

July 2022, Update

Subject: PFOA and PFOS Investigation

The Marinette Water Utility has committed to continued sampling, once per quarter, of the public drinking water treatment system to gather more data involving the location and quantity of PFAS compounds throughout the drinking water treatment system. The locations of sampling are the Bay of Green Bay water to be treated, raw drinking water after powder activated carbon addition, and finished drinking water being distributed to the public. Samples from the public drinking water system have been taken on November 20, 2017, December 4, 2018, January 3, 2019, April 15, 2019, July 1, 2019, October 8, 2019, February 12, 2020, May 13, 2020, September 30, 2020, December 30, 2020, March 30, 2021, June 17, 2021, September 30, 2021, December 9, 2021, April 6, 2022, and June 22, 2022 by Marinette Water and Wastewater Utility staff. Results are listed in the table below for the November 20, 2017, December 4, 2018, January 3, 2019, April 15, 2019, July 1, 2019, October 8, 2019, February 12, 2020, May 13, 2020, September 30, 2020, December 30, 2020, March 30, 2021, June 17, 2021, September 30, 2021, December 9, 2021, April 6, 2022, and June 22, 2022 samples.

In 2016 the EPA announced the release of health advisory levels for the PFAS compounds PFOA and PFOS in **DRINKING WATER**. The health advisory level set forth by the EPA identified the concentration of PFOA and PFOS in drinking water at or below which adverse health effects are not anticipated to occur over a lifetime of exposure. The Health advisory level was 70 parts per trillion for PFOA and PFOS. Health advisory levels are non-regulatory and reflect the EPA's assessment of the best available peer reviewed science.

On June 15, 2022, the United States EPA made a health advisory (HAL) announcement with new numbers for four PFAS compounds. HALs are non-enforceable; rather, they provide technical information that guides the officials to develop monitoring plans, determine treatment solutions, and create policies.

THE NEW NUMBERS

The HAL considers the effect of a lifetime of consumption at the levels listed below.

PFAS Compound	EPA Lifetime HAL	City of Marinette Drinking Water Sample 6-22-2022
PFOA	0.004 parts per trillion	1.5 parts per trillion
PFOS	0.02 parts per trillion	1.03 parts per trillion
GenX	10 parts per trillion	Non-detectable (Less than 0.42 parts per trillion)
PFBS	2,000 parts per trillion	Non-detectable (Less than 0.35 parts per trillion)

Through conversations with the Wisconsin DNR and the City of Marinette Water and Wastewater staff, it has been decided to include ALL detected PFAS compounds in the drinking water being distributed to the public. Results in the table below have been updated to show all PFAS compounds detected in the drinking water samples collected and analyzed.

Drinking Water Analysis:

(Bolded results indicate water distributed for human consumption)

Sample Location	Sample Date	PFOA (ppt) LOD=1.2 LOQ=3.9	PFOS (ppt) LOD=1.7 LOQ=5.3	PFHxA (ppt) LOD=1.3 LOQ=4.0	PFHpA (ppt) LOD=0.80 LOQ=2.6
Raw Drinking Water at Drinking Water Plant	11-20-2017	[2.11]	[1.87]	[2.04]	[1.04]
Finished Water at Drinking Water Plant	11-20-2017	[1.79]	Non Detectable	[2.34]	[1.03]
High School	11-20-2017	[1.81]	Non-Detectable	[3.13]	[1.05]
Hydrant Next to New REC Center	11-20-2017	[1.75]	Non Detectable	4.11	[1.07]
Raw Drinking Water from the Bay of Green Bay	12-4-2018	[3.54]	5.94	[1.8]	[1.09]
Raw Drinking Water After Carbon Addition	12-4-2018	[2.69]	[3.14]	[1.78]	[1.01]
Finished Drinking Water at Drinking Water Plant	12-4-2018	[2.08]	[1.95]	[1.66]	[1.14]
Raw Drinking Water from the Bay of Green Bay	1-3-2019	[1.87]	Non-Detectable	[1.61]	[0.89]
Raw Drinking Water After Carbon Addition	1-3-2019	[2.06]	[1.95]	[1.67]	[0.82]
Finished Drinking Water at Drinking Water Plant	1-3-2019	[2.10]	Non-Detectable	Non-Detectable	[0.86]
Raw Drinking Water from the Bay of Green Bay	4-15-2019	[1.93]	[1.96]	[1.36]	[0.99]
Raw Drinking Water After Carbon Addition	4-15-2019	[1.3]	[2.03]	[1.34]	[1.01]
Finished Drinking Water at Drinking Water Plant	4-15-2019	[1.68]	Non-Detectable	Non-Detectable	[0.86]
Raw Drinking Water from the Bay of Green Bay	7-1-2019	[1.77]	[2.06]	[1.64]	[0.93]
Raw Drinking Water After Carbon Addition	7-1-2019	[1.48]	[1.72]	[1.81]	[0.97]
Finished Drinking Water at Drinking Water Plant	7-1-2019	[1.73]	Non-Detectable	[1.98]	[1.12]

