

Marinette Wastewater Treatment Source Reduction

November 2017 – The City of Marinette was informed that state officials are aware of and investigating an active plume of PFAS compounds in the jurisdictional boundary of the City. The origin of these compounds is linked to a AFFF testing facility owned by the AFFF manufacturer ANSUL/TYCO/JCI.

The Wastewater Utility swiftly took action and sampled wastewater influent and effluent to determine the concentrations of PFAS present in the wastewater collection and treatment system. Results were found of 38.2 ppt PFOA and 42.8 ppt PFOS in the wastewater effluent.

May 2018 – Through conversations with City officials and Wisconsin DNR representatives the City of Marinette Wastewater Utility was tasked with sampling again the wastewater stream and biosolids for PFAS compounds. Results were observed at 50.3 ppt PFOA and 13.3 ppt in the effluent wastewater and 10 ppb PFOA and 210 ppb PFOS in the stored liquid biosolids. When the results from the 5-23- 2018 biosolids sampling were submitted to the DNR, they had inquired if we had the storage capacity to hold our biosolids until they had more time to investigate appropriate biosolids spreading guidance. We had informed them that we did have the capacity to hold biosolids for up to November of 2019. On 9-10-2018 the Wisconsin DNR made a formal request for Marinette to hold our biosolids for this year (2018).

July 2018 – A targeted collection system sampling program was placed in effect to determine possible hot spots of PFAS inputs to the wastewater collection system. The city was sectioned into 5 distinct areas of observation which could be independently analyzed through sampling. Wastewater utility staff found two sectors of town that showed elevated readings for PFOA and PFOS leading to further investigation upstream.

December 2018 - As part of the ongoing investigation of the transport of the contaminants through Marinette’s wastewater collection and treatment system, Wastewater Utility Staff collected samples directly from industries where previous manhole sampling, done on 7-9-2018, showed elevated results in the wastewater collection system areas. The industries sampled were Tyco/JCI on Industrial Parkway South, Tyco/JCI on Stanton Street, and ChemDesign Products Incorporated.

Sample Location	Sample Date	PFOA (ppt)	PFOS (ppt)
Tyco/JCI Industrial Parkway South Wastewater	12-6-2018	253	3670
Tyco/JCI Stanton Street Wastewater	12-6-2018	116	7.1
ChemDesign Wastewater	12-6-2018	1120	48.3

March 2019 – The City of Marinette requested that JCI/Tyco cease all discharges of AFFF foam wastewater to the wastewater treatment plant until further notice as a measure of source reduction of PFOA and PFOS.

July 2019 – The City of Marinette in coordination with Wisconsin DNR began monitoring the dewatering water concentrations for PFAS for making decisions on acceptance to the Wastewater collection system based on PFAS data. Screening levels utilized were based on Michigan’s interim numbers of 420 ppt PFOA and 11 ppt PFOS for waters discharged to water bodies used for drinking water consumption.

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August 2019 – The Marinette Wastewater Utility in conjunction with JCI/Tyco, their contract engineer Arcadis, and Waste Management conducted a major project dewatering 3.5 million gallons of stored biosolids to roughly 18% solids, containerizing the solids, and shipping them to Columbia Ridge Landfill in Oregon, USA.

October 2019 – As part of the ongoing investigation of PFOA and PFOS contamination in the City of Marinette Sanitary Sewer System, Marinette Water and Wastewater Utility staff collected samples of influent and effluent wastewater at the City Wastewater Treatment Facility on October 30, 2019. Results showed levels of 37 ppt PFOA and 5.4 ppt PFOS in the effluent wastewater.

January 2020 – As part of the ongoing investigation of PFOA and PFOS contamination in the City of Marinette Sanitary Sewer System, Wastewater Utility Staff collected samples directly from industries previously sampled in this PFOA and PFOS investigation. The industries sampled were Tyco/JCI on Industrial Parkway South, Tyco/JCI on Stanton Street, and ChemDesign Products Incorporated. The results of the investigative sampling are listed in the table below.

Wastewater Analysis:

Sample Location	Sample Date	PFOA (ppt)	PFOS (ppt)
Tyco/JCI Industrial Parkway South Wastewater	1-29-2020	28.4	71.8
Tyco/JCI Stanton Street Wastewater	1-29-2020	34	3.91
ChemDesign Wastewater	1-29-2020	1980	50.7

February 2020 – Due to continued presence of PFOA and PFOS in the sanitary wastewater being transported to the treatment facility, samples of current biosolids being stored after conventional anaerobic digestion sludge treatment have been analyzed. The stored post-conventional anaerobic digestion sludge treatment sample is from a collection of all biosolids processed upon completion of cleaning out the storage tank of the heavily PFAS contaminated biosolids in the fall of 2019 (Biosolids Holding Tank). Also, primary clarifier raw biosolids processed through a dewatering treatment technology and a subsequent biosolids drying technology were sampled to further understand the treatment capability of those primary clarifier raw biosolids with regards to the transport of PFOA and PFOS through the different technologies.

