WRRF | 433 | 1 | ND | ND | ND | ND |
| 102 | 38 | GLWA | GLWA WRRF | 433 | 1 | ND | ND | ND | ND |
| 103 | 38 | GLWA | GLWA WRRF | 433 | 1 | ND | ND | ND | ND |
| 104 | 38 | GLWA | GLWA WRRF | 433 | 1 | ND | ND | ND | ND |
| 105 | 38 | GLWA | GLWA WRRF | 433 | 1 | 50 | 50 | ND | ND |
| 106 | 38 | GLWA | GLWA WRRF | 433 | 3 | ND | ND | 6.9 | 20 |
| 107 | 38 | GLWA | GLWA WRRF | 433 | 1 | ND | ND | ND | ND |
| 108 | 38 | GLWA | GLWA WRRF | 433 | 1 | ND | ND | ND | ND |
| 109 | 38 | GLWA | GLWA WRRF | 433 | 1 | ND | ND | ND | ND |
| 110 | 38 | GLWA | GLWA WRRF | 433 | 1 | ND | ND | ND | ND |
| 111 | 38 | GLWA | GLWA WRRF | 433 | 1 | ND | ND | ND | ND |
| 112 | 38 | GLWA | GLWA WRRF | 433 | 13 | ND | ND | 16 | 30 |
| 113 | 38 | GLWA | GLWA WRRF | 433 | 1 | ND | ND | ND | ND |
| 114 | 38 | GLWA | GLWA WRRF | 433 | 1 | ND | ND | ND | ND |
| 115 | 38 | GLWA | GLWA WRRF | 433 | 1 | ND | ND | ND | ND |
| 116 | 38 | GLWA | GLWA WRRF | 433 | 1 | ND | ND | ND | ND |
| 117 | 38 | GLWA | GLWA WRRF | 433 | 1 | ND | ND | ND | ND |
| 118 | 38 | GLWA | GLWA WRRF | 433 | 2 | 10 | 10 | ND | ND |
| 119 | 38 | GLWA | GLWA WRRF | 433 | 2 | ND | ND | ND | ND |
| 120 | 38 | GLWA | GLWA WRRF | 433 | 1 | ND | ND | ND | ND |
| 121 | 38 | GLWA | GLWA WRRF | 433 | 1 | ND | ND | ND | ND |
| 122 | 38 | GLWA | GLWA WRRF | 433 | 1 | ND | ND | ND | ND |
| 123 | 38 | GLWA | GLWA WRRF | 433 | 1 | ND | ND | ND | ND |
| 124 | 38 | GLWA | GLWA WRRF | 433 | 1 | ND | ND | ND | ND |
| 125 | 38 | GLWA | GLWA WRRF | 433 | 1 | ND | ND | ND | ND |
| 126 | 38 | GLWA | GLWA WRRF | 433 | 1 | ND | ND | ND | ND |
| 127 | 38 | GLWA | GLWA WRRF | 433 | 1 | ND | ND | ND | ND |
| 128 | 38 | GLWA | GLWA WRRF | 433 | 1 | ND | ND | ND | ND |
| 129 | 38 | GLWA | GLWA WRRF | 433 | 1 | ND | ND | ND | ND |
| 130 | 38 | GLWA | GLWA WRRF | 433 | 1 | ND | ND | ND | ND |
| 131 | 38 | GLWA | GLWA WRRF | 437 | 16 | 3.6 | 170 | 4.4 | 8,400 |
| 132 | 38 | GLWA | GLWA WRRF | 437 | 22 | 32 | 1,790 | ND | 630 |
| 133 | 38 | GLWA | GLWA WRRF | 437 | 17 | 70 | 380 | 40 | 170 |
| 134 | 38 | GLWA | GLWA WRRF | 437 | 33 | 13 | 2,200 | 28 | 53,000 |
| 135 | 38 | GLWA | GLWA WRRF | 437 | 20 | 6.4 | 220 | 20 | 530 |
| 136 | 38 | GLWA | GLWA WRRF | 437 | 16 | 29 | 310 | 26 | 390 |
| 137 | 38 | GLWA | GLWA WRRF | 437 | 14 | ND | 890 | ND | 500 |
| 138 | 38 | GLWA | GLWA WRRF | 437 | 35 | 7.4 | 3,000 | 11 | 1,200 |
| 139 | 38 | GLWA | GLWA WRRF | 439 | 1 | ND | ND | ND | ND |
| 140 | 38 | GLWA | GLWA WRRF | 442 | 10 | 33 | 280 | 11 | 640 |
| 141 | 38 | GLWA | GLWA WRRF | 446 | 4 | 20 | 56 | 60 | 120 |
| 142 | 38 | GLWA | GLWA WRRF | 467 | 1 | ND | ND | ND | ND |
| 143 | 39 | GHSL | Grand Haven - Spring Lake WWTP | 433 | 1 | 4.7 | 4.7 | ND | ND |
| 144 | 39 | GHSL | Grand Haven - Spring Lake WWTP | 433 | 3 | ND | ND | 11 | 40 |

# Table 12

CIU PFAS Results
Michigan IPP PFAS Initiative

| Nr. | WWTP Nr. | WWTP Code | WWTP Name | 40 CFR Category | No. of Samples | PFOA (ng/L) | | PFOS (ng/L) | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Minimum (Min) | Maximum (Max) | Minimum (Min) | Maximum (Max) |
| 145 | 39 | GHSL | Grand Haven - Spring Lake WWTP | 433 | 1 | ND | ND | ND | ND |
| 146 | 39 | GHSL | Grand Haven - Spring Lake WWTP | 433 | 1 | ND | ND | ND | ND |
| 147 | 40 | GRAP | Grand Rapids WRRF | 410 | 5 | 6.51 | 114 | 2.3 | 36.07 |
| 148 | 40 | GRAP | Grand Rapids WRRF | 413 | 5 | ND | ND | ND | ND |
| 149 | 40 | GRAP | Grand Rapids WRRF | 413 | 6 | 2.8 | 2.8 | 320 | 34,020 |
| 150 | 40 | GRAP | Grand Rapids WRRF | 413 | 1 | 2.47 | 2.47 | 5.59 | 5.59 |
| 151 | 40 | GRAP | Grand Rapids WRRF | 413 | 1 | 3.8 | 3.8 | 660 | 660 |
| 152 | 40 | GRAP | Grand Rapids WRRF | 417 | 1 | ND | ND | ND | ND |
| 153 | 40 | GRAP | Grand Rapids WRRF | 433 | 3 | ND | ND | 7.9 | 7.9 |
| 154 | 40 | GRAP | Grand Rapids WRRF | 433 | 1 | ND | ND | ND | ND |
| 155 | 40 | GRAP | Grand Rapids WRRF | 433 | 2 | 2.2 | 2.2 | 269 | 970 |
| 156 | 40 | GRAP | Grand Rapids WRRF | 433 | 1 | 5.31 | 5.31 | ND | ND |
| 157 | 40 | GRAP | Grand Rapids WRRF | 433 | 1 | 2.4 | 2.4 | 4.7 | 4.7 |
| 158 | 40 | GRAP | Grand Rapids WRRF | 433 | 1 | ND | ND | ND | ND |
| 159 | 40 | GRAP | Grand Rapids WRRF | 433 | 1 | ND | ND | ND | ND |
| 160 | 40 | GRAP | Grand Rapids WRRF | 433 | 1 | 2.3 | 2.3 | 2.6 | 2.6 |
| 161 | 40 | GRAP | Grand Rapids WRRF | 433 | 3 | ND | ND | ND | ND |
| 162 | 40 | GRAP | Grand Rapids WRRF | 433 | 1 | ND | ND | ND | ND |
| 163 | 40 | GRAP | Grand Rapids WRRF | 433 | 2 | ND | ND | ND | ND |
| 164 | 40 | GRAP | Grand Rapids WRRF | 433 | 1 | 1.8 | 1.8 | 5.1 | 5.1 |
| 165 | 40 | GRAP | Grand Rapids WRRF | 433 | 1 | ND | ND | ND | ND |
| 166 | 40 | GRAP | Grand Rapids WRRF | 433 | 5 | 4.4 | 4.4 | 2.4 | 4700 |
| 167 | 40 | GRAP | Grand Rapids WRRF | 433 | 1 | 20 | 20 | 12,000 | 12,000 |
| 168 | 40 | GRAP | Grand Rapids WRRF | 433 | 1 | ND | ND | 2,000 | 2,000 |
| 169 | 40 | GRAP | Grand Rapids WRRF | 433 | 1 | ND | ND | 24 | 24 |
| 170 | 40 | GRAP | Grand Rapids WRRF | 433 | 1 | ND | ND | 7.89 | 7.89 |
| 171 | 40 | GRAP | Grand Rapids WRRF | 433 | 1 | ND | ND | ND | ND |
| 172 | 40 | GRAP | Grand Rapids WRRF | 433 | 1 | ND | ND | ND | ND |
| 173 | 40 | GRAP | Grand Rapids WRRF | 433 | 1 | 4.05 | 4.05 | ND | ND |
| 174 | 40 | GRAP | Grand Rapids WRRF | 433 | 1 | 3.4 | 3.4 | 4.5 | 4.5 |
| 175 | 40 | GRAP | Grand Rapids WRRF | 433 | 1 | ND | ND | ND | ND |
| 176 | 40 | GRAP | Grand Rapids WRRF | 433 | 2 | 2 | 2 | ND | ND |
| 177 | 40 | GRAP | Grand Rapids WRRF | 433 | 1 | 2.4 | 2.4 | 3.2 | 3.2 |
| 178 | 40 | GRAP | Grand Rapids WRRF | 433 | 1 | 6.4 | 6.4 | 4 | 4 |
| 179 | 40 | GRAP | Grand Rapids WRRF | 433 | 1 | 6.26 | 6.26 | ND | ND |
| 180 | 40 | GRAP | Grand Rapids WRRF | 433 | 1 | ND | ND | ND | ND |
| 181 | 40 | GRAP | Grand Rapids WRRF | 439 | 1 | ND | ND | ND | ND |
| 182 | 41 | GREE | Greenville WWTP | 433 | 3 | ND | ND | ND | ND |
| 183 | 44 | HART | Hartford WWTP | 433 | 1 | ND | ND | ND | ND |
| 184 | 45 | HAST | Hastings WWTP | 433 | 1 | ND | ND | ND | ND |
| 185 | 46 | HILL | Hillsdale WWTP | 433 | 1 | ND | ND | ND | ND |
| 186 | 47 | HOLL | Holland WWTP | 433 | 1 | ND | ND | ND | ND |
| 187 | 47 | HOLL | Holland WWTP | 433 | 1 | ND | ND | ND | ND |
| 188 | 47 | HOLL | Holland WWTP | 433 | 1 | ND | ND | 2.22 | 2.22 |
| 189 | 47 | HOLL | Holland WWTP | 433 | 1 | ND | ND | ND | ND |
| 190 | 47 | HOLL | Holland WWTP | 433 | 1 | ND | ND | 2.19 | 2.19 |
| 191 | 47 | HOLL | Holland WWTP | 433 | 1 | 2.43 | 2.43 | 3.8 | 3.8 |
| 192 | 47 | HOLL | Holland WWTP | 433 | 1 | 2.7 | 2.7 | ND | ND |
| 193 | 47 | HOLL | Holland WWTP | 437 | 13 | 7.32 | 242 | 57.06 | 57.06 |
| 194 | 48 | HLLY | Holly WWTP | 433 | 1 | 6.7 | 6.7 | ND | ND |
| 195 | 49 | HOWE | Howell WWTP | 433 | 11 | ND | ND | 1.5 | 2,000 |
| 196 | 50 | IONA | Ionia WWTP | 433 | 73 | ND | 9.15 | ND | 5,324 |
| 197 | 51 | ITHA | Ithaca WWSL | 433 | 1 | ND | ND | ND | ND |
| 198 | 52 | JACK | Jackson WWTP | 413 | 1 | ND | ND | ND | ND |
| 199 | 52 | JACK | Jackson WWTP | 413 | 1 | ND | ND | ND | ND |
| 200 | 52 | JACK | Jackson WWTP | 423 | 2 | ND | ND | ND | ND |
| 201 | 52 | JACK | Jackson WWTP | 433 | 1 | ND | ND | ND | ND |
| 202 | 52 | JACK | Jackson WWTP | 433 | 8 | ND | ND | 40 | 9,950 |
| 203 | 52 | JACK | Jackson WWTP | 433 | 1 | ND | ND | ND | ND |
| 204 | 52 | JACK | Jackson WWTP | 433 | 1 | ND | ND | ND | ND |
| 205 | 52 | JACK | Jackson WWTP | 433 | 1 | ND | ND | ND | ND |
| 206 | 52 | JACK | Jackson WWTP | 433 | 1 | ND | ND | ND | ND |
| 207 | 52 | JACK | Jackson WWTP | 433 | 1 | ND | ND | ND | ND |
| 208 | 52 | JACK | Jackson WWTP | 433 | 1 | ND | ND | ND | ND |
| 209 | 52 | JACK | Jackson WWTP | 433 | 1 | ND | ND | ND | ND |
| 210 | 52 | JACK | Jackson WWTP | 433 | 1 | ND | ND | ND | ND |
| 211 | 52 | JACK | Jackson WWTP | 433 | 1 | ND | ND | ND | ND |
| 212 | 53 | KZOO | Kalamazoo WWTP | 414 | 1 | ND | ND | ND | ND |
| 213 | 53 | KZOO | Kalamazoo WWTP | 430 | 22 | 16.9 | 110 | 2.36 | 190 |
| 214 | 53 | KZOO | Kalamazoo WWTP | 433 | 1 | ND | ND | ND | ND |
| 215 | 53 | KZOO | Kalamazoo WWTP | 433 | 1 | ND | ND | 3.7 | 3.7 |
| 216 | 53 | KZOO | Kalamazoo WWTP | 433 | 1 | ND | ND | ND | ND |

# Table 12
CIU PFAS Results
Michigan IPP PFAS Initiative

| Nr. | WWTP Nr. | WWTP Code | WWTP Name | 40 CFR Category | No. of Samples | PFOA (ng/L) | | PFOS (ng/L) | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Minimum (Min) | Maximum (Max) | Minimum (Min) | Maximum (Max) |
| 217 | 53 | KZOO | Kalamazoo WWTP | 433 | 2 | ND | ND | 2.1 | 3.6 |
| 218 | 53 | KZOO | Kalamazoo WWTP | 433 | 1 | 3.3 | 3.3 | ND | ND |
| 219 | 53 | KZOO | Kalamazoo WWTP | 433 | 1 | 2.7 | 2.7 | ND | ND |
| 220 | 53 | KZOO | Kalamazoo WWTP | 433 | 1 | ND | ND | ND | ND |
| 221 | 53 | KZOO | Kalamazoo WWTP | 433 | 4 | 1.71 | 1.71 | 3 | 4.27 |
| 222 | 53 | KZOO | Kalamazoo WWTP | 433 | 1 | ND | ND | ND | ND |
| 223 | 53 | KZOO | Kalamazoo WWTP | 433 | 1 | ND | ND | ND | ND |
| 224 | 53 | KZOO | Kalamazoo WWTP | 433 | 5 | ND | ND | 25.1 | 76 |
| 225 | 53 | KZOO | Kalamazoo WWTP | 433 | 1 | ND | ND | ND | ND |
| 226 | 53 | KZOO | Kalamazoo WWTP | 439 | 1 | ND | ND | 3.4 | 3.4 |
| 227 | 53 | KZOO | Kalamazoo WWTP | 439 | 1 | ND | ND | ND | ND |
| 228 | 53 | KZOO | Kalamazoo WWTP | 439 | 1 | ND | ND | ND | ND |
| 229 | 53 | KZOO | Kalamazoo WWTP | 467 | 6 | 4.5 | 4.5 | 2.4 | 17 |
| 230 | 54 | SAWY | KI Sawyer WWTP-Marquette Co | 463 | 1 | ND | ND | 61 | 61 |
| 231 | 54 | SAWY | KI Sawyer WWTP-Marquette Co | 467 | 1 | ND | ND | 3.2 | 3.2 |
| 232 | 56 | LANS | Lansing WWTP | 413 | 1 | ND | ND | 340 | 340 |
| 233 | 56 | LANS | Lansing WWTP | 433 | 1 | ND | ND | ND | ND |
| 234 | 56 | LANS | Lansing WWTP | 433 | 1 | ND | ND | ND | ND |
| 235 | 56 | LANS | Lansing WWTP | 433 | 1 | ND | ND | ND | ND |
| 236 | 56 | LANS | Lansing WWTP | 433 | 1 | ND | ND | ND | ND |
| 237 | 56 | LANS | Lansing WWTP | 433 | 1 | ND | ND | ND | ND |
| 238 | 56 | LANS | Lansing WWTP | 437 | 1 | 20 | 20 | ND | ND |
| 239 | 57 | LAPR | Lapeer WWTP | 433 | 301 | ND | 7.3 | ND | 34,000 |
| 240 | 60 | LYON | Lyon Township WWTP | 433 | 2 | ND | ND | ND | ND |
| 241 | 61 | MARY | Marysville WWTP | 420 | 1 | 1.9 | 1.9 | 1.4 | 1.4 |
| 242 | 61 | MARY | Marysville WWTP | 433 | 3 | 2 | 4.4 | 2.9 | 2.9 |
| 243 | 61 | MARY | Marysville WWTP | 433 | 3 | 2 | 2 | ND | ND |
| 244 | 61 | MARY | Marysville WWTP | 467 | 8 | 1.8 | 4.3 | 1.7 | 1.8 |
| 245 | 62 | MENO | Menominee WWTP | 433 | 1 | ND | ND | ND | ND |
| 246 | 63 | MILN | Milan WWTP | 433 | 1 | ND | ND | ND | ND |
| 247 | 64 | MONR | Monroe Metro WWTP | 420 | 1 | 2.7 | 2.7 | 3.6 | 3.6 |
| 248 | 64 | MONR | Monroe Metro WWTP | 433 | 3 | 9.9 | 9.9 | 12 | 16 |
| 249 | 65 | MTCL | Mt Clemens WWTP | 433 | 2 | 1.9 | 2.1 | ND | ND |
| 250 | 66 | MUSK | Muskegon Co WWMS Metro WWTP | 413 | 2 | 3.6 | 7.3 | 1,200 | 2,900 |
| 251 | 66 | MUSK | Muskegon Co WWMS Metro WWTP | 414 | 1 | 3 | 3 | 4.2 | 4.2 |
| 252 | 66 | MUSK | Muskegon Co WWMS Metro WWTP | 433 | 1 | 2 | 2 | ND | ND |
| 253 | 66 | MUSK | Muskegon Co WWMS Metro WWTP | 433 | 4 | 2.3 | 26 | 3.82 | 540 |
| 254 | 66 | MUSK | Muskegon Co WWMS Metro WWTP | 433 | 1 | 2.9 | 2.9 | 8.9 | 8.9 |
| 255 | 66 | MUSK | Muskegon Co WWMS Metro WWTP | 433 | 1 | 4 | 4 | 7 | 7 |
| 256 | 66 | MUSK | Muskegon Co WWMS Metro WWTP | 433 | 1 | 4.4 | 4.4 | ND | ND |
| 257 | 66 | MUSK | Muskegon Co WWMS Metro WWTP | 437 | 3 | 9.9 | 31 | 18 | 290 |
| 258 | 68 | HOUG | North Houghton Co Water and Sewage Authority | 433 | 1 | ND | ND | ND | ND |
| 259 | 69 | NKEN | North Kent SA WWTP | 433 | 1 | 4.44 | 4.44 | 5.83 | 5.83 |
| 260 | 69 | NKEN | North Kent SA WWTP | 433 | 2 | 4.13 | 4.13 | 10.3 | 58.8 |
| 261 | 70 | OTSE | Otsego WWTP | 433 | 1 | ND | ND | ND | ND |
| 262 | 71 | OWOS | Owosso/Mid Shiawassee Co WWTP | 433 | 1 | 1.5 | 1.5 | 0.66 | 0.66 |
| 263 | 74 | PHUR | PORT HURON WWTP | 433 | 11 | 2.1 | 2.1 | 290 | 14,250 |
| 264 | 74 | PHUR | PORT HURON WWTP | 433 | 1 | ND | ND | ND | ND |
| 265 | 77 | HURO | S Huron Valley UA WWTP | 433 | 1 | ND | ND | 11 | 11 |
| 266 | 77 | HURO | S Huron Valley UA WWTP | 433 | 2 | ND | ND | ND | ND |
| 267 | 77 | HURO | S Huron Valley UA WWTP | 433 | 1 | 8.9 | 8.9 | ND | ND |
| 268 | 77 | HURO | S Huron Valley UA WWTP | 442 | 2 | 77 | 87 | ND | ND |
| 269 | 78 | SGTW | Saginaw Twp WWTP | 433 | 1 | ND | ND | ND | ND |
| 270 | 79 | SAGN | Saginaw WWTP | 413 | 1 | 2.3 | 2.3 | 3.9 | 3.9 |
| 271 | 79 | SAGN | Saginaw WWTP | 433 | 1 | ND | ND | ND | ND |
| 272 | 80 | SALN | Saline WWTP | 433 | 1 | ND | ND | ND | ND |
| 273 | 84 | STJN | St. Johns WWTP | 433 | 1 | ND | ND | ND | ND |
| 274 | 86 | TAWS | Tawas Utility Authority WWTP | 433 | 2 | 2.6 | 6 | 4.4 | 4.4 |
| 275 | 87 | TRIV | Three Rivers WWTP | 430 | 1 | 12.9 | 12.9 | 15.6 | 15.6 |
| 276 | 87 | TRIV | Three Rivers WWTP | 433 | 2 | ND | ND | ND | ND |
| 277 | 90 | WARR | Warren WWTP | 413 | 6 | ND | ND | 74 | 3,200 |
| 278 | 90 | WARR | Warren WWTP | 413 | 1 | ND | ND | ND | ND |
| 279 | 90 | WARR | Warren WWTP | 413 | 8 | ND | ND | 8.6 | 250 |
| 280 | 90 | WARR | Warren WWTP | 413 | 7 | 1.8 | 19 | 9.9 | 600 |
| 281 | 90 | WARR | Warren WWTP | 413 | 10 | 3.1 | 19 | 11 | 13,000 |
| 282 | 90 | WARR | Warren WWTP | 433 | 1 | ND | ND | ND | ND |
| 283 | 90 | WARR | Warren WWTP | 433 | 1 | ND | ND | ND | ND |
| 284 | 90 | WARR | Warren WWTP | 433 | 6 | 15 | 740 | 4.6 | 2,400 |
| 285 | 92 | WIXO | Wixom WWTP | 413 | 27 | ND | ND | 0.44 | 28,000 |
| 286 | 92 | WIXO | Wixom WWTP | 413 | 25 | ND | ND | 1.1 | 9.2 |
| 287 | 92 | WIXO | Wixom WWTP | 413 | 4 | 2 | 2 | 2 | 2.2 |
| 288 | 93 | WYOM | Wyoming WWTP | 413 | 1 | ND | ND | 4.5 | 4.5 |

# Table 12

CIU PFAS Results
Michigan IPP PFAS Initiative

| Nr. | WWTP Nr. | WWTP Code | WWTP Name | 40 CFR Category | No. of Samples | PFOA (ng/L) | | PFOS (ng/L) | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Minimum (Min) | Maximum (Max) | Minimum (Min) | Maximum (Max) |
| 289 | 93 | WYOM | Wyoming WWTP | 413 | 5 | 2.2 | 4.8 | 79 | 5,100 |
| 290 | 93 | WYOM | Wyoming WWTP | 413 | 2 | 2.1 | 2.1 | 2.6 | 120 |
| 292 | 93 | WYOM | Wyoming WWTP | 433 | 5 | 6.4 | 18 | 910 | 24,000 |
| 293 | 93 | WYOM | Wyoming WWTP | 433 | 1 | 11 | 11 | ND | ND |
| 294 | 93 | WYOM | Wyoming WWTP | 433 | 1 | 2.6 | 2.6 | 3.1 | 3.1 |
| 295 | 93 | WYOM | Wyoming WWTP | 433 | 1 | ND | ND | ND | ND |
| 296 | 93 | WYOM | Wyoming WWTP | 433 | 1 | ND | ND | 7 | 7 |
| 297 | 93 | WYOM | Wyoming WWTP | 433 | 1 | 4.3 | 4.3 | ND | ND |
| 298 | 93 | WYOM | Wyoming WWTP | 433 | 1 | 1.5 | 1.5 | 1 | 1 |
| 299 | 93 | WYOM | Wyoming WWTP | 437 | 1 | 0.53 | 0.53 | 1.1 | 1.1 |
| 300 | 93 | WYOM | Wyoming WWTP | 437 | 5 | 7.7 | 34 | 15 | 120 |
| 291 | 93 | WYOM | Wyoming WWTP | 442 | 1 | 4.2 | 4.2 | 8.2 | 8.2 |
| 301 | 93 | WYOM | Wyoming WWTP | 467 | 5 | 1.5 | 3.8 | 68 | 5,200 |
| 302 | 94 | YCUA | YCUA Regional WWTP | 413 | 1 | 1.8 | 1.8 | 4.6 | 4.6 |
| 303 | 94 | YCUA | YCUA Regional WWTP | 413 | 6 | 1.6 | 2.6 | 26 | 170 |
| 304 | 94 | YCUA | YCUA Regional WWTP | 413 | 2 | 1.8 | 1.8 | 2.5 | 2.5 |
| 305 | 94 | YCUA | YCUA Regional WWTP | 433 | 1 | ND | ND | ND | ND |
| 306 | 94 | YCUA | YCUA Regional WWTP | 433 | 1 | 18 | 18 | 2.6 | 2.6 |
| 307 | 94 | YCUA | YCUA Regional WWTP | 433 | 1 | ND | ND | 1.7 | 1.7 |
| 308 | 94 | YCUA | YCUA Regional WWTP | 437 | 7 | 5.4 | 28 | 3.1 | 190 |
| 309 | 94 | YCUA | YCUA Regional WWTP | 463 | 1 | 16 | 16 | 3.4 | 3.4 |
| 310 | 95 | ZEEL | Zeeland WWTP | 433 | 1 | ND | ND | ND | ND |