Sample Location	Sample Date	PFOA (ppt) LOD=1.6 LOQ=5.3	PFOS (ppt) LOD=2.7 LOQ=9.1	PFHxA (ppt) LOD=1.3 LOQ=4.3	PFHpA (ppt) LOD=0.57 LOQ=1.9
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Raw Drinking Water from the Bay of Green Bay	10-8-2019	[2.44]	Non-Detectable	[1.87]	[1.02]
Raw Drinking Water After Carbon Addition	10-8-2019	[1.94]	Non-Detectable	[1.48]	[0.96]
Finished Drinking Water at Drinking Water Plant	10-8-2019	[1.93]	Non-Detectable	[1.56]	[1.19]

LOD= Limit of Detection: As low as the instrument can detect.

LOQ= Limit of Quantitation: As low as the instrument can detect with 100% certainty.

ppt = parts per trillion or nanograms per liter (ng/L)

Non-Detectable = Substance was not found above laboratory limit of detection

[] = Substance was found between laboratory limit of detection and limit of quantification

Note: Not included in this report are the results for 8 other PFAS compounds that we had analyzed that have not been detected in ANY drinking water sample taken. These results for the 8 other compounds were included in the test method run at the contracted laboratory in conjunction with the PFOA and PFOS and can be obtained upon request.

Sample Location	Sample Date	PFOA (ppt) LOD=0.66 LOQ=2.2	PFOS (ppt) LOD=0.28 LOQ=0.87	PFHxA (ppt) LOD=0.54 LOQ=1.8	PFHpA (ppt) LOD=0.27 LOQ=0.89	PFNA (ppt) LOD=0.37 LOQ=1.2	PFHxS (ppt) LOD=0.28 LOQ=0.93
Raw Drinking Water from the Bay of Green Bay	2-12-2020	[1.75]	1.52	[1.25]	1.03	[0.38]	[0.626]
Raw Drinking Water After Carbon Addition	2-12-2020	[1.67]	1.57	[1.27]	[0.864]	Non-Detectable	[0.49]
Finished Drinking Water at Drinking Water Plant	2-12-2020	[1.51]	[0.862]	[1.34]	[0.849]	Non-Detectable	[0.516]

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Note: Not included in this report are the results for 12 other PFAS compounds that we had analyzed that have not been detected in ANY drinking water sample taken. These results for the 12 other compounds were included in the test method run at the contracted laboratory in conjunction with the PFOA and PFOS and can be obtained upon request.

As shown by the table above, some compounds previously not-detected are now detected and quantified in this table due to lower LOD and LOQ values. This happens due to test method development and refinement at the contracted laboratory and is normal for emerging contaminants.