Biosolids Analysis:

Sample Location	Sample Date	PFOA (ug/Kg)	PFOS (ug/Kg)
Biosolids Holding Tank	5-23-2018	10	210
Biosolids Holding Tank	2-13-2020	5.3	30
Primary - Dewatered Biosolids (1)	2-13-2020	1.64	5.99
Primary - Dewatered Biosolids (2)	2-13-2020	2.2	8.0

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Primary - Dried Biosolids (1)	2-25-2020	1.45	4.48
Primary - Dried Biosolids (2)	2-25-2020	2.0	6.3

June 2020 – As part of the ongoing investigation of PFOA and PFOS contamination in the City of Marinette Sanitary Sewer System, Wastewater Utility Staff collected samples directly from industries, designated collection system manhole locations, and Wastewater Treatment Plant Influent and Effluent previously sampled in this PFOA and PFOS investigation. The results of the investigative sampling are listed in the tables below.

Industrial Sewer Sampling

Sample Location	Sample Date	PFOA (ppt)	PFOS (ppt)
Tyco/JCI Industrial Parkway South Wastewater	12-6-2018	253	3670
Tyco/JCI Stanton Street Wastewater	12-6-2018	116	7.1
ChemDesign Wastewater	12-6-2018	1120	48.3
Tyco/JCI Industrial Parkway South Wastewater	1-29-2020	28.4	71.8
Tyco/JCI Stanton Street Wastewater	1-29-2020	34	3.91
ChemDesign Wastewater	1-29-2020	1980	50.7
Tyco/JCI Industrial Parkway South Wastewater	6-18-2020	20	18
Tyco/JCI Stanton Street Wastewater	6-18-2020	14	2.6
ChemDesign Wastewater	6-18-2020	3700	<46

Treatment Plant Influent and Effluent Sampling

Sample Location	Sample Date	PFOA (ppt)	PFOS (ppt)
Wastewater Influent	11-20-2017	34.3	9.28
Wastewater Effluent	11-20-2017	38.2	42.8
Wastewater Influent	5-14-2018	43.5	25.4
Wastewater Effluent	5-14-2018	50.3	13.3
Wastewater Influent	10-30-2019	28	[3.8]
Wastewater Effluent	10-30-2019	37	5.4

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Wastewater Influent	6-18-2020	28	8.4
Wastewater Effluent	6-18-2020	38	9.3

Designated Manhole Sampling

Sample Location	Sample Date	PFOA (ppt)	PFOS (ppt)
Manhole #428	7-9-2018	9.92	Non-Detectable
Manhole #346A	7-9-2018	41.5	Non-Detectable
Manhole #433	7-9-2018	38.2	211
Manhole # 700A	7-9-2018	10.3	Non Detectable
Manhole #001A	7-9-2018	178	Non-Detectable
Manhole #428	6-18-2020	13	8.0
Manhole #346A	6-18-2020	86	13
Manhole #433	6-18-2020	8.5	4.9
Manhole # 700A	6-18-2020	14	6.7
Manhole #001A	6-18-2020	31	9.1

October 2020 – JCI/Tyco began plans to construct a treatment system for AFFF contaminated wastewater at their Industrial Parkway site as a form of pretreatment to discharge to the collection system. This system complies with the proposed NR 159 rules by the Wisconsin DNR as the best available treatment for AFFF containing wastewater.

November 2020 – Due to high PFAS results found in the ChemDesign discharge to the collection system they (ChemDesign) elected to completely seal their connection to the City of Marinette sewer collection system. All process wastewaters are hauled offsite and due to sealing of their pipe connection, infiltration and inflow PFAS sources have been reduced.

April 2021 – The wastewater utility required Michels to implement dewatering wastewater treatment for PFAS at one contaminated site location in the City of Marinette utilizing the BAT technology to reduce PFAS concentrations prior to discharging wastewater to the collection system as a measure of source reduction.

July 2021 – JCI/Tyco completed construction of the AFFF foam wastewater treatment system at their Industrial Parkway site and began trials of the system. The system consists of SBR technology, cloth filter, 4 GAC vessels, and 2 ion-exchange systems before discharge to the wastewater collection system. Marinette Wastewater began acceptance of this waste conditionally on a case by case basis to allow the system to be optimized. PFAS concentrations of less than 10 ppt were observed from the effluent.

December 2021 – Wastewater samples were taken in December of 2021 as part of an ongoing investigation of PFOA and PFOS compounds present in the Marinette Wastewater Collection and Treatment System. Sample results are detailed in the table below.