**Notes:**
**CIU** = Categorical Industrial User
**ND** = Non-Detect (Typical detection limits were between 2-10 ng/L)

# Table 14
## IU and SIU PFAS Results
## Michigan IPP PFAS Initiative

| Nr. | WWTP Nr. | WWTP Code | WWTP Name | Graph ID | Industrial User Type (SIU/CIU) | No. of Samples | PFOA (ng/L) | | PFOS (ng/L) | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Minimum (Min) | Maximum (Max) | Minimum (Min) | Maximum (Max) |
| 1 | 4 | AARB | Ann Arbor WWTP | LNDF-T2-CLS:S | SIU | 5 | 5.4 | 250 | 6.4 | 6.4 |
| 2 | 4 | AARB | Ann Arbor WWTP | MISC:I | IU | 1 | ND | ND | ND | ND |
| 3 | 4 | AARB | Ann Arbor WWTP | MISC:S | SIU | 1 | ND | ND | ND | ND |
| 4 | 4 | AARB | Ann Arbor WWTP | MISC:S | SIU | 1 | ND | ND | ND | ND |
| 5 | 4 | AARB | Ann Arbor WWTP | MISC:S | SIU | 1 | ND | ND | ND | ND |
| 6 | 6 | BCRK | Battle Creek WWTP | LDRY:S | SIU | 1 | ND | ND | ND | ND |
| 7 | 6 | BCRK | Battle Creek WWTP | MISC:I | IU | 2 | ND | ND | ND | ND |
| 8 | 6 | BCRK | Battle Creek WWTP | MISC:I | IU | 1 | ND | ND | ND | ND |
| 9 | 6 | BCRK | Battle Creek WWTP | MISC:I | IU | 1 | ND | ND | ND | ND |
| 10 | 6 | BCRK | Battle Creek WWTP | MISC:I | IU | 1 | ND | ND | ND | ND |
| 11 | 6 | BCRK | Battle Creek WWTP | MISC:I | IU | 1 | 3.5 | 710 | ND | ND |
| 12 | 6 | BCRK | Battle Creek WWTP | MISC:I | IU | 1 | ND | ND | ND | ND |
| 13 | 6 | BCRK | Battle Creek WWTP | MISC:I | IU | 1 | ND | ND | ND | ND |
| 14 | 6 | BCRK | Battle Creek WWTP | MISC:I | IU | 1 | ND | ND | ND | ND |
| 15 | 6 | BCRK | Battle Creek WWTP | MISC:I | IU | 1 | ND | ND | ND | ND |
| 16 | 6 | BCRK | Battle Creek WWTP | MISC:S | SIU | 1 | ND | ND | ND | ND |
| 17 | 7 | BAYC | Bay City WWTP | CONT-MMF:I | IU | 1 | ND | ND | ND | ND |
| 18 | 7 | BAYC | Bay City WWTP | LNDF-T2-CLS:I | IU | 1 | 199 | 199 | 66 | 66 |
| 19 | 7 | BAYC | Bay City WWTP | MISC:S | SIU | 1 | ND | ND | ND | ND |
| 20 | 7 | BAYC | Bay City WWTP | MISC:S | SIU | 1 | 1.38 | 1.38 | 1.9 | 1.9 |
| 21 | 9 | BELD | Belding WWTP | LNDF-T2-ACT:S | SIU | 2 | 790 | 970 | 150 | 170 |
| 22 | 9 | BELD | Belding WWTP | MISC:I | IU | 1 | ND | ND | 2.9 | 2.9 |
| 23 | 10 | BHSJ | Benton Harbor-St Joseph WWTP | CONT-MF:I | IU | 1 | ND | ND | ND | ND |
| 24 | 10 | BHSJ | Benton Harbor-St Joseph WWTP | MISC:S | SIU | 1 | ND | ND | ND | ND |
| 25 | 11 | BRAP | Big Rapids WWTP | MISC:I | IU | 1 | ND | ND | 3.8 | 3.8 |
| 26 | 11 | BRAP | Big Rapids WWTP | MISC:I | IU | 1 | ND | ND | ND | ND |
| 27 | 11 | BRAP | Big Rapids WWTP | MISC:I | IU | 1 | ND | ND | ND | ND |
| 28 | 11 | BRAP | Big Rapids WWTP | MISC:I | IU | 1 | ND | ND | ND | ND |
| 29 | 15 | BUCH | Buchanan WWTP | LNDF-T2-ACT:S | SIU | 4 | 290 | 708 | 29 | 71.5 |
| 30 | 16 | CADI | Cadillac WWTP | LNDF-T2-ACT:S | SIU | 1 | 590 | 590 | 120 | 120 |
| 31 | 19 | CLAR | Clare WWTP | CONT-LNDF:I | IU | 2 | 4.3 | 4.3 | 10 | 10 |
| 32 | 19 | CLAR | Clare WWTP | LNDF-T2-CLS:I | IU | 2 | 4.3 | 4.3 | 10 | 10 |
| 33 | 19 | CLAR | Clare WWTP | MISC:I | IU | 1 | ND | ND | ND | ND |
| 34 | 20 | COLD | Coldwater WRRF | MISC:I | IU | 1 | ND | ND | ND | ND |
| 35 | 20 | COLD | Coldwater WRRF | MISC:I | IU | 1 | ND | ND | ND | ND |
| 36 | 24 | DELT | Delta Twp WWTP | MISC:I | IU | 1 | ND | ND | ND | ND |
| 37 | 25 | DEXT | Dexter WWTP | MISC:I | IU | 1 | ND | ND | 7.9 | 7.9 |
| 38 | 25 | DEXT | Dexter WWTP | MISC:I | IU | 1 | ND | ND | 2.5 | 2.5 |
| 39 | 27 | DRVR | Downriver WWTP | AFFF-SEWER:S | SIU | 7 | 3.5 | 17 | 5.1 | 1800 |
| 40 | 27 | DRVR | Downriver WWTP | CONT-LNDF:I | IU | 1 | ND | ND | 18 | 18 |
| 41 | 27 | DRVR | Downriver WWTP | CONT-MISC:I | IU | 2 | 6.9 | 58 | 4.8 | 12 |
| 42 | 27 | DRVR | Downriver WWTP | LDRY:S | SIU | 5 | 4.9 | 6.2 | 8.8 | 29 |
| 43 | 27 | DRVR | Downriver WWTP | LDRY:S | SIU | 6 | 4.7 | 7.8 | 5.7 | 36 |
| 44 | 27 | DRVR | Downriver WWTP | LNDF-T2-ACT:S | SIU | 13 | 38 | 2800 | 8.5 | 710 |
| 45 | 27 | DRVR | Downriver WWTP | LNDF-T3-ACT:S | SIU | 2 | 58 | 58 | 4.8 | 4.8 |
| 46 | 27 | DRVR | Downriver WWTP | MISC:S | SIU | 1 | 7.7 | 7.7 | 2.6 | 2.6 |
| 47 | 27 | DRVR | Downriver WWTP | MISC:S | SIU | 1 | 2.2 | 2.2 | 2.2 | 2.2 |
| 48 | 27 | DRVR | Downriver WWTP | MISC:S | SIU | 1 | ND | ND | ND | ND |
| 49 | 32 | FLIN | Flint WWTP | CHEM:S | SIU | 1 | 2.5 | 2.5 | 5 | 5 |
| 50 | 32 | FLIN | Flint WWTP | CONT-LNDF:S | SIU | 6 | 53 | 53 | 4,000 | 4,000 |
| 51 | 32 | FLIN | Flint WWTP | CONT-MF:S | SIU | 1 | 15 | 15 | 4.5 | 4.5 |
| 52 | 32 | FLIN | Flint WWTP | CONT-MF:S | SIU | 1 | 15 | 15 | 4.5 | 4.5 |
| 53 | 32 | FLIN | Flint WWTP | CONT-MMF:I | IU | 2 | 2,200 | 2,280 | 27,580 | 34,000 |
| 54 | 32 | FLIN | Flint WWTP | LNDF-T3-CLS:S | SIU | 6 | 53 | 53 | 4,000 | 4,000 |
| 55 | 36 | RAGN | Genesee Co-Ragnone WWTP | LNDF-T2-ACT:S | SIU | 4 | 2.3 | 170 | 30 | 30 |
| 56 | 36 | RAGN | Genesee Co-Ragnone WWTP | LNDF-T2-ACT:S | SIU | 4 | 910 | 43,425 | 190 | 1500 |
| 57 | 36 | RAGN | Genesee Co-Ragnone WWTP | LNDF-T2-ACT:S | SIU | 1 | 1,100 | 1,100 | 180 | 180 |
| 58 | 36 | RAGN | Genesee Co-Ragnone WWTP | LNDF-T2-CLS:I | IU | 4 | 1,090 | 2,000 | 220 | 460 |
| 59 | 36 | RAGN | Genesee Co-Ragnone WWTP | LNDF-T2-CLS:S | SIU | 3 | 190 | 220 | 70 | 90 |
| 60 | 36 | RAGN | Genesee Co-Ragnone WWTP | MISC:I | IU | 1 | 510 | 510 | 8.5 | 8.5 |
| 61 | 36 | RAGN | Genesee Co-Ragnone WWTP | MISC:I | IU | 1 | ND | ND | ND | ND |
| 62 | 36 | RAGN | Genesee Co-Ragnone WWTP | MISC:I | IU | 1 | ND | ND | ND | ND |
| 63 | 38 | GLWA | GLWA WRRF | AFFF-SEWER:S | SIU | 4 | 7.8 | 35 | 240 | 3,500 |
| 64 | 38 | GLWA | GLWA WRRF | AFFF-SEWER:S | SIU | 12 | 5.1 | 140 | 9.2 | 220 |
| 65 | 38 | GLWA | GLWA WRRF | CHEM:S | SIU | 1 | ND | ND | ND | ND |
| 66 | 38 | GLWA | GLWA WRRF | CHEM:S | SIU | 1 | ND | ND | ND | ND |

# Table 14
IU and SIU PFAS Results
Michigan IPP PFAS Initiative

| Nr. | WWTP Nr. | WWTP Code | WWTP Name | Graph ID | Industrial User Type (SIU/CIU) | No. of Samples | PFOA (ng/L) | | PFOS (ng/L) | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Minimum (Min) | Maximum (Max) | Minimum (Min) | Maximum (Max) |
| 67 | 38 | GLWA | GLWA WRRF | CHEM:S | SIU | 1 | ND | ND | ND | ND |
| 68 | 38 | GLWA | GLWA WRRF | CHEM:S | SIU | 1 | ND | ND | ND | ND |
| 69 | 38 | GLWA | GLWA WRRF | CHEM:S | SIU | 10 | 28 | 520 | 36 | 4,600,000 |
| 70 | 38 | GLWA | GLWA WRRF | CHEM:S | SIU | 4 | 90 | 1,100 | 24 | 310 |
| 71 | 38 | GLWA | GLWA WRRF | CHEM:S | SIU | 1 | ND | ND | ND | ND |
| 72 | 38 | GLWA | GLWA WRRF | CONT-MISC:I | IU | 2 | 29 | 29 | 14 | 14 |
| 73 | 38 | GLWA | GLWA WRRF | CONT-MMF:I | IU | 14 | 1.9 | 5.5 | 1.9 | 130 |
| 74 | 38 | GLWA | GLWA WRRF | LDRY:S | SIU | 2 | ND | ND | 40 | 40 |
| 75 | 38 | GLWA | GLWA WRRF | LDRY:S | SIU | 5 | 13 | 84 | 33 | 69 |
| 76 | 38 | GLWA | GLWA WRRF | LDRY:S | SIU | 1 | ND | ND | ND | ND |
| 77 | 38 | GLWA | GLWA WRRF | LNDF-T2-ACT:S | SIU | 12 | 22 | 340 | 35 | 570 |
| 78 | 38 | GLWA | GLWA WRRF | LNDF-T2-ACT:S | SIU | 4 | 1,200 | 1,800 | 290 | 590 |
| 79 | 38 | GLWA | GLWA WRRF | LNDF-T2-ACT:S | SIU | 6 | 320 | 1,300 | 89 | 330 |
| 80 | 38 | GLWA | GLWA WRRF | LNDF-T2-ACT:S | SIU | 5 | 150 | 3,800 | 57 | 630 |
| 81 | 38 | GLWA | GLWA WRRF | LNDF-T2-CLS:S | SIU | 4 | 200 | 310 | 160 | 240 |
| 82 | 38 | GLWA | GLWA WRRF | LNDF-T2-CLS:S | SIU | 2 | 20 | 20 | 20 | 140 |
| 83 | 38 | GLWA | GLWA WRRF | LNDF-T2-CLS:S | SIU | 5 | 30 | 61 | 20 | 130 |
| 84 | 38 | GLWA | GLWA WRRF | LNDF-T2-CLS:S | SIU | 6 | 27 | 49 | 40 | 130 |
| 85 | 38 | GLWA | GLWA WRRF | LNDF-T2-CLS:S | SIU | 10 | 16 | 680 | 11 | 640 |
| 86 | 38 | GLWA | GLWA WRRF | LNDF-T3-ACT:S | SIU | 5 | 26 | 58 | 33 | 100 |
| 87 | 38 | GLWA | GLWA WRRF | MISC:S | SIU | 1 | ND | ND | 6.4 | 6.4 |
| 88 | 38 | GLWA | GLWA WRRF | MISC:S | SIU | 1 | 5.62 | 5.62 | 3.49 | 3.49 |
| 89 | 38 | GLWA | GLWA WRRF | MISC:S | SIU | 1 | ND | ND | ND | ND |
| 90 | 38 | GLWA | GLWA WRRF | MISC:S | SIU | 1 | 40 | 40 | ND | ND |
| 91 | 38 | GLWA | GLWA WRRF | MISC:S | SIU | 1 | ND | ND | ND | ND |
| 92 | 38 | GLWA | GLWA WRRF | MISC:S | SIU | 2 | ND | ND | ND | ND |
| 93 | 38 | GLWA | GLWA WRRF | MISC:S | SIU | 1 | ND | ND | ND | ND |
| 94 | 38 | GLWA | GLWA WRRF | MISC:S | SIU | 1 | 1.7 | 1.7 | ND | ND |
| 95 | 38 | GLWA | GLWA WRRF | MISC:S | SIU | 1 | ND | ND | ND | ND |
| 96 | 38 | GLWA | GLWA WRRF | MISC:S | SIU | 1 | ND | ND | ND | ND |
| 97 | 38 | GLWA | GLWA WRRF | MISC:S | SIU | 1 | ND | ND | ND | ND |
| 98 | 38 | GLWA | GLWA WRRF | PMFG:S | SIU | 1 | ND | ND | ND | ND |
| 99 | 40 | GRAP | Grand Rapids WRRF | CHEM:S | SIU | 1 | ND | ND | 324 | 324 |
| 100 | 40 | GRAP | Grand Rapids WRRF | CHEM:S | SIU | 1 | ND | ND | ND | ND |
| 101 | 40 | GRAP | Grand Rapids WRRF | CHEM:S | SIU | 1 | ND | ND | ND | ND |
| 102 | 40 | GRAP | Grand Rapids WRRF | CONT-MF:S | SIU | 16 | 1.99 | 7.54 | 1.6 | 2,260 |
| 103 | 40 | GRAP | Grand Rapids WRRF | LDRY:S | SIU | 1 | 3 | 3 | ND | ND |
| 104 | 40 | GRAP | Grand Rapids WRRF | LNDF-T2-ACT:S | SIU | 1 | 1,233 | 1,233 | 449 | 449 |
| 105 | 40 | GRAP | Grand Rapids WRRF | MISC:S | SIU | 1 | 6 | 6 | 6 | 6 |
| 106 | 40 | GRAP | Grand Rapids WRRF | MISC:S | SIU | 1 | 5 | 5 | 6 | 6 |
| 107 | 40 | GRAP | Grand Rapids WRRF | MISC:S | SIU | 1 | 2.4 | 2.4 | 2.5 | 2.5 |
| 108 | 40 | GRAP | Grand Rapids WRRF | MISC:S | SIU | 1 | 7.9 | 7.9 | 85 | 85 |
| 109 | 40 | GRAP | Grand Rapids WRRF | MISC:S | SIU | 1 | ND | ND | ND | ND |
| 110 | 40 | GRAP | Grand Rapids WRRF | MISC:S | SIU | 1 | ND | ND | ND | ND |
| 111 | 40 | GRAP | Grand Rapids WRRF | MISC:S | SIU | 1 | ND | ND | ND | ND |
| 112 | 45 | HAST | Hastings WWTP | LNDF-T2-ACT:S | SIU | 3 | 401.2 | 960 | 219.4 | 410 |
| 113 | 45 | HAST | Hastings WWTP | MISC:I | IU | 1 | ND | ND | ND | ND |
| 114 | 45 | HAST | Hastings WWTP | MISC:I | IU | 1 | ND | ND | ND | ND |
| 115 | 45 | HAST | Hastings WWTP | MISC:S | SIU | 1 | ND | ND | ND | ND |
| 116 | 47 | HOLL | Holland WWTP | CONT-MISC:I | IU | 3 | ND | ND | 19.7 | 37.51 |
| 117 | 47 | HOLL | Holland WWTP | CONT-PAINT:S | SIU | 38 | 74.07 | 74.07 | 3.98 | 6047 |
| 118 | 47 | HOLL | Holland WWTP | LDRY:S | SIU | 1 | ND | ND | 9.7 | 9.7 |
| 119 | 47 | HOLL | Holland WWTP | MISC:I | IU | 1 | ND | ND | 2.06 | 2.06 |
| 120 | 47 | HOLL | Holland WWTP | MISC:S | SIU | 1 | 19.3 | 19.3 | 2.74 | 2.74 |
| 121 | 47 | HOLL | Holland WWTP | MISC:S | SIU | 1 | 5.65 | 5.65 | ND | ND |
| 122 | 47 | HOLL | Holland WWTP | MISC:S | SIU | 1 | ND | ND | ND | ND |
| 123 | 47 | HOLL | Holland WWTP | PMFG:S | SIU | 5 | 3.82 | 3.82 | 107 | 107 |
| 124 | 51 | ITHA | Ithaca WWSL | MISC:S | SIU | 1 | 40 | 40 | ND | ND |
| 125 | 52 | JACK | Jackson WWTP | LDRY:S | SIU | 3 | 10 | 10 | 20 | 50 |
| 126 | 52 | JACK | Jackson WWTP | MISC:S | SIU | 1 | ND | ND | ND | ND |
| 127 | 52 | JACK | Jackson WWTP | MISC:S | SIU | 4 | 20 | 20 | ND | ND |
| 128 | 52 | JACK | Jackson WWTP | MISC:S | SIU | 2 | ND | ND | ND | ND |
| 129 | 52 | JACK | Jackson WWTP | MISC:S | SIU | 2 | ND | ND | ND | ND |
| 130 | 52 | JACK | Jackson WWTP | MISC:S | SIU | 2 | ND | ND | ND | ND |
| 131 | 52 | JACK | Jackson WWTP | MISC:S | SIU | 1 | ND | ND | ND | ND |
| 132 | 52 | JACK | Jackson WWTP | MISC:S | SIU | 1 | ND | ND | ND | ND |

# Table 14

IU and SIU PFAS Results
Michigan IPP PFAS Initiative

| Nr. | WWTP Nr. | WWTP Code | WWTP Name | Graph ID | Industrial User Type (SIU/CIU) | No. of Samples | PFOA (ng/L) | | PFOS (ng/L) | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Minimum (Min) | Maximum (Max) | Minimum (Min) | Maximum (Max) |
| 133 | 52 | JACK | Jackson WWTP | MISC:S | SIU | 1 | ND | ND | ND | ND |
| 134 | 53 | KZOO | Kalamazoo WWTP | CONT-MF:S | SIU | 7 | ND | ND | 14.5 | 8,000 |
| 135 | 53 | KZOO | Kalamazoo WWTP | CONT-PMFG:I | IU | 3 | 5.57 | 12 | 10.1 | 28.2 |
| 136 | 53 | KZOO | Kalamazoo WWTP | CONT-PMFG:S | SIU | 13 | 0.39 | 200 | 0.52 | 140 |
| 137 | 53 | KZOO | Kalamazoo WWTP | LDRY:S | SIU | 1 | ND | ND | ND | ND |
| 138 | 53 | KZOO | Kalamazoo WWTP | LDRY:S | SIU | 1 | 60 | 60 | ND | ND |
| 139 | 53 | KZOO | Kalamazoo WWTP | LNDF-T2-CLS:I | IU | 8 | 101 | 250 | 55 | 410 |
| 140 | 53 | KZOO | Kalamazoo WWTP | LNDF-T3-CLS:I | IU | 7 | 200 | 410 | 13.1 | 61 |
| 141 | 53 | KZOO | Kalamazoo WWTP | MISC:I | IU | 1 | ND | ND | 10 | 10 |
| 142 | 53 | KZOO | Kalamazoo WWTP | MISC:I | IU | 1 | ND | ND | ND | ND |
| 143 | 53 | KZOO | Kalamazoo WWTP | MISC:I | IU | 1 | ND | ND | ND | ND |
| 144 | 53 | KZOO | Kalamazoo WWTP | MISC:I | IU | 1 | ND | ND | ND | ND |
| 145 | 53 | KZOO | Kalamazoo WWTP | MISC:I | IU | 1 | ND | ND | ND | ND |
| 146 | 53 | KZOO | Kalamazoo WWTP | MISC:I | IU | 1 | 24 | 24 | ND | ND |
| 147 | 53 | KZOO | Kalamazoo WWTP | MISC:S | SIU | 1 | ND | ND | ND | ND |
| 148 | 53 | KZOO | Kalamazoo WWTP | MISC:S | SIU | 1 | ND | ND | ND | ND |
| 149 | 53 | KZOO | Kalamazoo WWTP | MISC:S | SIU | 3 | ND | ND | ND | ND |
| 150 | 53 | KZOO | Kalamazoo WWTP | PMFG:S | SIU | 5 | ND | ND | 6.96 | 20 |
| 151 | 54 | SAWY | KI Sawyer WWTP-Marquette Co | AFFF-SEWER:I | IU | 3 | 45 | 410 | 4,700 | 45,000 |
| 152 | 56 | LANS | Lansing WWTP | CONT-LNDF:I | IU | 1 | ND | ND | ND | ND |
| 153 | 56 | LANS | Lansing WWTP | LNDF-T2-ACT:I | IU | 1 | 470 | 470 | 110 | 110 |
| 154 | 57 | LAPR | Lapeer WWTP | LDRY:S | SIU | 1 | 1.9 | 1.9 | ND | ND |
| 155 | 57 | LAPR | Lapeer WWTP | MISC:I | IU | 1 | 2 | 2 | ND | ND |
| 156 | 57 | LAPR | Lapeer WWTP | MISC:I | IU | 1 | 8.6 | 8.6 | ND | ND |
| 157 | 57 | LAPR | Lapeer WWTP | MISC:S | SIU | 1 | ND | ND | ND | ND |
| 158 | 59 | LUDG | Ludington WWTP | CONT-MF:I | IU | 2 | 2.1 | 2.1 | ND | ND |
| 159 | 59 | LUDG | Ludington WWTP | LNDF-T2-ACT:I | IU | 2 | 400 | 420 | 150 | 220 |
| 160 | 59 | LUDG | Ludington WWTP | LNDF-T2-CLS:I | IU | 4 | 111 | 312 | 38.07 | 81.2 |
| 161 | 61 | MARY | Marysville WWTP | MISC:S | SIU | 1 | 5.2 | 5.2 | 7.8 | 7.8 |
| 162 | 61 | MARY | Marysville WWTP | MISC:S | SIU | 2 | ND | ND | ND | ND |
| 163 | 62 | MENO | Menominee WWTP | CONT-LNDF:S | SIU | 1 | 120 | 120 | 11 | 11 |
| 164 | 62 | MENO | Menominee WWTP | LNDF-T2-ACT:S | SIU | 10 | 150 | 580 | 18 | 160 |
| 165 | 62 | MENO | Menominee WWTP | MISC:S | SIU | 1 | 120 | 120 | 11 | 11 |
| 166 | 62 | MENO | Menominee WWTP | PMFG:S | SIU | 2 | 6.9 | 6.9 | 2.1 | 26 |
| 167 | 63 | MILN | Milan WWTP | PMFG:S | SIU | 1 | ND | ND | ND | ND |
| 168 | 64 | MONR | Monroe Metro WWTP | CONT-MF:S | SIU | 4 | 4.3 | 5 | 35 | 93 |
| 169 | 64 | MONR | Monroe Metro WWTP | LNDF-T3-CLS:S | SIU | 4 | 4.3 | 5 | 35 | 93 |
| 170 | 64 | MONR | Monroe Metro WWTP | PMFG:I | IU | 1 | 4.1 | 4.1 | 6.6 | 6.6 |
| 171 | 65 | MTCL | Mt Clemens WWTP | MISC:S | SIU | 1 | ND | ND | ND | ND |
| 172 | 66 | MUSK | Muskegon Co WWMS Metro WWTP | CONT-MF:I | IU | 2 | 2.9 | 2.9 | 23 | 32 |
| 173 | 66 | MUSK | Muskegon Co WWMS Metro WWTP | CONT-MISC:S | SIU | 1 | 4.6 | 4.6 | 7.2 | 7.2 |
| 174 | 66 | MUSK | Muskegon Co WWMS Metro WWTP | CONT-PMFG:S | SIU | 4 | 12.6 | 27 | ND | ND |
| 175 | 66 | MUSK | Muskegon Co WWMS Metro WWTP | LNDF-T2-ACT:I | IU | 10 | 330 | 1,500 | 50 | 240 |
| 176 | 66 | MUSK | Muskegon Co WWMS Metro WWTP | LNDF-T2-CLS:I | IU | 2 | 230 | 480 | 48 | 120 |
| 177 | 69 | NKEN | North Kent SA WWTP | CONT-TAN:I | IU | 10 | 6.3 | 135 | 5.73 | 514 |
| 178 | 69 | NKEN | North Kent SA WWTP | LNDF-T2-CLS:S | SIU | 3 | 1,080 | 2,660 | 309 | 641 |
| 179 | 69 | NKEN | North Kent SA WWTP | LNDF-T2-CLS:S | SIU | 4 | 69.1 | 182 | 95.9 | 386 |
| 180 | 70 | OTSE | Otsego WWTP | MISC:S | SIU | 1 | ND | ND | ND | ND |
| 181 | 71 | OWOS | Owosso/Mid Shiawassee Co WWTP | PMFG:I | IU | 3 | 2.03 | 2.03 | 23 | 23 |
| 182 | 73 | PONT | Oakland Co-Pontiac WWTP | AFFF-SEWER:I | IU | 1 | 42 | 42 | 9,100 | 9,100 |
| 183 | 73 | PONT | Oakland Co-Pontiac WWTP | LNDF-T2-ACT:S | SIU | 2 | 310 | 840 | 74 | 700 |
| 184 | 73 | PONT | Oakland Co-Pontiac WWTP | LNDF-T2-CLS:S | SIU | 3 | 53 | 75 | 11 | 27 |
| 185 | 74 | PHUR | PORT HURON WWTP | CHEM:I | IU | 2 | 20 | 20 | 18 | 30 |
| 186 | 74 | PHUR | PORT HURON WWTP | LNDF-T2-ACT:S | SIU | 5 | 267 | 1,300 | 100 | 370 |
| 187 | 74 | PHUR | PORT HURON WWTP | LNDF-T2-CLS:I | IU | 3 | 30 | 80 | 140 | 220 |
| 188 | 74 | PHUR | PORT HURON WWTP | MISC:I | IU | 1 | 80 | 80 | 10 | 10 |
| 189 | 74 | PHUR | PORT HURON WWTP | MISC:I | IU | 1 | ND | ND | ND | ND |
| 190 | 74 | PHUR | PORT HURON WWTP | PMFG:I | IU | 7 | 10 | 680 | 150 | 410 |
| 191 | 74 | PHUR | PORT HURON WWTP | PMFG:S | SIU | 5 | 25 | 89 | 30 | 210 |
| 192 | 75 | QUIN | Quincy WWSL | MISC:S | SIU | 2 | ND | ND | ND | ND |
| 193 | 76 | REED | Reed City WWTP | CONT-MISC:I | IU | 1 | 1.9 | 1.9 | 2.1 | 2.1 |
| 194 | 76 | REED | Reed City WWTP | LNDF-T2-CLS:I | IU | 2 | 86 | 140 | 35 | 35 |
| 195 | 76 | REED | Reed City WWTP | MISC:I | IU | 1 | 1.8 | 1.8 | 4.2 | 4.2 |
| 196 | 77 | HURO | S Huron Valley UA WWTP | LNDF-HAZ:S | SIU | 3 | 1.6 | 40 | 7 | 60 |
| 197 | 77 | HURO | S Huron Valley UA WWTP | LNDF-T2-CLS:S | SIU | 2 | 70 | 90 | 100 | 140 |
| 198 | 77 | HURO | S Huron Valley UA WWTP | LNDF-T2-CLS:S | SIU | 2 | 80 | 84 | 290 | 420 |

# Table 14
IU and SIU PFAS Results
Michigan IPP PFAS Initiative

| Nr. | WWTP Nr. | WWTP Code | WWTP Name | Graph ID | Industrial User Type (SIU/CIU) | No. of Samples | PFOA (ng/L) | | PFOS (ng/L) | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Minimum (Min) | Maximum (Max) | Minimum (Min) | Maximum (Max) |
| 199 | 77 | HURO | S Huron Valley UA WWTP | LNDF-T2-CLS:S | SIU | 2 | 5 | 5 | ND | ND |
| 200 | 77 | HURO | S Huron Valley UA WWTP | LNDF-T3-CLS:S | SIU | 2 | 20 | 29 | 6 | 6 |
| 201 | 77 | HURO | S Huron Valley UA WWTP | MISC:S | SIU | 2 | 4.2 | 4.2 | 4.2 | 4.2 |
| 202 | 77 | HURO | S Huron Valley UA WWTP | MISC:S | SIU | 1 | ND | ND | ND | ND |
| 203 | 77 | HURO | S Huron Valley UA WWTP | MISC:S | SIU | 1 | ND | ND | ND | ND |
| 204 | 78 | SGTW | Saginaw Twp WWTP | MISC:S | SIU | 1 | ND | ND | ND | ND |
| 205 | 79 | SAGN | Saginaw WWTP | CONT-LNDF:S | SIU | 1 | ND | ND | ND | ND |
| 206 | 79 | SAGN | Saginaw WWTP | CONT-MF:S | SIU | 1 | ND | ND | ND | ND |
| 207 | 79 | SAGN | Saginaw WWTP | LNDF-T3-ACT:S | SIU | 3 | ND | ND | 3.79 | 5.08 |
| 208 | 80 | SALN | Saline WWTP | CONT-MF:S | SIU | 3 | ND | ND | 20 | 280 |
| 209 | 80 | SALN | Saline WWTP | MISC:S | SIU | 1 | ND | ND | ND | ND |
| 210 | 81 | SAND | Sandusky WWTP | LNDF-T2-ACT:S | SIU | 6 | 543 | 1,300 | 83.5 | 260 |
| 211 | 81 | SAND | Sandusky WWTP | MISC:S | SIU | 2 | ND | ND | ND | ND |
| 212 | 83 | SCLN | Southern Clinton Co WWTP | LNDF-T2-ACT:S | SIU | 3 | 220 | 360 | 120 | 160 |
| 213 | 83 | SCLN | Southern Clinton Co WWTP | MISC:S | SIU | 1 | 30 | 30 | ND | ND |
| 214 | 83 | SCLN | Southern Clinton Co WWTP | MISC:S | SIU | 1 | 30 | 30 | ND | ND |
| 215 | 86 | TAWS | Tawas Utility Authority WWTP | MISC:I | IU | 1 | ND | ND | ND | ND |
| 216 | 87 | TRIV | Three Rivers WWTP | LNDF-T2-ACT:S | SIU | 1 | 1,300 | 1,300 | 160 | 160 |
| 217 | 87 | TRIV | Three Rivers WWTP | MISC:I | IU | 1 | ND | ND | ND | ND |
| 218 | 87 | TRIV | Three Rivers WWTP | PMFG:S | SIU | 2 | ND | ND | ND | ND |
| 219 | 87 | TRIV | Three Rivers WWTP | PMFG:S | SIU | 1 | ND | ND | ND | ND |
| 220 | 90 | WARR | Warren WWTP | CHEM:S | SIU | 1 | ND | ND | ND | ND |
| 221 | 90 | WARR | Warren WWTP | MISC:I | IU | 1 | ND | ND | ND | ND |
| 222 | 90 | WARR | Warren WWTP | MISC:S | SIU | 1 | ND | ND | ND | ND |
| 223 | 91 | WBAY | West Bay Co Regional WWTP | CONT-MISC:I | IU | 2 | 18 | 18 | 7.3 | 7.3 |
| 224 | 91 | WBAY | West Bay Co Regional WWTP | LNDF-T2-CLS:I | IU | 2 | 25 | 31 | 9.3 | 9.5 |
| 225 | 92 | WIXO | Wixom WWTP | MISC:S | SIU | 1 | ND | ND | ND | ND |
| 226 | 93 | WYOM | Wyoming WWTP | CONT-MF:S | SIU | 2 | 5.3 | 5.3 | ND | ND |
| 227 | 93 | WYOM | Wyoming WWTP | CONT-MISC:I | IU | 1 | 1.3 | 1.3 | ND | ND |
| 228 | 93 | WYOM | Wyoming WWTP | CONT-MISC:I | IU | 5 | 4.2 | 11 | 4.4 | 18 |
| 229 | 93 | WYOM | Wyoming WWTP | CONT-PAINT:I | IU | 4 | 32 | 120 | 360 | 2,900 |
| 230 | 93 | WYOM | Wyoming WWTP | LNDF-T2-ACT:S | SIU | 9 | 100 | 1,200 | 16 | 830 |
| 231 | 93 | WYOM | Wyoming WWTP | LNDF-T2-CLS:I | IU | 5 | 120 | 740 | 110 | 340 |
| 232 | 93 | WYOM | Wyoming WWTP | MISC:I | IU | 1 | 3.7 | 3.7 | 5.9 | 5.9 |
| 233 | 93 | WYOM | Wyoming WWTP | MISC:I | IU | 1 | 3.5 | 3.5 | 5.1 | 5.1 |
| 234 | 93 | WYOM | Wyoming WWTP | MISC:I | IU | 1 | 2.4 | 2.4 | 3.6 | 3.6 |
| 235 | 93 | WYOM | Wyoming WWTP | MISC:I | IU | 1 | 4.7 | 4.7 | 3.5 | 3.5 |
| 236 | 93 | WYOM | Wyoming WWTP | MISC:I | IU | 1 | 4.4 | 4.4 | 3.3 | 3.3 |
| 237 | 93 | WYOM | Wyoming WWTP | MISC:I | IU | 1 | 3 | 3 | 3.1 | 3.1 |
| 238 | 93 | WYOM | Wyoming WWTP | MISC:I | IU | 1 | 2.3 | 2.3 | 2 | 2 |
| 239 | 93 | WYOM | Wyoming WWTP | MISC:I | IU | 1 | 3 | 3 | ND | ND |
| 240 | 93 | WYOM | Wyoming WWTP | MISC:I | IU | 1 | ND | ND | ND | ND |
| 241 | 93 | WYOM | Wyoming WWTP | MISC:S | SIU | 1 | 13 | 13 | 8.2 | 8.2 |
| 242 | 93 | WYOM | Wyoming WWTP | MISC:S | SIU | 1 | 2.2 | 2.2 | 2.5 | 2.5 |
| 243 | 93 | WYOM | Wyoming WWTP | MISC:S | SIU | 1 | 1.3 | 1.3 | ND | ND |
| 244 | 93 | WYOM | Wyoming WWTP | MISC:S | SIU | 1 | 2 | 2 | ND | ND |
| 245 | 93 | WYOM | Wyoming WWTP | MISC:S | SIU | 1 | 1.6 | 1.6 | ND | ND |
| 246 | 94 | YCUA | YCUA Regional WWTP | CONT-MMF:S | SIU | 5 | 20 | 30 | 270 | 430 |
| 247 | 94 | YCUA | YCUA Regional WWTP | LNDF-T2-ACT:S | SIU | 7 | 2,200 | 5,400 | 320 | 5,000 |
| 248 | 94 | YCUA | YCUA Regional WWTP | LNDF-T2-ACT:S | SIU | 8 | 190 | 2,800 | 30 | 610 |
| 249 | 94 | YCUA | YCUA Regional WWTP | MISC:S | SIU | 1 | 70 | 70 | 8.6 | 8.6 |
| 250 | 94 | YCUA | YCUA Regional WWTP | MISC:S | SIU | 1 | ND | ND | 3.1 | 3.1 |
| 251 | 94 | YCUA | YCUA Regional WWTP | MISC:S | SIU | 1 | 3.8 | 3.8 | 2 | 2 |
| 252 | 94 | YCUA | YCUA Regional WWTP | MISC:S | SIU | 1 | 3.9 | 3.9 | 0.98 | 0.98 |
| 253 | 94 | YCUA | YCUA Regional WWTP | MISC:S | SIU | 1 | ND | ND | ND | ND |
| 254 | 94 | YCUA | YCUA Regional WWTP | MISC:S | SIU | 1 | ND | ND | ND | ND |
| 255 | 94 | YCUA | YCUA Regional WWTP | MISC:S | SIU | 1 | ND | ND | ND | ND |
| 256 | 107 | OSCO | Oscoda Twp WWTP Wurtsmith | CONT-AFFF:I | IU | 2 | ND | ND | 81.8 | 456 |