Sample Location	Sample Date	PFOA (ppt) LOD=0.31 LOQ=1.0	PFOS (ppt) LOD=0.45 LOQ=1.5	PFHxA (ppt) LOD=0.41 LOQ=1.4	PFHpA (ppt) LOD=0.34 LOQ=1.1	PFNA (ppt) LOD=0.45 LOQ=1.5	PFHxS (ppt) LOD=0.53 LOQ=1.8
Raw Drinking Water from the Bay of Green Bay	5-13-2020	1.97	1.84	1.63	1.17	Non-Detectable	[0.68]
Raw Drinking Water After Carbon Addition	5-13-2020	1.90	1.79	1.71	1.15	Non-Detectable	[0.59]
Finished Drinking Water at Drinking Water Plant	5-13-2020	1.57	[1.26]	[1.22]	[0.94]	Non-Detectable	[0.60]
Raw Drinking Water from the Bay of Green Bay	9-30-2020	1.88	1.94	[1.34]	1.29	Non-Detectable	[0.69]
Raw Drinking Water After Carbon Addition	9-30-2020	2.14	1.86	[1.24]	1.25	Non-Detectable	[0.72]
Finished Drinking Water at Drinking Water Plant	9-30-2020	1.86	[0.77]	[1.21]	1.10	Non-Detectable	[0.70]

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Sample Location	Sample Date	PFOA (ppt) LOD=0.66 LOQ=2.2	PFOS (ppt) LOD=0.26 LOQ=0.87	PFHxA (ppt) LOD=0.54 LOQ=1.8	PFHpA (ppt) LOD=0.27 LOQ=0.89	PFNA (ppt) LOD=0.37 LOQ=1.2	PFHxS (ppt) LOD=0.28 LOQ=0.93
Raw Drinking Water from the Bay of Green Bay	12-30-2020	[1.55]	1.37	[1.33]	[0.84]	Non-Detectable	[0.48]
Raw Drinking Water After Carbon Addition	12-30-2020	[1.52]	1.24	[1.42]	[0.88]	Non-Detectable	[0.47]
Finished Drinking Water at Drinking Water Plant	12-30-2020	[1.42]	[0.78]	1.89	1.05	Non-Detectable	[0.46]

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Note: Not included in this report are the results for 12 other PFAS compounds that we had analyzed that have not been detected in ANY drinking water sample taken. These results for the 12 other compounds were included in the test method run at the contracted laboratory in conjunction with the PFOA and PFOS and can be obtained upon request.

As shown by the table above, some compounds previously not-detected are now detected and quantified in this table due to lower LOD and LOQ values. This happens due to test method development and refinement at the contracted laboratory and is normal for emerging contaminants.

Sample Location	Sample Date	PFOA (ppt) LOD=0.66 LOQ=2.2	PFOS (ppt) LOD=0.70 LOQ=2.30	PFHxA (ppt) LOD=1.10 LOQ=3.60	PFHpA (ppt) LOD=0.74 LOQ=2.50	PFNA (ppt) LOD=0.87 LOQ=2.90	PFHxS (ppt) LOD=0.82 LOQ=2.70
Raw Drinking Water from the Bay of Green Bay	3-30-2021	[1.16]	[1.11]	Non-Detectable	[0.83]	Non-Detectable	Non-Detectable
Raw Drinking Water After Carbon Addition	3-30-2021	[1.07]	[1.02]	Non-Detectable	Non-Detectable	Non-Detectable	Non-Detectable
Finished Drinking Water at	3-30-2021	[1.32]	[0.85]	Non-Detectable	[0.74]	Non-Detectable	Non-Detectable