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Treatment Plant Influent and Effluent Sampling

Sample Location	Sample Date	PFOA (ppt)	PFOS (ppt)
Wastewater Influent	11-20-2017	34.3	9.28
Wastewater Effluent	11-20-2017	38.2	42.8
Wastewater Influent	5-14-2018	43.5	25.4
Wastewater Effluent	5-14-2018	50.3	13.3
Wastewater Influent	10-30-2019	28	[3.8]
Wastewater Effluent	10-30-2019	37	5.4
Wastewater Influent	6-18-2020	28	8.4
Wastewater Effluent	6-18-2020	38	9.3
Wastewater Influent	12-15-2021	12	7.1
Wastewater Effluent	12-15-2021	15	4.7

May 2022 – In March of 2022, the Marinette Wastewater Utility began operation of a biosolids drying process to essentially dehydrate the solids portion of the wastewater stream to provide easy transport of biosolids to a designated landfill in Oregon, USA. As part of the PFAS investigation the Marinette Wastewater Utility sampled the dried product (5-25-2022) to fully understand the movement of PFAS through the waste stream.

Sample Location	Sample Date	PFOA (ug/Kg)	PFOS (ug/Kg)
Biosolids Holding Tank	5-23-2018	10	210
Biosolids Holding Tank	2-13-2020	5.3	30
Primary - Dewatered Biosolids (1)	2-13-2020	1.64	5.99
Primary - Dewatered Biosolids (2)	2-13-2020	2.2	8.0
Primary - Dried Biosolids (1)	2-25-2020	1.45	4.48
Primary - Dried Biosolids (2)	2-25-2020	2.0	6.3
Dried Biosolids	5-25-2022	2.8	9.6

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August 2022 – JCI/Tyco begins operation of a large scale groundwater extraction and treatment system to begin removing legacy contamination of PFAS impacted groundwater at their facility and sites around the City of Marinette. This system aims to reduce the contamination of PFAS by 90% over its lifespan of roughly 30 years. This system is believed to help considerably in removing PFAS from potentially infiltrating the city owned infrastructure and ultimately ending up in the wastewater stream.

October 2022 - The wastewater utility required Tyco/JCI through Endpoint Solutions to implement dewatering wastewater treatment for PFAS at one contaminated site location in the City of Marinette utilizing the reverse osmosis technology to reduce PFAS concentrations prior to discharging wastewater to the collection system as a measure of source reduction. Tyco since 2013 has been committed to replacing and improving its underground infrastructure in an effort to curb infiltration of contaminants to the city owned sewerage system both at the Industrial Parkway site and the Stanton Street site. This dewatering is just one such occurrence. Other efforts include CIPP lining at both the locations, including manhole rehabilitation.

November 2022 – Through coordination of baseline monitoring with JCI/Tyco Marinette Wastewater Utility finalized a new permit controlling PFAS additions to the wastewater system. This permit reflects the real-world capabilities of what the foamy wastewater treatment system compliant with NR 159 can attain. Through weekly sampling results and proper action levels in place, PFAS additions are significantly reduced.

January 2023 – With upcoming regulations in place Marinette has taken steps pertaining to dewatering wastewaters in contamination zones. These steps involve making proper decisions to accept treated dewatering wastewater from contaminated zones of the city to protect the wastewater effluent from exceeding the new surface water regulations of 20 ppt PFOA and 8 ppt PFOS.

February 2023 – The Marinette Wastewater Utility has taken samples of wastewater influent and effluent and dried biosolids. Sample analytical results are included below. Source reduction efforts continue through working with local industry and investigation of any and all possible sources of PFAS in the influent wastewater stream.

Marinette Biosolids PFOA and PFOS Sampling

Sample Location	Sample Date	PFOA (ug/Kg)	PFOS (ug/Kg)
Biosolids Holding Tank	5-23-2018	10	210
Biosolids Holding Tank	2-13-2020	5.3	30
Primary - Dewatered Biosolids (1)	2-13-2020	1.64	5.99
Primary - Dewatered Biosolids (2)	2-13-2020	2.2	8.0
Primary - Dried Biosolids (1)	2-25-2020	1.45	4.48

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Primary - Dried Biosolids (2)	2-25-2020	2.0	6.3
Dried Biosolids	5-25-2022	2.8	9.6
Dried Biosolids	2-8-2023	1.6	6.2

Treatment Plant Influent and Effluent Sampling

Sample Location	Sample Date	PFOA (ppt)	PFOS (ppt)
Wastewater Influent	11-20-2017	34.3	9.28
Wastewater Effluent	11-20-2017	38.2	42.8
Wastewater Influent	5-14-2018	43.5	25.4
Wastewater Effluent	5-14-2018	50.3	13.3
Wastewater Influent	10-30-2019	28	[3.8]
Wastewater Effluent	10-30-2019	37	5.4
Wastewater Influent	6-18-2020	28	8.4
Wastewater Effluent	6-18-2020	38	9.3
Wastewater Influent	12-15-2021	12	7.1
Wastewater Effluent	12-15-2021	15	4.7
Wastewater Influent	2-8-2023	23	8.2
Wastewater Effluent	2-8-2023	30	4.5