Notes:

IU = Industrial User
SIU = Significant Industrial User
**ND** = Non-Detect (Typical detection limits were between 2-10 ng/L)

# Table 16

## Statewide PFAS Assessment of 42 WWTPs Evaluated
## Michigan IPP PFAS Initiative

| WWTP Nr. | WWTP Code | WWTP Name | IPP? (Yes/No) | Permit # | Address |
|---|---|---|---|---|---|
| 4 | AARB | Ann Arbor WWTP | Yes | MI0022217 | 49 Dixboro Road, Ann Arbor, MI 48105 |
| 6 | BCRK | Battle Creek WWTP | Yes | MI0022276 | 2000 RIVER RD W, BATTLE CREEK, MI 49037 |
| 7 | BAYC | Bay City WWTP | Yes | MI0022284 | 2905 N Water St, Bay City, MI 48708 |
| 14 | BRON | Bronson WWTP | Yes | MI0020729 | 408 Mill Street, Bronson, MI 49028 |
| 23 | DELH | Delhi Twp WWTP | Yes | MI0022781 | 5961 McCue, Holt, MI 48842 |
| 25 | DEXT | Dexter WWTP | Yes | MI0022829 | 8360 Huron St., Dexter, MI 48130 |
| 27 | DRVR | Downriver WWTP | Yes | MI0021156 | 797 CENTRAL ST, WYANDOTTE, MI 48192 |
| 32 | FLIN | Flint WWTP | Yes | MI0022926 | G4652 Beecher Road, Flint, MI 48532 |
| 33 | FOWL | Fowlerville WWTP | Yes | MI0020664 | 8610 West Grand River, Fowlerville, MI 48836 |
| 36 | RAGN | Genesee Co-Ragnone WWTP | Yes | MI0022977 | 9290 Farrand Road, Montrose, MI 48457 |
| 38 | GLWA | GLWA WRRF | Yes | MI0022802 | 9300 W JEFFERSON AVE, DETROIT, MI 48209 |
| 40 | GRAP | Grand Rapids WRRF | Yes | MI0026069 | 1300 MARKET AVE SW, GRAND RAPIDS, MI 49503 |
| 47 | HOLL | Holland WWTP | Yes | MI0023108 | 42 S River Ave, Holland, MI 49423 |
| 49 | HOWE | Howell WWTP | Yes | MI0021113 | 1191 S MICHIGAN AVE, HOWELL, MI 48843 |
| 50 | IONA | Ionia WWTP | Yes | MI0021041 | 720 Wells Street, Ionia, MI 48846 |
| 52 | JACK | Jackson WWTP | Yes | MI0023256 | 2995 Lansing Avenue, Jackson, MI 49202 |
| 53 | KZOO | Kalamazoo WWTP | Yes | MI0023299 | 1415 North Harrison, Kalamazoo, MI 49007 |
| 54 | SAWY | KI Sawyer WWTP-Marquette Co | Yes | MI0021423 | 1080 M-94, Gwinn, MI 49841 |
| 56 | LANS | Lansing WWTP | Yes | MI0023400 | 1625 Sunset Avenue, Lansing, MI 48917 |
| 57 | LAPR | Lapeer WWTP | Yes | MI0020460 | 1264 Industrial Drive, Lapeer, MI 48446 |
| 60 | LYON | Lyon Township WWTP | Yes | GW1810078 | 53656 Ten Mile Road, New Hudson, MI 48178 |
| 64 | MONR | Monroe Metro WWTP | Yes | MI0028401 | 2205 East Front Street, Monroe, MI 48161 |
| 65 | MTCL | Mt Clemens WWTP | Yes | MI0023647 | 1750 Clara Street, Mount Clemens, MI 48043 |
| 66 | MUSK | Muskegon Co WWMS Metro WWTP | Yes | MI0027391 | 698 N. Maple Island Road, Muskegon, MI 49442 |
| 69 | NKEN | North Kent SA WWTP | Yes | MI0057419 | 4775 Coit Avenue NE, Grand Rapids, MI 49525 |
| 73 | PONT | Oakland Co-Pontiac WWTP | Yes | MI0023825 | 155 N OPDYKE RD, PONTIAC, MI 48342 |
| 74 | PHUR | Port Huron WWTP | Yes | MI0023833 | 100 Merchant Street, Port Huron, MI 48060 |
| 77 | HURO | S Huron Valley UA WWTP | Yes | MI0043800 | 34001 W JEFFERSON AVE, BROWNSTWN TWP, MI 48173 |
| 79 | SAGN | Saginaw WWTP | Yes | MI0025577 | 2406 VETERANS MEMORIAL PKWY, SAGINAW, MI 48601 |
| 81 | SAND | Sandusky WWTP | Yes | MI0020222 | 103 South Campbell Street, Sandusky, MI 48471 |
| 88 | TRAV | Traverse City WWTP | Yes | MI0027481 | 606 Hannah Avenue, Traverse City, MI 49686 |
| 90 | WARR | Warren WWTP | Yes | MI0024295 | 32360 Warkop Ave, Warren, MI 48093 |
| 92 | WIXO | Wixom WWTP | Yes | MI0024384 | 2059 Charms Road, Wixom, MI 48393 |
| 93 | WYOM | Wyoming WWTP | Yes | MI0024392 | 2350 Ivanrest Ave, Wyoming, MI 49418 |
| 94 | YCUA | YCUA Regional WWTP | Yes | MI0042676 | 2777 STATE ST, YPSILANTI, MI 48198 |
| 97 | ALPE | Alpena WWTP | No | MI0022195 | 210 Harbor Drive, Alpena, MI 49707 |
| 99 | COMM | Commerce Twp WWTP | No | MI0025071 | 649 Welch Road, Commerce Township, MI 48390 |
| 101 | ELAN | East Lansing WWRF | No | MI0022853 | 1700 TROWBRIDGE RD, EAST LANSING, MI 48823 |
| 102 | GAYL | Gaylord WWTP | No | GW1810128 | 500 East Seventh Street, Gaylord, MI 49735 |
| 103 | MARQ | Marquette WWTP | No | MI0023531 | 300 W. Baraga, Marquette, MI 49855 |
| 105 | MIDL | Midland WWTP | No | MI0023582 | 2125 Austin, Midland, MI 48642 |
| 107 | OSCO | Oscoda Twp WWTP Wurtsmith | No | MI0055778 | 2998 Hunt, Oscoda, MI 48750 |

# Table 17
Aqueous Sample Locations
Statewide PFAS Assessment of 42 WWTPs

| Nr. | WWTP Nr. | WWTP Code | Facility | Sample ID | Sample Location | Treatment Code | Sample Description |
|---|---|---|---|---|---|---|---|
| 1 | 97 | ALPE | Alpena WWTP | WW1811090810GSC | ALPE-MI0022195-EFPT1 | EFF-CL | Final WWTP Effluent |
| 2 | 97 | ALPE | Alpena WWTP | WW1811090835GSC | ALPE-MI0022195-IFPT1 | INF | WWTP Influent |
| 3 | 4 | AARB | Ann Arbor WWTP | WW1811021030GSC | AARB-MI0022217-EFPT1 | EFF-UV | Final WWTP Effluent |
| 4 | 4 | AARB | Ann Arbor WWTP | WW1811021100GSC | AARB-MI0022217-IFPT1 | INF | Combined influent noted |
| 5 | 4 | AARB | Ann Arbor WWTP | BS1811021130GSC-A | AARB-MI0022217-STALS | A-STALS | Aqueous portion of biosolids (stabilized for 2 days) |
| 6 | 6 | BCRK | Battle Creek WWTP | WW1810311100GC | BCRK-MI0022276-EFPT1 | EFF-CL | Final WWTP Effluent |
| 7 | 6 | BCRK | Battle Creek WWTP | WW1810311115GC | BCRK-MI0022276-IFPT1 | INF | WWTP Influent |
| 8 | 7 | BAYC | Bay City WWTP | WW1811191145GSC | BAYC-MI0022284-EFPT1 | TER-EFF | Effluent after the GAC Filter, which was spent 16 years old, installed for PCBs removal |
| 9 | 7 | BAYC | Bay City WWTP | WW1811191230GSC | BAYC-MI0022284-EFTRF | SCT-EFF | Trickling filter and aeration effluent |
| 10 | 7 | BAYC | Bay City WWTP | WW1811191315GSC | BAYC-MI0022284-FLISP | WW-THPST | Screw-press filtrate from primary and secondary sludge |
| 11 | 7 | BAYC | Bay City WWTP | WW1811191200GSC | BAYC-MI0022284-IFGAC | SCT-EFF | Secondary treatment clarifiers effluent |
| 12 | 7 | BAYC | Bay City WWTP | SL1811191300GSC-A | BAYC-MI0022284-IFISP | A-THPST | Aqueous portion of primary and secondary sludge |
| 13 | 7 | BAYC | Bay City WWTP | WW1811191245GSC | BAYC-MI0022284-IFPT1 | INF | WWTP Influent |
| 14 | 7 | BAYC | Bay City WWTP | WW1811191215GSC | BAYC-MI0022284-IFTRF | PRT-EFF | Primary Clarifier effluent |
| 15 | 14 | BRON | Bronson WWTP | WW1810311430GC | BRON-MI0020729-EFPT1 | EFF-UV | Final WWTP Effluent |
| 16 | 14 | BRON | Bronson WWTP | WW1810311500GC | BRON-MI0020729-IFPT1 | INF | WWTP Influent |
| 17 | 99 | COMM | Commerce Twp WWTP | WW1811141115GSC | COMM-MI0025071-EFPT1 | EFF-UV | Final WWTP Effluent |
| 18 | 99 | COMM | Commerce Twp WWTP | WW1811141100GSC | COMM-MI0025071-IFPT1 | INF | WWTP Influent |
| 19 | 23 | DELH | Delhi Twp WWTP | WW1811011045GSC | DELH-MI0022781-EFPT1 | EFF-CL | Discharge from polishing lagoon (tertiary treatment). Chlorinated prior to discharge to the river. |
| 20 | 23 | DELH | Delhi Twp WWTP | WW1811011115GSC | DELH-MI0022781-IFPT1 | INF | WWTP Influent |
| 21 | 25 | DEXT | Dexter WWTP | WW1811021330GSC | DEXT-MI0022829-EFPT1 | EFF-CL | Final WWTP Effluent |
| 22 | 25 | DEXT | Dexter WWTP | WW1811021300GSC | DEXT-MI0022829-IFPT1 | INF | WWTP Influent |
| 23 | 25 | DEXT | Dexter WWTP | BS1811021245GSC-A | DEXT-MI0022829-STAND | A-STAND | Aqueous portion of biosolids anaerobically digested 93 degrees (F) for 30 days |
| 24 | 27 | DRVR | Downriver WTF | WW1811200800GSC | DRVR-MI0021156-EFPT1 | EFF-UV | Final WWTP Effluent |
| 25 | 27 | DRVR | Downriver WTF | WW1811200930GSC | DRVR-MI0021156-FLBFP | WW-DWPST | Belt-filter filtrate from primary and secondary sludge |
| 26 | 27 | DRVR | Downriver WTF | WW1811200830GSC | DRVR-MI0021156-IFPT1 | INF | WWTP Influent |
| 27 | 101 | ELAN | East Lansing WRRF | WW1811010920GSC | ELAN-MI0022853-EFPT1 | EFF-UV | Final WWTP Effluent after tertiary treatment (sand filter) |
| 28 | 101 | ELAN | East Lansing WRRF | WW1811010810GSC | ELAN-MI0022853-IFPT1 | INF | WWTP Influent |
| 29 | 101 | ELAN | East Lansing WRRF | WW1811010850GSC | ELAN-MI0022853-IFSDF | SCT-EFF | Secondary effluent prior to sand-filter |
| 30 | 32 | FLIN | Flint WWTP | WW1811051215GSC | FLIN-MI0022926-EFPT1 | EFF-CL | Final WWTP Effluent |
| 31 | 32 | FLIN | Flint WWTP | WW1811051230GSC | FLIN-MI0022926-IFPT1 | INF | WWTP Influent from East Pump Station |
| 32 | 32 | FLIN | Flint WWTP | WW1811051315GSC | FLIN-MI0022926-IFPT2 | INF | WWTP Influent from from NW Pump has recycled plant water |
| 33 | 32 | FLIN | Flint WWTP | WW1811051245GSC | FLIN-MI0022926-IFPT3 | INF | WWTP Influent from B Grit building both influents together |
| 34 | 32 | FLIN | Flint WWTP | SL1811051145GSC-A | FLIN-MI0022926-PSTSL | A-PSTSL | Aqueous portion of primary and secondary sludge |
| 35 | 33 | FOWL | Fowlerville WWTP | WW1811130920GSC | FOWL-MI0020664-EFPT1 | EFF-UV | Final WWTP Effluent |
| 36 | 33 | FOWL | Fowlerville WWTP | WW1811130900GSC | FOWL-MI0020664-IFPT1 | INF | WWTP Influent |
| 37 | 33 | FOWL | Fowlerville WWTP | WW1811131005GSC | FOWL-MI0020664-WWLAG | LAG-EFF | Sampled 3-ft below water surface of lagoon after secondary treatment |
| 38 | 102 | GAYL | Gaylord WWTP | WW1811080915GSC | GAYL-GW1810128-EFPT1 | EFF | Final WWTP Effluent. Sampled polishing ponds discharging into drainage fields. No disinfection indicated |
| 39 | 102 | GAYL | Gaylord WWTP | WW1811080900GSC | GAYL-GW1810128-IFPT1 | INF | WWTP Influent |
| 40 | 38 | GLWA | GLWA WRRF | WW1811161550GSC | GLWA-MI0022802-EFPT1 | EFF | Final WWTP Effluent before disinfection |
| 41 | 38 | GLWA | GLWA WRRF | WW1811161635GSC | GLWA-MI0022802-EFPT2 | EFF-CL | Cl, SO2, NaOCl and NaHSO4 |
| 42 | 38 | GLWA | GLWA WRRF | WW1811161400GSC | GLWA-MI0022802-FLBFP | WW-DWPST | Filtrate from belt filter press primary and secondary thickened sludge combined. |
| 43 | 38 | GLWA | GLWA WRRF | WW1811161600GSC | GLWA-MI0022802-IFPT1 | INF | WWTP Influent - NIEA |
| 44 | 38 | GLWA | GLWA WRRF | WW1811161440GSC | GLWA-MI0022802-IFPT2 | INF | WWTP Influent - Oakwood |
| 45 | 38 | GLWA | GLWA WRRF | WW1811161540GSC | GLWA-MI0022802-IFPT3 | INF | WWTP Influent - Jefferson |
| 46 | 38 | GLWA | GLWA WRRF | SL1811161450GSC-A | GLWA-MI0022802-THPRT | A-THPRT | Aqueous portion of primary treatment sludge |
| 47 | 38 | GLWA | GLWA WRRF | SL1811161520GSC-A | GLWA-MI0022802-THSCT | A-THSCT | Aqueous portion of secondary treatment sludge |
| 48 | 38 | GLWA | GLWA WRRF | WW1811161500GSC | GLWA-MI0022802-WWPRT | WW-THPRT | Primary thickener decant |
| 49 | 38 | GLWA | GLWA WRRF | WW1811161515GSC | GLWA-MI0022802-WWSCT | WW-THSCT | Secondary thickener decant |
| 50 | 40 | GRAP | Grand Rapids WRRF | WW1810291500GC | GRAP-MI0026069-DWCEN | WW-DWPST | Thicken/centrifuge filtrate of primary and secondary sludge |
| 51 | 40 | GRAP | Grand Rapids WRRF | WW1810291430GC | GRAP-MI0026069-EFPT1 | EFF-UV | Final WWTP Effluent |
| 52 | 40 | GRAP | Grand Rapids WRRF | WW1810291400GC | GRAP-MI0026069-IFPT1 | INF | WWTP Influent |
| 53 | 47 | HOLL | Holland WWTP | WW1810301240GC | HOLL-MI0023108-EFPT1 | EFF-CL | Final WWTP Effluent |
| 54 | 47 | HOLL | Holland WWTP | WW1810301310GC | HOLL-MI0023108-IFPT1 | INF | WWTP Influent - north |
| 55 | 47 | HOLL | Holland WWTP | WW1810301330GC | HOLL-MI0023108-IFPT2 | INF | WWTP Influent - south |
| 56 | 49 | HOWE | Howell WWTP | WW1811131105GSC | HOWE-MI0021113-EFPT1 | EFF-UV | Final WWTP Effluent |
| 57 | 49 | HOWE | Howell WWTP | WW1811131150GSC | HOWE-MI0021113-IFPT1 | INF | WWTP Influent |
| 58 | 49 | HOWE | Howell WWTP | SL1811131125GSC-A | HOWE-MI0021113-PRTSL | A-PRTSL | Aqueous portion of primary treatment sludge |
| 59 | 77 | HURO | S Huron Valley UA WWTP | WW1811201200GSC | HURO-MI0043800-DCALS | WW-STALS | Filtrate from belt filter press and sludge cells from dewatered alkaline stabilized biosolids |
| 60 | 77 | HURO | S Huron Valley UA WWTP | WW1811201100GSC | HURO-MI0043800-EFPT1 | EFF-CL | Final WWTP Effluent |
| 61 | 77 | HURO | S Huron Valley UA WWTP | WW1811201115GSC | HURO-MI0043800-IFPT1 | INF | WWTP Influent |
| 62 | 77 | HURO | S Huron Valley UA WWTP | BS1811201215GSC-A | HURO-MI0043800-STALS | A-STALS | Aqueous portion of alkaline stabilized biosolids |
| 63 | 77 | HURO | S Huron Valley UA WWTP | SL1811201130GSC-A | HURO-MI0043800-THGRA | A-PSTSL | Aqueous portion of combined primary and secondary thickened sludge |
| 64 | 50 | IONA | Ionia WWTP | WW1810310815GC | IONA-MI0021041-EFPT1 | EFF-CL | Final WWTP Effluent |
| 65 | 50 | IONA | Ionia WWTP | WW1810310800GC | IONA-MI0021041-IFPT1 | INF | WWTP Influent |
| 66 | 50 | IONA | Ionia WWTP | BS1810310830GC-A | IONA-MI0021041-STAND | A-STAND | Aqueous portion of anaerobic stabilized biosolids |
| 67 | 52 | JACK | Jackson WWTP | WW1811050830GSC | JACK-MI0023256-EFPT1 | EFF-CL | Final WWTP Effluent |
| 68 | 52 | JACK | Jackson WWTP | WW1811050800GSC | JACK-MI0023256-IFPT1 | INF | WWTP Influent |
| 69 | 52 | JACK | Jackson WWTP | BS1811050900GSC-A | JACK-MI0023256-STAND | A-STAND | Anaerobic digestor constantly mixed for a week prior to storage |

# Table 17
Aqueous Sample Locations
Statewide PFAS Assessment of 42 WWTPs

| Nr. | WWTP Nr. | WWTP Code | Facility | Sample ID | Sample Location | Treatment Code | Sample Description |
|---|---|---|---|---|---|---|---|
| 70 | 53 | KZOO | Kalamazoo WWTP | WW1810301610GC | KZOO-MI0023299-EFPT1 | EFF | Final WWTP Effluent before tertiary treatment (sand beds) and disinfection |
| 71 | 53 | KZOO | Kalamazoo WWTP | WW1810301530GC | KZOO-MI0023299-IFPT1 | INF | WWTP Influent |
| 72 | 54 | SAWY | KI Sawyer WWTP | WW1811071045GSC | SAWY-MI0021423-EFPT1 | EFF-CL | Final WWTP Effluent |
| 73 | 54 | SAWY | KI Sawyer WWTP | WW1811071150GSC | SAWY-MI0021423-IFPT1 | INF | WWTP Residential influent |
| 74 | 54 | SAWY | KI Sawyer WWTP | WW1811071215GSC | SAWY-MI0021423-IFPT2 | INF | WWTP Industrial influent (Industry and Airport) |
| 75 | 54 | SAWY | KI Sawyer WWTP | BS1811071100GSC-A | SAWY-MI0021423-STAED | A-STAED | Aqueous portion of Aerobic stabilized biosolids (estimated 2 weeks of storage) |
| 76 | 54 | SAWY | KI Sawyer WWTP | SL1811071140GSC-A | SAWY-MI0021423-WACSL | A-PSTSL | Aqueous portion of combined primary and secondary waste activated sludge |
| 77 | 56 | LANS | Lansing WWTP | WW1811011250GSC | LANS-MI0023400-EFPT1 | EFF-UV | WWTP Effluent outfall 001 to Grand River |
| 78 | 56 | LANS | Lansing WWTP | WW1811011430GSC | LANS-MI0023400-IFPT1 | INF | WWTP Influent combined from multiple sources |
| 79 | 57 | LAPR | Lapeer WWTP | BS1805091545SK-A | LAPR-MI0020460-DWCEN | A-STAED | Aqueous portion of aerobically digested biosolids |
| 80 | 57 | LAPR | Lapeer WWTP | WW1805091615SK | LAPR-MI0020460-DWCEN | WW-STAED | Centrate from aerobic digester |
| 81 | 57 | LAPR | Lapeer WWTP | WW1805091630SK | LAPR-MI0020460-DWDRB | WW-STDRB | Filtrate from old drying beds. |
| 82 | 57 | LAPR | Lapeer WWTP | WW1805091505SK | LAPR-MI0020460-EFPT1 | EFF-CL | Final WWTP Effluent |
| 83 | 60 | LYON | Lyon Twp WWTP | WW1811131505GSC | LYON-GW1810078-EFPT1 | EFF | WWTP Effluent to rapid infiltration beds |
| 84 | 60 | LYON | Lyon Twp WWTP | WW1811131515GSC | LYON-GW1810078-IFPT1 | INF | WWTP Influent |
| 85 | 103 | MARQ | Marquette WWTP | WW1811070915GSC | MARQ-MI0023531-EFPT1 | EFF-CL | Final WWTP Effluent |
| 86 | 103 | MARQ | Marquette WWTP | WW1811070930GSC | MARQ-MI0023531-IFPT1 | INF | WWTP Influent |
| 87 | 105 | MIDL | Midland WWTP | WW1811190915GSC | MIDL-MI0023582-EFPT1 | EFF-CL | Final WWTP Effluent |
| 88 | 105 | MIDL | Midland WWTP | WW1811190930GSC | MIDL-MI0023582-IFPT1 | INF | WWTP Influent (Two individual treatment trains) |
| 89 | 64 | MONR | Monroe WWTP | WW1811201445GSC | MONR-MI0028401-EFPT1 | EFF-UV | Final WWTP Effluent (Chlorine utilized in addition to UV during high flows) |
| 90 | 64 | MONR | Monroe WWTP | WW1811201500GSC | MONR-MI0028401-FLISP | WW-DWPST | Screw-press filtrate from primary and secondary sludge |
| 91 | 64 | MONR | Monroe WWTP | WW1811201430GSC | MONR-MI0028401-IFPT1 | INF | WWTP Influent |
| 92 | 65 | MTCL | Mt Clemens WWTP | WW1811151215GSC | MTCL-MI0023647-EFPT1 | EFF-UV | Final WWTP Effluent |
| 93 | 65 | MTCL | Mt Clemens WWTP | WW1811151200GSC | MTCL-MI0023647-IFPT1 | INF | WWTP Influent |
| 94 | 66 | MUSK | Muskegon Co WWMS Metro WWTP | WW1810300930GC | MUSK-MI0027391-EFMAC | PRT-EFF | Fully mixed aeration cell discharge primary treatment |
| 95 | 66 | MUSK | Muskegon Co WWMS Metro WWTP | WW1810301010GC | MUSK-MI0027391-EFPT1 | EFF | No disinfection Muskegon River Outfall 001, Tertiary Treatment Effluent |
| 96 | 66 | MUSK | Muskegon Co WWMS Metro WWTP | WW1810300950GC | MUSK-MI0027391-ELAGN | LAG-EFF | Eastern lagoon surface water (12-16 month storage capacity) |
| 97 | 66 | MUSK | Muskegon Co WWMS Metro WWTP | WW1810300830GC | MUSK-MI0027391-IFPT1 | INF | WWTP Influent (Domestic) |
| 98 | 66 | MUSK | Muskegon Co WWMS Metro WWTP | WW1810300910GC | MUSK-MI0027391-IFSDF | SCT-EFF | Effluent from interception ditch prior to Rapid Infiltration Basins (tertiary treatment) |
| 99 | 69 | NKEN | North Kent S A WWTP | WW1810290930GC | NKEN-MI0057419-EFPT1 | EFF-UV | Final WWTP Effluent |
| 100 | 69 | NKEN | North Kent S A WWTP | WW1810290900GC | NKEN-MI0057419-IFPT1 | INF | WWTP Influent |
| 101 | 107 | OSCO | Oscoda Twp WWTP Wurtsmith | WW1811091215GSC | OSCO-GW1810213-EFPT1 | LAG-EFF | No disinfection employed (Aerated lagoon discharging to Rapid Infiltration Basins as final WWTP effluent) |
| 102 | 107 | OSCO | Oscoda Twp WWTP Wurtsmith | WW1811091200GSC | OSCO-GW1810213-IFPT1 | INF | WWTP Influent |
| 103 | 107 | OSCO | Oscoda Twp WWTP Wurtsmith | WW1811091230GSC | OSCO-GW1810213-MPLAG | SCT-EFF | Midpoint between lagoon cells (No primary/tertiary treatment employed) |
| 104 | 73 | PONT | Clinton River WRRF - Pontiac WWTP | WW1811141410GSC | PONT-MI0023825-EFPT1 | EFF-CL | Final WWTP Effluent |
| 105 | 73 | PONT | Clinton River WRRF - Pontiac WWTP | WW1811141510GSC | PONT-MI0023825-FLBFP | WW-DWPST | Filtrate from belt filter primary and secondary sludge combined (Anaerobic digestors prior are offline) |
| 106 | 73 | PONT | Clinton River WRRF - Pontiac WWTP | WW1811141520GSC | PONT-MI0023825-IFPT1 | INF | WWTP Influent (combined source influent at Auburn intake) |
| 107 | 74 | PHUR | Port Huron WWTP | WW1811150905GSC | PHUR-MI0023833-EFPT1 | EFF-CL | Final WWTP Effluent |
| 108 | 74 | PHUR | Port Huron WWTP | WW1811150840GSC | PHUR-MI0023833-IFPT1 | INF | WWTP Influent |
| 109 | 74 | PHUR | Port Huron WWTP | BS1811151015GSC-A | PHUR-MI0023833-STALS | A-STALS | Aqueous portion of alkaline stabilized biosolids (2 moths old) |
| 110 | 74 | PHUR | Port Huron WWTP | SL1811150940GSC-A | PHUR-MI0023833-THGRA | A-PSTSL | Aqueous portion of combined gravity thickened sludge (primary and secondary) |
| 111 | 36 | RAGN | Genesee Co-Ragnone WWTP | WW1811051500GSC | RAGN-MI0022977-EFPT1 | EFF-CL | WWTP Effluent |
| 112 | 36 | RAGN | Genesee Co-Ragnone WWTP | WW1811051515GSC | RAGN-MI0022977-IFPT1 | INF | WWTP Influent |
| 113 | 79 | SAGN | Saginaw WWTP | WW1811191630GSC | SAGI-MI0025577-EFPT1 | EFF-CL | Final WWTP Effluent |
| 114 | 79 | SAGN | Saginaw WWTP | WW1811191500GSC | SAGI-MI0025577-IFPT1 | INF | WWTP Influent |
| 115 | 81 | SAND | Sandusky WWTP | WW1811160840GSC | SAND-MI0020222-EFPT1 | EFF-UV | Final WWTP Effluent after UV and cloth media filter (tertiary) |
| 116 | 81 | SAND | Sandusky WWTP | WW1811160825GSC | SAND-MI0020222-IFCMF | SCT-EFF | Secondary treatment clarifiers effluent |
| 117 | 81 | SAND | Sandusky WWTP | WW1811160815GSC | SAND-MI0020222-IFPT1 | INF | WWTP Influent |
| 118 | 81 | SAND | Sandusky WWTP | BS1811160850GSC-A | SAND-MI0020222-STAND | A-STAND | Aqueous portion of Anaerobic stabilized biosolids |
| 119 | 88 | TRAV | Traverse City WWTP | WW1811081300GSC | TRAV-MI0027481-EFPT1 | EFF-UV | Final WWTP Effluent |
| 120 | 88 | TRAV | Traverse City WWTP | WW1811081350GSC | TRAV-MI0027481-IFPT1 | INF | WWTP Influent |
| 121 | 90 | WARR | Warren WWTP | WW1811151545GSC | WARR-MI0024295-EFSDF | TER-EFF | Eefluent after sand filter (tertiary) |
| 122 | 90 | WARR | Warren WWTP | WW1811151600GSC | WARR-MI0024295-EFPT1 | EFF-UV | Final WWTP Effluent after sand filter (tertiary) and UV |
| 123 | 90 | WARR | Warren WWTP | WW1811151450GSC | WARR-MI0024295-IFPT1 | INF | WWTP Influent |
| 124 | 92 | WIXO | Wixom WWTP | WW1811140915GSC | WIXO-MI0024384-EBSCT | SCT-EFF | Secondary clarifier effluent sampled from equalization basin |
| 125 | 92 | WIXO | Wixom WWTP | WW1811140845GSC | WIXO-MI0024384-EFPT1 | EFF-UV | UV Disinfection |
| 126 | 92 | WIXO | Wixom WWTP | WW1811140950GSC | WIXO-MI0024384-FLBFP | WW-DWPST | Filtrate from belt filter primary and secondary sludge combined. |
| 127 | 92 | WIXO | Wixom WWTP | SL1811140945GSC-A | WIXO-MI0024384-IFBFP | A-PSTSL | Aqueous portion of combined primary and secondary sludge (screw press influent) |