Drinking Water Plant							
Raw Drinking Water from the Bay of Green Bay	6-17-2021	[1.92]	[1.89]	Non-Detectable	[1.18]	Non-Detectable	[0.89]
Raw Drinking Water After Carbon Addition	6-17-2021	[2.00]	[1.76]	[1.41]	[1.08]	Non-Detectable	[0.87]
Finished Drinking Water at Drinking Water Plant	6-17-2021	[1.96]	[1.32]	[1.25]	[1.27]	Non-Detectable	[0.91]
Raw Drinking Water from the Bay of Green Bay	9-30-2021	[2.16]	[2.05]	[1.69]	[1.08]	Non-Detectable	Non-Detectable
Raw Drinking Water After Carbon Addition	9-30-2021	[2.04]	[1.94]	[1.85]	[1.17]	Non-Detectable	Non-Detectable
Finished Drinking Water at Drinking Water Plant	9-30-2021	[1.83]	[1.20]	[1.47]	[1.06]	Non-Detectable	Non-Detectable
Raw Drinking Water from the Bay of Green Bay	12-9-2021	[1.75]	[1.91]	[1.18]	[0.88]	Non-Detectable	Non-Detectable
Raw Drinking Water After Carbon Addition	12-9-2021	[1.73]	[1.91]	[1.17]	[0.92]	Non-Detectable	Non-Detectable
Finished Drinking Water at Drinking Water Plant	12-9-2021	[1.77]	[1.01]	[1.20]	[0.90]	Non-Detectable	Non-Detectable

Raw Drinking Water from the Bay of Green Bay	4-6-2022	[1.65]	[1.62]	Non-Detectable	[0.90]	Non-Detectable	Non-Detectable
Raw Drinking Water After Carbon Addition	4-6-2022	[1.67]	[1.29]	[1.13]	[1.01]	Non-Detectable	Non-Detectable
Finished Drinking Water at Drinking Water Plant	4-6-2022	[1.62]	[1.14]	Non-Detectable	[1.01]	Non-Detectable	Non-Detectable

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[] = Substance was found between laboratory limit of detection and limit of quantification

Note: Not included in this report are the results for 12 other PFAS compounds that we had analyzed that have not been detected in ANY drinking water sample taken. These results for the 12 other compounds were included in the test method run at the contracted laboratory in conjunction with the PFOA and PFOS and can be obtained upon request.

As shown by the table above, some compounds previously not-detected are now detected and quantified in this table due to lower LOD and LOQ values. This happens due to test method development and refinement at the contracted laboratory and is normal for emerging contaminants.

Sample Location	Sample Date	PFOA (ppt) LOD=0.51 LOQ=1.70	PFOS (ppt) LOD=0.25 LOQ=0.82	PFHxA (ppt) LOD=0.72 LOQ=2.40	PFHpA (ppt) LOD=0.61 LOQ=2.00	PFNA (ppt) LOD=0.27 LOQ=0.91	PFHxS (ppt) LOD=0.19 LOQ=0.62	PFBS (ppt) LOD=0.35 LOQ=1.20
Raw Drinking Water from the Bay of Green Bay	6-22-2022	1.78	1.71	[1.44]	[0.88]	[0.28]	[0.56]	Non-Detectable
Raw Drinking Water After Carbon Addition	6-22-2022	1.78	1.64	[1.47]	[0.94]	[0.32]	[0.56]	[0.36]
Finished Drinking Water at	6-22-2022	[1.50]	1.03	[1.36]	[0.82]	Non-Detectable	[0.40]	Non-detectable

Drinking Water Plant								
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ppt = parts per trillion or nanograms per liter (ng/L)

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[] = Substance was found between laboratory limit of detection and limit of quantification

Note: Not included in this report are the results for 11 other PFAS compounds that we had analyzed that have not been detected in ANY drinking water sample taken. These results for the 12 other compounds were included in the test method run at the contracted laboratory in conjunction with the PFOA and PFOS and can be obtained upon request.

As shown by the table above, some compounds previously not-detected are now detected and quantified in this table due to lower LOD and LOQ values. This happens due to test method development and refinement at the contracted laboratory and is normal for emerging contaminants.

Biosolids Analysis:

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

Note: Not included in this report are the results for other PFAS compounds that we had analyzed that do not have a health advisory limit set forth by any regulatory agency. These results were included in the test method run at the contracted laboratory in conjunction with the PFOA and PFOS and can be obtained upon request.

For more information regarding PFAS in the environment please visit <https://www.epa.gov/pfas> as well as <https://dnr.wisconsin.gov/topic/pfas>.