# Table 17
Aqueous Sample Locations
Statewide PFAS Assessment of 42 WWTPs

| Nr. | WWTP Nr. | WWTP Code | Facility | Sample ID | Sample Location | Treatment Code | Sample Description |
|---|---|---|---|---|---|---|---|
| 128 | 92 | WIXO | Wixom WWTP | WW1811141000GSC | WIXO-MI0024384-IFPT1 | INF | WWTP Influent |
| 129 | 92 | WIXO | Wixom WWTP | BS1811140830GSC-A | WIXO-MI0024384-STACD | A-STAED | Aqueous portion of Aerobic stabilized biosolids (estimated 6 months of storage) |
| 130 | 92 | WIXO | Wixom WWTP | SL1811140905GSC-A | WIXO-MI0024384-WACSL | A-PSTSL | Aqueous portion of primary and secondary sludge |
| 131 | 93 | WYOM | Wyoming WWTP | WW1810291130GC | WYOM-MI0024392-EFPT1 | EFF-CL | Final WWTP Effluent |
| 132 | 93 | WYOM | Wyoming WWTP | WW1810291045GC | WYOM-MI0024392-IFPT1 | INF | WWTP Influent |
| 133 | 94 | YCUA | YCUA Regional WWTP | WW1811020900GSC | YCUA-MI0042676-EFPT1 | EFF-UV | Final WWTP Effluent |
| 134 | 94 | YCUA | YCUA Regional WWTP | WW1811020910GSC | YCUA-MI0042676-IFPT1 | INF | WWTP Influent |

**Legend:**

| Aqueous Treatment Process | Treatment Code | Treatment Process Description |
|---|---|---|
| WWTP Effluents | | |
| Effluent | EFF | Effluent Prior to / No or Unknown Disinfection |
| | EFF-CL | Effluent with Chlorine Disinfection |
| | EFF-UV | Effluent with UV Disinfection |
| | | |
| Influent | WWTP Influent | |
| | INF | Influent of WWTP |
| | | |
| Aqueous | Aqueous portion of sludge or biosolids | |
| Primary | A-PRTSL | Aqueous portion of primary treatment sludge |
| Primary | A-THPRT | Aqueous portion of primary treatment thickened sludge |
| Secondary | A-SCTSL | Aqueous portion of secondary treatment sludge |
| Secondary | A-THSCT | Aqueous portion of secondary treatment sludge |
| Combined | A-PSTSL | Aqueous portion of primary treatment sludge |
| Combined | A-DWPST | Aqueous portion for dewatered combined primary and secondary sludge |
| Stabilized - Alkaline | A-STALS | Aqueous portion of alkaline stabilized biosolids |
| Stabilized-Anaerobically | A-STAND | Aqueous portion of anaerobically stabilized biosolids. |
| Stabilized - Aerobically | A-STAED | Aqueous portion of aerobically stabilized biosolids. |
| | | |
| Wastewater | Wastewater - Aqueous Process Flow | |
| Primary | PRT-EFF | Primary treatment effluent |
| Secondary | SCT-EFF | Secondary treatment effluent (could be from clarifier or other treatments) |
| Tertiary | TER-EFF | Tertiary Treatment effluent |
| Stabilized - Lagoon | LAG-EFF | Wastewater from lagoon with stabilized biosolids |
| Primary | WW-THPRT | Decant primary treatment thickened sludge |
| Secondary | WW-THSCT | Decant secondary treatment thickened sludge |
| Combined | WW-THPST | Filtrate or Centrate from combined primary and secondary treatment thickened sludge |
| Combined | WW-DWPST | Filtrate or Centrate from dewatered primary and secondary treatment combined sludge |
| Stabilized - Alkaline | WW-STALS | Filtrate or Centrate from alkaline stabilized biosolids |
| Stabilized-Anaerobically | WW-STAED | Filtrate or Centrate from aerobically stabilized biosolids |
| Stabilized - Aerobically | WW-STDRB | Filtrate from stabilized biosolids form drying beds |

# Table 18

## Aqueous PFAS Sample Results
## Statewide PFAS Assessment of 42 WWTPs

| Nr. | WWTP Nr. | WWTP Code | Sample Location | Sample ID | Sample Date | Report | Units | Total PFAS | PFBA | PFPeA | PFHxA | PFHpA | PFOA | PFNA | PFDA | PFUnDA | PFDoDA | PFTrDA | PFTeDA | PFBS | PFPeS | PFHxS | PFHpS | PFOS | PFNS | PFDS | FOSA | 4:2 FTSA | 6:2 FTSA | 8:2 FTSA | EtFOSAA | MeFOSAA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 97 | ALPE | ALPE-MI0022195-EFPT1 | WW1811090810GSC | 11/9/2018 | 1803704 | ng/L | 73 | 6.08 | 15.8 | 19.6 | 3.39 | 7.49 | < 1.94 | 1.79 | < 1.94 | < 1.94 | < 1.94 | < 1.94 | 9.12 | < 1.94 | 5.05 | < 1.94 | 5.07 | < 1.94 | < 1.94 | < 1.94 | < 1.94 | < 1.94 | < 1.94 | < 1.94 | < 1.94 |
| 2 | 97 | ALPE | ALPE-MI0022195-IFPT1 | WW1811090835GSC | 11/9/2018 | 1803704 | ng/L | 51 | 4.53 | 7.95 | 8.1 | 2.94 | 5.94 | < 1.99 | < 1.99 | < 1.99 | < 1.99 | < 1.99 | < 1.99 | 9.34 | < 1.99 | 6.81 | < 1.99 | 5.44 | < 1.99 | < 1.99 | < 1.99 | < 1.99 | < 1.99 | < 1.99 | < 1.99 | < 1.99 |
| 3 | 4 | AARB | AARB-MI0022217-EFPT1 | WW1811021030GSC | 11/2/2018 | 1803610 | ng/L | 113 | 8.61 | 33.2 | 33.5 | 6.92 | 4.42 | < 2.00 | < 2.00 | < 2.00 | < 2.00 | < 2.00 | < 2.00 | 6.7 | < 2.00 | 3.1 | < 2.00 | 14.8 | < 2.00 | < 2.00 | < 2.00 | < 2.00 | 1.6 | < 2.00 | < 2.00 | < 2.00 |
| 4 | 4 | AARB | AARB-MI0022217-IFPT1 | WW1811021100GSC | 11/2/2018 | 1803610 | ng/L | 89 | 8.55 | 28.1 | 16.5 | 6.68 | 2.91 | < 2.07 | < 2.07 | < 2.07 | < 2.07 | < 2.07 | < 2.07 | 6.34 | < 2.07 | 3.18 | < 2.07 | 16.5 | < 2.07 | < 2.07 | < 2.07 | < 2.07 | < 2.07 | < 2.07 | < 2.07 | < 2.07 |
| 5 | 4 | AARB | AARB-MI0022217-STALS | BS1811021130GSC-A | 11/2/2018 | 1803610 | ng/L | 381 | < 27.8 | 58.6 | 144 | < 27.8 | < 27.8 | < 27.8 | < 27.8 | < 27.8 | < 27.8 | < 27.8 | < 27.8 | < 27.8 | < 27.8 | < 27.8 | < 27.8 | 178 | < 27.8 | < 27.8 | < 27.8 | < 27.8 | < 27.8 | < 27.8 | < 27.8 | < 27.8 |
| 6 | 6 | BCRK | BCRK-MI0022276-EFPT1 | WW1810311100GC | 10/31/2018 | 1803581 | ng/L | 72 | 7.69 | 10.8 | 27.1 | 3.19 | 8.43 | 2.79 | < 2.09 | < 2.09 | < 2.09 | < 2.09 | < 2.09 | 2.92 | < 2.09 | 2.28 | < 2.09 | 5.14 | < 2.09 | < 2.09 | < 2.09 | < 2.09 | 1.76 | < 2.09 | < 2.09 | < 2.09 |
| 7 | 6 | BCRK | BCRK-MI0022276-IFPT1 | WW1810311115GC | 10/31/2018 | 1803581 | ng/L | 47 | 7.75 | 5.17 | 10 | 3.87 | 7.25 | 2.97 | < 2.51 | < 2.51 | < 2.51 | < 2.51 | < 2.51 | < 2.51 | < 2.51 | < 2.51 | < 2.51 | 3.28 | < 2.51 | < 2.51 | < 2.51 | < 2.51 | 6.49 | < 2.51 | < 2.51 | < 2.51 |
| 8 | 7 | BAYC | BAYC-MI0022284-EFPT1 | WW1811191145GSC | 11/19/2018 | 1803773 | ng/L | 76 | 5.31 | 7.5 | 8.88 | 2.34 | 5.39 | < 2.16 | < 2.16 | < 2.16 | < 2.16 | < 2.16 | < 2.16 | 12 | < 2.16 | 14.2 | < 2.16 | 15.8 | < 2.16 | < 2.16 | < 2.16 | < 2.16 | 3.06 | < 2.16 | < 2.16 | 1.52 |
| 9 | 7 | BAYC | BAYC-MI0022284-EFTRF | WW1811191230GSC | 11/19/2018 | 1803773 | ng/L | 75 | 4.83 | 7.76 | 8.38 | 2.44 | 6.09 | < 2.24 | < 2.24 | < 2.24 | < 2.24 | < 2.24 | < 2.24 | 13.9 | < 2.24 | 10.8 | < 2.24 | 15.8 | < 2.24 | < 2.24 | < 2.24 | < 2.24 | 3.32 | < 2.24 | < 2.24 | 1.86 |
| 10 | 7 | BAYC | BAYC-MI0022284-FLISP | WW1811191315GSC | 11/19/2018 | 1803773 | ng/L | 60 | < 2.12 | 6.63 | 7.42 | 2.3 | 3.54 | < 2.12 | < 2.12 | < 2.12 | < 2.12 | < 2.12 | < 2.12 | 20.9 | < 2.12 | 6.27 | < 2.12 | 6.06 | < 2.12 | < 2.12 | < 2.12 | < 2.12 | 2.42 | < 2.12 | 4.35 | < 2.12 |
| 11 | 7 | BAYC | BAYC-MI0022284-IFGAC | WW1811191200GSC | 11/19/2018 | 1803773 | ng/L | 72 | 4.82 | 6.76 | 7.85 | 2.38 | 5.45 | < 2.07 | < 2.07 | < 2.07 | < 2.07 | < 2.07 | < 2.07 | 11.9 | < 2.07 | 12.6 | < 2.07 | 15.5 | < 2.07 | < 2.07 | < 2.07 | < 2.07 | 2.55 | < 2.07 | < 2.07 | 1.88 |
| 12 | 7 | BAYC | BAYC-MI0022284-IFISP | SL1811191300GSC-A | 11/19/2018 | 1803773 | ng/L | 59 | < 21.8 | < 21.8 | < 21.8 | < 21.8 | < 21.8 | < 21.8 | < 21.8 | < 21.8 | < 21.8 | < 21.8 | < 21.8 | < 21.8 | < 21.8 | < 21.8 | < 21.8 | 44 | < 21.8 | < 21.8 | < 21.8 | < 21.8 | < 21.8 | < 21.8 | 15.3 | < 21.8 |
| 13 | 7 | BAYC | BAYC-MI0022284-IFPT1 | WW1811191245GSC | 11/19/2018 | 1803773 | ng/L | 69 | 4.33 | 5.06 | 6.24 | 1.87 | 4.87 | < 2.17 | < 2.17 | < 2.17 | < 2.17 | < 2.17 | < 2.17 | 9.57 | 2.68 | 13.4 | < 2.17 | 18.2 | < 2.17 | < 2.17 | < 2.17 | < 2.17 | 2.97 | < 2.17 | < 2.17 | < 2.17 |
| 14 | 7 | BAYC | BAYC-MI0022284-IFTRF | WW1811191215GSC | 11/19/2018 | 1803773 | ng/L | 72 | 5.19 | 6.16 | 7.46 | 2.54 | 5.19 | < 2.07 | < 2.07 | < 2.07 | < 2.07 | < 2.07 | < 2.07 | 12.1 | < 2.07 | 11 | < 2.07 | 17.3 | < 2.07 | < 2.07 | < 2.07 | < 2.07 | 3.33 | < 2.07 | < 2.07 | 1.79 |
| 15 | 14 | BRON | BRON-MI0020729-EFPT1 | WW1810311430GC | 10/31/2018 | 1803576 | ng/L | 290 | 2.92 | 7.14 | 10.7 | 2.89 | 2.4 | < 2.00 | < 2.00 | < 2.00 | < 2.00 | < 2.00 | < 2.00 | 25.1 | < 2.00 | < 2.00 | < 2.00 | 169 | < 2.00 | < 2.00 | < 2.00 | < 2.00 | 69.4 | < 2.00 | < 2.00 | < 2.00 |
| 16 | 14 | BRON | BRON-MI0020729-IFPT1 | WW1810311500GC | 10/31/2018 | 1803576 | ng/L | 2,219 | 3.79 | 4.65 | 4.52 | < 2.22 | < 2.22 | < 2.22 | < 2.22 | < 2.22 | < 2.22 | < 2.22 | < 2.22 | 144 | < 2.22 | < 2.22 | < 2.22 | 843 | < 2.22 | < 2.22 | < 2.22 | 8.78 | 1210 | < 2.22 | < 2.22 | < 2.22 |
| 17 | 99 | COMM | COMM-MI0025071-EFPT1 | WW1811141115GSC | 11/14/2018 | 1803710 | ng/L | 146 | 8.03 | 63.6 | 41.3 | 2.25 | 15.5 | < 2.27 | < 2.27 | < 2.27 | < 2.27 | < 2.27 | < 2.27 | 11 | < 2.27 | 2.29 | < 2.27 | 1.92 | < 2.27 | < 2.27 | < 2.27 | < 2.27 | < 2.27 | < 2.27 | < 2.27 | < 2.27 |
| 18 | 99 | COMM | COMM-MI0025071-IFPT1 | WW1811141100GSC | 11/14/2018 | 1803710 | ng/L | 104 | 5.91 | 31.8 | 22.8 | 2.21 | 17.9 | < 2.35 | 6.51 | < 2.35 | 1.85 | < 2.35 | < 2.35 | 5.6 | < 2.35 | < 2.35 | < 2.35 | 6.38 | < 2.35 | < 2.35 | < 2.35 | < 2.35 | < 2.35 | < 2.35 | < 2.35 | 2.75 |
| 19 | 23 | DELH | DELH-MI0022781-EFPT1 | WW1811011045GSC | 11/1/2018 | 1803608 | ng/L | 21 | 2.55 | 3.33 | 10.6 | < 2.07 | 2.33 | < 2.07 | < 2.07 | < 2.07 | < 2.07 | < 2.07 | < 2.07 | < 2.07 | < 2.07 | < 2.07 | < 2.07 | 1.76 | < 2.07 | < 2.07 | < 2.07 | < 2.07 | < 2.07 | < 2.07 | < 2.07 | < 2.07 |
| 20 | 23 | DELH | DELH-MI0022781-IFPT1 | WW1811011115GSC | 11/1/2018 | 1803608 | ng/L | 5 | < 2.13 | 2.95 | 2.17 | < 2.13 | < 2.13 | < 2.13 | < 2.13 | < 2.13 | < 2.13 | < 2.13 | < 2.13 | < 2.13 | < 2.13 | < 2.13 | < 2.13 | < 2.13 | < 2.13 | < 2.13 | < 2.13 | < 2.13 | < 2.13 | < 2.13 | < 2.13 | < 2.13 |
| 21 | 25 | DEXT | DEXT-MI0022829-EFPT1 | WW1811021330GSC | 11/2/2018 | 1803611 | ng/L | 105 | 7.23 | 39.8 | 43.8 | 1.78 | 7.97 | < 2.03 | < 2.03 | < 2.03 | < 2.03 | < 2.03 | < 2.03 | 2.83 | < 2.03 | < 2.03 | < 2.03 | 1.51 | < 2.03 | < 2.03 | < 2.03 | < 2.03 | < 2.03 | < 2.03 | < 2.03 | < 2.03 |
| 22 | 25 | DEXT | DEXT-MI0022829-IFPT1 | WW1811021300GSC | 11/2/2018 | 1803611 | ng/L | 12 | 1.72 | 3.65 | 3.85 | < 2.11 | < 2.11 | < 2.11 | < 2.11 | < 2.11 | < 2.11 | < 2.11 | < 2.11 | 2.31 | < 2.11 | < 2.11 | < 2.11 | < 2.11 | < 2.11 | < 2.11 | < 2.11 | < 2.11 | < 2.11 | < 2.11 | < 2.11 | < 2.11 |
| 23 | 25 | DEXT | DEXT-MI0022829-STAND | BS1811021245GSC-A | 11/2/2018 | 1803611 | ng/L | 234 | < 37.6 | 28 | 206 | < 37.6 | < 37.6 | < 37.6 | < 37.6 | < 37.6 | < 37.6 | < 37.6 | < 37.6 | < 37.6 | < 37.6 | < 37.6 | < 37.6 | < 37.6 | < 37.6 | < 37.6 | < 37.6 | < 37.6 | < 37.6 | < 37.6 | < 37.6 | < 37.6 |
| 24 | 27 | DRVR | DRVR-MI0021156-EFPT1 | WW1811200800GSC | 11/20/2018 | 1803767 | ng/L | 88 | 4.97 | 9.78 | 13.3 | 4.43 | 12.7 | < 2.06 | 1.53 | < 2.06 | < 2.06 | < 2.06 | < 2.06 | 11.5 | < 2.06 | 8.17 | < 2.06 | 7.93 | < 2.06 | < 2.06 | < 2.06 | < 2.06 | 13.5 | < 2.06 | < 2.06 | < 2.06 |
| 25 | 27 | DRVR | DRVR-MI0021156-FLBFP | WW1811200930GSC | 11/20/2018 | 1803767 | ng/L | 70 | 5.4 | 8.59 | 17.3 | 4.24 | 8.56 | < 2.18 | < 2.18 | < 2.18 | < 2.18 | < 2.18 | < 2.18 | 7.07 | < 2.18 | 6.78 | < 2.18 | 4.66 | < 2.18 | < 2.18 | < 2.18 | < 2.18 | 7.16 | < 2.18 | < 2.18 | < 2.18 |
| 26 | 27 | DRVR | DRVR-MI0021156-IFPT1 | WW1811200830GSC | 11/20/2018 | 1803767 | ng/L | 84 | 4.83 | 7.85 | 9.62 | 3.65 | 7.2 | < 2.17 | 3.02 | < 2.17 | < 2.17 | < 2.17 | < 2.17 | 8.83 | < 2.17 | 6.29 | < 2.17 | 22.2 | < 2.17 | < 2.17 | < 2.17 | < 2.17 | 8.01 | < 2.17 | < 2.17 | 2.08 |
| 27 | 101 | ELAN | ELAN-MI0022853-EFPT1 | WW1811010920GSC | 11/1/2018 | 1803606 | ng/L | 38 | 3.48 | 11.6 | 6.25 | 8.03 | 3.28 | < 2.07 | < 2.07 | < 2.07 | < 2.07 | < 2.07 | < 2.07 | 2.88 | < 2.07 | < 2.07 | < 2.07 | 2.01 | < 2.07 | < 2.07 | < 2.07 | < 2.07 | < 2.07 | < 2.07 | < 2.07 | < 2.07 |
| 28 | 101 | ELAN | ELAN-MI0022853-IFPT1 | WW1811010810GSC | 11/1/2018 | 1803606 | ng/L | 18 | 2.23 | 3.69 | 3.53 | 1.93 | 2.21 | 1.72 | < 2.16 | < 2.16 | < 2.16 | < 2.16 | < 2.16 | 2.64 | < 2.16 | < 2.16 | < 2.16 | < 2.16 | < 2.16 | < 2.16 | < 2.16 | < 2.16 | < 2.16 | < 2.16 | < 2.16 | < 2.16 |
| 29 | 101 | ELAN | ELAN-MI0022853-IFSDF | WW1811010850GSC | 11/1/2018 | 1803606 | ng/L | 38 | 3.53 | 11.5 | 6.68 | 7.42 | 3.26 | < 2.07 | < 2.07 | < 2.07 | < 2.07 | < 2.07 | < 2.07 | 3.02 | < 2.07 | < 2.07 | < 2.07 | 2.62 | < 2.07 | < 2.07 | < 2.07 | < 2.07 | < 2.07 | < 2.07 | < 2.07 | < 2.07 |
| 30 | 32 | FLIN | FLIN-MI0022926-EFPT1 | WW1811051215GSC | 11/5/2018 | 1803698 | ng/L | 96 | 4.86 | 17.5 | 12.6 | 12.5 | 4.5 | < 2.02 | < 2.02 | < 2.02 | < 2.02 | < 2.02 | < 2.02 | 12 | < 2.02 | 12.7 | < 2.02 | 14.8 | < 2.02 | < 2.02 | < 2.02 | < 2.02 | 4.79 | < 2.02 | < 2.02 | < 2.02 |
| 31 | 32 | FLIN | FLIN-MI0022926-IFPT1 | WW1811051230GSC | 11/5/2018 | 1803698 | ng/L | 77 | 3.21 | 4.94 | 6.57 | 2.15 | 4.83 | 1.94 | < 2.07 | < 2.07 | < 2.07 | < 2.07 | < 2.07 | 4.59 | 2.01 | 20.6 | < 2.07 | 26.6 | < 2.07 | < 2.07 | < 2.07 | < 2.07 | < 2.07 | < 2.07 | < 2.07 | < 2.07 |
| 32 | 32 | FLIN | FLIN-MI0022926-IFPT2 | WW1811051315GSC | 11/5/2018 | 1803698 | ng/L | 97 | < 2.01 | 8.14 | 12.7 | 6.03 | 6.35 | 2.12 | 3.14 | 1.86 | < 2.01 | < 2.01 | < 2.01 | < 2.01 | < 2.01 | 5.93 | < 2.01 | 34.8 | < 2.01 | < 2.01 | < 2.01 | < 2.01 | 10.7 | < 2.01 | 1.57 | 3.9 |
| 33 | 32 | FLIN | FLIN-MI0022926-IFPT3 | WW1811051245GSC | 11/5/2018 | 1803698 | ng/L | 52 | 3.08 | 4.72 | 5.55 | 2 | 4.41 | < 2.19 | < 2.19 | < 2.19 | < 2.19 | < 2.19 | < 2.19 | 4.95 | < 2.19 | 8.68 | < 2.19 | 16.4 | < 2.19 | < 2.19 | < 2.19 | < 2.19 | 2.35 | < 2.19 | < 2.19 | < 2.19 |
| 34 | 32 | FLIN | FLIN-MI0022926-PSTSL | SL1811051145GSC-A | 11/5/2018 | 1803698 | ng/L | 182 | < 21.1 | 15.4 | 35.9 | < 21.1 | < 21.1 | < 21.1 | < 21.1 | < 21.1 | < 21.1 | < 21.1 | < 21.1 | < 21.1 | < 21.1 | 17.4 | < 21.1 | 43.3 | < 21.1 | < 21.1 | < 21.1 | < 21.1 | 70 | < 21.1 | < 21.1 | < 21.1 |
| 35 | 33 | FOWL | FOWL-MI0020664-EFPT1 | WW1811130920GSC | 11/13/2018 | 1803706 | ng/L | 62 | 2.38 | 21.6 | 23.1 | 1.83 | 7.6 | < 2.09 | < 2.09 | < 2.09 | < 2.09 | < 2.09 | < 2.09 | 4.13 | < 2.09 | < 2.09 | < 2.09 | 1.47 | < 2.09 | < 2.09 | < 2.09 | < 2.09 | < 2.09 | < 2.09 | < 2.09 | < 2.09 |
| 36 | 33 | FOWL | FOWL-MI0020664-IFPT1 | WW1811130900GSC | 11/13/2018 | 1803706 | ng/L | 7 | < 2.03 | 3.09 | 3.69 | < 2.03 | < 2.03 | < 2.03 | < 2.03 | < 2.03 | < 2.03 | < 2.03 | < 2.03 | < 2.03 | < 2.03 | < 2.03 | < 2.03 | < 2.03 | < 2.03 | < 2.03 | < 2.03 | < 2.03 | < 2.03 | < 2.03 | < 2.03 | < 2.03 |
| 37 | 33 | FOWL | FOWL-MI0020664-WWLAG | WW1811131005GSC | 11/13/2018 | 1803706 | ng/L | 1,161 | 86 | 161 | 163 | 84 | 231 | 130 | 95.2 | 14.9 | 5.2 | < 2.00 | < 2.00 | 12.4 | < 2.00 | 3.25 | < 2.00 | 94.1 | < 2.00 | < 2.00 | 5.42 | < 2.00 | < 2.00 | < 2.00 | 60.7 | 14.9 |
| 38 | 102 | GAYL | GAYL-GW1810128-EFPT1 | WW1811080915GSC | 11/8/2018 | 1803702 | ng/L | 161 | 6.71 | 80.2 | 42.3 | 1.96 | 8.72 | < 1.96 | < 1.96 | < 1.96 | < 1.96 | < 1.96 | < 1.96 | 15.4 | < 1.96 | 1.9 | < 1.96 | 4.26 | < 1.96 | < 1.96 | < 1.96 | < 1.96 | < 1.96 | < 1.96 | < 1.96 | < 1.96 |
| 39 | 102 | GAYL | GAYL-GW1810128-IFPT1 | WW1811080900GSC | 11/8/2018 | 1803702 | ng/L | 17 | < 2.02 | 7.72 | 6.1 | < 2.02 | < 2.02 | < 2.02 | < 2.02 | < 2.02 | < 2.02 | < 2.02 | < 2.02 | < 2.02 | < 2.02 | < 2.02 | < 2.02 | < 2.02 | < 2.02 | < 2.02 | < 2.02 | < 2.02 | 3.01 | < 2.02 | < 2.02 | < 2.02 |
| 40 | 38 | GLWA | GLWA-MI0022802-EFPT1 | WW1811161550GSC | 11/16/2018 | 1803716 | ng/L | 119 | 11.6 | 8.89 | 14.2 | 3.7 | 6.7 | < 2.07 | < 2.07 | < 2.07 | < 2.07 | < 2.07 | < 2.07 | 13.4 | < 2.07 | 8.41 | < 2.07 | 9.68 | < 2.07 | < 2.07 | < 2.07 | < 2.07 | 42.2 | < 2.07 | < 2.07 | < 2.07 |
| 41 | 38 | GLWA | GLWA-MI0022802-EFPT2 | WW1811161635GSC | 11/16/2018 | 1803716 | ng/L | 125 | 11.5 | 8.85 | 18.7 | 3.57 | 7.18 | < 2.12 | < 2.12 | < 2.12 | < 2.12 | < 2.12 | < 2.12 | 13.2 | < 2.12 | 5.7 | < 2.12 | 9.31 | < 2.12 | < 2.12 | < 2.12 | < 2.12 | 46.7 | < 2.12 | < 2.12 | < 2.12 |
| 42 | 38 | GLWA | GLWA-MI0022802-FLBFP | WW1811161400GSC | 11/16/2018 | 1803716 | ng/L | 243 | 11.6 | 10.3 | 17 | 4.29 | 7.2 | < 2.40 | < 2.40 | < 2.40 | < 2.40 | < 2.40 | < 2.40 | 20.8 | < 2.40 | 7.1 | < 2.40 | 23.6 | < 2.40 | < 2.40 | < 2.40 | < 2.40 | 141 | < 2.40 | < 2.40 | < 2.40 |
| 43 | 38 | GLWA | GLWA-MI0022802-IFPT1 | WW1811161600GSC | 11/16/2018 | 1803716 | ng/L | 71 | 7.99 | 6.97 | 9.26 | 2.77 | 6.02 | < 2.09 | < 2.09 | < 2.09 | < 2.09 | < 2.09 | < 2.09 | 17.4 | < 2.09 | 4.61 | < 2.09 | 7.54 | < 2.09 | < 2.09 | < 2.09 | < 2.09 | 8.68 | < 2.09 | < 2.09 | < 2.09 |
| 44 | 38 | GLWA | GLWA-MI0022802-IFPT2 | WW1811161440GSC | 11/16/2018 | 1803716 | ng/L | 117 | 18.1 | 11.2 | 14.7 | 4.44 | 9.1 | < 2.11 | < 2.11 | < 2.11 | < 2.11 | < 2.11 | < 2.11 | 18.1 | < 2.11 | 10.2 | < 2.11 | 15.6 | < 2.11 | < 2.11 | < 2.11 | < 2.11 | 12.4 | < 2.11 | 2.71 | < 2.11 |
| 45 | 38 | GLWA | GLWA-MI0022802-IFPT3 | WW1811161540GSC | 11/16/2018 | 1803716 | ng/L | 53 | 5.53 | 8.05 | 7.3 | 2.4 | 4.64 | < 2.04 | < 2.04 | < 2.04 | < 2.04 | < 2.04 | < 2.04 | 4.91 | < 2.04 | 3.1 | < 2.04 | 10.7 | < 2.04 | < 2.04 | < 2.04 | < 2.04 | 6.5 | < 2.04 | < 2.04 | < 2.04 |
| 46 | 38 | GLWA | GLWA-MI0022802-THPRT | SL1811161450GSC-A | 11/16/2018 | 1803716 | ng/L | 63 | < 48.1 | < 48.1 | < 48.1 | < 48.1 | < 48.1 | < 48.1 | < 48.1 | < 48.1 | < 48.1 | < 48.1 | < 48.1 | < 48.1 | < 48.1 | < 48.1 | < 48.1 | < 48.1 | < 48.1 | < 48.1 | < 48.1 | < 48.1 | 63.2 | < 48.1 | < 48.1 | < 48.1 |
| 47 | 38 | GLWA | GLWA-MI0022802-THSCT | SL1811161520GSC-A | 11/16/2018 | 1803716 | ng/L | 279 | 14.9 | 11.1 | 27.1 | < 14.1 | 11.2 | < 14.1 | < 14.1 | < 14.1 | < 14.1 | < 14.1 | < 14.1 | 23.4 | < 14.1 | < 14.1 | < 14.1 | 18.6 | < 14.1 | < 14.1 | < 14.1 | < 14.1 | 173 | < 14.1 | < 14.1 | < 14.1 |
| 48 | 38 | GLWA | GLWA-MI0022802-WWPRT | WW1811161500GSC | 11/16/2018 | 1803716 | ng/L | 130 | 10.8 | 8.45 | 10.7 | 3.49 | 6.22 | < 2.07 | < 2.07 | < 2.07 | < 2.07 | < 2.07 | < 2.07 | 13.6 | < 2.07 | 4.76 | < 2.07 | 15.5 | < 2.07 | < 2.07 | < 2.07 | < 2.07 | 56.5 | < 2.07 | < 2.07 | < 2.07 |
| 49 | 38 | GLWA | GLWA-MI0022802-WWSCT | WW1811161515GSC | 11/16/2018 | 1803716 | ng/L | 156 | 12 | 8.6 | 15.3 | 3.64 | 7.35 | < 2.05 | < 2.05 | < 2.05 | < 2.05 | < 2.05 | < 2.05 | 13.2 | < 2.05 | 4.82 | < 2.05 | 11.2 | < 2.05 | < 2.05 | < 2.05 | < 2.05 | 78.3 | < 2.05 | < 2.05 | 2.04 |
| 50 | 40 | GRAP | GRAP-MI0026069-DWCEN | WW1810291500GC | 10/29/2018 | 1803553 | ng/L | 619 | 16 | 60 | 41.2 | 4.8 | 7.74 | < 2.13 | < 2.13 | < 2.13 | < 2.13 | < 2.13 | < 2.13 | 18.6 | < 2.13 | 4.1 | < 2.13 | 26.5 | < 2.13 | < 2.13 | < 2.13 | < 2.13 | 429 | 1.77 | 3.65 | 5.86 |
| 51 | 40 | GRAP | GRAP-MI0026069-EFPT1 | WW1810291430GC | 10/29/2018 | 1803553 | ng/L | 403 | 15.9 | 49.9 | 48.5 | 11.4 | 11.4 | < 2.08 | 1.56 | < 2.08 | < 2.08 | < 2.08 | < 2.08 | 16.4 | < 2.08 | 5.86 | < 2.08 | 35.6 | < 2.08 | < 2.08 | < 2.08 | < 2.08 | 202 | < 2.08 | 2.26 | 2.45 |
| 52 | 40 | GRAP | GRAP-MI0026069-IFPT1 | WW1810291400GC | 10/29/2018 | 1803553 | ng/L | 72 | 4.19 | 6.56 | 6.57 | 1.7 | 5.06 | < 2.10 | < 2.10 | < 2.10 | < 2.10 | < 2.10 | < 2.10 | 4.96 | < 2.10 | < 2.10 | < 2.10 | 12.7 | < 2.10 | < 2.10 | < 2.10 | < 2.10 | 30.4 | < 2.10 | < 2.10 | < 2.10 |
| 53 | 47 | HOLL | HOLL-MI0023108-EFPT1 | WW1810301240GC | 10/30/2018 | 1803578 | ng/L | 43 | 4.89 | 3.13 | 14.5 | 1.91 | 4.67 | < 2.07 | < 2.07 | < 2.07 | < 2.07 | < 2.07 | < 2.07 | < 2.07 | < 2.07 | 1.55 | < 2.07 | 2.41 | < 2.07 | < 2.07 | < 2.07 | < 2.07 | 9.65 | < 2.07 | < 2.07 | < 2.07 |
| 54 | 47 | HOLL | HOLL-MI0023108-IFPT1 | WW1810301310GC | 10/30/2018 | 1803578 | ng/L | 16 | 3.24 | 2.43 | 2.78 | < 2.19 | 3.2 | < 2.19 | < 2.19 | < 2.19 | < 2.19 | < 2.19 | < 2.19 | < 2.19 | < 2.19 | < 2.19 | < 2.19 | < 2.19 | < 2.19 | < 2.19 | < 2.19 | < 2.19 | 4.08 | < 2.19 | < 2.19 | < 2.19 |
| 55 | 47 | HOLL | HOLL-MI0023108-IFPT2 | WW1810301330GC | 10/30/2018 | 1803578 | ng/L | 37 | 6.73 | 3.73 | 6.71 | 2.81 | 5.73 | < 2.01 | < 2.01 | < 2.01 | < 2.01 | < 2.01 | < 2.01 | 4.1 | < 2.01 | < 2.01 | < 2.01 | 3.79 | < 2.01 | < 2.01 | < 2.01 | < 2.01 | 3.25 | < 2.01 | < 2.01 | < 2.01 |
| 56 | 49 | HOWE | HOWE-MI0021113-EFPT1 | WW1811131105GSC | 11/13/2018 | 1803707 | ng/L | 71 | 3.65 | 17.7 | 26.6 | 1.85 | 7.39 | < 2.05 | < 2.05 | < 2.05 | < 2.05 | < 2.05 | < 2.05 | 6.25 | < 2.05 | 2.3 | < 2.05 | 4.87 | < 2.05 | < 2.05 | < 2.05 | < 2.05 | < 2.05 | < 2.05 | < 2.05 | < 2.05 |
| 57 | 49 | HOWE | HOWE-MI0021113-IFPT1 | WW1811131150GSC | 11/13/2018 | 1803707 | ng/L | 13 | < 2.07 | 3.69 | 4.78 | < 2.07 | 4.42 | < 2.07 | < 2.07 | < 2.07 | < 2.07 | < 2.07 | < 2.07 | < 2.07 | < 2.07 | < 2.07 | < 2.07 | < 2.07 | < 2.07 | < 2.07 | < 2.07 | < 2.07 | < 2.07 | < 2.07 | < 2.07 | < 2.07 |
| 58 | 49 | HOWE | HOWE-MI0021113-PRTSL | SL1811131125GSC-A | 11/13/2018 | 1803707 | ng/L | 64 | < 61.6 | < 61.6 | < 61.6 | < 61.6 | < 61.6 | < 61.6 | < 61.6 | < 61.6 | < 61.6 | < 61.6 | < 61.6 | < 61.6 | < 61.6 | < 61.6 | < 61.6 | 63.9 | < 61.6 | < 61.6 | < 61.6 | < 61.6 | < 61.6 | < 61.6 | < 61.6 | < 61.6 |
| 59 | 77 | HURO | HURO-MI0043800-DCALS | WW1811201200GSC | 11/20/2018 | 1803768 | ng/L | 710 | 398 | 35.4 | 81.9 | 5.63 | 26.8 | 4.06 | 8.79 | 2.89 | 7.54 | < 2.16 | < 2.16 | 36.9 | < 2.16 | 10.2 | < 2.16 | 34.1 | < 2.16 | < 2.16 | < 2.16 | < 2.16 | 18.2 | 2.16 | 13.8 | 23.6 |
| 60 | 77 | HURO | HURO-MI0043800-EFPT1 | WW1811201100GSC | 11/20/2018 | 1803768 | ng/L | 102 | 42.6 | 8.31 | 13.4 | 2.27 | 6.69 | < 2.16 | < 2.16 | < 2.16 | < 2.16 | < 2.16 | < 2.16 | 20.9 | < 2.16 | 2.52 | < 2.16 | 5.33 | < 2.16 | < 2.16 | < 2.16 | < 2.16 | < 2.16 | < 2.16 | < 2.16 | < 2.16 |
| 61 | 77 | HURO | HURO-MI0043800-IFPT1 | WW1811201115GSC | 11/20/2018 | 1803768 | ng/L | 18 | 5.7 | 3.99 | 4.27 | < 2.14 | 3.76 | < 2.14 | < 2.14 | < 2.14 | < 2.14 | < 2.14 | < 2.14 | < 2.14 | < 2.14 | < 2.14 | < 2.14 | < 2.14 | < 2.14 | < 2.14 | < 2.14 | < 2.14 | < 2.14 | < 2.14 | < 2.14 | < 2.14 |
| 62 | 77 | HURO | HURO-MI0043800-STALS | BS1811201215GSC-A | 11/20/2018 | 1803768 | ng/L | 685 | 510 | < 70.2 | 110 | < 70.2 | < 70.2 | < 70.2 | < 70.2 | < 70.2 | < 70.2 | < 70.2 | < 70.2 | 64.5 | < 70.2 | < 70.2 | < 70.2 | < 70.2 | < 70.2 | < 70.2 | < 70.2 | < 70.2 | < 70.2 | < 70.2 | < 70.2 | < 70.2 |
| 63 | 77 | HURO | HURO-MI0043800-THGRA | SL1811201130GSC-A | 11/20/2018 | 1803768 | ng/L | 818 | 608 | 44.6 | 35.3 | < 8.99 | 18.7 | < 8.99 | < 8.99 | < 8.99 | < 8.99 | < 8.99 | < 8.99 | 64.5 | < 8.99 | 7.02 | < 8.99 | 17.2 | < 8.99 | < 8.99 | < 8.99 | < 8.99 | 22.8 | < 8.99 | < 8.99 | < 8.99 |
| 64 | 50 | IONA | IONA-MI0021041-EFPT1 | WW1810310815GC | 10/31/2018 | 1803583 | ng/L | 143,360 | 34.9 | 31.3 | 66 | 34 | < 2.15 | < 2.15 | < 2.15 | < 2.15 | < 2.15 | < 2.15 | < 2.15 | 2.43 | < 2.15 | 2.05 | < 2.15 | 635 | < 2.15 | < 2.15 | < 2.15 | 154 | 142000 | 400 | < 2.15 | < 2.15 |
| 65 | 50 | IONA | IONA-MI0021041-IFPT1 | WW1810310800GC | 10/31/2018 | 1803583 | ng/L | 8,667 | 5.09 | 4.27 | 5.16 | 6.34 | < 2.23 | < 2.23 | < 2.23 | < 2.23 | < 2.23 | < 2.23 | < 2.23 | 2.03 | < 2.23 | < 2.23 | < 2.23 | 213 | < 2.23 | < 2.23 | < 2.23 | 42.2 | 8280 | 109 | < 2.23 | < 2.23 |
| 66 | 50 | IONA | IONA-MI0021041-STAND | BS1810310830GC-A | 10/31/2018 | 1803583 | ng/L | 158,137 | 87.8 | 89.9 | 251 | 34.7 | 10.1 | 3.66 | < 4.13 | < 4.13 | < 4.13 | < 4.13 | < 4.13 | < 4.13 | < 4.13 | 3.91 | 10.6 | 2920 | < 4.13 | < 4.13 | < 4.13 | 116 | 154000 | 605 | < 4.13 | 4.54 |
| 67 | 52 | JACK | JACK-MI0023256-EFPT1 | WW1811050830GSC | 11/5/2018 | 1803697 | ng/L | 60 | 6.59 | 22.4 | 20.1 | < 2.02 | 3.38 | < 2.02 | < 2.02 | < 2.02 | < 2.02 | < 2.02 | < 2.02 | 2.9 | < 2.02 | 1.84 | < 2.02 | 3.17 | < 2.02 | < 2.02 | < 2.02 | < 2.02 | < 2.02 | < 2.02 | < 2.02 | < 2.02 |
| 68 | 52 | JACK | JACK-MI0023256-IFPT1 | WW1811050800GSC | 11/5/2018 | 1803697 | ng/L | 16 | 2.43 | 2.7 | 2.82 | < 2.28 | < 2.28 | < 2.28 | < 2.28 | < 2.28 | < 2.28 | < 2.28 | < 2.28 | 1.87 | < 2.28 | < 2.28 | < 2.28 | 5.98 | < 2.28 | < 2.28 | < 2.28 | < 2.28 | < 2.28 | < 2.28 | < 2.28 | < 2.28 |
| 69 | 52 | JACK | JACK-MI0023256-STAND | BS1811050900GSC-A | 11/5/2018 | 1803697 | ng/L | 300 | 20.6 | 35.4 | 132 | < 24.6 | 23.9 | < 24.6 | < 24.6 | < 24.6 | < 24.6 | < 24.6 | < 24.6 | < 24.6 | < 24.6 | < 24.6 | < 24.6 | 45.1 | < 24.6 | < 24.6 | < 24.6 | < 24.6 | 19.4 | < 24.6 | < 24.6 | 23.2 |
| 70 | 53 | KZOO | KZOO-MI0023299-EFPT1 | WW1810301610GC | 10/30/2018 | 1803577 | ng/L | 86 | 11.9 | 31.8 | 18.9 | < 2.00 | 9.81 | < 2.00 | < 2.00 | < 2.00 | < 2.00 | < 2.00 | < 2.00 | 4.24 | < 2.00 | 3.49 | < 2.00 | 5.79 | < 2.00 | < 2.00 | < 2.00 | < 2.00 | < 2.00 | < 2.00 | < 2.00 | < 2.00 |
| 71 | 53 | KZOO | KZOO-MI0023299-IFPT1 | WW1810301530GC | 10/30/2018 | 1803577 | ng/L | 88 | 10.1 | 8.88 | 10.6 | 3.34 | 8.43 | 1.56 | < 2.26 | < 2.26 | < 2.26 | < 2.26 | < 2.26 | 4.87 | < 2.26 | 4.54 | < 2.26 | 26 | < 2.26 | < 2.26 | < 2.26 | < 2.26 | 9.74 | < 2.26 | < 2.26 | < 2.26 |
| 72 | 54 | SAWY | SAWY-MI0021423-EFPT1 | WW1811071045GSC | 11/7/2018 | 1803701 | ng/L | 133 | 3.97 | 12 | 15.7 | 5.88 | 10.2 | 3.66 | < 1.99 | 1.42 | < 1.99 | < 1.99 | < 1.99 | 4.51 | < 1.99 | 11.2 | < 1.99 | 62 | < 1.99 | < 1.99 | < 1.99 | < 1.99 | 2.1 | < 1.99 | < 1.99 | < 1.99 |
| 73 | 54 | SAWY | SAWY-MI0021423-IFPT1 | WW1811071150GSC | 11/7/2018 | 1803701 | ng/L | 23 | < 2.04 | 3.18 | 2.92 | < 2.04 | < 2.04 | < 2.04 | < 2.04 | < 2.04 | < 2.04 | < 2.04 | < 2.04 | < 2.04 | < 2.04 | 11.4 | < 2.04 | 5.77 | < 2.04 | < 2.04 | < 2.04 | < 2.04 | < 2.04 | < 2.04 | < 2.04 | < 2.04 |
| 74 | 54 | SAWY | SAWY-MI0021423-IFPT2 | WW1811071215GSC | 11/7/2018 | 1803701 | ng/L | 116 | 1.88 | 3.79 | 5.08 | < 2.09 | < 2.09 | < 2.09 | < 2.09 | 8.82 | < 2.09 | < 2.09 | < 2.09 | 2.34 | < 2.09 | 8.59 | < 2.09 | 81 | < 2.09 | < 2.09 | < 2.09 | < 2.09 | 4.07 | < 2.09 | < 2.09 | < 2.09 |
| 75 | 54 | SAWY | SAWY-MI0021423-STAED | BS1811071100GSC-A | 11/7/2018 | 1803701 | ng/L | 6,408 | 403 | 918 | 772 | 314 | 1000 | 558 | 70.4 | 103 | < 57.3 | < 57.3 | < 57.3 | 355 | < 57.3 | 355 | < 57.3 | 1560 | < 57.3 | < 57.3 | < 57.3 | < 57.3 | < 57.3 | < 57.3 | < 57.3 | < 57.3 |
| 76 | 54 | SAWY | SAWY-MI0021423-WACSL | SL1811071140GSC-A | 11/7/2018 | 1803701 | ng/L | 322 | 7.2 | 15.1 | 18.2 | 6.68 | 15.8 | 7.31 | 3.78 | 11 | < 2.54 | 2.52 | < 2.54 | 5.14 | < 2.54 | 15.8 | 2 | 197 | < 2.54 | < 2.54 | < 2.54 | < 2.54 | 6.07 | 4.83 | < 2.54 | 4.05 |
| 77 | 56 | LANS | LANS-MI0023400-EFPT1 | WW1811011250GSC | 11/1/2018 | 1803607 | ng/L | 107 | 8.32 | 33 | 28.6 | 3.55 | 7.58 | 2.21 | < 2.03 | < 2.03 | < 2.03 | < 2.03 | < 2.03 | 14.1 | < 2.03 | 2.76 | < 2.03 | 5.51 | < 2.03 | < 2.03 | < 2.03 | < 2.03 | 1.84 | < 2.03 | < 2.03 | < 2.03 |
| 78 | 56 | LANS | LANS-MI0023400-IFPT1 | WW1811011430GSC | 11/1/2018 | 1803607 | ng/L | 35 | 4.51 | 6.18 | 7.72 | 2.17 | 4.98 | < 2.16 | < 2.16 | < 2.16 | < 2.16 | < 2.16 | < 2.16 | < 2.16 | < 2.16 | < 2.16 | < 2.16 | < 2.16 | < 2.16 | 2.42 | < 2.16 | < 2.16 | 5.37 | < 2.16 | 1.74 | < 2.16 |
| 79 | 57 | LAPR | LAPR-MI0020460-DWCEN | BS1805091545SK-A | 5/9/2018 | 1800935 | ng/L | 1,645 | 141 | 275 | 462 | 415 | 55.7 | < 9.39 | < 9.39 | < 9.39 | < 9.39 | < 9.39 | < 9.39 | 12.1 | < 9.39 | < 9.39 | < 9.39 | 182 | < 9.39 | < 9.39 | < 9.39 | < 9.39 | 102 | < 9.39 | < 9.39 | < 9.39 |
| 80 | 57 | LAPR | LAPR-MI0020460-DWCEN | WW1805091615SK | 5/9/2018 | 1800935 | ng/L | 866 | 39.5 | 134 | 204 | 171 | < 17.0 | < 17.0 | < 17.0 | < 17.0 | < 17.0 | < 17.0 | < 17.0 | < 17.0 | < 17.0 | < 17.0 | < 17.0 | 48.4 | < 17.0 | < 17.0 | < 17.0 | < 17.0 | 269 | < 17.0 | < 17.0 | < 17.0 |
| 81 | 57 | LAPR | LAPR-MI0020460-DWDRB | WW1805091630SK | 5/9/2018 | 1800935 | ng/L | 8,686 | 294 | 959 | 1400 | 757 | 91.6 | < 17.0 | 17.1 | < 17.0 | < 17.0 | < 17.0 | < 17.0 | 18.2 | < 17.0 | 17.7 | < 17.0 | 3180 | < 17.0 | 41 | < 17.0 | < 17.0 | 1910 | < 17.0 | < 17.0 | < 17.0 |
| 82 | 57 | LAPR | LAPR-MI0020460-EFPT1 | WW1805091505SK | 5/9/2018 | 1800935 | ng/L | 374 | 29.3 | 81.4 | 90.8 | 122 | 5.03 | < 1.32 | < 1.32 | < 1.32 | < 1.32 | < 1.32 | < 1.32 | 7.46 | < 1.32 | 1.32 | < 1.32 | 28.7 | < 1.32 | < 1.32 | < 1.32 | < 1.32 | 8.13 | < 1.32 | < 1.32 | < 1.32 |
| 83 | 60 | LYON | LYON-GW1810078-EFPT1 | WW1811131505GSC | 11/13/2018 | 1803708 | ng/L | 111 | 4.78 | 53.1 | 22.6 | 2.49 | 15.4 | < 2.01 | 1.91 | < 2.01 | < 2.01 | < 2.01 | < 2.01 | 10.4 | < 2.01 | < 2.01 | < 2.01 | < 2.01 | < 2.01 | < 2.01 | < 2.01 | < 2.01 | < 2.01 | < 2.01 | < 2.01 | < 2.01 |
| 84 | 60 | LYON | LYON-GW1810078-IFPT1 | WW1811131515GSC | 11/13/2018 | 1803708 | ng/L | 8 | 2 | 2.2 | 3.3 | < 2.28 | < 2.28 | < 2.28 | < 2.28 | < 2.28 | < 2.28 | < 2.28 | < 2.28 | < 2.28 | < 2.28 | < 2.28 | < 2.28 | < 2.28 | < 2.28 | < 2.28 | < 2.28 | < 2.28 | < 2.28 | < 2.28 | < 2.28 | < 2.28 |
| 85 | 103 | MARQ | MARQ-MI0023531-EFPT1 | WW1811070915GSC | 11/7/2018 | 1803700 | ng/L | 86 | 4.16 | 22.6 | 26.2 | 1.86 | 6.56 | < 1.98 | 1.89 | < 1.98 | < 1.98 | < 1.98 | < 1.98 | 4.04 | < 1.98 | 8.16 | < 1.98 | 10.7 | < 1.98 | < 1.98 | < 1.98 | < 1.98 | < 1.98 | < 1.98 | < 1.98 | < 1.98 |
| 86 | 103 | MARQ | MARQ-MI0023531-IFPT1 | WW1811070930GSC | 11/7/2018 | 1803700 | ng/L | 39 | 2.13 | 3.43 | 4.27 | < 2.10 | 3.27 | < 2.10 | < 2.10 | < 2.10 | < 2.10 | < 2.10 | < 2.10 | 3.82 | < 2.10 | 9 | < 2.10 | 10.3 | 2.41 | < 2.10 | < 2.10 | < 2.10 | < 2.10 | < 2.10 | < 2.10 | < 2.10 |

# Table 18

## Aqueous PFAS Sample Results
## Statewide PFAS Assessment of 42 WWTPs

| Nr. | WWTP Nr. | WWTP Code | Sample Location | Sample ID | Sample Date | Report | Units | Total PFAS | PFBA | PFPeA | PFHxA | PFHpA | PFOA | PFNA | PFDA | PFUnDA | PFDoDA | PFTrDA | PFTeDA | PFBS | PFPeS | PFHxS | PFHpS | PFOS | PFNS | PFDS | FOSA | 4:2 FTSA | 6:2 FTSA | 8:2 FTSA | EtFOSAA | MeFOSAA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 87 | 105 | MIDL | MIDL-MI0023582-EFPT1 | WW1811190915GSC | 11/19/2018 | 1803772 | ng/L | 79 | 9.56 | 12.1 | 16.2 | 4.02 | 10.5 | < 2.07 | < 2.07 | < 2.07 | < 2.07 | < 2.07 | < 2.07 | 16.1 | < 2.07 | 6.51 | < 2.07 | 4.03 | < 2.07 | < 2.07 | < 2.07 | < 2.07 | < 2.07 | < 2.07 | < 2.07 | < 2.07 |
| 88 | 105 | MIDL | MIDL-MI0023582-IFPT1 | WW1811190930GSC | 11/19/2018 | 1803772 | ng/L | 70 | 8.06 | 7.22 | 10.3 | 3.64 | 10.3 | < 2.16 | < 2.16 | < 2.16 | < 2.16 | < 2.16 | < 2.16 | 16.4 | < 2.16 | 7.4 | < 2.16 | 2.72 | < 2.16 | < 2.16 | < 2.16 | < 2.16 | 1.57 | < 2.16 | 2.31 | < 2.16 |
| 89 | 64 | MONR | MONR-MI0028401-EFPT1 | WW1811201445GSC | 11/20/2018 | 1803771 | ng/L | 50 | 3.99 | 13.5 | 8.16 | 1.81 | 5.35 | < 2.02 | < 2.02 | < 2.02 | < 2.02 | < 2.02 | < 2.02 | 9.2 | < 2.02 | 2.84 | < 2.02 | 5.46 | < 2.02 | < 2.02 | < 2.02 | < 2.02 | < 2.02 | < 2.02 | < 2.02 | < 2.02 |
| 90 | 64 | MONR | MONR-MI0028401-FLISP | WW1811201500GSC | 11/20/2018 | 1803771 | ng/L | 35 | 5.47 | 7.94 | 8.1 | < 2.16 | 2.73 | < 2.16 | < 2.16 | < 2.16 | < 2.16 | < 2.16 | < 2.16 | < 2.16 | < 2.16 | 2.14 | < 2.16 | 6.22 | < 2.16 | < 2.16 | < 2.16 | < 2.16 | 1.94 | < 2.16 | < 2.16 | < 2.16 |
| 91 | 64 | MONR | MONR-MI0028401-IFPT1 | WW1811201430GSC | 11/20/2018 | 1803771 | ng/L | 33 | 3.52 | 4.5 | 5.52 | 1.5 | 2.89 | < 2.13 | < 2.13 | < 2.13 | < 2.13 | < 2.13 | < 2.13 | 4.05 | < 2.13 | 3.18 | < 2.13 | 5.5 | < 2.13 | < 2.13 | < 2.13 | < 2.13 | 2.51 | < 2.13 | < 2.13 | < 2.13 |
| 92 | 65 | MTCL | MTCL-MI0023647-EFPT1 | WW1811151215GSC | 11/15/2018 | 1803713 | ng/L | 92 | 5.42 | 34.1 | 22.6 | 2.87 | 9.03 | < 2.08 | < 2.08 | < 2.08 | < 2.08 | < 2.08 | < 2.08 | 10.9 | < 2.08 | 3.89 | < 2.08 | 3.4 | < 2.08 | < 2.08 | < 2.08 | < 2.08 | < 2.08 | < 2.08 | < 2.08 | < 2.08 |
| 93 | 65 | MTCL | MTCL-MI0023647-IFPT1 | WW1811151200GSC | 11/15/2018 | 1803713 | ng/L | 41 | 3.87 | 7.55 | 8 | 2.11 | 4.6 | < 2.07 | < 2.07 | < 2.07 | < 2.07 | < 2.07 | < 2.07 | 5.18 | < 2.07 | 4.29 | < 2.07 | 5.02 | < 2.07 | < 2.07 | < 2.07 | < 2.07 | < 2.07 | < 2.07 | < 2.07 | < 2.07 |
| 94 | 66 | MUSK | MUSK-MI0027391-EFMAC | WW1810300930GC | 10/30/2018 | 1803575 | ng/L | 55 | 4.34 | 3.23 | 8.98 | < 2.29 | 10.1 | < 2.29 | < 2.29 | < 2.29 | < 2.29 | < 2.29 | < 2.29 | 2.55 | < 2.29 | 6.07 | < 2.29 | 9.58 | < 2.29 | < 2.29 | < 2.29 | < 2.29 | 3.09 | < 2.29 | 1.95 | 5.37 |
| 95 | 66 | MUSK | MUSK-MI0027391-EFPT1 | WW1810301010GC | 10/30/2018 | 1803575 | ng/L | 125 | 10.6 | 14.2 | 22.4 | 10.4 | 31.7 | 2.04 | < 2.25 | < 2.25 | < 2.25 | < 2.25 | < 2.25 | 10.6 | < 2.25 | 6.37 | < 2.25 | 16.2 | < 2.25 | < 2.25 | < 2.25 | < 2.25 | < 2.25 | < 2.25 | < 2.25 | < 2.25 |
| 96 | 66 | MUSK | MUSK-MI0027391-ELAGN | WW1810300950GC | 10/30/2018 | 1803575 | ng/L | 234 | 12.4 | 16 | 38.4 | 9.65 | 34.3 | 11.3 | 18.6 | 1.43 | < 2.02 | < 2.02 | < 2.02 | 8.89 | < 2.02 | 6.69 | < 2.02 | 26.1 | < 2.02 | < 2.02 | < 2.02 | < 2.02 | 10.2 | < 2.02 | 14.1 | 26.3 |
| 97 | 66 | MUSK | MUSK-MI0027391-IFPT1 | WW1810300830GC | 10/30/2018 | 1803575 | ng/L | 49 | 2.94 | 4.08 | 5.13 | < 2.48 | 11.7 | < 2.48 | < 2.48 | < 2.48 | < 2.48 | < 2.48 | < 2.48 | 4.56 | 3.62 | < 2.48 | < 2.48 | 10.5 | < 2.48 | < 2.48 | < 2.48 | < 2.48 | 6.29 | < 2.48 | < 2.48 | < 2.48 |
| 98 | 66 | MUSK | MUSK-MI0027391-IFSDF | WW1810300910GC | 10/30/2018 | 1803575 | ng/L | 153 | 11.2 | 19.4 | 26.3 | 11.1 | 36.9 | 2.35 | < 2.27 | < 2.27 | < 2.27 | < 2.27 | < 2.27 | 8.18 | < 2.27 | 6.91 | < 2.27 | 24.3 | < 2.27 | < 2.27 | < 2.27 | < 2.27 | 4.38 | < 2.27 | 1.95 | < 2.27 |
| 99 | 69 | NKEN | NKEN-MI0057419-EFPT1 | WW1810290930GC | 10/29/2018 | 1803551 | ng/L | 389 | 26.6 | 182 | 121 | 9.34 | 21.2 | < 2.10 | < 2.10 | < 2.10 | < 2.10 | < 2.10 | < 2.10 | 10.4 | < 2.10 | 5.68 | < 2.10 | 12.5 | < 2.10 | < 2.10 | < 2.10 | < 2.10 | < 2.10 | < 2.10 | < 2.10 | < 2.10 |
| 100 | 69 | NKEN | NKEN-MI0057419-IFPT1 | WW1810290900GC | 10/29/2018 | 1803551 | ng/L | 80 | 6.01 | 10.5 | 10.3 | 2.93 | 11.2 | < 2.11 | < 2.11 | < 2.11 | < 2.11 | < 2.11 | < 2.11 | 4.5 | < 2.11 | < 2.11 | < 2.11 | 31.1 | < 2.11 | < 2.11 | < 2.11 | < 2.11 | < 2.11 | < 2.11 | 3.87 | < 2.11 |
| 101 | 107 | OSCO | OSCO-GW1810213-EFPT1 | WW1811091215GSC | 11/9/2018 | 1803705 | ng/L | 153 | 5.14 | 7.09 | 20.7 | 3.29 | 12.4 | 2.12 | 1.35 | < 1.96 | < 1.96 | < 1.96 | < 1.96 | 3.29 | 1.85 | 16.8 | < 1.96 | 75.8 | < 1.96 | < 1.96 | < 1.96 | < 1.96 | 1.88 | < 1.96 | < 1.96 | 1.42 |
| 102 | 107 | OSCO | OSCO-GW1810213-IFPT1 | WW1811091200GSC | 11/9/2018 | 1803705 | ng/L | 62 | 4.87 | 2.7 | 4.67 | < 2.10 | 4.42 | < 2.10 | < 2.10 | < 2.10 | < 2.10 | < 2.10 | < 2.10 | < 2.10 | < 2.10 | 7.35 | < 2.10 | 38.2 | < 2.10 | < 2.10 | < 2.10 | < 2.10 | < 2.10 | < 2.10 | < 2.10 | < 2.10 |
| 103 | 107 | OSCO | OSCO-GW1810213-MPLAG | WW1811091230GSC | 11/9/2018 | 1803705 | ng/L | 125 | < 2.06 | 4.72 | 14.4 | 2.46 | 8.77 | 1.61 | 1.43 | < 2.06 | < 2.06 | < 2.06 | < 2.06 | 2.64 | < 2.06 | 12.7 | < 2.06 | 71 | < 2.06 | < 2.06 | < 2.06 | < 2.06 | < 2.06 | < 2.06 | < 2.06 | 5.62 |
| 104 | 73 | PONT | PONT-MI0023825-EFPT1 | WW1811141410GSC | 11/14/2018 | 1803711 | ng/L | 169 | 9.03 | 22.5 | 35.3 | 7.92 | 38.1 | 2.52 | 3.25 | < 2.15 | < 2.15 | < 2.15 | < 2.15 | 4.1 | < 2.15 | 16.5 | < 2.15 | 20 | < 2.15 | < 2.15 | < 2.15 | < 2.15 | 4.86 | < 2.15 | 1.69 | 2.82 |
| 105 | 73 | PONT | PONT-MI0023825-FLBFP | WW1811141510GSC | 11/14/2018 | 1803711 | ng/L | 88 | 6.65 | 10.6 | 23.6 | 2.77 | 9.41 | < 3.25 | 3.49 | < 3.25 | < 3.25 | < 3.25 | < 3.25 | < 3.25 | < 3.25 | 3.38 | < 3.25 | 17.8 | < 3.25 | < 3.25 | < 3.25 | < 3.25 | 3.72 | < 3.25 | 3.66 | 3.19 |
| 106 | 73 | PONT | PONT-MI0023825-IFPT1 | WW1811141520GSC | 11/14/2018 | 1803711 | ng/L | 42 | 5.66 | 6.47 | 8.24 | 2.19 | 4.94 | < 2.22 | < 2.22 | < 2.22 | < 2.22 | < 2.22 | < 2.22 | 3.22 | < 2.22 | 4.03 | < 2.22 | 7.68 | < 2.22 | < 2.22 | < 2.22 | < 2.22 | < 2.22 | < 2.22 | < 2.22 | < 2.22 |
| 107 | 74 | PHUR | PHUR-MI0023833-EFPT1 | WW1811150905GSC | 11/15/2018 | 1803712 | ng/L | 336 | 28.5 | 74.6 | 92 | 30.5 | 44.8 | 2.72 | 1.65 | < 2.05 | < 2.05 | < 2.05 | < 2.05 | 39.1 | < 2.05 | 6.92 | < 2.05 | 13.1 | < 2.05 | < 2.05 | < 2.05 | < 2.05 | 2.4 | < 2.05 | < 2.05 | < 2.05 |
| 108 | 74 | PHUR | PHUR-MI0023833-IFPT1 | WW1811150840GSC | 11/15/2018 | 1803712 | ng/L | 361 | 29.1 | 84.8 | 91.8 | 37.2 | 64.6 | 3.77 | 2.39 | < 2.08 | < 2.08 | < 2.08 | < 2.08 | 16.6 | < 2.08 | 7.88 | < 2.08 | 19.5 | < 2.08 | < 2.08 | < 2.08 | < 2.08 | 1.56 | < 2.08 | < 2.08 | 1.88 |
| 109 | 74 | PHUR | PHUR-MI0023833-STALS | BS1811151015GSC-A | 11/15/2018 | 1803712 | ng/L | 980 | 51 | 121 | 161 | 38.6 | 92.1 | < 28.9 | 38 | < 28.9 | < 28.9 | < 28.9 | < 28.9 | 38.6 | < 28.9 | < 28.9 | < 28.9 | 277 | < 28.9 | < 28.9 | < 28.9 | < 28.9 | 38.9 | 37.8 | 44.1 | 42 |
| 110 | 74 | PHUR | PHUR-MI0023833-THGRA | SL1811150940GSC-A | 11/15/2018 | 1803712 | ng/L | 258 | < 129 | 125 | 133 | < 129 | < 129 | < 129 | < 129 | < 129 | < 129 | < 129 | < 129 | < 129 | < 129 | < 129 | < 129 | < 129 | < 129 | < 129 | < 129 | < 129 | < 129 | < 129 | < 129 | < 129 |
| 111 | 36 | RAGN | RAGN-MI0022977-EFPT1 | WW1811051500GSC | 11/5/2018 | 1803699 | ng/L | 74 | 7.04 | 10.7 | 23.8 | 2.41 | 7.23 | < 2.25 | < 2.25 | < 2.25 | < 2.25 | < 2.25 | < 2.25 | 14 | < 2.25 | 3.74 | < 2.25 | 4.72 | < 2.25 | < 2.25 | < 2.25 | < 2.25 | < 2.25 | < 2.25 | < 2.25 | < 2.25 |
| 112 | 36 | RAGN | RAGN-MI0022977-IFPT1 | WW1811051515GSC | 11/5/2018 | 1803699 | ng/L | 46 | 4.78 | 6.34 | 8.2 | 2.06 | 4 | < 2.17 | < 2.17 | < 2.17 | < 2.17 | < 2.17 | < 2.17 | 12.5 | < 2.17 | < 2.17 | < 2.17 | 5.22 | < 2.17 | < 2.17 | < 2.17 | < 2.17 | 2.78 | < 2.17 | < 2.17 | < 2.17 |
| 113 | 79 | SAGN | SAGI-MI0025577-EFPT1 | WW1811191630GSC | 11/19/2018 | 1803774 | ng/L | 42 | 4.53 | 8.04 | 9.93 | < 2.15 | 4.58 | < 2.15 | < 2.15 | < 2.15 | < 2.15 | < 2.15 | < 2.15 | 8.51 | < 2.15 | 2.7 | < 2.15 | 4.13 | < 2.15 | < 2.15 | < 2.15 | < 2.15 | < 2.15 | < 2.15 | < 2.15 | < 2.15 |
| 114 | 79 | SAGN | SAGI-MI0025577-IFPT1 | WW1811191500GSC | 11/19/2018 | 1803774 | ng/L | 26 | 3.08 | 3.42 | 3.55 | < 2.03 | 2.56 | < 2.03 | < 2.03 | < 2.03 | < 2.03 | < 2.03 | < 2.03 | 6.66 | < 2.03 | 2.47 | < 2.03 | 4.19 | < 2.03 | < 2.03 | < 2.03 | < 2.03 | < 2.03 | < 2.03 | < 2.03 | < 2.03 |
| 115 | 81 | SAND | SAND-MI0020222-EFPT1 | WW1811160840GSC | 11/16/2018 | 1803715 | ng/L | 154 | 31.7 | 25.7 | 48.1 | 5.94 | 8.39 | 1.44 | < 2.10 | < 2.10 | < 2.10 | < 2.10 | < 2.10 | 21.5 | < 2.10 | 4.88 | < 2.10 | 5.26 | < 2.10 | < 2.10 | < 2.10 | < 2.10 | < 2.10 | < 2.10 | < 2.10 | 1.58 |
| 116 | 81 | SAND | SAND-MI0020222-IFCMF | WW1811160825GSC | 11/16/2018 | 1803715 | ng/L | 155 | 31.8 | 24.4 | 46.4 | 4.96 | 8.37 | 1.78 | < 2.02 | < 2.02 | < 2.02 | < 2.02 | < 2.02 | 21.1 | < 2.02 | 6.14 | < 2.02 | 7.59 | < 2.02 | < 2.02 | < 2.02 | < 2.02 | < 2.02 | < 2.02 | < 2.02 | 2.11 |
| 117 | 81 | SAND | SAND-MI0020222-IFPT1 | WW1811160815GSC | 11/16/2018 | 1803715 | ng/L | 138 | 24.9 | 17.1 | 38.2 | 7.15 | 12.2 | < 2.12 | < 2.12 | < 2.12 | < 2.12 | < 2.12 | < 2.12 | 18.6 | < 2.12 | 11.8 | < 2.12 | 7.98 | < 2.12 | < 2.12 | < 2.12 | < 2.12 | < 2.12 | < 2.12 | < 2.12 | < 2.12 |
| 118 | 81 | SAND | SAND-MI0020222-STAND | BS1811160850GSC-A | 11/16/2018 | 1803715 | ng/L | 322 | 43.9 | 38.9 | 84.3 | 9.98 | 17.6 | 26.9 | < 6.39 | 5.22 | < 6.39 | < 6.39 | < 6.39 | 30.8 | < 6.39 | 13.5 | < 6.39 | 24.7 | < 6.39 | < 6.39 | < 6.39 | < 6.39 | < 6.39 | < 6.39 | 9.13 | 16.8 |
| 119 | 88 | TRAV | TRAV-MI0027481-EFPT1 | WW1811081300GSC | 11/8/2018 | 1803703 | ng/L | 154 | 4.25 | 34.6 | 74.1 | 3.42 | 20.7 | < 2.02 | 1.84 | < 2.02 | < 2.02 | < 2.02 | < 2.02 | 5.28 | < 2.02 | 3.67 | < 2.02 | 2.9 | < 2.02 | < 2.02 | < 2.02 | < 2.02 | 3.16 | < 2.02 | < 2.02 | < 2.02 |
| 120 | 88 | TRAV | TRAV-MI0027481-IFPT1 | WW1811081350GSC | 11/8/2018 | 1803703 | ng/L | 38 | 3.64 | 8.25 | 8.95 | 2.89 | 6.17 | < 2.07 | < 2.07 | < 2.07 | < 2.07 | < 2.07 | < 2.07 | 3.82 | < 2.07 | < 2.07 | < 2.07 | 4.73 | < 2.07 | < 2.07 | < 2.07 | < 2.07 | < 2.07 | < 2.07 | < 2.07 | < 2.07 |
| 121 | 90 | WARR | WARR-MI0024295-EFSDF | WW1811151545GSC | 11/15/2018 | 1803714 | ng/L | 76 | 5.07 | 19.6 | 13.7 | 2.57 | 7.21 | < 2.02 | < 2.02 | < 2.02 | < 2.02 | < 2.02 | < 2.02 | 12.7 | < 2.02 | 5.59 | < 2.02 | 7.64 | < 2.02 | < 2.02 | < 2.02 | < 2.02 | 1.54 | < 2.02 | < 2.02 | < 2.02 |
| 122 | 90 | WARR | WARR-MI0024295-EFPT1 | WW1811151600GSC | 11/15/2018 | 1803714 | ng/L | 74 | 5.31 | 19.4 | 12.9 | 2.62 | 7.19 | < 1.92 | < 1.92 | < 1.92 | < 1.92 | < 1.92 | < 1.92 | 12 | < 1.92 | 4.75 | < 1.92 | 7.48 | < 1.92 | < 1.92 | < 1.92 | < 1.92 | 1.89 | < 1.92 | < 1.92 | < 1.92 |
| 123 | 90 | WARR | WARR-MI0024295-IFPT1 | WW1811151450GSC | 11/15/2018 | 1803714 | ng/L | 59 | 3.19 | 5.6 | 6.07 | 1.82 | 4.61 | < 2.09 | < 2.09 | < 2.09 | < 2.09 | < 2.09 | < 2.09 | 11.1 | < 2.09 | 3.84 | < 2.09 | 7.31 | < 2.09 | < 2.09 | < 2.09 | < 2.09 | 15.5 | < 2.09 | < 2.09 | < 2.09 |
| 124 | 92 | WIXO | WIXO-MI0024384-EBSCT | WW1811140915GSC | 11/14/2018 | 1803709 | ng/L | 4,712 | 85.7 | 804 | 446 | 341 | 9.12 | 3.13 | < 2.05 | < 2.05 | < 2.05 | < 2.05 | < 2.05 | 13.4 | < 2.05 | 1.45 | < 2.05 | 218 | < 2.05 | < 2.05 | < 2.05 | < 2.05 | 2790 | < 2.05 | < 2.05 | < 2.05 |
| 125 | 92 | WIXO | WIXO-MI0024384-EFPT1 | WW1811140845GSC | 11/14/2018 | 1803709 | ng/L | 4,950 | 89.7 | 794 | 442 | 326 | 9.89 | 3.44 | < 2.24 | < 2.24 | < 2.24 | < 2.24 | < 2.24 | 13.1 | < 2.24 | 2.81 | < 2.24 | 269 | < 2.24 | < 2.24 | < 2.24 | < 2.24 | 3000 | < 2.24 | < 2.24 | < 2.24 |
| 126 | 92 | WIXO | WIXO-MI0024384-FLBFP | WW1811140950GSC | 11/14/2018 | 1803709 | ng/L | 13,754 | 288 | 1720 | 992 | 727 | 28.6 | 17.6 | 13.7 | 2.39 | 3.02 | < 2.48 | < 2.48 | 31.3 | < 2.48 | 3.35 | 9.86 | 8080 | 4.25 | < 2.48 | < 2.48 | < 2.48 | 1820 | 6.26 | 1.76 | 4.48 |
| 127 | 92 | WIXO | WIXO-MI0024384-IFBFP | SL1811140945GSC-A | 11/14/2018 | 1803709 | ng/L | 5,473 | 239 | 1490 | 809 | 608 | 22.6 | 8.46 | 2.51 | < 2.31 | < 2.31 | < 2.31 | < 2.31 | 24.3 | < 2.31 | 1.8 | < 2.31 | 444 | < 2.31 | < 2.31 | < 2.31 | < 2.31 | 1820 | 3.21 | < 2.31 | < 2.31 |
| 128 | 92 | WIXO | WIXO-MI0024384-IFPT1 | WW1811141000GSC | 11/14/2018 | 1803709 | ng/L | 2,329 | 20.7 | 131 | 71 | 52.6 | 3.07 | < 2.30 | < 2.30 | < 2.30 | < 2.30 | < 2.30 | < 2.30 | 4.13 | < 2.30 | 1.93 | < 2.30 | 128 | < 2.30 | < 2.30 | < 2.30 | 2.1 | 1910 | 4.89 | < 2.30 | < 2.30 |
| 129 | 92 | WIXO | WIXO-MI0024384-STACD | BS1811140830GSC-A | 11/14/2018 | 1803709 | ng/L | 32,663 | 791 | 3540 | 2870 | 1980 | 108 | 50.4 | < 63.4 | < 63.4 | < 63.4 | < 63.4 | < 63.4 | 66.2 | < 63.4 | < 63.4 | < 63.4 | 11700 | < 63.4 | < 63.4 | < 63.4 | < 63.4 | 11500 | 56.9 | < 63.4 | < 63.4 |
| 130 | 92 | WIXO | WIXO-MI0024384-WACSL | SL1811140905GSC-A | 11/14/2018 | 1803709 | ng/L | 6,437 | 130 | 995 | 588 | 535 | 24.6 | 10.3 | < 5.52 | < 5.52 | < 5.52 | < 5.52 | < 5.52 | 15 | < 5.52 | < 5.52 | < 5.52 | 555 | < 5.52 | < 5.52 | < 5.52 | < 5.52 | 3580 | 4.52 | < 5.52 | < 5.52 |
| 131 | 93 | WYOM | WYOM-MI0024392-EFPT1 | WW1810291130GC | 10/29/2018 | 1803552 | ng/L | 113 | 11.2 | 29.9 | 32.1 | 5.38 | 8.74 | < 2.11 | < 2.11 | < 2.11 | < 2.11 | < 2.11 | < 2.11 | 3.95 | < 2.11 | 4.6 | < 2.11 | 12 | < 2.11 | < 2.11 | < 2.11 | < 2.11 | 5.15 | < 2.11 | < 2.11 | < 2.11 |
| 132 | 93 | WYOM | WYOM-MI0024392-IFPT1 | WW1810291045GC | 10/29/2018 | 1803552 | ng/L | 1,208 | 5.53 | 6.23 | 9.15 | 2.39 | 5.08 | < 2.08 | < 2.08 | < 2.08 | < 2.08 | < 2.08 | < 2.08 | 3.18 | < 2.08 | < 2.08 | < 2.08 | 26.4 | < 2.08 | < 2.08 | < 2.08 | < 2.08 | 1150 | < 2.08 | < 2.08 | < 2.08 |
| 133 | 94 | YCUA | YCUA-MI0042676-EFPT1 | WW1811020900GSC | 11/2/2018 | 1803609 | ng/L | 109 | 17.8 | 17.7 | 26 | 4.37 | 12.6 | < 2.16 | 2.03 | < 2.16 | < 2.16 | < 2.16 | < 2.16 | 13.1 | < 2.16 | 6.39 | < 2.16 | 6.12 | < 2.16 | < 2.16 | < 2.16 | < 2.16 | 3.36 | < 2.16 | < 2.16 | < 2.16 |
| 134 | 94 | YCUA | YCUA-MI0042676-IFPT1 | WW1811020910GSC | 11/2/2018 | 1803609 | ng/L | 61 | 7.44 | 8.07 | 9.21 | 2.65 | 7.39 | < 2.25 | < 2.25 | < 2.25 | < 2.25 | < 2.25 | < 2.25 | 12.1 | < 2.25 | 4.56 | < 2.25 | 7.51 | < 2.25 | 2.02 | < 2.25 | < 2.25 | < 2.25 | < 2.25 | < 2.25 | < 2.25 |

**Notes:**

"**< #**" = Values Below the Detection Limit (**DL**)

- Perfluoroalkyl Carboxylic Acids (**PFCAs**)
- Perfluoroalkane Sulfonic Acids (**PFSAs**)
- Perfluoroalkane Sulfonamides (**FASAs**)
- Fluorotelomer Sulfonic Acids (**FTSAs**)
- N-Ethyl Perfluoroalkane Sulfonamidoacetic Acids (**EtFASAAs**)
- N-Methyl Perfluoroalkane Sulfonamidoacetic Acids (**MeFASAAs**)

**PFBA** = Perfluorobutanoic acid
**PFPeA** = Perfluoropentanoic acid
**PFHxA** = Perfluorohexanoic acid
**PFHpA** = Perfluoroheptanoic acid
**PFOA** = Perfluorooctanoic acid
**PFNA** = Perfluorononanoic acid

**PFDA** = Perfluorodecanoic acid
**PFUnDA** = Perfluoroundecanoic acid
**PFDoDA** = Perfluorododecanoic acid
**PFTrDA** = Perfluorotridecanoic acid
**PFTeDA** = Perfluorotetradecanoic acid
**PFBS** = Perfluorobutane sulfonic acid

**PFPeS** = Perfluoropentane sulfonic acid
**PFHxS** = Perfluorohexane sulfonic acid
**PFHpS** = Perfluoroheptane sulfonic acid
**PFOS** = Perfluorooctane sulfonic acid
**PFNS** = Perfluorononane sulfonic acid
**PFDS** = Perfluorodecane sulfonic acid

**FOSA** = Perfluorooctane sulfonamide
**4:2 FTSA** = 4:2 Fluorotelomer sulfonic acid
**6:2 FTSA** = 4:2 Fluorotelomer sulfonic acid
**8:2 FTSA** = 4:2 Fluorotelomer sulfonic acid
**EtFOSAA** = N-Ethyl perfluorooctane sulfonamidoacetic acid
**MeFOSAA** = N-Methyl perfluorooctane sulfonamidoacetic acid

# Table 19

Solids Sample Locations
Statewide PFAS Assessment of 42 WWTPs

| Nr. | WWTP Nr. | WWTP Code | Facility | Sample Location | Sample ID | Solid_Type | Solid Treatment Process | Treatment Code | Sample Description | Final Treated Solids | Disposal Methods |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 97 | ALPE | Alpena WWTP | ALPE-MI0022195-STAND | BS1811090820GSC | Biosolids | Stabilization | STAND | Sampled anaerobically digestor outflow prior to storage | Yes | Land App |
| 2 | 4 | AARB | Ann Arbor WWTP | AARB-MI0022217-STALS | BS1811021130GSC-S | Biosolids | Stabilization | STALS | Alkaline stabilized biosolids (2 days after stabilization) | Yes | Land App/Landfill |
| 3 | 6 | BCRK | Battle Creek WWTP | BCRK-MI0022276-STALS | BS1810311220GC | Biosolids | Stabilization | STALS | Alkaline stabilized biosolids (2 hours of stabilization at pH 12) | Yes | Land App/Landfill |
| 4 | 6 | BCRK | Battle Creek WWTP | BCRK-MI0022276-THCEN | SL1810311230GC | Sludge | Combined | THPST | Combined primary and secondary sludge sampled from centrifuge | No | Land App/Landfill |
| 5 | 7 | BAYC | Bay City WWTP | BAYC-MI0022284-DWISP | SL1811191330GSC | Sludge | Combined | DWPST | Dewatered combined primary and thickened secondary, effluent of screw press | Yes | Landfill |
| 6 | 7 | BAYC | Bay City WWTP | BAYC-MI0022284-IFISP | SL1811191300GSC-S | Sludge | Secondary | THPST | Combined primary and thickened secondary, influent to screw press (post-storage) | No | Landfill |
| 7 | 14 | BRON | Bronson WWTP | BRON-MI0020729-STAND | BS1810311445GC | Biosolids | Stabilization | STAND | Anaerobic stabilized biosolids | Yes | Land App/Landfill |
| 8 | 99 | COMM | Commerce Twp WWTP | COMM-MI0025071-DWBFP | SL1811141130GSC | Sludge | Combined | DWPST | Combined primary and secondary cake from BFP | Yes | Landfill |
| 9 | 23 | DELH | Delhi Twp WWTP | DELH-MI0022781-STAND | BS1811011030GSC | Biosolids | Stabilization | STAND | Anaerobic digestor effluent sample | Yes | Land App |
| 10 | 25 | DEXT | Dexter WWTP | DEXT-MI0022829-STAND | BS1811021245GSC-S | Biosolids | Stabilization | STAND | Heated, anaerobically digested biosolids sample (93 F for 30 days) | Yes | Land App/Landfill |
| 11 | 27 | DRVR | Downriver WTF | DRVR-MI0021156-DWBFP | SL1811200945GSC | Sludge | Combined | DWPST | Combined primary and secondary cake from BFP | Yes | Landfill |
| 12 | 27 | DRVR | Downriver WTF | DRVR-MI0021156-PRTSL | SL1811200915GSC | Sludge | Primary | PRTSL | Sludge from primary clarifiers | No | Landfill |
| 13 | 27 | DRVR | Downriver WTF | DRVR-MI0021156-WACSL | SL1811200900GSC | Sludge | Secondary | SCTSL | WAS from secondary clarifiers | No | Landfill |
| 14 | 101 | ELAN | East Lansing WRRF | ELAN-MI0022853-DWBFP | SL1811010800GSC | Sludge | Combined | DWPST | Combined primary and secondary sludge from BFP | Yes | Landfill |
| 15 | 32 | FLIN | Flint WWTP | FLIN-MI0022926-PSTSL | SL1811051145GSC-S | Sludge | Combined | PSTSL | Combined primary and secondary sludge from storage tank before BFP. | Yes | Landfill |
| 16 | 32 | FLIN | Flint WWTP | FLIN-MI0022926-DWBFP | SL1811051130GSC | Sludge | Combined | DWPST | Combined primary and secondary sludge from BFP after being dewatered | No | Landfill |
| 17 | 102 | GAYL | Gaylord WWTP | GAYL-GW1810128-STAED | BS1811080930GSC | Biosolids | Stabilization | STAED | Sampled from aerobic storage tanks | Yes | Land App |
| 18 | 38 | GLWA | GLWA WRRF | GLWA-MI0022802-DWBFP | SL1811161350GSC | Sludge | Combined | DWPST | Combined primary and secondary sludge sampled from BFP and centrifuge | Yes | Land App/Landfill/Incineration |
| 19 | 38 | GLWA | GLWA WRRF | GLWA-MI0022802-DSASH | SL1811161410GSC | Sludge | Disposal Ash | DSASH | Ash, 1300 deg. (F) Incinerator | No | Incinerator |
| 20 | 38 | GLWA | GLWA WRRF | GLWA-MI0022802-DSPAL | SL1811161615GSC | Sludge | Disposal Pallets | STALS | Pellets from biosolids drying facility (BDF) | Yes | Land App |
| 21 | 38 | GLWA | GLWA WRRF | GLWA-MI0022802-THPR | SL1811161450GSC-S | Sludge | Primary | THPRT | Sludge sampled from primary thickener #3 | No | Land App/Landfill/Incineration |
| 22 | 38 | GLWA | GLWA WRRF | GLWA-MI0022802-THSCT | SL1811161520GSC-S | Sludge | Secondary | THSCT | Sludge sampled from secondary thickener #12 | No | Land App/Landfill/Incineration |
| 23 | 38 | GLWA | GLWA WRRF | GLWA-MI0022802-THPST | SL1811161355GSC | Sludge | Combined | THPST | Combined primary and secondary sludge post-blending and aeration after thickening | No | Land App/Landfill/Incineration |
| 24 | 40 | GRAP | Grand Rapids WRRF | GRAP-MI0026069-DWCEN | SL1810291445GC | Sludge | Combined | THPST | Combined primary and secondary sample from effluent of thickener. Sludge sent to off-site facility for processing. | Yes | Landfill |
| 25 | 40 | GRAP | Grand Rapids WRRF | GRAP-MI0026069-PRTSL | SL1810291530GC | Sludge | Primary | PRTSL | Sludge from primary clarifier | No | Landfill |
| 26 | 40 | GRAP | Grand Rapids WRRF | GRAP-MI0026069-THCEN | SL1810291600GC | Sludge | Secondary | SCTSL | Activated sludge | No | Landfill |
| 27 | 47 | HOLL | Holland WWTP | HOLL-MI0023108-STALS | BS1810301350GC | Biosolids | Stabilization | STALS | Alkaline stabilized biosolids | Yes | Land App/Landfill |
| 28 | 49 | HOWE | Howell WWTP | HOWE-MI0021113-DWBFP | SL1811131115GSC | Sludge | Combined | DWPST | Combined primary and secondary cake from BFP | Yes | Landfill |
| 29 | 49 | HOWE | Howell WWTP | HOWE-MI0021113-PRTSL | SL1811131125GSC-S | Sludge | Primary | PRTSL | Sludge from primary clarifiers | No | Landfill |
| 30 | 77 | HURO | S Huron Valley UA WWTP | HURO-MI0043800-STALS | BS1811201145GSC | Biosolids | Stabilization | STALS | Alkaline stabilization sampled after 1 day of stabilization | Yes | Land App |
| 31 | 77 | HURO | S Huron Valley UA WWTP | HURO-MI0043800-STALS | BS1811201215GSC-S | Biosolids | Stabilization | STALS | Alkaline stabilized biosolids sampled from sludge cell (15 ft total depth) | No | Land App |
| 32 | 77 | HURO | S Huron Valley UA WWTP | HURO-MI0043800-THGRA | SL1811201130GSC-S | Sludge | Combined | THPST | Combined primary and secondary thickened sludge | No | Land App |
| 33 | 50 | IONA | Ionia WWTP | IONA-MI0021041-STAND | BS1810310830GC-S | Biosolids | Stabilization | STAND | Anaerobic stabilized biosolids | Yes | Land App |
| 34 | 52 | JACK | Jackson WWTP | JACK-MI0023256-STAND | BS1811050900GSC-S | Biosolids | Stabilization | STAND | Anaerobic digestors sampled (constantly blended, 1 week old) | Yes | Land App/Landfill |
| 35 | 52 | JACK | Jackson WWTP | JACK-MI0023256-DWDRB | BS1811050930GSC | Biosolids | Stabilization | DWAND | Sampled drying beds. No land app in last 2 years | No | Land App/Landfill |
| 36 | 53 | KZOO | Kalamazoo WWTP | KZOO-MI0023299-DWBFP | SL1810301620GC | Sludge | Combined | DWPST | Combined primary and secondary sample from BFP | Yes | Land App/Landfill |
| 37 | 53 | KZOO | Kalamazoo WWTP | KZOO-MI0023299-THPCL | SL1810301640GC | Sludge | Primary | PRTSL | Sludge from primary clarifiers | No | Land App/Landfill |
| 38 | 53 | KZOO | Kalamazoo WWTP | KZOO-MI0023299-THSCL | SL1810301650GC | Sludge | Secondary | SCTSL | Sludge from secondary clarifiers | No | Land App/Landfill |
| 39 | 54 | SAWY | KI Sawyer WWTP | SAWY-MI0021423-STAED | BS1811071100GSC-S | Biosolids | Stabilization | STAED | Aerobic stabilized biosolids (estimated 2 weeks of storage) | Yes | Land App |
| 40 | 54 | SAWY | KI Sawyer WWTP | SAWY-MI0021423-WACSL | SL1811071140GSC-S | Sludge | Secondary | SCTSL | Reactivated Sludge (RAS) taken after secondary clarifiers | No | Land App |
| 41 | 56 | LANS | Lansing WWTP | LANS-MI0023400-STALS | BS1811011400GSC | Biosolids | Stabilization | STALS | Sampled stabilized biosolids tank (2-6 months of storage) | Yes | Land App |
| 42 | 56 | LANS | Lansing WWTP | LANS-MI0023400-DWBFP | SL1811011315GSC | Sludge | Combined | DWPST | Combined primary and secondary sludge cake from BFP | Yes | Landfill |
| 43 | 57 | LAPR | Lapeer WWTP | LAPR-MI0020460-DWDRB | BS1805091705SK | Biosolids | Stabilization | STAED | Stabilized aerobically biosolids collected from drying beds. | Yes | Land App |
| 44 | 57 | LAPR | Lapeer WWTP | LAPR-MI0020460-DWCEN | BS1805091545SK-S | Biosolids | Secondary | THSCT | Thickened activate sludge | No | Land App |
| 45 | 60 | LYON | Lyon Twp WWTP | LYON-GW1810078-STAED | BS1811131545GSC | Biosolids | Stabilization | STAED | Well-mixed biosolids storage tank sampled | Yes | Land App |
| 46 | 103 | MARQ | Marquette WWTP | MARQ-MI0023531-DWBFP | BS1811070945GSC | Biosolids | Stabilization | DWAND | Anaerobic stabilized biosolids cake from BFP. | Yes | Land App |
| 47 | 105 | MIDL | Midland WWTP | MIDL-MI0023582-STAND | BS1811190945GSC | Biosolids | Stabilization | STAND | Anaerobic stabilized biosolids | Yes | Land App/Landfill |
| 48 | 64 | MONR | Monroe WWTP | MONR-MI0028401-DWISP | SL1811201510GSC | Sludge | Combined | DWPST | Combined primary and secondary sludge cake from screw-press | Yes | Landfill |
| 49 | 65 | MTCL | Mt Clemens WWTP | MTCL-MI0023647-STAED | BS1811151230GSC | Biosolids | Stabilization | STAED | Biosolids sampled from sludge tank (1 week old) | Yes | Land App |
| 50 | 66 | MUSK | Muskegon Co WWMS Metro WWTP | MUSK-MI0027391-DWDRB | SL1810301040GC | Sludge | Stabilization | STLAG | Biosolids drying beds sampled (composite sample) stabilized by lagoons | Yes | Landfill |
| 51 | 69 | NKEN | North Kent S A WWTP | NKEN-MI0057419-DWISP | SL1810290940GC | Sludge | Stabilization | DWAED | Sampled stabilized sludge from inclined screw press after aerobic digestion | Yes | Landfill |
| 52 | 107 | OSCO | Oscoda Twp WWTP Wurtsmith | OSCO-GW1810213-DWDRB | SO1811091245GSC | Soil | Soil | Soil | Sampled Soil from Rapid Infiltration Bed #8 | No | Land App |
| 53 | 73 | PONT | Clinton River WRRF - Pontiac WWTP | PONT-MI0023825-DWBFP | BS1811141455GSC | Biosolids | Stabilization | DWAND | Sludge cake from belt-filter press after anaerobic digestion | Yes | Land App/Landfill |
| 54 | 74 | PHUR | Port Huron WWTP | PHUR-MI0023833-STALS | BS1811151015GSC-S | Biosolids | Stabilization | STALS | Alkaline stabilized biosolids (estimated 2 months of storage) | Yes | Land App |
| 55 | 74 | PHUR | Port Huron WWTP | PHUR-MI0023833-THGRA | SL1811150940GSC-S | Sludge | Combined | THPST | Combined primary and secondary sludge sampled from gravity thickener, no lime and no polymer addition. | No | Land App |
| 56 | 74 | PHUR | Port Huron WWTP | PHUR-MI0023833-THRST | SL1811150945GSC | Sludge | Combined | THPST | Combined primary and secondary sludge. No lime addition, post-polymer addition influent of rotary drum thicker | No | Land App |
| 57 | 74 | PHUR | Port Huron WWTP | PHUR-MI0023833-THRST | SL1811151000GSC | Sludge | Combined | THPST | Combined primary and secondary sludge, sampled immediately after lime and polymer addition. Collected from auger | No | Land App |
| 58 | 36 | RAGN | Genesee Co-Ragnone WWTP | RAGN-MI0022977-STALS | BS1811051445GSC | Biosolids | Stabilization | STALS | Alkaline stabilized biosolids sampled immediately before transfer into truck. | Yes | Land App/Landfill |
| 59 | 79 | SAGN | Saginaw WWTP | SAGI-MI0025577-STALS | BS1811191600GSC | Biosolids | Stabilization | STALS | Anaerobic stabilized biosolids (estimated 6 month storage) | Yes | Land App |
| 60 | 79 | SAGN | Saginaw WWTP | SAGI-MI0025577-PRTSL | SL1811191515GSC | Sludge | Primary | PRTSL | Sludge sampled from primary clarifier | No | Land App |
| 61 | 79 | SAGN | Saginaw WWTP | SAGI-MI0025577-SCTSL | SL1811191530GSC | Sludge | Secondary | SCTSL | Sludge sampled from secondary clarifier | No | Land App |
| 62 | 81 | SAND | Sandusky WWTP | SAND-MI0020222-STAND | SL1811160850GSC-S | Sludge | Stabilization | STAND | Anaerobic stabilized sludge. | Yes | Landfill |
| 63 | 88 | TRAV | Traverse City WWTP | TRAV-MI0027481-STAND | BS1811081315GSC | Biosolids | Stabilization | STAND | Sampled anaerobic digestor outflow | Yes | Land App |
| 64 | 90 | WARR | Warren WWTP | WARR-MI0024295-DWBFP | SL1811151620GSC | Sludge | Combined | DWPST | Combined primary and secondary sludge influent to BFP | Yes | Incinerator |
| 65 | 90 | WARR | Warren WWTP | WARR-MI0024295-DSASH | SL1811151530GSC | Sludge | Ash | DSASH | Ash Lagoon/dry | No | Incinerator |

# Table 19

Solids Sample Locations

Statewide PFAS Assessment of 42 WWTPs

| Nr. | WWTP Nr. | WWTP Code | Facility | Sample Location | Sample ID | Solid_Type | Solid Treatment Process | Treatment Code | Sample Description | Final Treated Solids | Disposal Methods |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 66 | 92 | WIXO | Wixom WWTP | WIXO-MI0024384-DWBFP | SL1811140930GSC | Sludge | Secondary | DWSCT | Dewatered final treated solids from screw press and polymer addition. No primary sludge generated at Wixom. | Yes | Land App/Landfill |
| 67 | 92 | WIXO | Wixom WWTP | WIXO-MI0024384-IFBFP | SL1811140945GSC-S | Sludge | Secondary | SCTSL | Secondary influent to screw press with no polymer. No primary sludge generated at Wixom. | No | Land App/Landfill |
| 68 | 92 | WIXO | Wixom WWTP | WIXO-MI0024384-STAED | BS1811140830GSC-S | Biosolids | Stabilization | STAED | Aerobic stabilized biosolids (estimated 6 months of storage) | Yes | Land App/Landfill |
| 69 | 92 | WIXO | Wixom WWTP | WIXO-MI0024384-WACSL | SL1811140905GS | Sludge | Secondary | SCTSL | Waste activated sludge (WAS) sampled prior to biological sludge storage | No | Land App/Landfill |
| 70 | 93 | WYOM | Wyoming WWTP | WYOM-MI0024392-STALS | BS1810291030GC | Biosolids | Stabilization | STALS | Alkaline stabilized biosolids after thickening by centrifugation. | Yes | Land App/Landfill |
| 71 | 94 | YCUA | YCUA Regional WWTP | YCUA-MI0042676-DWBFP | SL1811020930GSC | Sludge | Combined | DWPST | Combined primary and secondary sample from gravity belt prior to incineration | Yes | Incinerator/Landfill |

**Legend:**

| Solid Treatment Process | Treatment Code | Treatment Process Description |
|---|---|---|
| Primary | PRTSL | Primary treatment sludge |
| Primary | THPRT | Primary treatment thickened sludge |
| Secondary | SCTSL | Secondary treatment sludge |
| Secondary | THSCT | Secondary treatment thickened sludge |
| Secondary | DWSCT | Dewatered secondary treatment sludge. |
| Combined | PSTSL | Primary and secondary treatment combined sludge |
| Combined | THPST | Primary and secondary treatment thickened sludge |
| Combined | DWPST | Dewatered primary and secondary treatment |
| Combined | DWPST | Dewatered primary and secondary treatment |

| Solid Treatment Process | Treatment Code | Treatment Process Description |
|---|---|---|
| Stabilized - Alkaline | STALS | Alkaline stabilized biosolids |
| Stabilized-Anaerobically | STAND | Anaerobically stabilized biosolids |
| Stabilized-Anaerobically | DWAND | Dewatered anaerobically stabilized biosolids |
| Stabilized - Aerobically | STAED | Aerobically stabilized biosolids. |
| Stabilized - Aerobically | DWAED | Dewatered aerobically stabilized biosolids |
| Stabilized - Lagoon | STLAG | Stabilized biosolids in lagoons |
| Incineration - ASH | DSASH | Ash from Incineration |
| Soil | SOIL | Soil impacted with irrigation wastewater rapid infiltration beds |

**Land Application Group:** Final treated solids from WWTPs that today are considered either biosolids or sludge that might be applied on agricultural fields or have been applied in the past.

# Table 20
## Solids PFAS Sample Results
## Statewide PFAS Assessment of 42 WWTPs

| Nr. | WWTP Nr. | WWTP Code | Sample Location | Sample ID | Sample Date | Report | Units | Total PFAS | PFBA | PFPeA | PFHxA | PFHpA | PFOA | PFNA | PFDA | PFUnDA | PFDoDA | PFTrDA | PFTeDA | PFBS | PFPeS | PFHxS | PFHpS | PFOS | PFNS | PFDS | FOSA | 4:2 FTSA | 6:2 FTSA | 8:2 FTSA | EtFOSAA | MeFOSAA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 97 | ALPE | ALPE-MI0022195-STAND | BS1811090820GSC | 11/9/2018 | 1803704 | µg/Kg | 137 | < 0.863 | < 0.863 | 1.86 | < 0.863 | 1.36 | 1.27 | 11.1 | 2.72 | 5.8 | 0.767 | 1.38 | < 0.863 | < 0.863 | < 0.863 | < 0.863 | 42.1 | < 1.29 | 1.46 | 7.96 | < 0.863 | < 0.863 | 2.64 | 18.2 | 37.9 |
| 2 | 4 | AARB | AARB-MI0022217-STALS | BS1811021130GSC-S | 11/2/2018 | 1803610 | µg/Kg | 27 | < 0.801 | < 0.801 | 1.31 | < 0.801 | < 0.801 | < 0.801 | 1.33 | < 0.801 | 1.05 | < 0.801 | < 0.801 | < 0.801 | < 0.801 | < 0.801 | < 0.801 | 15.2 | < 1.20 | < 0.801 | < 0.801 | < 0.801 | < 0.801 | < 0.801 | 1.92 | 6.66 |
| 3 | 6 | BCRK | BCRK-MI0022276-STALS | BS1810311220GC | 10/31/2018 | 1803581 | µg/Kg | 8 | < 0.965 | < 0.965 | 1.94 | < 0.965 | < 0.965 | 0.935 | < 0.965 | 0.937 | < 0.965 | < 0.965 | 0.886 | < 0.965 | < 0.965 | < 0.965 | < 0.965 | < 0.965 | < 1.45 | < 0.965 | < 0.965 | < 0.965 | < 0.965 | < 0.965 | 1.81 | 1.86 |
| 4 | 6 | BCRK | BCRK-MI0022276-THCEN | SL1810311230GC | 10/31/2018 | 1803581 | µg/Kg | 16 | < 0.995 | < 0.995 | 1.45 | < 0.995 | < 0.995 | 1.06 | 1.05 | 1.02 | 0.999 | < 0.995 | < 0.995 | < 0.995 | < 0.995 | < 0.995 | < 0.995 | 3.18 | < 1.49 | 0.844 | < 0.995 | < 0.995 | < 0.995 | < 0.995 | 2.76 | 3.41 |
| 5 | 7 | BAYC | BAYC-MI0022284-DWISP | SL1811191330GSC | 11/19/2018 | 1803773 | µg/Kg | 18 | < 0.934 | < 0.934 | < 0.934 | < 0.934 | < 0.934 | < 0.934 | < 0.934 | < 0.934 | 1.15 | < 0.934 | < 0.934 | < 0.934 | 1.86 | < 0.934 | < 0.934 | 8.95 | < 1.40 | 0.91 | < 0.934 | < 0.934 | < 0.934 | < 0.934 | 2.5 | 2.41 |
| 6 | 7 | BAYC | BAYC-MI0022284-IFISP | SL1811191300GSC-S | 11/19/2018 | 1803773 | µg/Kg | 16 | < 0.691 | < 0.691 | < 0.691 | < 0.691 | < 0.691 | < 0.691 | < 0.691 | < 0.691 | 1.14 | < 0.691 | < 0.691 | < 0.691 | < 0.691 | < 0.691 | < 0.691 | 7.16 | < 1.04 | 3.14 | < 0.691 | < 0.691 | < 0.691 | < 0.691 | 2.15 | 1.94 |
| 7 | 14 | BRON | BRON-MI0020729-STAND | BS1810311445GC | 10/31/2018 | 1803576 | µg/Kg | 1,173 | 1.66 | 4.07 | 7.91 | 0.885 | 3.86 | 1.18 | 13.3 | 1.97 | 7.97 | < 0.981 | 1.94 | 1.32 | < 0.981 | < 0.981 | < 0.981 | 1060 | < 1.47 | 17.6 | 5.03 | < 0.981 | 8.17 | 3.21 | 8.26 | 24.7 |
| 8 | 99 | COMM | COMM-MI0025071-DWBFP | SL1811141130GSC | 11/14/2018 | 1803710 | µg/Kg | 102 | 2.15 | 10.4 | 10.7 | 1.15 | 14.1 | 1.92 | 18.9 | 1.9 | 4.85 | 0.934 | 1.54 | 6.14 | < 0.987 | < 0.987 | < 0.987 | 12.7 | < 1.48 | 1.83 | 2.02 | < 0.987 | < 0.987 | < 0.987 | 2.96 | 8.12 |
| 9 | 23 | DELH | DELH-MI0022781-STAND | SL1811011030GSC | 11/1/2018 | 1803608 | µg/Kg | 34 | < 1.00 | < 1.00 | 0.916 | < 1.00 | < 1.00 | < 1.00 | 1.08 | < 1.00 | 1.43 | < 1.00 | < 1.00 | 13 | < 1.00 | < 1.00 | < 1.00 | 2.68 | < 1.50 | 2.08 | < 1.00 | < 1.00 | < 1.00 | < 1.00 | 4.92 | 7.98 |
| 10 | 25 | DEXT | DEXT-MI0022829-STAND | BS1811021245GSC-S | 11/2/2018 | 1803611 | µg/Kg | 59 | < 0.944 | < 0.944 | 3.88 | < 0.944 | < 0.944 | 1.3 | 5.32 | 1.91 | 4.74 | < 0.944 | 1.43 | < 0.944 | < 0.944 | < 0.944 | < 0.944 | 5.95 | < 1.42 | 11.1 | 2.5 | < 0.944 | < 0.944 | < 0.944 | 6.77 | 14.1 |
| 11 | 27 | DRVR | DRVR-MI0021156-DWBFP | SL1811200945GSC | 11/20/2018 | 1803767 | µg/Kg | 82 | < 0.980 | 3.49 | 3.34 | < 0.980 | 3.94 | < 0.980 | 7.65 | 1.32 | 3.53 | < 0.980 | 0.923 | < 0.980 | < 0.980 | 1.3 | < 0.980 | 42.5 | < 1.47 | 1.55 | < 0.980 | < 0.980 | < 0.980 | 1.83 | 4.25 | 6.84 |
| 12 | 27 | DRVR | DRVR-MI0021156-PRTSL | SL1811200915GSC | 11/20/2018 | 1803767 | µg/Kg | 46 | < 0.903 | < 0.903 | 0.828 | < 0.903 | < 0.903 | < 0.903 | 3.83 | 1.07 | 3.08 | < 0.903 | 0.78 | < 0.903 | < 0.903 | < 0.903 | < 0.903 | 27.8 | < 1.35 | 1.57 | < 0.903 | < 0.903 | < 0.903 | 1.12 | 2.72 | 3.47 |
| 13 | 27 | DRVR | DRVR-MI0021156-WACSL | SL1811200900GSC | 11/20/2018 | 1803767 | µg/Kg | 72 | < 0.951 | < 0.951 | 1.37 | < 0.951 | 1.88 | < 0.951 | 7.51 | 1.35 | 3.1 | < 0.951 | 0.948 | < 0.951 | < 0.951 | 1.35 | < 0.951 | 41 | < 1.43 | < 0.951 | < 0.951 | < 0.951 | 0.922 | 2.28 | 4.07 | 5.81 |
| 14 | 101 | ELAN | ELAN-MI0022853-DWBFP | SL1811010800GSC | 11/1/2018 | 1803606 | µg/Kg | 21 | < 0.997 | < 0.997 | 2.24 | < 0.997 | 0.886 | < 0.997 | 2.26 | < 0.997 | 1.08 | < 0.997 | < 0.997 | < 0.997 | < 0.997 | < 0.997 | < 0.997 | 4.94 | < 1.50 | 1.26 | < 0.997 | < 0.997 | < 0.997 | < 0.997 | 3.3 | 4.98 |
| 15 | 32 | FLIN | FLIN-MI0022926-PSTSL | SL1811051145GSC-S | 11/5/2018 | 1803698 | µg/Kg | 39 | < 0.946 | < 0.946 | < 0.946 | < 0.946 | < 0.946 | < 0.946 | 0.929 | 1.99 | 2.03 | < 0.946 | 0.895 | < 0.946 | < 0.946 | 1.88 | < 0.946 | 11.6 | < 1.42 | 13.2 | < 0.946 | < 0.946 | < 0.946 | < 0.946 | 3.17 | 3.27 |
| 16 | 32 | FLIN | FLIN-MI0022926-DWBFP | SL1811051130GSC | 11/5/2018 | 1803698 | µg/Kg | 44 | < 0.976 | < 0.976 | 0.905 | < 0.976 | < 0.976 | < 0.976 | 1.09 | 2.24 | 2.41 | < 0.976 | 0.928 | < 0.976 | < 0.976 | < 0.976 | < 0.976 | 13.5 | < 1.46 | 14.8 | 0.83 | < 0.976 | 1.05 | < 0.976 | 3.38 | 3.32 |
| 17 | 102 | GAYL | GAYL-GW1810128-STAED | BS1811080930GSC | 11/8/2018 | 1803702 | µg/Kg | 215 | 5.95 | 21.5 | 28.4 | 2.55 | 17.7 | 3.89 | 19.7 | 1.88 | 5.08 | < 1.00 | 1.97 | 22.2 | < 1.00 | 0.974 | < 1.00 | 55 | < 1.50 | < 1.00 | 9.72 | < 1.00 | 1.82 | 1.24 | 5.14 | 9.81 |
| 18 | 38 | GLWA | GLWA-MI0022802-DWBFP | SL1811161350GSC | 11/16/2018 | 1803716 | µg/Kg | 14 | < 0.958 | < 0.958 | < 0.958 | < 0.958 | < 0.958 | < 0.958 | < 0.958 | < 0.958 | < 0.958 | < 0.958 | < 0.958 | < 0.958 | < 0.958 | < 0.958 | < 0.958 | 7.07 | < 1.44 | < 0.958 | < 0.958 | < 0.958 | 3.8 | < 0.958 | 1.93 | 1.4 |
| 19 | 38 | GLWA | GLWA-MI0022802-DSASH | SL1811161410GSC | 11/16/2018 | 1803716 | µg/Kg | ND | < 0.870 | < 0.870 | < 0.870 | < 0.870 | < 0.870 | < 0.870 | < 0.870 | < 0.870 | < 0.870 | < 0.870 | < 0.870 | < 0.870 | < 0.870 | < 0.870 | < 0.870 | < 0.870 | < 1.30 | < 0.870 | < 0.870 | < 0.870 | < 0.870 | < 0.870 | < 0.870 | < 0.870 |
| 20 | 38 | GLWA | GLWA-MI0022802-DSPAL | SL1811161615GSC | 11/16/2018 | 1803716 | µg/Kg | 19 | < 0.875 | < 0.875 | 1.46 | < 0.875 | 1.12 | < 0.875 | 0.776 | < 0.875 | 0.953 | < 0.875 | < 0.875 | < 0.875 | < 0.875 | < 0.875 | < 0.875 | 9.44 | < 1.31 | 1.15 | < 0.875 | < 0.875 | < 0.875 | < 0.875 | 2.13 | 1.53 |
| 21 | 38 | GLWA | GLWA-MI0022802-THPR | SL1811161450GSC-S | 11/16/2018 | 1803716 | µg/Kg | 9 | < 0.919 | < 0.919 | < 0.919 | < 0.919 | < 0.919 | < 0.919 | < 0.919 | < 0.919 | < 0.919 | < 0.919 | < 0.919 | < 0.919 | < 0.919 | < 0.919 | < 0.919 | 4.7 | < 1.38 | 1.11 | < 0.919 | < 0.919 | 2.27 | < 0.919 | 1.4 | < 0.919 |
| 22 | 38 | GLWA | GLWA-MI0022802-THSCT | SL1811161520GSC-S | 11/16/2018 | 1803716 | µg/Kg | 53 | < 0.957 | < 0.957 | 0.938 | < 0.957 | 1.12 | < 0.957 | 1.3 | < 0.957 | 1.44 | < 0.957 | 0.811 | < 0.957 | < 0.957 | < 0.957 | < 0.957 | 20.7 | < 1.44 | 0.908 | < 0.957 | < 0.957 | 14.1 | 1.17 | 5.69 | 4.52 |
| 23 | 38 | GLWA | GLWA-MI0022802-THPST | SL1811161355GSC | 11/16/2018 | 1803716 | µg/Kg | 16 | < 0.975 | < 0.975 | < 0.975 | < 0.975 | < 0.975 | < 0.975 | < 0.975 | < 0.975 | < 0.975 | < 0.975 | < 0.975 | < 0.975 | < 0.975 | < 0.975 | < 0.975 | 6.61 | < 1.46 | 2.1 | < 0.975 | < 0.975 | 4.36 | < 0.975 | 1.55 | 1.06 |
| 24 | 40 | GRAP | GRAP-MI0026069-DWCEN | SL1810291445GC | 10/29/2018 | 1803553 | µg/Kg | 74 | < 1.00 | < 1.00 | 3.52 | < 1.00 | 0.922 | < 1.00 | 1.67 | < 1.00 | 1 | < 1.00 | < 1.00 | < 1.00 | < 1.00 | < 1.00 | < 1.00 | 21.8 | < 1.50 | < 1.00 | < 1.00 | < 1.00 | 29.4 | 1.63 | 7.03 | 7.13 |
| 25 | 40 | GRAP | GRAP-MI0026069-PRTSL | SL1810291530GC | 10/29/2018 | 1803553 | µg/Kg | 162 | < 0.981 | 1.04 | 1.85 | < 0.981 | 8.34 | < 0.981 | < 0.981 | < 0.981 | < 0.981 | < 0.981 | < 0.981 | < 0.981 | < 0.981 | < 0.981 | < 0.981 | 25.9 | < 1.47 | < 0.981 | < 0.981 | < 0.981 | 114 | 2.17 | 4.43 | 4.75 |
| 26 | 40 | GRAP | GRAP-MI0026069-THCEN | SL1810291600GC | 10/29/2018 | 1803553 | µg/Kg | 155 | 3 | 29.7 | 24.1 | 1.69 | 3.87 | < 1.24 | 4.78 | < 1.24 | 2.51 | < 1.24 | < 1.24 | 2.72 | < 1.24 | < 1.24 | < 1.24 | 43.6 | < 1.85 | < 1.24 | < 1.24 | < 1.24 | 6.23 | 2.76 | 13.9 | 15.8 |
| 27 | 47 | HOLL | HOLL-MI0023108-STALS | BS1810301350GC | 10/30/2018 | 1803578 | µg/Kg | 22 | < 0.988 | < 0.988 | 3.02 | < 0.988 | < 0.988 | < 0.988 | < 0.988 | < 0.988 | < 0.988 | < 0.988 | < 0.988 | < 0.988 | < 0.988 | < 0.988 | < 0.988 | 5.89 | < 1.48 | < 0.988 | < 0.988 | < 0.988 | 7.61 | < 0.988 | 1.84 | 3.8 |
| 28 | 49 | HOWE | HOWE-MI0021113-DWBFP | SL1811131115GSC | 11/13/2018 | 1803707 | µg/Kg | 52 | < 0.979 | 1.07 | 3.37 | < 0.979 | 1.67 | < 0.979 | 5.13 | 1.1 | 2.77 | < 0.979 | < 0.979 | < 0.979 | < 0.979 | 2.09 | < 0.979 | 21 | < 1.47 | 1.92 | 1.24 | < 0.979 | 3.09 | < 0.979 | 3.13 | 4.69 |
| 29 | 49 | HOWE | HOWE-MI0021113-PRTSL | SL1811131125GSC-S | 11/13/2018 | 1803707 | µg/Kg | 10 | < 0.653 | < 0.653 | < 0.653 | < 0.653 | < 0.653 | < 0.653 | 1.19 | < 0.653 | 0.593 | < 0.653 | < 0.653 | < 0.653 | < 0.653 | < 0.653 | < 0.653 | 5.24 | < 0.980 | 0.982 | < 0.653 | < 0.653 | < 0.653 | < 0.653 | 0.813 | 0.789 |
| 30 | 77 | HURO | HURO-MI0043800-STALS | BS1811201145GSC | 11/20/2018 | 1803768 | µg/Kg | 75 | 9.29 | < 0.987 | 1.45 | < 0.987 | 2.46 | < 0.987 | 3.95 | 1.86 | 7.06 | 1.16 | 1.94 | 18.3 | < 0.987 | < 0.987 | < 0.987 | < 0.987 | < 1.48 | < 0.987 | < 0.987 | < 0.987 | 2.5 | < 0.987 | 11.1 | 14.2 |
| 31 | 77 | HURO | HURO-MI0043800-STALS | BS1811201215GSC-S | 11/20/2018 | 1803768 | µg/Kg | 32 | 2.67 | < 0.761 | 0.828 | < 0.761 | 0.913 | < 0.761 | 1.48 | 0.711 | 1.65 | < 0.761 | < 0.761 | < 0.761 | < 0.761 | < 0.761 | < 0.761 | 8.47 | < 1.14 | 5.19 | < 0.761 | < 0.761 | < 0.761 | < 0.761 | 4.26 | 6.2 |
| 32 | 77 | HURO | HURO-MI0043800-THGRA | SL1811201130GSC-S | 11/20/2018 | 1803768 | µg/Kg | 50 | 10.1 | 0.782 | 1.18 | < 0.904 | 1.09 | < 0.904 | 2.28 | 1.29 | 4.62 | < 0.904 | 1.36 | 3.76 | < 0.904 | < 0.904 | < 0.904 | 7.05 | < 1.36 | 3.34 | < 0.904 | < 0.904 | 1.14 | < 0.904 | 5.75 | 6.33 |
| 33 | 50 | IONA | IONA-MI0021041-STAND | BS1810310830GC-S | 10/31/2018 | 1803583 | µg/Kg | 1,006 | < 0.990 | < 0.990 | 4.36 | < 0.990 | < 0.990 | < 0.990 | < 0.990 | < 0.990 | < 0.990 | < 0.990 | < 0.990 | < 0.990 | < 0.990 | < 0.990 | < 0.990 | 983 | < 1.49 | 6.91 | < 0.990 | < 0.990 | 2,050 | 136 | 4.44 | 7.07 |
| 34 | 52 | JACK | JACK-MI0023256-STAND | BS1811050900GSC-S | 11/5/2018 | 1803697 | µg/Kg | 88 | < 0.928 | < 0.928 | 2.54 | < 0.928 | 0.797 | 0.907 | 5.64 | 1.66 | 4.26 | < 0.928 | 1.74 | < 0.928 | < 0.928 | < 0.928 | < 0.928 | 19.5 | < 1.39 | 5.3 | 3.99 | < 0.928 | < 0.928 | < 0.928 | 10.3 | 31.2 |
| 35 | 52 | JACK | JACK-MI0023256-DWDRB | BS1811050930GSC | 11/5/2018 | 1803697 | µg/Kg | 155 | < 0.713 | < 0.713 | 3.07 | 0.805 | 4.41 | 2.01 | 8.17 | 2.25 | 4.73 | 0.884 | 1.63 | < 0.713 | < 0.713 | < 0.713 | < 0.713 | 90.6 | < 1.07 | 2.04 | 2.85 | < 0.713 | 0.765 | 2.25 | 7.48 | 21.2 |
| 36 | 53 | KZOO | KZOO-MI0023299-DWBFP | BS1810301620GC | 10/30/2018 | 1803577 | µg/Kg | 18 | < 1.00 | 4.79 | < 1.00 | < 1.00 | < 1.00 | < 1.00 | 1.28 | < 1.00 | < 1.00 | < 1.00 | < 1.00 | < 1.00 | < 1.00 | < 1.00 | < 1.00 | 6.49 | < 1.50 | < 1.00 | < 1.00 | < 1.00 | < 1.00 | < 1.00 | 2.18 | 2.94 |
| 37 | 53 | KZOO | KZOO-MI0023299-THPCL | SL1810301640GC | 10/30/2018 | 1803577 | µg/Kg | 5 | < 1.00 | < 1.00 | < 1.00 | < 1.00 | < 1.00 | < 1.00 | < 1.00 | < 1.00 | < 1.00 | < 1.00 | < 1.00 | < 1.00 | < 1.00 | < 1.00 | < 1.00 | 3.04 | < 1.50 | < 1.00 | < 1.00 | < 1.00 | < 1.00 | < 1.00 | 1.18 | 0.945 |
| 38 | 53 | KZOO | KZOO-MI0023299-THSCL | SL1810301650GC | 10/30/2018 | 1803577 | µg/Kg | 33 | < 0.944 | < 0.944 | 1.32 | < 0.944 | 1.81 | 0.981 | 3.11 | < 0.944 | 0.92 | < 0.944 | < 0.944 | < 0.944 | < 0.944 | < 0.944 | < 0.944 | 15.2 | < 1.42 | < 0.944 | < 0.944 | < 0.944 | < 0.944 | < 0.944 | 3.69 | 6.21 |
| 39 | 54 | SAWY | SAWY-MI0021423-STAED | BS1811071100GSC-S | 11/7/2018 | 1803701 | µg/Kg | 662 | 2.18 | 5.28 | 5.34 | 3.56 | 25.4 | 39.9 | 19.7 | 78 | 5.85 | 25.6 | 1.79 | 3 | < 0.626 | 11 | 2.87 | 387 | 0.981 | 7.65 | 10.9 | < 0.626 | 1.02 | 3.49 | 5.74 | 15.6 |
| 40 | 54 | SAWY | SAWY-MI0021423-WACSL | SL1811071140GSC-S | 11/7/2018 | 1803701 | µg/Kg | 211 | < 0.990 | < 0.990 | < 0.990 | < 0.990 | < 0.990 | 1.27 | 2.97 | 37.2 | 1.28 | 14.7 | < 0.990 | < 0.990 | < 0.990 | 0.856 | < 0.990 | 133 | < 1.48 | < 0.990 | 4.02 | < 0.990 | < 0.990 | 2.82 | 3.88 | 9.31 |
| 41 | 56 | LANS | LANMI0023400-STALS | BS1811011400GSC | 11/1/2018 | 1803607 | µg/Kg | 28 | < 0.998 | < 0.998 | 1.56 | < 0.998 | < 0.998 | < 0.998 | 3.03 | 1.51 | 3.04 | < 0.998 | < 0.998 | < 0.998 | < 0.998 | < 0.998 | < 0.998 | 5.08 | < 1.50 | < 0.998 | 1.46 | < 0.998 | < 0.998 | < 0.998 | 4.42 | 7.65 |
| 42 | 56 | LANS | LANMI0023400-DWBFP | SL1811011315GSC | 11/1/2018 | 1803607 | µg/Kg | 40 | < 1.00 | < 1.00 | 10.4 | < 1.00 | < 1.00 | < 1.00 | 2.58 | 1.51 | 2.44 | < 1.00 | < 1.00 | < 1.00 | < 1.00 | < 1.00 | < 1.00 | 7.18 | < 1.50 | 1.81 | 1.77 | < 1.00 | < 1.00 | 1.67 | 3.35 | 7.47 |
| 43 | 57 | LAPR | LAPR-MI0020460-DWDRB | BS1805091705SK | 5/9/2018 | 1800935 | µg/Kg | 2,358 | 8.73 | 26 | 48 | 14.8 | < 5.58 | < 5.58 | < 5.58 | < 5.58 | < 5.58 | < 5.58 | < 5.58 | < 5.58 | < 5.58 | < 5.58 | < 5.58 | 1680 | < 9.45 | < 5.58 | < 5.58 | < 5.58 | 562 | 8.51 | < 5.58 | 9.86 |
| 44 | 57 | LAPR | LAPR-MI0020460-DWCEN | BS1805091545SK-S | 5/9/2018 | 1800935 | µg/Kg | 217 | < 3.51 | 5.82 | 13.2 | 15.4 | 4.34 | < 3.51 | 3.94 | < 3.51 | < 3.51 | < 3.51 | < 3.51 | < 3.51 | < 3.51 | < 3.51 | < 3.51 | 161 | < 5.95 | < 3.51 | < 3.51 | < 3.51 | 7.41 | < 3.51 | < 3.51 | 5.89 |
| 45 | 60 | LYON | LYON-GW1810078-STAED | BS1811131545GSC | 11/13/2018 | 1803708 | µg/Kg | 133 | 2.26 | 7.59 | 4.6 | < 0.955 | 25.1 | 2.62 | 47.7 | 1.66 | 11.7 | < 0.955 | 3.22 | 8.12 | < 0.955 | < 0.955 | < 0.955 | 6.35 | < 1.43 | < 0.955 | 1.34 | < 0.955 | < 0.955 | < 0.955 | 3.74 | 6.77 |
| 46 | 103 | MARQ | MARQ-MI0023531-DWBFP | BS1811070945GSC | 11/7/2018 | 1803700 | µg/Kg | 104 | < 0.997 | 1.55 | 9.58 | < 0.997 | 2.72 | 2.46 | 7.1 | 2.53 | 3 | < 0.997 | 1.09 | < 0.997 | < 0.997 | < 0.997 | < 0.997 | 43 | < 1.50 | 4.27 | 3.85 | < 0.997 | < 0.997 | < 0.997 | 7.52 | 15.5 |
| 47 | 105 | MIDL | MIDL-MI0023582-STAND | BS1811190945GSC | 11/19/2018 | 1803772 | µg/Kg | 92 | < 0.840 | < 0.840 | 3.6 | < 0.840 | 1.93 | 1.37 | 6.15 | 1.19 | 3.18 | < 0.840 | 1.56 | < 0.840 | < 0.840 | < 0.840 | < 0.840 | 12.7 | < 1.26 | 6.22 | 2.32 | < 0.840 | < 0.840 | 1.09 | 12.8 | 37.5 |
| 48 | 64 | MONR | MONR-MI0028401-DWISP | SL1811201510GSC | 11/20/2018 | 1803771 | µg/Kg | 34 | < 0.958 | 1.39 | < 0.958 | < 0.958 | < 0.958 | < 0.958 | 2.48 | 1.27 | 2.05 | < 0.958 | < 0.958 | < 0.958 | < 0.958 | < 0.958 | < 0.958 | 10.9 | < 1.44 | 3.16 | 1.35 | < 0.958 | < 0.958 | < 0.958 | 5.29 | 5.65 |
| 49 | 65 | MTCL | MTCL-MI0023647-STAED | BS1811151230GSC | 11/15/2018 | 1803713 | µg/Kg | 95 | < 0.998 | 1.49 | 1.96 | < 0.998 | 6.43 | 1.85 | 12.3 | 1.87 | 3.91 | < 0.998 | 1.3 | < 0.998 | < 0.998 | < 0.998 | < 0.998 | 24.7 | < 1.50 | 2.5 | 5.23 | < 0.998 | < 0.998 | < 0.998 | 14.7 | 16.4 |
| 50 | 66 | MUSK | MUSK-MI0027391-DWDRB | SL1810301040GC | 10/30/2018 | 1803575 | µg/Kg | 87 | < 0.994 | < 0.994 | 0.867 | 1.36 | 8.42 | 4.46 | 8.74 | 2.75 | 2.62 | < 0.994 | < 0.994 | < 0.994 | < 0.994 | < 0.994 | < 0.994 | 11.3 | < 1.49 | 3.1 | < 0.994 | < 0.994 | < 0.994 | 2.51 | 13.4 | 27.1 |
| 51 | 69 | NKEN | NKEN-MI0057419-DWISP | SL1810290940GC | 10/29/2018 | 1803551 | µg/Kg | 332 | 8.1 | 41.9 | 24.2 | < 1.74 | 11 | 1.93 | 12.3 | < 1.74 | 3.27 | < 1.74 | < 1.74 | 6.82 | < 1.74 | < 1.74 | < 1.74 | 160 | < 2.61 | < 1.74 | 4.77 | < 1.74 | < 1.74 | < 1.74 | 37 | 21.2 |
| 52 | 107 | OSCO | OSCO-GW1810213-DWDRB | SO1811091245GSC | 11/9/2018 | 1803705 | µg/Kg | 6 | < 0.994 | < 0.994 | < 0.994 | < 0.994 | < 0.994 | < 0.994 | < 0.994 | < 0.994 | < 0.994 | < 0.994 | < 0.994 | < 0.994 | < 0.994 | < 0.994 | < 0.994 | 2.93 | < 1.49 | < 0.994 | < 0.994 | < 0.994 | 2.98 | < 0.994 | < 0.994 | < 0.994 |
| 53 | 73 | PONT | PONT-MI0023825-DWBFP | BS1811141455GSC | 11/14/2018 | 1803711 | µg/Kg | 29 | < 1.00 | < 1.00 | 1.13 | < 1.00 | < 1.00 | < 1.00 | 2.17 | < 1.00 | 1.43 | < 1.00 | < 1.00 | < 1.00 | < 1.00 | < 1.00 | < 1.00 | 7.31 | < 1.50 | 2.73 | 1.68 | < 1.00 | < 1.00 | < 1.00 | 7.61 | 5.29 |
| 54 | 74 | PHUR | PHUR-MI0023833-STALS | BS1811151015GSC-S | 11/15/2018 | 1803712 | µg/Kg | 196 | < 0.918 | 0.918 | 1.64 | 0.877 | 4.42 | 2.88 | 12.5 | 7.09 | 4.39 | 1.31 | 1.73 | < 0.918 | < 0.918 | 1.27 | < 0.918 | 77.6 | < 1.38 | 7.21 | 5.26 | < 0.918 | 1.64 | 12.8 | 27.1 | 25.7 |
| 55 | 74 | PHUR | PHUR-MI0023833-THGRA | SL1811150940GSC-S | 11/15/2018 | 1803712 | µg/Kg | 72 | < 0.830 | 1.09 | 1.56 | 0.914 | 4.18 | 1.4 | 6.53 | 1.75 | 2.11 | < 0.830 | 0.881 | < 0.830 | < 0.830 | 1.11 | < 0.830 | 23.6 | < 1.24 | 3.68 | 1.31 | < 0.830 | < 0.830 | 1.84 | 8.73 | 11.6 |
| 56 | 74 | PHUR | PHUR-MI0023833-THRST | SL1811150945GSC | 11/15/2018 | 1803712 | µg/Kg | 48 | < 0.822 | 0.758 | 1.05 | < 0.822 | 2.81 | 0.966 | 4.54 | 1.15 | 1.58 | < 0.822 | < 0.822 | < 0.822 | < 0.822 | < 0.822 | < 0.822 | 17.7 | < 1.23 | 2.08 | < 0.822 | < 0.822 | < 0.822 | 1.34 | 6.13 | 7.85 |
| 57 | 74 | PHUR | PHUR-MI0023833-THRST | SL1811151000GSC | 11/15/2018 | 1803712 | µg/Kg | 53 | < 0.958 | 0.977 | 1.93 | < 0.958 | 3.23 | 1.52 | 4.82 | 1.4 | 1.61 | < 0.958 | 0.838 | < 0.958 | < 0.958 | < 0.958 | < 0.958 | 20.5 | < 1.44 | < 0.958 | < 0.958 | < 0.958 | < 0.958 | 1.4 | 7.44 | 7.76 |
| 58 | 36 | RAGN | RAGN-MI0022977-STALS | BS1811051445GSC | 11/5/2018 | 1803699 | µg/Kg | 83 | < 0.999 | < 0.999 | 2.59 | < 0.999 | 1.66 | 3.74 | 5.61 | 2.03 | 3.08 | < 0.999 | < 0.999 | < 0.999 | < 0.999 | < 0.999 | < 0.999 | 15.7 | < 1.50 | 2.57 | 2.82 | < 0.999 | < 0.999 | 0.888 | 19.1 | 23.6 |
| 59 | 79 | SAGN | SAGI-MI0025577-STALS | BS1811191600GSC | 11/19/2018 | 1803774 | µg/Kg | 13 | < 1.72 | < 1.72 | < 1.72 | < 1.72 | < 1.72 | < 1.72 | < 1.72 | < 1.72 | < 1.72 | < 1.72 | < 1.72 | < 1.72 | < 1.72 | < 1.72 | < 1.72 | 2.18 | < 2.58 | 2.59 | < 1.72 | < 1.72 | < 1.72 | < 1.72 | 3.17 | 4.56 |
| 60 | 79 | SAGN | SAGI-MI0025577-PRTSL | SL1811191515GSC | 11/19/2018 | 1803774 | µg/Kg | 21 | < 0.788 | < 0.788 | < 0.788 | < 0.788 | < 0.788 | < 0.788 | 0.891 | < 0.788 | 1.55 | < 0.788 | < 0.788 | < 0.788 | < 0.788 | < 0.788 | < 0.788 | 4.78 | < 1.18 | 3.18 | < 0.788 | < 0.788 | < 0.788 | < 0.788 | 4.76 | 5.68 |
| 61 | 79 | SAGN | SAGI-MI0025577-SCTSL | SL1811191530GSC | 11/19/2018 | 1803774 | µg/Kg | 49 | < 1.10 | 0.972 | 0.957 | < 1.10 | < 1.10 | < 1.10 | 3.89 | 1.46 | 2.7 | < 1.10 | < 1.10 | < 1.10 | < 1.10 | < 1.10 | < 1.10 | 10.7 | < 1.66 | 2.24 | 2.4 | < 1.10 | < 1.10 | < 1.10 | 9.63 | 14.1 |
| 62 | 81 | SAND | SAND-MI0020222-STAND | SL1811160850GSC-S | 11/16/2018 | 1803715 | µg/Kg | 94 | < 0.964 | < 0.964 | 2.32 | < 0.964 | 0.902 | 5.43 | 1.82 | 6.97 | 4 | 1.28 | 1.81 | 1.09 | < 0.964 | 0.944 | < 0.964 | 12.8 | < 1.45 | 11.7 | 2.61 | < 0.964 | < 0.964 | < 0.964 | 15.4 | 24.5 |
| 63 | 88 | TRAV | TRAV-MI0027481-STAND | BS1811081315GSC | 11/8/2018 | 1803703 | µg/Kg | 79 | < 0.997 | 1.03 | 3.32 | < 0.997 | 4.16 | 1.68 | 13.5 | 1.62 | 3.24 | < 0.997 | 0.879 | < 0.997 | < 0.997 | < 0.997 | < 0.997 | 13.6 | < 1.49 | 2.15 | 3.92 | < 0.997 | 1.29 | 2.3 | 8.14 | 18.4 |
| 64 | 90 | WARR | WARR-MI0024295-DWBFP | SL1811151620GSC | 11/15/2018 | 1803714 | µg/Kg | 22 | < 0.997 | < 0.997 | < 0.997 | < 0.997 | < 0.997 | < 0.997 | 2.12 | < 0.997 | 1.65 | < 0.997 | < 0.997 | < 0.997 | < 0.997 | < 0.997 | < 0.997 | 9.19 | < 1.50 | < 0.997 | < 0.997 | < 0.997 | < 0.997 | < 0.997 | 4.14 | 5.39 |
| 65 | 90 | WARR | WARR-MI0024295-DSASH | SL1811151530GSC | 11/15/2018 | 1803714 | µg/Kg | ND | < 0.992 | < 0.992 | < 0.992 | < 0.992 | < 0.992 | < 0.992 | < 0.992 | < 0.992 | < 0.992 | < 0.992 | < 0.992 | < 0.992 | < 0.992 | < 0.992 | < 0.992 | < 0.992 | < 1.49 | < 0.992 | < 0.992 | < 0.992 | < 0.992 | < 0.992 | < 0.992 | < 0.992 |
| 66 | 92 | WIXO | WIXO-MI0024384-DWBFP | SL1811140930GSC | 11/14/2018 | 1803709 | µg/Kg | 1,510 | 14 | 67.6 | 99.6 | 61.3 | 4.58 | 4.38 | 7.28 | 1.91 | 3.17 | < 0.963 | 1.2 | 2.18 | < 0.963 | < 0.963 | < 0.963 | 1200 | 3.28 | 5.65 | 1.47 | < 0.963 | 21.8 | 4.88 | 1.45 | 4.52 |
| 67 | 92 | WIXO | WIXO-MI0024384-IFBFP | SL1811140945GSC-S | 11/14/2018 | 1803709 | µg/Kg | 1,268 | 4.58 | 23.6 | 19.8 | 15.5 | 1.72 | 2.75 | 5.17 | 1.33 | 2.22 | < 0.971 | 1.05 | 0.828 | < 0.971 | < 0.971 | < 0.971 | 1090 | 2.25 | 2.46 | 1.66 | < 0.971 | 83.5 | 4.14 | 1.12 | 4.64 |
| 68 | 92 | WIXO | WIXO-MI0024384-STAED | BS1811140830GSC-S | 11/14/2018 | 1803709 | µg/Kg | 2,324 | 4.3 | 18.1 | 20.1 | 14.4 | 1.73 | 2.41 | 6.21 | 2.1 | 2.86 | < 0.914 | 0.809 | < 0.914 | < 0.914 | < 0.914 | 4.65 | 2150 | 4.74 | 3.75 | 3.61 | < 0.914 | 59.5 | 10 | 2.08 | 12.6 |
| 69 | 92 | WIXO | WIXO-MI0024384-WACSL | SL1811140905GS-S | 11/14/2018 | 1803709 | µg/Kg | 733 | 2.91 | 12.9 | 16.2 | 10.1 | 1.33 | 2.34 | 4.32 | 1.41 | 2.41 | < 0.974 | < 0.974 | < 0.974 | < 0.974 | < 0.974 | < 0.974 | 666 | 1.59 | 2.46 | < 0.974 | < 0.974 | 144 | 5.52 | 0.978 | 2.98 |
| 70 | 93 | WYOM | WYOM-MI0024392-STALS | BS1810291030GC | 10/29/2018 | 1803552 | µg/Kg | 32 | < 1.00 | < 1.00 | 2.59 | < 1.00 | < 1.00 | < 1.00 | 1.19 | < 1.00 | 1.18 | < 1.00 | < 1.00 | < 1.00 | < 1.00 | < 1.00 | < 1.00 | 15 | < 1.50 | < 1.00 | 1.03 | < 1.00 | < 1.00 | 1.04 | 2.2 | 7.87 |
| 71 | 94 | YCUA | YCUA-MI0042676-DWBFP | SL1811020930GSC | 11/2/2018 | 1803609 | µg/Kg | 33 | < 0.998 | < 0.998 | 1.3 | < 0.998 | 1.41 | 0.9 | 5.83 | 1.18 | 1.92 | < 0.998 | < 0.998 | < 0.998 | < 0.998 | < 0.998 | < 0.998 | 7.75 | < 1.50 | < 0.998 | < 0.998 | < 0.998 | < 0.998 | < 0.998 | 3.84 | 8.73 |

**Notes:**

"**< #** " = Values Below the Detection Limit (**DL**)

Perfluoroalkyl Carboxylic Acids (**PFCAs**)
Perfluoroalkane Sulfonic Acids (**PFSAs**)
Perfluoroalkane Sulfonamides (**FASAs**)
Fluorotelomer Sulfonic Acids (**FTSAs**)
N-Ethyl Perfluoroalkane Sulfonamidoacetic Acids (**EtFASAAs**)
N-Methyl Perfluoroalkane Sulfonamidoacetic Acids (**MeFASAAs**)

**PFBA** = Perfluorobutanoic acid
**PFPeA** = Perfluoropentanoic acid
**PFHxA** = Perfluorohexanoic acid
**PFHpA** = Perfluoroheptanoic acid
**PFOA** = Perfluorooctanoic acid
**PFNA** = Perfluorononanoic acid

**PFDA** = Perfluorodecanoic acid
**PFUnDA** = Perfluoroundecanoic acid
**PFDoDA** = Perfluorododecanoic acid
**PFTrDA** = Perfluorotridecanoic acid
**PFTeDA** = Perfluorotetradecanoic acid
**PFBS** = Perfluorobutane sulfonic acid

**PFPeS** = Perfluoropentane sulfonic acid
**PFHxS** = Perfluorohexane sulfonic acid
**PFHpS** = Perfluoroheptane sulfonic acid
**PFOS** = Perfluorooctane sulfonic acid
**PFNS** = Perfluorononane sulfonic acid
**PFDS** = Perfluorodecane sulfonic acid

**FOSA** = Perfluorooctane sulfonamide
**4:2 FTSA** = 4:2 Fluorotelomer sulfonic acid
**6:2 FTSA** = 4:2 Fluorotelomer sulfonic acid
**8:2 FTSA** = 4:2 Fluorotelomer sulfonic acid
**EtFOSAA** = N-Ethyl perfluorooctane sulfonamidoacetic acid
**MeFOSAA** = N-Methyl perfluorooctane sulfonamidoacetic acid

# Table 21

PFOA, PFOS, and Total PFAS Summary Results for Influent, Effluent, and Final Treated Solids
Statewide PFAS Assessment of 42 WWTPs

| Nr. | WWTP # | Facility Name | Influent | | | Effluent | | | Sludge/Biosolids | | | | Sample Date | Additional Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | PFOA (ng/l) | PFOS (ng/l) | Total PFAS (ng/l) | PFOA (ng/l) | PFOS (ng/l) | Total PFAS (ng/l) | PFOA (µg/Kg) | PFOS (µg/Kg) | Total PFAS (µg/Kg) | Final Treated Solids Sample Location | | |
| 1 | 97 | Alpena WWTP | 5.94 | 5.44 | 51.05 | 7.49 | 5.07 | 73.39 | 1.36 | 42.1 | 136 | Anaerobic Digestor | 11/9/2018 | |
| 2 | 4 | Ann Arbor WWTP | 2.91 | 16.5 | 88.76 | 4.42 | 14.8 | 112.85 | <0.801 | 15.2 | 27.47 | Lime Stabilized Solids* | 11/2/2018 | *2 days after stabilization |
| 3 | 6 | Battle Creek WWTP | 7.25 | 3.28 | 46.78 | 8.43 | 5.14 | 72.10 | <0.97 | <0.97 | 8.37 | Lime Stabilized Solids* | 10/31/2018 | *2 hours of stabilization |
| 4 | 7 | Bay City WWTP | 4.87 | 18.20 | 69.19 | 5.39* | 15.80* | 76* | <0.93[1] | 8.951 | 17.781 | Inclined Screw Press Effluent (Primary and Secondary) | 11/19/2018 | * Effluent after GAC tank, before UV \| [1]Dewatered solids after polymer |
| 5 | 14 | Bronson WWTP | <2.22 | 843 | 2,219 | 2.4 | 169 | 290 | 3.86 | 1,060 | 1,173 | Anaerobic Digestor | 10/31/2018 | |
| 6 | 99 | Commerce Twp. WWTP | 17.9 | 6.38 | 104 | 15.5 | 1.92 | 146 | 14.10 | 12.70 | 102 | Belt Filter Press* | 11/14/2018 | *Primary and Secondary Treatment |
| 7 | 23 | Delhi Twp. WWTP | <2.13 | <2.13 | 5.12 | 2.33 | 1.76 | 20.57 | <1.00 | 2.68 | 34.09 | Anaerobic Digestor | 11/1/2018 | |
| 8 | 25 | Dexter WWTP | <2.11 | <2.11 | 11.53 | 7.97 | 1.51 | 105 | <0.94 | 5.95 | 59.00 | Anaerobic Digestor | 11/2/2018 | |
| 9 | 27 | Downriver WTF | 7.20 | 22.20 | 83.58 | 12.70 | 7.93 | 87.81 | 3.94 | 42.50 | 82.46 | Belt Filter Press* | 11/20/2018 | |
| 10 | 101 | East Lansing WRRF | 2.21 | <2.16 | 17.95 | 3.28 | 2.01 | 37.53 | 0.89 | 4.94 | 20.95 | Belt Filter Press* | 11/1/2018 | *Primary and Secondary Treatment |
| 11 | 32 | Flint WWTP | 4.83/6.35[1] | 26.6/34.8[1] | 77.44/97.24[1] | 4.50 | 14.80 | 96.25 | <0.98 | 13.50 | 44.45 | Belt Filter Press[2] | 11/5/2018 | [1]Without/with return flow \| [2]Primary and Secondary Treatment |
| 12 | 33 | Fowlerville WWTP | <2.03 | <2.03 | 6.78 | 7.6 | 1.47 | 62.11 | * | * | * | * | 11/5/2018 | *Did not collect solids |
| 13 | 102 | Gaylord WWTP | <2.02 | <2.02 | 16.83 | 8.72 | 4.26 | 161 | 17.70 | 55.00 | 214 | Aerobic Digestor | 11/13/2018 | |
| 14 | 38 | GLWA WRRF | 6.02[1]/9.1[2]/4.64[3] | 7.54[1]/15.6[2]/10.7[3] | 71.24[1]/117[2]/53.13[3] | 6.7[4]/7.18[5] | 9.68[4]/9.31[5] | 119[4]/125[5] | <0.87[6]/1.12[7]/<0.96[8] | <0.87[6]/9.44[7]/7.07[8] | ND[6]/18.56[7]/14.2[8] | see notes | 11/16/2018 | [1]NIEA, [2]Oakwood, [3]Jefferson, [4]049B in Plant, [5]049F Zug Island, [6]Ash from Incinerator, [7]Pellets, [8]Cake from Belt Filter Press - primary and secondary |
| 15 | 40 | Grand Rapids WRRF | 5.06 | 12.70 | 72.14 | 11.40 | 35.60 | 403 | 0.92 | 21.80 | 74.10 | Dewatered Solids* | 11/16/2018 | *Primary and Secondary Treatment |
| 16 | 47 | Holland WWTP | 5.73/3.20[1] | 3.79/<2.19[1] | 36.85/15.73[1] | 4.67 | 2.41 | 42.71 | < 0.98 | 5.89 | 22.16 | Lime Stabilized Solids[2] | 10/30/2018 | [1]North Influent/South Influent \| [2]Collected from the sludge tank |
| 17 | 49 | Howell WWTP | 4.42 | <2.07 | 12.89 | 7.39 | 4.87 | 70.61 | 1.67 | 21.00 | 52.27 | Belt Filter Press* | 11/13/2018 | *Primary and Secondary Treatment |
| 18 | 77 | S. Huron Valley UA WWTP | 3.76 | <2.14 | 17.72 | 6.69 | 5.33 | 102 | 2.46/0.913[1] | <0.987/8.47[1] | 75.27/32.37[1] | Lime Stabilized Solids | 11/20/2018 | [1]One(1) day of stabilization/Sludge cell (15 ft total depth) |
| 19 | 50 | Ionia WWTP | <2.23 | 213 | 8,667 | <2.15 | 635 | 143,360 | <0.99 | 983 | 1,006 | Anaerobic Digestor | 10/31/2018 | |
| 20 | 52 | Jackson WWTP | <2.28 | 5.98 | 15.80 | 3.38 | 3.17 | 60.38 | 0.80/4.41[1] | 19.50/90.60[1] | 87.83/155[1] | Anaerobic Digestor/Drying Bed[1] | 11/5/2018 | [1]One (1) week old constantly blend/No land application in the last 2 years |
| 21 | 53 | Kalamazoo WWTP | 8.43 | 26 | 88.06 | 9.81 | 5.79 | 85.93 | <1.00 | 6.49 | 17.68 | Belt Filter Press* | 10/30/2018 | *Primary and Secondary Treatment |
| 22 | 54 | KI Sawyer WWTP | <2.04/<2.09[1] | 5.77/81.00[1] | 23.27/156[1] | 10.20 | 62.00 | 132.64 | 25.40 | 387 | 662 | Aerobic Stabilized - Storage Tank[2] | 11/7/2018 | [1]Residential/Industrial \| [2]Estimated to be 2 weeks old |
| 23 | 56 | Lansing WWTP | 4.98 | <2.16 | 35.09 | 7.58 | 5.51 | 107 | <1.00/<1.00[1] | 5.08/7.18[1] | 27.75/40.18[1] | Lime Stabilized Solids/ Belt Filter Press[1] | 11/1/2018 | [1]Estimated to be 2-6 months old/Primary and secondary treatment |
| 24 | 57 | Lapeer | * | * | * | 5.03 | 28.70 | 374 | <5.58 | 1680.00 | 2358.00 | Drying Beds[1] | 5/9/2018 | *Not sampled during initial sampling period [1]Dewatered biosolids collected from drying beds. |
| 25 | 60 | Lyon Twp. WWTP | <2.28 | <2.28 | 7.50 | 15.40 | <2.01 | 111 | 25.10 | 6.35 | 133 | Biosolids Storage Tank | 11/13/2018 | |
| 26 | 103 | Marquette WWTP | 3.27 | 10.30 | 38.63 | 6.56 | 10.70 | 86.17 | 2.72 | 43.00 | 104 | Belt Filter Press* | 11/7/2018 | *Anaerobic stabilized biosolids cake from BFP. |
| 27 | 105 | Midland WWTP | 10.30 | 2.72 | 69.92 | 10.50 | 4.03 | 79.02 | 1.93 | 12.70 | 91.61 | Storage Tank* | 11/19/2018 | *Anaerobic stabilized sludge |
| 28 | 64 | Monroe WWTP | 2.89 | 5.50 | 33.17 | 5.35 | 5.46 | 50.31 | <0.958 | 10.90 | 33.54 | Screw Press* | 11/20/2018 | *Primary and Secondary Treatment |
| 29 | 65 | Mt. Clemens WWTP | 4.60 | 5.02 | 40.62 | 9.03 | 3.40 | 92.21 | 6.43 | 24.70 | 93.21 | Storage Tank* | 11/15/2018 | *Biosolids were 1 week old |
| 30 | 66 | Muskegon Co WWMS Metro WWTP | 11.7 | 10.5 | 48.82 | 31.70 | 16.20 | 124 | 8.42 | 11.30 | 86.63 | Drying Beds* | 10/30/2018 | *Biosolids stabilized using lagoons |
| 31 | 69 | North Kent S A WWTP | 11.2 | 31.1 | 80.41 | 21.2 | 12.5 | 389 | 11.00 | 160 | 332 | Screw Press* | 11/29/2018 | *Aerobic digested solids |
| 32 | 107 | Oscoda Twp. WWTP Wurtsmith | 4.42 | 38.20 | 62.21 | 12.40 | 75.80 | 153 | * | * | * | * | 11/9/2018 | *Did not collect treated solids only soil |
| 33 | 73 | Pontiac WWTP - Oakland Co. | 4.94 | 7.68 | 42.43 | 38.10 | 20.00 | 169 | <1.00 | 7.31 | 29.35 | Belt Filter Press* | 11/14/2018 | *Dewatered biosolids after anaerobic digestion |
| 34 | 74 | Port Huron WWTP | 64.60 | 19.50 | 361 | 44.80 | 13.10 | 336 | 4.42 | 77.60 | 196 | Lime Stabilized Solids* | 11/15/2018 | *Storage tank about 2 months old |
| 35 | 36 | Genesee Co-Ragnone WWTP | 4.00 | 5.22 | 45.88 | 7.23 | 4.72 | 73.64 | 1.66 | 15.70 | 83.39 | Lime Stabilized Solids* | 11/5/2018 | *Sampled before transfer into truck |
| 36 | 79 | Saginaw WWTP | 2.56 | 4.19 | 25.93 | 4.58 | 4.13 | 42.42 | < 1.72 | 2.18 | 12.50 | Anaerobic Stabilized Solids* | 11/19/2018 | *Sampled from storage tank 6 months old |
| 37 | 81 | Sandusky WWTP | 12.2 | 7.98 | 138 | 8.39 | 5.26 | 154 | 0.90 | 12.80 | 93.58 | Anaerobic Digester | 11/16/2018 | |
| 38 | 88 | Traverse City WWTP | 6.17 | 4.73 | 38.45 | 20.70 | 2.90 | 154 | 4.16 | 13.60 | 77.61 | Anaerobic Digester | 11/8/2018 | |
| 39 | 90 | Warren WWTP | 4.61 | 7.31 | 59.04 | 7.19/7.21[1] | 7.48/7.64[1] | 73.54/75.62[1] | <0.997/<0.992 | 9.19/<0.992 | 22.49/ND | Belt Filter Press/Ash[2] | 11/15/2018 | [1]Effluent after UV/Effluent after sand filter \| [2]Primary and Secondary Treatment / Incinerator ash lagoon |
| 40 | 92 | Wixom WWTP | 3.07 | 128 | 2,329 | 9.89 | 269 | 4,950 | 1.73/4.58* | 2,150/1,200* | 2,324/1,510* | Aerobic Stabilized Biosolids/Screw Press* | 11/14/2018 | *Storage tank 6 months old/Dewatered final treated solids |
| 41 | 93 | Wyoming WWTP | 5.08 | 26.6 | 1,208 | 8.74 | 12.00 | 113 | <1.00 | 15.00 | 32.10 | Lime Stabilized Solids* | 10/29/2018 | *Sampled from the storage tank |
| 42 | 94 | YCUA Regional WWTP | 7.39 | 7.51 | 60.95 | 12.6 | 6.12 | 109 | 1.41 | 7.75 | 32.68 | Belt Filter Press* | 11/2/2018 | *Primary and Secondary Treatment |

Note: ND = Non-detect with detection limits typical about 1 µg/Kg or parts per billion (ppb)

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